# GREATER THAMES ESTUARY
# ESSEX ZONE

## MONITORING SURVEY

## ASSESSMENT
## AND
## UPDATED PROJECT DESIGN

## ISSUE 2

Essex County Council

ENGLISH HERITAGE

**JUNE 2004**

# GREATER THAMES ESTUARY
# ESSEX ZONE

# MONITORING SURVEY

ASSESSMENT
AND
UPDATED PROJECT DESIGN

ISSUE 2

**Report prepared by**

**E. Heppell**

**With contributions by**
**N. Brown and P. Murphy**

**June 2004**

**Essex County Council**
**Historic Environment Branch**

Field Archaeology Unit
Fairfield Court,
Fairfield Road,
Braintree
Essex
CM7 3YQ

Tel: 01376 331431

Heritage Advice, Management and Promotion
County Hall,
Chelmsford.
CM1 1HQ

Tel: 01245 492211

**ACKNOWLEDGEMENTS**

This project could not have taken place without the input of a great number of people. Ron and Janet Hall gave generously of their time and expertise to assist in field recording at Collins Creek and the tidal flow monitoring. Peter Murphy of English Heritage provided scientific and general advice and contributed to developing the methodologies described within. Rodney Larner provided valuable information about the current position at The Stumble, and Hazel Martingell commented on his extensive flintwork collection. Thanks are also due to English Nature.

The project was co-ordinated by Nigel Brown of ECC HAMP with contributions from Hester Cooper-Reade (formerly of ECC FAU) and Mark Atkinson of ECC FAU. The project was funded by English Heritage, monitored by Sarah Cross. Additional funding was provided by Essex County Council, as part of the Planarch 2 Interreg project.

The field survey team was supervised by Ellen Heppell, who was assisted by Holly Champion, Andrew Lewsey, Teresa O'Connor, and Dave Smith. Thanks are due to the field team for enduring less than ideal survey conditions, ranging from the heat of summer to autumn downpours, with no shelter. The field survey team was augmented at various times by Ron, Janet, Nigel and Peter along with Anwen Cooper and Pat Connell of ECC HAMP and Nicky Spurr, the Blackwater Project Officer of Maldon District Council, Ian Black of English Nature and the staff at the RSPB reserve at Purfleet.

*Alresford Creek, 2001*

# GREATER THAMES ESTUARY

# ESSEX ZONE

# MONITORING SURVEY

# ASSESSMENT REPORT

# ISSUE 2

**JUNE 2004**

## CONTENTS

FIGURES

# GREATER THAMES ESTUARY; ESSEX ZONE MONITORING SURVEY

# ASSESSMENT REPORT: ISSUE 2

## 1.0 PROJECT BACKGROUND

### 1.1 INTRODUCTION

Following extensive survey in the 1980s, 'The Hullbridge Survey' (Wilkinson and Murphy 1995), in the summer of 1999 proposals for further survey and monitoring of known sites along the Essex coast were submitted to the Greater Thames Estuary Regional Research Framework Steering Committee and English Heritage. Following discussion it was decided to separate the proposal into two parts. A project design for the new survey work was approved by English Heritage in December 1999, and fieldwork carried out in 2000 and an assessment report submitted in 2001 (Heppell and Brown 2001).

This report relates to the second set of proposals, the monitoring of known sites which had been located by the Hullbridge Survey (Wilkinson and Murphy 1995). The project design for this was submitted to English Heritage in November 2000 and, after amendment, approved in February 2001. The monitoring survey was designed to run for three years, and two interim reports have been issued through the course of the project (Heppell and Brown 2002 and Heppell 2003). Summaries have been appeared in *Essex Archaeology and History, Essex Past and Present, Blackwater Matters*. In addition a summary has been submitted for the English Heritage web site. This report presents the results of the entire project.

In carrying out the monitoring survey it became clear that two of the key sites in the Blackwater estuary would benefit from some additional work (see 1.3). This comprised additional visits to the Neolithic landsurface with extensive occupation at The Stumble and an initial visit to the Collins Creek Fish trap complex. This additional work was funded by Essex County Council through its participation in the Planarch 2 Interreg project. Whilst the Monitoring Project progressed, a trial excavation, funded by English Heritage, of timber structures in the intertidal zone apparently associated with a small Tudor earthwork fort was carried out at Cudmore Grove, Mersea for which a separate Assessment Report has been prepared (Heppell 2004)

### 1.2 BACKGROUND

The coastal zone of England contains an important legacy of historic assets, which includes a wide range of fragile and irreplaceable archaeological remains. These are vulnerable to a variety of threats, including natural sea level fluctuation, changes in climate, natural processes, and increased amounts of development and dredging. The UK has the longest coastline of any EU member around 18,000 km of this 8,500km are in England, of which 8% is in Essex. The Essex coast is of great importance for nature conservation, and

consequently over 80% is designated as a series of Sites of Special Scientific Importance (SSSI, Fig 1). The link between heritage and nature conservation is an important one, especially on the coasts where sites of interest to both bodies coincide.

The Greater Thames estuary, which includes most of the Essex coast, has been identified as a national priority for archaeological investigation (Fulford et al 1997). The long history of archaeological research in the Greater Thames area is summarised in the Greater Thames Estuary Regional Archaeological Research Framework (Williams and Brown 1999). The Hullbridge survey, of the 1980s, covered much of the Essex coastline, clearly demonstrated the wide range of remains present in the intertidal zone.

The Hullbridge Survey concluded with a sample excavation of the Neolithic settlement landscape at The Stumble in the mid to late 1980s (Wilkinson and Murphy 1995 and in prep.). Work continued in the coastal zone and a series of analytical earthwork surveys were funded jointly by ECC and RCHME/EH were prepared of the major grazing marsh nature reserves. Work on the intertidal zone during the 1990s, was carried on primarily through aerial photographic survey. Central to this campaign of aerial photography were a series, those of the large fish trap complexes around the Blackwater Estuary (Murphy and Brown 1999, 12) first recognised by local archaeologists, Ron Hall, Kevin Bruce and Barry Pierce. A number of these sites were subsequently subject to ground based visits and sampled for radiocarbon dating which demonstrated a Middle Saxon (Strachan 1998). One example, the vast fish trap complex at Collins Creek, was subject to more detailed ground based survey relatively little monitoring of known sites had taken place (Strachan 1996), and thus there was little data available to assess patterns of change and destruction. This presents a strong contrast with considerable efforts which were already underway with regard to the impact of coastal erosion and change on nature conservation issues such as saltmarsh loss (eg CGP 2000; Cook et al 1994; Burd 1992).

The monitoring project which is the subject of this report represents a preliminary attempt at systematic monitoring of change and erosion of archaeological sites and deposits around the Essex coast. The project, which ran over a three year period, comprised two elements. Firstly a number of different sites, identified during the Hullbridge Survey, were selected for revisits so that a rapid assessment could take place of the changes to these (Heppell and Brown 2002). The locations were chosen to give a range of site types, submerged land-surfaces, peat deposits, wooden structures, red hills and submerged forests, in a variety of estuarine conditions and tidal ranges. Secondly the area around Rolls Farm on the north shore of the River Blackwater was selected for a series of regular monitoring visits over a three year period. Rolls Farm comprises a complex at which a number of different site types, typical of intertidal archaeology, can be found. As such it was considered to be ideal for gathering data on patterns of erosion and change primarily through regular replanning and observation.

### 1.3 ADDITIONAL WORK

During the monitoring project it became clear that some additional work would be beneficial. This comprised further visits at The Stumble, which would usefully augment the single visit included in the original project design. Initial observations during the monitoring project visit, and reports form a local birdwatcher had clearly demonstrated that new exposures of old land surface and associated Neolithic occupation were being revealed and needed to be assessed. The monitoring at Rolls Farm identified significant pieces of the Collins Creek fish trap complex within the driftwood, suggestive of erosion. As such this site too was re-visited, with the help of Ron Hall, to re-assess the remains. The additional funding for this work was provided by Essex County Council through its participation in the Planarch 2 Interreg project, The results have been incorporated into this report.

## 2.0 STRUCTURE OF REPORT

The report is separated into five sections dealing with:

- Project Background
- Results of the revisits to selected sites
- Results of the monitoring
- General discussion
- Recommendations for further work/UPD

Illustrations can be found to the rear of the report.

## 3.0 AIMS AND OBJECTIVES

The aims and objectives of the project were set out in the project design (Brown, *et al*. 2001) and are summarised below.

The revisits to selected Hullbridge survey sites and the regular monitoring at Rolls Farm to assess the degree of survival and the processes of change, will contribute to four broad objectives

A1: Provide an indication of the degree and nature of the threat to coastal historic assets
A2: Assist in providing a sound basis for developing management and research priorities
A3: Assist in the identification of areas or sites requiring positive management action
A4: Provide an indication of how the rate of destruction of exposed wooden structures and other archaeological deposits, including old land surfaces, may be addressed

These objectives are being pursued through the following research aims
RA1 Study of Chemical changes and moisture content in waterlogged wood
RA2 Study of the nature and extent of the physical erosion of wooden structures
RA3 Study of the nature and extent of physical erosion of archaeological sites and deposits (including peat deposits)

RA4 Study of the nature and extent of erosion/changes (including new exposures of structures and deposits) at selected Hullbridge survey sites

# 4.0 REVISITS TO SELECTED HULLBRIDGE SURVEY SITES

## 4.1 SCOPE OF WORK

Seven Hullbridge Survey sites were selected for revisit and rapid assessment of change/erosion, which could then be compared to the Hullbridge Survey data. It was also an opportunity to check for new exposures at known sites. The sites examined represent some of the most significant archaeological deposits along the Essex coast.

The sites selected lie within four different areas, the Thames Estuary, along the Crouch Estuary, the Colne Estuary and the Clacton area (Figs 2 and 3).

The sites visited are summarised in the table below:

| Site No. | Easting | Northing | Site Name | Description |
|---|---|---|---|---|
| T1 | 58235 | 18322 | Leigh Beck | Red hills, Roman and medieval fish processing site. |
| T2 | 55445 | 17871 | Aveley (Purfleet) | Submerged forest, wood peat and old land surface. |
| C4 | 8026 | 9561 | Rettendon | Lower and upper peats and old land surface. |
| C56 | 59244 | 19591 | Canewdon Paddle | The Canewdon paddle, later Bronze Age. |
| CO1 | 60582 | 21978 | Alresford | Medieval wooden structures. |
| CL1 | 61563 | 21312 | Jaywick (Lion Point) | Old land surfaces and features |
| CL2 | 62663 | 22475 | Walton-on-the-Naze | Old land surface |

Table 1: Hullbridge sites selected for revisits

A site record was generated for each of the sites visited and supplied to the Essex Heritage Conservation Record. These included a text record, plans and sections (as appropriate), digital plans prepared using GPS and photographs. In addition notes were made as to the current land use, the condition of the foreshore, weather conditions which may have effected the reliability of the survey and areas of erosion. This data could then be compared with the records of the Hullbridge Survey.

## 4.2 THE THAMES ESTUARY

The Thames is a micro tidal estuary, with the section from Tilbury to Shoeburyness notably ebb tide dominant. The salt marsh along this coast has been largely reclaimed during the medieval period and converted to grazing marsh which over the last 50 years has largely been lost to arable conversion or

development. The areas of salt marsh outside the wall are eroding at a rapid rate, a loss of 20% being recorded between 1973 and 1982 (Mouchel 1997). The main areas of salt marsh are located around the tidal creeks at Pitsea and to the north and south of Canvey Island, where there are also areas of enclosed grazing marsh. The pattern of sediment movement within the Thames estuary is complex, but within the twentieth century has kept pace with sea level rise, despite dredging activity and extensive reclamation.

The Thames estuary is subject to a number of anthropogenic pressures. The river is a main conduit to Tilbury and the rest of the Port of London. Tilbury concentrates primarily on container handling roll on/off traffic and bulk items such as forest products, this trade, which requires large vessels, is on the increase. On the coastal fringe and inland the Thames is also subject to industrial uses, these include quarrying, brickmaking and the large refineries at Shellhaven, currently subject to a development proposal for a major container port. The industrial landscape reflects the importance of the Thames as a trading route. The proximity of the area to London has also meant that the Thames is also the site of a great deal of housing development. The Thames Gateway, as defined in Regional Planning Guidance Note 9, runs on both sides of the Thames, from Docklands in London at the west end, to Southend and the Isle of Sheppey at the east the regeneration of this area, is identified as "… a regional and national priority" (RPG 9 Para 4.9). Further strategic guidance is provided in RPG 9a 'Thames Gateway Planning Framework'**.** Thames Gateway is said to be the largest regeneration and development in Europe and is one of the key growth areas identified in the *Sustainable Communities Plan* (ODPM 2003). A major, innovative heritage mapping project for Thames Gateway has recently been prepared by English Heritage with the support of Essex and Kent County Councils, designed to inform strategic planning in the Gateway.

Two sites identified during the Hullbridge survey, were selected for monitoring Thames site 1, at Leigh Beck, Canvey Island, and Thames site 2 at Purfleet (Fig 4)

### 4.2.1 Thames Site 1: Leigh Beck

Thames site 1, Leigh Beck, comprised a range of deposits including Roman and medieval middens, the latter probably related to fish processing, along with Red hills (Fig 5). At the time of the Hullbridge Survey the probable medieval fish processing was considered to be unique in eastern England.

#### *4.2.1.1 Background*

Canvey Island lies almost entirely below modern high water and is composed of Flandrian silts (Wilkinson and Murphy 1995, 183-194); it was a salt-marsh island or islands, important for sheep grazing in the medieval period. The island was embanked and converted to grazing marsh in the 16$^{tth}$ century, and the eastern part is now heavily built up. There are some 12-14 red hills located on the island. In general the range of finds of Roman, Saxon and Medieval date recovered from the south and east coasts of Canvey is remarkable, suggesting a major focus of coastal industry and transhipment site for transport of goods (eg Wymer and Brown 1995, Crowe 1996, Fulford *et al* 1997).

The red hill deposits at Leigh Beck, on the eastern end of the island have been known for many years and have yielded abundant artefacts. The site comprised a body of occupation, midden deposits some 2m deep. These contain pottery and briquetage.

The work at Leigh Beck in the 1980s suggested the following sequence of events

- Ist Century AD: Old ground surface (olive grey clay) thought to be slightly above sea level
- Aggredation of briquetage rich deposits, containing fish bones and cereal deposits of Roman date.
- There is a break in activity until the 12/13$^{th}$ centuries, possible occupation and abundant fish bone deposits, possibly the waste from a local fish processing industry
- Accumulation of a grey-brown clay with a blocky structure, relating to post-medieval drainage

In addition to the work of the Hullbridge Survey trenching has been carried out at Leigh Beck by the Rochford Hundred Group (Mackley and Faulkner 1994), the whole area has been subject to both systematic and casual collection by various groups and individuals for decades.

ECC FAU carried out a revisit to the site in 2000. At this time it was noted that a number of timbers were visible to the south of the red hill complex, probably associated with post medieval drainage. Although no structures were visible in the area of the red hills there were traces of red deposits and briquetage to the south of the salt marsh cliff.

#### *4.2.1.2 Methodology*

A detailed walkover was carried out in the area in which deposits had been previously noted. Particular attention was paid to the edge of the marsh. The limits of deposits noted were planned using the GPS, as were the locations of timbers. The edge of the marsh itself were also planned so that should further visits take place accurate rates of erosion can be assessed.

#### *4.1.2.3 Results*

The area around Leigh Beck has altered greatly since the 1980s. A yacht club occupies an area of the high saltmarsh, with its own embankment. A great deal of erosion has also taken place over the last 50 years and considerable losses continue to occur. In 2000 it was possible to walk along the footpath to Canvey Point. There were some eroding sections of the old sea wall visible against this. In 2001 the path had fallen away and more of the historic sea wall was visible, being actively eroded by the sea.

