
15 Jurassic and Cretaceous rocks of the Market Weighton area

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Geological succession

The itinerary illustrates the late Cretaceous chalk succession and its basal unconformity on the Market Weighton Block. Surface features reflect erosion by meltwater along the main glacial overflow channel on the eastern side of the Yorkshire Wolds between Kiplingcotes and Market Weighton.

Logistics

This one-day excursion can be divided into two half-days (Localities 1–5 and 6–8). Private transport is recommended, as there is no public transport from Market Weighton to the Kiplingcotes area. All exposures are accessible by road, with roadside parking available, and little walking is necessary. Most localities require permission for entry to be arranged in advance and contact details are given in the locality descriptions below.

Note: Safety helmets should be worn near quarry faces.

Maps

O.S. 1:50 000 Sheet 196 Market Weighton; O.S. 1:25 000 Sheet SE 84/94 Market Weighton; B.G.S. 1:63 360 Sheet 72 Beverley.

Geological background

Throughout Jurassic and early Cretaceous times, the area around Market Weighton was subjected to the intermittent uplift of the deep-seated Market Weighton Block. This structure, about 20 km across from north to south, trending east–west and continuing eastwards beyond the Holderness coast, separated slowly subsiding regions to the north and south. Its persistent buoyancy, associated with minor periods of erosion, resulted in a marked thinning or complete absence of sediments of Jurassic and early Cretaceous age across the Block (Kent, 1980).

In the Goodmanham area, almost all the Jurassic succession is absent. Thin remnants of Middle Lias resting on Lower Lias are overlain unconformably by attenuated early Cretaceous Albion deposits referred to the Carstone (under investigation) and Hunstanton Formation (Red Chalk). Early Cretaceous beds below the Carstone are absent between Market Weighton and north Lincolnshire, where they gradually reappear to the south. Late Cretaceous white chalk of the Ferriby, Welton and Burnham Formations oversteps the region with indications of thinning in the Cenomanian (Figure 15.1). Near Rifle Butts Quarry ((Figure 15.2), Locality 1), a spring line indicates the base of the chalk.

The chalk of the area is generally harder than that of southern England, and in some sedimentary situations less pure chalks can be coloured red, pink or grey. Flint occurs commonly in the northern chalk succession with the exception of the lowest 30 m. The highest flints occur about 215 m above the base of the chalk at localities in the northeast of the region, where higher parts of the succession are seen.

Vast sheets of thick, grey flint (tabular flint) and intermittent flat flints (lenticular flints) occur, mostly parallel to bedding, at a number of horizons within the chalk, some providing important marker horizons which can be traced throughout the Northern Province chalk. Nodular and burrow describe other forms of flint.

Marl bands occur frequently in the chalk. They contain micro- and nannofossils which can be used biostratigraphically. Some of these bands provide important marker horizons which can be correlated throughout the region.

A review of chalk exposures in the Kiplingcotes and Market Weighton area, together with recent new and temporary exposures, has made it possible to establish a more detailed local succession, 125 m thick, which extends from the basal Albian Hunstanton Formation up to the *Micraster cortestudinarium* Biozone of the Coniacian in the Burnham Formation (Figure 15.1). A section created during the construction of the Market Weighton bypass [SE 895 420] to [SE 885 910] exposed thin representatives of the Lower and Middle Lias, overlain by thin beds of Carstone (0.5 m) and Hunstanton Formation (1 m) and about 5 m of Lower Cenomanian chalk. The Lias beds yielded a fauna of bivalves and ammonites, whilst the belemnite *Neohibolites* was recovered from the Hunstanton Formation and the bivalve *Inoceramus crippsi* from the Cenomanian. This is now grassed over.

During construction of the Market Weighton pumping station [SE 889 419] in 1966–7, a large excavation exposed the lower part of the Cenomanian chalk up to and just above the Totternhoe Stone. The latter yielded large examples of the ammonite *Parapuzosia (Austiniceras) austeni* and the brachiopods *Ornatothyris* and *Rectithyris*, with *Inoceramus crippsi* in lower beds. The underlying Hunstanton Formation and Carstone were exposed in the base of the foundations, where the former yielded the brachiopod *Moutonithyris dutempleana* and the belemnite *Neohibolites minimus*. The Carstone contained many large polished pebbles and the matrix was generally coarser than that exposed in the Melton and South Ferriby quarries further south.

