British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

New geological models from the British Geological Survey

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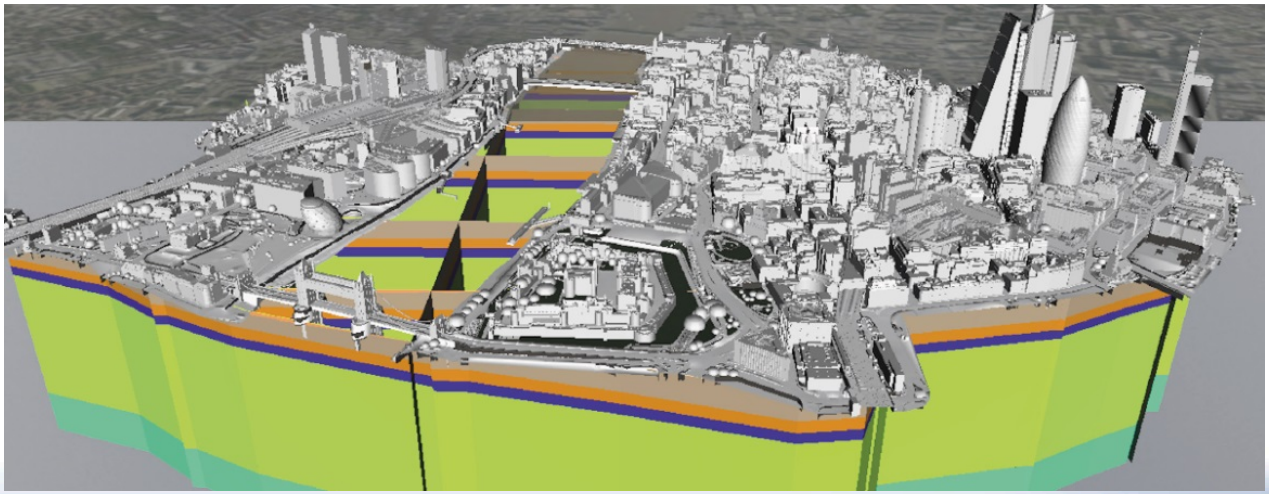


8th EUREGEO Barcelona | Catalonia | Spain june 15th - 17th 2015

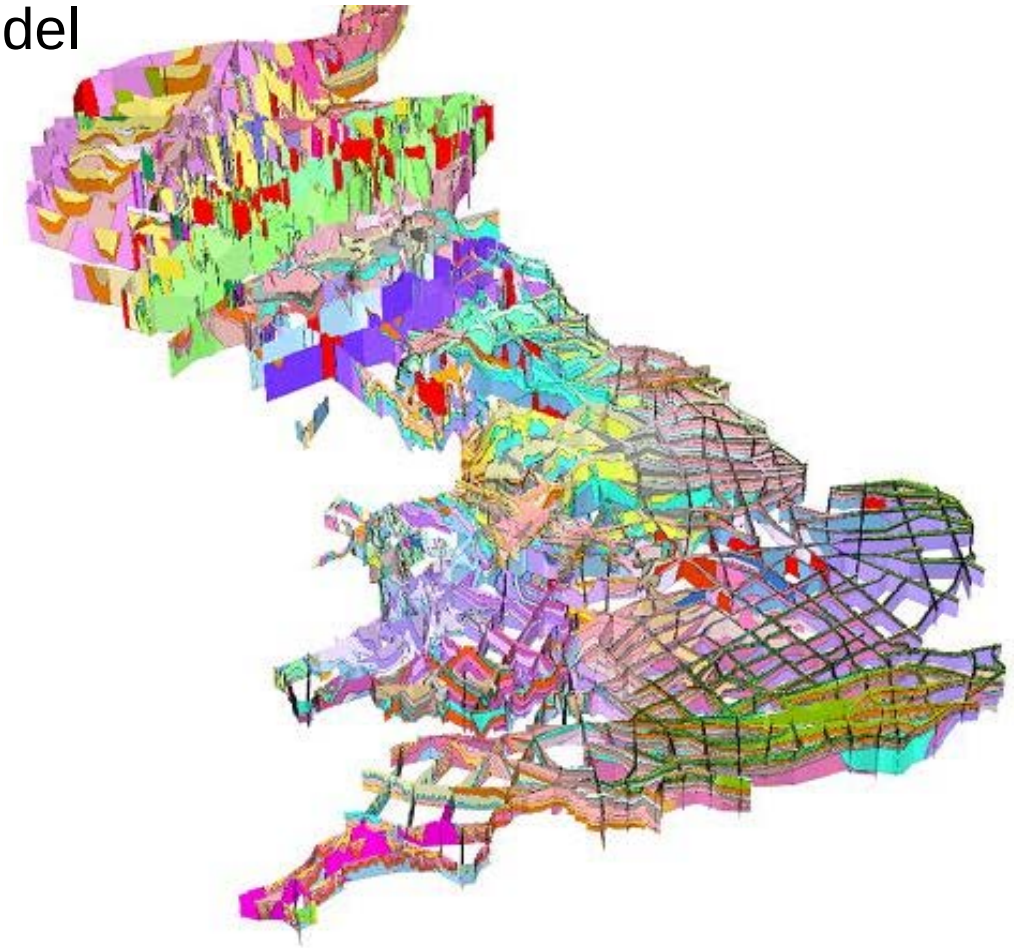
Freistaat Bayern

RegioneEmiliaRomagna

City Model courtesy of ARUP

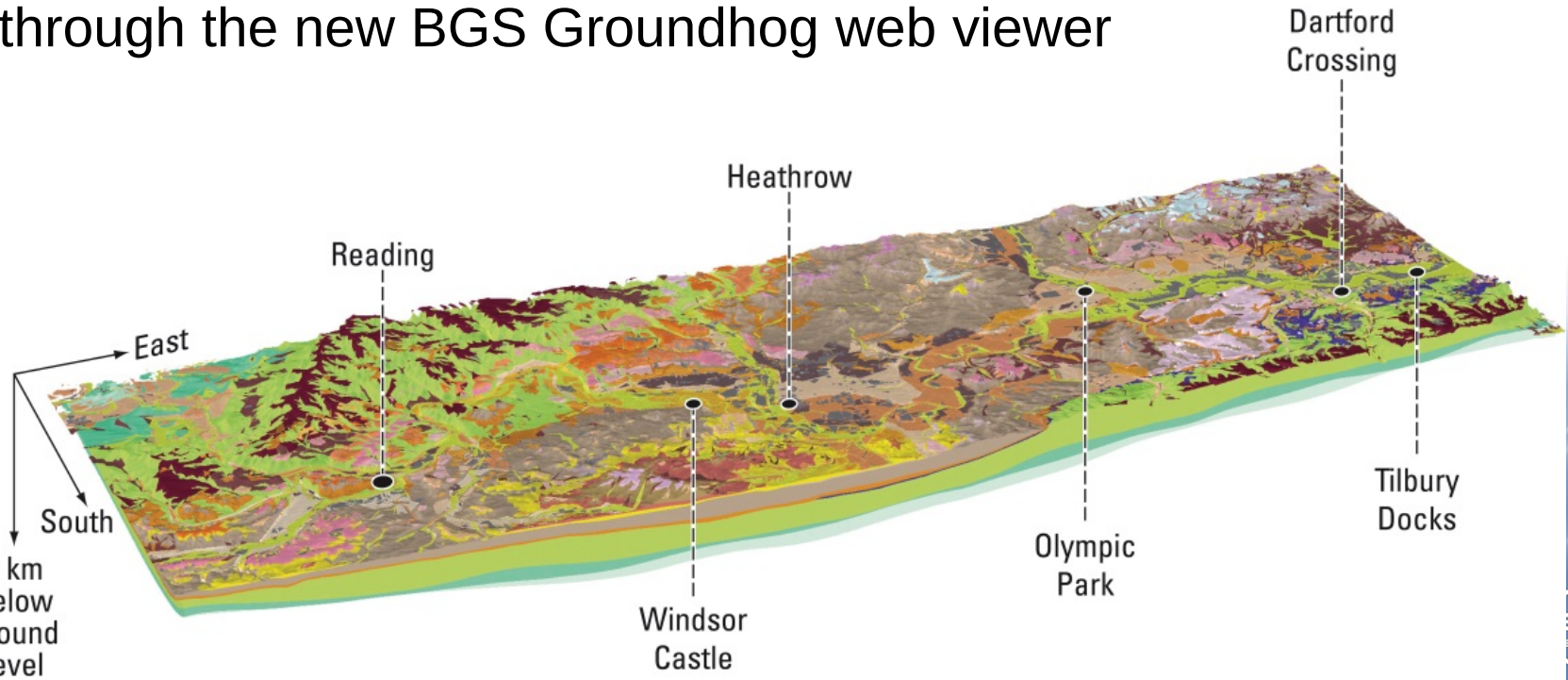
Introduction

- The London and Thames Valley model
- The National Geological Model
- Delivering models
- Conclusion