Although a careful walkover was made of the area along the edge of the marsh, none of the midden deposits identified in the Hullbridge survey were relocated. Given the degree of erosion at this site it would seem reasonable to suggest that they have been destroyed. A subsequent revisit in 2002 revealed what were apparently the vestigial eroded remains of the base of the medieval midden deposits, recorded by the Hullbridge Survey. The red hill and briquetage deposits have also been eroded away. In 2000 some 'red' deposits were identifiable however, by 2002 the area had eroded down to an uneven sandy clay. Although

there is some briquetage and pottery still present on the surface it is by no means as dense as in previous years. Such material is also visible on the surface of the salt marsh, having been deposited by the tide.

In the area of marsh where the Hullbridge Survey sites were located comparison of survey data and vertical air photographs from the 1970s indicate that some 20m of marsh has been lost from this section. This would suggest an erosion rate of some 0.66m per annum.

### 4.2.2 Thames Site 2: Purfleet Submerged Forest

Thames site (Fig 6) is a substantial remnant of the extensive submerged forests and associated deposits along the Thames identified by Spurrell (1889) and earlier antiquarians. Similar deposits have been recorded buried at a variety of locations within deep alluvial sequences inland to the north east, including beneath the immediately adjacent Rainham Marsh nature reserve.

#### *4.2.2.1 Background*

The site was located during the 1986 season of the Hullbridge Survey. It comprises a single bed of wood peat, up to 1m thick, located on the Thames foreshore to the west of the confluence of the Mar Dyke (T2, TQ 5445 7871). The peat contains ash, alder, yew and other trees, both roots and trunks. Estuarine sediments underlie this deposit, containing some drifted tree trunks. Radiocarbon dates place the estuarine deposits within the Thames II transgression, c. 6500-5400BP and the peat at the end of the subsequent Tilbury III regression, c. 4930-3850BP (Wilkinson and Murphy, 1995, 90-8).

The analysis of the evidence (Wilkinson and Murphy 1995) suggested the following sequence of events

- Initial sedimentation in an estuarine environment during the Thames II transgression (estuarine deposits)
- Tilbury III regression; a soil horizon forms, which later develops into woodland. Artefacts would suggest some activity.

Conditions became wetter, wood peat formed above the sediments.

#### *4.2.2.2 Methodology*

The survey was carried out on 5 and 6 September 2001, around the spring tide. The weather conditions were good, and visibility in the site areas was clear.

A plan of the site was prepared using the GPS. The upper and lower edge of the peat bed were planned, as was the lower part of the sea wall as its position appeared to have altered from the position shown by the Ordnance Survey. The larger stools and tree trunks were also planned. Consequently, should further studies take place, ready comparison could be made of the deposits, and trees present.

#### *4.2.2.3 Results*

The wood and peat deposits at this site stretch for some 400m at the present time. For ease of description this has been split into three sections, west, east and central (see Fig. 7).

In the western section the peat deposit was still extant, and some 1m thick. The edge of this deposit lay close to the low water mark, and was marked by a small ridge. The eroded surface of this deposit runs back towards the sea wall for some 6m, the inland limit of the deposit is also marked by a ridge, c. 0.5m high. The top of this represents the highest level of the deposit. This upper shelf lies close to the modern sea wall. In places it is masked by the silts and concrete blocks associated with it. The western section of the site contains the vast majority of the tree stools and trunks.

The comparison of this data with that of the Hullbridge survey clearly shows that erosion has taken place in this section, the peat being far closer to the sea wall and approximately 50m of the peat deposits have been lost from the western end of the site.

The central section of the site is the most altered. It has been almost completely covered with concrete blocks, presumably placed to re-enforce the sea wall. The remains of some of the trees from the earlier survey can be seen poking up from the blocks.

The eastern section of the wall has also been eroded. The 1980s survey located the peat deposits running for c. 220m in this section, almost to the Mar Dyke. Reference to the published photographs would also suggest that the deposit was much wider, extending some distance from the sea wall.

The exposure of peat in this section now runs for 80m, and extends for a maximum of 8m from the base of the sea wall. Much of the peat deposit has been eroded back to the sea wall. Exposures of the paleosoil were located to the south of this peat bed. There are small roots and rootlets visible in this deposit.

No artefacts were recovered during the 2001 survey.

Coastal erosion is clearly a major threat in this area, the exposures of peat are certainly less extensive than they were in the 1980s. Comparison of photographs would also suggest that there are now more of the trees exposed. The erosion pattern appears to be lateral, with shelves being cut into the peat deposits, undermining them and leading to collapse

The large vessels using the navigation channel in this relatively narrow area of the Thames estuary add considerably to wave action in this area.

## 4.3 THE CROUCH

The rivers Crouch and Roach share an estuary, draining into the Greater Thames estuary between two large areas of reclaimed marsh, the Dengie peninsular to the north and Wallasea, Potton and Foulness Islands, to

the south (Fig 9). The two rivers form a single morpho-dynamic tidal system. This is characterised by relatively deep narrow channels, flanked by narrow tidal areas. The narrowness of the channels, which are restricted by sea walls results in an increase in tidal velocity, which limits sedimentary deposition and salt marsh development.

The Hullbridge survey located some 60 sites along the Crouch. The project design planned to examine sites, 52 and 53, to the west of Fenn Creek, and site 56. However sites 52 and 53 proved difficult to reach, as a sluice channel cut through the mudflats and was too deep to cross. Given that it was only possible to cross the Fenn Creek c. 1.5hrs before and after low tide, thus allowing a window of 3hrs, it seemed that diverting around this sluice to access site 52 and 53 would be impractical. As such it was decided to survey the accessible section at site 4 which has a similar sequence of deposits as at 52 and 53.

### 4.3.1 Crouch Site 4: Fenn Creek

#### *4.3.1.1 Background*

In the early part of the 20th century work was carried out by F.W. Reader and Hazeldine Warren at an intertidal Mesolithic site at Hullbridge, the results published in the *Essex Naturalist* in 1911. Crouch site 4 is located immediately to the west of the junction with Fenn Creek, to the east of Hullbridge (TL 8026 9561). It was first discovered in 1911 by Mr. William Henry Rand. The site comprises a strategraphic sequence of peats and associated deposits, which is one of the type sequences in the Crouch estuary (Wilkinson and Murphy, 1995, 35-42, 62- 67) critical to our understanding of the archaeology of the Essex coast.

A lower paleosoil was located at the base of the sequence, and was a lithic yielding horizon. The artefacts recovered from this level were largely Mesolithic in date, but some Neolithic artefacts were also present. This old land surface was shown to extend for 290m, with varying concentrations of artefacts along this stretch.

A lower peat deposit overlies the land surface. Wood was generally sparse in this deposit, which formed a marked step or bench of material, and ran for a length of 440m. This lower peat bench was overlain by a series of estuarine deposits, which contained some plant material. This was overlain by an upper peat deposit, which was split into 3-4 layers and sealed by another inundation deposit. The present salt marsh comprised the top of the sequence.

The modern channels of the Crouch complicate the topographical analysis of the site. Sites 4, 5, 15 and 17 probably represent one greater site area. An examination of boreholes, geological survey cores and auguring would indicate that a buried channel, floored by gravel deposits, immediately to the north of Site 4. This was probably still a topographic feature when the lower peat was deposited (c. 4000 BP Wilkinson and Murphy 1995).

The Hullbridge survey suggested that the main threat to the site was progressive erosion, but that this was not proceeding rapidly. Comparison of photographs of the 1911 work suggested that little change had taken place.

#### *4.3.1.2 Methodology*

The monitoring survey of the site 4 (Fig 10) took place on the 10, 11 and 12 October 2001. The first two days of the survey were clear and sunny, and visibility was good. The final day of the survey was dull and overcast.

A sample section was prepared, to establish the erosion patterns of the layers present on site. A GPS plan was prepared of the lower peat shelf and the edge of the salt marsh, and the limits of the paleosoil, to establish the rate of horizontal erosion on the site. This included locating areas of wood within the peat and on the adjacent paleosoil. A careful walkover was carried out along this paleosoil in order to assess artefact concentrations to compare with the earlier work.

It was noted that the gravel banks located in the channel were different to those shown on earlier maps, and the outline of the adjacent gravel bank was also planned.

#### *4.3.1.3 Results*

The deposits noted in the earlier studies were still present on site (Fig 11). The lower peat shelf was located an average of 15m from the low water mark. This is in contrast to the earlier survey (1982), when it was located c. 10m from this. This represents a retreat of c. 5m over a period of 19 years; indicating an average rate of erosion of c. 0.25 m per annum. The edge of the salt marsh itself has retreated by 2m between the two surveys.

The most vulnerable deposits appear to be the peats. The lower peat shelf is being undercut by wave action in the area, as is the upper peat. The majority of the collapsed 'lumps' were part of this the upper peat. The undercutting of this deposit, by some 0.15m, leads to the collapse of the upper marsh surface.

The paleosoil runs down between 0.5 and 2m beyond low water. By touch it was possible to roughly identify what is thought to be the limit of this horizon as there was a shelf of material, beyond which the ground was much softer. The walkover of the visible area of the paleosoil uncovered no artefacts during the Hullbridge Survey this area had only yielded a few artefacts. There were a number of small tree stools, rootlets and some loose timbers located in this surface.

At the eastern end of the site, towards the junction with Fenn Creek, rather more lithic artefacts were recorded during the Hullbridge survey, this area is now under a substantial gravel bank.

The survey has clearly demonstrated that erosion is taking place on the Fenn Creek Site 4. It would seem reasonable to suggest that this would be a fairly general pattern in the upper Crouch estuary. However it should also be noted that the shifting gravel banks in the area may protect some portions of the sites.

The Crouch is an active area for yachting, and there are a number of vessels moored on or near the site. At low tide these vessels rest on the palaeosoil. As the tides rises and falls the keels of these vessels are digging into the material. Thus more erosion is taking place. The backwash from vessels when travelling under motor is also possibly an added factor to erosion patterns.

It should be noted that although the site appears to essentially appear the same as that observed in the 1980s and indeed in 1911, the salt marsh has retreated a considerable distance landward. It is likely that the salt marsh deposits will, in the relatively near future, be completely eroded away. It is likely that the peat deposits will be destroyed, the effect of such erosion on the vulnerable artefact scatters and land surfaces riverward, is difficult to assess, but it seems likely there will be considerable damage.

### 4.3.2 Crouch Site 56: The Canewdon Paddle

#### *4.3.2.1 Background*

In May 1983 the survey was continuing up the Crouch estuary, to the north of the village of Canewdon. A paddle blade was noted protruding from the vertical salt marsh face. It was decided that the paddle should be urgently excavated, as its position was vulnerable to yachts. Excavation uncovered the full length of a 2.08m oak paddle, subsequently dated to the later Bronze Age (Wilkinson and Murphy 1995, 152-157).

The strategraphic context in which the paddle was found was good. The vertical salt marsh face comprised salt marsh deposits, peat, and a series of clays, with the paddle resting on a relict strandline.

#### *4.3.2.2 Method*

The stretch of estuary in which the paddle was located was walked on 06 August 2003 (Fig 9) Observations were made from both the top of the marsh face and along the base where it was safe to do so.

#### *4.3.2.3 Results*

In contrast to the results at Fenn Creek it was noted that the slat marsh cliff had not retreated landward by any appreciable amount. Indeed comparison of survey data collected on site and vertical photographs taken in 2000 showed no measurable change. It was however clear that at least some erosion was taking place, large ‘chunks’ of marsh deposits were present on the foreshore. No artefacts were recovered on this stretch of estuary.

## 4.4 THE COLNE ESTUARY

The Colne estuary is macro-tidal, it is characterised by ebb dominant tidal currents. Both the Colne and the Blackwater join the sea at Mersea Island. In comparison to the other rivers in the survey the Colne has undergone little modification to its morphology in the last 100 years. This failure to adapt to sea level rise

through morphological change may lead to the Colne progressively 'drowning', with associated loss of mud flats and salt marsh (Mouchel 1997).

### 4.4.1 CO1: Alresford

#### *4.4.1.1 Background*

Colne site 1(Wilkinson and Murphy, 1995, 203-5) is located at the junction of the River Colne and Alresford Creek, on the northern bank of the creek (Fig 13 and 14). The saltmarsh in this area was eroding and slumped sediment overlaid the lower sequence, but this slumped material covered a firm clay bench, on which a number of wooden structures were located.

The main structure (Context 2) comprised eight vertical timbers, with associated horizontal timbers, one held in place by a small wedge. Carpentry was visible on the timbers, some of the vertical timbers had mortice holes cut into them and one of the horizontals was trough shaped. The surface pottery in this area was fifteenth century in date and the timbers dated to the thirteenth century (Wilkinson and Murphy, 1995, 203-5 and table 18). A number of other wooden structures occur on the site, all associated with the firm clay bench. Contexts 3, 4, 5 and 6 could possibly be part of a sea wall revetment, with brushwood bundle 7 representing the remains of bundles used to face the sea wall or seal a breach. All these features are shown located at 30-50m from the marsh edge as mapped in the 1980s.

#### *4.4.1.2 Methodology*

Field survey of the Alresford sites was carried out on the 25 and 26 September 2001. Both days were still and clear and the visibility was good.

A great deal of erosion of the salt marsh has taken place in the intervening period between the two surveys, the plants on the marsh surface are not present in many areas and this has meant that the salt marsh deposits are breaking down and slumping. These very fine deposits are very unstable and difficult to cross. As a result it was not possible to either hand plan or GPS plan those features visible on the site. Therefore an extensive photographic record was taken. The positions of the timbers were sketched onto a copy of the modern OS map.

The comparison of the data from the two surveys also proved problematical. The Hullbridge site drawings show the edge of the salt marsh, and few other reference points. Given that the degree of marsh erosion in this area is great it is not possible to overlay the edges of the marsh to compare locations of structures. Thus comparison of the two sets of data with any reliability at the present time is difficult.

#### *4.4.1.3 Results*

A total of five groups of timbers and a number of what appeared to be isolated posts were located during the 2001 survey.

The first group, 100, was located immediately to the west of the channel which runs alongside the railway embankment. This group comprised two distinct elements. To the north, within a patch of salt marsh deposits, there were a number of roundwood stems. These are possibly the remains of a trackway or platform. To the south of these there was a row of three ?upright posts, the central post being slightly offset. To the south of this row, and on line with it, was an upright board.

A similar feature, 101, was located to the west of the previously described structure, c.5m from the current edge of the salt marsh. This structure comprised a round post, with a board c.1m to the south. This upright board had a round mortice hole cut onto the top of it, similar to those noted in context 2 in the 1980s survey.

Group 103 was a group of six posts, 2-10m from the edge of the marsh. There was no readily apparent pattern or alignment to these posts.

Group 104 was located close to the edge of the surviving edge of the marsh, and comprised two rows of timbers, perpendicular to each other. The west east row consisted of four timbers, one of which was slightly offset. This ran for c. 3m. The north south row had three timbers, running for c. 2m.

Group 105 was located close to the edge of the marsh in an area where a new channel had eroded. There were at least ten upright posts in this area, but again there was no real discernible pattern to their layout.

The isolated posts noted were concentrated in the channel, which runs alongside the railway embankment. These were more substantial than the others noted, and some were square cut. Presumably these would be tying up posts for small boats. The other isolated timbers were located along the edge of the marsh. These may be associated with other timbers, which have either been eroded away or are not yet exposed.

Despite the problems comparing data it would seem likely that the timbers located are different to those found in the 1980s,the timbers recorded then lay some 20-30m from the edge of the salt marsh. By contrast the structures located in 2001 lay far closer, 10m being the greatest distance, given the extent of erosion of the saltmarsh which is likely to have taken place, it seems highly unlikely that the two sets of timbers can be the same.

The threats to the archaeology in this area are clear. Erosion is considerable and its effects very apparent, the edge of the railway embankment is being actively eroded, as is the salt marsh. Much of the marsh area has lost its consolidating vegetation and is gradually being washed away.