Chalk from the numerous small pits and quarries appears to have been used mainly in the construction of local railway embankments, roads and farm tracks. Some of the softer chalks were also used for the liming of agricultural land.

A number of glacial overflow channels incise the surface of thin tills and the underlying chalk of the eastern flank of the Yorkshire Wolds. The main channel is the Goodmanham Channel (previously the Market Weighton Spillway), cut between Kiplingcotes and Market Weighton and now a dry valley. It was a direct overflow, by which the drainage of an aligned series of channels along the eastern side of the Wolds was taken into the Vale of York (de Boer *et al.*, 1958)

The height of flow probably originated at 82 m O.D., with the outlet at about 52 m O.D. Some dry gullies can still be seen, the best known of which runs down to Rifle Butts Quarry ((Figure 15.2), Locality 1). The disused railway track from Beverley to Market Weighton follows the broad, flat base of the spillway. Some parts of the fairly steep-sloping sides of the spillway exhibit grooved horizontal ridges which may have been formed by fast-moving meltwaters cutting through the chalk as the levels of the flow reduced. Extensive deposits of gravels in the Market Weighton area were probably laid down by meltwaters as they flowed into Lake Humber.

Tills (Newer Drift) of Devensian age cover the eastern flanks of the Wolds, but thin away at about 62 m O.D. These clays contain irregular-shaped chalk fragments, Cheviot igneous rocks, Silurian greywackes, sand streaks, laminated silts (containing lumps of till) and chalk gravels and flints of morainic origin.

Excursion details

Roadside parking is available at Locality 1, Rifle Butts Quarry, and Localities 2 and 3 are within easy walking distance. Proceed by car to locations 4–5, 6–7 and 8 following the route shown on the map (Figure 15.2). Parking on verges is possible at all locations and a car park is located at Kiplingcotes Station.

Locality 1, Rifle Butts Quarry, a Yorkshire Wildlife Trust Nature Reserve [SE 898 426]

It is not necessary to gain permission for small groups to enter. For large groups, contact the Warden (Mr G. Scaife, 24 Rossington Road, Hunters Bar, Sheffield, S11 8SA; tel: 01742 660663) or Yorkshire Wildlife Trust, 10 Croft Green, York, YO1 1JT; tel: 01904 659570]

The geological section here is managed by Hull Geological Society. It is subject to erosion in the winter months and instability of the overlying chalk. Protective measures designed to prevent further deterioration of this important exposure include the erection of a protective canopy in 1993, kindly funded by English Nature and the Geologists' Association Curry Fund. The site is an S.S.S.I. and **hammering is prohibited**.

This is the only known exposure in the region at the present time where the attenuated Jurassic succession and early Cretaceous unconformity resulting from the effects of the Market Weighton Block can be observed. The lowest beds contain large ferruginous nodules in a brown gritty matrix and are thought to be of Middle Lias (early Jurassic) age. These are overlain by thin remnants of Carstone, a ferruginous sandy deposit containing polished pebbles, and about 1 m of nodular red chalk of the Hunstanton Formation (Albian, early Cretaceous). The sequence is capped by fractured and faulted Cenomanian (late Cretaceous) grey and white chalk of the Ferriby Formation. In the past, the Hunstanton Formation has yielded the brachiopods *Moutonithyris dutempleana*, *Platythyris capillata*, the belemnite *Neohibolites minimus* and the echinoid *Hemiaster* sp. Fossils from the Cenomanian chalk are the bivalve *Inoceramus crippei*, and echinoids *Holaster subglobosus* and *Camerogalerus cylindricus*.

Locality 2, bank above and east of Rifle Butts Quarry [SE 901 427]

Permission for access is required from the landowner (Mr P. R. Sawyer, Rectory Farm, Goodmanham; tel: 01430 872251)

Several small, ridged, horizontal exposures in the chalk occur in the side of the valley, possibly due to either soil creep, or furrowing by ice movement or meltwaters. These exposures are mainly confined to the Lower Pink Band occurring above the Totternhoe Stone in the Ferriby Formation (Figure 15.1), although fragments of the ammonite *Parapuzosia* (*Austiniceras*) *austeni* (mainly confined to the Totternhoe Stone at this horizon) have been found on the scree. The Pink Band yields the rare small belemnite *Belemnocamax boweri*, together with brachiopods *Terebratulina etheridgei* and *Concinnithyris concinna*, and the echinoid *Camerogalerus cylindricus*.

