The geology of Hadleigh Castle Country Park

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Geological Field Guide

Situated a only a short distance west of the castle, Hadleigh Castle Country Park offers some of the best views in Essex. The hilly landscape of the park consists of London Clay overlain by the sandy clay of the Claygate Beds which in turn passes up into Bagshot Sand on the highest ground. This geological succession clearly shows a gradual shallowing of the London Clay Sea about 50 million years ago. The sediment being deposited on the subtropical sea floor became more and more sandy until eventually it consisted entirely of the fine yellow sand we now call Bagshot Sand which was probably laid down across most of Essex in a great complex of river deltas. All that now remains of this sand are isolated patches on the tops of these South Essex hills, the rest having been removed by the intense erosion of the Ice Age.

From the car park a track leads downhill past a large fishing lake on the left which is outside the boundary of the country park. The lake was originally a pit serving an extensive brickworks that was in existence during the first half of the twentieth century and some of the buildings of the former brickworks can still be seen. The steep slopes of the old pit are much disturbed by badgers which have a liking for these sandy rocks. From here the path continues south to the main part of the country park which is a valley flanked by the steep slopes of Round Hill to the west and Sandpit Hill to the east. Both Round Hill and Sandpit Hill are capped by Bagshot Sand. From here the path continues down to grazing marsh, sea wall, and a narrow strip of saltmarsh alongside Benfleet Creek.

The steep ground hereabouts is prone to extensive landslips. This is particularly evident on the east side of Sandpit Hill (on land owned by the Salvation Army) where successive rotational slips have created a series of sloping terraces separated by small cliffs or ‘scarps’. The scarps provide glimpses of the underlying geology with Bagshot Sand at the top of the hill and sticky London Clay at the bottom.

South-east of Sandpit Hill another brickworks was in operation at the end of the nineteenth century and the large hollows filled with trees are the former pits. These brickworks and others on Salvation Army land were linked by a tramway to a small wharf on the Thames, and the embankment where the tramway crossed the main railway line can still be seen.

Bagshot Sand

The Bagsot Sand is about 50 million years old. One of the best exposures of Bagshot Sand in the Country Park is situated at the top of the steep, wooded, south-facing slope of Sandpit Hill. Although difficult to access it is well worth the climb up from the marked footpath at the bottom of the slope. It shows layers of mottled yellow, very fine-grained sand which consists almost entirely of quartz but there is also feldspar and white mica. Almost all sedimentary rocks owe their origin to the destruction of other rocks and the Bagshot Sand contains just the minerals that would result from the erosion of granite. This is supported by the presence of small amounts of heavy minerals such as zircon, tourmaline, topaz and garnet which are also found in granite. Studies of these minerals show that the source was the granite of the Scottish Highlands and the sand was transported south to Essex over thousands of years by longshore drift.

The Hadleigh borehole

In 1973 a cored borehole was drilled by the British Geological Survey in order to study the complete geological succession in the Hadleigh area for the first time. The site chosen was near the top of Sandpit Hill (TQ 8002 8654) at an altitude of 70 metres (230 feet) above sea level so that the maximum depth of strata could be examined. After passing through 10 metres (33 feet) of Bagshot Sand and 17 metres (55 feet) of Claygate Beds the borehole penetrated the full thickness of London Clay which here was 132 metres (433 feet) thick. Below the London Clay the borehole continued through 12 metres (40 feet) of Oldhaven and Woolwich Beds (which yielded numerous fossil shells) before passing into the Thanet Sand and terminating at a depth of 176 metres (576 feet) which is over 100 metres (330 feet) below sea level. Beneath the Thanet Sand is the Chalk which forms the foundations of the London Basin. The borehole results are recorded in minute detail in the 1986 geological survey memoir for the Southend district. Of particular interest was the discovery of a claystone nodule at the base of the London Clay at a depth of 159 metres which contained particles suspected to have originally been volcanic ash. Bands of volcanic ash, probably from Scottish volcanoes, are common at the base of the London Clay near Harwich but this was the first time it had been identified in this part of Essex.

The Hadleigh Castle landslip

Hadleigh Castle is situated on the edge of an ancient cliff of London Clay which was cut by the Thames about 27,000 years ago, during one of the coldest periods of the Ice Age. The cliff was abandoned by the river at least 10,000 years ago and since then there have been a considerable number of landslips as the ground attempts to regain a stable slope. The severe effects of the landslip on the medieval castle can be clearly seen. The ground is still actively landslipping (the largest slide in historical times occurred in the late 19th century) and it may be at least another 10,000 years before it reaches an angle of stability.

An aerial view of Hadleigh Castle and its famous landslip. *Photo copyright Essex County Council*

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