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Geological Investigation of the Ashdown Beds at Fairlight, East Sussex

Integrated Geoscience Surveys (Southern)/English Nature
Commercial Report CR/05/040N

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View of the cliffs at Goldbury Point, Fairlight, Sussex.

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1 Introduction

1.1 PROJECT SCOPING

The coastline from Hastings eastward to Cliff End in Sussex is dominated by cliffs that expose a significant proportion of the Ashdown Formation, the lowest part of the Wealden succession described from the Weald of Sussex and Kent. The cliffs from East Hill in Hastings to Pett Beach, some 7.5 km distant to the east-northeast, are designated as a Site of Special Scientific Importance (SSSI) for its geological interest. These cliffs expose the most complete succession of terrestrial Lower Cretaceous rocks in Europe and are the principal exposure of the Ashdown Formation in the Weald.

Within this SSSI the Ashdown Formation is preserved in a low amplitude north-northwest to south-southeast trending anticline (the Fairlight Anticline) that cuts the coast between Lee Ness Ledge and Fairlight Cove. At the eastern end of this anticline adjacent to a bounding reverse fault (the Fairlight Cove Reverse Fault) the cliffs have suffered a catastrophic landslide. The British Geological Survey was commissioned by English Nature to report upon the accessible principal elements of the succession adjacent to the western limit of this landslide and to compare the beds identified with those exposed over the crest of the anticline to its opposite limb at Lee Ness Ledge (about 1.5 km to the west).

This report gives a historical appraisal of the data held at BGS for this SSSI, provides outline stratigraphical logs for the accessible portion of the cliffs between the landslide and Lee Ness Ledge and discusses the significance of the exposures presently visible.

1.2 TERMS OF REFERENCE

To provide a scientific basis on which to assess the likely impact of any proposed coastal defence structures on the scientific interest of the SSSI through: -

- Identifying and determining the scientific importance of the geological exposures affected by the landslip
- Comparing in terms of stratigraphy, palaeogeography and scientific importance the succession affected by the landslip with the equivalent succession exposed in the western limb of the Fairlight Anticline.
- Reporting, both in terms of reduction of strata exposed and on the ability to scientifically interpret the stratigraphical succession of the Ashdown Beds, should a stretch of the eastern limb be lost due to coastal protection work.
- Desk study to identify the geological successions likely to be present and interpretations of the geology.
- Confirm whether the succession found at Fairlight is repeated at Lee Ness and other possible locations.
- Log the successions at Fairlight Cove and elsewhere within the SSSI.

2 History of Research

The Hastings area was first surveyed on the one-inch scale and published as part of the 'Old Series' Sheets 4 and 5 in 1863 and 1864 respectively. The notes of the surveyors were incorporated in Topley's regional memoir on the Weald (1875). The original one-inch mapping was recast in the 'New Series' format as sheets 320 and 321, published with minor amendments in 1928, accompanied by a descriptive memoir (White, 1928). The most recent geological survey was carried out by R.A.B. Bazley, E.A. Edmonds, R.D. Lake, E.R. Shephard-Thorn and J.G.O. Smart between 1956 and 1970. The new 1:50 000 geological map for sheets 320/321 was published in 1980, and the 1:25 000 Hastings-Rye Sheet (in the 'Classical Areas of British Geology' Series) in 1977. In addition to the Memoir, an 'open file' report detailing supplementary material, additional sections, borehole logs and offshore geology was published by R. D. Lake and E. R. Shephard-Thorn in 1988.

The cliffs were first described in an outline stratigraphical account of the Cretaceous rocks of southern England by Coneybeare and Phillips (1822). A detailed sketch of the Hastings coast sections accompanied a short paper by Webster published in 1829. A wide-ranging stratigraphical account of the Jurassic and Cretaceous rocks of southern England including those exposed at Hastings was published by Fitton (1824 & 1836). In the latter paper he described the sections west of Hastings. His short account of the geology of the Hastings district (1833) includes useful local details. Fitton was the first to recognise that the Wealden sediments had been laid down in non-marine environments.

The more detailed work of Milner and Bull (1925) described the 26 miles of coastal section between Beachy Head and Cliff End. Sedimentological and stratigraphical data on the Wealden and Purbeck rocks have been provided by several cored BGS boreholes in south-eastern England. The most relevant to this study in this area being the Fairlight Borehole (TQ 81 SE 1 [TQ 8592 1173]) (Holliday and Shephard-Thorn, 1974) that provides the most comprehensive bed-by-bed description of a typical succession within the Ashdown Formation.

Environmental interpretations of the succession are based principally on the included flora and fauna, sedimentology and mineralogy and provide a reasonably comprehensive understanding of the conditions of deposition but there is still some argument on the exact interpretation of the whole environment.

Palaeontological research dates from the early 1800's including flora, macrofossils and spores (e.g. Hughes 1955, 1975, 1976). Ostracod faunas provided a broad zonal scheme of correlation and also an index of salinity. Morter (1984) reviewed Purbeck – Wealden bivalve faunas, in which he recognised a number of faunal assemblages, which could be matched with variations in palaeosalinity. Anderson and Bazley (1971) developed a 'faunicycle' scheme for the whole of the Wealden .

The occurrence of spherulitic siderite (sphaerosiderite) in the Fairlight Clays near Hastings were noted and described by Spencer (1925). The researches of P. Allen over about 40 years from the 1940's constituted a major contribution to the understanding of the Wealden sedimentary environments (e.g. Allen, 1949a, 1959,

1975, 1981). His studies used derivation of pebbles and heavy minerals and he first attempted to interpret the Wealden sediments in terms of broadly deltaic environments (1949a). This was superseded by a fluvial model in which the tectonic framework controlled sedimentary patterns (Allen, 1976, 1981). Stewart (1981a and b, 1983) subsequently modified Allen's model by recognising the importance of relatively high sinuosity, suspended-load channel deposits in the Wealden.

3 Data Sources

BGS Maps
Six-inch geological maps: TQ81 NE (1965-66)
1:50000 geological map 320/321
1:25000 geological sheet Hastings – Rye (1977). Classical Areas of British Geology.

BGS Books
Geology of the country near Hastings and Dungeness, Explanation of sheets 320 and 321, Osborne White (1928)
Geology of the country around Hastings and Dungeness: Memoir for 1:50000 geological sheets 320 and 321, Lake and Shephard-Thorn (1987).

Other BGS Records
Borehole records: Fairlight Borehole: TQ81SE 1 [TQ 8592 1173]. Depth: 396.7 metres. Core, log and interpretations. Petrological notes on specimens from the Fairlight Borehole (1978).
Field notebooks, draft field logs/sections.
Contour structure diagrams
Field Photographs (c.1980's) held in the BGS reference collection.

4 Geological Succession

4.1 SOLID GEOLOGY

4.1.1 Lower Cretaceous: General overview of the Wealden

The Wealden 'Series' includes a succession of mudstones, siltstones and sandstones which lie between the Purbeck Beds and the Lower Greensand of the Weald, and these strata have been stratigraphically divided into the Hastings Beds and the Weald Clay. The series is classified into mainly mud prone or sand prone divisions as follows:

	Weald Clay Formation	Up to 14 m (in district)
	Tunbridge Wells Sand Formation	up to 110 m
Wealden	Wadhurst Clay Formation	15 to 60 m
'Group'	Ashdown Formation (mainly sandy with	
	local clay facies called the 'Fairlight Clays')	115 to 215 m

The total thickness of the Wealden 'Group' (Hastings Beds) is about 380 m at outcrop in the western part of the district. In the east, at Dungeness, a reduced thickness of only about 165 m was indicated by trial boreholes.

It is thought that the Wealden sediments were deposited in predominantly freshwater environments in a large 'lake' or 'lagoon' that occupied much of the present Hampshire Basin and Wealden areas and extended eastwards into the Paris Basin. The sediments were mainly derived from source areas in London-Brabant massif to the north and Cornubia to the west, but there is also evidence for a southerly derivation (Amorican Massif) for some strata. The thicker sandy units are attributed to influxes of clastic sediment, possibly consequent on rejuvenation of the source areas by block-faulting and/or to increased precipitation as climates fluctuated. Most of the clay rocks were laid down in distal environments including bays and lagoons, but some were deposited in more proximal fluvial overbank environments.

Allen (1949a, 1959) recognised large-scale cyclical sedimentation within the 'Hastings Beds' and originally suggested that the siltstone-sandstone bodies within them were deposited in a series of prograding deltas, in which the following typical cyclothem is repeated several times:

— gradual passage or sharp break with erosion —

8 Thick dark ostracod clays. Beds of *Neomiodon*

7 Thin *Neomiodon* shell beds

6 Thin dark clay

5 *Equisetites* soil bed at top of alternating series of thin cross-laminated lenticular sandstone, siltstones and clays forming perfect passage from 4 to 6

4 Thin graded pebble bed. Top rippled; interior rippled and/or current-bedded

— sharp break with erosion —

3 Thick sandstone (in southern outcrops). Coarsens upwards

2 Thick lenticular siltstones and silty clays, in south forming passage upwards into 3

1 Thick silty clays. Locally red or red-mottled. Grades upwards into 2.

The red-mottled clays are taken to indicate periodic emergent conditions, which led to the partial oxidation of the clays and the development of soil profiles and sphaerosiderite. The red-mottled clays which occur within the Ashdown Formation and Tunbridge Wells Sand Formation differ, both in their scale of development and in the presence of sphaerosiderite, from those present at the top of argillaceous formations, which are thin and generally lack sphaerosiderite. The sphaerosiderite occurs as radially crystalline spheres, about 1 mm in diameter, commonly intimately associated with fossil root traces, in rocks which closely resemble Coal Measures seatearths. These rocks probably represent the development of plant communities and soil profiles on overbank alluvial deposits (Unit 1), but very rarely show any trace of a coal or similar organic deposit above the root horizon.

The massive sandstones (Unit 3) are typified by the Top Ashdown Sandstone and the overlying pebble beds (Unit 4) are taken to represent significant transgressive episodes. Allen (1959) recognised three major cyclothems in the Wealden 'Series', essentially pairs of sandy and muddy formations. These comprised (using his terms)

the Ashdown Beds and Wadhurst Clay; the Lower Tunbridge Wells Sand and Grinstead Clay and the Upper Tunbridge Wells Sand and Weald Clay. He later (1976) discarded his deltaic model in favour of a fluvial one in which alluvial and lagoonal mudplains were periodically invaded by sandy sheets laid down by braided rivers. In the new model each 'megacycle' is taken to represent a pulse of increasing stream energy caused by periodic uplift and subsequently, 'the mud-swamp regime re-asserted itself, once more with tenuous marine connections and/or sensitivity to evaporation'. Brackish-water faunas within the succession, such as those which characterise the Wadhurst Clay, reflect periods of reduced run-off and the consequent flow of saline water into the basin.

Allen (1981) subsequently modified his fluvial model by envisaging a proximal fan-apex zone, a medial braid-plain zone, and a basinal pro-fan zone of lagoons and bays.

Stewart (1981, 1983) suggested that some of the major siltstone-sandstone bodies were formed by lateral accretion as major channels migrated. Smaller-scale sand bodies represent minor point-bar sequences and alternate with overbank clays that were partially oxidised during periods of low water-table. Stewart's fluvial model involves much lower stream energies than Allen's and envisages meandering, rather than braided, streams with high suspended loads.

4.1.2 Ashdown Formation

4.1.2.1 Overview

The Ashdown Formation comprises sandstones, siltstones and mudstones with subordinate lenticular beds of lignite, sideritic mudstone and sphaerosiderite nodules. Although siltstones dominate the successsion in the east of the district, an upper sandy division about 30 to 50 m thick can be distinguished from the more argillaceous beds which make up the rest of formation and are locally red-mottled. These two divisions, the 'Ashdown Sands' and 'Fairlight Clays' of early authors, have a total thickness of between 180 and 215 m, although there is a marked attenuation immediately south-west of the district (Lake and others, 1987) and at Dungeness, where a thickness of about 115 m was proved in trial boreholes. The base of the Ashdown Formation has been taken at the top of the Greys Limestones Member of the Purbeck Group. At the junction with the overlying Wadhurst Clay Formation a bed of massive sandstone is generally, but not always present. This is the Top Ashdown Sandstone (Allen, 1949a) that is up to 10 m thick. The overlying Top Ashdown Pebble Bed is taken as the basal bed of the Wadhurst Clay Formation although locally the boundary may be more complex.

Although the formation has an extensive outcrop-in the Hastings district it is not possible to determine the full succession at any one locality. In the coast-section, east of Hastings the top 130 m are exposed, down to just below the Lee Ness Sandstone. Inland, the basal beds surround the Purbeck inliers, but elsewhere less than 100 m of the upper beds are typically present at outcrop. The BGS Fairlight Borehole [TQ 8592 1173] (Appendix 1) provided a fully cored succession of the Ashdown Formation, but the logs of previous deep boreholes tend to be unreliable for correlation because the silty lithologies were not distinguished by the drillers and were often erroneously classified as clays because of their plasticity in the wet state. BGS boreholes at Cooden, Icklesham, Little Maxfield and Westfield provided additional cored sequences of the upper part of the Ashdown Formation.

With the exception of plant and fish detritus and root traces, fossils are generally extremely rare. An ostracod horizon has been recognised in boreholes about 60 m below the top of the formation and estheriids occur at certain levels. Saurian footprints have been observed on the lower surface of the Lee Ness Sandstone and at other levels in the lower exposed part of the Ashdown Formation (Sarjeant, 1974). Well-preserved plant fossils have been collected from the 'Fairlight Clays' in the past and are found in several museum collections (Watson, 1969, 1958) have also published studies of Wealden plant spores.

4.1.2.2 SEDIMENTARY FACIES

Sedimentary facies are best studied in cored boreholes or on the excellent coastal sections. In the inland areas where exposures are generally poor, it is difficult to relate the evidence from restricted exposures to sedimentary facies with confidence. For example, coarsening-upward sequences are believed to be present in the Westfield area, but locally it has proved difficult to distinguish this style of sedimentation from that present at the Ashdown Formation – Wadhurst Clay Formation boundary. Further difficulties are experienced with some of the clays in the upper Ashdown Formation which superficially resemble those in the Wadhurst Clay Formation in the weathered state; typically the mudstones of the Ashdown Formation weather to ochreous and pale grey mottled silty clays and are readily distinguished from the khaki or greenish grey clays of the Wadhurst Clay Formation.

Channel-fill deposits

Broad flat-bottomed channels occur at several horizons in the Ashdown Formation of the Hastings – Cliff End coast section. The channels are typically floored with a mud-flake conglomerate, consisting of clasts of ferruginous mudstone and siltstone with plant detritus and rare bones, and with a matrix of variable grain-size. Where sand predominates, large-scale cross-beds are present whereas rhythmic alternations in grain-size characterise the finer-grained infills that commonly contain abundant comminuted plant detritus. The largest example [TQ 882 122] near Haddock's Cottages (Plate 3) was described by Allen (1962, p. 221; 1976, p.394) and Stewart (1983, fig.4, p.375). Local examples of dewatering structures suggest intervals of rapid sedimentation.

