East Anglia and adjoining areas - The Fenland and beyond

This area includes the low-lying Fenland and adjacent countryside extending from the Wash in the north, south-westwards through Huntingdon to the districts around Biggleswade and St Neots. Other important settlements within this area include Holbeach, Wisbech, Downham Market, Ely and Cambridge. This area is bounded to the east by a prominent ridge, formed by Chalk, that extends from Hunstanton due south to Soham and then south-westwards through Cambridgeshire to the south-western limits of the region.

Younger sedimentary bedrock

The bedrock in this part of the region consists of a variety of sedimentary rocks, their overall shape, thickness and sequence are quite well known because there are widespread boreholes. The stack of layers are only 100 to 200 m thick in the south of this area but they get progressively thicker going north and are about 500 m thick around the Wash. These sedimentary rocks are formed of distinct layers of limestone, mudstone and sandstone which geologists group together into distinctive units or formations which can be traced for long distances, often over hundreds of kilometres. The individual layers or beds vary from a few metres to tens of metres thick and are very gently tilted towards the south-east. Throughout the area there are Jurassic rocks, 200 to 150 million years old, which were laid down in warm shallow seas. These include the famous brick clays that are dug to the west of the region around Bedford and thick grey mudstone known as the Lias which is famous for its fossil marine reptiles such as Plesiosaurus and Ichthyosaurs.

Farther north the sedimentary bedrock layers are thicker and descend to greater depths while the lowest part of the rock sequence is composed of still older sandstones, overlain by mudstones, both with a reddish colouration due to iron oxide stains formed when they were deposited in very dry desert-like conditions between 250 and 210 million years ago. These red rocks do not crop out at the surface within the East Anglia region but around the Wash the sandstones (New Red Sandstone, Sherwood Sandstone) are up to 100m thick and are used as a minor aquifer. The red mudstone (Mercia Mudstone) above is up to 100 m thick around Spalding and forms a barrier or seal preventing the water within the sandstone from moving upwards.

Older sedimentary bedrock and basement rocks

Underlying the sequence of younger sedimentary layers lies the older sedimentary bedrock deposited from about 410 to 300 million years ago, and the even older basement rocks. These older rocks are present within 100 to 200 m of the surface in the south-west of the area, but farther north towards the Wash they lie deeper, typically at depths of about 500 m or more. The older sedimentary bedrock is quite well known from drill holes in the south of this area and mainly comprises red mudstones and sandstones, popularly known as the Old Red Sandstone. The available information indicates that they are several hundred metres thick and are overlain by thin Carboniferous Limestone. The basement rocks are mainly grey mudstones and sandstones that are weakly metamorphosed so that they are much harder and denser than the sedimentary rocks above them. They have been tightly folded and tilted at steep angles during ancient earth movements, when they were buried much deeper than they are today. While the rocks themselves are less porous than the
younger sediments they are cut through by fractures that do contain groundwater. They include geological faults where the rocks on each side of the fracture have moved relative to one another. The basement rocks were originally deposited between 550 and 410 million years ago, similar rocks underlie much of England, and occur at the surface farther west, forming much of the hill country of Cumbria and Wales.

Geophysical surveys reveal local anomalies in the magnetic field and the force of gravity in some parts of this area including the countryside north and north-west of Cambridge, also to the north of Wisbech, and south of Hunstanton. Such anomalies are common in areas where there are buried pillar-shaped bodies of granite or similar rocks, known as igneous intrusions. These intrusions are the solidified remains of chambers of molten rock or magma, that lie beneath many active volcanoes today. The anomalies occur because the granite is lighter than the surrounding basement rocks and so gives a low or negative gravity anomaly. The granite also contains more magnetic minerals than the rest of the basement rocks producing highs or spikes in the magnetic signal. The presence of these granite masses has only been proven by a single borehole near Wisbech. The interpretation of the geophysical signals is consistent with what has been found where similar basement rocks occur near the surface or buried in other parts of the UK.

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