

Geological Succession:

Holocene:

At the end of the Ice Age when the ice sheets melted, about 10,000 years ago, the sea level rose to 'drown' the Deben valley to form the estuary we see today. Salt-marsh and mud-flats have subsequently developed.

Pliocene:

Red Crag Red-coloured sands deposited in a near-shore shallow tidal sea about 2.8 million years ago, displaying classic sedimentary structures and containing abundant fossil molluscs.

Coralline Crag Fossiliferous pale creamy sands deposited about 3.8 million years ago in shallow seas, often cemented to form a limestone hard enough to be used as a building stone.

Miocene:

Not seen *in situ* but sometimes found as pebbles, historically called 'Boxstones' of hard brown sandstone, sometimes containing moulds of fossil molluscs, deposited about 7-10 million years ago.

Eocene:

Brown/grey London Clay deposited about 50 million years ago in a shallow sea. Pyritised wood derived from the clay can be found easily on Bawdsey beach and at Ramsholt Rocks.



The Pulhamite Cliffs at Bawdsey

SAFETY

Suffolk RIGS takes safety extremely seriously.

- ◆ Beware of collapsing cliff faces and falling material.
- ◆ Tidal currents are very strong; keep away from the water's edge, particularly where there is loose shingle.
- ◆ 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.
- ◆ Wear appropriate clothing for the locality and time of year.

Further Information

This leaflet is published by the Suffolk RIGS Group. We aim to promote understanding and appreciation of the ge-resources of Suffolk and may be contacted at The Museum, High Street, Ipswich, Suffolk IP1 3QH. Suffolk RIGS wishes to acknowledge the financial support of English Nature.

It is suggested that Ordnance Survey sheets 197 and 212 in the 1:25,000 "Explorer" series are used in conjunction with this leaflet.



Bawdsey Manor, with the 'Pulhamite' cliff below and the Red Crag and London Clay beyond



To find out more, contact Ipswich Museum 01473-433 550, or English Nature Suffolk Team on 01284-762 218.

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GEO! Suffolk

The Deben Estuary

Places to visit of
Geological Interest



All Saints Church, Sutton
unique building stones

The Deben Estuary

1 Kyson (Kingston) Hill

A former London Clay brickpit at Kyson Quay, now with a dwelling built in it, yielded mammal teeth and a jaw fragment in 1837. These were thought by Richard Owen to be an extinct Eocene monkey, *Macacus eocaenus*. These, with more teeth found in 1841 were identified by Owen as *Hyracotherium cuniculus*. It was later thought that *Hyracotherium* was in fact *Eohippus* - an early form of horse. Following further finds at Ferry Cliff, on the opposite bank of the Deben, *Hyracotherium cuniculus* was re-assigned to a new genus, *Cymbalophus*.

Access: Park at Broom Heath car park and viewing point on Broom Heath at the top of Kyson Hill (TM265478); proceed by foot from there. Or walk along the river wall foot-path from Woodbridge Quay or Martlesham following the signed "Fynn Valley Walk".

2 Woodbridge

As well as being a charming market town worthy of exploration, several examples of early 'Pulhamite' - moulded ornamental plasterwork - can be seen: a phoenix at 18 Thoro'fare, an animal head at 30 Thoro'fare, 2 heads above doorway arches at 1 New Street, 2 heads at 31 Cumberland Street. Further examples can be examined at the Museum on Market Hill. Lime Kiln Quay is of historic significance. Stone was imported to make 'new' (Portland) cement and Roman cement in kilns here from 1822 by William Lockwood.

3 Melton Old Church - The Wood Graves

Searles Valentine Wood (1798-1880), his son, Searles Valentine Wood 'junior', (1830-1884) and their wives are buried in Grave 37 in the SE corner of the graveyard and have memorial tablets inside the church. Many more members of the Wood family are also buried in the graveyard. S.V.Wood 'Sen' is best known for his monographs on the Crag Mollusca (1848-1882). S.V.Wood 'Jun' made the first attempt to map the "Glacial Beds" and was considered the "parent of drift research in England".