Coarsening-upwards sequences

These sequences are 3 to 6 m thick and have been identified in borehole cores and exceptionally in coastal sections. Characteristically the following lithologies are present in descending order:

— Erosion surface —

iii Sandstone, lignitic, cross-bedded passing down to

ii Siltstone, variably laminated or bioturbated, with estheriids, passing down to

i Mudstone, silty with plant fragments and roots

— Erosion surface —

The siltstone unit may alternatively comprise rhythmic alternations of dark silty mudstones and siltstones, giving a striped appearance. Although the evidence is

limited it is possible that these cycles may persist laterally over some distance (Lake and Young, 1978 p. 15).

Coarsening-upward sandstones

This facies is comparable to, but coarser-grained than, that above and units (i) and (ii) are condensed or absent. The sandstones contain increased amounts of argillaceous material downward and are capped with a pebble bed or are coarse grained towards their tops. These beds are laterally persistent and sheet-like and are characterised by the Top Ashdown Sandstone.

Red-mottled argillaceous beds

The clays of the lower part of the Ashdown Formation, the 'Fairlight Clays' of early authors, typically show colour mottling in shades of grey, green, red, brown, yellow and purple. In borehole cores the mottling is locally vertically aligned, suggesting association with root formation. Sphaerosiderite, which is abundant in this lithology is scattered unevenly and is commonly associated with roots or forms ovoid aggregates up to 0.3 m in diameter.

Comparison with similar lithologies in the Tunbridge Wells Sand Formation, suggests that the colour mottling of argillaceous beds is probably impersistent and they may pass into grey beds.

4.1.2.3 CORRELATION OF THE UPPER ASHDOWN FORMATION

Although many of the variations in grain-size of these rocks are oscillatory, distinct coarsening-upwards and fining-upwards sequences were recognised in places. The fining-upward sequences were generally associated with channel fills.

A tentative correlation is made between six of the borehole sequences in the upper Ashdown Formation (as seen in cored boreholes at Glynleigh [TQ6085 0637] (on Sheet 319), Penhurst [TQ7050 1634], Westfield [TQ8204 1614], Little Maxfield [TQ8414 1532], Icklesham [TQ8763 1586] and Fairlight [TQ8592 173]). These show an overall tendency to coarsen upwards to a level, approximately 25 m below the top of the Ashdown Formation, above which finer-grained sediments recur. The higher strata show a progressive tendency to coarsen upwards and within these beds coarsening-upwards cycles culminate in the Top Ashdown Sandstone; bivalves occur near the base of the upper beds in the Icklesham Borehole.

4.2 STRUCTURE

The coastal cliffs between Goldbury Point and Cliff End are divided into three main sections by two major reverse faults; the Haddock's Reversed Fault and Fairlight Cove Reversed Fault. The cliffs to the west of the Fairlight Cove Reverse Fault are also dominated by the Fairlight Anticline.

As with many of the faults shown on BGS maps, particularly those within softer sediments and which also show various phases of movement, the Fairlight Cove and Haddock's reversed faults are likely to comprise more than one single fault plane.

Only detailed study of clear exposures or closely spaced boreholes is likely to give a comprehensive answer to this problem. In the case of the Fairlight Cove Reverse Fault the outcrop is obscured and confused by the landslide, and indeed may well be a contributory factor in its development. Further study would be required to elucidate this problem and is beyond the scope of this report.

4.3 GEOHAZARDS: LANDSLIDES

In the inland parts of the district there are a number of small-scale landslides, chiefly involving slopes in Wadhurst Clay Formation strata. Most of the landslips appear to have originated during the Devensian or early Flandrian periods. Much larger landslips occur along the coast between Hastings and Cliff End, including the area of interest for this project. The slips are developed mainly in Ashdown Formation strata, particularly where clays are exposed at the foot of the cliffs. They range from rotational slips involving 50 metres or more of strata to minor mud-flows. Several of the slips are compound in nature having a rotational style on their landward side and passing into debris flows and mud slides seaward. It is evident that large volumes of material are being transported down the cliffs by this mechanism. This results in over-steepening of the scarp of the overall landslip and ultimately collapse.

The Fairlight cliffs are undefended except for a 0.5 km length below Sea Road that is protected by a rock bund to prevent further undercutting of the cliff along this length. These defence works were constructed in 1990 following concern in the mid-1980's over the increasing rate of erosion of the cliffs between Haddock's Fault and Fairlight Cove Fault.

5 The coastal sections

5.1 INTRODUCTION

The cliff sections of the Hastings district provide excellent exposures in the Ashdown Formation and basal Wadhurst Clay Formation (Hastings Beds) of the Wealden Group and are the type area for these beds. This account provides details of the major section along the coastline between Lee Ness Ledge and the landslide east of Goldbury Point, which include a succession of rocks from low in the Ashdown Formation to the basal Wadhurst Clay Formation. The latter formation is not described from sections included here as it forms the highest and inaccessible uppermost part of the cliffs.

The special 1:25 0000 geological sheet 'Hastings–Rye' (in the 'Classical Areas of British Geology' series) is a useful complement to the descriptions given below.

Some parts of the sections are only accessible at certain states of the tide and it is essential to consult tide tables and to plan excursions with an adequate safety margin to reach a suitable access point. In addition some of the higher cliffs are dangerously unstable, so that it is not advisable to work on or close to the foot of the cliffs without prior inspection; protective headgear is strongly recommended.

The Ashdown Formation is well exposed in the cliffs between Hastings and Cliff End (Figure 1) and details are included below to bring into focus the more detailed descriptions from the area surveyed for this report.

5.1.1 Hastings to Ecclesbourne

East Hill rises steeply on the east of the Old Town; it is ascended by a cliff railway in a cutting [TQ 827 095] which displays the upper part of the Ashdown Formation, similar to those of Hastings Castle, overlain by thin basal shales and the massive Cliff End Sandstone about 7 m thick of the Wadhurst Clay Formation. The shales contain fossils of the tree fern *Tempskya* were noted by Fitton (1836) and Tylor (1862). The Cliff End Sandstone forms a near-vertical feature on East Hill and adjacent cliff tops. A section at the southern end of the row of houses at High Wickham [TQ 8296 0999] shows a well developed pebble bed, 8 cm thick, with quartz and rare chert pebbles up to 7 mm in diameter, overlying 4 m of friable, white, fine-grained sandstone (Cliff End Sandstone) with vertical root traces.

The top Ashdown Formation sandstones and Cliff End Sandstone are clearly exposed in the abandoned sea-cliffs behind Rock-a-Nore Road to the eastern breakwater, as are the gently eastward-dipping foresets in the former. The old caves above the scree at the foot of the cliff are man-made.

Beyond the eastern breakwater eastwards to the Foul Ness Fault the top 50 m of the Ashdown Formation and the Cliff End Sandstone are well exposed above a mass of slipped and fallen rock debris which lies at the cliff foot. The composite section of the Ashdown Formation which has been compiled from overlapping sections recorded at [TQ 8305 0961], [TQ 8311 0961], [TQ 8311 0966] and [TQ 8326 0970] is as follows:

	Thickness m
Wadhurst Clay Formation	
Shales and siltstones with ironstone nodules	-
Ashdown Formation	
Sandstone, fine to medium-grained, massive, with gently dipping cross-bedding; thin bands of ferruginous mud-flake conglomerate	estimated 17.0
Clay, dark grey, throws out ferruginous springs	0.1
Sandstones and siltstones, thinly interbedded, much iron pan on joints	3.5
Mudstone, silty, grey	1.0
Sandstone, fine-grained, silty, laminated, massive, well jointed, with some iron pan	1.7
Sandstone and siltstones, grey and ochreous; local cross-bedding; iron pan on joints	5.5
Mudstone, dark grey, ochreous, with much plant debris and lignite streaks; roots up to 7 mm in dismeter penetrate bed below	0.1
Siltstone, pale grey and ochreous, with interlaminated fine-grained sandstone and ferruginous ribs which weather out to give honeycomb affect on cliff face; plant debris; local roots	2.3
Sandstone, very fine-grained, silty, grey-white and ochreous; much iron pan throughout in very irregular forms; plant debris on bedding. Some red and ochreous staining in top 0.6 m; 'boxstone' nodules near base	2.4
Siltstone, dark grey, laminated, planty	0.4
Mudstone, silty, grey-green, with sphaerosiderite	2.2
Sandstone, fine-grained, pale grey, with sphaerosiderite, silty laminae and much iron pan	0.45
Mudstone, silty, pale grey-green to pale grey; sphaerosiderite in top 0.6 m, shaly and dark olive-grey below; massive below 0.9 m	2.4
Alternating siltstones, grey, ferruginous, locally sphaerosideritic and mudstones, silty, grey; plant debris near the bases of some units	4.75

The Foul Ness Fault crosses the cliff top at an acute angle at [TQ 8325 0970] trending N 115° and throwing down about 15 m to the north-east. This has the effect of juxtaposing in the cliff top, the Cliff End Sandstone to the south-west and shales somewhat higher in the Wadhurst Clay to the north-east. The shales are unstable and

slip across the fault-plane on to the beach. The section in the backwall of the resulting slip-scar [TQ 8328 0977] revealed two fine-grained sandstones 1.0 m (upper) and 2.4 m (lower) thick separated by 2.1 m of shales and about 12 m above the top of the Cliff End Sandstone.

On the foreshore, south of the Foul Ness Fault and south of the sewer outfall pipe [TQ 834 096], a rock platform is cut in grey-green, silty, fine-grained sandstone with sphaerosiderite.

Between Hastings eastern breakwater and Foul Ness, the lower part of the cliff is largely concealed by rock debris that has fallen or slipped from above. The soft clays and shales have been rapidly removed by wave-action leaving boulders of the more resistant sandstones strewn over the beach and wave-cut platform. Several interesting varieties of calcareous 'Tilgate Stone' from the basal Wadhurst Clay are present including some with mammillated forms, others with shells and bones, and a spectacular form where the calcite has crystallised in radial aggregates giving a spotted 'pseudo-igneous' appearance.

Continuing eastward beyond the Foul Ness Fault towards the mouth of Ecclesbourne Glen, a succession closely similar to that of East Cliff is seen, but older beds appear in the foot of the cliff because of the gentle south-westerly dip. Below the equivalents of the lowest silty mudstones of the East Cliff section, a massive cross-bedded unit up to 5 m thick, of grey siltstone with ribs, laminae and irregular pods (pseudonodules) of white, fine-grained sandstone rich in fine-grained plant debris is seen. The foresets of this unit dip at about 10° NE. They have been deformed by dewatering and differential compaction producing minor faults and folds, pull-aparts and loading structures. Stewart (1981, fig. 3.13; 1983) has published detailed profiles of the sedimentary structures hereabouts and farther east and has suggested that the large scale cross-sets are point-bar deposits produced by migrating fluvial channels, which carried a high suspended load.

The base of this cross-bedded unit is obscured by talus and beach material at the foot of the cliff below Ecclesbourne Glen. However, on the wave-cut platform, outcrops of grey massive silty fine-grained sandstone with sphaerosiderite, plant debris and traces of mud-flake conglomerate are visible beneath it [TQ 847 099]. Similar siltstones with sphaerosiderite occur in the wave-cut platform east of Ecclesbourne Glen, where some cross-bedding is apparent.

The characteristic massive facies of the top Ashdown Formation sandstones, with flattish easterly facing foresets and strong jointing, as seen in the crags below Hastings Castle, is maintained across East Cliff and Foul Ness almost to the western rim of Ecclesbourne Glen. The character of this sedimentary unit undergoes a major change from west to east across the mouth of the glen, as viewed in the inaccessible cliff-top. On the western side [TQ 8360 0992] the lowest massive sandstones are replaced by a set of cross-strata, up to 12 m thick, with alternating foresets of sandstone and siltstone. On the eastern side, the massive character is entirely lost and here thinly interbedded sandstones and siltstones with some silty mudstone occur. The upper 7 m of the unit seems to be flat-bedded but cross-bedding, inclined at 5 to 10° SW is clearly visible in the lower 4 to 6 m of strata, which can be traced for a few hundred metres east of the glen.

At the cliff top, about 100 m ENE of the mouth of Ecclesbourne Glen [TQ 8378 1000], a clear section in upper Ashdown Formation and lower Wadhurst Clay Formation strata may be examined with the aid of field glasses, although it is quite inaccessible. The thicknesses quoted in the following description are thus, of necessity, estimated. It is not possible to confirm the presence of the Top Ashdown Pepple Bed:

	Estimated Thickness m
Wadhurst Clay Formation	
Shales, olive, with thin lenticular siltstones and 'Tilgate Stone' bands	3.0
Sandstone, fine-grained, massive, white, well jointed, with some calcareous doggers	6.0
Shales, olive, with interlaminated siltstones	1.0
'Tilgate Stone', hard, laminated	1.0
Clay-ironstone, dark brown	0.3
Shales, olive, with siltstones	0.6
Clay-ironstone, nodular	0.15
Sandstone, fine-grained, massive (or? Siltstone)	0.45
Clay-ironstone, nodular	0.15
shales and siltstones	1.0
Ashdown Formation	
Sandstones and siltstones, thinly bedded, buff and grey	5.0
Interbedded grey silty mudstones and thin silty sandstones	2.0
Sandstones and siltstones; cross-bedded, foresets inclined at 10 to 15° SW	4.0

5.1.2 Ecclesbourne to Lee Ness

Proceeding ENE from the mouth of Ecclesbourne Glen, the foot of the cliff is much obscured by talus for the next 500 m. At the cliff top the distinctive outcrop of the Cliff End Sandstone can clearly be seen to rise gently north-eastward. Immediately beneath, the basal shales and 'Tilgate Stones' of the Wadhurst Clay form a sloping grassy ledge. The top Ashdown Formation sandstones maintain their character and thickness of about 10 m thick for some distance. Beneath them, 30 m of well stratified sandstones with minor silty and argillaceous beds crop out in the cliff forming vertical joint-bounded faces. The cross-bedded unit of grey siltstones with

sandstone laminae that appeared in the foot of the cliff east of Foul Ness is at a higher elevation beneath these stratified sandstones. Some 500 m east of the mouth of the glen [TQ 841 100] the cross-beds give way to a saucer-like channel, 60 m wide by 10 m deep, which was first noted and figured by Topley (1875, fig.3, p.47). This apparent example of large scale, trough cross-stratification may represent a complex channel-fill. On the east the channel intersects planar-bedded sandstones, 2 to 10 m thick, which in turn rest on a massive sandstone bed, 2.5 m thick, that forms a ledge at the foot of the cliff. This prominent bed of pale grey silty sandstone has a hardened ferruginous crust on its upper surface, which incorporates a mud-flake conglomerate with plant debris, from which root-like protuberances, associated with abundant sphaerosiderite, extend down for 0.3 m. The hardened surface probably results from a period of emergence and plant colonisation. Below, the sandstone is fairly uniform for 0.45 m and then becomes highly sphaerosideritic with iron-staining for 0.55 m, in which a crude lamination is apparent before passing downwards by alternation into olive-grey silty mudstone. This bed was figured by White (1928, plate IIB) who used it to mark the junction of the 'Ashdown Sand' and 'Fairlight Clays', a division that can no longer be upheld.