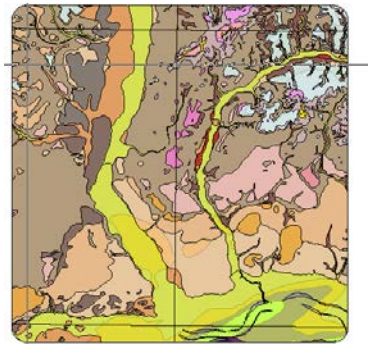


The London and Thames Valley model

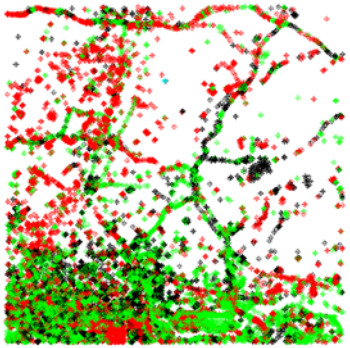
- Modelled area: 4,800km^2 to c.500m depth
- 70 bedrock and superficial geological units modelled, plus artificial ground and mass movement deposits
- Attributed with engineering and hydrogeological properties
- Modelled Revised fault network
- Delivered as standard file types (vector, raster etc.) and also through the new BGS Groundhog web viewer



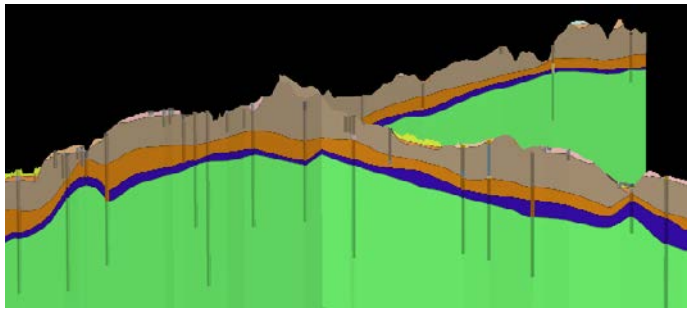
Building the model



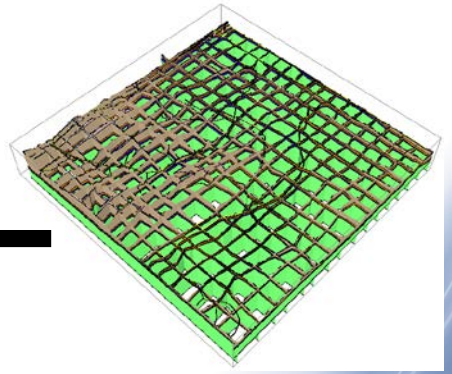
Map and DTM



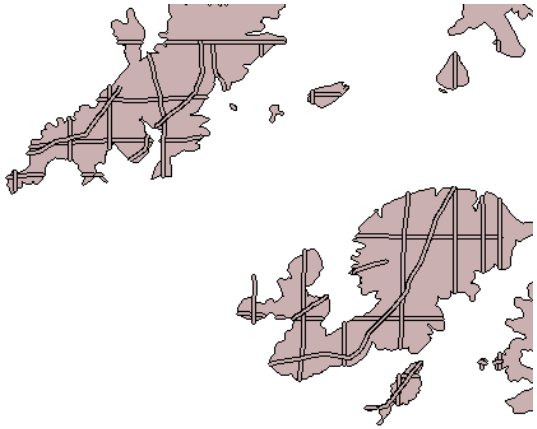