## 4.4 CLACTON AND WALTON

The Clacton area for the purposes of this study comprises the stretch of coast from Jaywick to Walton-on-the-Naze (Fig 13). This stretch of open coastline is almost covered in beach sand and shingle, which cover the exposures of Flandrian material. Hazeldine Warren carried out extensive surveys of these exposures of land surface, at Clacton, Walton, Jaywick and Dovercourt (Warren et al 1936).

### 4.4.1 CL1: Jaywick

#### *4.4.1.1 Background*

The exposure at Jaywick corresponds to Clacton area 2 (Wilkinson and Murphy, 1995, 100-104), which was first recorded by Hazeldine Warren in the early twentieth century (eg Warren et al 1936). This work identified a later Neolithic land surface which outcropped between Jaywick and Dovercourt. This surface termed the 'Lyonese surface', was associated with a range of settlement features.

The 1984 season of the Hullbridge survey examined sections along this exposure, but noted that at the time the length of the Lyonese deposits was 'sadly depleted'. The survey concentrated on an area off Lion Point, sub-divided into three areas by wooden groynes. The best exposures of the old land surface were located on top of head deposits towards the top of the beach. Further towards the low water mark such surfaces had eroded down onto the London Clay. Such exposures were visible through 'windows' in the beach sand.

Archaeological deposits were reported in the late 1990s. A team from FAU visited the site to record these exposures but the Environment Agency was recharging the beach at this time as part of a major programme of works in the area and any exposures had been covered up.

#### *4.4.1.2 Methodology*

The re-visit to the Lion Point site took place on 08 October 2001. The previous night had been very windy, as was the day of the survey.

A walkover was carried out across the areas where deposits and features had been noted in the previous survey.

#### *4.4.1.3 Results*

No archaeological deposits were visible at Jaywick. The whole area was the site of a major scheme by the Environment Agency in the late 1990s. New, very substantial, breakwaters have been constructed using large granite blocks and the beach area has been recharged. In the area towards the top of the beach, where the majority of the archaeological deposits were noted, the sand is almost up to the top of the sea wall. Any surviving archaeological deposits will lie beneath this sand, in effect preserved, for the time being, from further erosion (Fig 15).

### 4.4.2 CL2: Walton-on-the-Naze

#### *4.4.2.1 Background*

The site (Wilkinson and Murphy, Interim Report 5 1984, 9-13) was situated at the north end of the Naze (Fig 14) in an area where the London clay deposits, which lies below the old land surface, dips below the later marine clays.

The site comprised exposures of old land surface, a silt loam or pale blue clay depending on location. These exposures contained occasional to common heat-shattered flints, occasional struck flints and small sherds of pottery (rare).

The old land surface was truncated by a recent trench and was relatively uneroded to the south west of this (inland). To the north east the surface was patchy, most of the area had eroded down to London clay. Contexts on the old land surface included shallow cut features, artefact scatters, and some areas of peat.

#### *4.4.2.2 Methodology*

An initial site visit was carried out on 08/10/01, the weather at this time was very overcast and windy. A second visit took place on 06/11/01, the weather at this time was clear and sunny and visibility was good.

On both visits the site was walked over in detail and examined for artefacts, and other surfaces. Notes were made as to the current condition of the site.

#### *4.4.2.3 Results*

The revisit to the Walton site showed that a number of changes had occurred in the area. The area is now littered with boulders, which have been displaced from the sea defences. The area between these was covered by a loose sand deposit. What is thought to be route of the trench observed in 1984 is now also filled by boulders.

There were exposures of the London clay to the north of the barrier beach, but only limited patches of a lighter grey clay (the old land surface) were visible on this. No artefact scatters were visible. There were occasional patches of peaty material, however these contained modern (19-20$^{th}$ century) material, such as brick and ceramic pipes. As such they are not thought to be a prehistoric context.

The shifting sands and boulders in the area make it impossible to assess the level of survival at the present time. However it would seem likely that these are masking any surviving archaeological deposits.

# 5.0 THE BLACKWATER ESTUARY

## 5.1 INTRODUCTION

The Blackwater estuary is a macro-tidal estuary, the geomorphology of which is determined by its geology and Quaternary history. There are two major London clay islands, Osea and Northey, and the mouth of the channel is over deepened, marking a former course of the Thames (Mouchel 1997). There are extensive areas of mud flats and salt marsh in the estuary, which are currently suffering from severe erosion. In response to the threat of erosion, and consequential loss of coastal habitat there are a number managed realignment schemes taking place in the estuary. These include the Abbots Hall and Old Hall sites in the Tollesbury area on the north side of the river and Orplands to the south.

The Hullbridge survey identified some 36 sites in the Blackwater estuary, second only to the numbers in the Crouch (Wilkinson and Murphy 1995,10) . These sites represented the wide range of sites which are encountered in the intertidal zone. These include old land surfaces with associated finds scatters, numerous red hills, and wooden structures.

The Blackwater is also the site of a number of wooden fish traps which lie at or close to low water (Strachan 1998), these include the very large Collins Creek complex (Hall and Clarke 2000).

## 5.2 BL28: THE STUMBLE

### 5.2.1 Archaeological Background

'The Stumble' is an area of intertidal mudflats located between Osea Island and the mainland. The area is an extensive exposure of prehistoric landsurface with Neolithic habitation, together with later peat deposits and wooden structures. The site was first located during the 1985 season of the Hullbridge survey, trial excavation commenced in 1986 (Wilkinson and Murphy, 1995, 76-81 and 150).

The area of the site lies 500m from Goldhanger Creek, which remains water filled at low tide, the main channel of the Blackwater runs to the south of Osea Island and is located some 1km to the south and 3km to the east of the site.

Saltmarsh lay to the north of the site, the deposits, which formed this were up to 2m deep. These deposits overlay thick layers of estuarine clays. These in turn overlay grey estuarine clay containing some organic remains and a lower peat deposit, of early Bronze Age date. This overlaid a leached silty sandy soil, an old land surface, formed on a silty or sandy clay head deposit.

The initial survey identified an early Neolithic occupation site (areas A, B, C and E). This was initially recognised by a dense concentration of early Neolithic pottery and flint, eroding out of the side of a narrow channel cutting into the old land surface. Further survey showed that this scatter had clearly defined limits. Excavation in this area identified post holes and other shallow irregular features, remarkably well preserved charred plant remains were recovered from samples and pollen analysis of preserved soils here and at other

sites in the Blackwater estuary has provided good evidence for the environmental setting and economy of the site. The Stumble represents one of the most significant Neolithic settlement sites in the Eastern Counties (eg Murphy 1996, Brown and Murphy 2000, Brown *et al* 2000). When occupied the site would have been on dryland, around 2-3m above high water as a rough indicator the early Neolithic High Water mark may be considered to be around the contemporary low water mark. Osea Island would have formed a low hill connected to the mainland.

Later Neolithic settlement (Area D and contexts 99,117, 118, and 124) was also identified by finds scatters, although noticeably less dense than the earlier site. Artefacts recovered comprised Grooved Ware, flintwork and concentrations of burnt flint. By this period sea level rise must have meant that the sites were very close indeed to the high tide mark. By the Early Bronze Age the lower peat was deposited, and Osea may have become an island.

A number of wooden structures were also located at 'The Stumble' by the Hullbridge survey work, largely to the north-west of the Neolithic settlement areas, closer to the edge of the salt marsh. They were gradually eroding out of the estuarine clay layers, as they were largely eroded in plan and not in section they were without a good stratigraphic context. The structures are listed below with their Hullbridge Survey site number, and date based on radiocarbon dates which are listed in Wilkinson and Murphy (1995, Table 18)

- BL 28.96, Hurdle bridge across creek, oak and hazel, Iron Age
- BL 28.98, Post and brushwood structure, Saxon
- BL 28.121, Wood scatter with two posts, Iron Age
- BL 28.126, Post alignment, Iron Age
- BL 28.127, brushwood with posts, Post Medieval
- BL 28.128, Brushwood with posts, Post Medieval
- BL 28.129, Submerged complex of wood, Iron Age
- BL 28.195, small fragment of track, Iron Age
- BL 28.244, Hurdle, Iron Age/ Roman

### 5.2.2 Methodology

An initial visit to 'The Stumble' on the 24 July 2001, was carried out by Ellen Heppell (ECC), Peter Murphy (EH), Nigel Brown (ECC) and Ron Hall. At this visit the general location of the site was restablished and methodologies for the survey were discussed.

The bulk of the survey work was carried out on 13, 14, 15 August 2001. The weather conditions were good for the duration of the survey, although the bright sunshine did make visibility difficult on occasions. The site was relatively dry with water pooling in only limited areas.

The survey team was augmented by P. Connell, and A. Cooper of ECC, HAMP and Nicky Spurr (MDC Blackwater Project Officer).

Given that the Hullbridge survey had located the site through the density of finds in the area the initial task was to establish if such finds scatters were still present. The site area was easily identifiable as the paling track from the earlier excavations and some grid pegs were still present on site. This area was walked over. Note was also taken of any other finds concentrations along the mudflats. Particular attention was paid to areas in which the lower peat shelf was exposed.

A sample section showing the relative heights of the different deposits was prepared using a level and the GPS. Values for these heights are relative to the top of the salt marsh at c. 2.5m as time constraints meant that an OS related TBM could not be brought in.

The wooden structures associated with the site were located closer to the edge of the salt marsh, as such this area was also closely examined.

In early 2003 a report was received from a Mr Larner, a retired fisherman who visits the Stumble regularly, that he had recovered both pottery and flintwork from the site in recent months. As such it was decided that a repeat visit should be carried out to locate this material. The site was visited by R. Clarke and A. Gascoyne of ECC. The location of the finds scatter was much closer to the causeway than any noted previously. In addition to the finds, wooden structures and what may be part of a red hill were located.

Mr Larner also brought along a small selection of the finds he has recovered from the site, these included a remarkable number of flint axes, polished stone axes, flint scrapers, arrowheads. In addition substantial pieces of pottery, probably Peterborough ware, have been recovered. Whilst the investigations during the 1980s recovered large assemblages of high quality flintwork and early Neolithic pottery together with Peterborough ware and some Grooved Ware, the axes represent a significant new addition to material from the site. An initial meeting has been carried out between Mr Larner and Hazel Martingell to assess the flintwork in the collection and a report on some of the finds is in preparation.

Further fieldwork was carried out in October 2003 in order to further assess the context from which this material had derived and to produce an accurate plan which could be used as a basis for further work.

### 5.2.3 Results

#### *5.2.3.1 The Neolithic Sites*

The earlier Neolithic site, located around trenches A/B and C, was initially identified in this survey by the presence of the chestnut paling trackway placed there to facilitate access during excavation in the 1980s. However the channel, which ran adjacent to the site, has completely silted up and is no longer identifiable on the ground. There were no traces of the excavated areas.

The dense finds scatter associated with this site is still present and relatively dense. A substantial amount of pottery was present, including rim and body sherds. The relative sherd size was also fairly large, up to 6cm.

The sherds were also not noticeably abraded. The flintwork comprised a mix of tools and waste flakes, including a well preserved section of a blade.

As with the earlier study the limits of the finds scatter were clearly defined. The spread was some 80m east west and 60m north south. The southern limit of the spread was located roughly in the position of area C identified in the 1980s. The northern limit was roughly at the position of areas B and C. This scatter was located on the top of the old land surface which was obscured in places by mud and sand which had been deposited on the area, along with a considerable amount of shell.

There were few finds associated with area D, identified in the Hullbridge survey as an area of later Neolithic activity. This reflects the results of the earlier survey in which the finds density is described as occasional.

In addition to the areas located above, which were previously known sites, other areas of finds were located. These were further to the west of the main site, towards the causeway. These were located immediately below an exposure of the lower peat, which was c. 100m long. Although the density of finds was low their presence would suggest that new areas of archaeological activity area being exposed at the Stumble.

The old land surface extended intermittently for some 600m, 40m more than previously recorded. Where levels were taken to establish a sample section of the paleogeology in the area this surface was shown to be almost flat, with a drop of only 0.19m over a distance of 180m, the width of the old land surface at the eastern end of the site. There are patches of a peat deposit overlying this land surface. This is a thin deposit, an average of 0.1-0.2m thick.

Following the report of finds by Mr. Larner further survey in 2003, funded by ECC through its involvement in the Planarch 2 Interreg project identified an area which is considered to have high archaeological potential. Previously, although artefacts had been noted along most of the old land surface there were no distinct concentrations, like those recorded by the Hullbridge Survey at the eastern end of the exposure of landsurface. However, survey at a location close to the causeway a c100m by 20m area was noted to have what was considered a significant concentration of artefacts. This new exposure was planned and will be the subject of further work in 2004-6, as part of the Planarch 2 Interreg project.

#### *5.3.2.2 Wooden Structures*

A total of nine sets of wooden structure were located during the 2001 survey. With the exception of structure 500 all were eroding out of the mud flats immediately to the south of the edge of the salt marsh.

Structure 500 was located immediately to the north west of the area of Neolithic finds. This was initially identified as two partial rows of posts, c. 2m apart and running for 2.5m. On the later survey days some roundwood, probably part of a hurdle trackway was exposed. Some cut ends were visible. It is notable that no wooden structures located close to the Neolithic areas were recorded by the Hullbridge survey.

Structure 501 was located at the point of the salt marsh, eroding out of estuarine deposits. This structure consisted of two parallel rows of round posts. It is thought that this may be another trackway. However no roundwood was located. There were also no associated finds in this area.

Structure 502 also consisted of parallel groups of posts. In this case there were some pieces of roundwood exposed but not in a great enough density to definitively state that this was another hurdle trackway. This structure has only recently been exposed. When located on a modern Ordnance Survey base map it is under an area of salt marsh.

Structures 503 and 504 were located at the base of slumped material from the eroding salt marsh. Both consisted of isolated posts.

Structures 505 and 506 are the only ones, which could possibly be associated with structures located in the earlier survey. 505 was an alignment of five posts. It lies close to the location of 98, a post and brushwood structure. It is possible that the posts may have survived whereas the brushwood has washed away. The same is true of 506, which may be associated with 128.

The remaining wooden features were isolated posts, 507 and 508. These were located at the northern limit of one of the peat exposures. Traces of these were located during the 2003 work although they were by this time fragmentary.

#### *5.3.2.3 Threats*

The monitoring of the Stumble has identified a number of areas in which active erosion is taking place. The results clearly show that there has been vertical erosion across the flats. A greater area of old land surface has been exposed in comparison to the previous studies. The dense scatter of apparently recently exposed finds would suggest that the Neolithic habitation site located by the Hullbridge Survey is being actively eroded. The identification of finds scatters further to the west of the Hullbridge site would suggest that new Neolithic habitation sites are also being revealed and subsequently eroded.

The vertical erosion is probably greatest at the more forceful spring tides, especially in bad weather when the wind whips up waves and drags them across the flats. The length of 'trails' of material behind posts and the scouring around the base observed during the current phase of fieldwork, clearly show the amount of material shifted by tidal forces even during a calm period.

There is some deposition taking place, which masks the old land surface in places. This material is coarse slightly silly sand, containing a high proportion of shells. However the deposits are unconsolidated and regularly shift with the tide, thus providing little protection for the underlying deposits.

The erosion of the salt marsh is also clear, the point has retreated at least 10m since the Ordnance Survey was last updated. The whole length of the marsh is eroding, and this is likely to expose more of the wooden structures located during both phases of the survey.

## 5.3 COLLINS CREEK FISH TRAP COMPLEX

### 5.3.1 Background

The Collins Creek fish trap complex is located to the south of the Rolls Farm site, in amongst a series of shingle and gravel banks (Hall and Clarke 2000; Fig 17). The site is only accessible by boat at the lowest spring tides.

The site, which comprises many thousands of wooden posts. Between one of these is a network of smaller timbers, which resemble wattling and may have either formed a base to stand on or may initially have been upright between the posts. The complex consists of multiple rows of posts which form parts of 'V' shaped traps. The scale of the site is impressive, running for approximately 1 mile in an E-W direction (Fig 21 and 22).