About 750 m ENE of Ecclesbourne Glen, beneath Hastings Downs, a sizeable landslide [TQ 845 101] extends for some 200 m long the cliffs. Beyond this slide the cliffs are stable for a short distance of 50 m or so where the major land-slipped area of Covehurst Wood is reached. Between the two slides the cliffs show an Ashdown Formation succession which is generally similar to that described near Ecclesbourne Glen overlain by basal Wadhurst Clay Formation and a prominent crag of Cliff End Sandstone in the cliff top. The description of the estimated succession visible in the inaccessible cliffs [TQ 846 101] is as follows:

	Estimated Thickness m
Wadhurst Clay Formation	
Sandstone, thinly bedded at top, more massive below	2.0
Shales, blue-grey, with harder beds projecting in the cliff	2.5
Cliff End Sandstone:	
Sandstone, white, massive, well-jointed, dark band at top	5.0
Sandstone, thinly bedded, some shale partings	3.0
Ashdown Formation	
Sandstone, silty, thinly bedded, soft	2.0
Sandstone, more compact, ochreous stained, cross-bedded	3.0
Siltstones and thin sandstones, soft, some mudstones interbedded	6.0
Sandstone, blocky, well bedded, laminated	10.0
Mudstones, silty, grey with some colour	

mottling. Thin sandstone and/or siltstone bands		10.0

The Covehurst Wood landslip is a major rotational slip, which extends north-eastwards along the coast for 800 m as far as the mouth of Fairlight Glen. The cliffs which form the backwall of the slip rise to about 100 m OD and drop steeply to the tumbled and roughly vegetated under-cliff area, which is up to 250 m wide.

Midway along the landslide, the rocks of the backwall are disturbed by the Ore Fault which crosses the cliff in a small re-entrant [TQ 8490 1042] and disappears beneath the under-cliff. The fault trends N105° and has a throw of about 15 m down to the SSW here. The Ore Fault and the dip combine to bring older rocks up into the cliff foot, notably the chiefly argillaceous rocks of the Ashdown Formation, which are an important factor in the slip movements. The rocks of the backwall cliff are largely inaccessible, but the Cliff End Sandstone continues to form a distinctive feature at the cliff top. Beneath it a grassy slope marks the outcrop of the basal Wadhurst Clay Formation. The topmost Ashdown Formation still consists mainly of thinly bedded silty sandstones, about 10 m thick, which overlie more massive sandstones about 20 m thick beneath, which in turn rest on argillaceous beds concealed beneath the under-cliff.

Fairlight Glen and Warren Glen are short steep-sided valleys that drop about 120 m in half a kilometre from the Fairlight ridge to the sea, where their small streams ‘hang’ above the beach due to rapid cliff recession. The Cliff End Sandstone forms a good feature around the rim of the two glens. The valley sides are cut in Ashdown Formation and are much obscured by hillwash, but the sandstone features are sufficiently prominent for them to be mapped separately from the clays. In the ravine at Dripping Well [TQ 8504 1109] and in the adjacent old quarry, near Place Farm, the following succession was measured:

		Thickness m
Wadhurst Clay Formation		
Cliff End Sandstone:		
Sandstone, fine-grained, massive, white, well-joined	seen	8.0
Clay-ironstone; large, flat, brown-skinned, blue-hearted nodules	up to	0.15
Shales, blue-grey with interlaminated siltstones and thin ‘Tilgate Stone’ bands		2.6
Gap, section obscured		0.9
Ashdown Formation		
Sandstone, fine-grained, silty, massive, brown	seen	3.0

The spring that gives Dripping Well its name, rises at the base of the Cliff End Sandstone. No trace of the Top Ashdown Pebble Bed was seen above the sandstone, which forms a small waterfall in the stream.

The Cliff End Sandstone is also exposed in crags near Lover's Seat [TQ 854 108] and here it contains internal channelling structures, streaks of small quartz pebbles and lignitic plant debris, silty bands and local calcareous cementation.

Several outcrops, which appear to be undisturbed, protrude through beach deposits at the NE end of the Covehurst Wood landslide At Black Rock [TQ 8526 1055], below the mouth of Fairlight Glen, siltstones and silty sandstones, with coarser red-stained sand picking out ripple sets, dip at 5°, N280°. The reefs 120 m to the NE [TQ 8537 1060] are of massive fine-grained sandstone with reddish iron-staining, associated with cross-laminated siltstones and these apparently dip at 20°, N 325° but this may be a foreset dip.

Marine erosion has truncated the spur between Fairlight Glen and Warren Glen, exposing alternating clays and sandstones of the Ashdown Formation over a 500 m length of coast known as Willowpit Wood. The relative incompetence of these strata is reflected by the fairly gently stepped profile of the cliffs here, which are much affected by minor mud-flows.

Around the mouth of Warren Glen [TQ 858 108] the rocks at beach level are *in situ* and are well exposed. On the west [TQ 8555 1068] a mainly sandy unit rises into the bottom of the cliff and thence eastward. The following succession can be made out:

		Thickness m
v) Loose and tumbled silty mudstones and sandstones: Blocks of upper cliff		-
iv) Sandstone, fine-grained, ochreous, flat-bedded, well jointed	about	5.0
iii) Mudstones, silty, soft, pale grey with dark band in top 0.3 m		1.5
ii) Sandstones, silty, cross-bedded, with layers of silt and plant debris. Much lignitic plant debris in basal 1.0 m. Mud-flake conglomerate at base		4.0 to 5.0
i) Siltstone, grey, with layers of white snd, giving a laminated effect, cross-bedded as above; several examples of small drag-folds with 'micro-thrusts' produced by penecontemporaneous movement. Compact, with irregular curved fracture; well Jointed	seen	3.0

These beds can be traced eastward for 100 m or more and it is apparent that units (i) and (ii) above represent proximal and distal end members of a set of cross-strata up to 10 m thick. The cross-beds have an apparent dip of up to 10° WNW. They probably resulted from lateral accretion in a broad fluvial channel environment similar to that

suggested for the cross-bedded unit seen near Ecclesbourne Glen. However, some of the sedimentary structures seen in (i) invite comparison with a tidal flat environment with migrating channels. Several examples of small three-toed foot-prints, up to 0.2 m long, were seen hereabouts on the undersides of fallen sandstone blocks. These are most probably from bed (iv) above although it has not been possible to verify this.

On the eastern side of Fairlight Glen, below the Coastguard Station, the upper cliff is much affected by landslipping, over a distance of 600m.

5.1.3 Lee Ness to Fairlight Cove

At Lee Ness Ledge [TQ 8967 108] a distinctive bed, the Lee Ness Sandstone, forms a flat reef and can be clearly traced in the cliff for 1 km eastward, picking out the Fairlight Anticline. The bed is up to 2.3 m thick and displays a number of interesting sedimentary and faunal features. It is best seen in the reefs below the cliffs at Goldbury Point [TQ 876 114]; this latter place name was used by White (1928) although it does not appear on the Ordnance Survey maps. The Lee Ness Sandstone is characterised by small-scale lateral variations, which are generally caused by loading structures or internal erosion; the following section is fairly typical:

		Thickness m
Sandstone, fine-grained, whitish grey, massive, becoming medium greenish grey below with traces of faint lamination, bioturbation and small clasts of grey silt. Some secondary ochreous staining associated with sphaerosiderite. Top of bed, as exposed on beach, is irregular and is penetrated by vertical cylindrical trace fossils (roots or burrows?) up to 7 cm in diameter and 20 cm deep. Gradational base		0.45
Siltstone, olive-grey, laminated with white fine-grained sand; bioturbated (burrows with meniscus fills up to 20 mm in diameter); slightly irregular burrowed base		0.15 to 0.23
Sandstone, fine-grained, whitish grey, faintly laminated as above; gradational base		0.08 to 0.15
Sandstone, silty, with greenish grey silt laminae; slight bioturbation; gradational base		0.05 to 0.10
Siltstone, pale grey, with wavy greenish grey to dark grey laminations		0.10 to 0.15
Siltstone, grey, uniform		0.10 to 0.13
Siltstone, pale grey, with olive-grey laminae. Bioturbation and load casts abundant; partly Erosional base		0.10 to 0.25
Sandstone, silty, grey to olive-grey above, with irregular laminations and wisps and burrow-fills of white, fine-grained sand. Passing down below about 0.45 m into pale grey silty sandstone with faint laminations.	Seen to	1.25

The underside of the Lee Ness Sandstone has an irregular contact with the underlying grey silty mudstone, and carries frequent casts of the three-toed footprints of *Iguanodon* up to 0.5 m in length. These suggest a phase of lower water level or even emergence immediately prior to the transgressive event which laid down the Lee Ness Sandstone and infilled the footprints, preserving them as casts. It is difficult to interpret the sedimentary environment of the Lee Ness Sandstone, which appears to be out of context with the beds above and below. The frequent load-casts and the almost complete bioturbation of the sandstone by burrowing organisms suggests that it may represent a brief estuarine incursion up a major embayment or channel. Stewart (1981, p. 3.20), however, interpreted the Lee Ness Sandstone as a small lacustrine delta.

The axis of the gentle Fairlight Anticline crosses the cliff about 600 m ENE of Lee Ness Ledge [TQ 8715 1120] with a trend of N100°. The 10 m of Ashdown Formation strata which are exposed below the Lee Ness Sandstone on the crest of the anticline, are the lowest seen in the cliff sections between Hastings and Cliff End. They comprise alternating beds of red-mottled grey and green silty mudstones and fine-grained sandstones (at least three of which form prominent ledges) and siltstones with plant debris; sphaerosiderite is abundant throughout. The harder sandstones form a series of linear curving reefs on the shore platform.

The cliffs between Lee Ness Ledge and Goldbury Point are cut in alternating thin sandstones and mottled silty mudstones and rise to a fairly uniform height of about 55 m OD. For the most part the beds above the Lee Ness Sandstone are inaccessible and partly obscured by talus and minor mud flows, but Stewart (1981, fig.3.14) illustrated a possible point-bar sequence 7.5 m thick, high in the cliff. At Goldbury Point [TQ 877 114] frequent cliff falls have left a clean, but inaccessible section:

	Estimated thickness m
Head	
Sandy loam, brown	1.1
Ashdown Formation	
Mudstone, silty, grey-green	1.1
Siltstone, ferruginous, hard	0.8
Mudstone, silty, grey-green; red-mottled at base	1.5
Sandstone, massive, ferruginous, irregular Weathered surface	2.0
Mudstone, silty, olive-green, with hard ribs of siltstone. Becomes more massive and silty near the base with harder ferruginous band projecting	
Mudstone, dark grey and olive-grey; some	

Purplish red mottling at base	5.5
Sandstone, fine-grained, massive, jointed	0.8
Mudstone, silty, banded dark grey and grey-green, Ochreous staining	3.7
Siltstone, ferruginous, hard	0.3
Mudstone, silty, pale olive-green with red Mottled bands and patches of ochreous staining	3.0
Mudstone, silty, pale olive-green with red mottled bands ferruginous band at top	2.0
Siltstone, massive, with much iron-staining and iron pan on vertical joints	2.4
Mudstone, silty, dark grey and grey-green with some dark red mottling	4.6
Siltstone, ferruginous, banded, hard	1.1
Mudstone, silty, grey and red mottled	3.0
Lee Ness Sandstone: exposed on shore at foot of cliffs	2.3

Nodular spheroidal aggregates of sphaerosiderite up to 0.3 m in diameter are seen weathering out of red and dark grey-green mottled mudstones at the foot of the cliff, west of the point. Small three-toed reptilean footprints have been noted on fallen blocks of sandstone and siltstone nearby. Stewart (1981, p.3.20, fig. .15) has equated the variegated mudstones in the Goldbury Point section with overbank deposits with pedogenic horizons and has also identified possible point-bar deposits and crevasse splays.

At Goldbury Point, the cliff line turns through about 30° to a NE trend. Strata similar to those seen west of the point continue for 700 m as far as the Fairlight Cove Reversed Fault but they are much affected by landslides and mud-flows. The Lee Ness Sandstone passes out to sea at Goldbury Point. At a horizon a few metres above the Lee Ness Sandstone, another cross-stratified unit (Sandstone GD herein) is intermittently exposed at the foot of the cliff, northeast of the point. The cross-beds face northeast and comprise ferruginous sandstones and siltstones with lignite (fossil drift-wood), sphaerosiderite and mud-flake conglomerates. These rocks acquire a reddish brown skin on exposure but are grey and grey-green on freshly broken surfaces. Stewart (1981, fig.3.16) has interpreted this unit as a point-bar deposit.

The landslipped area between Goldbury Point and Fairlight Cove, displays rotational movements with back tilting of foundered blocks, as well as mud-flows of varying scale.

A thin sandstone which is present between Fire Hills and Fairlight Cove was exposed in 1970 in the backwall of a slip [TQ 8786 1179], 250 m SW of the Fairlight Cove Reversed Fault, where the following section was measured:

	Thickness m
Ashdown Formation	
Mudstone, silty, greenish grey, weathering soft and ochreous	1.50
Sandstone, fine-grained, silty, ferruginous	0.45
Sandstone, fine-grained, with siltstone bands; blocky fracture; much plant debris, becomes dark grey, silty and planty in lower half	2.00
Siltsone, pale to medium grey, with white fine-grained sand laminae, irregular lenticles of lignite up to 25 mm thick and much fine plant debris	0.52
Mudstone, silty, pale mauve-grey, ochreous with iron Pan on irregular fissures. Some thin ribs of sandy siltstone and lignite streaks	1.20

5.1.4 Fairlight Cove to Haddock's Reversed Fault

The Fairlight Cove Reversed Fault crosses the coast [TQ 8806 1197] in a re-entrant in the cliff which provides convenient access to the shore; the fault plane intersects the cliff dipping at about 60°, N210°. In the absence of a suitable marker bed the throw cannot be precisely determined, but it is thought to be about 60 m down to the north-north-east.