Boreholes



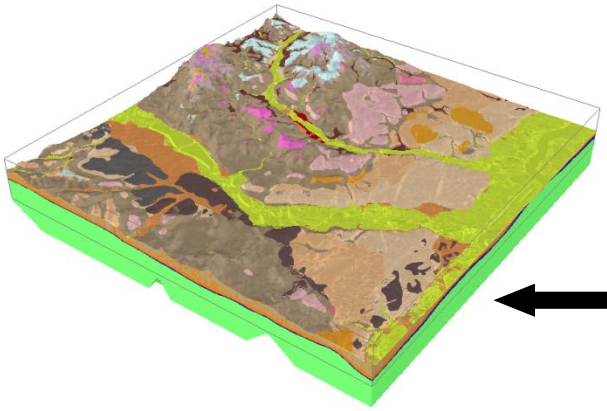
Cross-sections



Fence diagram

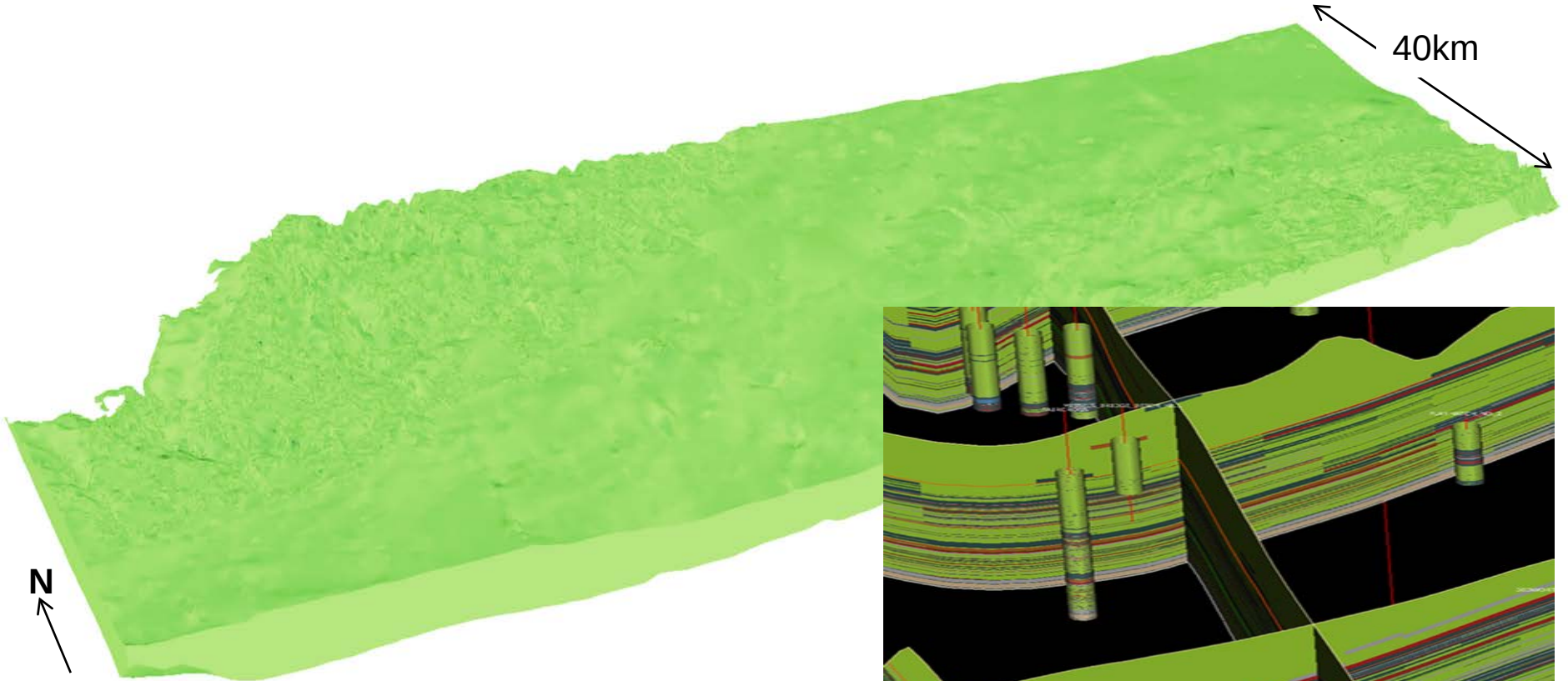


Unit distribution



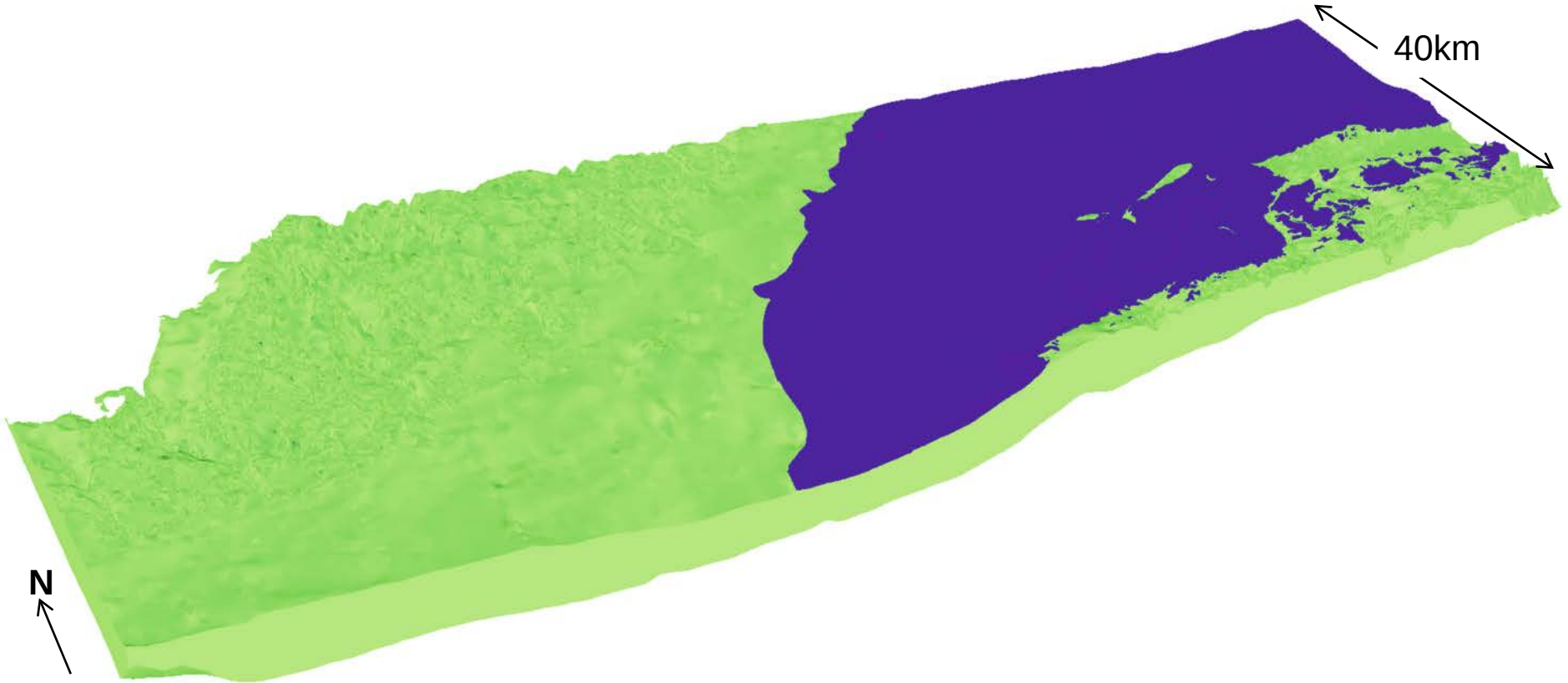
Geological Block model

1 Chalk



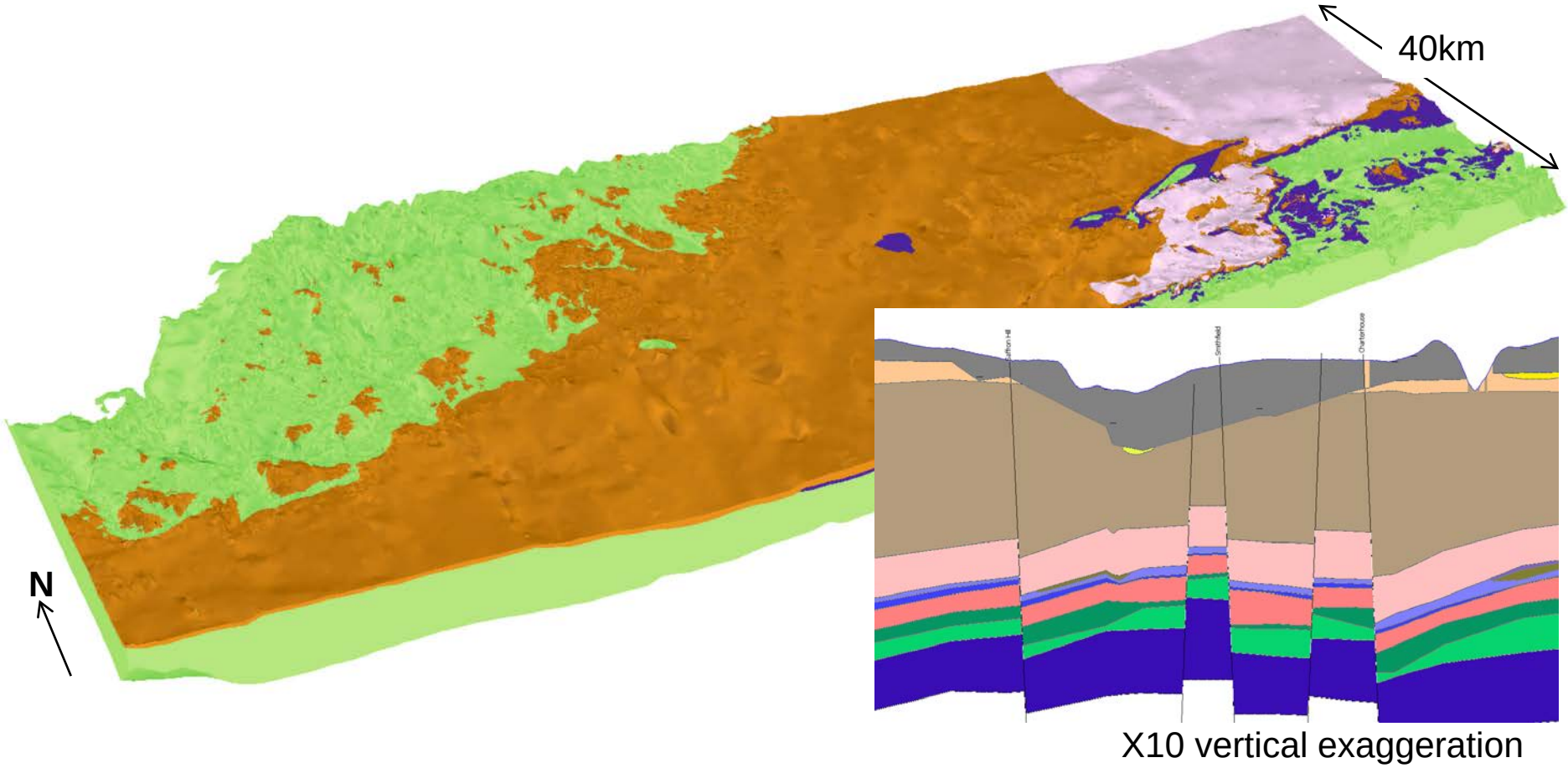
X10 vertical exaggeration

2 Thanet Formation subcrop (royal blue)



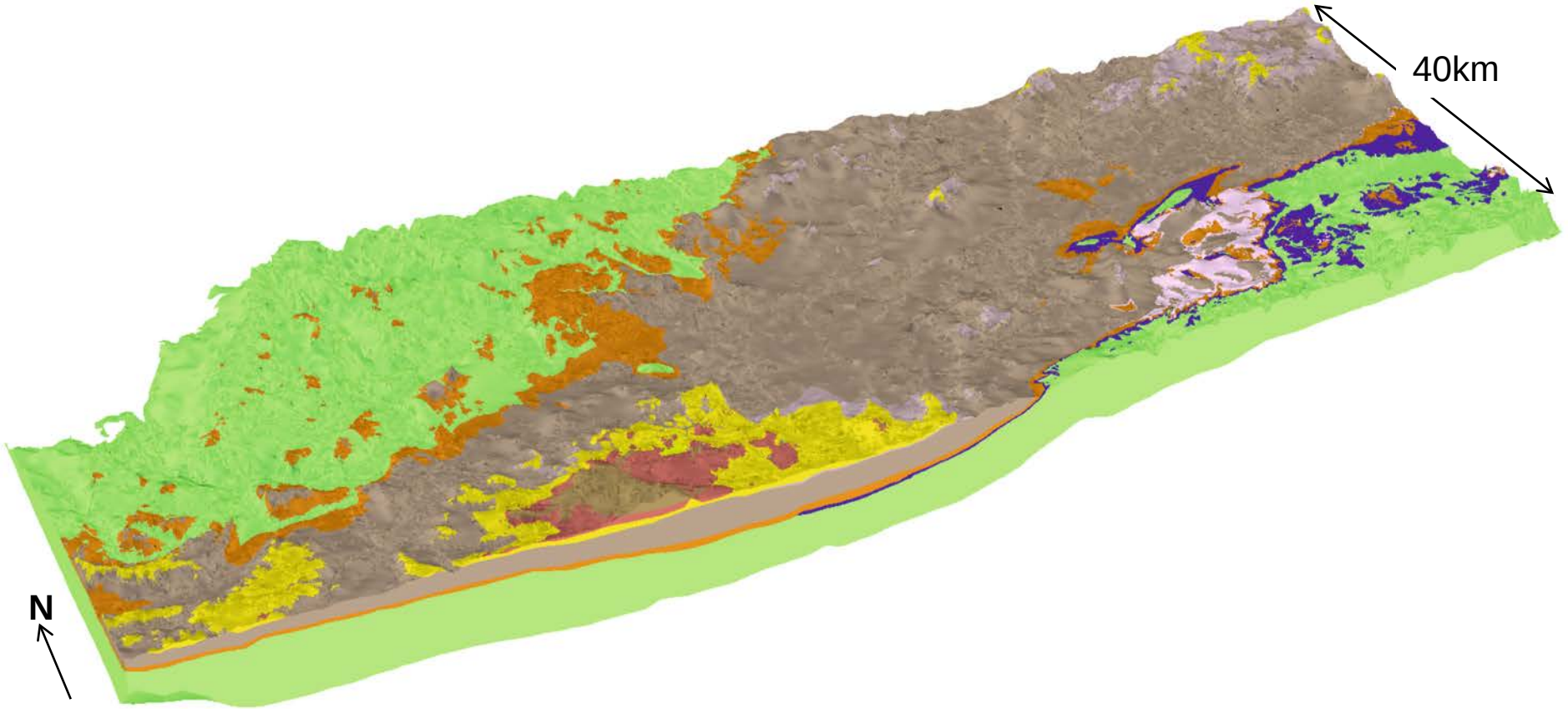
X10 vertical exaggeration

3 Harwich Formation (pink) and Lambeth Group (ochre)



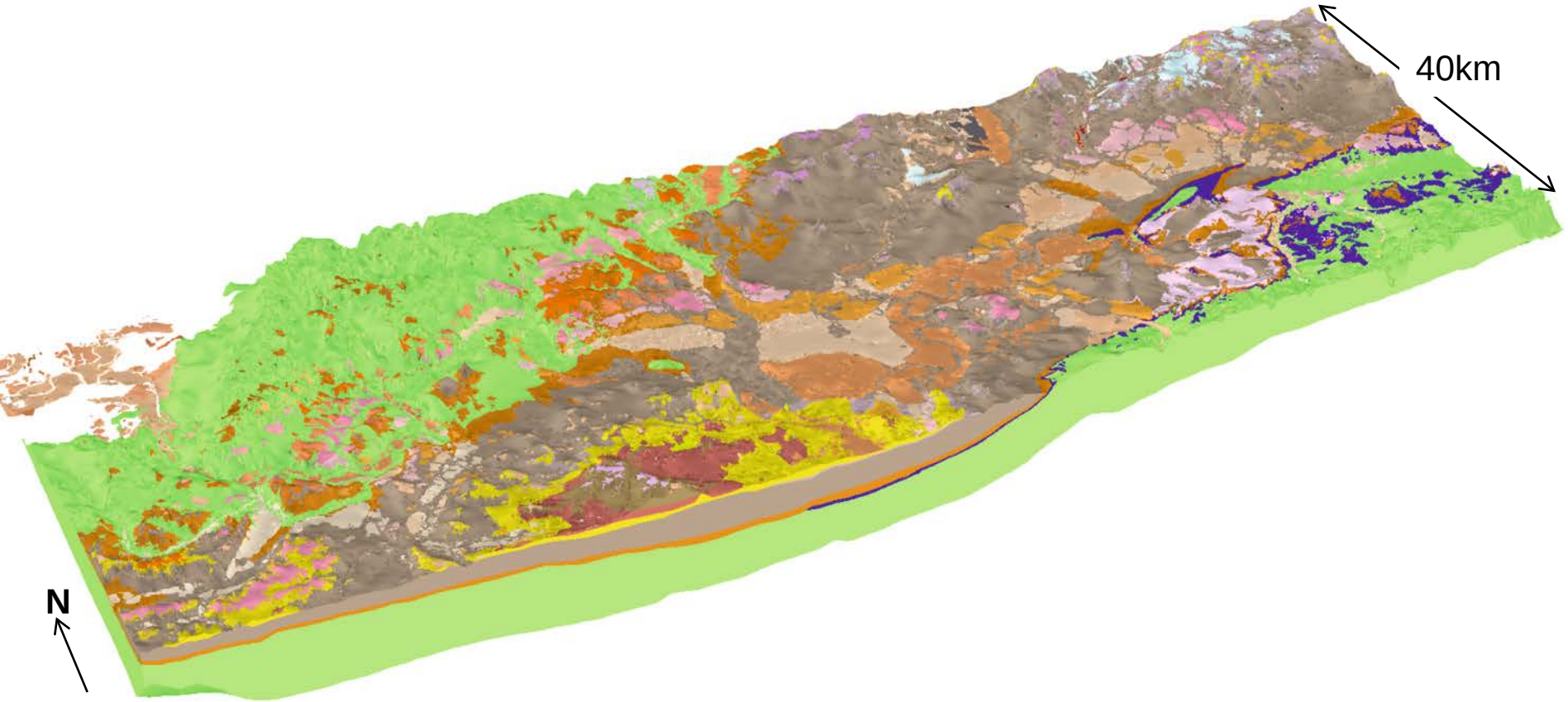
X10 vertical exaggeration

5 Bedrock geology at rockhead (all Quaternary removed)



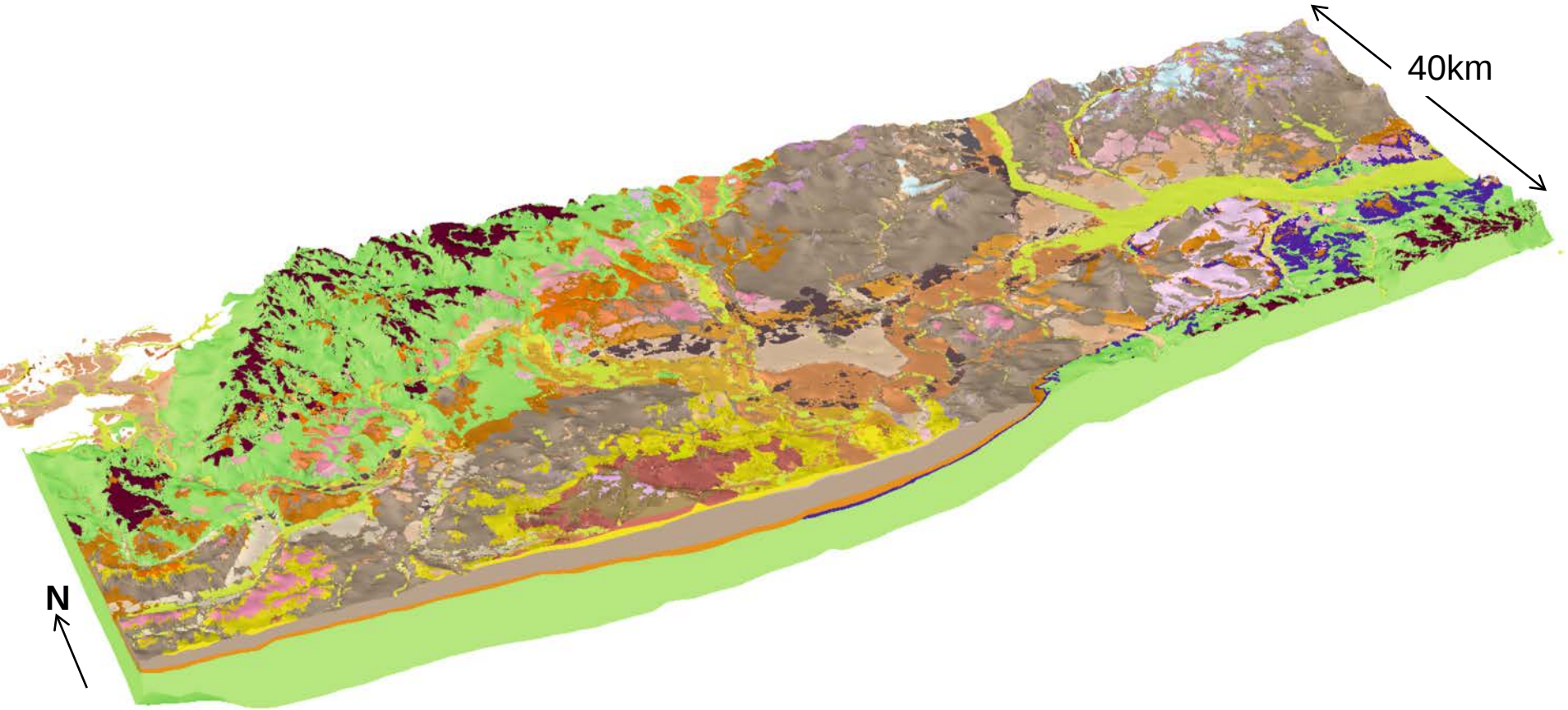