The site was originally identified by Ron Hall and was plotted from aerial photography. Subsequent to this a major recording exercise was carried out, funded by English Heritage. Samples taken at this time were dated to between 640-675 AD and 882-957 AD. This date range coupled with the complexity of the site plan definitely indicates a multi-phase site.

The monitoring survey at Rolls Farm identified numerous sections of worked wood, including sections with mortice holes, were noted on the shore. As there was no evidence of this type of wood from any of the sites at Rolls it was clearly not in situ and therefore was thought to have come from the Collins complex which is visible from the site. This indicated a great deal of erosion was taking place. Neither Collins Creek nor any other of the Saxon fishtraps around the Blackwater estuary were included in the Monitoring Project. Funding was therefore provided by ECC through its involvement in the Planarch2 Interreg project, to carry out a further revisit and some new survey at Collins Creek.

### 5.3.2 Method

Collins Creek was visited on the 27 and 28 September 2003 with transport and assistance provided by Ron and Janet Hall. Clear rows of posts were planned using the GPS and a photographic record made.

### 5.3.3 Results

The survey of the Collins Creek post identified a number of post alignments which had not been previously noted. This was particularly the case where the shingle and gravel banks had shifted to expose elements of the structures. In some cases the new planned sections helped elucidate the overall plan of the complex. In the western part of the complex a number of rows of posts, aligned west to east were identified, also the point of a trap not noted in previous surveys. In the eastern part of the complex two post alignments were identified. One was aligned NNE to SSE and the other NE to SW. Perhaps most interesting was the fact

that these alignments crossed. These alignments could possible link to some which had been previously recorded.

The most telling result was the degree of vertical erosion which had taken place within the banks. It was possible to re-locate one of the survey stations which were used to tie in the original aerial survey. These were pegs driven into the surface and capped by a large white 'lid' which was flush with the ground surface. The lid of the re-located survey point was however some 0.25m above the present surface level, indicating significant erosion.

## 5.4 DETAILED MONITORING: ROLLS FARM

### 5.4.1 Introduction

Rolls Farm is located on the north shore of the River Blackwater, to the north of the Collins Creek fish trap complex, and to the east of The Stumble (Fig 17). This area was chosen for regular monitoring as within a relatively small area a range of site types exist which can, to some extent be considered typical of intertidal archaeology in the Blackwater estuary. These include an area of buried land surface, wooden trackways, red hills and other later wooden structures including an old sea wall. The area was subject to regular monitoring visits throughout the three year survey. The regular monitoring aimed to help establish the rate of degradation and destruction of such sites.

### 5.4.2 Location and Topography

The Rolls Farm sites are located to the north of Thirslet Creek, on the north shore of the Blackwater. The sites are located within a square 'bay', probably created as a result of sea wall breaching prior to the late 19$^{th}$ century. The west and east of this bay are delineated by hard sea defences, with concrete facings. The eastern section of wall has an additional sheet pile section on top, raising the height of the wall. The embankment to the north is not as substantial, as the foot is protected by salt marsh (Fig 23). This marsh is clearly subject to erosion.

In the west of the bay is an area of firm blocky clay, around 0.3m lower than the surface of the modern marsh, with some patches of vegetation still extant. This extends for around 60m south of the marsh edge, seaward of this are mudflats, with areas of peat like deposits and old land surface close to mean low water. To the east erosion has uncovered a pattern of relict creeks.

Landward of the sea wall the ground rises gently to the north. Rolls Farm itself, to the north west of the site, is at around 4m OD. There are numerous red hills in the area, along with embankments and decoy ponds.

### 5.4.3 Archaeological Background

#### *5.4.3.1 The Neolithic Site*

An earlier Neolithic habitation site was located at approximately –1.5mOD, this comprised an 'abundance' of flint and pottery eroding out from a lower peat deposit. The site was first recorded during survey in 1985 this

comprised an 'abundance' of flint and pottery eroding out from under the edge of the lower peat shelf close to the level of mean low water.

The stratigraphy of the site is as follows

- Salt marsh and estuarine clays
- Firmer clay with some rootlets
- Lower peat (estuarine detritus)
- Buried soil on firm clayey slightly sandy silt

The scatter was examined by the means of a transect, in which finds density was logged. Trial pits were also excavated through the peat in order to ascertain at which level the artefacts occurred. These studies identified a mean density of struck flint at 10 per $m^2$, greater than any other site studied with the exception of the Stumble.

#### *5.4.3.2 Wooden Structures*

A number of wooden structures were located 80m to the north of this occupation scatter, some 30m from the edge of the salt marsh. These were located within the area of estuarine clays and were being gradually exposed by coastal erosion. Four structures were identified in 1985 and a further five in 1987. These structures were either situated in depressions representing a relict creek system, or on a firmer bench overlooking this.

The structures comprised sections of trackways and platforms. Some of these were poorly exposed in 1985 and could not be located in subsequent survey during 1987. This was interpreted as being because of erosion over the winter months. Those structures which where dated proved to be Bronze Age. At this date the environment in the area was probably salt marsh, developed in the early Bronze Age. The sections of trackway appear to cross the relict creeks associated with this marsh, bridging soft points. The absence of associated finds scatter would suggest that this site, although obviously the focus of a great deal of activity, was not the site of settlement, the short tracks being placed to facilitate activities such as grazing of the open marsh, fishing and hunting.

#### *5.4.3.3 Red Hills*

To the west of the main exposures of the Neolithic and Bronze age there is a substantial red hill (BL 11), part of a line of such features along this part of the Blackwater estuary spaced around 300-350m apart. The site barely rises above the salt marsh but is clearly visible from the seaward side as the southern side is being steadily eroded, and displays a distinctive red colour. The main site area is 60m E-W and 20m N-S, but some areas of briquetage in salt marsh creeks to the north would suggest that it either extends this far or that there is a further feature inland. Within the main site area a possible hearth and a possible evaporating trough were identified.

To the south of this red hill a line of posts were identified, part of a relict breached sea wall.

### 5.4.4 Methodology

As a number of different site types were present methodologies were adapted to suit each site. As Rolls Farm is to be monitored regularly over the next three years it was important that the data collected could be easily replicated in following visits.

The Neolithic site lay close to the low water mark and as such the time available on this section of the site is limited. An area of the lower peat surface and old land surface was chosen for study, as close as possible to that examined in the earlier survey. A transect was placed north south across this, using metal grid pegs. The present surface level was marked by a hacksaw mark on the pegs so that the amount of vertical erosion could be measured. The edge of the peat in relation to this grid line was planned, to allow the degree of horizontal erosion to be measured. The old land surface was divided into 1m wide collection units, again so that relative find densities could be compared.

The Bronze Age wooden structures and associated creek systems were located close to the marsh edge. Two areas in which wooden structures were present were planned in detail. Again the present surface level was marked by hacksaw marks on the grid pegs. A plan of the relict creek system in the immediate vicinity was prepared using the GPS equipment and the current edge of the salt marsh was also marked. Some isolated areas of roundwood stems and timbers were noted on the edges of the relict creek system. These were thought perhaps to either be the remnants of tracks/hurdles or the very tops of such features being exposed by erosion. As such the positions of these features were noted and the locations re-examined at each re-visit. .

The general area of the red hill was planned using the GPS. The main area of briquetage, the extent of associated deposits, grey clay layers associated with settling tanks and the edge of the salt marsh were all located. Detailed hand drawn plans and sections were made of selected areas. Again the grid pegs were marked with hacksaw lines.

The line of posts associated with a relict sea wall was planned using the GPS. It should be noted however that the western extent of the line is sketch plotted, as the ground was too unstable in this area for safe access.

A full record of colour prints was made of all notable features and contexts.

In addition to the field survey detailed above measurement of the tidal flow at the site took place, using a suspension type tidal flow meter.

In addition to the on-site monitoring samples were taken for laboratory analysis to consider the factors which may effect the degradation of wooden structures (as outlined in the Project Design)

Oxidisation of iron sulphide impregnating wood tissue. Although this has the effect of hardening and cementing wood together, thus protecting it from erosion, the effect on wood microscopically means that establishing stem age and and species may prove impossible.

- Intermittent desiccation Exposure twice daily may result in the drying and distorition of the top surfaces of wooden components, and possibly microbial degradation
- Physical erosion of components by tidal erosion

The degradation and destruction of archaeological deposits, such as peat horizons, old land surface and the exposed red hill are also likely to result from a number of factors.

- Intermittent desiccation. Exposure twice daily may result in the drying of upper surfaces, accelerating disaggredation and consequently erosion.
- Physical erosion of deposits by tidal erosion
- Animal and plant damage

### 5.4.5 Results

#### *5.4.5.1 The Neolithic Site*

The Neolithic site (Fig 24) was examined carefully as described above. The density of the finds in the area examined, below the lower peat, close to that of the original survey, was low. Some flint was recovered, along with the occasional piece of very small abraded pottery. In the majority of the collection units no finds were recovered.

This absence of material is a great contrast to the results of the work carried out in the 1980s, in which the abundance of material made this area one of the richest found in the survey. This spread was located 250m from the sea wall to the north. Comparison between the two sets of survey plans would suggest that the edge of the lower peat lies at roughly the same distance from the sea wall. It was noted in the initial survey that the scatter was concentrated in a stretch along the edge of the lower peat of 50m (E-W), with concentrations diminishing at each end. The low density could be the result of masking by the loose sand, shelly, gravel layer which has been deposited over the old land surface, in which finds are difficult to discern. This deposit was not present when the site was revisited in 1996 as part of the Blackwater Management Plan. Indeed at that time it was possible to make out the location of one of the Hullbridge Survey trenches, and the range and concentration of artefacts noted, was similar to that recorded by the Hullbridge Survey (Strachan 1996).

It was also thought possible that the concentrations of material located during the Hullbridge work, had been missed. As such on the second visit the area examined was increased. The results however did not change, and the finds density remained low.

The vertical erosion between visits proved to be minimal, an average of 0.05m across the top of the peat shelf. The most noticeable difference was the greater degree of undercutting of the peat deposit.

Subsequent visits to the site have located a more dense finds scatter, located to the west of those identified during the Hullbridge survey. This scatter comprised a number of struck flints, which were in very good condition. The scatter was, like that of the initial Hullbridge survey, located close to low water and eroding out from the lower peat shelf. Given the density of this scatter, and its differing location in comparison to that of the initial survey work, it would seem reasonable to suggest that this scatter may represent a previously unrecorded area of Neolithic activity, which is now being actively eroded.

#### *5.4.5.2 Wooden Structures*

A number of wooden structures were noted during the first monitoring survey some of which were associated with the relict creek system, which was clearly visible (Fig 25). A total of six sections of trackways were noted and four areas which could, potentially, be trackways.

The sections of trackway can be divided into two main types, those which were located on the firm blocky clay to the south of the red hill, and those at a lower level either crossing or associated with the relict saltmarsh creeks.

Sections of wooden structures 200, 215, 202 and 203 were located on the edge of the marsh. 215 was sampled for laboratory analysis (see section 5.4.6 below). These sections of track were constructed of long lengths of roundwood, running NE SW weaving across shorter more substantial timbers. There was the occasional vertical post. Although on roughly the same alignment it would seem unlikely that these represent a single feature. This is especially the case with structures 202 and 203. These two sections lay close to each other, and on the same alignment but 202 lies some 0.3m lower than 203. Unfortunately a gully cut through the mud between these two structures, making the stratigraphic relationship difficult to discern. The presence of vertical posts, presumably used to tie the panels in place suggests that these features are trackways, as opposed to once upright panels which have subsequently collapsed.

Structures 202 and 203 suffered a great deal of erosion during the winter months of 2001; in April 2002 when the site was revisited they had all but disappeared with only the more firmly anchored uprights and fragments of the larger horizontal timbers remaining. By the final site visit in October 2003 only very fragmentary remains were present. The rapid erosion of this structure is likely to be closely tied to its location, on a step on the edge of the salt marsh which is likely to be the position at which waves break.

Structure 204 was the best example of a trackway located, again interpreted as such due to the existence of uprights. It was some 5m long and c 2m wide. A further possible section of trackway, 205, ran perpendicular to this feature. This section was very eroded, with only an occasional timber remaining in situ. These two sections of trackway were planned in detail to enable monitoring to take place.

In contrast to 202 and 203 which lay close to it, trackway 204 remained remarkably well preserved throughout the survey. Re-planning of the structure using fixed grid points showed that although differing

portions of the structure were exposed at any given time, particularly at the west end of the feature where loose damaged elements were present, much of the structure survived (Fig 26 and 27).

As originally planned the structure comprised five sails or stakes, spaced at 0.30m intervals. Some of these appeared to be almost complete at 2.4m in length. Others were more fragmentary. The rods or weavers between these sails were generally in good condition in the central portion of the structure, although it was not possible to identify any endsails. The western end of the structure was more fragmentary. Here there was no clear pattern to the timbers, and it is possible that this material could represent a rough platform or dump of material used as a base for the panel.

The monitoring of this structure showed that the eastern 0.5m of the structure was washed away during the course of the survey, mainly during the winter of 2002. The eastern end was also eroded, with the loose timbers being washed away. In contrast the central section remained remarkably well preserved, particularly to the south. The ground level at either side of the structure, where grids pegs were located dropped by 0.07m during the course of the survey.

Trackways, 206, 207, 208, and 209, were situated on the edges of the relict creek system. These were small areas in which roundwood stems were visible. These either represent the remains of eroded trackways or the top of sections, which are not yet fully exposed. These sections lie in the same area as those found during the Hullbridge Survey. No further structures were identified in these areas during revisits.

Structures 211, 212 and 213 were located seaward of the blocky clay platform, in the west part of the site, and were first located in August 2001. Of particular note was structure 212, a bundle of brushwood positioned centrally in a relict creek. Structure 213 was a section of fragmentary wattling, 5m by 2m, comprising roundwood stems and some vertical or angled poles. Also included were some cut boards or planks. By April 2002 these structures had also been washed away, only occasional fragments were visible.

The results of the monitoring of the wooden structures at Rolls Farm has shown that patterns of erosion can be very localised, this is particularly demonstrated in the area of the relict creek system where one section has all but disappeared whereas another, within meters of it, is still extant. Some general conclusions can however be drawn as to the most vulnerable locations. These would appear to be the point where waves break, for example the edge of the salt marsh or any noticeable changes in height, and extensive areas of flat where vulnerable structures have little or no protection.

### 5.4.6 Context 215 Wood Preservation Peter Murphy

#### *5.4.6.1 Introduction*

This roundwood structure was exposed on the upper shore at a level equivalent to other structures which have given radiocarbon dates of 2850 $\pm$ 70 BP (HAR-8879: 1125-920 cal BC, 2 sigma) and 2790 $\pm$ 80 BP (HAR-7055: 1036-842 cal BC), (Wilkinson and Murphy 1995, 58 and 143-150).

Plainly, it was not possible to remove wood samples from the monitored structures to examine wood preservation in detail, for that would have disrupted monitoring of erosion. Instead, 215 was selected for sampling, since it was a simple structure - probably the eroded remnant of a brushwood bundle (cf. context 191) - in a terminal stage of destruction, and within a few metres of the monitored structures. This structure had first been seen in August 2001, so it must have been partly exposed for at least 4 months.

#### *5.4.6.2 Methods*

Sampling was carried out on 23.11.01. Samples were taken from 25 roundwood components - virtually the entire structure. Two samples per component were collected; 'A', from part of the stem exposed; and 'B' from a part still embedded in intertidal mud.

Examination of this sample collection was seen primarily as a pilot study to determine whether significant differences could be seen between exposed and buried wood, and whether these might be quantifiable. Two of these samples - 3A and B - were sent to Ian Panter (EH) for fixing and scanning electron microscopy. The remaining samples were stored in plastic bags, and chilled to minimise chemical changes before examination. 30 stems were examined macroscopically, then by transmitted light microscopy, at magnifications of x 250-400.