In the low cliffs between the Fairlight Cove and Haddock's Reversed Faults, a distance of 800 m, the strata exposed are chiefly sandstones with interbedded silty mudstones, which are roughly equivalent to beds from 50 to 80 m below the top of the Ashdown Formation. The dominant feature is a thick cross-bedded unit which Stewart (1983, fig.4) has named the 'Haddocks Rough Unit'. This extends for 500 m NE of the Fairlight Cove Reversed Fault (see Allen 1976, p.394 and pl. I; Stewart 1981, p.3.20, Fig. 3.14). The unit is up to 10 m thick and rises from the base of the cliff at the fault to the top near Haddock's Cottages [TQ 883 124]. The base of the unit is erosional and cuts down deeply into the underlying strata. The foresets dip south-westwards, generally at about 10° but with a maximum dip of 19°. The rocks between the two faults are arched into a gentle fold. A composite section of the beds exposed in this tract [TQ 8806 1197 to 8857 1251] is given below. These beds show great lateral variability and contain several erosion surfaces. The higher beds at the north-eastern end of the section are inaccessible but can be seen to comprise alternating foresets of fine-grained sandstones and silts with occasional mudstone bands, up to 1.5 m in thickness:

	Thickness m

Ashdown Formation

Haddock's Rough Unit:

Major cross-bedded unit (cuts across lower strata to the top of the distinctive sandstone bed marked 'X' below) comprising alternating thin interbeds of fine sandstone, siltstone and silty mudstone with much black plant debris; mud-flake conglomerate at base. overall tendency for cross-beds to get finer distally, i.e. to the south-west	up to about	10.0
Silt and silty mudstone, grey		1.1
Sandstone, fine-grained, massive, white, with dark Shale band		2.0
Silt and silty mudstone, grey, iron pan on joints		3.7
Mudstone, silty, sphaerosideritic, with white fine-grained sandstone at top, 0.6 m thick		1.7
Sandstone, fine-grained, grey and buff, with much iron pan on oblique joints, sphaerosiderite in patches		1.8
Silt, massive, grey, with iron pan on joints; thin sphaerosideritic clay over band of lignitic Plant debris at base		2.9
Silt, grey, much iron pan on joints; thin grey sphaerosideritic clay at base		1.5
Sandstone, fine-grained, ochreous		0.1
Mudstone, silty, grey, more silty at top; iron pan on joints		1.8
Sandstone, silty, massive, buff, much iron pan; sphaerosiderite in top 0.9 m, with lignite in band 0.3 m above base; silty with plant debris at base		2.4
Mudstone, silty, grey, with sphaerosiderite		1.3
Sandstone, silty, yellowish buff, with prominent vertical trace fossils which branch upwards and are picked out by brown sphaerosiderite aggregates. More silty with much plant debris at base [X]		2.4
Variable cross-stratified unit consisting of grey-green sphaerosideritic silty clay with much plant debris and lenses of pebbly, coarse sandstone, up to 1 m thick		2.4
Siltstone, grey, hard		0.4
Clay, silty, grey		0.2
Sandstone, silty, sphaerosideritic, with iron pan on joints		0.9

Clay, silty, pale grey		0.5
Sandstone, fine to medium-grained, grey, with thin lenses of coarse pebbly sand near base	seen to	1.4
Gap – obscured by beach material		
Cross-bedded siltstones and sandstones with plant Debris exposed on foreshore platform		

Stewart (1981, p.3.20; 1983, p.377) has drawn attention to the presence of siltstone and sandstone drapes in the Haddock's Rough Unit and to the disturbance of individual foresets by burrowing organisms, which together indicate significant variations in discharge. A probable sedimentary model is that of a point-bar, accreted laterally by small increments of sediment into a deep channel, rather than that of a giant sand-wave in a high-energy braided stream environment, as suggested by Allen (1976, p.394). Possible brackish water influences are suggested by dinoflagellate assemblages which have been extracted from the Haddock's Rough Unit (Batten and Eaton, 1980).

Immediately SW of the Haddock's Reversed Fault the distinctive sandstone bed crops out at beach level and rises gently to reach the cliff top just south of Haddock's Cottages where it is cut out by the Haddock's Rough Unit. The rocks of the foreshore platforms between Haddock's Cottages and the Haddock's Reversed Fault exhibit large-scale trough cross-bedding, of low amplitude. At least three superimposed orders of cross-strata may be discerned with dips of between 2 and 10° on the flanks of the troughs. These seem to be the cross-strata which Stewart (1981, p.3.17) has interpreted as laterally accreted point-bar deposits.

Some earlier workers (Milner and Bull, 1925, p.309) mistakenly interpreted these cross-strata as tectonic structures, which could not be traced into the adjacent cliffs. They therefore postulated a fault running parallel to the coast to complete the picture.

5.1.5 Haddock's Reversed Fault to Cliff End and Toot Rock

The Haddock's Reversed Fault crosses the coast in a re-entrant in the cliff about 200 m NE of Haddock's Cottages [TQ 8857 1251] with a trend parallel to that of the Fairlight Cove Reversed Fault. The fault plane dips at 60°, N120°.

The quarry near Fairlight Church was the site of the BGS Fairlight Borehole [TQ8592 1173] drilled in 1970–1971. The quarry now forms the car park for the country park, but some faces in the top of the Cliff End Sandstone are still visible. A small face in the northern part of the workings [TQ 8589 1185] formerly exposed the following section:

	Thickness m
Wadhurst Clay Formation	
Siltstone, ripple-laminated	0.30
Shales and siltstones, interlaminated	0.20

Top Cliff End Pebble Bed:		
Sandstone, fine-grained, ochreous, with scattered small quartz pebbles; siltstone drapes on tops of ripples	up to	0.10
Cliff End Sandstone:		
Sandstone, fine-grained, white, with sharp flat top but irregular base		0.20 to 0.40
Sand, fine-grained, black, with much plant debris; traces of roots	up to	0.15
Sandstone, fine-grained, white, massive; faintly purplish and lignitic at top; traces of vertical roots	seen to	3.00

At another location in this quarry [TQ 8592 1177] the following section was noted:

		Thickness m
Top Cliff End Pebble Bed (lithology as in section listed above)	up to	0.10
Cliff End Sandstone		
Sandstone, fine to medium-grained, white; cross-bedding picked out by streaks of small white quartz pebbles and black plant debris		1.80
Sand, pebbly; pebbles up to 3 mm in diameter		0.03
Sand, fine to medium-grained, white, with vertical root traces		1.50
Sandstone, silty, pale mauvish grey, with plant debris	seen to	1.00

Combining the thicknesses of the Cliff End Sandstone visible in the quarry and proved in the borehole at Fairlight gives a total of approximately 10 m which is about 0.8 m less than measured in the cliffs at Cliff End. The prominent band of ironstone maintains its position about 0.9 m above the Top Ashdown Pebble Bed. At Cliff End, the Cliff End Sandstone rests directly on the ironstone, but at Fairlight 0.88 m of shales and sandstones intervene. This suggests that the base of the Cliff End Sandstone is erosional and has cut down more deeply at Cliff End.

5.1.7 Ashdown Formation in the Fairlight Borehole

A brief description of the BGS Fairlight Borehole [TQ8592 1173] was given by Shephard-Thorn (*in* IGS, 1971, pp.21–22) it is presented here in Appendix 1.

The Ashdown Formation between 212.52 and 219.15 m (the top of the Purbeck Beds) comprises alternating sandstones and mudstones. In the mudstones above, to a depth of 202.79 m, two sandstones occur which form parts of coarsening-upward cycles

similar to those in the Arenaceous Beds of the Purbeck, but rooty mudstones cap each sandstone and a shelly fauna is absent. Fine-grained sediments dominate the succession above up to 130 m where sandy, muddy siltstones occur (below 118.78 m). Siltstones and mudstones predominate again in the beds above but sandstones are more common in the uppermost 35 m of the Ashdown Formation, above 42.27 m.

Most of the mudstones below 42 m tend to be olive or greenish grey, massive and uniform in appearance and are of the 'seatearth' type but commonly lacking rootlet traces. Laminated mudstones only occur in association with coarser sediments except below 163 m where they are more common and some of these show bioturbation structures. Sphaerosiderite is common throughout the formation, especially in the argillaceous beds. Sideritic nodules and replacive beds occur locally below 114 m depth and are particularly common in the argillaceous beds below 180 m.

Few useful marker horizons can be recognised in the succession proved by this borehole, although the Lee Ness Sandstone may be represented by the beds above 130m.

6 Fauna

6.1 OSTRACOD ZONES

Ostracods are the most abundant fossils in the Wealden and are present in sufficient diversity of form for them to be used as a basis for the biostratigraphical division of the Wealden. The ostracod genus *Cypridea,* which probably lived by preference under mixohaline conditions, includes a large number of species and subspecies and is ideally suited for use in the division of the succession. The ostracod faunas show a salinity-controlled cyclicity comparable with that in the Purbeck Beds with alternating low salinity faunas, dominated by *Cypridea* species (C phases) and higher salinity forms (S phases). One C Phase with its succeeding S phase constitutes a faunicycle (Anderson and Bazley, 1971).

The ostracod zones listed below are all characterised by assemblages of species of the genus *Cypridea*.

In the *C. paulsgrovensis* Zone few species are represented, although individuals may be numerous. Apart from the name fossil only *C. laevigata* and *C. tuberculata* are common.

The *C. aculeate* Zone contains an ostracod fauna richer and more varied than any other part of the Wealden. The name fossil itself is a variable species and together with *C. bispinosa* dominates the fauna. Two other distinctive species *C. recta* and *C. melvillei*, are characteristic of the zone. In the Wadhurst Clay, the S-phase forms include secies of *Darwinula, Mantelliana, Orthonotacythere, Rhinocypris, Theriosynoecum* and *Timiriasevia*.

Detailed information on the Wealden faunas has been provided by Anderson (1962, 1967, 1985) and Anderson, Bazley and Shepard-Thorn(1967). The late Dr Anderson's results on material from the BGS Cooden Borehole are described in more detail by Lake (1975).

Table 1 Ostracod zones of the Wealden

Ostracod zone		Lithostratigraphical unit
C. valdensis		
C. clavata		
C. marina		Weald Clay Formation
C. tuberculata		
C. dorsispinata		
		Tunbridge Wells Sand
C. aculeate		
	Upper	
	Middle	Wadhurst Clay Formation
C. paulsgrovensis	Lower	
C. brevirostrate		Ashdown Formation

6.2 MOLLUSCAN FAUNAS

Bivalves and gastropods occur commonly in the Wealden clay formations, locally in sufficient numbers to form thin monospecific shell limestones, such as the *'Paludina'* – limestones of the Weald Clay Formation. They are generally rare in the sandy formations.

The shells collected by Mantell and Fitton in the early nineteenth century were first described by J. Sowerby (1812), J. de C. Sowerby (*in* Fitton, 1836) and Forbes (1851). Subsequent to these earlier works the bivalve families Corbiculidae and Neomiodontidae were reviewed by Casey (1955a, 1955b). The mollusca of the Weald Clay were studied by Morter (*in* Worssam, 1978) who also (1984) re-examined the Purbeck-Wealden molluscan faunas and related them to various salinity ranges.

6.3 WEALDEN VERTEBRATES

Bones and teeth of reptilians, mammals and fish, have been collected from the Wealden rocks of the Hastings district. They are most common in the clay

formations, concentrated in one of the several thin ‘bone-beds’ and associated with developments of calcareous ‘Tilgate Stone’. The Cliff End Bone-Bed, of the lower Wadhurst Clay Formation, has its type exposure in the present district, and is noteworthy as the source of some of the earliest Cretaceous mammalian remains (A.S. Woodward, 1911; 1963; Clemens and Lees, 1971).

6.4 SAURIAN FOOTPRINTS

Fossil footprints, believed to be those of *Iguanodon* and related forms, were first recorded over a century ago, when their true affinity was not recognised. A review of these occurrences and their descriptions in the literature was given by Sarjeant (1974). The footprints are usually preserved as casts of sandstone or siltstone, overlying the mudstone in which the prints were initially made, and are thus commonly seen on the undersides of fallen or overhanging blocks in coast sections. Although these fossils have little stratigraphical value, they indicate shallow water conditions succeeded by rapid deposition of the overlying sand or silt which assured their preservation as casts.

In the cliffs east of Hastings several other occurrences of fossil footprints have been noted in Ashdown Beds strata. Near Lee Ness Ledge [867 108], casts of three-toed foot-prints of *Iguanodon*, up to 0.5 m in length, are commonly observed on the lower surface of the Lee Ness Sandstone (p.65) in cliff overhangs and on fallen blocks. The prints are preserved as sandstone casts. Series of up to 5 or 6 ‘steps’ have been noted on fallen blocks. The Lee Ness Sandstone footprints are presumably the same as those referred to by Dixon (1850, p. 145). Smaller three-toed prints have also been noted on fallen blocks of sandstone and siltstone near Goldbury Point [TQ 877 114].

7 Data Recording/Methodology

An inspection of the area was conducted on 7th and 8th March 2005. The area covered by the inspection included the foreshore, beach and sea cliffs extending from the Fairlight Landslide [TQ 8795 1185] around Goldbury Point to Lee Ness [TQ 8658 1103].

Observations were recorded on a fieldslip and field notebook where appropriate. A comprehensive photographic record of the inspection was also obtained (Appendix 2). Raw digital photographs are available.
Earlier photographic records for this specific site are also held at BGS. Relevant copies are reproduced in Appendix 3.

The location of the landslide and individual logged sections are shown in Figure 2. A diagrammatic section correlating the logs across the anticline is presented in Figure 3.

8 Key observations and conclusions

Generalised lithostratigraphical sections of the exposed rocks in the Fairlight Cove to Lee Ness Ledge stretch of the SSSI coastline were logged and are provided diagrammatically in Logs 1 – 10 below.

This exposure of the Ashdown Formation forms an anticlinal structure, known as the Fairlight Anticline, and provides one of the most important exposures of Wealden facies in Britain. Although the same rock successions are exposed either side of the anticline, both the lithofacies and the floral/faunal assemblages can vary considerably over this distance. This is due to variations in the environment of deposition during Lower Cretaceous times.

A total of ten lithological logs were recorded along the area of study, establishing general changes in lithofacies. The site of each log was governed by accessibility and stratigraphical relevance. By using a series of logs it is possible to establish a number of ‘marker’ horizons within the sequence allowing correlation along the coastline. In this case, the key marker horizons are five major sandstone units. Each unit was named ‘GA’, ‘GB’, ‘GC’, ‘GD’ and ‘GE’ for ease of reference. Equally, the intervening mudstone units could have been used, however, these are more likely to be degraded and obscured due to weathering. An overview of the main findings are outlined below.

- The Lee Ness Sandstone (‘GE’ on the logs) forms the main continuous, traceable sandstone unit across the anticline. This unit is also readily identified by the presence of a semi-continuous sphaerosideritic horizon within its upper part. (Sphaerosiderites are millimetre-scale $FeCO_3$ spherulites that form in wetland soil environments).
- The Lee Ness Sandstone GE proves not to be a single sandstone unit but can be composed of a number of sandstone beds separated by thin siltstones.

- Above the Less Ness Sandstone at least 4 other major sandstone units were identified and accessible as part of this study.
- At the scale surveyed, the only unit not observed across the axis of the anticline is the carbonaceous Sandstone 'GD'. This unit, which has its greatest development east of Goldbury Point, consists of very fine-grained sandstones and siltstones, abundant dewatering structures and thin lignitic layers. This type of succession indicates a very active environment where the river system is stripping the source area of plant and tree material and the environment of deposition is close to or above water level. The coals, highly burrowed siltstones and faunal assemblages suggest an environment of palaeosol formation prone to flooding and burial.
- Sandstone 'GC' is a consistent marker across the anticline. It includes major cross-bedded channel form units resulting in lateral thickness variation.
- On a small-scale lateral facies changes are common reflecting the continually developing depositional environment. Thus the units between major marker sandstones can show considerable lateral lithological variation.
- In general, the eastern part of the section is more argillaceous whereas towards the west and Lee Ness, the sandstone units visibly increase in thickness and become more prominent. This suggests that lagoonal and overbank deposits predominate in the east with channel-fill deposits more prevalent in the west.
- In comparison with the archive photographs, it is obvious that the present cliffs are far more degraded and subject to landsliding, resulting in a much more limited exposure of the rock units.