X10 vertical exaggeration

6 Quaternary deposits – most terrace gravel units and glacial deposits



X10 vertical exaggeration

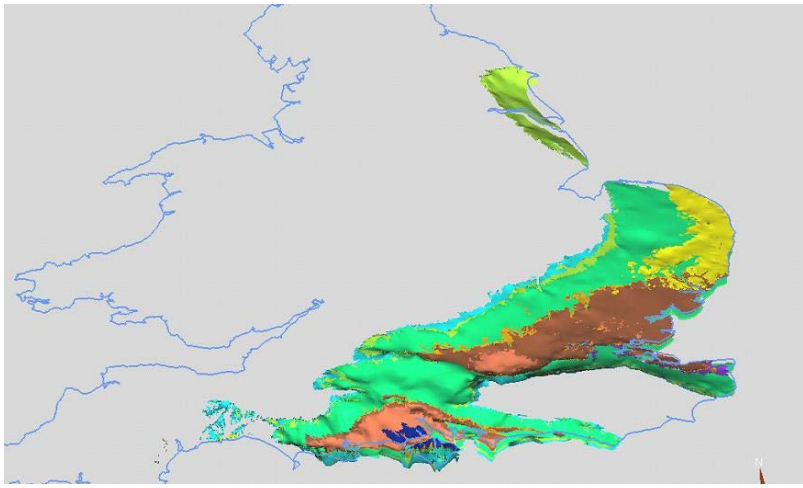
7 All geological units



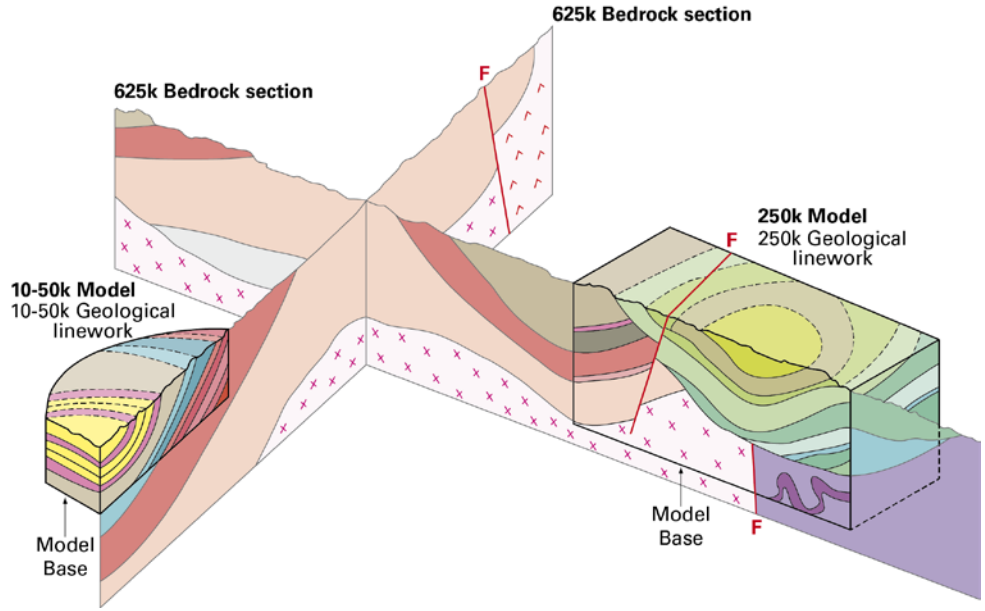
X10 vertical exaggeration

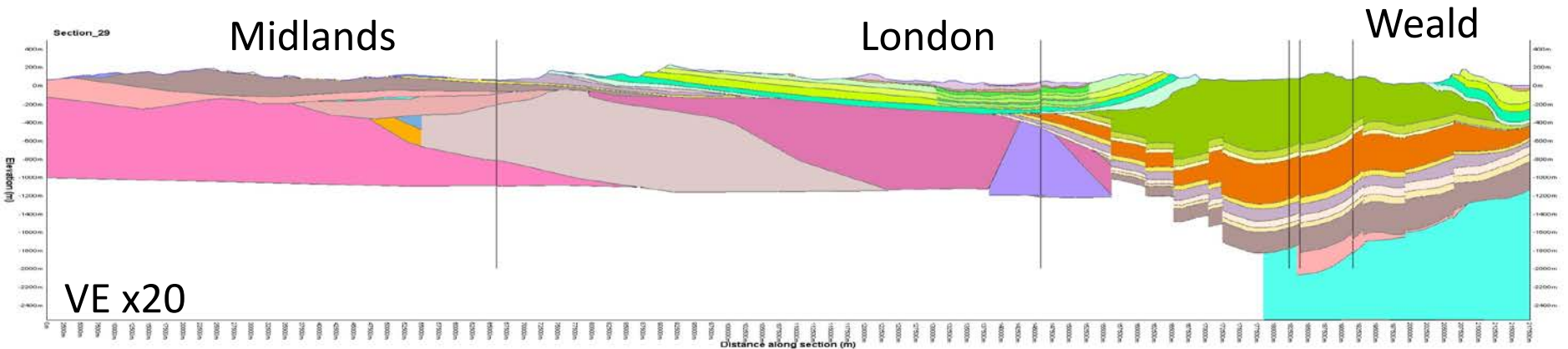
The National Geological Model

- >200 Sections, >30,000 line km
- All existing models and 305 deep boreholes considered
- Depth ranging from min 1.5 to 6 km
- Multi-scaled
- Co-funded by the Environment Agency and Nuclear Decommissioning Authority
- Calculates to base Permian
- Available on the BGS website



