

In an age where digital systems allow rapid production of 2D/3D maps and models at scales selected and required by the user, is there a place for an applied national engineering geological map of the UK? **Marcus Dobbs, Helen Reeves, Kevin Northmore and David Entwisle** discuss why the engineering geological map of the UK is so important.

# Engineering geology maps of the UK

School and university students of geology, engineering geology and geotechnical engineering generally have less knowledge of engineering geological conditions than those who have had experience of hands-on research or practice. In the UK, the number of geology, geoscience and earth science departments has reduced over the past 25 years. Engineering geology has a very weak academic base and geology is taught less to civil engineering students than previously.

In 1996/7, the BGS collaborated with Professor William ('Bill') Dearman to develop a small-scale engineering geological map of the UK. The initial interpretation was completed but, unfortunately, the map was never published. In late 2008 it was decided to revive the original interpretation and to apply it to the new digital versions of the 1:625 000 scale geological maps. This has resulted in the production of two engineering geological maps, one for bedrock and one for superficial deposits. Sadly, Professor Dearman died in early 2009 before the maps were completed; they are dedicated to him in celebration of the significant achievements he made to engineering geology in the UK and internationally.

The new engineering geological maps are attributed with 'engineering geological map units', each of which may comprise one or more separate 'engineering geological lithologies', which are independent of stratigraphy and based on the physical properties (e.g. strength,

grain size etc.) of the geological units. To enhance this engineering classification a system of stripes has been used, particularly for the bedrock geology, as a means of displaying the relative proportions of engineering geological lithologies present within each map unit. For example, the Cretaceous Hastings Beds, which consist of interbedded sands and clays are classed as 'fine soil' and 'coarse soil' in the proportion 1:1, represented on the map as alternating, coloured stripes of equal width; the separate colours representing each engineering geological lithology.

Additionally, included with each map is a detailed key which contains a description of each engineering geological lithology and information on engineering geological considerations, including suitability for foundations, excavatability, use of material as engineered fill, and appropriate ground investigation approaches. The classes shown on the key are based on those used in the BGS applied engineering



*Geology isn't always taught as a significant part of civil engineering degrees and postgraduate courses. The new 1:1 million map shows the engineering considerations which are most affected by geology. For example, for foundations it gives descriptions about compressibility of the natural materials, factors likely to influence the design of shallow foundations, or whether piling to a firmer horizon and stronger material is necessary.*

geological maps (particularly for the Bradford Metropolitan District) to provide information for civil engineers and planners to aid future development

and redevelopment of urban areas in the UK. In addition, the maps also include a number of very small scale inset maps, text boxes and schematic diagrams. These cover topics such as landslides, shrink/swell clays, seismicity, undermining, and potential sulphate hazard. The purpose of these is to illustrate aspects of engineering geology that have a significant impact upon land use and development but could not be incorporated into the main map.

In an age when digital systems allow a range of 2D, 2.5D and 3D maps and models to be produced with comparative ease, the preparation of a national engineering geological map of the UK may seem to be a dated concept. These maps however, have an important role to play in bridging the educational gap that is starting to develop, due the reduction in the practical teaching of engineering geological concepts and principals. This is especially the trend in the field-based training in engineering geology

and geotechnical engineering for civil engineering undergraduate and postgraduate students. Once these young graduate students are working in practice they are expected to have an extensive understanding of geological ground conditions of the UK. The engineering geology map of the UK will provide some of the information to help them learn and assess this.

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*It is planned that the two UK engineering geological maps — superficial deposits (left) and bedrock (right) — will be made available as free website downloads intended for undergraduates and postgraduates from geoscience, civil engineering and environmental sciences. The pdf maps can be printed at the original scale (1:1 000 000) or smaller. In addition, paper copies will be made available to geoscience and civil engineering departments, and to consultants, contractors and other professional organisations to be displayed in laboratories, common rooms and offices. In this way, engineering geology will be brought to the attention of students and less experienced professionals on a regular basis.*