The Geology of the Hatfield Peverel Area

(Key Source British Geological Survey Memoir & Map 241 1985)

The Parish of Hatfield Peverel lies on a flat spur of land bounded by three attractive River valleys, the Ter in the west, the Blackwater in the east and the Chelmer to the south.

Ancient Past

Deep under our Parish lie buried “hills” of Paleozoic Era rocks around 400 million years old, these are detected using geophysics and proven by boreholes in the region (e.g. at Harwich and Canvey). The area saw little or no sedimentary deposition during the following Triassic and Jurassic periods, at this time the Hatfield Peverel area was likely to have been inhabited by dinosaurs.

Subsequently, during the late Cretaceous (about 100 million years ago) there was a period of global-warming, when the polar ice caps melted and a subtropical shallow sea covered the whole area. The result is a thick layer of white Chalk … a continuation of the same layers that form The White Cliffs of Dover. This Chalk layer is around 200m thick and has been proven by boreholes drilled locally at Witham, Kelvedon and Wickham Bishops. In 1900 a borehole was drilled closer to home, at Hatfield Place it penetrated thick Chalk with flints about 100m underground (see Bigden 1978, Hatfield Peverel Library Reference section).

Shark Infested Sub-Tropical Seas

The subsequent geological period (The Tertiary) saw layers of sand and mud deposited across the region in a layer up to about 100m thick. The fossils found in this, such as sharks teeth and occasional fish vertebrae, suggest that a warm sea covered the area about 50 million years ago. The main mud layer is called the London Clay, this clay underpins the soils of our predominantly agricultural Parish, providing valuable food crops. There are three boreholes drilled into these layers recorded by the British Geological Society; at Crabs Hill, Hatfield Place and Brakeys (Crix Lane). During late Tertiary times the region became land again. The UK climate was cooling, due in part to the continent drifting to the north, heralding the next chapter in Hatfield Peverel’s geologic history, the great Ice Age (see later).

The Restless Earth

When the Alps formed in continental Europe, plate tectonic movements very gently folded the Chalk and overlying Tertiary layers of England. During this time an elongate WSW-ENE anticline, a subterranean “Chalk hill”, formed underlying the north of the Parish. Underground boreholes reveal geological faults in the Witham and Wickham Bishops area. These faults lie in the north

and the south of the Parish respectively, and run WSW-ENE (sub-parallel to the A12). In 1884 faults closely related to these moved, resulting in the “Colchester Earthquake”, which caused more destruction than any other earthquake ever recorded in Britain.

The Great Ice Age

The cherished landscape of today’s gently rolling countryside (which deservedly has special recognition in our District’s planning) somewhat surprisingly has the most harsh and inhospitable of origins. During the Pleistocene Period ice age, a glacial ice sheet lay across much of Britain and Scandinavia. Geologists can discern that the Hatfield Peverel area was right at the edge of the glacial ice sheet, through information gained from boreholes, small quarries and pits and cuttings (for the railway, A12 road by-pass and the North Sea gas pipeline).

Rushing melt-waters from the glaciers deposited the sands and gravels that have been commercially quarried in the region for decades. While these comprise predominantly flint, chert and quartz; frequently exotic pebbles can be found. The glaciers flowing from the far north have transported igneous rocks like basalts and metamorphic rocks (sometimes with garnets, though unfortunately not gemstone grade!). Other deposits of glacial clays allow geologists to detect sub-glacial “tunnel-valleys” and melt-water lakes. During this period, the freezing stresses in the deep frozen permafrost caused the underlying layers to bend, buckle and distort in quite amazing ways.

Today the porous and permeable sands and gravels lie on top of the London Clay, making for not only fresh-water springs where water seeps out at the surface, but also an underground water-bearing aquifer. This has helped previous generations with a local water supply, via wells and water pumps. But it can also make for unstable land and landslips, as recorded by the British Geological Survey. Bigden 1978 documents that when the A12 road by-pass was dug, “*tons of concrete was poured in to stop up the flow of some of the underground springs*”. Conversely, our lack of water (believe it or not we have one of the driest climates in England!) promotes desiccating and cracking clay soils, leading to the opposite type of soil instabilities, challenging the construction industry and other land users.

Bricks from Nounsley

During the ice ages, the frozen tundra must have seen periods of bitterly cold dry winds which have transported silty clay particles into drifts and pockets (“loess”). The even grain size and lack of pebbles make this silty and sandy clay ideal for brick and tile making. A number of commercial brick pits sprung up in our region in the 19th Century, notably in Boreham and Nounsley. The traditional craft bricks are termed “Boreham Reds” and “Suffolk Whites” reflecting the colour of the clay used.

When the one kilometre thick ice sheet finally melted, particles previously suspended and caught up in the ice were deposited in a layer of glacial

“Boulder Clay” across most of the Parish. The Boulder Clay is several metres thick with distinctive mixed sized pebbles within it. White Chalk pebbles predominate, but there are also pebbles and fragments of many other rock types brought down from the far north. Jurassic and Cretaceous microfossils and also larger fossil shells have been found in the district (although they are very rare, some lucky fossil hunters have found beautiful coiled Ammonites!).

Ulting on Thames

There were several inter-glacial periods when the climate warmed. During one of these times a series of alluvial river terrace deposits suggest that an ancient pre-cursor to the River Thames flowed across the far south of the Parish, following the path of the Chelmer Valley. Clearly river drainage patterns have changed since the ice receded. The path of the River Blackwater makes very sharp turns at Coggeshall, Kelvedon and Smallands Hall, on its route from Braintree to arrive in our Parish … this is a product of “river capture” as the drainage pattern evolved over recent times.

The last 10,000 years

At or near the surface there are rare peat deposits and sometimes calcium deposits associated with springs. Occasionally there are pale calcium-rich clays, in the past these were extracted and used by farmers to improve their clay soils, leaving small lime-pits (for example at Rivenhall End). Elsewhere there are pockets of mud, former lake deposits, with fossils indicating warmer climates. Hippopotamus, elephant and rhinoceros bones were found in just such lake muds in Moulsham. There is evidence of sea levels 10’s of metres higher during these warmer times. Former *sub-marine* estuary muds and fossil shell banks are found above present day sea-level forming the mudflats, saltings and marshes of the Essex coast.

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