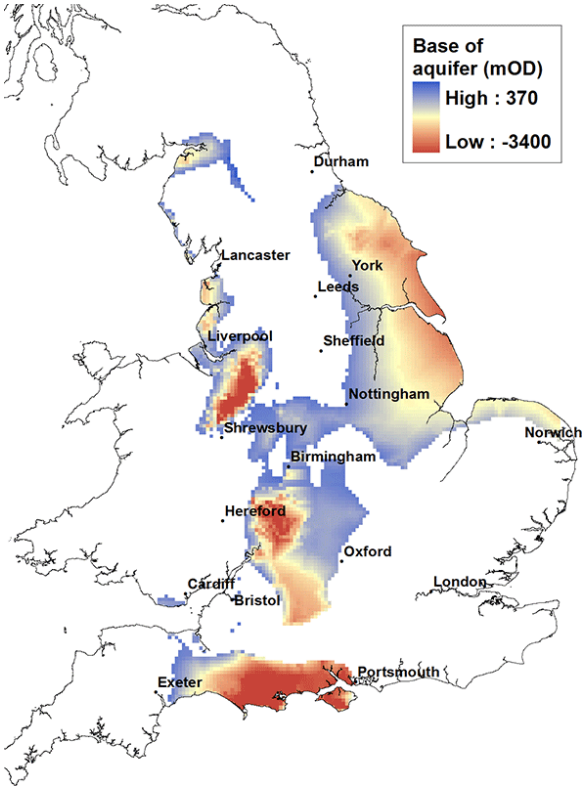
The concept of a multi-scaled model





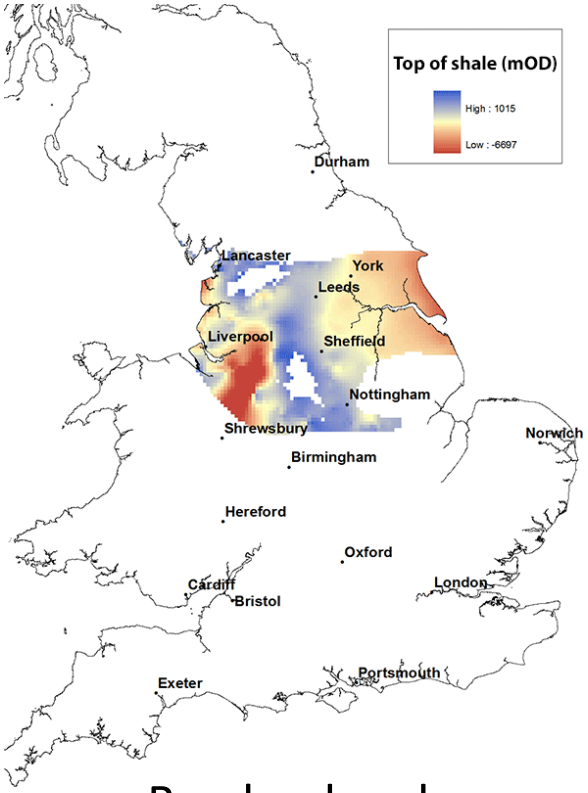
Using the National Geological Model

Aquifer occurrence



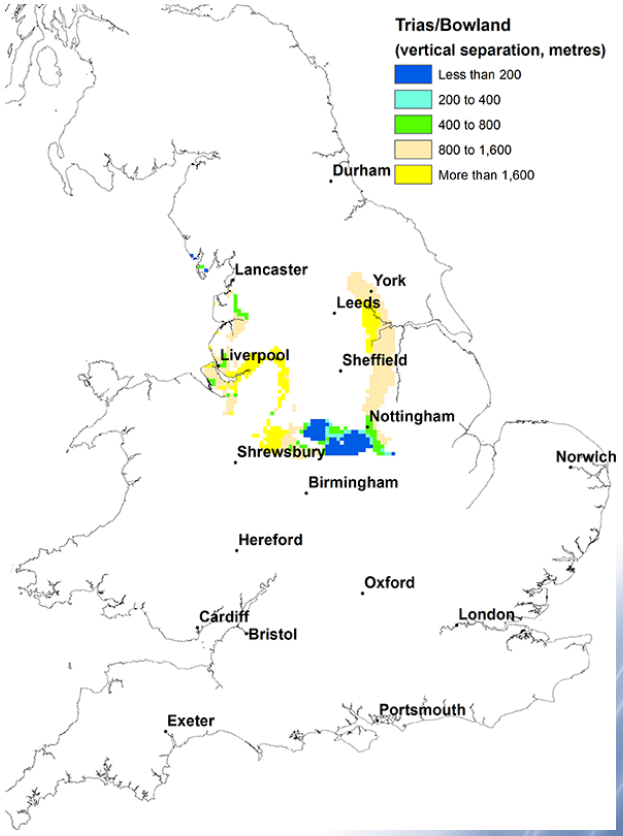
Triassic sandstone aquifer coverage

Shales occurrence



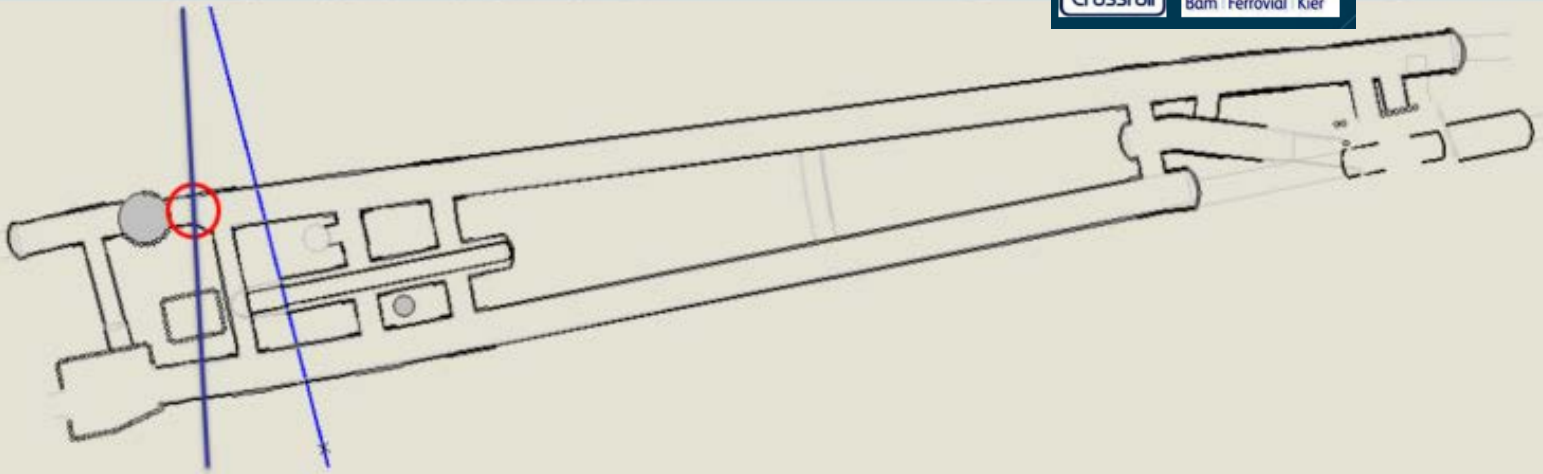
Bowland and Craven Groups

Shale-aquifer separation

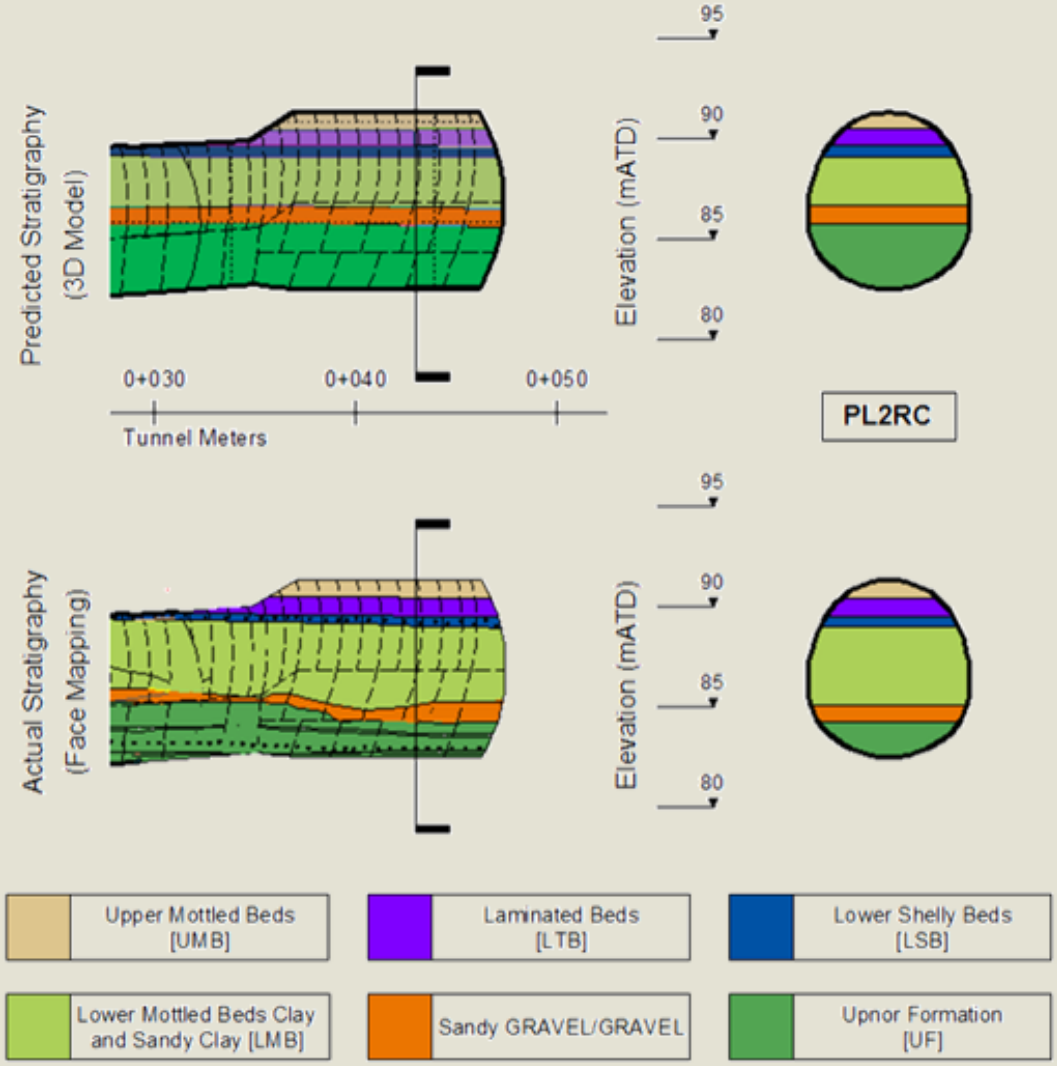


Working with others – London Crossrail

Integrating tunnel excavation data

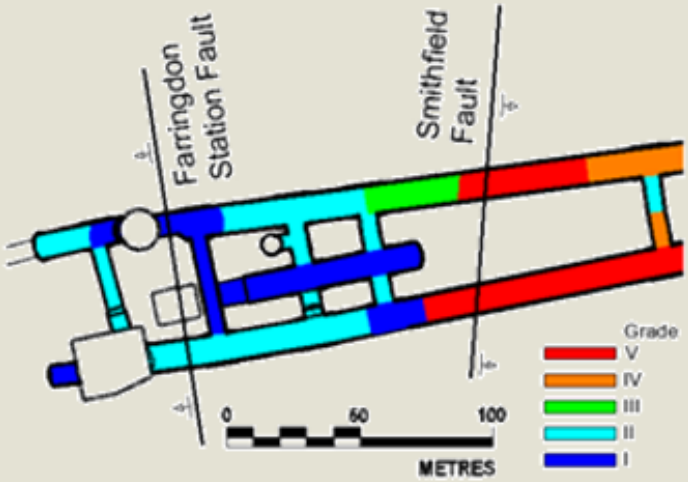


Case Study: Wraparound PL2RC