Species identification was not attempted systematically. Roundwood samples from intertidal contexts, as here, are very soft and spongey, and to provide sections suitable for identification, it is normally necessary to soak samples in methanol to harden them. However, it was thought that this might modify some of the variables being recorded. Although clear radial longitudinal sections (RLS) can be obtained from samples not pre-treated with methanol, and these clearly show presence/absence of framboids and fine cell structures, cutting TS and TLS was very difficult. From characteristics of rays and perforation plates seen in RLS, it appeared that that *Corylus* (hazel) predominated. Roundwood structures nearby were of *Acer, Corylus, Fraxinus, Quercus* and *Salix/Populus* (Wilkinson and Murphy, *ibid*.). Other variables that had been thought to be potentially informative when writing the Project Design were as follows (Brown *et al* 2001, 8).

- % water content. In fact, macroscopic examination of samples indicated that both exposed and buried wood samples were saturated. There is, no doubt, surface evaporation from exposed wood, but it appears that water is rapidly replaced by capillary action. In view of this % water content was not determined.

- Physical erosion, especially presence/absence of bark. Typical diameters of exposed and buried portions of each stem were recorded. Plainly, there is natural variation along the length of a stem, but surviving stem diameters give an idea of the degree of surface erosion.

- Degree of induration by iron sulphide minerals. Macroscopically, this was perceptible by hardening of bark and wood tissue, making sectioning difficult. Where iron sulphide replacement has occurred, a

slight 'crunching' sound is audible during sectioning, and there is resistance to the blade. Microscopically, the presence of pyritic framboids in pith, medullary ray cells and vessels was noted.

- Colour of replaced tissue. In anoxic sediments, this should be black. After exposure, oxidation of iron minerals would be expected to give a reddish colour. This might be an indication of duration of exposure.

- Boring organisms, and other associated plants and animals.

    - Gross distortion and fissuring, and degree of preservation of fine structures, particularly vessel perforation plates. A 'scoring ' system of 1-3 for both was adopted, '1' indicating good preservation (i.e. potentially identifiable) to '3' badly fissured/distorted and fine structures lacking.

#### *5.4.6.3 Results*

1. Gross physical erosion. None of the stems examined had bark, which must have been lost in prehistory, prior to burial. The mean stem diameter for exposed stems was 12.4mm; for stems still embedded in sediment 13.1mm. Recent erosion since exposure had resulted in about a 4.5% mean loss in diameter.

2. Fissuring. There was very little sign of this. Only one exposed stem showed radial fissures.

3. Boring. Only 4 stems showed boring, by some unknown organism. Both buried and exposed stems were affected. This took the form of narrow tubular boring, of about the same diameter as the nematodes associated with stems.

4. Associated biota. The majority of exposed stems had formed a substrate for filamentous green algae, and on one there was a rooted seedling, with a leaf form similar to *Halimione portulacoides*. Nematodes, hydrobiids and an amphipod were also associated.

5. Framboids in wood tissue. It seems likely that replacement of wood by iron compounds - probably principally pyrite - is initiated by microbially-induced iron sulphide framboid formation in waterlogged sediments with adequate levels of organic material and sulphur (Wiltshire *et al* 1994). In intertidal sediments sulphate ions from sea-water would ensure that sulphur was not a limiting factor for framboid formation. The most stable iron sulphide found under these conditions is pyrite, which is the ultimate product of a chemical pathway beginning with the formation of intermediate ferrimagnetic sulphides. The results from the intertidal timber circle at Holme-next-the-Sea, Norfolk suggest an arrested phase of diagenesis surrounding the timber where the metastable ferrimagnetic iron sulphides survived and the ultimate formation of pyrite had not yet occurred (Linford, in press). There was very rapid oxidation of iron sulphide minerals at Holme, but at Rolls Farm virtually none - just superficial reddening on three stems. Deeper in the wood tissue, there were abundant unoxidised framboids.

6. Cell structure. This was uniformly good. In most samples there were well-preserved hazel-type perforation plates.

#### *5.4.6.4 Conclusions*

It is not possible to specify exactly how long the wood components visible on the mudflat surface had been exposed, but the structure as a whole was visible in August, 2001, and must have been exposed for at least 4 months. Some superficial erosion had occurred (mean loss in diameter about 4.5%), and this probably resulted partly from physical abrasion by sediment suspended in the water column, partly from biological activity (e.g. the radulas of hydrobiids). Boring was uncommon. The wood appeared never to have dried out fully, so there was little splitting. There was also little oxidation of pyrite framboids or larger pyrite masses impregnating the wood. Fine cell structures had survived well.

Although this study indicates some of the destructive processes in operation, in isolation the relative significance of these variables is unclear. Further studies in contrasting intertidal environments are required.

### 5.4.7 Red Hills

Essex in general, and the Blackwater in particular are well known for the presence of red hills, Late Iron Age and Roman saltworking sites. There are a number of examples of these on the reclaimed marsh, landwards of the Rolls Farm site, one of which BL 11 is bisected by the sea wall. Where grazing marsh has been converted to arable these show up best in aerial photographs as extensive soil marks. There is a good example of this type of monument on the salt marsh, outside the sea wall, at Rolls Farm. This red hill is clearly visible, and it is also clear that a great deal of erosion has taken place in this area.

The red hill is a substantial monument, approximately 60m from west to east and rising for 1.2m above the surface of the flats in front of it. The red hill has been divided in two by an inlet. Three clay lined tanks were noted in this area, 0.5m deep. These internal structures were not visible at the time of the Hullbridge survey. One of these appears to coincide with an area of briquetage noted in the 1980s. There are also traces of what could be clay lined tanks on the west of the inlet. The exposure of such internal features clearly indicates that considerable erosion has taken place between the Hullbridge survey and the present fieldwork.
.

The monitoring of the red hill established that erosion was taking place, particularly in the area to the west of the inlet. To the east of the inlet erosion was concentrated in the areas around the upstanding clay lined tanks with water appearing to force itself though the gaps between the different types of deposits. Loose red material was present in front of the monument, it was typically in this area that briquetage was recovered. It was noted that more of this type of material was present after the winter months, suggesting a greater amount of disturbance or erosion.

There was little change in height in this area during the survey but erosion of the upstanding face of the red hill, to the east of the inlet was notable. Typically the more sandy red hill deposits were undermined and eroded away, leaving an overhang of salt marsh deposits, which subsequently collapse.

### 5.4.8 Relict Sea Wall

In addition to the sites recorded during the Hullbridge survey there are sections of relict sea wall present in the area, running across the flats. The alignment of these features was planned by DGPS and comprise a row of substantial posts, driven into the underlying clays at an angle of c. 45°. In some areas two rows of such posts were visible. These survive up to a height of 1m. In contrast to the relict sea wall at Thames site 1 (Leigh Beck), there is no rubble core to this earthwork, suggesting that it was a simple embankment. In places traces of what is likely to be the internal fleet ditch survive. Of particular interest is a raised area of rubble, located at a gap in the posts. This is likely to be the position of an attempt to fill a breach in the wall. At subsequent visits it was noted that the relative density of posts, in general, was lower

There appear to be three distinct elements to these features, suggesting piecemeal reclamation in the area. Although undated at the present time reference to cartographic sources would suggest that this relict feature pre dates the first Edition Ordnance Survey dating to 1876.

### 5.4.9 Tidal Flow

Measurement of the tidal flow off the site was carried out on a spring tide and a neap tide. This measured the speed of the current in meters per second, with an average reading being recorded every ten minutes.

The neap tide was monitored on 16 July 2001, the weather was calm and clear. The readings were found to be largely consistent. One hour after high water, on the ebb, when the depth of water was >2.25m the flow was on average 0.4m/s, this gradually decreased to a total of 0.04m/s. The same pattern was noted with the flow tide.

The spring tide was monitored on 23 July 2001 by Ron Hall, again the weather was relatively calm. One hour after high tide, on the ebb, with a water depth of 2.2m, the flow was an average of 0.5m/s. This gradually diminished to 0.17m/s. The same pattern was noted with the flow tide, with speed increasing to 0.6 at around high water.

Provisional analysis of these results would suggest that tidal flow is greater at the spring tide than neap tides and on the flow. This would mean that

the greater erosion threat would occur at this time when the flow is from the south west. Thus the most vulnerable area is that of the red hill, borne out by the pattern of erosion in this area.

## 6.0 GENERAL DISCUSSION.

The Greater Thames monitoring survey has provided a wide range of data from which has improved our knowledge of the considerable threat to existing sites, identified priorities for further work and will be available to contribute to the management of the coastal zone.

*A1 Provide an indication of the degree and nature of the threat to coastal historic assets:*
The monitoring survey has shown that, in the case of all the sites visited during the survey some degree of threat was identified. In all cases some degree of erosion was noted. This was particularly the case on the Thames sites examined.

It was clear however that much erosion is dependant on very localised conditions. This can perhaps be best demonstrated at Rolls Farm. Wooden structures, which although not of identical types were broadly similar, were located across the foreshore. However those of a slightly raised area on the western half of the site are no longer extant. In contrast similar features located in the area of the relict creek system were still extant, and in relatively good condition, after being exposed for at least three years.

The monitoring survey has therefore succeeded in identifying some factors which pose a threat to historic assets. It has however also shown that patterns of erosion and deposition can be complex, even within a relatively small locality.

*A2 Assist in providing a sound basis for developing management and research priorities*
*A3 Assist in the identification of areas or sites requiring positive management action*
The monitoring survey has accumulated a wide range of data which will be available to contribute in developing research priorities, and indeed the long term nature of the project has meant that some progress has already been made.

The data obtained through the monitoring survey has already contributed to the development of further research projects. This is particularly the case at The Stumble where the survey identified new exposures of old land surface with associated artefact scatters. This has served to further illustrate the significant nature of this site.

*A4 Provide an indication of how the rate of destruction to exposed wooden structures and other archaeological deposits, including old land surfaces, may be assessed*
In practical terms the nature of the intertidal landscape has meant that adaptable methodologies had to be developed in order to gather data in order to assess rates of destruction. Such practical issues include the distance to site, and therefore the limited amount of equipment that can be carried; the limited time available to work on site and primarily the importance of a well thought out Health and Safety policy/ Risk Assessment.

Modern techniques, particularly DGPS, proved to be the most practical method for planning the limits of extensive deposits for example the edges of salt marsh. This data could then readily be compared with both

historic and modern mapping, and vertical aerial photographs within GIS packages such as ArcView 3.1 and ArcGIS 8. This provided valuable information on rates of erosion and patterns of change in the estuaries. The use of GIS also means that any data gathered during the course of any follow on work can be easily added.

DGPS planning was less successful on a detailed level, for example for the internal structures within the Rolls Farm red hill. Where more detailed planning, or information beyond a simple location was required, hand drawn plans were prepared, with planning points located to the national grid by DGPS.
Assessing rates of vertical erosion, that is the reduction downwards of deposits, was also problematic. Given the limited time available on most of the sites visited and problems of access it was not practical to transfer bench marks to sites in order to establish a datum. Indeed in some cases finding a position to set up equipment without it sinking was difficult. As such in many cases only limited height data is available.

At Rolls Farm datums were transferred to the top of the planning points utilised throughout the monitoring. The position of the ground surface was then marked on these pegs, and changes noted at subsequent visits.

In conclusion the Greater Thames, Essex Zone monitoring survey established that
"The constant dynamic pattern of exposure and destruction of archaeological deposits within the intertidal zone makes regular monitoring vital if important information and discoveries are not to go unrecorded" (Williams and Brown 1999, 40)

It is therefore considered that in order to continue to develop our understanding of key areas of the coastal zone a programme of further work should be established. Some proposals to take this forward are outlined in the Updated Project Design, below.

BIBLIOGRAPHY

Brown, N. and Murphy, P. 2000 'Neolithic and Bronze Age' in Brown, N. and Glazebrook, J. eds *Research and Archaeology: A Framework for the Eastern Counties 2. Research agenda and strategy* East Anglian Archaeology Occasional Paper 8, 9-12

Brown, N., Murphy, P., Ayers, B., Bryant, S. and Malim, T. 2000 'Research Themes' in Brown, N. and Glazebrook, J. eds *Research and Archaeology: A Framework for the Eastern Counties 2. Research agenda and strategy* East Anglian Archaeology Occasional Paper 8, 44-48

Brown, N., Medlycott, M. and Murphy, P. 2001. *The Greater Thames Estuary. Monitoring, Essex Zone*. Unpublished Project Design, Essex County Council.

Burd, F. H. 1992 *Erosion and vegetation change on the saltmarshes of Essex and North Kent between 1973 and 1988* Nature Conservancy Council, Rsearch and Survey in Nature Conservation No. 42

Cook, A.S., O'Dowd, B. and Durdin, C. J. 1994 *Breeding Redshanks on Essex Saltmarshes in 1993* RSPB

CGP Coastal Morphology Partnership 2000 *Essex Saltmarsh Mapping* (report for Environment Agency)

Crowe, K. 1996 'The Early Medieval Settlement of Canvey Island' *Essex Journal* 31, No.1, 12-18

Fulford, M., Champion, T. and Long, A. eds 1997 *England's Coastal Heritage: A survey for English Heritage and the RCHME* English Heritage archaeological Report 15

Hall, R and Clarke, CP 2000 'A Saxon intertidal fish-weir at Collins Creek in the Blackwater Estuary' *Essex Archaeology and History* 31

Heppell, E. and Brown, N. 2001 *Greater Thames Estuary, Essex Zone: Survey, Assessment Report* unpublished

Heppell, E. and Brown, N. 2002 *Greater Thames Estuary, Essex Zone: Monitoring Survey, Interim Report No 1* unpublished

Heppell, E. 2003 *Greater Thames Estuary, Essex Zone: Monitoring Survey, Interim Report No 2* unpublished
Heppell, E. 2004 *Cudmore Grove, East Mersea; Excavation. , Assessment Report* unpublished

Linford, N. in press. 'Characterising the source of magnetic minerals from the Bronze Age timber circle, Holme-next-the-sea, Norfolk, UK'**.** In Brennand, M. in press. *Proceedings of the Prehistoric Society***.**

Mackley, R. and Faulkner, N. 1996 *Excavation on the Leigh Beck Marshes 1993* transactions of the Rochford Hundred Field Archaeology Group Volume 1

Mouchel 1997 *Essex Shoreline Management Plan* Mouchel Associates Ltd

Murphy, P. 1996 'Environmental Archaeology in Essex' in Bedwin, O. ed *The Archaeology of Essex: Proceedings of the Writtle Conference* 168-180

Spurrell, F.C.J. 1889 'On the estuary of the Thames and its alluvium' *Proceedings of the Geological Society* 11, 210-230

Strachan, D. 1996 *Foreshore Survey in the Blackwater Estuary: 1995-6* Unpublished Report

Strachan, D. 1998 'Intertidal stationary fishing structures' *Essex archaeology and History* 29, 274-284

Warren, S. H., Piggott, S., Clark, J. G. D., Burkitt, M.C. and H. and M. E. Godwin, 1936 'Archaeology of the submerged landsurface of the Essex coast' *Proceedings of the Prehistoric Society* 2, 178-210

Wilkinson T. and Murphy, P. 1985 *The Hullbridge Basin survey, Interim report No.5* Unpublished Report

Wilkinson, T.J. and Murphy, P.L, 1995 *Archaeology of the Essex coast, Volume 1: the Hullbridge Survey,* East Anglian Archaeology 71, Chelmsford

Wilkinson, T.J. and Murphy, P.L, in prep *Archaeology of the Essex coast, Volume 2: The Stumble,* East Anglian Archaeology, Chelmsford

Williams, J. and Brown, N. eds 1999 *An Archaeological Research Framework for the Greater Thames Estuary* ECC

Wiltshire, P.E.J, Edwards, K.J. and Bond, S, 1994
'Microbially-derived metallic sulphide spherules and the waterlogging of archaeological sites', *American Association of Sedimentary Palynologists Contributions Series* **29**, 207-221

Wymer, J. and Brown, N. 1995 *Excavations at North Shoebury: settlement and economy in south-east Essex* East Anglian Archaeology 75

# GREATER THAMES ESTUARY
# ESSEX ZONE

# MONITORING SURVEY

# UPDATED PROJECT DESIGN

# ISSUE 2

**CONTENTS**

# GREATER THAMES ESTUARY; ESSEX ZONE MONITORING SURVEY

# UPDATED PROJECT DESIGN: ISSUE 2

## 1.0 INTRODUCTION

The monitoring survey of selected sites, previously recorded during the Hullbridge Survey has run over a three year period. This survey, funded by English Heritage, along with other complementary work in the coastal zone, has provided valuable data as to the threats to historic coastal assets, as well as types and rates of erosion.

