British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

Construction and application of the London and Thames Valley 3D model

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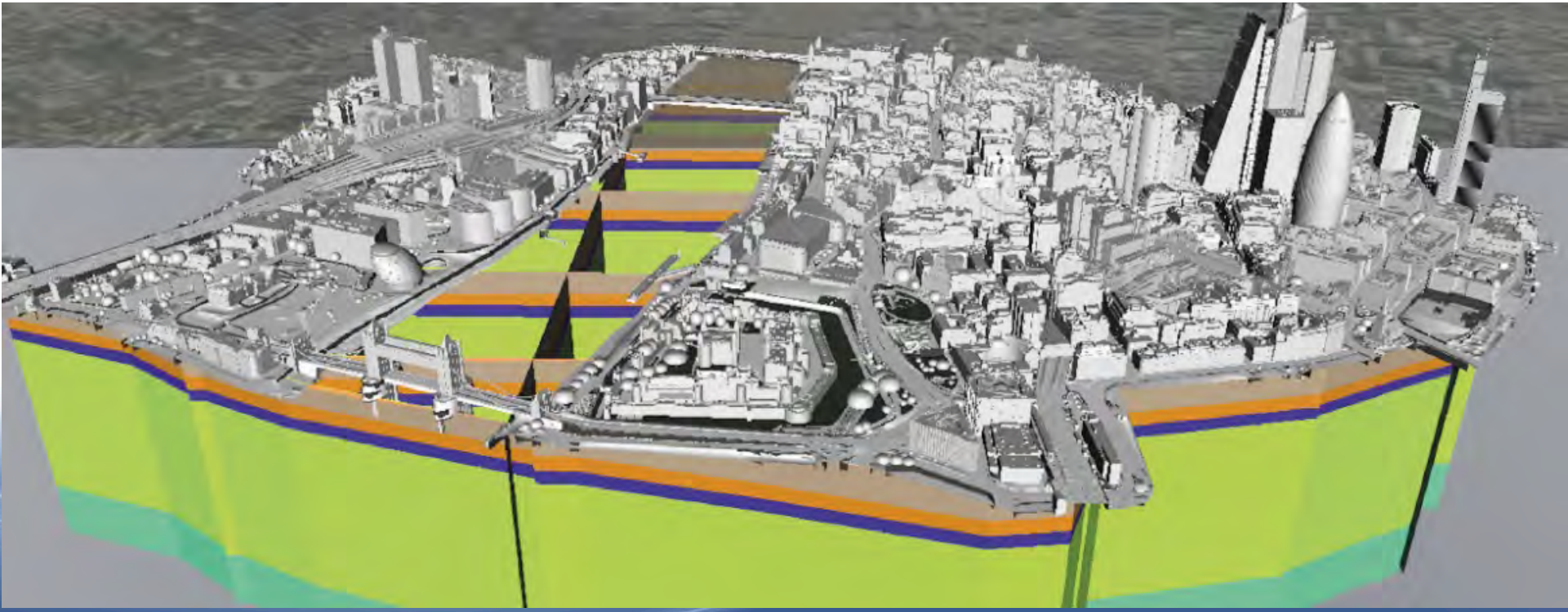
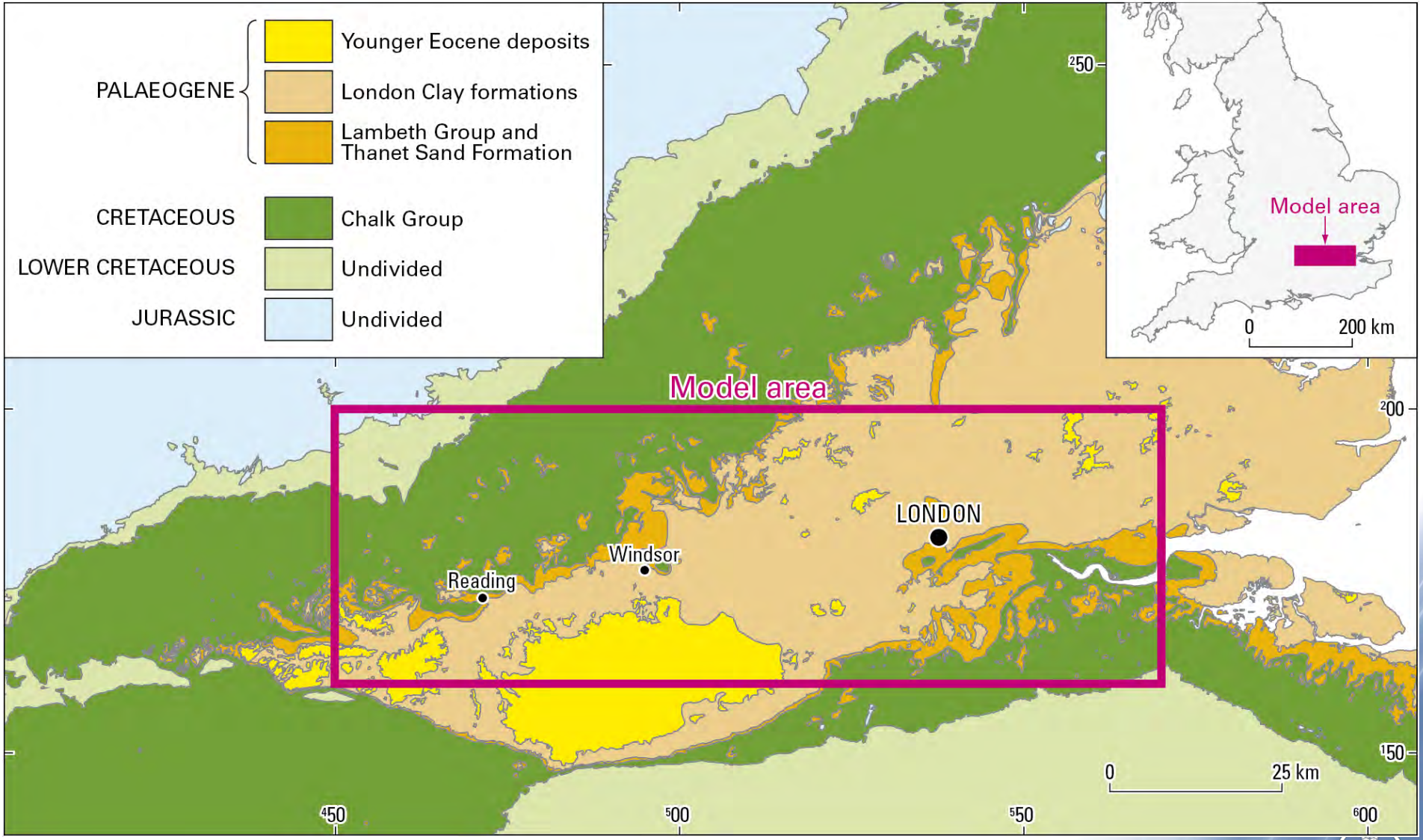


Introduction

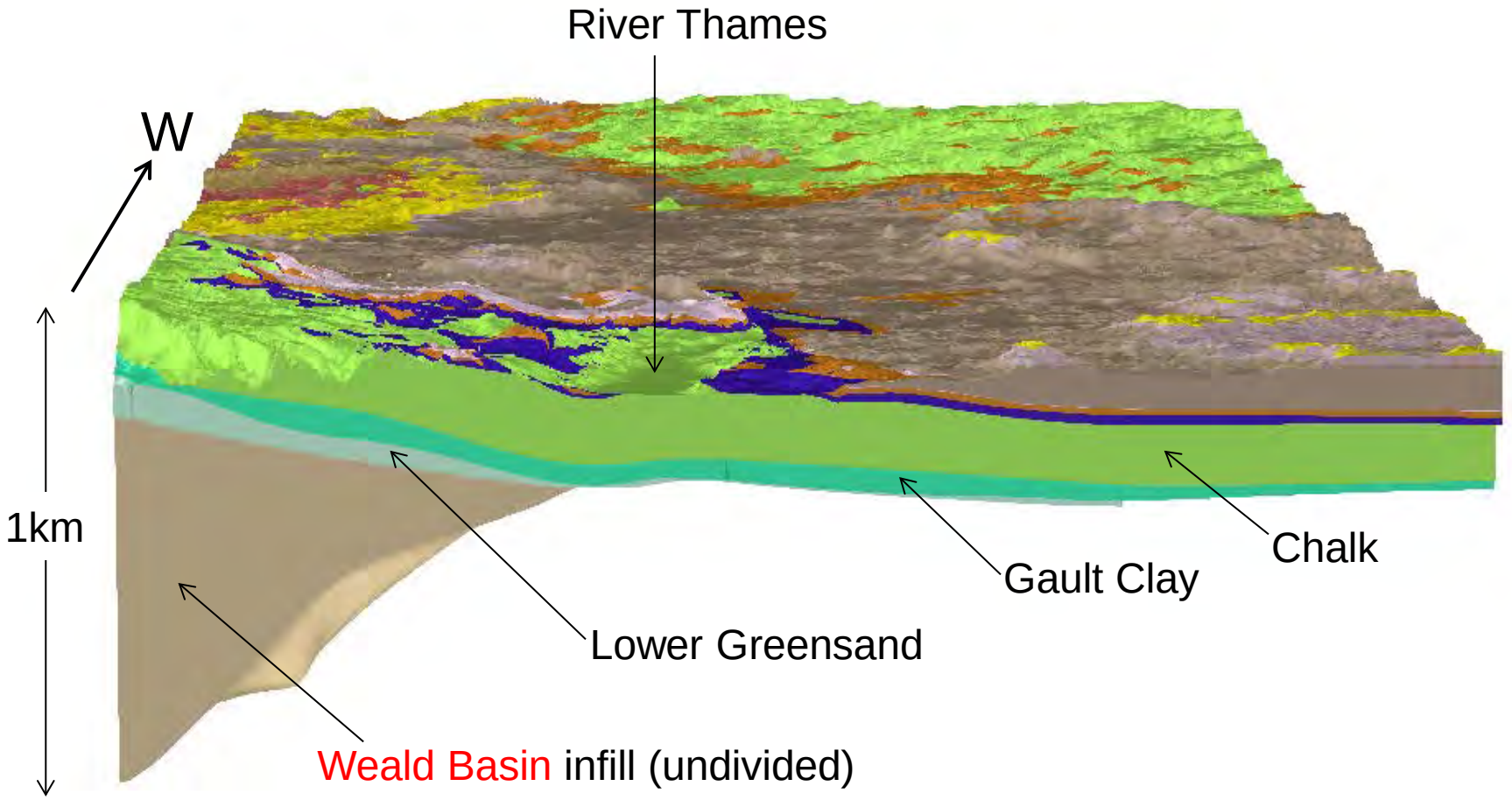
- Modelled area: 120x40km (8 50K map sheets)
- Model extends the geological maps into 3D
- 70 bedrock and superficial geological units modelled, plus artificial ground and mass movement deposits
- Modelled to c.500m depth
- 3D geological modellers: Helen Burke, Jon Ford, Steve Mathers, Ricky Terrington, Steve Thorpe, Paul Williamson
- Delivered as standard file types (vector, raster etc.) and also through the new BGS Groundhog web viewer
- London geological model website

Published article:

Regional Bedrock Geology



3D view of all modelled bedrock units

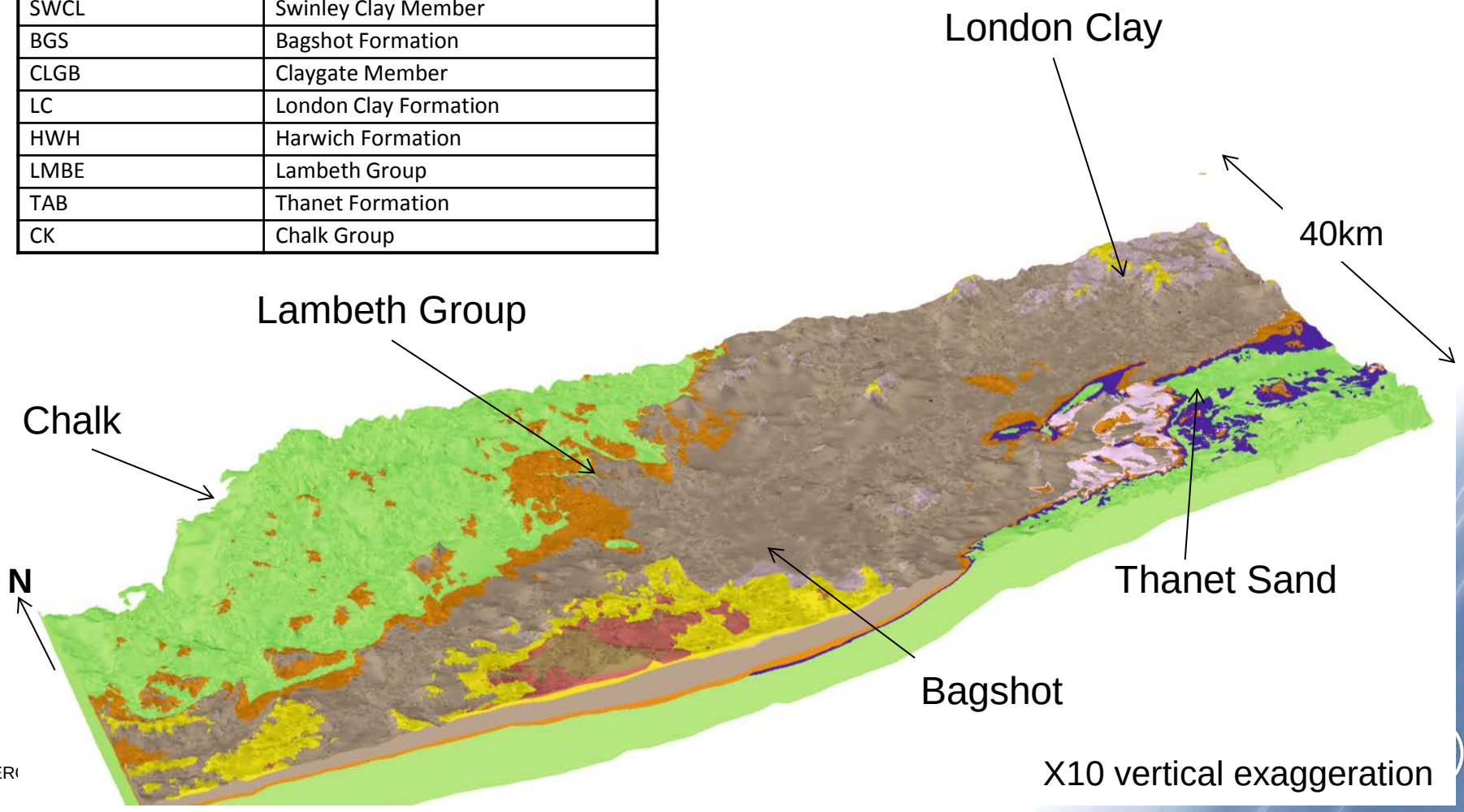


X10 vertical exaggeration

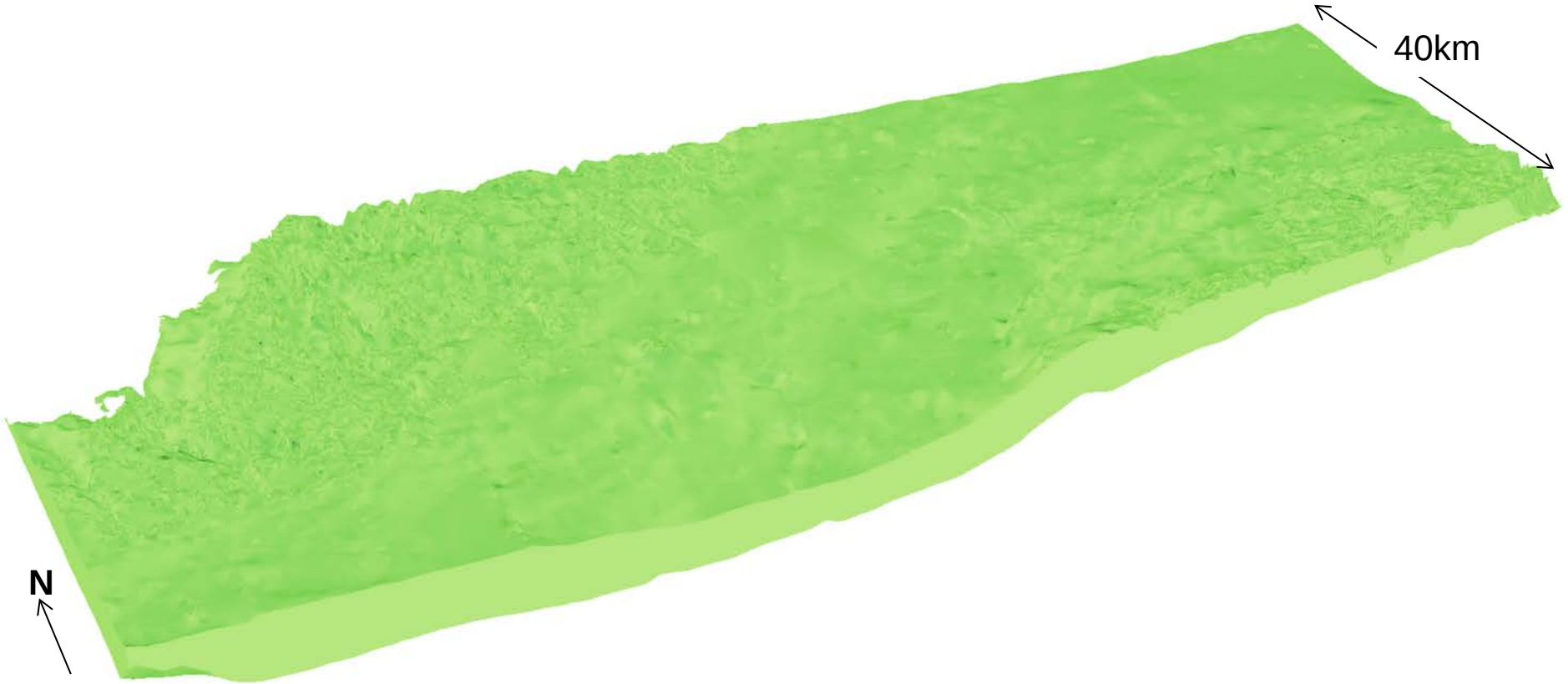
Bedrock geology looking west

Bedrock geology

BGS Lexicon code	Name
LNM	Lenham Formation
CMBS	Camberley Sand Formation
STHP	Stanners Hill Pebble Bed
WIDS	Windlesham Formation
SAHP	St Ann's Hill Pebble Bed
SWCL	Swinley Clay Member
BGS	Bagshot Formation
CLGB	Claygate Member
LC	London Clay Formation
HWH	Harwich Formation
LMBE	Lambeth Group
TAB	Thanet Formation
CK	Chalk Group