Locality 3, Springwells pumping station [SE 900 426]

Permission for access is required from the landowner (Mr P. R. Sawyer, Rectory Farm, Goodmanham; tel: 01430 872251)

A single, narrow-banded exposure, similar to Locality 2, and about 1 m wide, can be seen from the road about 250 m northeast of the pumping station in the south side of the valley. The unit seen is the Black Band, a series of khaki marls with dark-coloured bands in the middle part, also known as the Plenus Marls. This horizon occurs at the top of the *Holaster trecensis* Biozone, just below the top of the Cenomanian Stage and is much thicker here compared with other locations north of the Humber, forming an important widespread marker horizon in England, northwest Germany, northern France and in boreholes in the North Sea. Its average thickness in Yorkshire is 0.5 m, and 1 m at Buckton Cliffs on the coast east of Speeton.

Locality 4, Kiplingcotes Pit, a Yorkshire Wildlife Trust Nature Reserve [SE 916 435] (Pit 37 of Wright & Wright (1942))

For parties of more than 6 people, it is necessary to seek permission from the Trust (to Toft Green, York, YO1 1JT; tel: 01904 659570)

The site is an S.S.S.I. and **hammering is prohibited**.

Access is via the reserve. Note the broad, flat valley floor of the Goodmanham Channel. This former rail-side pit exposes horizontal beds of the Welton Formation, fairly high in the *Terebratulina lata* Biozone of the Turonian chalk, and although the lower beds are obscured by scree, it is still possible to examine the Lower and Upper Deepdale Marls near the top of the exposure (Figure 15.1). Fossils include bivalves of the *Inoceramus lamarcki geinitzi* —*I.I. cuvieri* group, the brachiopods *Concinnithyris* and *Orbirhynchia*, and the echinoid *Salenia granulosa*, as well as the first appearance of the distinctive echinoid *Infulaster excentricus*.

Locality 5, pit in lane opposite Locality 4 [SE 918 434] (Pit 39 of Wright & Wright (1942))

Permission for access is required from the landowner (Mr D. Hiles, Goodmanham Lodge Farm, Goodmanham; tel: 01430 810572]

This small exposure, about 5–6 m thick, occurs in the lower, middle beds of the *Sternotaxis plano* Biozone of the Burnham Formation. Four thick tabular flints are exposed, and the section lies in the Ulceby Marl and Wooton Marls interval (Figure 15.1). A shallow trench in the pit floor has recently yielded a few fossils, including fragments of inoceramid bivalves, the brachiopod *Orbirhynchia* and the echinoid *Echinocorys*.

Locality 6, Arras Road Pit, Kiplingcotes [SE 928 433] (Pit 40 of Wright & Wright (1942); Whitham (1991))

If working, permission for access is required from T. Woodliffe, Yapham Road, Meltonby, York, YO4 2PH; tel: 01759 304202. The section in this pit, recently worked and greatly extended, exposes about 12 m of the mid part of the Burnham Formation, from just below the Enthorpe Marls, a series of four marl bands in 2.5 m of chalk, up to the lowest unit of the Kiplingcotes Flints. The three Kiplingcotes Marls are well exposed in the higher part of the sequence. Fossils include the echinoids *Sternotaxis placenta*, *Micraster corbovis*, bivalve *Pycnodonte vesicularis*, brachiopods *Gibbithyris semiglobosa*, *Orbirhynchia* sp., the coral *Parasmilia*, and several species of inoceramid bivalves. The important rare bivalve *Didymotis? uermoesensis* occurs just below the middle Kiplingcotes Marl and marks both the boundary between the *Sternotaxis Plana* and *Micraster cortestudinarium* Biozones and the international boundary between the Turonian and Coniacian Stages. This horizon also marks the upper limit of the range of *S. placenta*. [Note. The above description is retained here, but, unfortunately, the pit has been the subject of much illegal tipping, and the exposures are mostly obscured.]