On a broad scale, the section has been well studied and documented to date and the general environment of deposition has been discussed at length. However, there could be scope for more detailed bed-by-bed work in the future integrating biostratigraphy, sedimentology and lithostratigraphy.

The only major unit that cannot be seen to advantage west of Goldbury Point is the sandstone unit GD

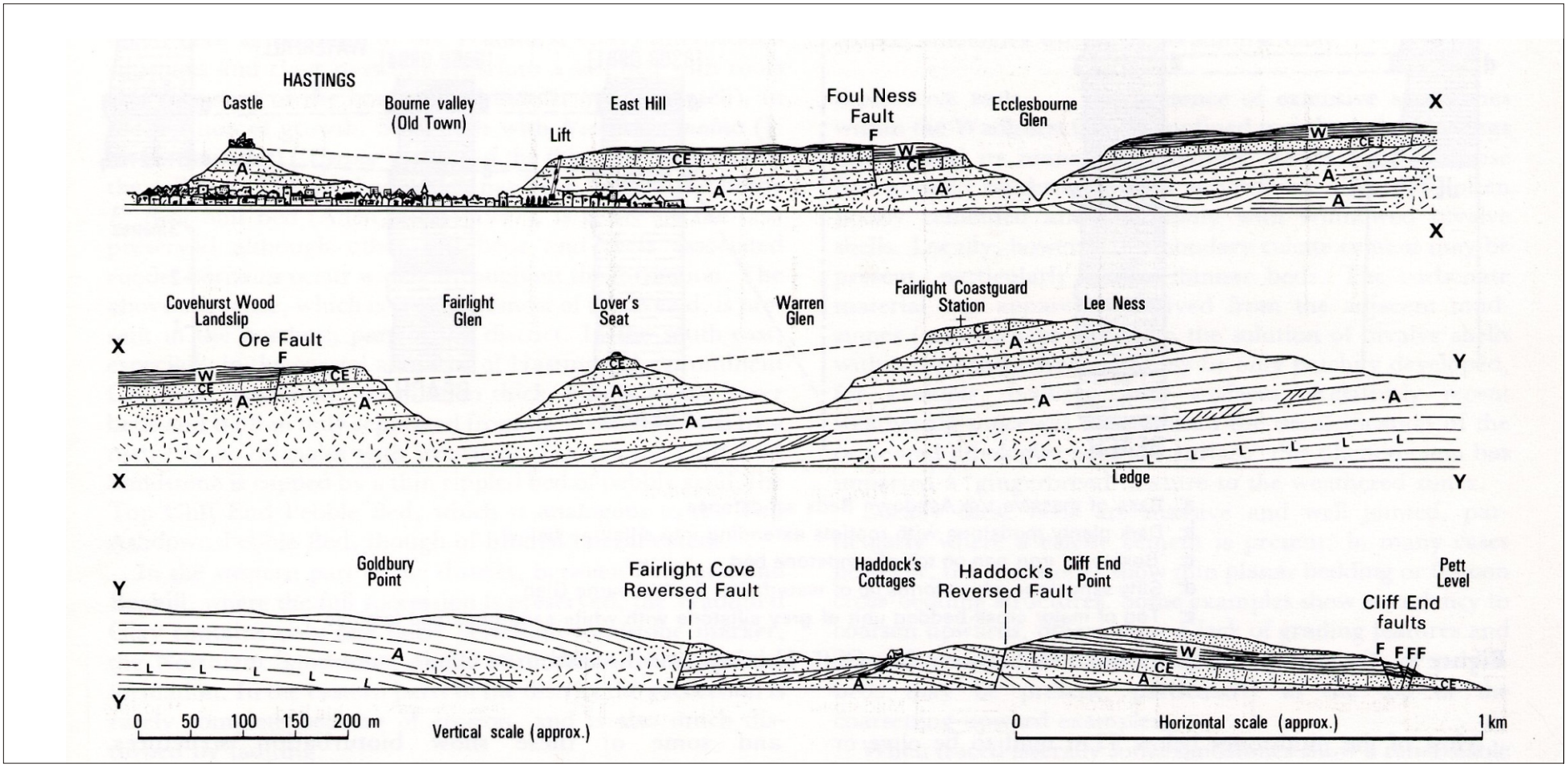


Figure 1: Sketch section of the cliffs between Hastings and Cliff End.

A: Ashdown Formation CE: Cliff End Sandstone L: Lee Ness Sandstone W: Wadhurst Clay F: Fault
Irregular stipple represents landslips and cliff-fall material. Cross-bedded units shown diagramatically only.

Figure 2: Coastal section studied and location of logs.

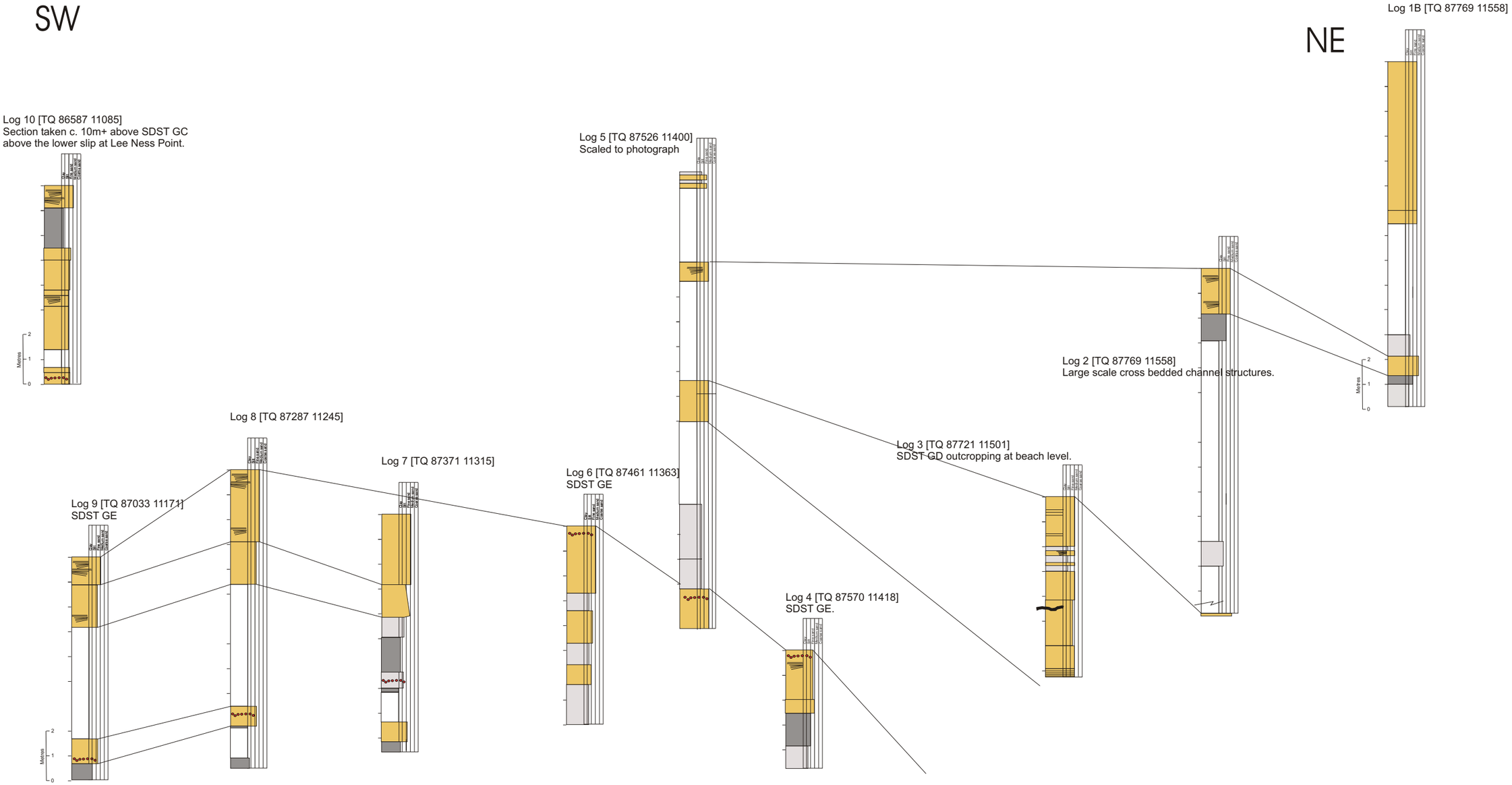
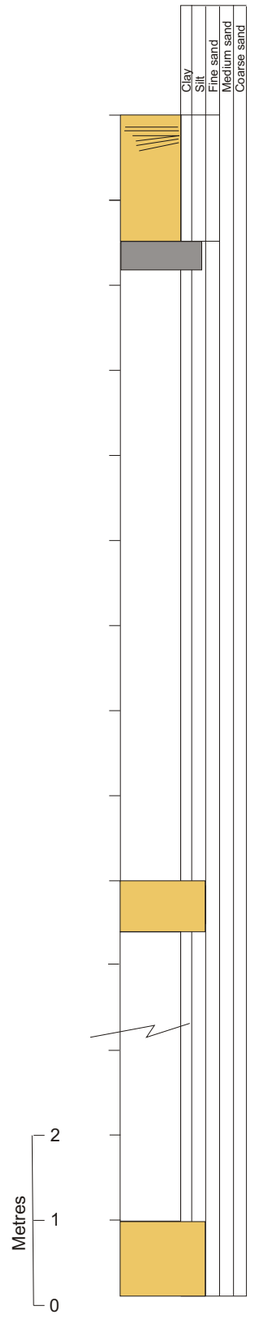


Figure 3: Composite logs for the section of study between Lee Ness Ledge and the Fairlight Landslide.

Log 1A [TQ 86693 11086] Lee Ness Ledge



SDST GC
Silty fine-grained sandstone, finely cross-bedded, small scale falser bedding.

Grey siltstone with carbonaceous fragments.

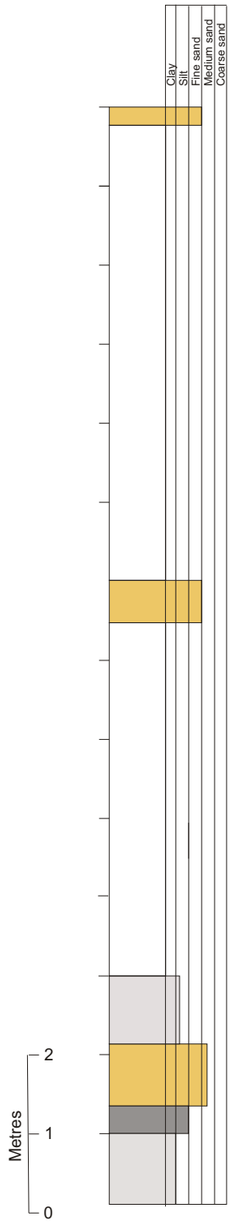
Scree. Slumped and fallen debris material obscuring the cliff face.

SDST GD
fine-grained grey sandstone with convolute structures

17.8m
Scree. Slumped and fallen debris material obscuring the cliff face.

SDST GE: Lee Ness Sandstone
pale grey-brown very fine-grained sandstone, ferruginous, hard.

Log 1B [TQ 87769 11558] Cliff section east of Goldbury Point.



SDST GA
Upper blocky fine-grained sandstone.

Scree.
Slumped and fallen debris material obscuring the cliff face (c. 6m)

SDST GB
Inpersistent fine-grained sandstones 30cm - 50 cm in thickness.

Scree.
Slumped and fallen debris material obscuring the cliff face (4.5m)

Grey silty mudstone with carbonaceous fragments (0.80m).

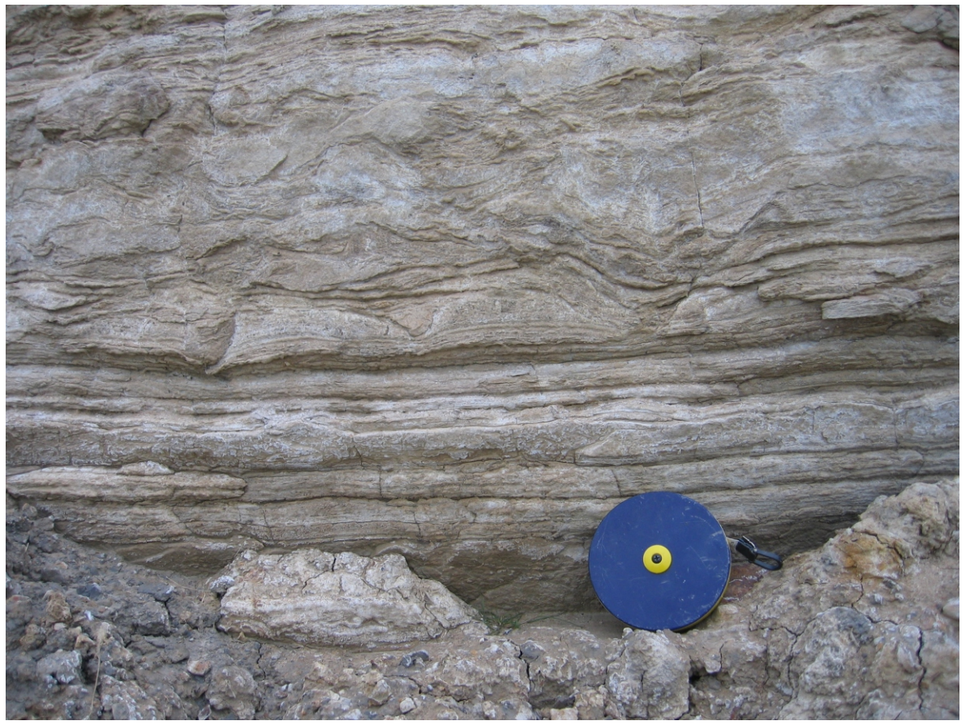
SDST GC.
Light grey-brown fine-grained sandstones, varying in thickness of between 30 - 70cm.

Pale grey-brown siltstone (0.40m)

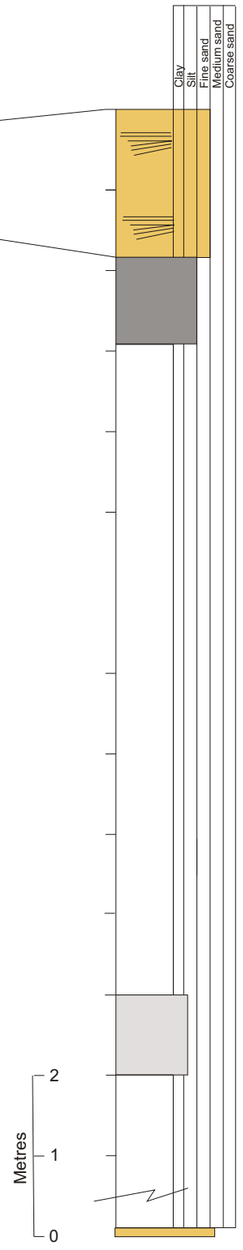
Grey mudstone, carbonaceous material in upper part (0.80+ m)

Scree to beach

Sedimentary sructures: channel fill deposits (above) and dewatering structures (below)



Log 2 [TQ 87769 11558] Cliff section east of Goldbury Point. Large scale cross-bedded channel structures.