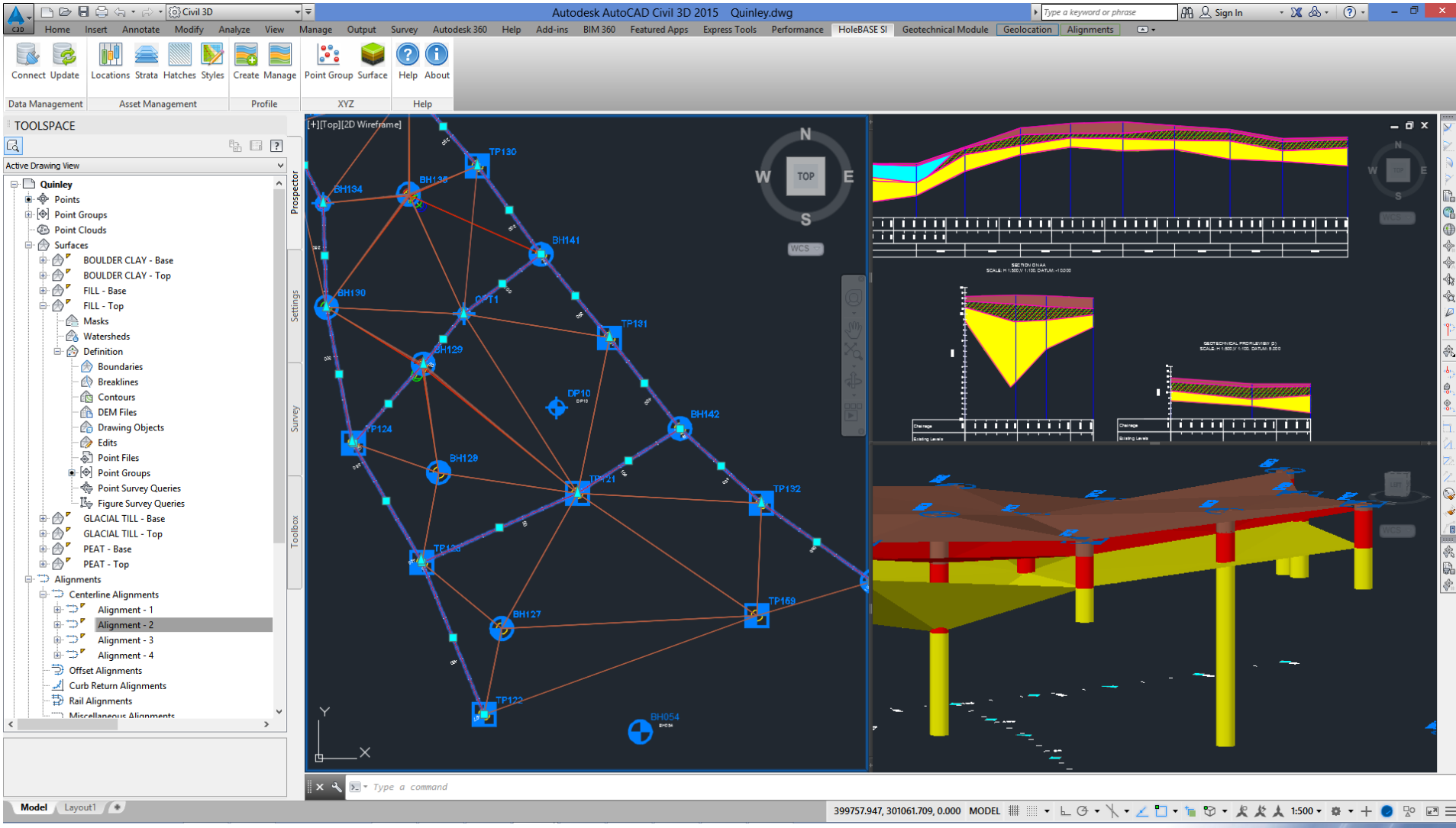


Design phase

Construction Phase



Direct access to models inside industry software



http://www.keynetix.com/holebasesi/keynetix-and-bgs-to-develop-bim-for-the-subsurface

Web based access - professional reports

Geological models

A geological model is a virtual representation of the geology in three dimensions. Geological models can provide information on geological unit surface elevations or thicknesses and can be queried to generate synthetic boreholes and vertical and horizontal cross-sections.