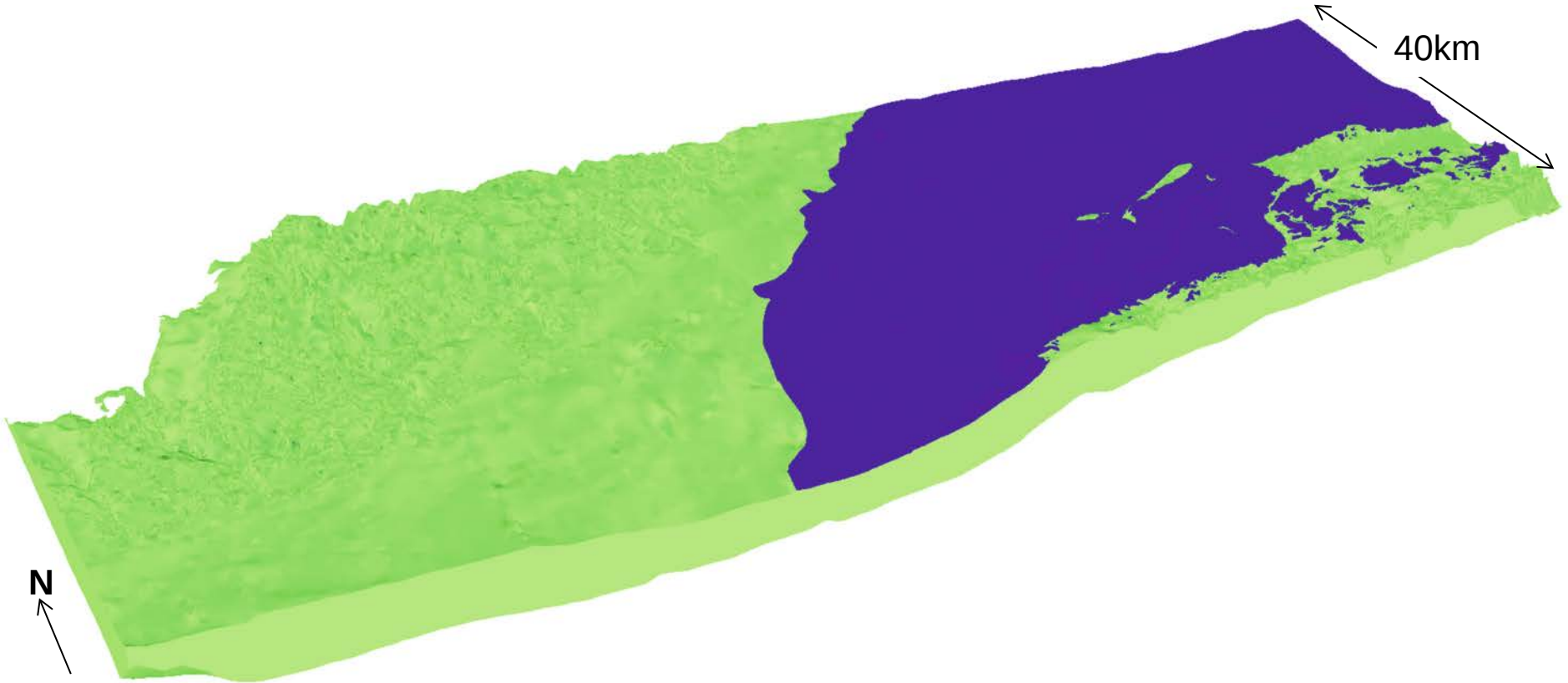


1 Chalk



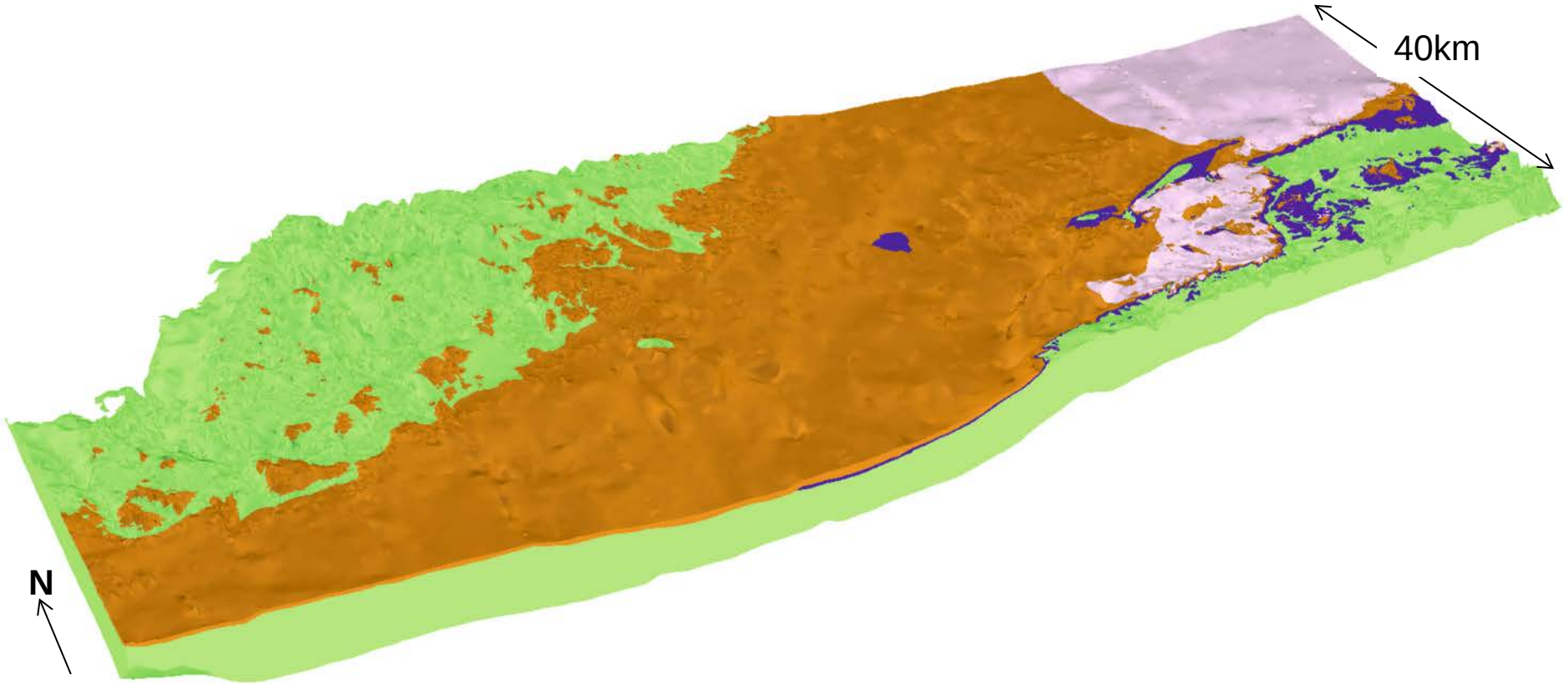
X10 vertical exaggeration

2 Thanet Formation subcrop (royal blue)



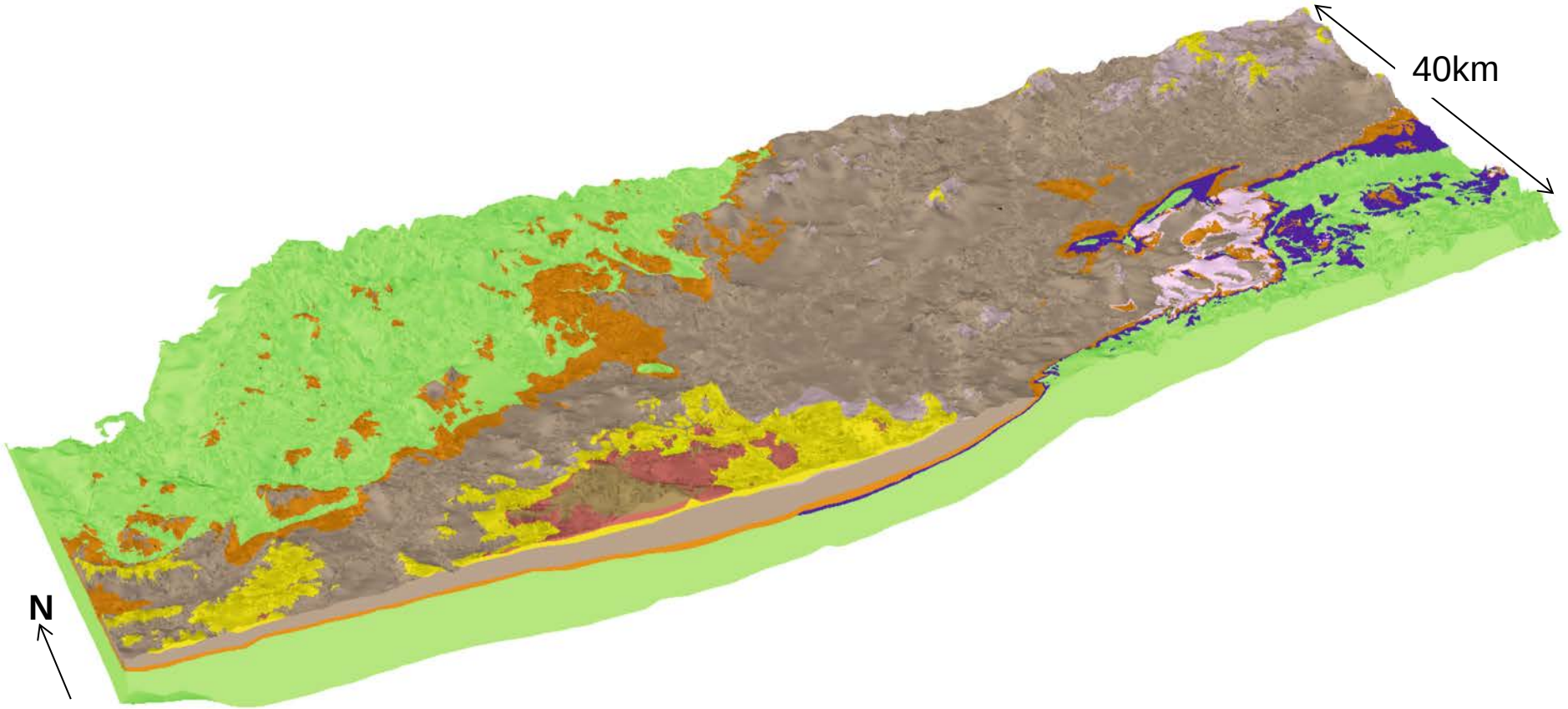
X10 vertical exaggeration

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



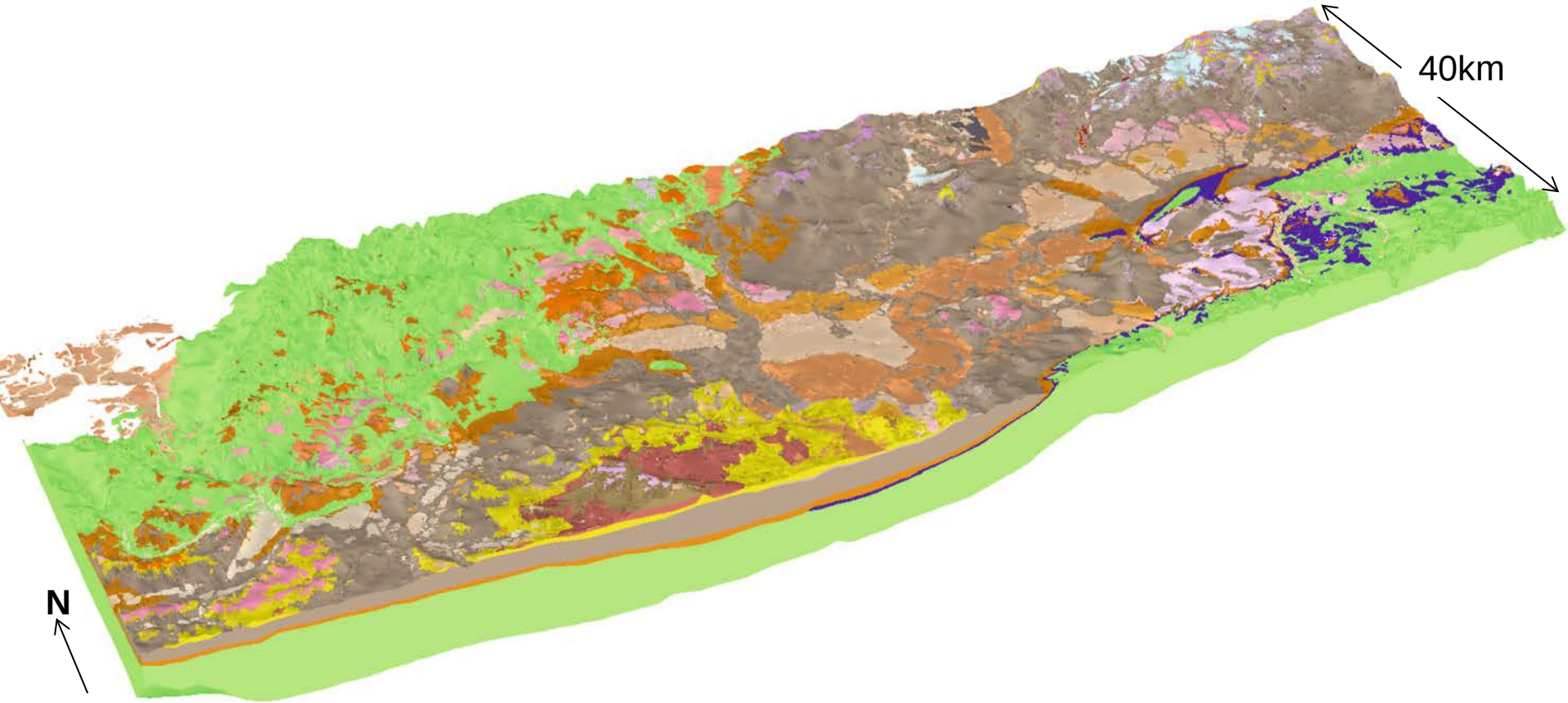
X10 vertical exaggeration

5 Bedrock geology at rockhead (all Quaternary removed)



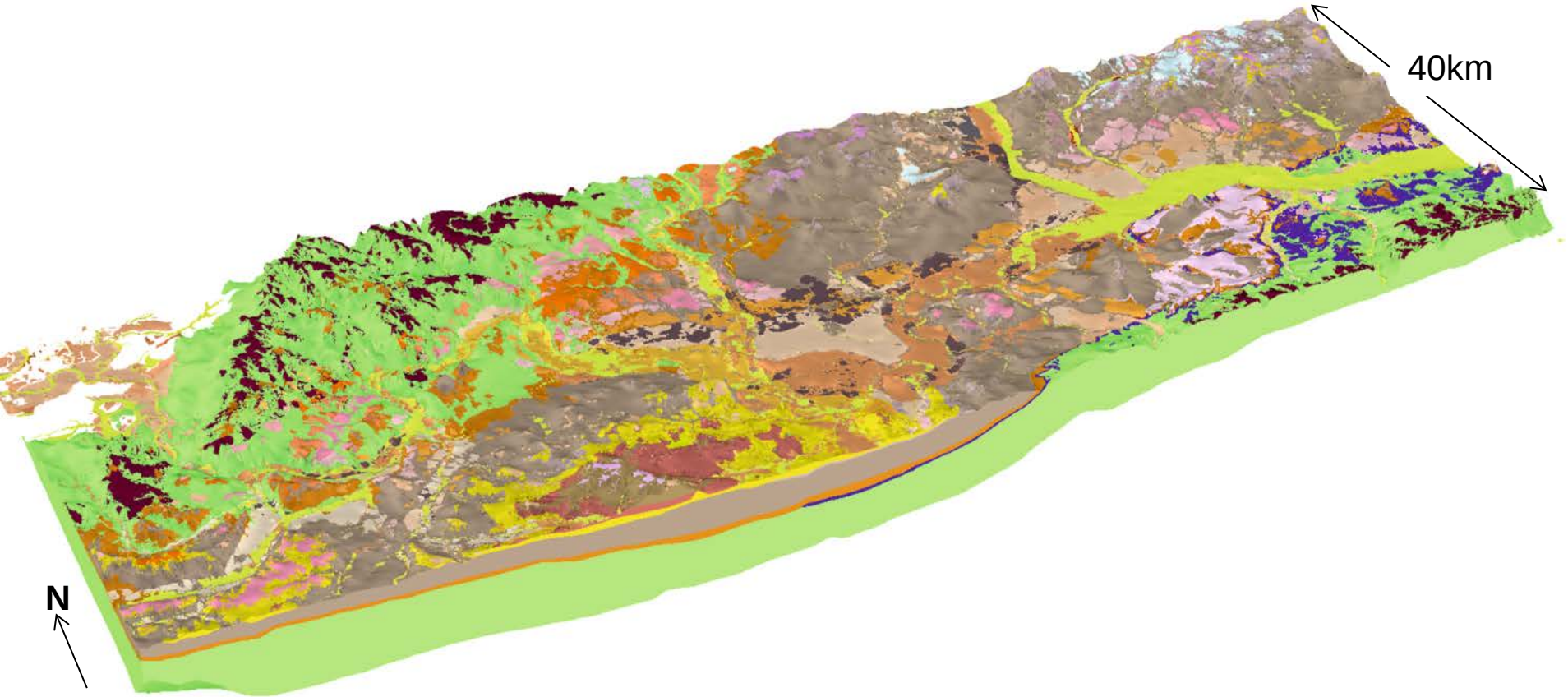
X10 vertical exaggeration

6 Quaternary deposits – most terrace gravel units and glacial deposits



X10 vertical exaggeration

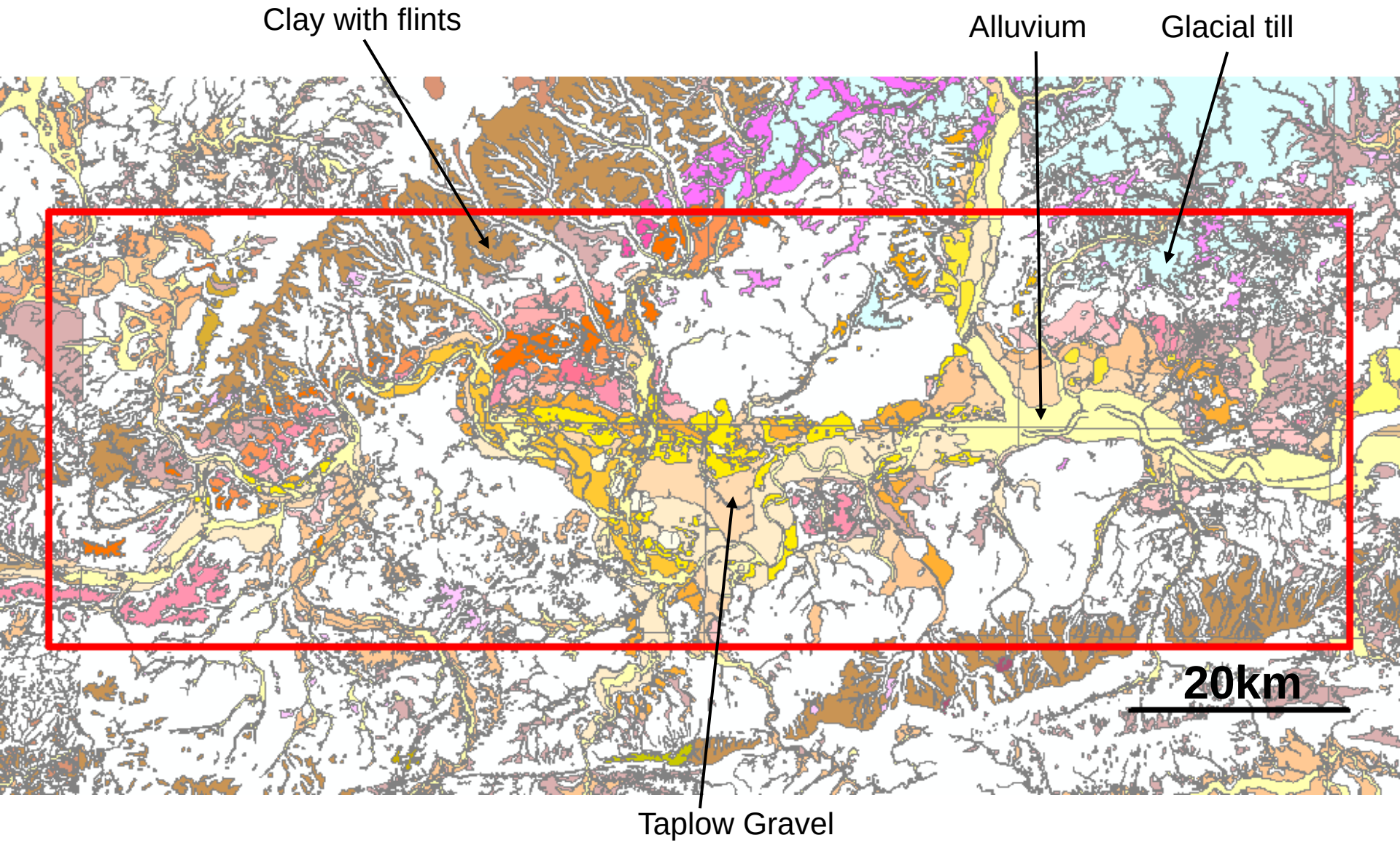
7 All geological units



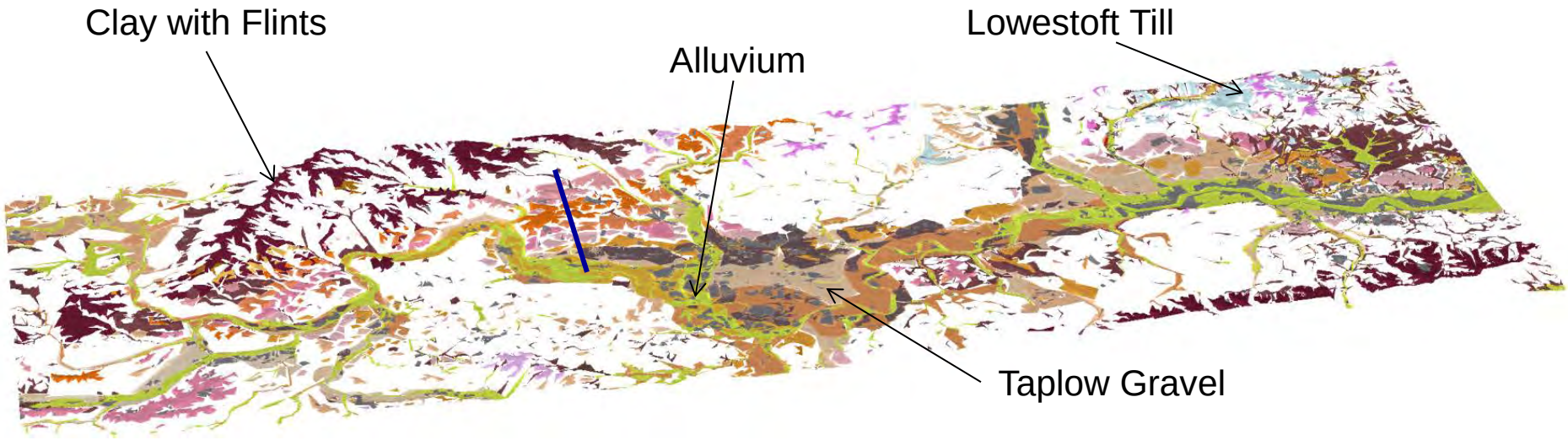
X10 vertical exaggeration

Lower units (to base Jurassic) added from existing regional model

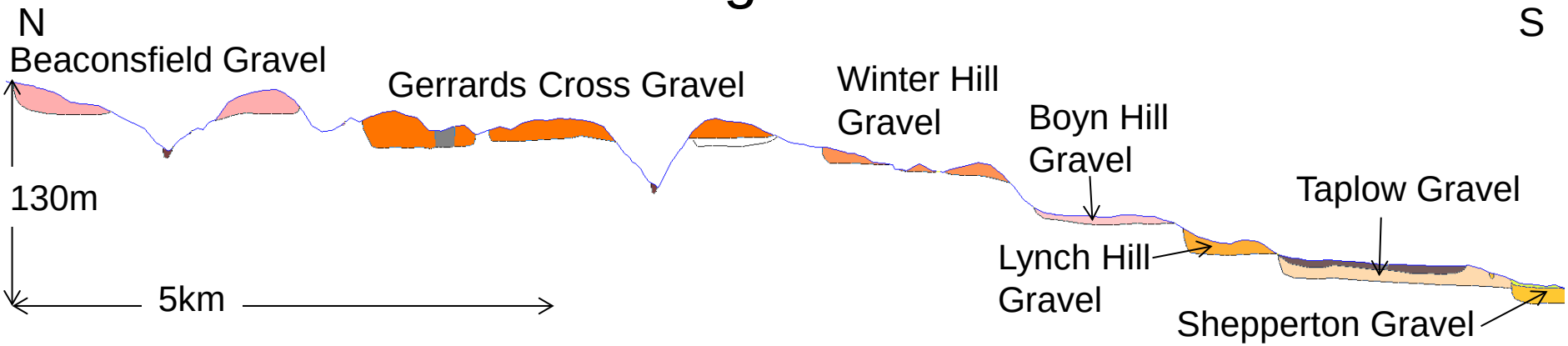
Regional Quaternary Geology