SDST GC
Thinly bedded and cross-bedded fine-grained sandstone unit (1.8m).

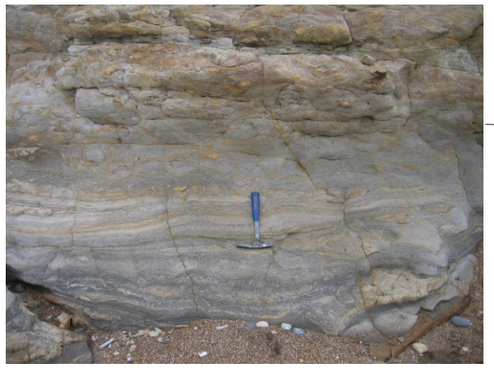
Pale grey siltstone with carbonaceous fragments (1.1m)

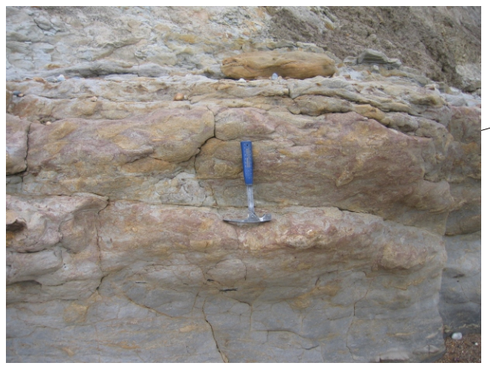
Scree.
Slumped and fallen debris material obscuring the cliff face (c. 8m)

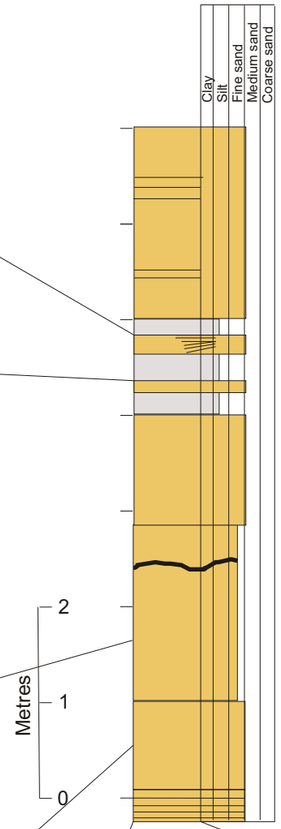
Dark grey mudstone with carbonaceous fragments (1.0m).

Scree to beach level (8.0m)
SDST GD exposed at beach level.

Log 3 [TQ 87721 11501] Cliff section east of Goldbury Point.
SDST GD outcropping at beach level.
[Measured dip: 16° to 095°]







Interbedded fine to medium-grained sandstones and fine sandy siltstones, varying bed thicknessess, grey (1.0m)

Dark grey mudstone laminates within fine to medium-grained sandstone. Thin laminates of carbonaceous material. Occasional ripple bedding and dewatering structures (0.80m)

Pale grey massive fine to medium-grained sandstone. No carbonaceous material (1.10m)

Fine-grained grey sandstone. Convoluted bedding and slump structures (0.50m)
Prominent coal band, anastomosing. (0.01m)

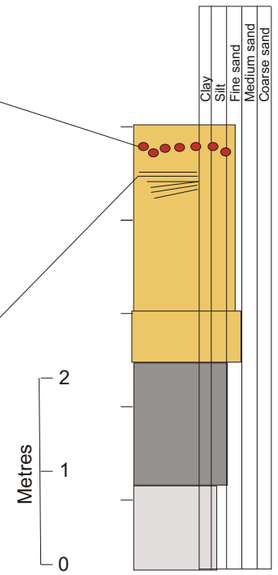
Convoluted grey-brown fine-grained sandstone. Nodular weathered appearance.
Abundant dewatering structures at base. (1.3m)

Dark grey carbonaceous rich silty fine to medium-grained sandstone. Abundant dewatering structures indicating highly active sedimentary environment (0.95m).
Occasional very thin silty mudstone layer.

Horizontally bedded highly carbonaceous layer (0.40m)

Sandstone GD running out to sea.
Looking ENE towards the toe of the Fairlight Landslide

Log 4 [TQ 87570 11418] West of Goldbury Point. SDST GE.



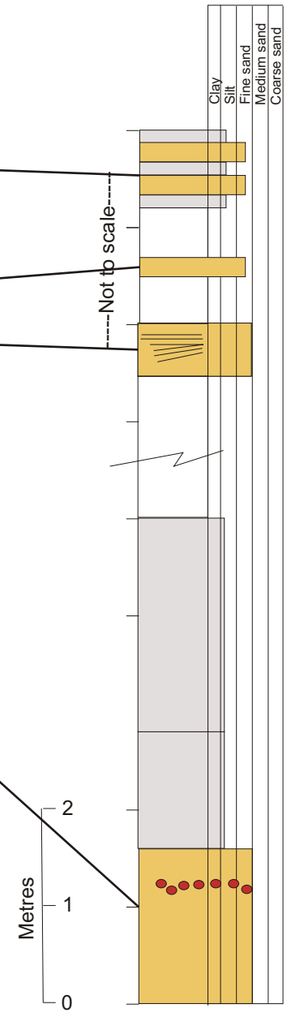
SDST GE: Lee Ness Sandstone
Pale grey fine-grained sandstone with thin silty mudstones containing abundant sphaerosiderite.
The sphaerosiderite (c. 1-2mm diameter) form a continuous band extending westwards before gradually thinning and splitting into 3 narrow bands (15cm) becoming increasingly iron-rich and loosing its nodularity.
Abundant burrow evidence.
Massive planar-bedded fine-grained sandstone with occasional thin bed of brown siltstone.

Thinly laminated convoluted fine-grained grey-brown sandstone (0.55m)

Nodular coarse-grained siltstone to very fine-grained sandstone. Occasional convoluted layer and planar bedding. (1.30m)

Pale grey carbonacaous mudstone (0.90m).

Log 5 [TQ 87526 11400]



Series of interbedded sandstones and mudstones forming the upper sections of the cliff.
Inaccessible, estimated diagramatic interpretation only.

Scree.
Slumped and fallen debris material obscuring the cliff face

SDST GC

Scree.
Slumped and fallen debris material obscuring the cliff face
SDST GD?
Thinly bedded fine-grained sandstone. Apparent cross bedding. Inaccessible at time of survey

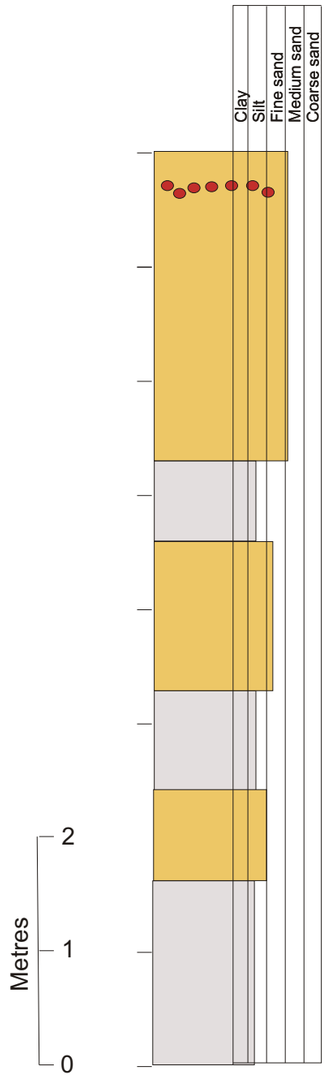
Scree.
Slumped and fallen debris material obscuring the cliff face

Carbonacaous silty mudstone (2.2m).

Silty mudstone (1.2m).

SDST GE: Lee Ness Sandstone
Massive bedded fine-grained sandstone.
Sphaerosideritic layer to the east, thinning and dividing into 3 to the west.

Log 6 [TQ 87461 11363]
SDST GE: Lee Ness Sandstone



SDST GE
cross-bedded fine-grained sandstone.
Thinly bedded in middle part, massive basal unit 55cm think. (2.7m)
Sphaerosiderite-rich layer 25 - 45cm from top of unit

Friable grey siltstone (0.70m).

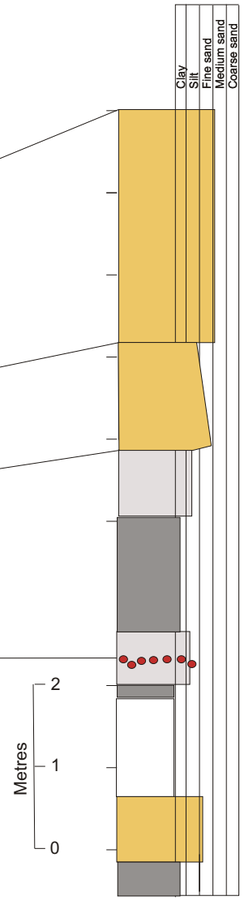
Silty to very fine-grained sandstone, nodular, yellow.
Highly convoluted bedding and dewatering
structures (1.30m).

Pale grey siltstone grading to pale grey silty mudstone (0.85m)

Dark grey hard silty sandstone. Highly weathered (0.80m)

Pale to dark grey, mottled red clayey siltstone (1.25+)

Log 7 [TQ 87371 11315]



SDST GE: Lee Ness Sandstone
Cross-bedded fine to medium-grained grey sandstone.
Abundant large-scale dewatering structures at base of bed (2.8m)

Very fine-grained sandstone fining up into siltstone.
Abundant small dewatering structures at base (1.80m).

Dark grey siltstone (0.80m)

Dark grey thinly laminated silty mudstone. Purple mottled base (1.30m)

Sphaerosideritic sandy siltstone. Fine-grained hard grey silty sandstone matrix (0.65m)

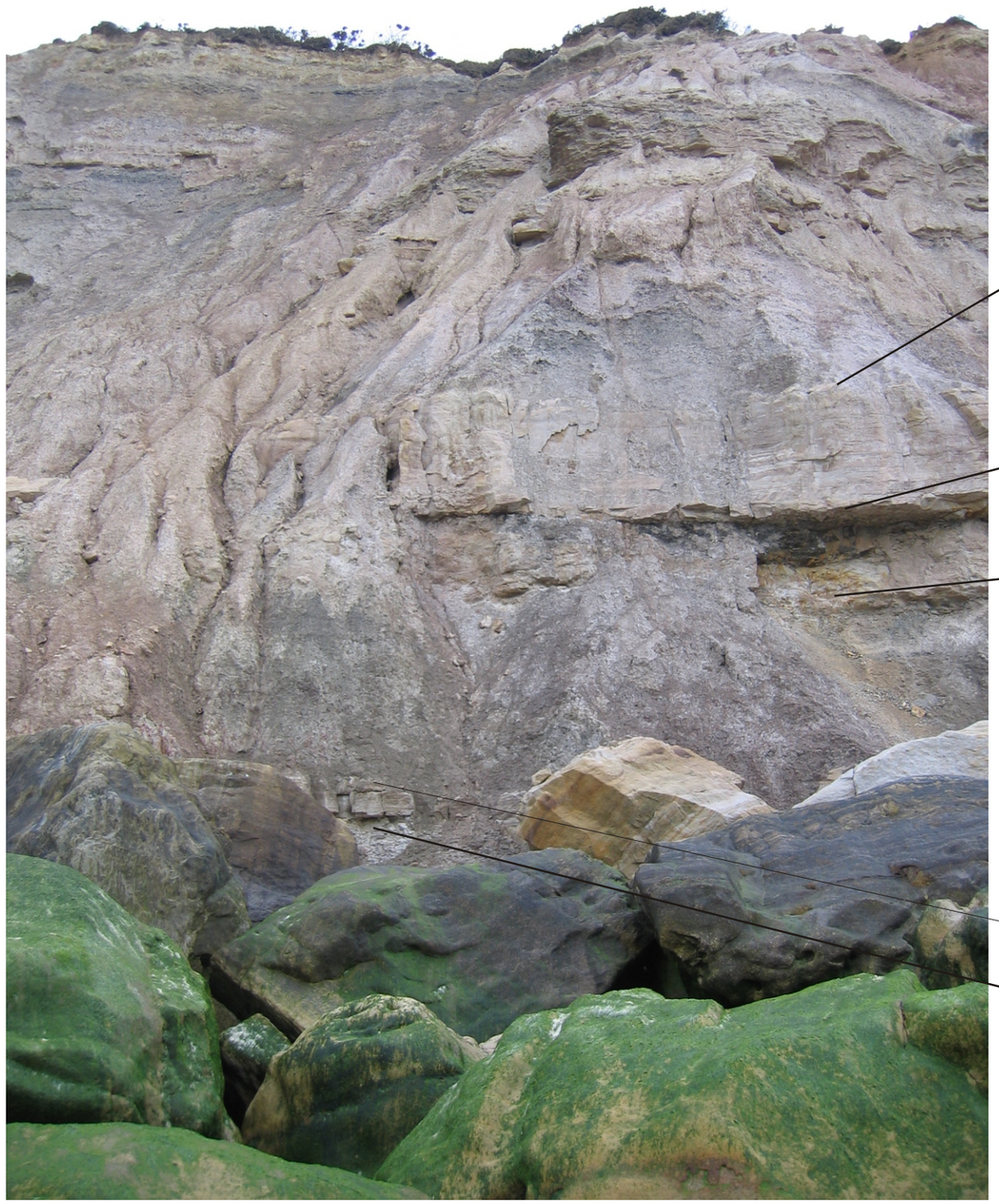
Soft mudstone with occasional siderite nodule grading to pale grey and red silty mudstone (0.15+m)

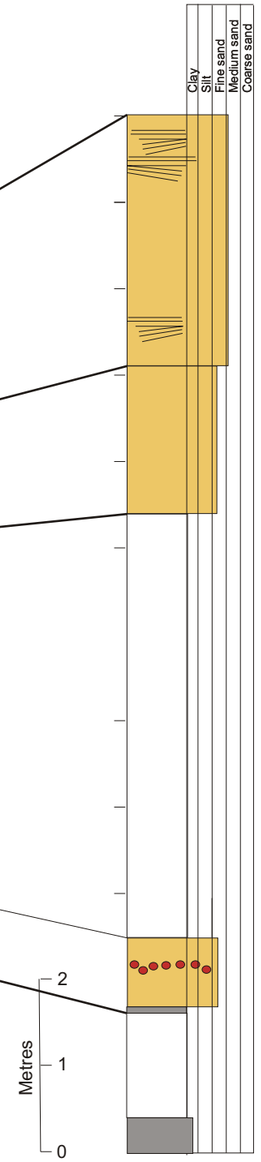
Scree.
Slumped and fallen debris material obscuring the cliff face

Hard massive-bedded to laminated, pale brown-grey, very fine-grained sandstone (0.70m).