Locality 7, Kiplingcotes Station Quarry [SE 932 437] (Pit 38 of Wright & Wright (1942))

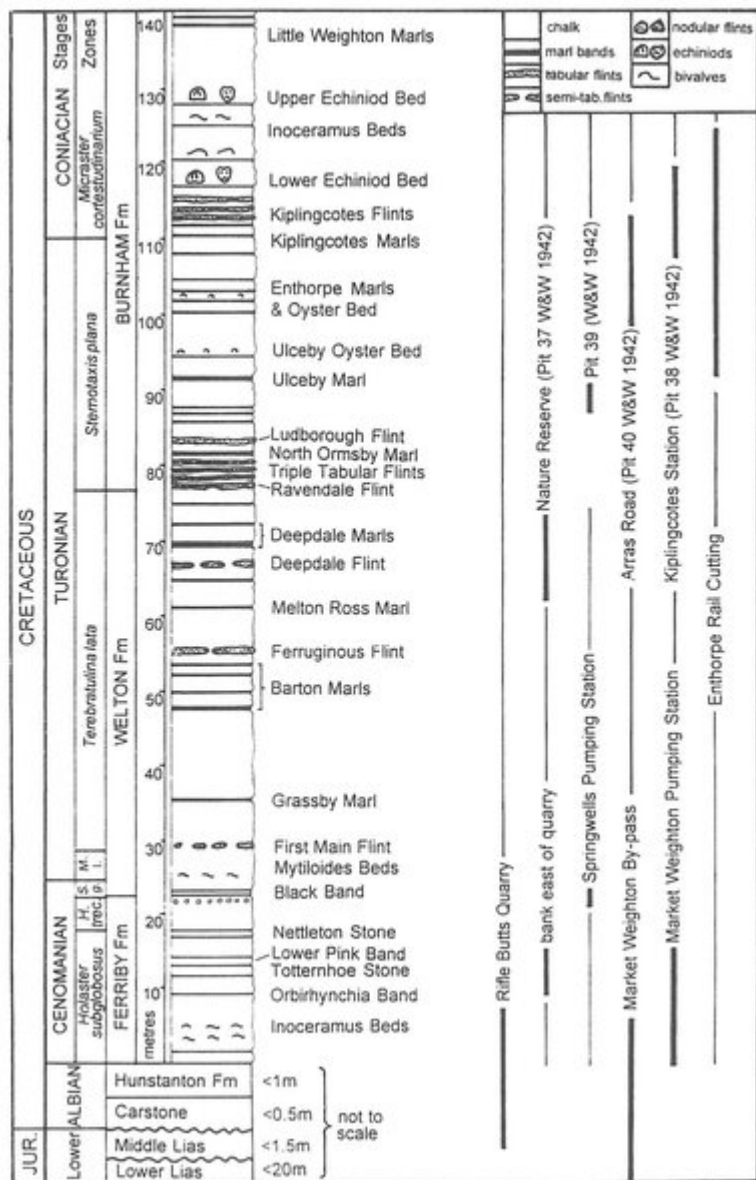
Information for access is required from Kiplingcotes Classic Furniture, Station House, Kiplingcotes; tel: 01430 810284. The section in this disused quarry exhibits the three Kiplingcotes Marls spread over about 2 m, with the overlying three semi-tabular Kiplingcotes Flints occupying about 2 m of the succession. Wright & Wright (1942) discovered iron-stained lenticular patches of nodular chalk containing large numbers of gastropods and bivalves preserved in iron oxide, thought to have been saved from destruction or excessive alteration on the sea floor by the collapsed shells of large ammonites. Fossils can still be found on the quarry floor in loose blocks, including the echinoids *Echinocorys scutata*, *Micraster* sp., several species of inoceramid bivalves, and the brachiopod *Orbirhynchia* sp. [Note. Although the original description is retained here, this pit has also suffered from illegal tipping, and the previous good exposures are no longer visible.]

Locality 8, Enthorpe railway cutting [SE 906 456]–[SE 914 459]; (? Pit 45 of Wright & Wright (1942))