Quaternary and man made deposits (63 units)

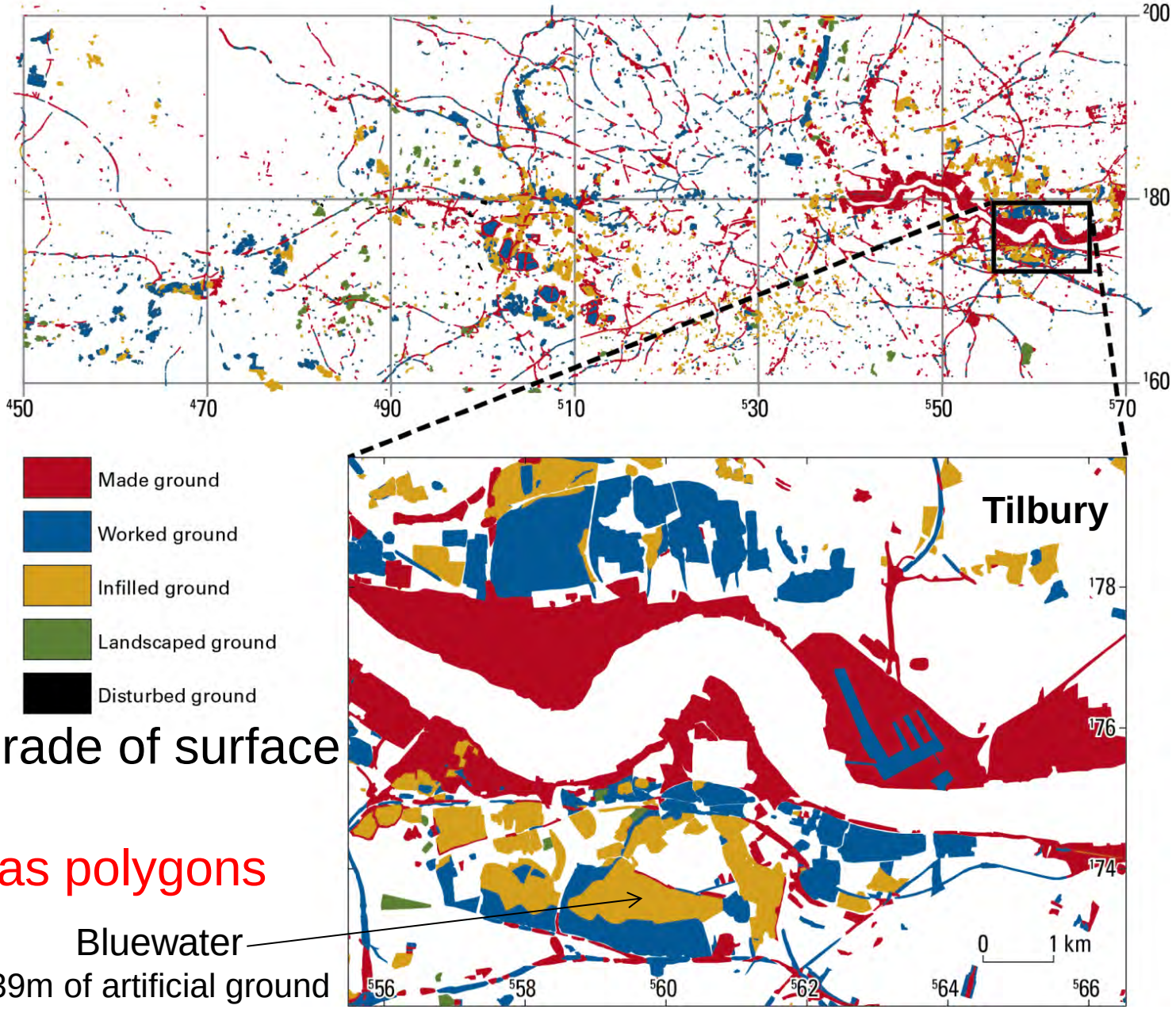


Cross-section of terrace gravels



Vertical exaggeration x20

Revised man made deposits

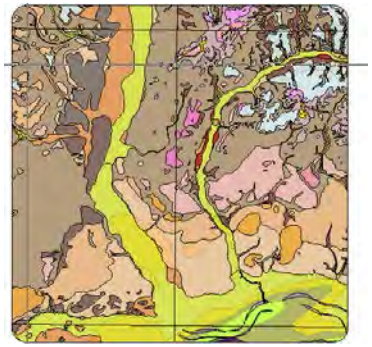


Significant upgrade of surface extent

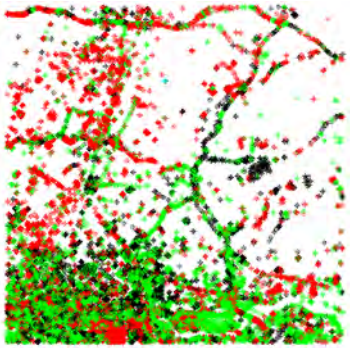
Modelled only as polygons

Bluewater
39m of artificial ground

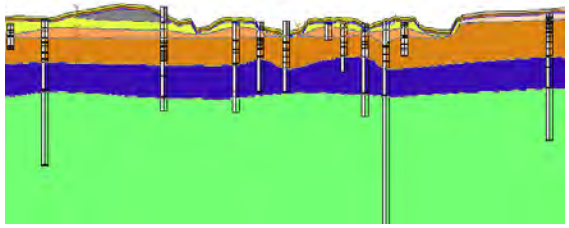
3D Modelling workflow



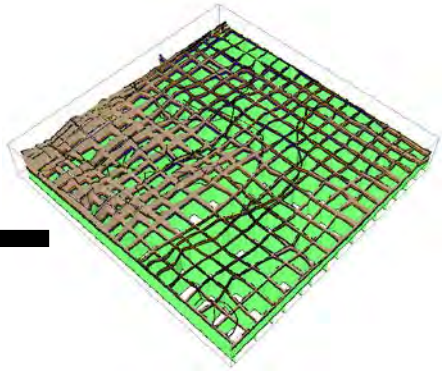
Map and DTM



Boreholes

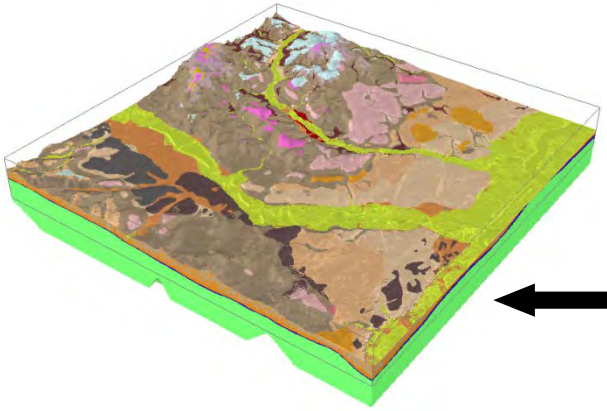


Cross-sections



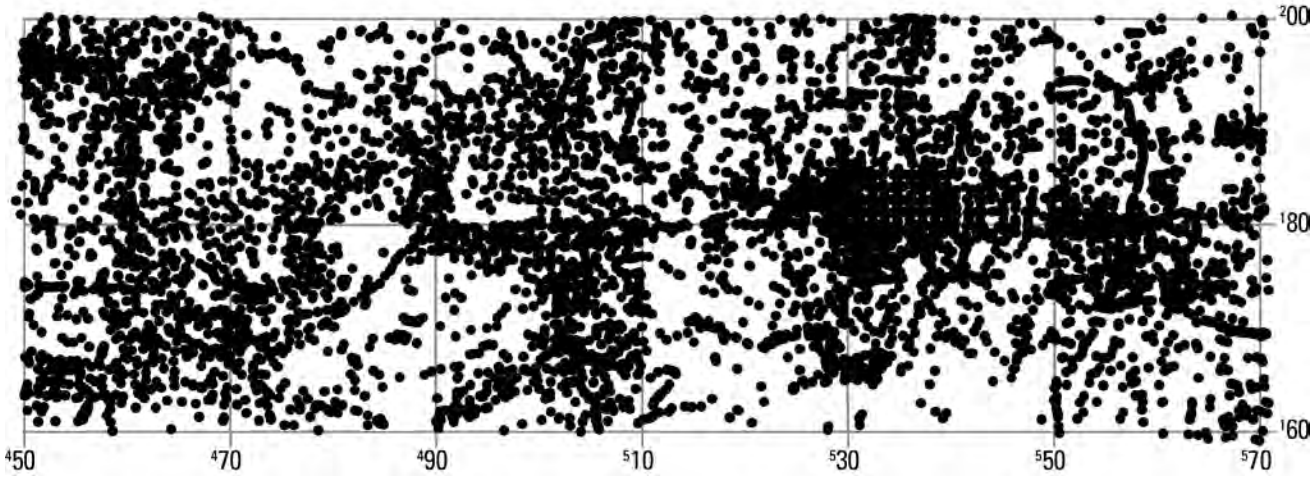
Fence diagram

Unit distribution

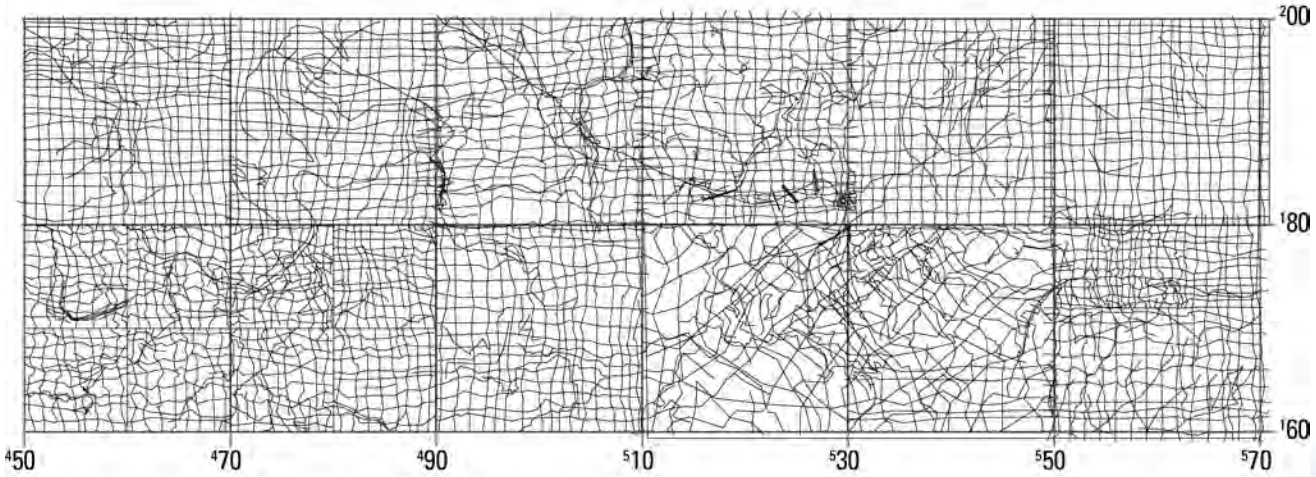


Geological Block model

Cross-section and borehole locations

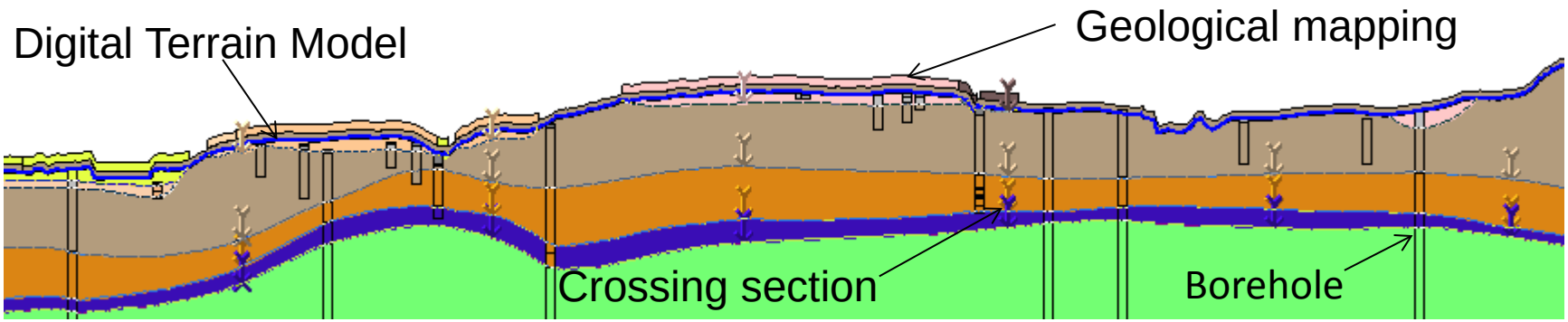


Boreholes considered in the modelling (c 7,000, 7%, the best records)