The revisits to the selected Hullbridge survey sites have shown that the majority of the sites are eroding to varying degrees. This has resulted in the almost complete destruction of some sites, for example the midden and associated deposits at Leigh Beck, T1. The survey has also demonstrated that there are new exposures of archaeological material at some of the sites. This is most clearly demonstrated at the Stumble, where new finds scatters were located outside the limits of the earlier sites. Further timber structures were also located along the eroding edge of the salt marsh. The only exception to this was site CL 1 (Jaywick) which now lies below beach recharge deposits. The assessment report was submitted with an outline UPD in March 2004.

Work on other projects on the Essex coast is ongoing. Excavation of timber structures at Cudmore Grove was carried out in the winter of 2002-3, funded by English Heritage, and an assessment report is in preparation. Further fieldwork at The Stumble is underway as part of the Interreg Planarch 2 project.

This UPD sets out proposals for further work in four areas

- Publication report on the monitoring programme
- Fieldwork at The Stumble to compliment and add value to the Planarch 2 studies
- Monitoring visits to Collins Creek fishtrap complex
- Fieldwork at significant intertidal sites within Thames Gateway

These proposals are designed to form an integrated package which builds on the results of the monitoring project ,complement ongoing work funded from other sources to further the aims of the Greater Thames Regional Research Framework (Williams and Brown 1999), and of *Exploring Our Past* Primary Goal Advancing understanding of England's Archaeology (2.1) and will also relate to Primary Goal B securing the conservation of England's archaeological landscape sites and collections.

# 2.0 PROPOSALS FOR FURTHER WORK

## 2.1 PUBLICATION

The Greater Thames Estuary Research Framework (Williams and Brown 1999) identifies the need to raise general awareness of the archaeological projects taking place in the area and this necessity was recognised in the Project Design for the monitoring survey (Brown et al 2000; 6). This has been ongoing throughout the three years that the project has run. Promotion has comprised

- Issuing of two limited circulation interim reports
- Summaries in *Essex Archaeology and History*
- Summary for the English Heritage website
- Talks at the Greater Thames Estuary Research Framework Annual Conference
- Talks for local groups
- Popular Articles in *Blackwater Matters* and *Essex Past and Present*

The feedback from this has been very positive and has facilitated ongoing contacts with a range of other organisations and individuals involved in developing integrated coastal zone management.

The results of the monitoring work have provided a valuable collection of data relating to patterns of change and erosion/deposition affecting archaeological sites in the intertidal zone. It is considered that it would be appropriate and beneficial to publish the key results of this project together with aspects of the survey project also funded by English Heritage and completed in 2001 (Heppell and Brown 2001). Both the survey and monitoring projects have generated widespread interest not only from heritage bodies but from other organisations such as English Nature, the Environment Agency and the RSPB.

The results would be presented against the wider background of research and management of the Essex coast. This would include the creation of the Regional Research Framework for the Greater Thames estuary, aerial survey, grazing marsh survey and contributions to the Interreg Projects Planarch 1 and 2. This will enable current work to be seen as integral to a dynamic package of research and management of the historic environment of the Essex coast.

An appropriate form for the publication would be an article in the *Journal of Wetland Archaeology* such a publication would reach the appropriate audience both in Britain and internationally.
The published article would be approximately 6,000 words long with eight line drawings and four photographs and would comprise:

- Summary
- Background earlier work up to and including the Hullbridge Survey
- Development of the Regional Research framework, aerial photographic and grazing marsh surveys
- The new survey of 2000
- The three year monitoring survey
- Conclusion and future directions.

*Programming, Staffing and Costs*

Preparation of the publication would best be carried out between November and December 2004, when there is a hiatus in Planarch funded fieldwork in the coastal zone. Editing and corrections could be carried out in the February with submission in March.

The report will be prepared by E. M Heppell (ECC FAU) and N. Brown (ECC HAMP). Internal editing will be carried out by N. Brown prior to submission. Illustrations will be prepared by E.M. Heppell and the ECC FAU CAD Officer, A. Lewsey.

It is estimated that this can be carried out at a cost of £

## 2.2 THE BLACKWATER

### 2.2.1 Introduction

The Neolithic settlement and later structures at The Stumble and the Saxon Collins Creek fish trap complex, both in the Blackwater estuary, are nationally important monuments. The monitoring survey has demonstrated that there is a clear threat to them both and that there is also potential for gaining a greater understanding of them with relatively modest fieldwork which can build on and add value to the work funded through the Planarch 2 Interreg project.

The results of the Hullbridge survey in the 1980s (Wilkinson and Murphy 1995), the Essex Zone Rapid Coastal Zone Survey (Heppell and Brown 2001) and the Suffolk RCZAS (Everett et al 2003) have not identified any site with as impressive and extensive a range of artefacts or of such large areas of old land surface as that at The Stumble. It appears, at present both in terms of the quality of the Neolithic settlement evidence preserved and, for an intertidal site, its ease of access to be unique.

### 2.2.2 The Stumble

A programme of fieldwork at the Stumble, for a total cost of €****** funded by the Planarch 2 Interreg project, is underway. This fieldwork has been designed to target issues identified by the monitoring survey.

This work is taking place in three stages

- Systematic artefact collection to identify concentrations of artefacts/ areas of old land surface
- Auger survey in areas of concentrations
- Bin sampling

This work will run through 2004 and 2005. Regular updates will be fed through to a bespoke Planarch 2 website, and the final report will be widely circulated to interested parties, both nationally and internationally.

The Planarch project concentrates on the Neolithic land surface, associated deposits and finds scatters. The Stumble is however a multi period complex, with later activity represented by wooden structures such as hurdles, tracks and post alignments. These structures were largely of Iron Age date, with some evidence suggestive of Saxon and post medieval structures (Wilkinson and Murphy 1995, 150). Further wooden

structures were noted during the course of the monitoring survey, particularly in the vicinity of the retreating salt marsh edge

Due to the limited time available during the course of the monitoring survey the location of these structures was noted and photographs taken, no detailed plans were made. Identification and mapping of wooden structures at The Stumble, so that these can be related to the deposit model developed by the auger survey and bin sampling. This will enable the later phases of human land use at The Stumble to be included in a holistic approach to the management of this remarkable site. This will enable comparison with the monitoring work at Rolls Farm, 4 km out in the estuary.

This additional work can be co-ordinated with the ongoing Planarch programme

A program of scientific dating would also be advisable. This would contribute to an understanding of the development of the site and address site specific questions, for example
"… to test whether the wooden structures were indeed restricted to the Iron Age or later, as seems to be the case at present." (Wilkinson and Murphy in prep).
This will need to be discussed with Peter Murphy (EH Regional Scientific Advisor)

The results of this fieldwork would be incorporated into the Planarch report due to be issued at the end of 2005.

*Programming, Staffing and Costs*

It is proposed that this work would be best programmed to run in conjunction with that proposed for the Planarch survey work as the two surveys will closely complement each other. The main phases of fieldwork are in April to October 2004 and April to June 2005, to be followed by reporting.

It is considered that three visits would be appropriate. The results of the work of at Rolls Farm suggest that the greatest erosion takes place in the winter months. In order to assess if this is the case at The Stumble at least one of the monitoring visits would need to take place prior to winter 2004.

Fieldwork, day-to-day mangement and reporting would be carried out by E M. Heppell of ECC FAU. The general management wil be integrated with that of the Planarch programme, general ECC FAU management would be carried out by M. Atkinson, N. Brown will contribute general advice. The fieldwork will be carried out by a team of two, the assistant from the excavation team at ECC FAU.

.

The cost of this work is likely to be in the region of £ *****

### 2.2.3 Collins Creek

Timber fishtraps are complex monuments, and their position means that they are vulnerable to both general erosion and damage by boats. None of these structures were included in the original monitoring project. The Collins Creek complex in the Blackwater is one of the most extensive of these monuments and is subject to coastal erosion. As part of the match funding for the Planarch 2 Interreg project Essex County Council funded a monitoring visit in late summer 2003 (Sec 5.3 assessment report) It is considered that further monitoring of this monument would be appropriate particularly after the positive results of this revisit.

The complexity of the Collins Creek fish traps can be seen in plan. However the recent visits have illustrated that the shifting of sand banks and gravel bars has exposed new elements. The availability of digital plans of the monument, and GPS technology has meant that it is possible to combine the plans and get a more complete plan of the monuments. The necessity for carrying out such ground based survey is mentioned in the Greater Thames Research Framework (Williams and Brown 1999, 30).

Further ground based survey would provide an enhanced plan of the complex and provide an understanding of the nature and rate of erosion. This would allow for the design of a scientific dating programme to refine the chronology of the monument. Upon the completion of the field visits a short report would be prepared.

*Programming, Staffing and Costs*

The location of Collins Creek, close to the low water mark, means that survey can only be carried out at the very lowest predicted tides (this may be at a weekend). The field visit would take place in spring/summer 2005.

At least two days are required to carry out the work as the complex is spread out over an extremely large area. Contingency sums will also need to be made due to variations in tidal height from that predicted which can severely limit time available on site, and the possibility of weekend working.

Survey will be carried out by ECC FAU under the direction of E M Heppell, with the assistance of Ron Hall.

The cost of his work is likely to be £**** (inclusive of contingency outlined above)

## 2.3 THE THAMES GATEWAY

The Thames Gateway, encompassing parts of Greater London, Essex and Kent, has been identified as a national priority for re-generation and development. There are major developments in the area which both impact on the archaeological resource or have led to archaeological investigations. These include the potential development of Shell Haven and the construction of the Channel Tunnel Rail Link (CTRL).

Thames Site 2, the Purfleet submerged forest, is one of the key sites along the estuary, and one of the few surviving fragments of this type of exposure along the Essex coast. Recent work at the new Purfleet, Wennington, Rainham and Aveley marshes during works associated with the creation of an RSPB reserve

has also identified remains of this type landward of the sea wall. It has also been encountered along the route of the Channel Tunnel Rail Link.

This recent wok has demonstrated the importance of the site, and the monitoring survey has clearly demonstrated the threat of erosion in this area. In 1995, in the conclusions to the publication of the Hullbridge Survey the possibility that further work should be carried out at this site, prior to its destruction by erosion was acknowledged. It was suggested that this should be a more detailed strategraphic and palaeoecological work (Wilkinson and Murphy 1995, 225).

A single re-visit was carried out as part of the monitoring survey. It is suggested that the next step would be regular monitoring at the site, similar to that carried out at Rolls Farm. Regular re-visits would aim to monitor any changes in the area, potentially identify artefact scatters and assess the effects of port development along the Thames.

***Programming and Costs***

It is proposed that this should commence in the spring of 2005, and run through to spring 2006 at which time a more detailed assessment and UPD would be produced. This work would need to be co-ordinated with the RSPB in order to limit disturbance to wildlife. In the long term this would allow integration with the Environment Agency Flood Risk Management programme and the management of the Rainham marshes by the RSPB.

It is estimated that this work could be carried out for a cost of £*****

## 2.4 FOULNESS ISLAND

Foulness Island, at the mouth of the Rivers Crouch and Roach, and the Thames has an interesting, and well documented, historical environment. Roman red hills have been identified on three of the islands in the group. The island was first embanked in 1271, with subsequent expansion of the reclaimed area. The internal counterwalls which defined this landscape are still visible on the island today. One such counterwall was excavated and provided a date of 1484-9 AD. Settlement comprised disperced farms and homesteads with foci at Churchend and Courtsend. RCZAS survey around the island confirmed that the majority of the farms would have had their own landing place, some of which survive. The economy of the island was initially based on sheep and fisheries, with a shift to arable production from the 17$^{th}$ century onwards.

Since 1918 most of Foulness and the surrounding islands have been owned by the Ministry of Defence (MoD), with the Maplin Sands to on the Thames side of the island used as an overwater recovery range. In 1922 the military built the first bridge on to the island.

The modern island is made up of Foulness, New England and Havengore, enclosed by a single substantial sea wall. The MoD presence has meant that the area has not been subject to the intense development that is seen along the north bank of the Thames, despite its proximity to Southend and Shoeburyness. Features

of the historic environment are clearly visible, including a number of historic buildings and the counterwalls which played such a key role in the flood defence of the island. In addition there are also important natural environment designations in place. Foulness therefore is currently the subject of one of the pilot projects for integrated designation, which aims to develop a practical methodology for the proposed unified system of designations.

The results of the RCZAS identified a number of monuments along the coastline of the island, particularly quaysides and landing places, which are considered key to the understanding of the settlement and economy of the island. At present only basic plans of these have been made. It is considered that it would be appropriate to carry out a more detailed survey of one of these quaysides. The results of this could be linked with information about the historic farms which they served, and documentary information relating to the economy.

*Programming and Costs*

Fieldwork would be carried out in 2005. This allows for time for liaison with the MoD to get security clearance for access and for liaison with the relevant nature conservation bodies.

It is estimated that this work can be carried out for a cost of £******

## 3.0 PRESENTATION OF FINANCIAL INFORMATION

Financial details removed 18 June 2004

## BIBLIOGRAPHY

Brown, N. and Murphy, P. 2000 'Neolithic and Bronze Age' in Brown, N. and Glazebrook, J. eds *Research and Archaeology: A Framework for the Eastern Counties 2. Research agenda and strategy* East Anglian Archaeology Occasional Paper 8, 9-12

Brown, N., Murphy, P., Ayers, B., Bryant, S. and Malim, T. 2000 'Research Themes' in Brown, N. and Glazebrook, J. eds *Research and Archaeology: A Framework for the Eastern Counties 2. Research agenda and strategy* East Anglian Archaeology Occasional Paper 8, 44-48

Brown, N., Medlycott, M. and Murphy, P. 2001. *The Greater Thames Estuary. Monitoring, Essex Zone*. Unpublished Project Design, Essex County Council.