Geological models are created by geologists using geological data and expert knowledge. Data such as borehole records, geophysics, field observations and digital terrain models are interpreted and the conceptual geological understanding is captured via geological cross sections, geological maps and/or point interpretations that describe a surface. The 3D geological model is created by interpolation between all interpreted points.

The accuracy of the geological model is dependent on, for example, the data density, the prevailing understanding of the geology at the time of modelling and the geological complexity. The geological map herein indicates the sites of borehole records considered by the geologist and also the locations of interpreted cross sections; the density of these around the area of interest provides an indication of uncertainty.

Limitations

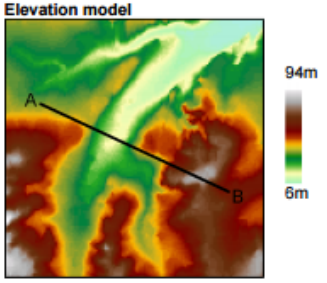
The quality of observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, improved databases and modelling software, and better access to sampling locations. The top surface of the geological model is constrained by the digital terrain model; this may contain artefacts and may have been sub-sampled at a lower resolution and thus minor mismatches between geomorphological features and modelled units may occur.

The information herein should not be used as a replacement for site investigation. For further information on the limitations of modelling in this area, see the relevant metadata report available from enquiries@bgs.ac.uk and view the current terms and conditions at http://shop.bgs.ac.uk/Groundhog. For comprehensive information of the geology at this point, please use our BGS GeoReports Service at http://shop.bgs.ac.uk/GeoReports/.

Feedback

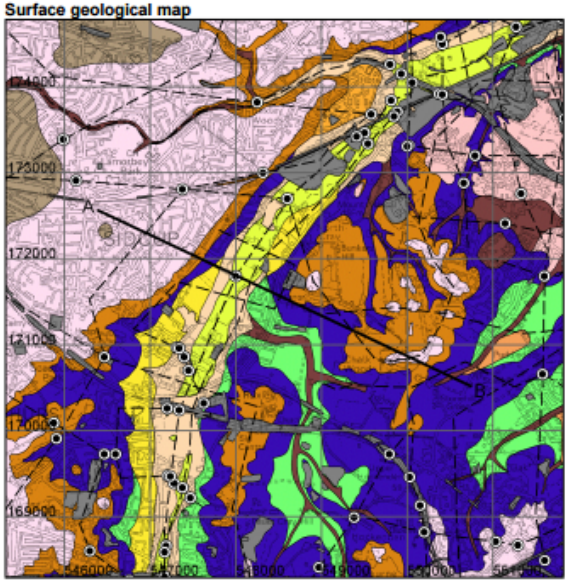
To improve geological models your feedback is essential. Please contact enquiries@bgs.ac.uk if your site investigations yield data that could improve our interpretations.

Elevation model



© NEXTMap Britain elevation data from Intermap Technologies

Surface geological map

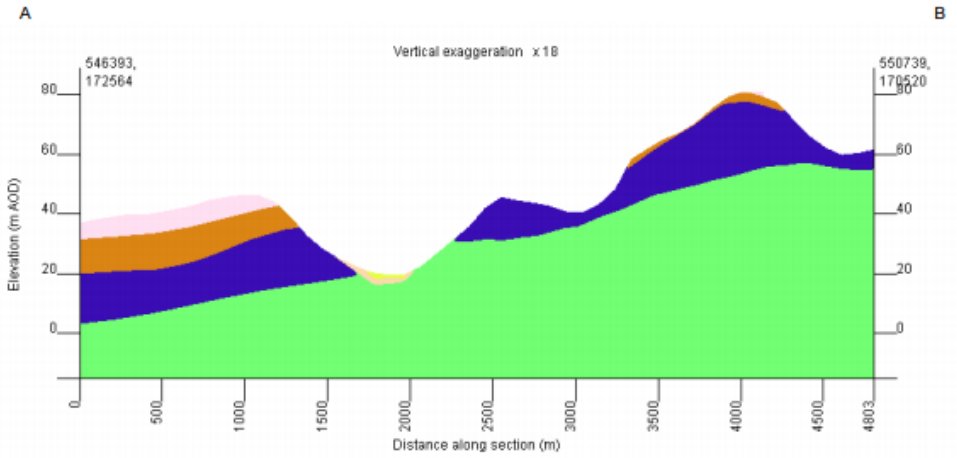


Legend

- Worked Ground (Void)
- Made Ground (Variable composition)
- Infilled Ground (Variable composition)
- Landscaped Ground (Variable composition)
- Alluvium (Clay, Silty, Sandy, Gravelly)
- River Terrace Deposits (Gravel, Sandy)
- Head (Clay, Silty, Sandy, Gravelly)
- Crayford Silt Formation (Silt, Sandy)
- Taplow Gravel Formation (Gravel, Sandy)
- Lynch Hill Gravel Formation (Gravel, Sandy)
- Boyn Hill Gravel Formation (Gravel, Sandy)
- London Clay (Clay, Silty, Sandy)
- Harwich Formation (Sand, Gravelly)
- Lambeth Group (Clay, Silty, Sandy, Gravelly)
- Thanet Sand Formation (Sand)
- Chalk Formation, undifferentiated (Chalk)
- Gault and Upper Greensand Formations (Mudstone, Sandstone and Limestone)
- Lower Greensand Formation (Sandstone and Mudstone)
- Wealden and Jurassic strata, undifferentiated (Mudstone, sandstone and limestone)

Borehole record
Interpreted cross section
Synthetic cross section

Geological cross section



British Geological Survey
NERC

Sidcup to Hextable

Report ID: GH_100074/134

Model: London and Thames Valley geological model

Regional geological model originally created by H Burke, S Mathers, J Ford, R Terrington, S Thorpe, P Williamson. Model released: 2014.

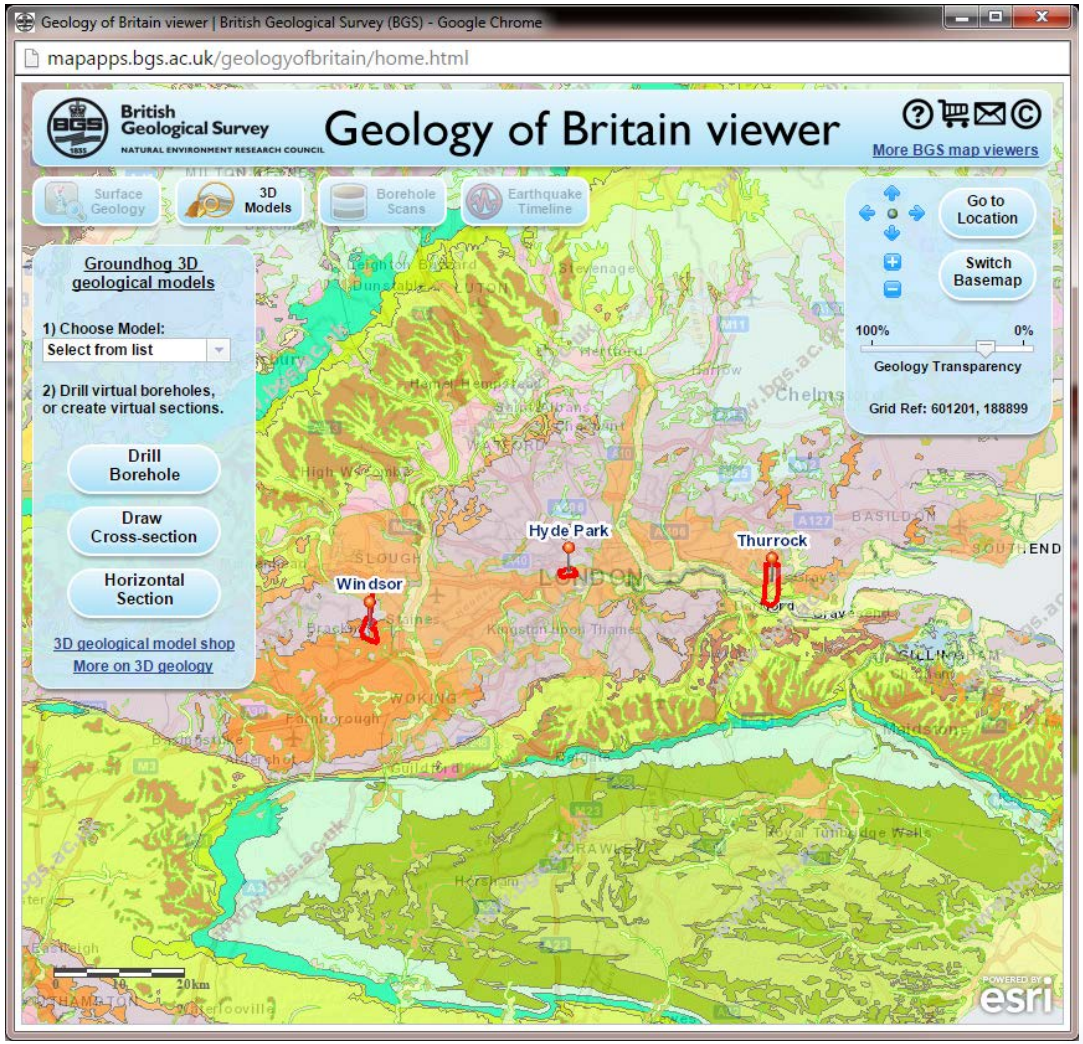
The information on this map sheet, including the surface geological map and the synthetic cross section, is derived from the National Geological Model. Geological models provide an indication of reality; alternative interpretations of the same data are possible. The surface geological map is based on the published geological map, with revisions based on new interpretations and may therefore differ from published geological maps and products. Truncation of the lowest unit in the cross section does not necessarily denote its basal depth. Heights are in metres.