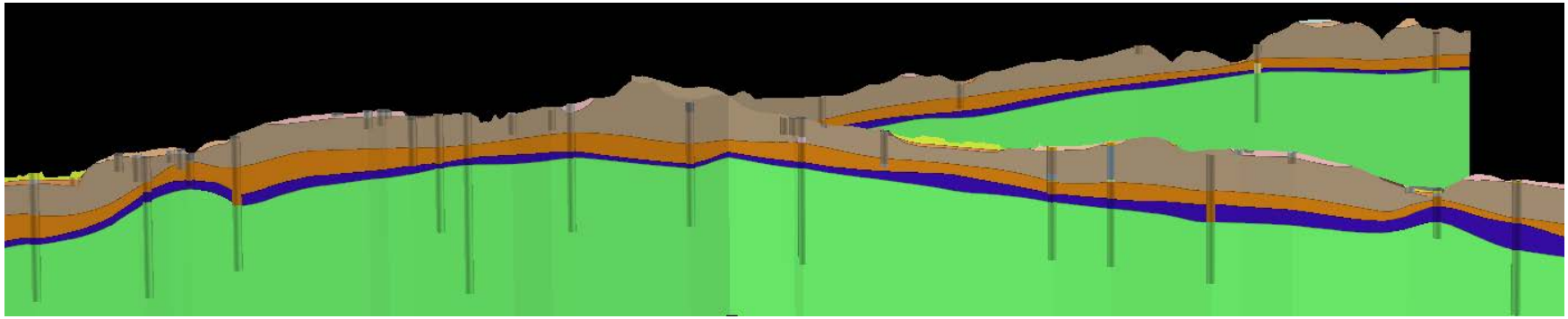


Cross-sections correlated to constrain the model

Building cross-sections



vertical exaggeration x10

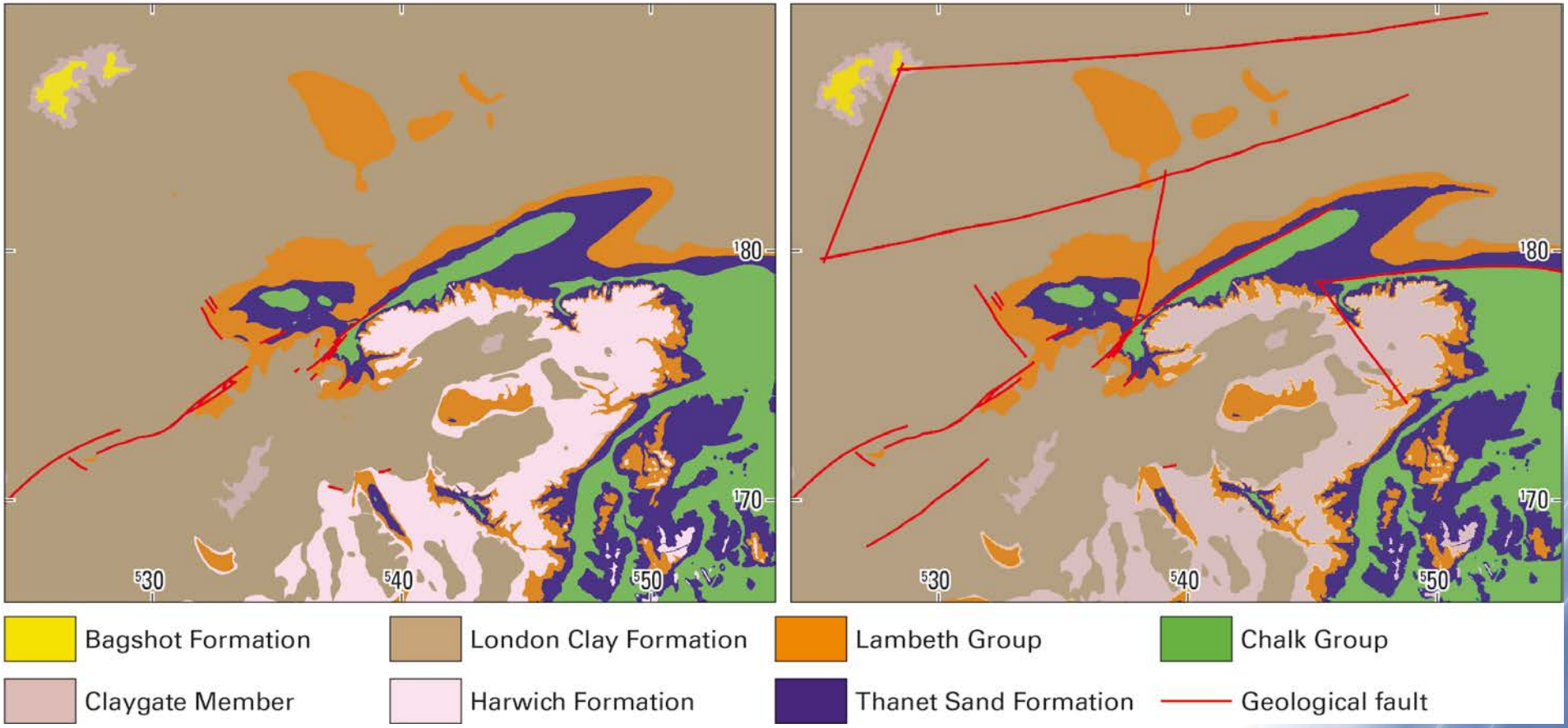


vertical exaggeration x10

New bedrock interpretation

Existing DiGMapGB-50

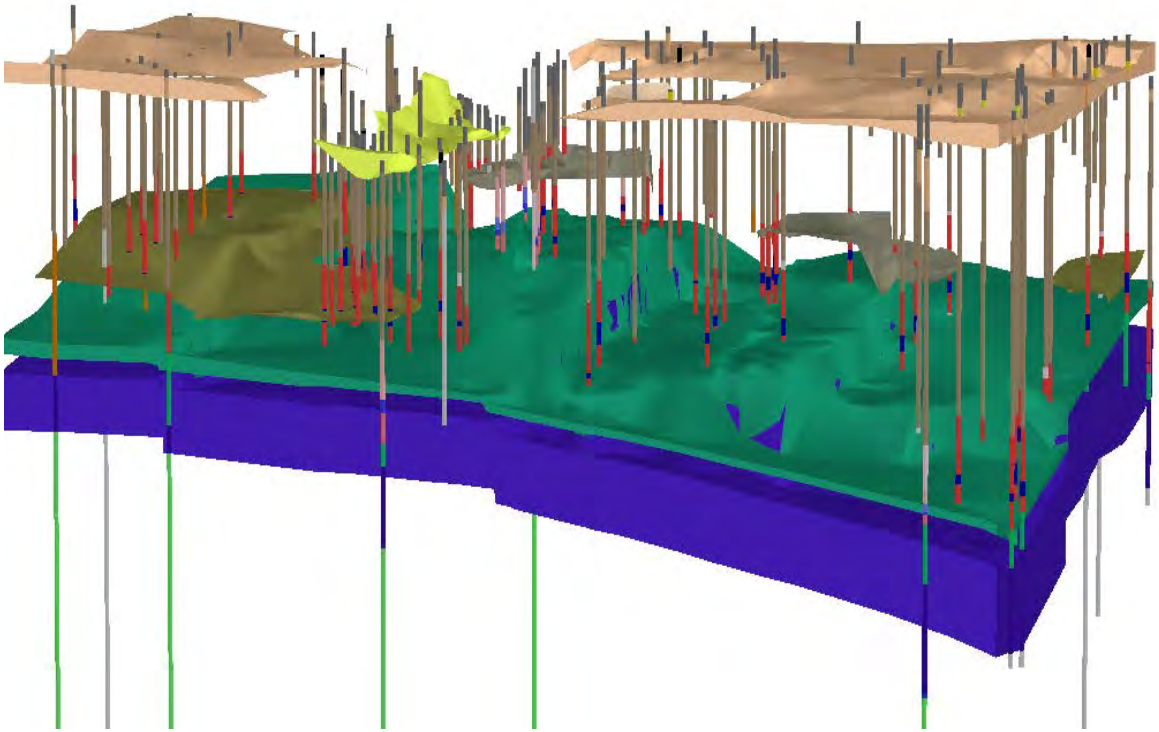
New interpretation from 3D visualisation



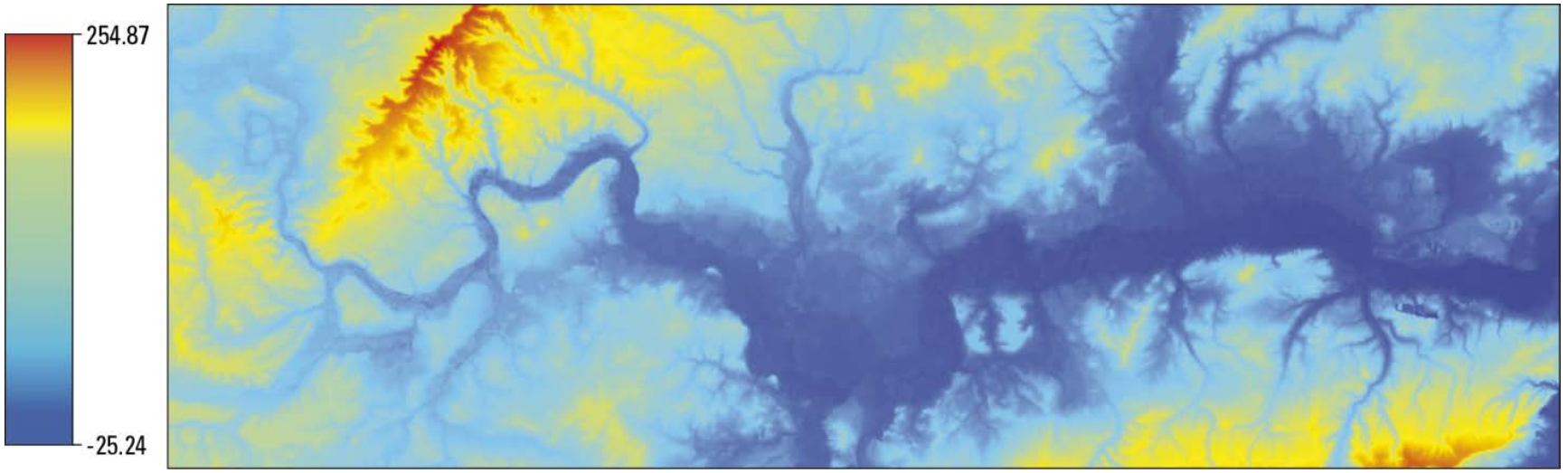
Example of a detailed model within the London Area: Farringdon Station

The regional model provides **a framework** for detailed site specific modelling

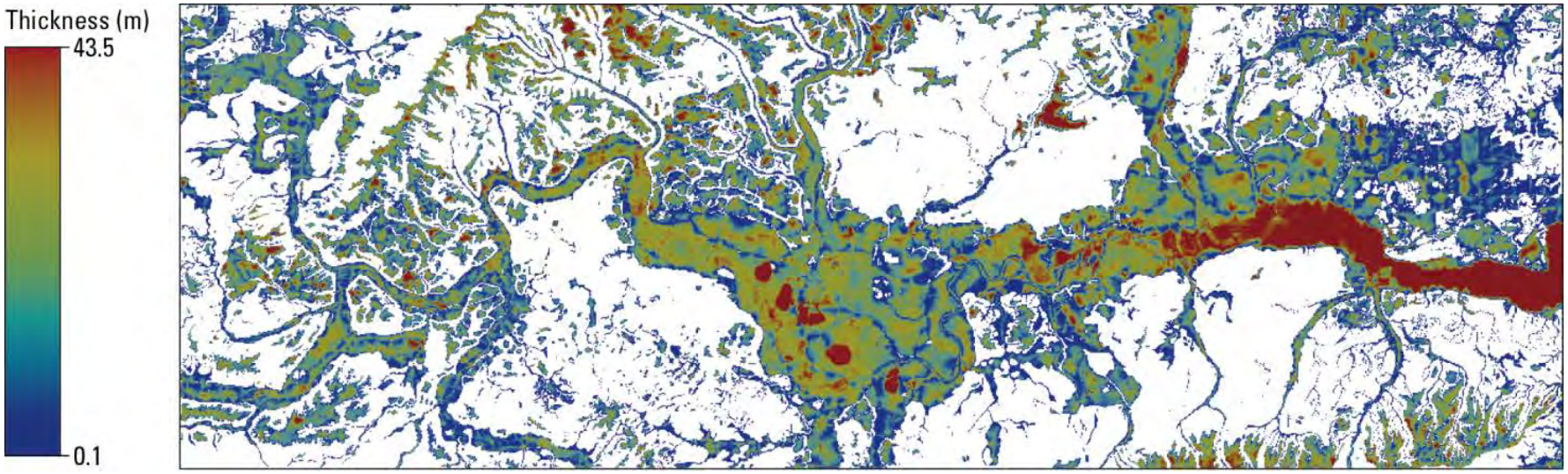
Sand units in alluvium, river gravels, Lambeth Group and Thanet Formation