Burd, F. H. 1992 *Erosion and vegetation change on the saltmarshes of Essex and North Kent between 1973 and 1988* Nature Conservancy Council, Rsearch and Survey in Nature Conservation No. 42

Cook, A.S., O'Dowd, B. and Durdin, C. J. 1994 *Breeding Redshanks on Essex Saltmarshes in 1993* RSPB

CGP Coastal Morphology Partnership 2000 *Essex Saltmarsh Mapping* (report for Environment Agency)

Crowe, K. 'The Early Medieval Settlement of Canvey Island' *Essex Journal* 31, No.1, 12-18

Fulford, M., Champion, T. and Long, A. eds 1997 *England's Coastal Heritage: A survey for English Heritage and the RCHME* English Heritage archaeological Report 15

Heppell, E. and Brown, N. 2001 *Greater Thames Estuary, Essex Zone: Survey, Assessment Report* unpublished

Linford, N. in press. 'Characterising the source of magnetic minerals from the Bronze Age timber circle, Holme-next-the-sea, Norfolk, UK'**.** In Brennand, M. in press. *Proceedings of the Prehistoric Society.*

Mackley, R. and Faulkner, N. 1996 *Excavation on the Leigh Beck Marshes 1993* transactions of the Rochford Hundred Field Archaeology Group Volume 1

Mouchel 1997 *Essex Shoreline Management Plan* Mouchel Associates Ltd

Murphy, P. 1996 'Environmental Archaeology in Essex' in Bedwin, O. ed *The Archaeology of Essex: Proceedings of the Writtle Conference* 168-180

Spurrell, F.C.J. 1889 'On the estuary of the Thames and its alluvium' *Proceedings of the Geological Society* 11, 210-230

Strachan, D. 1996 *Foreshore Survey in the Blackwater Estuary: 1995-6* Unpublished Report

Warren, S. H., Piggott, S., Clark, J. G. D., Burkitt, M.C. and H. and M. E. Godwin, 1936 'Archaeology of the submerged landsurface of the Essex coast' *Proceedings of the Prehistoric Society* 2, 178-210

Wilkinson T. and Murphy, P. 1985 *The Hullbridge Basin survey, Interim report No.5* Unpublished Report

Wilkinson, T.J. and Murphy, P.L, 1995 *Archaeology of the Essex coast, Volume 1: the Hullbridge Survey,* East Anglian Archaeology 71, Chelmsford

Williams, J. and Brown, N. eds *An Archaeological Research Framework for the Greater Thames Estuary*

Wiltshire, P.E.J, Edwards, K.J. and Bond, S, 1994
'Microbially-derived metallic sulphide spherules and the waterlogging of archaeological sites', *American Association of Sedimentary Palynologists Contributions Series* **29**, 207-221

Wymer, J. and Brown, N. 1995 Excavations at North Shoebury: settlement and economy in south-east Essex East Anglian Archaeology 75

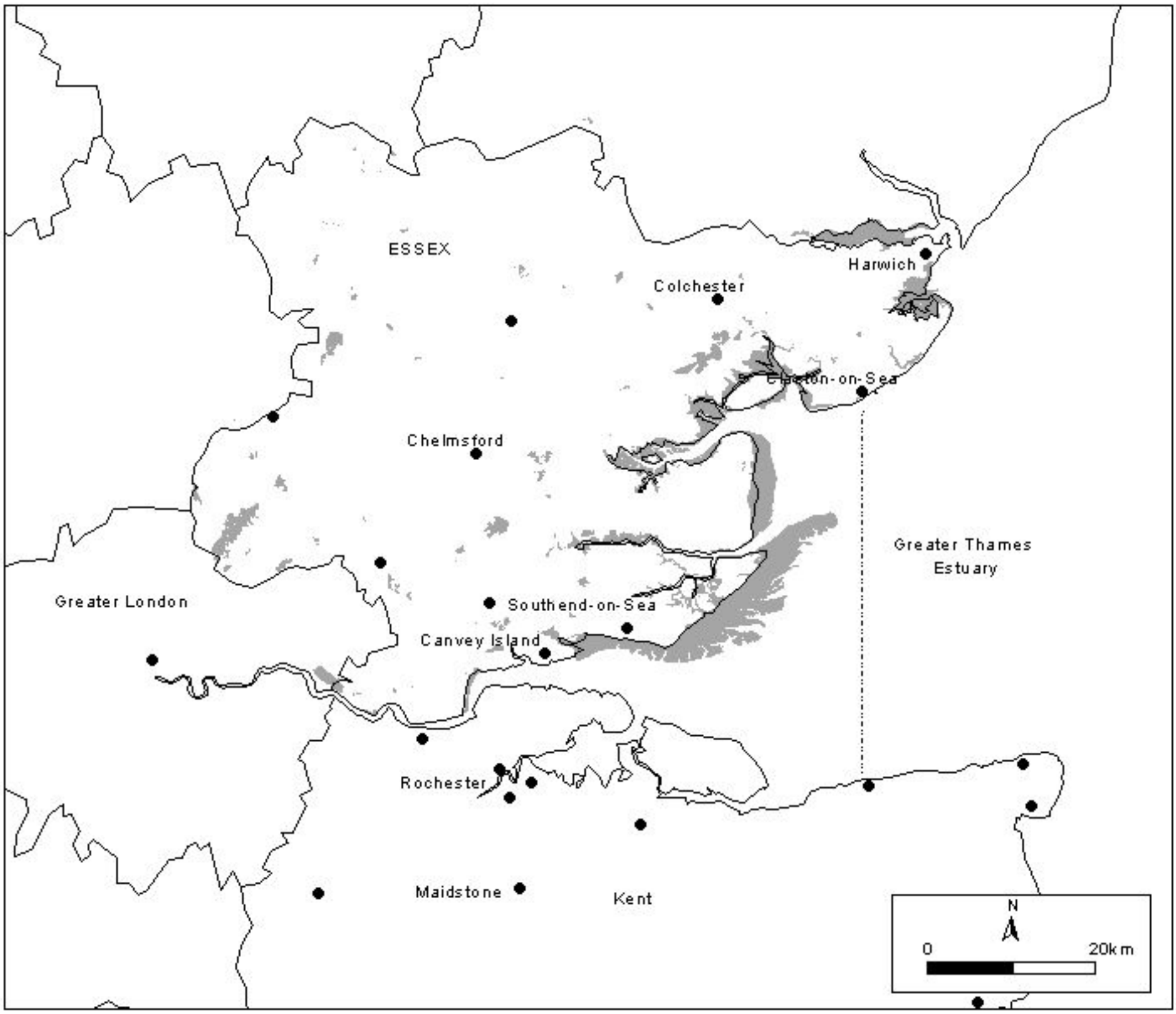



Fig 1 The Greater Thames Estuary and trhe Essex Coast showing the extent of Sites of Special Scientific Interest (grey)

