Bawdsey Manor Cliff [TM 339380]

From the quayside car park (TM 332378) walk south and eastwards around the manor, past the Pulhamite artificial stone cliff. You will then find Pliocene Red Crag, a shelly sand, overlying the London Clay. Well records show the Clay to be 26.5m thick here. It is exposed for over 1km in the cliff and on the foreshore at extreme low tide. Although cliff falls may mask it, the boundary with the overlying Red Crag is often seen. Pyritised wood and lignite is often washed out on the beach and the occasional shark tooth may be found. Sea Kale (*Crambe maritima*) and the Yellow Horned Poppy (*Glaucium flavum*) can be seen growing on the beach shingle above the high water line.

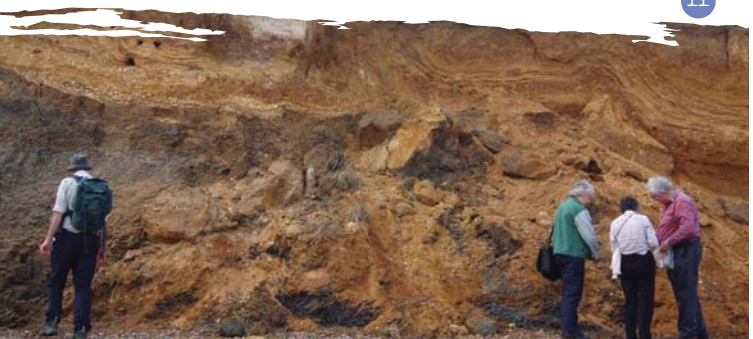
Harkstead Shore [TM 187340]

A footpath from the Bakers Arms pub (TM 187347) takes you down to the shore; then turn east and walk along the beach until you come to good exposure in the cliffs. Ash bands and layers of calcareous mudstone (septaria) can be seen. The Harwich Stone Bed is the most prominent mudstone layer, 30 cm thick, outcropping low in the cliff. Note the fallen blocks of septaria littering the beach. Small faults are well displayed in the cliff. This part of the river is known as Copperas Reach, a reference to the abundant pyritised (iron sulphide) material from the London Clay, once collected for use in tanning and dyeing, and for making sulphuric acid.

Ramsholt Rocks [TM 298428]

It is a long but scenic walk northwards along the river wall footpath from the Ramsholt car park (TM 308414) to "The Rocks", a low cliff and foreshore with London Clay and, sometimes, Coralline and Red Crags exposed.

10. Harkstead Shore - General view
11. East Lane - London Clay overlain by Red Crag



SAFETY

GeoSuffolk takes safety extremely seriously.

- Visit sites only at low tide – access is otherwise difficult; check tide times before visiting sites.
- The cliffs are unstable and liable to collapse at any time; keep away from the cliff tops and faces, and beware of falling material.
- Tidal currents are very strong; keep away from the water's edge, particularly where there is loose shingle.
- This is an actively eroding coast and beach levels may change. Public foot-paths may therefore temporarily be closed. Please check before using them.
- Follow the 'countryside code'.
- Keep to public footpaths and do not climb the cliffs or go onto private property.
- Be aware of uneven ground and trip hazards.
- The London Clay is very slippery – take great care when walking on it.
- Wear appropriate clothing for the locality and time of year.

It is recommended that Ordnance Survey sheet 197 in the 1:25,000 "Explorer" series is used in conjunction with this leaflet. The London Clay sections described lie within Suffolk Coast & Heaths Area of Outstanding Natural Beauty, designated in 1969.

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FURTHER INFORMATION

This leaflet is published by GeoSuffolk. We aim to promote understanding and appreciation of Suffolk's Earth Heritage. To find out more, visit our web-site www.geosuffolk.co.uk. To contact us: info@geosuffolk.co.uk or care of The Museum, High Street, Ipswich, Suffolk IP1 3QH.

Suffolk Coast & Heaths Area of Outstanding Natural Beauty

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Looks at the **London Clay**

Ramsholt Rocks - a general view

East Lane - Pyritised wood on the London Clay surface

East Lane - rotational slips

GEO Suffolk

looks at the **LONDON CLAY**

The London Clay...

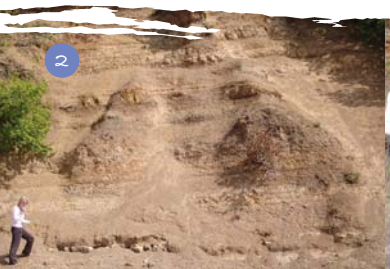
comprises brown and grey muds and silty muds deposited in a shallow sea during the Eocene Period about 53 million years ago over much of Essex and Suffolk. Large rivers carried the sediment out to sea, up to 100m deep, where it settled and compacted on the sea floor.