New rockhead (base Quaternary) surface



New Quaternary Thickness Model



Further development of the model

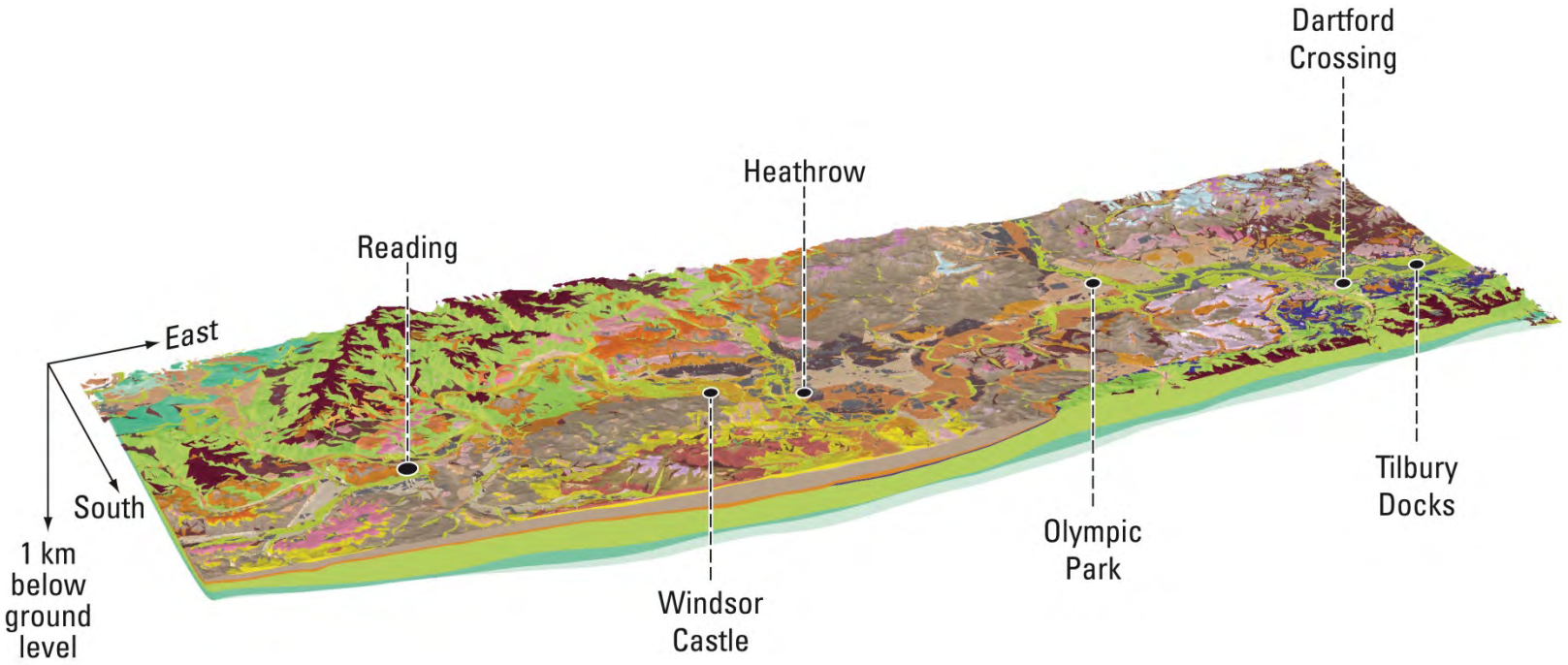
As new data is acquired, we want to improve the model through the **participation of users and stakeholders:**

- Improve the 3D representation of **man made** deposits and **thin** deposits
- Improve fault modelling for an **integrated** structural interpretation
- **More stratigraphic detail**; Chalk and Lambeth Group
- Expand the coverage of the model
- Continuous revision of the model, and most importantly its use

Geological model delivery

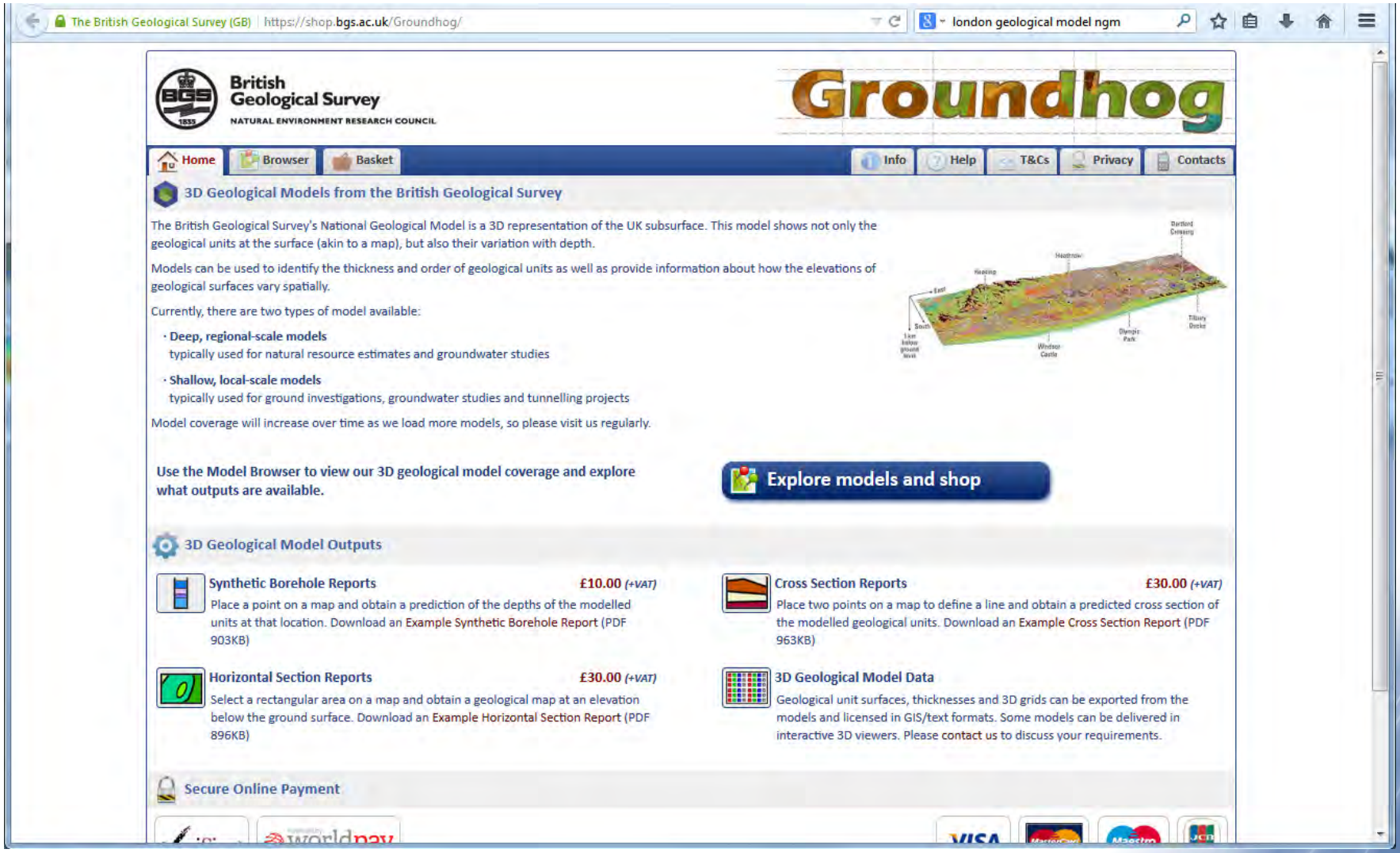
http://www.bgs.ac.uk/igeology

Launch of commercial groundhog for the London and Thames model



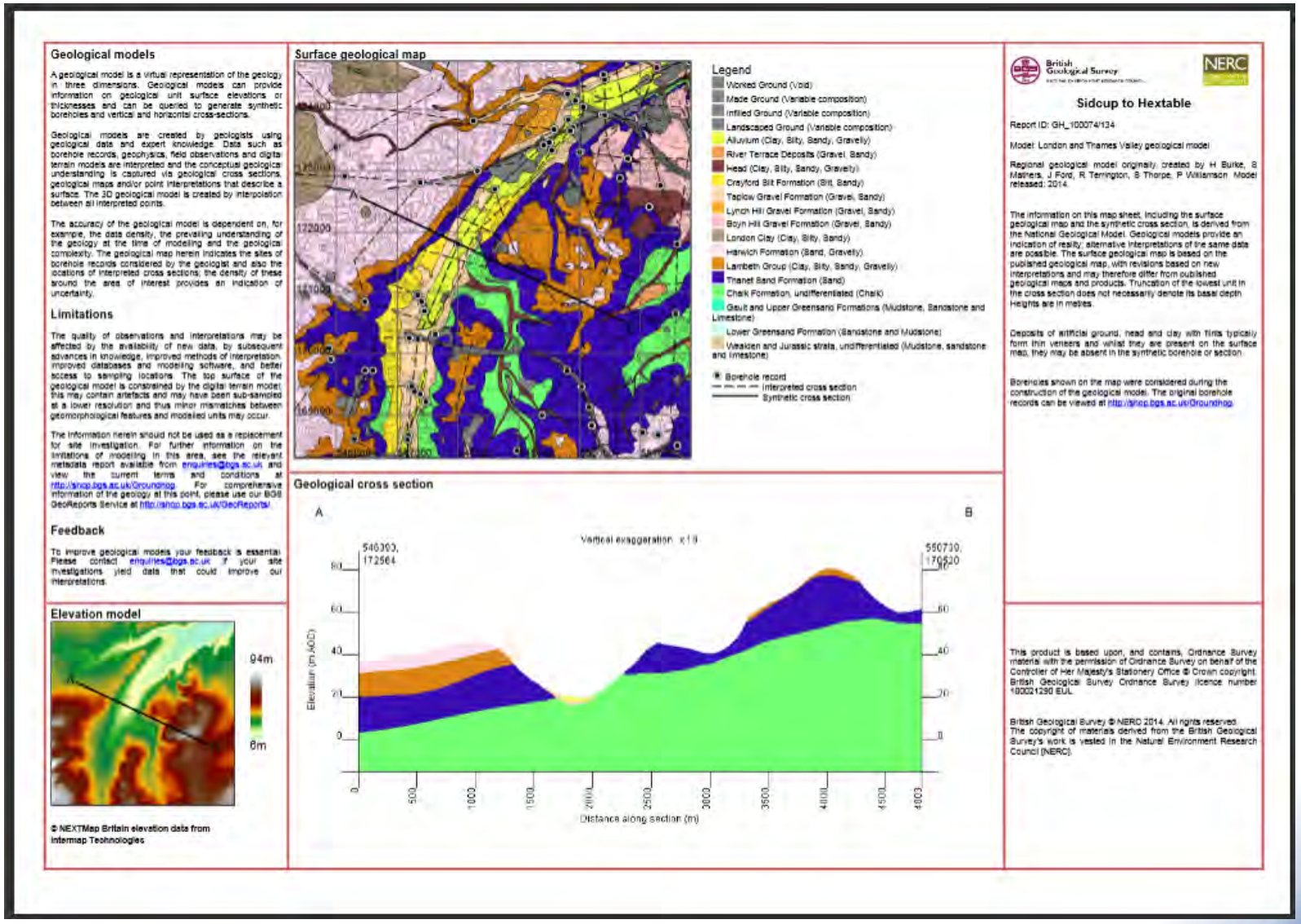
https://shop.bgs.ac.uk/Groundhog

BGS Groundhog



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

BGS Groundhog (example output)



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

Licensing options:

Free data
Open Geoscience (Open Government License)

Commercial license
3D data - cost ~60 p per seat, per year
(plus data preparation and licensing charges)