Very fine-grained sandy silty mudstone. Rare carbonaceous fragments (0.40+m)

Log 8 [TQ 87287 11245]





SDST GE: Lee Ness Sandstone
Cross-bedded fine to medium-grained grey sandstone.
Abundant large scale dewatering structures at base of bed (2.90m)

Unevenly bedded silty sandstone. Highly convoluted dewatering structures. Light brown.
Abundant small dewatering structures at base (1.70m).

Scree.
Slumped and fallen debris material obscuring the cliff face (4.9m)

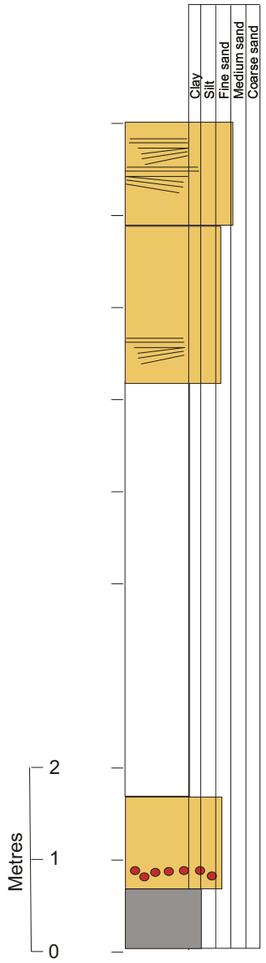
Sphaerosideritic fine-grained sandstone. Thinly laminated (0.55m)

Dark green-grey mudstone (0.05m)

Scree.
Slumped and fallen debris material obscuring the cliff face (1.20m)

Dark purple-green silty mudstone to beach level.

Log 9 [TQ 87033 11171]
SDST GE: Lee Ness Sandstone



SDST GE
Cross bedded fine-grained grey sandstone.
Abundant large-scale dewatering structures at base of bed (2.90m)

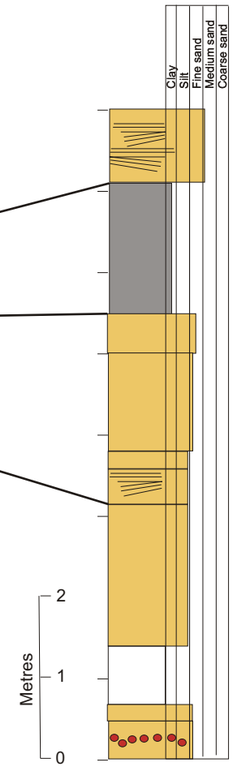
Unevenly bedded silty sandstone. Highly convuluted. Light brown.
Abundant dewatering structures at base (1.70m).

Scree.
Slumped and fallen debris material obscuring the cliff face (4.9m)

Sphaerosideritic sandstone. Fine-grained, thinly laminated,
occasional carbonaceous fragment (0.55m)

Dark grey silty mudstone (0.65m)

Log 10 [TQ 86587 11085]
Section taken c. 10m+ above SDST GC above the lower landslide at Lee Ness Point.



Fine to medium-grained sandstone (0.90m).

Silty mudstone (1.60m).

Massive bedded fine-grained sandstone (0.40m).

Laminated fine-grained sandstone and interbedded mudstones (1.20m).

Massive sandstone, very fine-grained (0.25m).

Strongly cross-bedded sandstone, fine-grained (0.40m).

Massive bedded and weakly cross bedded silty sandstone, micaceous, planar bedding surface at base of unit (1.70m).

Scree.
Slumped and fallen debris material obscuring the cliff face (0.70m)

Grey fine-grained sandstone (0.20m)

Pale grey silty fine-grained sandstone (0.20m+) with sphaerosiderite
Beach

View over Lee Ness Ledge from landslide

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APPENDIX 1

BGS Fairlight Borehole [8592 1173] (TQ81 SE1)

Surface level c 155.5 m above OD: Date 1970–71

	Thickness m	Depth m
Wadhurst Clay		
Cliff End Sandstone:		
Rock-bit, no core	1.68	1.68
Sandstone, fine-grained, white and ochreous, slightly micaceous, with occasional ripple-marks and silty clay partings. Scattered fish fragments, *Neomiodon* valves and fossil wood. Strongly cemented with calcite from 1.75 to 2.49 m. Vertical root traces throughout	2.54	4.22
Clay, blue-grey, with thin silt laminae	0.05	4.27
Sandstone, very fine-grained, silty and Micaceous, with some shell moulds and clay Partings. Vertical root traces	1.17	5.44
Basal Beds:		
Shales, blue-grey, with cross-laminated lenticles of silty fine-grained sandstone, Shell moulds	0.07	5.51
Sandstone, very fine-grained, silty with dark silt picking out cross-lamination. Several grey soft silty clay partings with mudcracks from 5.84 to 5.94 m. Shell moulds common at base	0.59	6.10
Shales, soft, grey with lenticles of sandstone	0.22	6.32
Clay-ironstone, massive, rusty brown, packed with moulds of *Neomiodon* valves	0.18	6.50
Mudstone, shaly, grey-green, soft	0.23	6.73
Mudstone, grey, interlaminated with thin pale grey siltstones giving a striped appearance; branching trace fossils on bedding planes of siltstones, some shell moulds, Core loss: 0.38 m in middle	0.56	7.29
Sandstone, very fine-grained, buff and ochreous, with grey shale partings. Coarsens downwards passing into	0.13	7.42
Top Ashdown Pebble Bed:		

Sandstone, coarse-grained, cross-laminated and rippled, with pebbles of quartz and some dark cherts up to 6 mm in diameter at base; some clay partings; sharp base	0.10	7.52
Ashdown Beds		
Top Ashdown Sandstone:		
Sandstone, fine to very fine-grained, silty at base, white to grey-buff, much plant debris on partings. Iron-staining on vertical joints	7.14	14.66
Alternating sandstones and violet-grey lignitic silty mudstones	18.71	33.37
Siltstones and sandstones with channel structures. Local mudstone partings and dewatering structures. Sharp base	8.90	42.27
Alternating mudstones, greenish grey, and siltstones, sphaerosideritic, with subordinate sandstones. Both gradational and fining-upward sequences present. Local red mottling below 52.4 m	17.90	60.17
Alternating silty, mudstones and muddy siltstones. Local plant debris and minor sphaerosiderite. Minor red and purple mottling in generally grey beds. Erosional surfaces associated with ?channel-structures. Sandy intercalations below 103 m, generally showing sharp erosional bases	58.70	118.87
Siltstones, muddy with abundant plant debris and sandy partings and interbeds. Medium-grained sandstone, 0.2 m thick, at base	11.13	130.00
Mudstones, silty and muddy siltstones with sandy partings and plant debris. Mudflake conglomerate at base. Probably a channel-fill sequence	8.25	138.25
Mudstones and siltstones, grey and greenish grey, Sphaerosideritic, with rootlets. Rare bedding structures. Red mottling locally below 142.5 m. Disturbed erosional contact at 148.79 m. passes downwards into	21.59	159.84
Alternating muddy siltstones and sandstones, fine-grained. Abundant plant debris. Internal ?slump structures and erosional contacts	3.81	163.65
Mudstones, silty and muddy siltstones, laminated; plant debris and rootlets	3.05	166.70
Alternating sandstones and silty mudstones. Rooty mudstones are homogeneous; other lithologies are well laminated with varying degrees of bioturbation. Plant debris; *Unio* at 170.5 m	5.82	172.52

Mudstones, silty, fawnish grey and dark grey, generally homogeneous with abundant roots and plant material; locally silt-laminated. Sharp erosional base with mud pellets	8.40	180.92
Mudstones, siltstones and sandstones, striped beds; cross-laminated locally; sphaerosiderite locally; plant debris; *Unio* at 186 m	8.26	189.18
Mudstones, silty, olive-grey, greenish grey and dark grey, rooty; generally homogeneous, rarely silt-laminated; local plant debris. calcareous siltstone at 193 m (0.13 m thick); laminated with calcareous siltstones below 193.6 m. *Unio* at 193.8 to 194. 2m	6.86	196.04
Alternating sandstones and silty mudstones. The sandstones are fine-grained, locally calcareous. The mudstones are medium grey and greenish grey, generally homogeneous, with rootlets and plant fragments, less commonly laminated with silt	6.75	202.79
Sandstone, medium-grained, cross-bedded, rooty, passing down to striped silty mudstones	3.64	206.43
Mudstone, greenish grey; mudflake conglomerate at base	2.99	209.42
Sandstone, fine-grained, rooty passing down to rooty greenish grey mudstone. Dark grey mudstone with calcareous silt laminations below 211.84 m; passing down to	3.10	212.52
Alternating silty mudstones and fine-grained sandstones with gradational contacts or, locally sharp bases to the sandstones; rootlets common; local plant debris	5.46	217.98
Siltstone, muddy with plant debris passing down to rooty silty mudstone. Calcareous siltstone at sharp base.	1.17	219.15
Purbeck Beds		
Mudstones, olive-grey and greenish grey, generally rooty. Shelly partings with *Eocallista (Hemicorbula) parva* (J. de C. Sowerby)	1.17	220.32

APPENDIX 2

Digital photograph listing for the coastal section between Lee Ness Ledge and Fairlight Landslide. (see digital files for further information)

	A	B	C	D	E	F	G	H
1	OCAL_IMAGE_NUMBE	Brief Description	Long Description	Date	SHEET NO	LAT_LONG	EASTING	NORTHING
2	105_0530.jpg	Hastings to Pett Level SSSI. V	Panorama of Covehurst Bay to Goldbury Poit from Lee Ness Ledge. First	08.03.2005	320 Hastings	National Grid TQ	586620	110860
3	105_0531.jpg	Hastings to Pett Level SSSI. V	Panorama of Covehurst Bay to Goldbury Poit from Lee Ness Ledge. Secc	08.03.2005	320 Hastings	National Grid TQ	586620	110860
4	105_0532.jpg	Hastings to Pett Level SSSI. V	Panorama of Covehurst Bay to Goldbury Poit from Lee Ness Ledge. Thirc	08.03.2005	320 Hastings	National Grid TQ	586620	110860
5	105_0533.jpg	Hastings to Pett Level SSSI. V	Panorama of Covehurst Bay to Goldbury Poit from Lee Ness Ledge. Four	08.03.2005	320 Hastings	National Grid TQ	586620	110860
6	105_0534.jpg	Hastings to Pett Level SSSI. V	Panorama of Covehurst Bay to Goldbury Poit from Lee Ness Ledge. Fifth	08.03.2005	320 Hastings	National Grid TQ	586620	110860
7	105_0535.jpg	Hastings to Pett Level SSSI. V	Top of the upper part of the Lee Ness sandstone (GE). Massive units of fi	08.03.2005	320 Hastings	National Grid TQ	586693	111086
8	105_0536.jpg	Hastings to Pett Level SSSI. V	Channel-fill very fine- to fine-grained sandstone. Planar, ripple and cross	08.03.2005	320 Hastings	National Grid TQ	586693	111086
9	105_0537.jpg	Hastings to Pett Level SSSI. V	View looking southwest over Lee Ness Ledge formed of the upper leaf of	08.03.2005	320 Hastings	National Grid TQ	586693	111086
10	105_0538.jpg	Hastings to Pett Level SSSI. V	Channel-fill very fine- to fine-grained sandstone. Planar, ripple and cross	08.03.2005	320 Hastings	National Grid TQ	586693	111086
11	105_0539.jpg	Hastings to Pett Level SSSI. V	General view of cliff face which hereabouts is approximately 50 m high	08.03.2005	320 Hastings	National Grid TQ	586768	111049
12	105_0540.jpg	Hastings to Pett Level SSSI. V	View of Cliff. First of three images for panorama west to east	08.03.2005	320 Hastings	National Grid TQ	586768	111049
13	105_0541.jpg	Hastings to Pett Level SSSI. V	View of Cliff. Second of three images for panorama west to east	08.03.2005	320 Hastings	National Grid TQ	586768	111049
14	105_0542.jpg	Hastings to Pett Level SSSI. V	View of Cliff. Third of three images for panorama west to east	08.03.2005	320 Hastings	National Grid TQ	586768	111049
15	105_0543.jpg	Hastings to Pett Level SSSI. V	Panorama west to east of top of the Lee Ness Sandstone. First of four im	08.03.2005	320 Hastings	National Grid TQ	586946	111099
16	105_0544.jpg	Hastings to Pett Level SSSI. V	Panorama west to east of top of the Lee Ness Sandstone. Second of four	08.03.2005	320 Hastings	National Grid TQ	586946	111099
17	105_0545.jpg	Hastings to Pett Level SSSI. V	Panorama west to east of top of the Lee Ness Sandstone. Third of four in	08.03.2005	320 Hastings	National Grid TQ	586946	111099
18	105_0546.jpg	Hastings to Pett Level SSSI. V	Panorama west to east of top of the Lee Ness Sandstone. Fourth of four i	08.03.2005	320 Hastings	National Grid TQ	586946	111099
19	105_0547.jpg	Hastings to Pett Level SSSI. V	Panorama from west to east of the Lee Ness Sandstone. First of four ima	08.03.2005	320 Hastings	National Grid TQ	587063	111164
20	105_0548.jpg	Hastings to Pett Level SSSI. V	Panorama from west to east of the Lee Ness Sandstone. Second of four i	08.03.2005	320 Hastings	National Grid TQ	587063	111164
21	105_0549.jpg	Hastings to Pett Level SSSI. V	Panorama from west to east of the Lee Ness Sandstone. Third of four ima	08.03.2005	320 Hastings	National Grid TQ	587063	111164
22	105_0550.jpg	Hastings to Pett Level SSSI. V	Panorama from west to east of the Lee Ness Sandstone. Fourth of four in	08.03.2005	320 Hastings	National Grid TQ	587063	111164
23	105_0551.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. First c	08.03.2005	320 Hastings	National Grid TQ	587206	111185
24	105_0552.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Secor	08.03.2005	320 Hastings	National Grid TQ	587206	111185
25	105_0553.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Third	08.03.2005	320 Hastings	National Grid TQ	587206	111185
26	105_0554.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Fourtl	08.03.2005	320 Hastings	National Grid TQ	587206	111185
27	105_0555.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. First c	08.03.2005	320 Hastings	National Grid TQ	587298	111246
28	105_0556.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Secor	08.03.2005	320 Hastings	National Grid TQ	587298	111246
29	105_0557.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Third	08.03.2005	320 Hastings	National Grid TQ	587298	111246
30	105_0558.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Fourtl	08.03.2005	320 Hastings	National Grid TQ	587298	111246
31	105_0559.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. First c	08.03.2005	320 Hastings	National Grid TQ	587434	111311
32	105_0560.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Secor	08.03.2005	320 Hastings	National Grid TQ	587434	111311
33	105_0561.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Third	08.03.2005	320 Hastings	National Grid TQ	587434	111311
34	105_0562.jpg	Hastings to Pett Level SSSI. V	Panorama showing Lee Ness Sandstone (GE) and Sandstone GC. Fourtl	08.03.2005	320 Hastings	National Grid TQ	587434	111311
35	105_0563.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
36	105_0564.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
37	105_0565.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
38	105_0566.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
39	105_0567.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
40	105_0568.jpg	Hastings to Pett Level SSSI. V	Panorama of Cliffs from the Fire Hill slip to Goldbury Point.Lee Ness sanc	08.03.2005	320 Hastings	National Grid TQ	587567	111393
41	105_0569.jpg	Hastings to Pett Level SSSI. V	Panorama east of Goldbury Point. Cliffs about 35 to 40 m. Sandstone GC	08.03.2005	320 Hastings	National Grid TQ	587770	111480
42	105_0570.jpg	Hastings to Pett Level SSSI. V	Panorama east of Goldbury Point. Cliffs about 35 to 40 m. Sandstone GC	08.03.2005	320 Hastings	National Grid TQ	587770	111480