England had a warm subtropical climate, with luxuriant rain forest and mangrove types of vegetation on land. Large sluggish rivers swept sediment and plant debris, logs and branches, seeds and fruits out to sea. Much is preserved now as pyritised fossil wood and can easily be found on Bawdsey, Ramsholt, Harkstead and Nacton beaches today.

Many species of sharks and other fish swam in the seas – you may be fortunate enough to find fossil shark teeth on the beaches, having been washed out of the clay by the waves. Other vertebrates include turtles, and a small, poor invertebrate fauna has been found. The London Clay has also yielded tiny rare bird bones.

The lower part of the London Clay, known as the Harwich Formation, contains thin layers of pale creamy yellowish rust-coloured sediment, seen at Nacton and Harkstead. These are layers of volcanic ash, originating from volcanoes as the North Atlantic opened up. The ash was blown by the wind from the volcanoes into the North Sea area. The layers can be correlated over the North Sea Basin and similar layers are found in Denmark & NW Germany. Over 30 layers are recognised in Suffolk and northern Essex – most are 10-80mm thick, weathered, and can contain graded bedding and cross-lamination. The ash content comprises angular, brown glass shards, crystal fragments and tiny lithic fragments. You might also see layers of pale hard calcareous mudstones, called "septaria".


1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BUILDING MATERIALS

Septaria are widely used in Suffolk's Norman churches, most often in conjunction with Caen limestone. They outcrop from Bawdsey southwards along the coast and up the Deben and Orwell estuaries on the foreshore and in cliffs. They were also obtained offshore by dredging. At Dunwich the stylish Norman/Early English architecture of the Leper Chapel ruin can be seen, with finely carved Caen stone windows and arches and contrasting darker brown septaria. Orford Castle owes its imposing dominance to dark septaria.

Septaria fracture and weather easily, sometimes leading to collapse, as the churches of Orford and Alderton testify. Repair and restoration has been a constant theme!


4


5

Septaria were once used for making 'Roman' cement. Developed in the 1780s, it was made obsolete by C19th Portland Cement.

Bricks did not become much used until the reigns of Henry VIII and Elizabeth I, when they became most fashionable – for example in Seckford Hall, built in the 1540s, and the Tudor towers of Waldringfield and Hemley churches. Later, as their use became more widespread, many local clay and brick pits were developed in the London Clay.

SPRINGS

Where porous, permeable sands lie above the London Clay springs and water seepages often occur. Migrating ground water cannot pass through the impermeable clay so emerges at the surface at the sand/clay boundary to form a spring line. Such springs can be observed at Christchurch Park, Ipswich. The springs have been harnessed since the earliest days of the town for water supply, medieval fish ponds, formal ornamental garden ponds and wildlife havens.

Red Crag sands overlie London Clay at Newbourne Springs Wildlife Trust Nature Reserve, noted for the contrast between marshy muddy valley floor on the Clay and dry sandy valley slopes of the Crag. Spring sapping processes can be observed; pools develop where springs emerge and may contain a litter of shell fragments washed out of the Crag by the water.

1. Nacton Shore - Creamy yellow ash band
2. Nacton Shore - General view of cliff
3. Nacton Shore - The Harwich Stone Bed a prominent layer of calcareous mudstone
4. Orford Castle - Detail
5. Orford Castle - Dark Septaria contrast with pale Barrack and Caen Limestone
6. East Lane - General view
7. Nacton Shore - General view
8. Nacton Shore - Note the well diplayed fault
9. Nacton Shore - Note the gentle fold

OUTCROPS

East Lane [TM 355396]

From the B1083 in Bawdsey village, follow the public foot path [from TM 347393] to the beach. The Martello Tower lies about 750m to the northeast. Note the well exposed London Clay wave-cut platform and cliff. About 5m of blue grey clay can be seen and is actively being eroded by the sea. Pyritised wood is common and the occasional shark tooth can be found.

In the cliff, the unconformity with overlying Red Crag and its basal pebble bed, containing many phosphatic nodules, can be seen.When viewing the wave-cut platform from the beach or cliff top, the bedding in the London Clay can be picked out quite clearly, showing that the Clay has been gently folded.


6

Nacton Shore [TM 225387]

From Nacton village follow the signs southwards to the picnic site car park [TM 219391]. When on the beach, walk eastwards 500m to the start of the cliff section.

There is an excellent exposure of London Clay in the 15m cliff. Bands of septaria can easily be identified, and thin pale creamy yellow ash bands can be seen. Small faults and folds occur. The occasional shark tooth might be found, and twig-sized pieces of pyritised wood may be washed out on the beach. Rotational landslips are notable features of the cliff landforms.


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