Access: Church Lane is off the B1438 north of Melton village; the Old Church is at TM296514.

4 Newbourne Springs

The open valley of this Suffolk Wildlife Trust nature reserve demonstrates the contrast between the marshy, peaty, muddy valley floor of impermeable London Clay and the dry sandy valley slopes of permeable Red Crag. Several springs issue from the junction between the two rock-types and 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. Nearby 'Crag Cottage' attests to the local rock-type.

Access: there is a car park at the entrance to the Reserve at TM274433.

5 All Saints Church, Sutton

Of interest are the building materials used externally to face the walls during the 1854-1860 restoration work. Mostly dressed flints were used, some containing belemnites and sponges. However, many of the pebbles are 'Boxstones'. The remainder are London Clay septaria and a variety of metamorphic rocks. Many of the flints are encrusted with Red Crag barnacles or with shells adhered to them. Evidently most of the pebbles were waste material from nearby 'coprolite' pits. 'Coprolites' (phosphatic nodules) derived from the London Clay and found in the Crag were extracted to make fertiliser; the industry was centered around the Deben Estuary from the 1840s to the 1880s and employed many hundreds of men.

Access: parking is outside the church at TM 306464

6 All Saints' Church, Waldringfield

The church restoration of 1862 used money raised by coprolite extraction from the adjacent glebe. The East window is a good example of Victorian stained glass and is known as 'The Coprolite Window'. There is also a memorial tablet to the Nobel Laureate scientist Sir William Lawrence Bragg. There are good views of the estuary from the south porch.

Access: the church has a small car park (TM 282443).

7a Ramsholt

The 'Rocks': Landslips occasionally provide exposures in this wooded river cliff. Some 2m of Coralline Crag has been recorded, overlain by Red Crag. London Clay outcrops low in the cliff and on the foreshore. Abundant Crag shells, and sharks' teeth and fish vertebrae derived from the London Clay, can be found washed out on the foreshore.

7b The Cliff:

Now over-grown, the river cliff once had good exposures of Red Crag. Landslips now provide temporary exposures, showing sandwaves and rippled shelly sands.

Access: park at the top of the hill leading down to the quay (TM 309414). A 2km walk along the river wall is needed to get to The 'Rocks' (TM398428).

8 Bawdsey Cliff

The cliff section was once considered the finest Red Crag exposure in Britain, but 50 years of talus accumulation now masks much of it. Rust-coloured Red Crag overlies London Clay (Harwich Formation). A patchy discontinuous pebble bed of phosphatic nodules may be seen at the base of the Crag. Large-scale current-bedding of sand waves is well-displayed; laminated rippled silts, mud drapes and other structures can also be observed. The fossil Crag molluscs are dominated by *Spisula*, *Mytilus* and *Mya* assemblages.

Access: as for Bawdsey Manor Cliff.

9 Bawdsey Manor Cliff

The cliff adjacent to the manor is made of 'Pulhamite', a man-made artificial stone of cement, crag, beach shingle and containing many modern whelk and oyster shells. It has a gritty sandstone texture and appearance, and resembles bedded rocky crags. It was named after James Pulham (1788-1838), a local Woodbridge plaster craftsman. The 'Pulhamite' forms a 400 yard cliff walk laid out as a landscaped Alpine rockery with meandering paths, tunnels and grottos for Lady Quilter of Bawdsey Manor in about 1896.

Access: parking is available at the quay (TM332378) and from there by walking along the beach.

10 Bawdsey Bar

A modern shingle spit and banks formed by long-shore drift from the north in a similar way to Orford Ness. Pebbles of brown Miocene sandstone ('Boxstones') can sometimes be found; some contain casts of fossils when broken open. Pieces of fossil bone derived from the Crag cliffs may also be found. Bawdsey was once a port and Tudor Woodbridge relied upon shipping but the strong currents and constantly shifting shingle make navigation into the estuary notoriously difficult.

Access: as for Bawdsey Manor Cliff.

