

Revealing the UK's hidden depths

Underneath the Earth's surface lies a wealth of resources. But will the way we currently use them give us problems in the future? Dr Ciaran Beggan, Dr Andrew Barkwith and Dr Caroline Graham at the NERC British Geological Survey (BGS) explain why we need a clearer picture.

People have been using the subsurface for millennia. We've quarried stone to build homes, dug cellars to store goods, drilled for oil, mined for minerals, buried rubbish... the list goes on. And often we don't know how it was used by people before us or what it's actually made of.

These buried secrets can cause nightmares for planners. Builders working on the Edinburgh tram route were slowed down by forgotten, unmapped Victorian water pipes and sewers, the remains of a leper colony and hundreds of 15th century skeletons. In fact it's been estimated that half of the overruns on civil engineering projects are caused by unforeseen ground conditions.

Mapping it

We need to know more about previous human activity underground as well as the ground's physical, mechanical and chemical properties. More than that, we need all that information to be in one place. That's not just to aid construction projects but also so that we don't compromise our future. For example, cities dealing with increasing populations are digging down to create space while our reliance on groundwater supplies in the UK is up by 50 per cent compared with 60 years ago. These needs are in competition as our underground infrastructure blocks our access to groundwater.

Because each use of the subsurface has a knock on effect for the future, to manage it properly we need think about what pressures we might face next. In the Futures Team at BGS, we're trying to



Since 1958 it's been mandatory for records of cores deeper than 30 metres to be archived at BGS but they aren't always detailed: older records might have noted which layers held coal but not collected any data on the layers above it.

understand and avoid problems different buried infrastructure might cause and emphasise how it can best work in harmony.

Until recently, we've only had pockets of information about certain areas of the country, gathered from various projects and held in different places. So at BGS we're bringing it all together. Using that data, collected over many decades, we're building a 3D map, called UK3D, showing 5 km of the UK's underground layers.

UK3D will help us get better at forecasting the effects of events like groundwater movement during floods and of the wider implications of future projects. For example we'll be able to ask questions like: 'if I build a tunnel at X, will I affect the water table at Y?' We're also working to make it easy to use for non-geologists like policymakers.

Earth observatories: real-time data

A new NERC project with BGS will help us get highly-detailed, real-time data on the immediate effects of human activity underground by using a range of monitoring devices in more than one hundred boreholes. By independently monitoring and observing drilling, extraction and underground storage, the project will tell us about using subsurface resources safely and sustainably.

UK3D shows a network of cross sections through the earth's crust. Download it for free from BGS.ac.uk and open it in Google Earth to rotate, tilt and zoom into the UK's geological layers.

GB3D

Dr Ciaran Beggan, Dr Andrew Barkwith and Dr Caroline Graham are based at the British Geological Survey. Find out more about their work at www.bgs.ac.uk/sciencefutures/ and about the new project at www.nerc.ac.uk/funding/available/capital/esios/