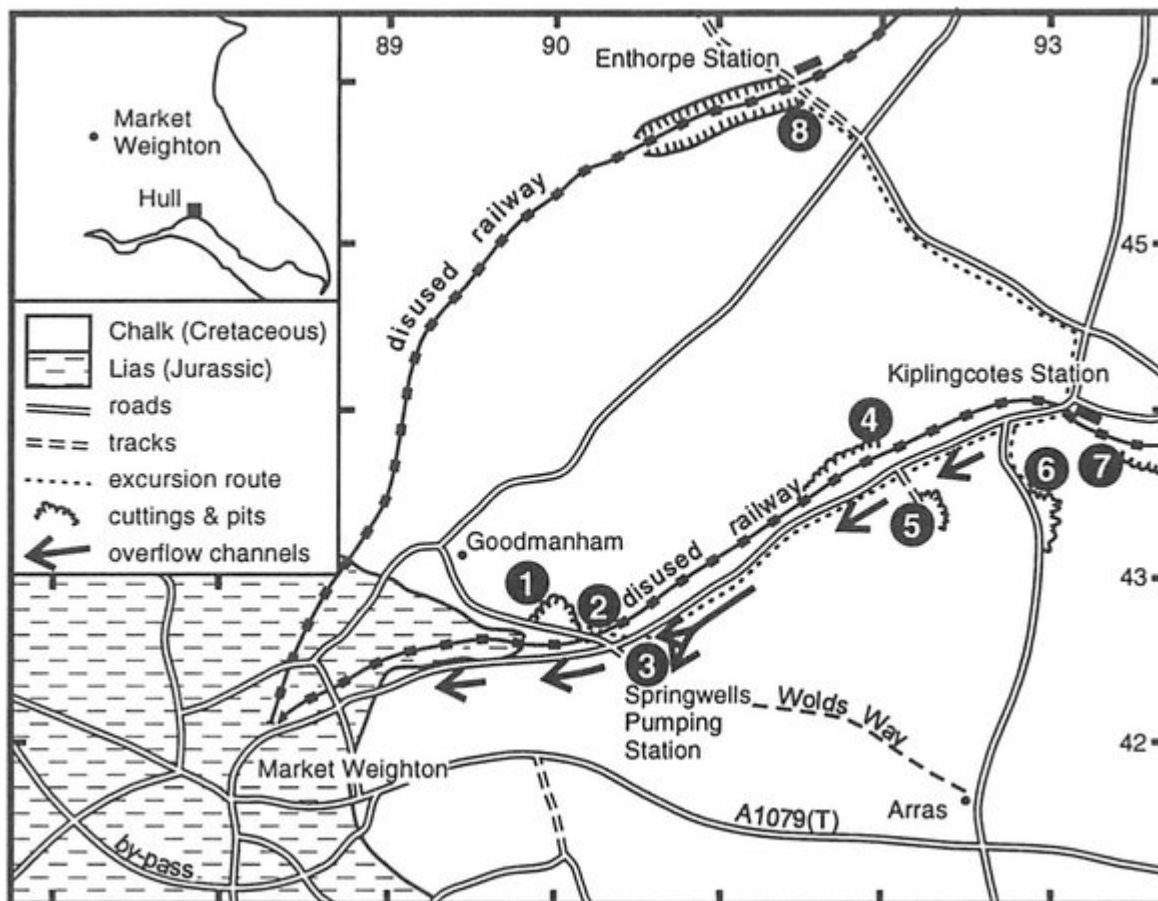
Permission for access is required from the landowner (Mr Emmerson, Rossmoor Farm, General Lane, Melbourne, Near York). The disused railway cutting at Enthorpe is about 0.75 km long and trends east–northeast. Access is difficult, as banks are overgrown, and care should be taken. About 30 m of Burnham Formation chalk is exposed, the lowest 16.5 m in the *Sternotaxis plana* Biozone, with the lowest beds marked by the Ulceby Marl at the southwest end of the cutting. The upper 13.5 m is referred to the *Micraster cortestudinarium* Biozone with the highest beds seen near the old station bridge (Whitham 1991)

Fossils from the *S. plana* Biozone are similar to those found at Arras Road and the same sequence of beds occurs, including the Enthorpe Marls, and the Kiplingcotes Marls and Flints. The basal beds of the overlying *M. cortestudinarium* Biozone yield numerous specimens of the echinoid *Echinocorys scutata* and less common examples of *Micraster*. Several species of inoceramid bivalves occur, including *Cremnoceramus inconstans*, *C. schloenbachi*, *C. deformis* and *Inoceramus lamarcki*. [Section now mostly overgrown, but some exposures are still visible.]

[Bibliography](#)



(Figure 15.1) Geological succession in the Market Weighton–Kiplingcotes area.



(Figure 15.2) Sketch map of the Market Weighton–Kiplingcotes area.