LOCAL GEOLOGICAL SITES
UTTLESFORD DISTRICT

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UfdG17 Flitch Way Ballast Pit and Tufa Springs

Site location: On the Flitch Way footpath, south west of Great Dunmow.

Grid Reference: TL 6195 2160

Status: Accessible at all reasonable times.

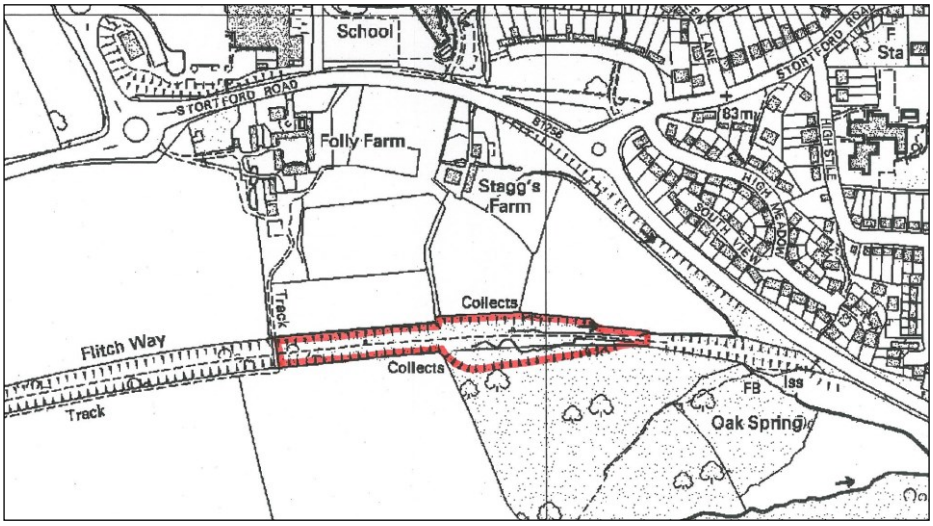
Summary of the geological interest:

The Bishops Stortford, Dunmow and Braintree branch railway opened in 1869 and closed in 1969. The route of the line is now the Flitch Way Country Park, which is managed by Essex County Council. For construction of the railway a pit was excavated adjacent to the line near Great Dunmow to provide ballast on which to lay the track. This pit still exists and provides exposures of Kesgrave Sands and Gravels, which were deposited by the River Thames during the Ice Age when it flowed through here over 500,000 years ago.

Lying on top of these sands and gravels and outcropping in the cutting to the west of the pit is the Anglian Till (also known as chalky boulder clay), which was laid down by the Anglian Ice Sheet about 450,000 years ago. This ice sheet covered most of Britain as far south as Essex and was responsible for diverting the Thames to its present course.

This site provides a rare opportunity to study these two Ice Age deposits, and the junction between them, in one place. Also of particular interest are hard-water 'petrifying' springs, which are the source of crystal-clear streams that run in the cutting, depositing calcium carbonate 'tufa' and encrusting all the objects in the steam bed including leaves and twigs.

The site includes not only the ballast pit but also the section of the cutting westwards to Folly Bridge, which carries a farm track over the former line.



Date of selection/last revision: March 2020

Site Assessment. *Local Geological Sites (LoGS) in Essex are assessed using criteria based on DEFRA guidance. An assessment form is used which asks key questions under four value categories: scientific, educational, historical and aesthetic. This site has been assessed and qualifies under these criteria*

Scientific interest and site importance

The route of the former railway around the south of Great Dunmow is now occupied by the Dunmow bypass. From this road the route (the 'Flitch Way') continues over the river on an embankment and enters a cutting, the eastern end of which has been enlarged to create the ballast pit.

The geology of the hill in which the cutting is excavated consists of London Clay bedrock overlain by Kesgrave Sands and Gravels and capped by Anglian Till. The London Clay outcrops at the eastern end but the ballast pit was excavated in Kesgrave Sands and Gravels. The base of the cutting (the track bed) here rises in a westerly direction at a gradient of 1 in 86 (Paye 2010). This gradient, together with the rising of the ground, means that the till appears at the highest level in the cutting and increases in thickness as you walk west, with a corresponding reduction in the thickness of the outcrop of the sands and gravels until they finally disappear beneath the floor of the cutting. The geology of the ballast pit was first recorded by Whitaker et al. (1878) as follows:

> A ballast-pit by the side of the railway-cutting, half a mile W. of Dunmow Station, gave the following section. The sands are false bedded, the lines trending eastward; the beds were observed and noted as they succeeded each other along the N. side of the section, but no thicknesses could be taken:
>
> Boulder clay (by the bridge over the line).
> Reddish and mottled clayey sand with pebbles (in places only).
> Fine gravel of rolled quartz pebbles, few flints.
> Yellow and whitish sand, with patches of whitish clay (thickens eastward).
> Fine gravel of rolled quartz pebbles.
> Yellow and whitish clayey sand.

The pit was next recorded by Hey (1980) who provided a pebble count from the gravel on 16-32mm fractions. Although it was only a small sample of 190 pebbles he found 71% flint, 20% quartz, 8% quartzite and 1% pinhole chert (Lower Greensand). No volcanic or other exotic rocks were found in Hey's sample, but they will be present. This pit is also referred to in Appendix 1 of Rose et al. (1999) and in Whiteman (1992). The latter has divided the Kesgrave Sands and Gravels into at least eight Thames terrace aggradations and states that this site provides an exposure of the Stebbing Gravel.

A visit in 2011 revealed no visible exposures but coarse, ferruginous, sandy gravel of classic 'Kesgrave' type was seen in the roots of fallen trees in the south side of the pit. Close to Folly Bridge the presence of till is indicated by chalk clasts in the soil. The site is important as it provides a potential exposure of Kesgrave Sands and Gravels and Anglian Till, and the contact between them, and is close to the town centre.

Also of scientific interest are the hard-water springs, which are the source of crystal-clear streams that run in the cutting. Dissolved carbon dioxide (CO_2) in rainwater (H_2O) soaks into the ground and has reacted with chalk (calcium carbonate - $CaCO_3$) in the boulder clay to form soluble calcium bicarbonate ($Ca(HCO_3)_2$). When the groundwater reaches the surface and comes into contact with the air, carbon dioxide is lost from the

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water and a hard deposit of cream-coloured calcium carbonate (tufa) is formed. Along the bed of the streams the lime-rich water has encrusted all the objects in the steam bed including twigs and other organic material. The stream beds are fortunately protected from damage by the board walk along the floor of the cutting.

References

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PAYE, P. 2010. **The Bishops Stortford, Dunmow and Braintree Branch**. 2nd edition. Oakwood Press.

ROSE, J., WHITEMAN, C.A., ALLEN, P. and KEMP, R.A. 1999. **The Kesgrave Sands and Gravels: 'pre-glacial' Quaternary deposits of the River Thames in East Anglia and the Thames valley**. *Proceedings of the Geologists' Association*. Vol. 110. Pages 93-116.

WHITAKER, W., PENNING, W.H., DALTON, W.H. and BENNETT, F.J. 1878. **Geology of the N.W. Part of Essex and the N.E. Part of Hertfordshire**. Memoirs of the Geological Survey. HMSO. Page 43.

WHITEMAN, C.A. 1992. **The palaeogeography and correlation of the pre-Anglian glaciation terraces of the River Thames in Essex and the London basin**. *Proceedings of the Geologists' Association*. Vol. 103. Pages 37-56

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