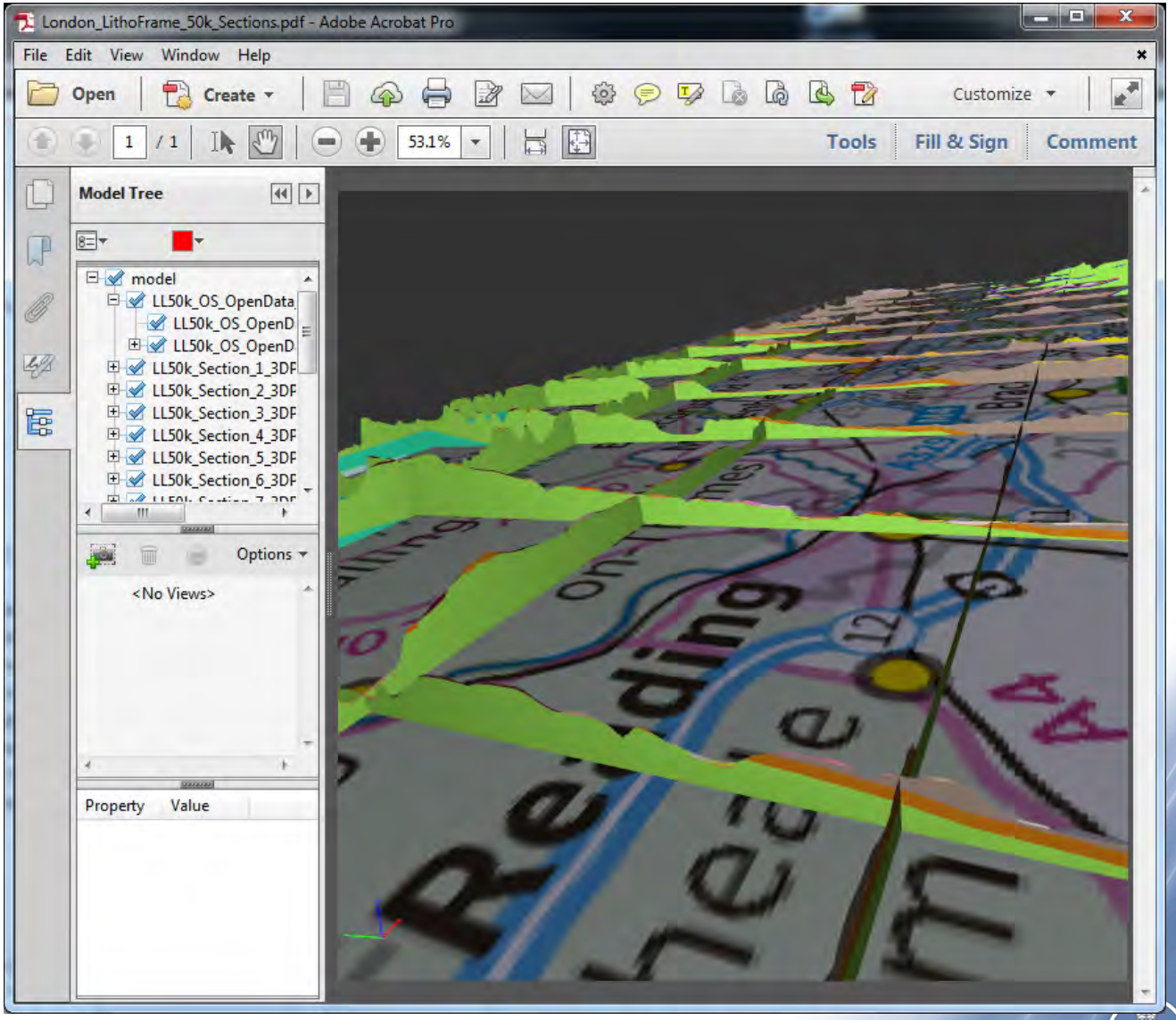
Academic license
Completely free for academic use
(with acknowledgement of BGS)

Innovation agreement
Free for evaluation purposes (limited time and area)

See https://shop.bgs.ac.uk/Groundhog or email digitaldata@bgs.ac.uk for further information

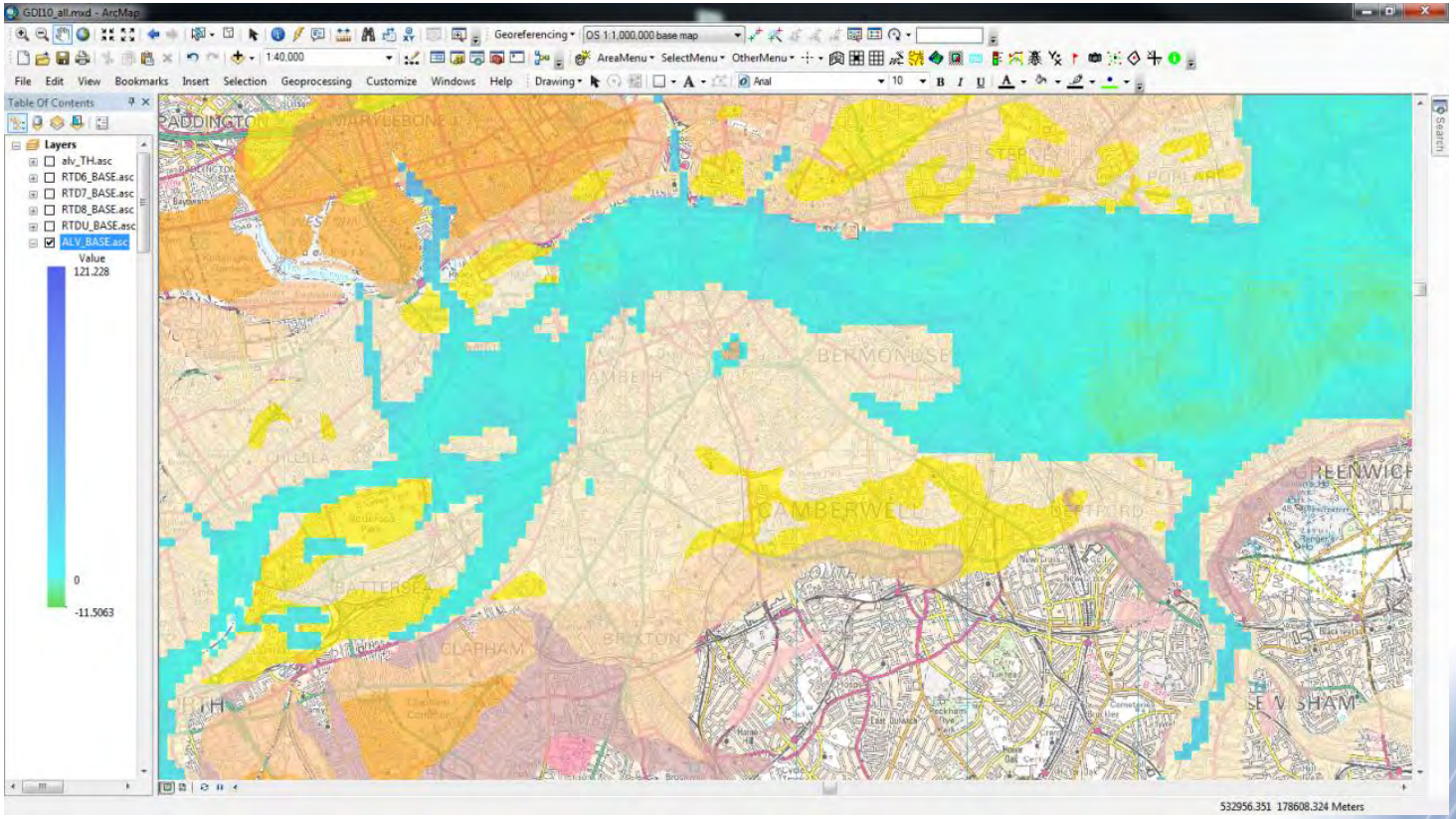
Getting 3D models to you:

- 3D PDFs



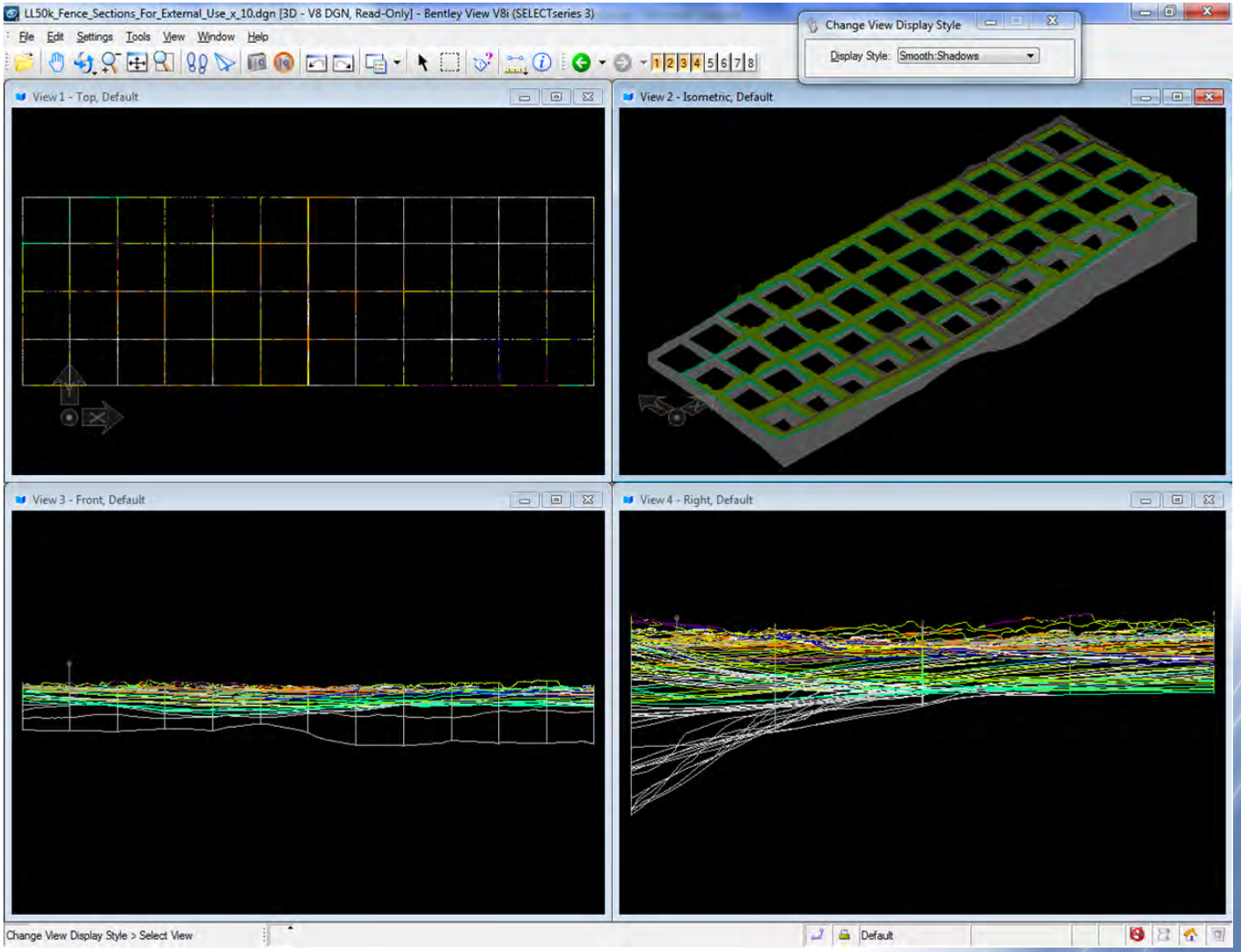
Getting 3D models to you:

- 3D PDFs
- GIS



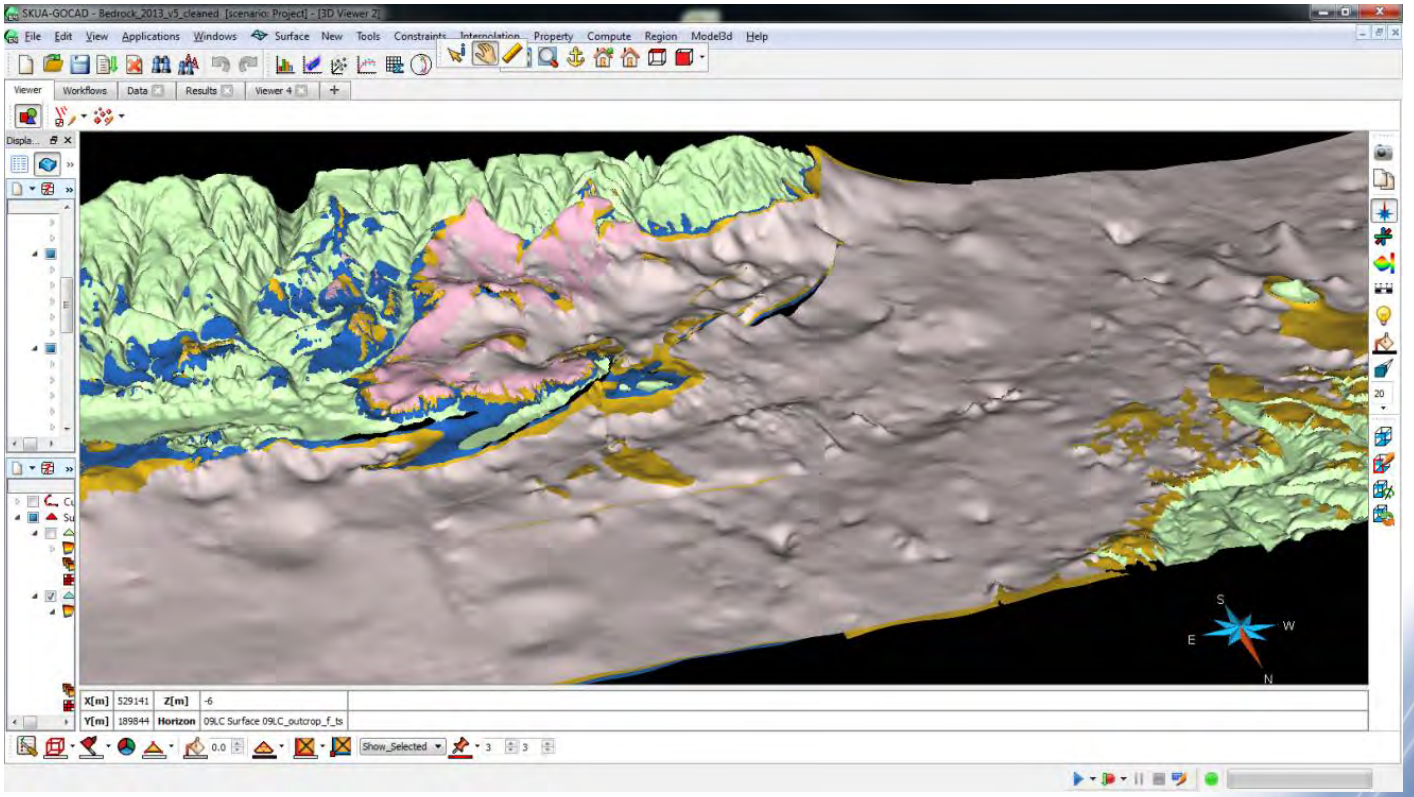
Getting 3D models to you:

- 3D PDFs
- GIS
- CAD (BIM)



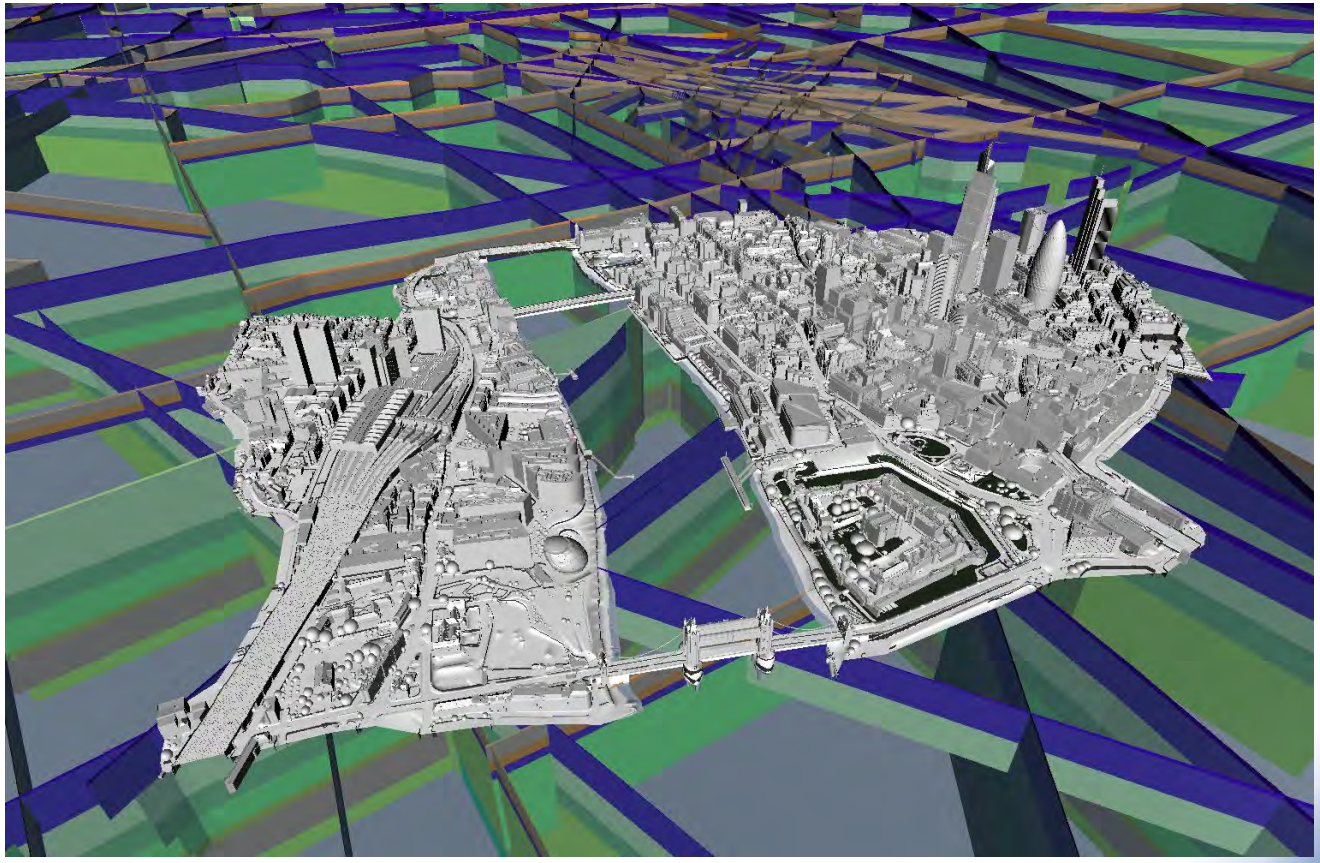
Getting 3D models to you:

- 3D PDFs
- GIS
- CAD (BIM)
- Modelling software



Getting 3D models to you:

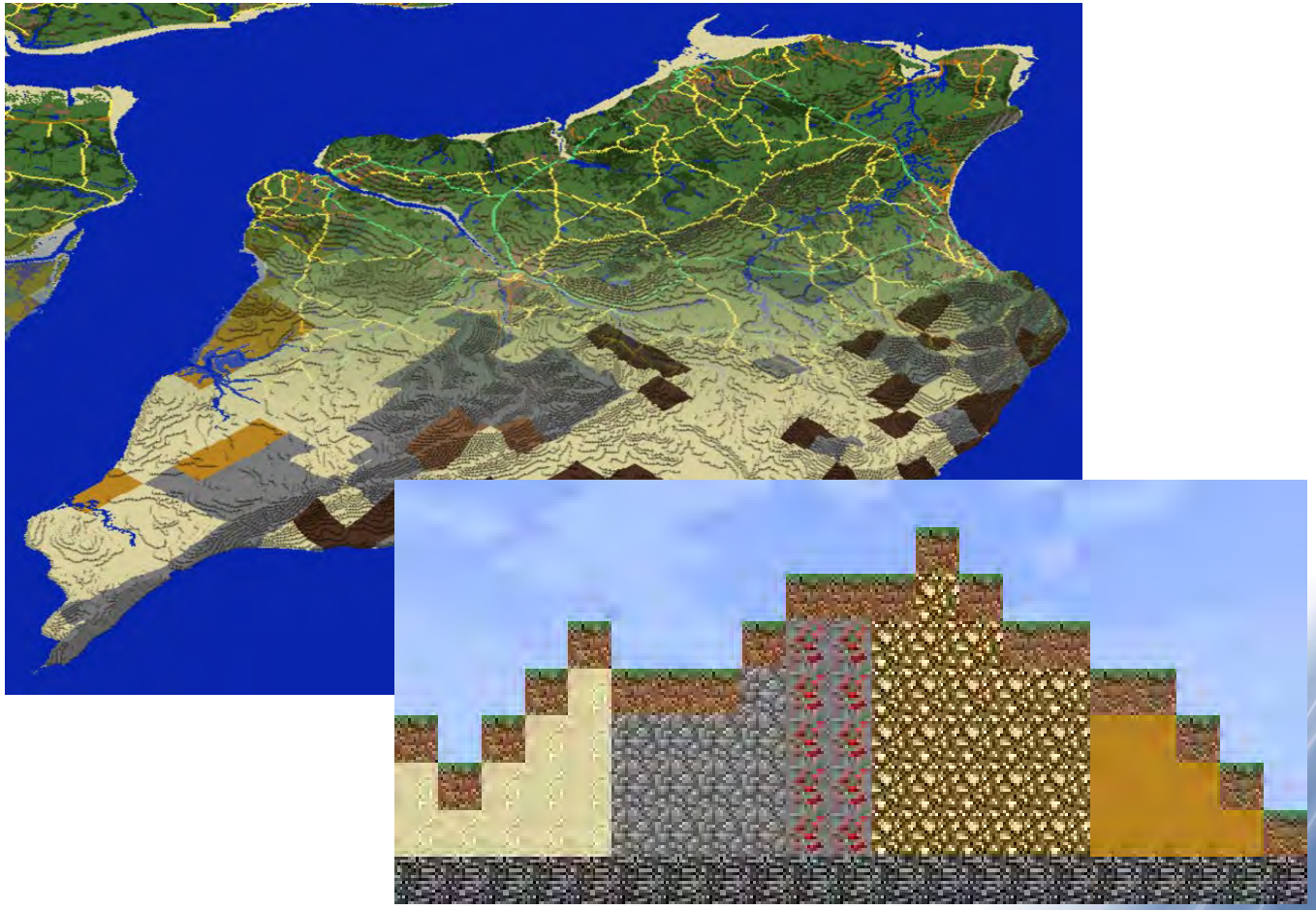
- 3D PDFs
- GIS
- CAD (BIM)
- Modelling software
- Visualisation packages



3D city model courtesy of Arup (Simon.Mabey@arup.com)

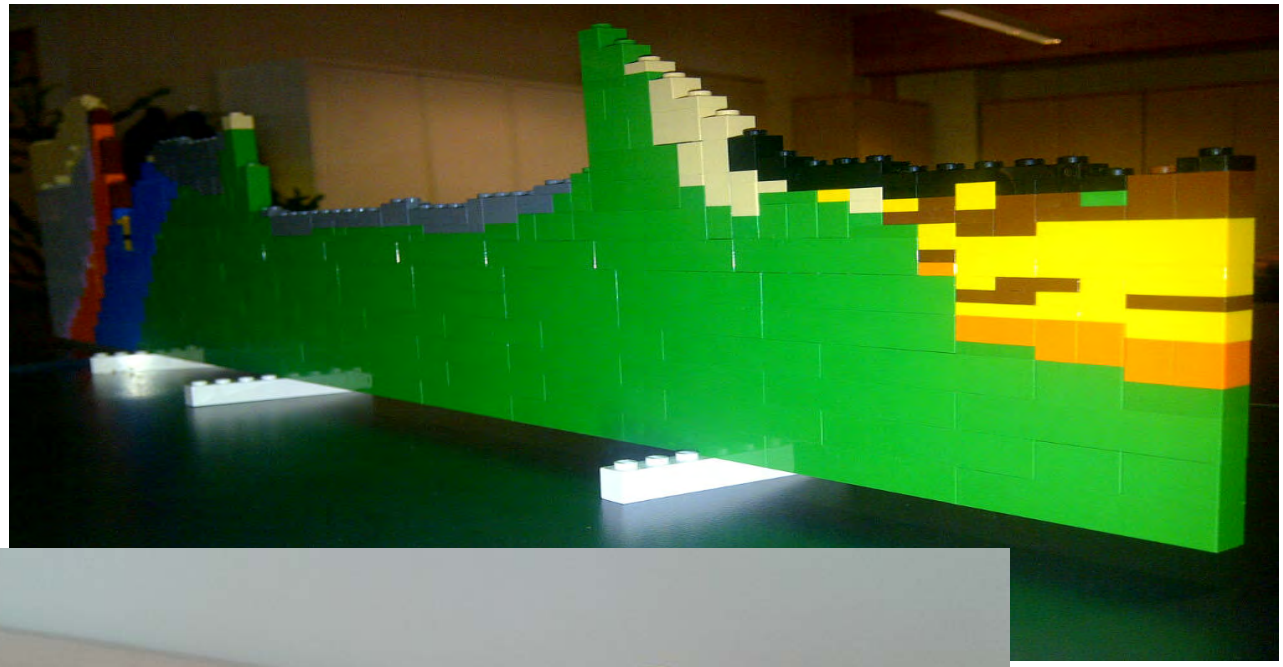
Getting 3D models to you:

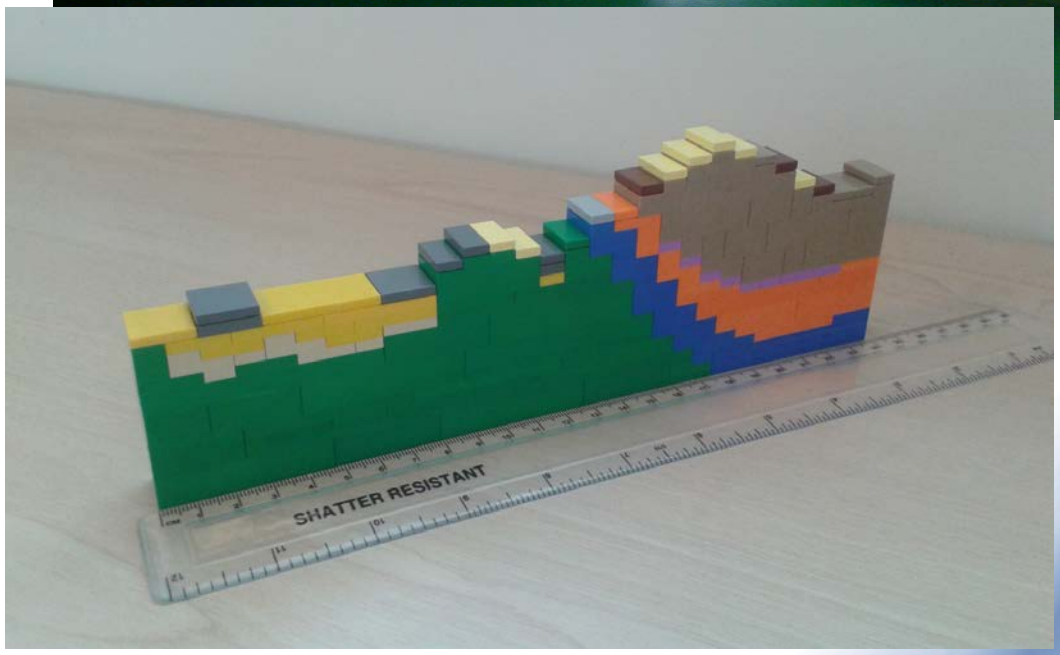
- 3D PDFs
- GIS
- CAD (BIM)
- Modelling software
- Visualisation packages
- Minecraft



Getting 3D models to you:

- 3D PDFs
- GIS
- CAD (BIM)
- Modelling software
- Visualisation packages
- Minecraft
- Lego!





Summary:

We are on a journey of improving the delivery of complex science that is fit for purpose

All models are wrong some are useful

George E. P. Box (Statistician)

We hope the London model will be useful to you, so, use it, tell us about it and ultimately help us to improve it….

enquiries@bgs.ac.uk