Deposits of artificial ground, head and clay with flints typically form thin veneers and whilst they are present on the surface map, they may be absent in the synthetic borehole or section.

Boreholes shown on the map were considered during the construction of the geological model. The original borehole records can be viewed at http://shop.bgs.ac.uk/Groundhog.

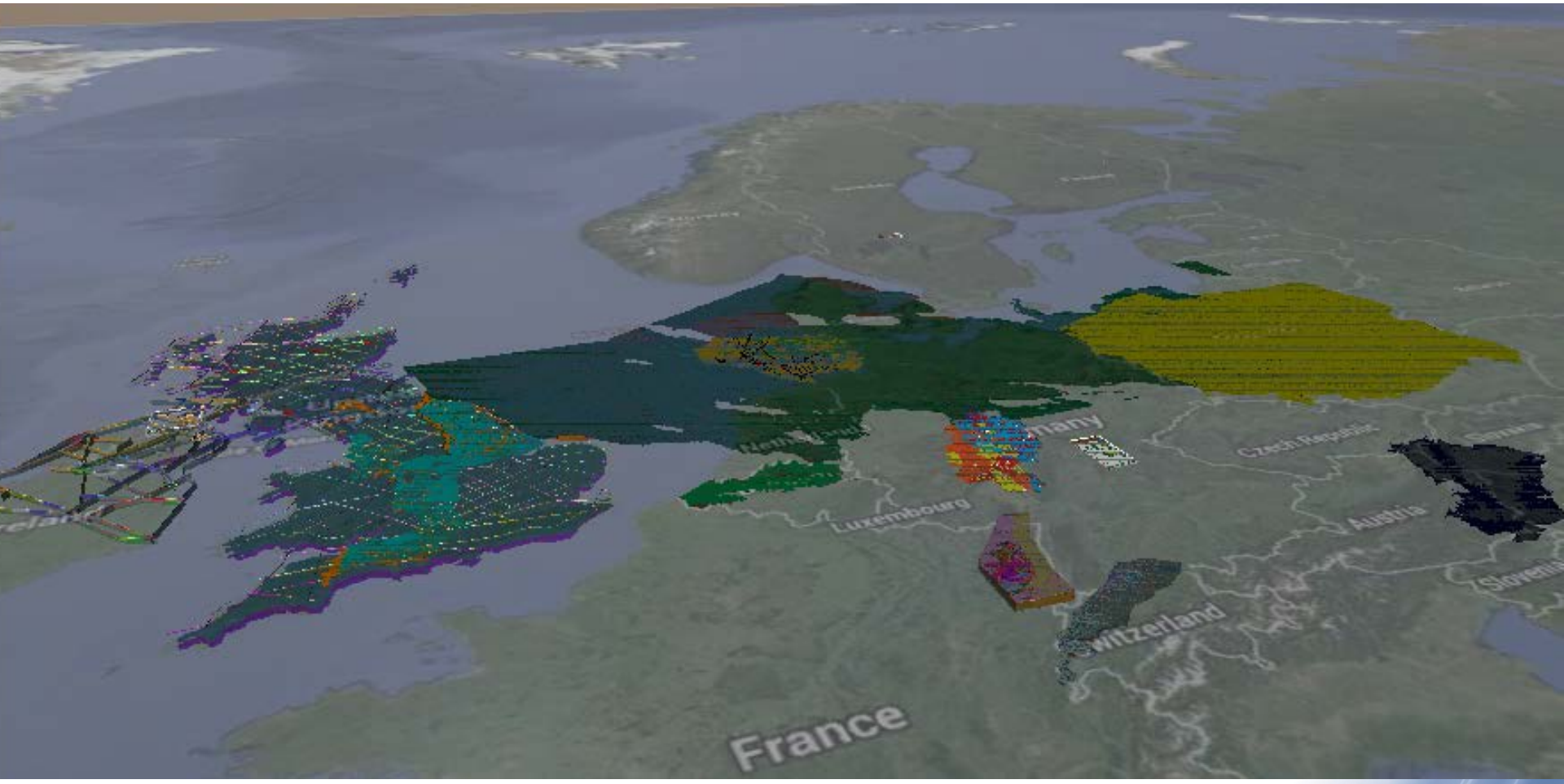
https://shop.bgs.ac.uk/Groundhog/

Geology of Britain Viewer free and open data

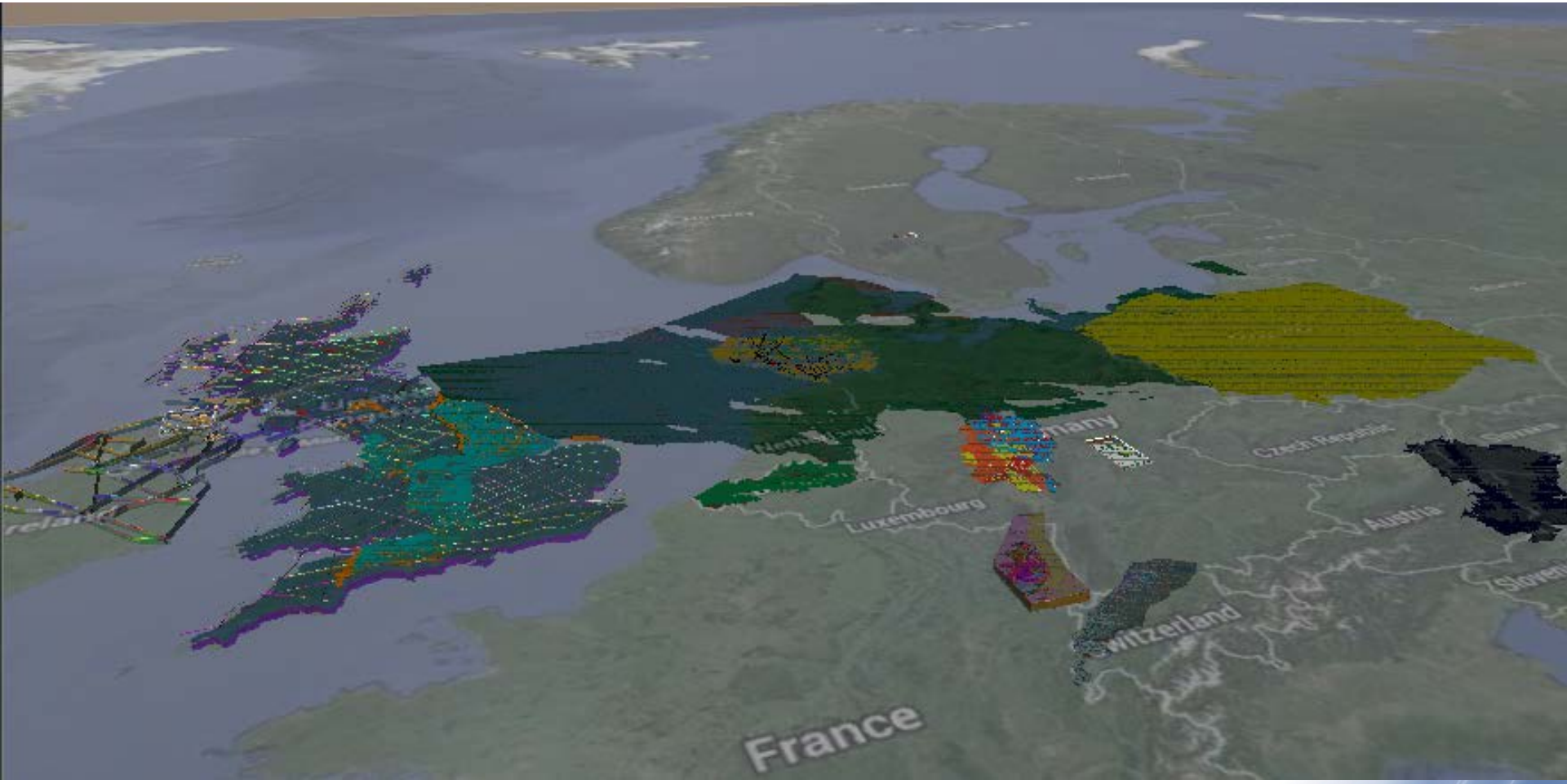


http://mapapps.bgs.ac.uk/geologyofbritain/home.html

And also - don’t forget to have some fun



Most importantly: keep on modelling!



Thank you