APPENDIX 2

Digital photograph listing for the coastal section between Lee Ness Ledge and Fairlight Landslide. (see digital files for further information)

	A	B	C	D	E	F	G	H
43	105_0571.jpg	Hastings to Pett Level SSSI. V	Panorama east of Goldbury Point. Cliffs about 35 to 40 m. Sandstone GC	08.03.2005	320 Hastings	National Grid TQ	587770	111480
44	105_0572.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
45	105_0573.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
46	105_0574.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
47	105_0575.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
48	105_0576.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
49	105_0577.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
50	105_0578.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
51	105_0579.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
52	105_0580.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
53	105_0581.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587841	111600
54	105_0582.jpg	Hastings to Pett Level SSSI. V	Various views of the Landslide at Fairlight Cove.	08.03.2005	320 Hastings	National Grid TQ	587820	111540
55	105_0583.jpg	Hastings to Pett Level SSSI. V	Detail of carbonaceous silty mudstone. Hammer 28 cm.	08.03.2005	320 Hastings	National Grid TQ	587780	111520
56	105_0584.jpg	Hastings to Pett Level SSSI. V	An example of a coarsening up cycle. From the base dark grey carbonac	08.03.2005	320 Hastings	National Grid TQ	587769	111558
57	105_0585.jpg	Hastings to Pett Level SSSI. V	Close-up of Sandstone in image 0584	08.03.2005	320 Hastings	National Grid TQ	587769	111558
58	105_0586.jpg	Hastings to Pett Level SSSI. V	Sandstone GD to the east of Goldbury Point. Carbonaceous fine- to medi	08.03.2005	320 Hastings	National Grid TQ	587721	111501
59	105_0587.jpg	Hastings to Pett Level SSSI. V	Sandstone GD dewatering structures. Hammer 28 cm	08.03.2005	320 Hastings	National Grid TQ	587721	111501
60	105_0588.jpg	Hastings to Pett Level SSSI. V	Sandstone GD ledge within shingle beach. Hammer 28 cm	08.03.2005	320 Hastings	National Grid TQ	587721	111501
61	105_0589.jpg	Hastings to Pett Level SSSI. V	Sandstone GD. Silty fine-grained sandstone with dewatering structures. H	08.03.2005	320 Hastings	National Grid TQ	587721	111501
62	105_0590.jpg	Hastings to Pett Level SSSI. V	Sandstone GD. Silty fine-grained sandstone with dewatering structures. H	08.03.2005	320 Hastings	National Grid TQ	587721	111501
63	105_0591.jpg	Hastings to Pett Level SSSI. V	Sandstone GD. Silty fine-grained sandstone with dewatering structuresHa	08.03.2005	320 Hastings	National Grid TQ	587721	111501
64	105_0592.jpg	Hastings to Pett Level SSSI. V	Sandstone GD. Lower finely bedded very carbonaceous very fine- to fine-	08.03.2005	320 Hastings	National Grid TQ	587721	111501
65	105_0593.jpg	Hastings to Pett Level SSSI. V	Detail of plant remains within a fallen silty mudstone block at Goldbury Po	08.03.2005	320 Hastings	National Grid TQ	587720	111480
66	105_0594.jpg	Hastings to Pett Level SSSI. V	Detail of plant remains within a fallen silty mudstone block at Goldbury Po	08.03.2005	320 Hastings	National Grid TQ	587720	111480
67	105_0595.jpg	Hastings to Pett Level SSSI. V	The spherosideritic-rich top of the Lee Ness Sandstone. Hammer 28 cm.	08.03.2005	320 Hastings	National Grid TQ	587570	111418
68	105_0596.jpg	Hastings to Pett Level SSSI. V	The spherosideritic-rich top of the Lee Ness Sandstone. Hammer 28 cm.	08.03.2005	320 Hastings	National Grid TQ	587570	111418
69	105_0597.jpg	Hastings to Pett Level SSSI. V	The spherosideritic-rich top of the Lee Ness Sandstone. Lens 5 cm.	08.03.2005	320 Hastings	National Grid TQ	587570	111418
70	105_0598.jpg	Hastings to Pett Level SSSI. V	View of cliffs and foreshore west of Goldbury Point where the Lee Ness S	08.03.2005	320 Hastings	National Grid TQ	587526	111400
71	105_0599.jpg	Hastings to Pett Level SSSI. V	View of cliffs and foreshore west of Goldbury Point where the Lee Ness S	08.03.2005	320 Hastings	National Grid TQ	587526	111400
72	105_0600.jpg	Hastings to Pett Level SSSI. V	View of cliffs and foreshore west of Goldbury Point where the Lee Ness S	08.03.2005	320 Hastings	National Grid TQ	587526	111400
73	105_0601.jpg	Hastings to Pett Level SSSI. V	View of cliffs and foreshore west of Goldbury Point where the Lee Ness S	08.03.2005	320 Hastings	National Grid TQ	587526	111400
74	105_0602.jpg	Hastings to Pett Level SSSI. V	Mudcracks in fallen block of silty mudstone. Hammer 28 cm	08.03.2005	320 Hastings	National Grid TQ	587375	111297
75	105_0603.jpg	Hastings to Pett Level SSSI. V	Mudcracks in fallen block of silty mudstone. Lens 5cm	08.03.2005	320 Hastings	National Grid TQ	587375	111297
76	105_0604.jpg	Hastings to Pett Level SSSI. V	Cycle below Lee Ness Sandstone at position of section log 7	08.03.2005	320 Hastings	National Grid TQ	587371	111315
77	105_0605.jpg	Hastings to Pett Level SSSI. V	Cycle below Lee Ness Sandstone at position of section log 7	08.03.2005	320 Hastings	National Grid TQ	587371	111315
78	105_0606.jpg	Hastings to Pett Level SSSI. V	Cycle below Lee Ness Sandstone at position of section log 7	08.03.2005	320 Hastings	National Grid TQ	587371	111315
79	105_0607.jpg	Hastings to Pett Level SSSI. V	View of cliffs at site of section log 8.	08.03.2005	320 Hastings	National Grid TQ	587287	111245
80	105_0608.jpg	Hastings to Pett Level SSSI. V	Cliffs above Lee Ness Ledge	08.03.2005	320 Hastings	National Grid TQ	586587	111085
81	105_0609.jpg	Hastings to Pett Level SSSI. V	Cliffs above Lee Ness Ledge	08.03.2005	320 Hastings	National Grid TQ	586587	111085
82	105_0610.jpg	Hastings to Pett Level SSSI. V	Cliffs above Lee Ness Ledge	08.03.2005	320 Hastings	National Grid TQ	586587	111085
83	105_0611.jpg	Hastings to Pett Level SSSI. V	Cliffs above Lee Ness Ledge	08.03.2005	320 Hastings	National Grid TQ	586587	111085
84	105_0612.jpg	Hastings to Pett Level SSSI. V	View of cliff and foreshore looking east from landslip above Lee Ness Led	08.03.2005	320 Hastings	National Grid TQ	586587	111085

APPENDIX 2

Digital photograph listing for the coastal section between Lee Ness Ledge and Fairlight Landslide. (see digital files for further information)

	A	B	C	D	E	F	G	H
85	105_0613.jpg	Hastings to Pett Level SSSI. V	Panorama view of foreshore looking west to east from landslip above Lee	08.03.2005	320 Hastings	National Grid TQ	586587	111085
86	105_0614.jpg	Hastings to Pett Level SSSI. V	Panorama view of foreshore looking west to east from landslip above Lee	08.03.2005	320 Hastings	National Grid TQ	586587	111085
87	105_0615.jpg	Hastings to Pett Level SSSI. V	Panorama view of foreshore looking west to east from landslip above Lee	08.03.2005	320 Hastings	National Grid TQ	586587	111085
88	105_0616.jpg	Hastings to Pett Level SSSI. V	Panorama view of foreshore looking west to east from landslip above Lee	08.03.2005	320 Hastings	National Grid TQ	586587	111085
89	105_0617.jpg	Hastings to Pett Level SSSI. V	Cliffs above Lee Ness Ledge	08.03.2005	320 Hastings	National Grid TQ	586587	111085
90	105_0618.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
91	105_0619.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
92	105_0620.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
93	105_0621.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
94	105_0622.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
95	105_0623.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
96	105_0624.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
97	105_0625.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
98	105_0626.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
99	105_0627.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
100	105_0628.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
101	105_0629.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
102	105_0630.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
103	105_0631.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
104	105_0632.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
105	105_0633.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
106	105_0634.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
107	105_0635.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
108	105_0636.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
109	105_0637.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
110	105_0638.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
111	105_0639.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
112	105_0640.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Goldbury Point	08.03.2005	320 Hastings	National Grid TQ	586750	111020
113	105_0641.jpg	Hastings to Pett Level SSSI. V	Lee Ness Sandstone at base of Goldbury Point and cliffs above	08.03.2005	320 Hastings	National Grid TQ	587660	111430
114	105_0642.jpg	Hastings to Pett Level SSSI. V	View east of cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	582960	109490
115	105_0643.jpg	Hastings to Pett Level SSSI. V	Panorama from east to west of cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	582960	109490
116	105_0644.jpg	Hastings to Pett Level SSSI. V	Panorama from east to west of cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	582960	109490
117	105_0645.jpg	Hastings to Pett Level SSSI. V	Panorama from east to west of cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	582960	109490
118	105_0646.jpg	Hastings to Pett Level SSSI. V	Panorama from east to west of cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	582960	109490

APPENDIX 2

Digital photograph listing for the coastal section between Lee Ness Ledge and Fairlight Landslide. (see digital files for further information)

	A	B	C	D	E	F	G	H
119	105_0647.jpg	Hastings to Pett Level SSSI. V	Cliffs east of Ecclesbourne Glen from Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	583020	109480
120	105_0648.jpg	Hastings to Pett Level SSSI. V	Cliffs beneath East Hill, Old Town Hastings	08.03.2005	320 Hastings	National Grid TQ	583020	109480
121	Fairlight Cliffs 001.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2006	321 Hastings	National Grid TQ	587841	111600
122	Fairlight Cliffs 002.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2007	322 Hastings	National Grid TQ	587841	111600
123	Fairlight Cliffs 003.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2008	323 Hastings	National Grid TQ	587841	111600
124	Fairlight Cliffs 004.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2009	324 Hastings	National Grid TQ	587841	111600
125	Fairlight Cliffs 005.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2010	325 Hastings	National Grid TQ	587841	111600
126	Fairlight Cliffs 006.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2011	326 Hastings	National Grid TQ	587841	111600
127	Fairlight Cliffs 007.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2012	327 Hastings	National Grid TQ	587841	111600
128	Fairlight Cliffs 008.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2013	328 Hastings	National Grid TQ	587841	111600
129	Fairlight Cliffs 009.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2014	329 Hastings	National Grid TQ	587841	111600
130	Fairlight Cliffs 010.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2015	330 Hastings	National Grid TQ	587841	111600
131	Fairlight Cliffs 011.jpg	Fairlight landslide	Various views of the Landslide at Fairlight Cove.	08.03.2016	331 Hastings	National Grid TQ	587841	111600
132	Fairlight Cliffs 012.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2017	332 Hastings	National Grid TQ		
133	Fairlight Cliffs 013.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2018	333 Hastings	National Grid TQ		
134	Fairlight Cliffs 014.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2019	334 Hastings	National Grid TQ		
135	Fairlight Cliffs 015.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2020	335 Hastings	National Grid TQ		
136	Fairlight Cliffs 016.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2021	336 Hastings	National Grid TQ		
137	Fairlight Cliffs017.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2022	337 Hastings	National Grid TQ		
138	Fairlight Cliffs 018.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2023	338 Hastings	National Grid TQ		
139	Fairlight Cliffs 019.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2024	339 Hastings	National Grid TQ		
140	Fairlight Cliffs 020.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2025	340 Hastings	National Grid TQ		
141	Fairlight Cliffs 021.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2026	341 Hastings	National Grid TQ		
142	Fairlight Cliffs 022.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2027	342 Hastings	National Grid TQ		
143	Fairlight Cliffs 023.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2028	343 Hastings	National Grid TQ		
144	Fairlight Cliffs 024.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2029	344 Hastings	National Grid TQ		
145	Fairlight Cliffs 025.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2030	345 Hastings	National Grid TQ		
146	Fairlight Cliffs 026.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2031	346 Hastings	National Grid TQ		
147	Fairlight Cliffs 027.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2032	347 Hastings	National Grid TQ		
148	Fairlight Cliffs 028.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2033	348 Hastings	National Grid TQ		
149	Fairlight Cliffs 029.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2034	349 Hastings	National Grid TQ		
150	Fairlight Cliffs 030.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2035	350 Hastings	National Grid TQ		
151	Fairlight Cliffs 031.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2036	351 Hastings	National Grid TQ		
152	Fairlight Cliffs 032.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2037	352 Hastings	National Grid TQ		
153	Fairlight Cliffs 033.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2038	353 Hastings	National Grid TQ		
154	Fairlight Cliffs 034.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2039	354 Hastings	National Grid TQ		
155	Fairlight Cliffs 035.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2040	355 Hastings	National Grid TQ		
156	Fairlight Cliffs 036.jpg	Hastings to Pett Level SSSI. V	Panorama west to east between Lee Ness Ledge and Fairlight	08.03.2041	356 Hastings	National Grid TQ		
157								

APPENDIX 3: Archive Photographs

A11284: Sandstone filled channel in middle Ashdown Beds, Pett.

A11338: Cliffs near Lovers Seat, Fairlight.

A11339: Coastal scenery at Fairlight

A11340: Coastal views near Fairlight.

A11341: Landslip, LeeNess

A11342: Lee Ness Ledge, Fairlight

A11343: Cliffs, Lee Ness to Goldbury Point.

A11344: Cliffs in Middle Ashdown Beds, Fire Hills, Fairlight.

A11345: Sphaerosiderite ‘balls’ in silty mudstone, near Fairlight.

A11347: LeeNess Sandstone, near Goldbury Point.

A11351: Cliff sections in Middle Ashdown Beds, near Goldbury Point.

A11350: Cliff sections in Middle Ashdown Beds, near Goldbury Point.

A11354: Mudflow, Fairlight Cove.

A11360: Trough cross-bedding, Fairlight Cove.

A11372: Minor channelling in upper Ashdown Beds sandstones, Cliff End.