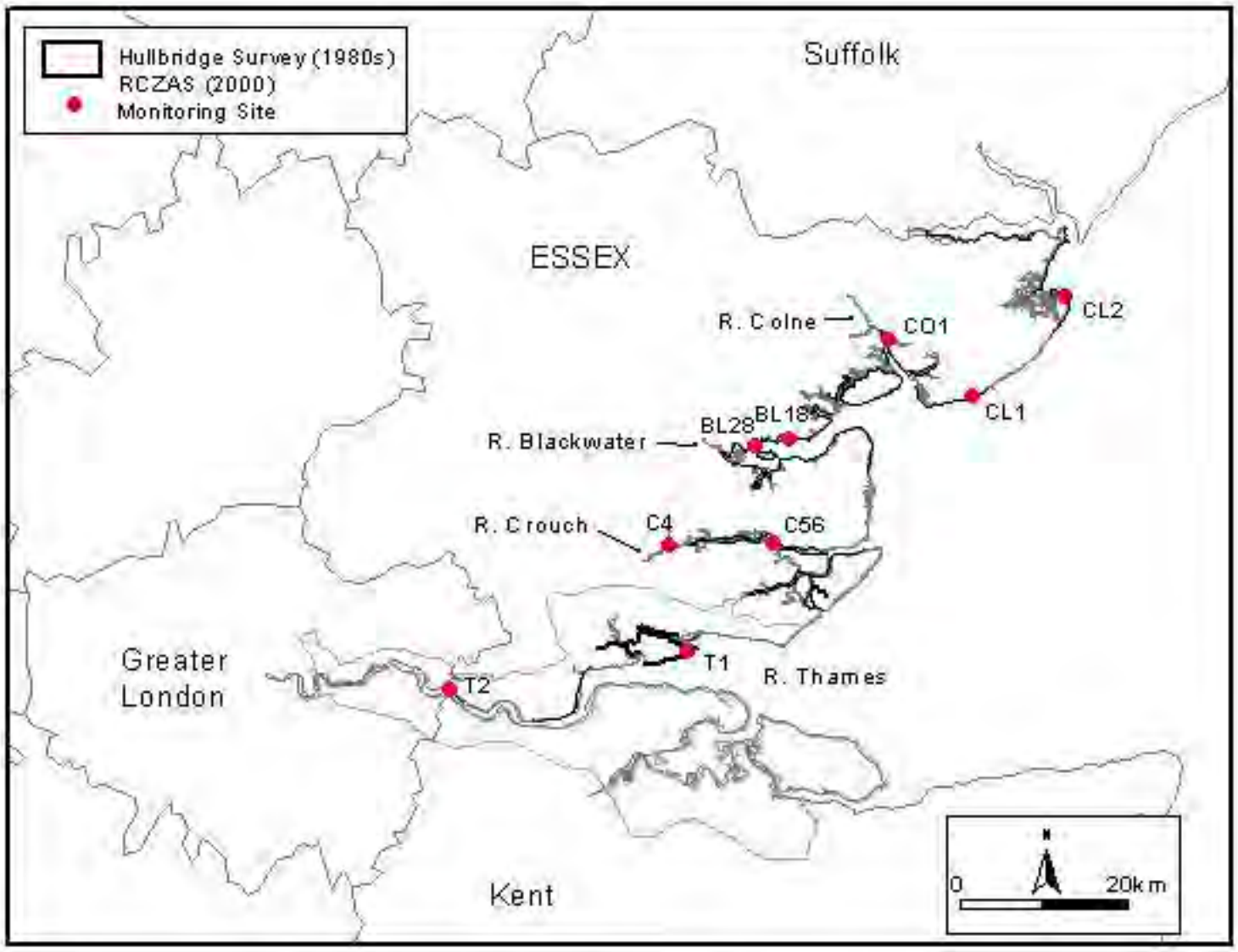



Fig 2 Location of monitoring survey sites showing the Essex Estuaries

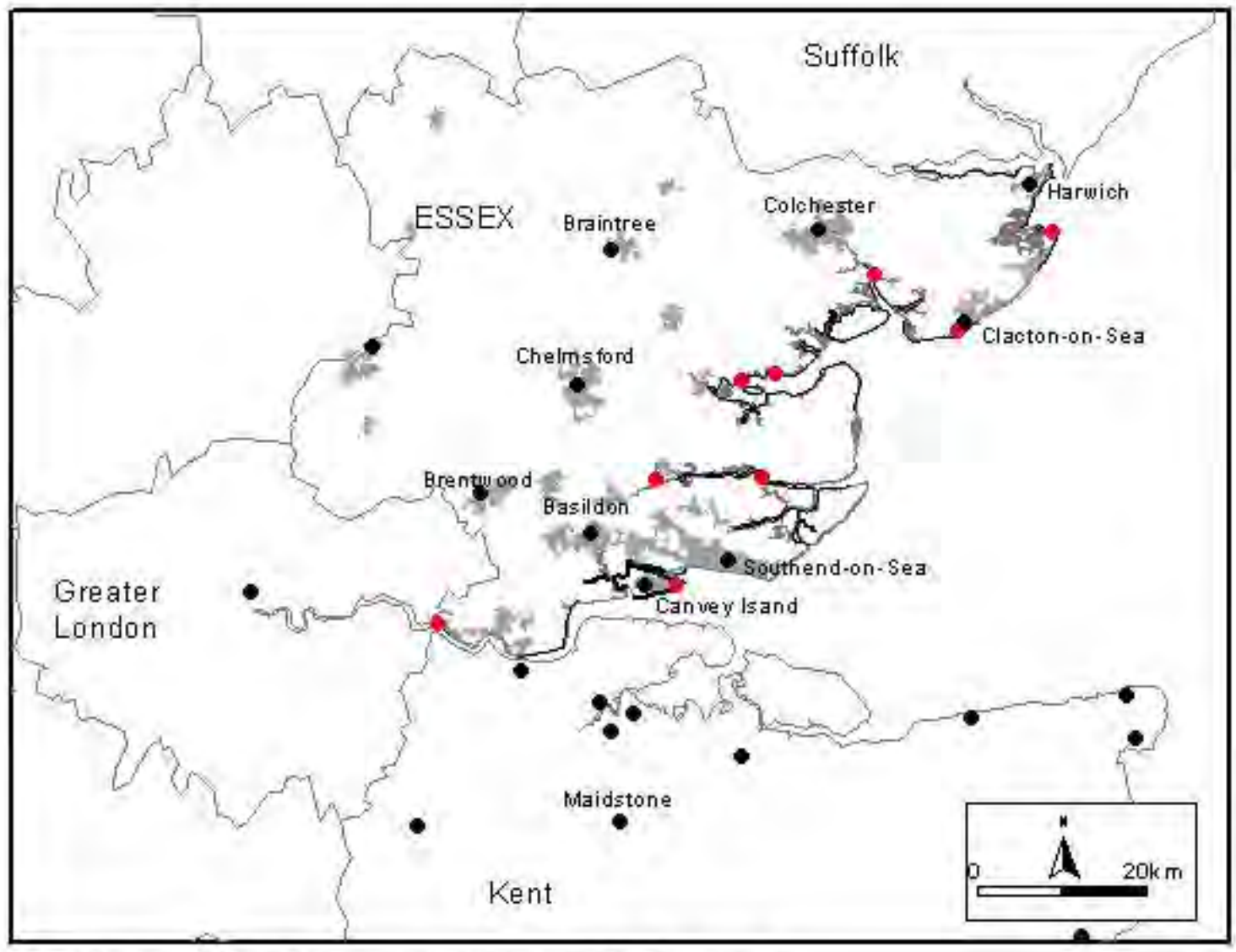



Fig 3 Location of monitoring survey sites showing built up areas


Fig 4 Location of sites along the Thames

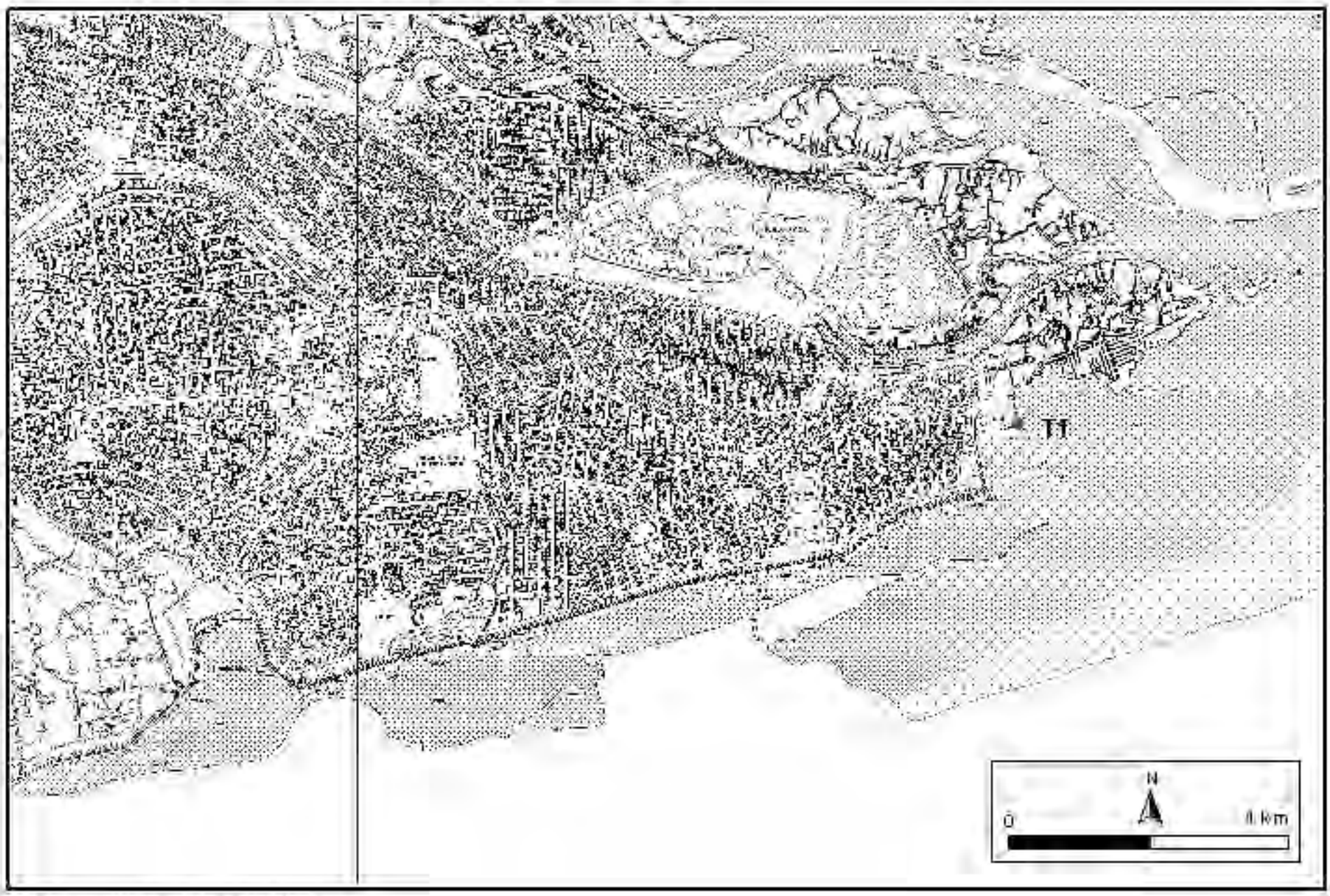



Fig 5 Location of T1, Leigh Beck

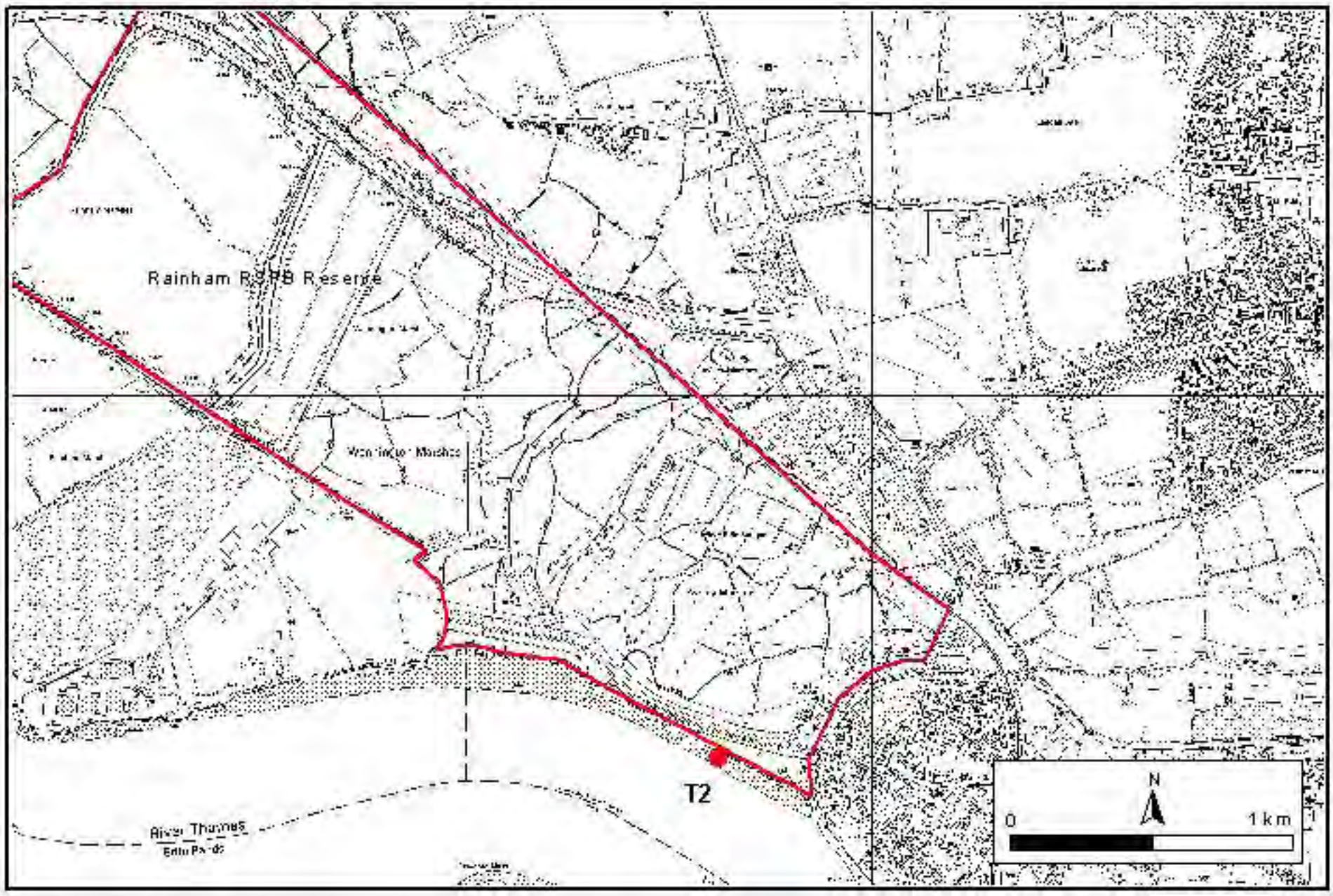



Fig 6 Location of T2; Purfleet Submerged Forest

Fig 7 Surveying at the Purfleet Submerged Forest

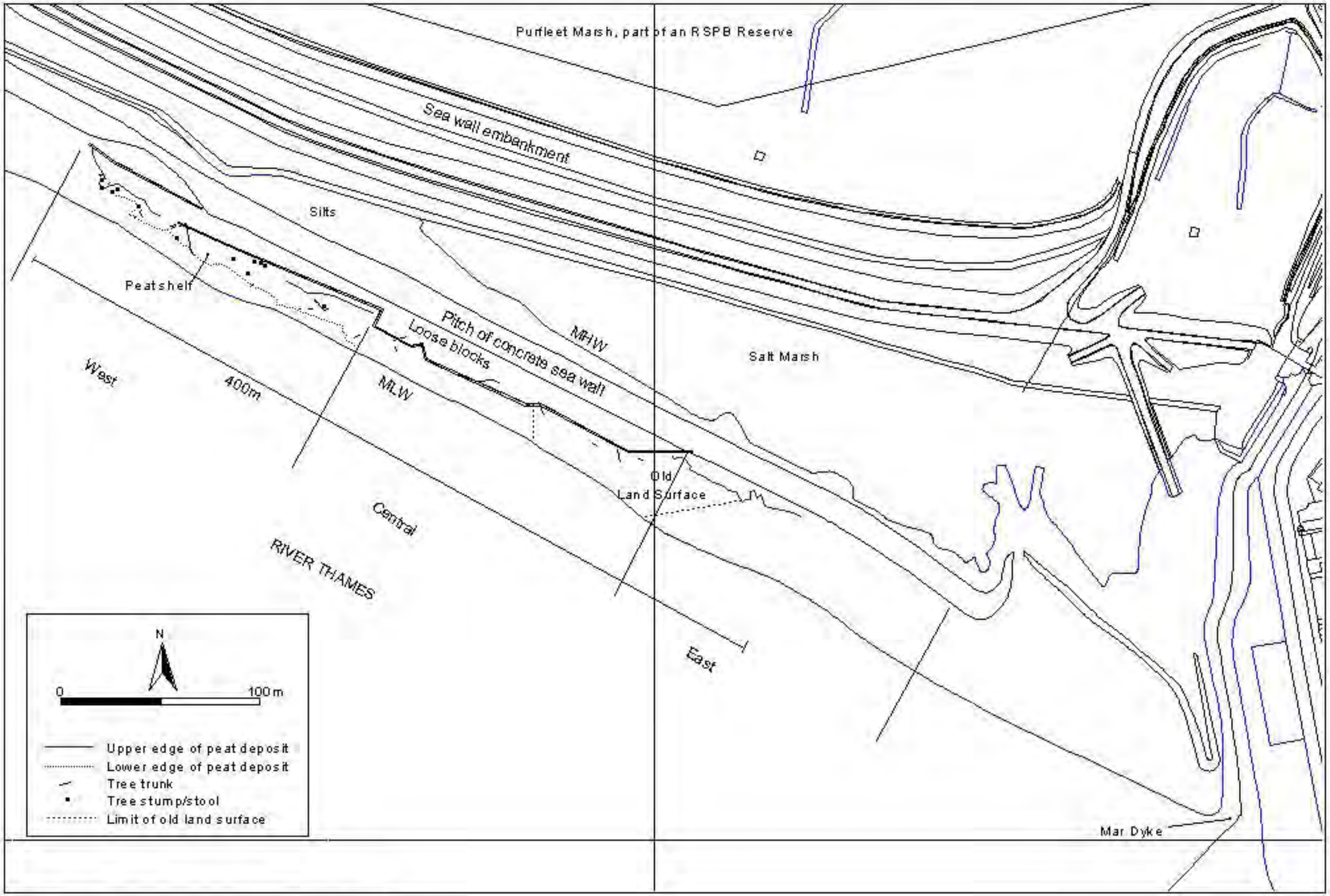



Fig 8 Thames Site 2: Purfleet Submerged Forest in 2001

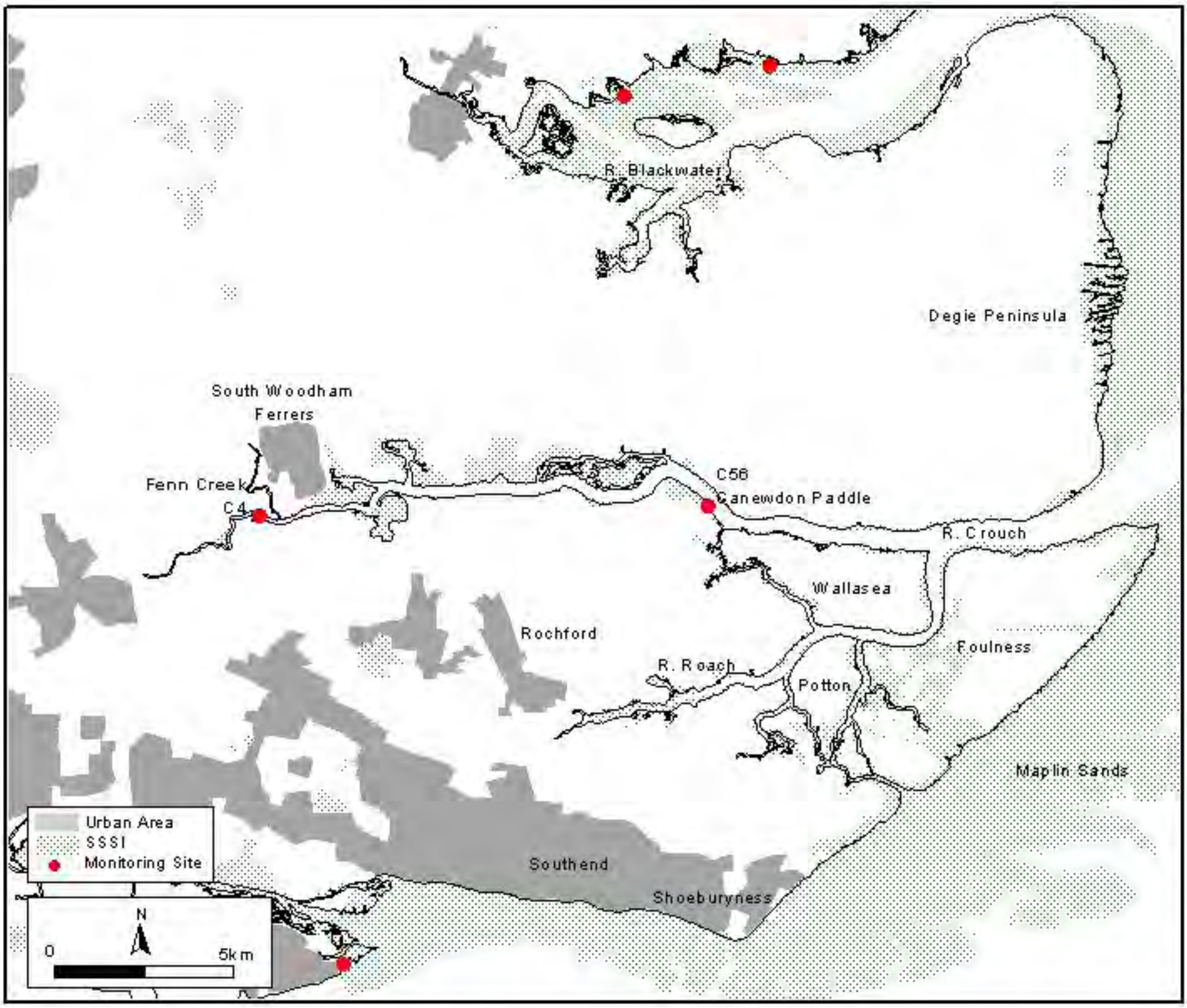



Fig 9 Location of monitoring survey sites along the Crouch

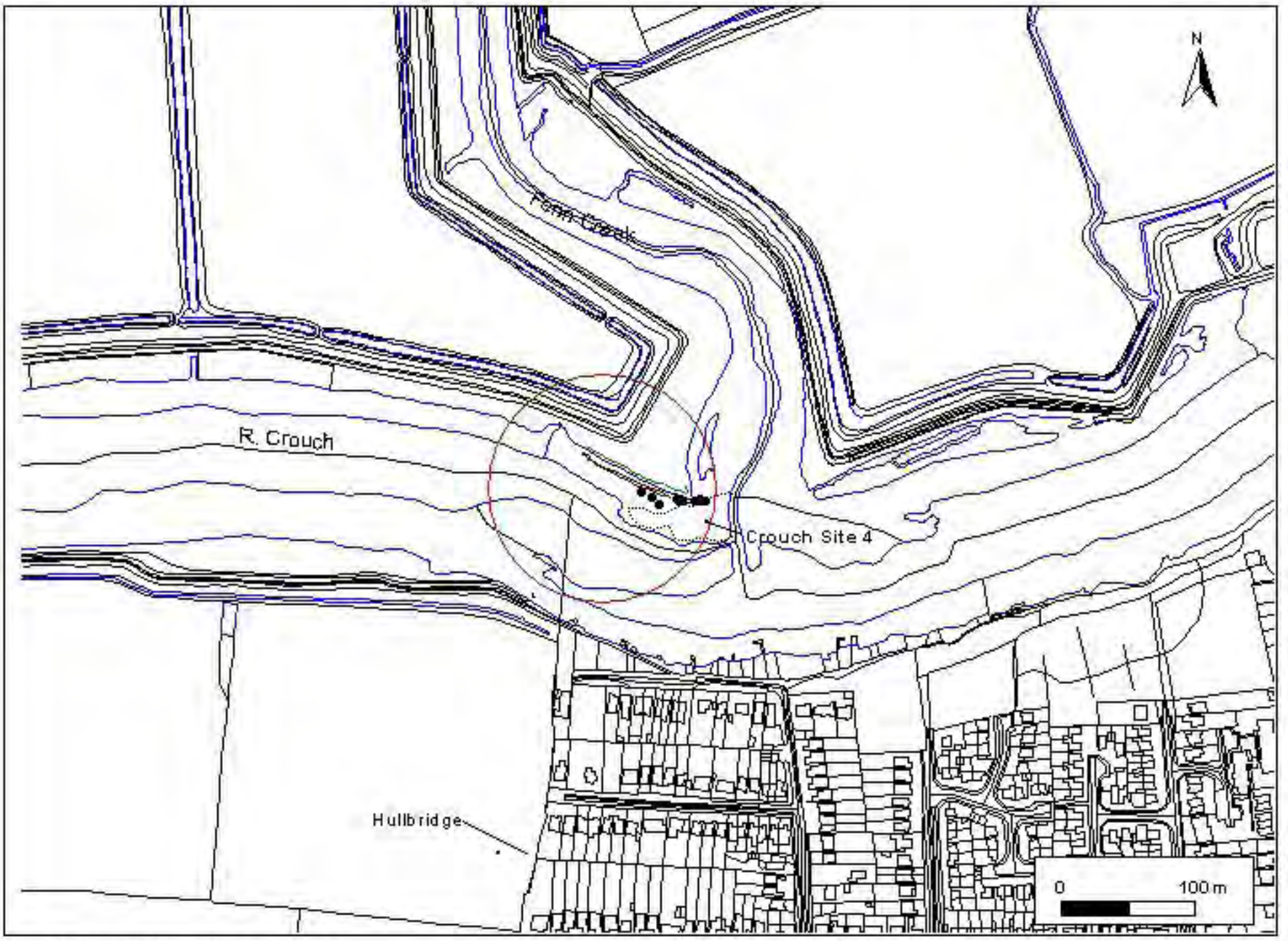



Fig. 10 Crouch Site 4, Location Plan

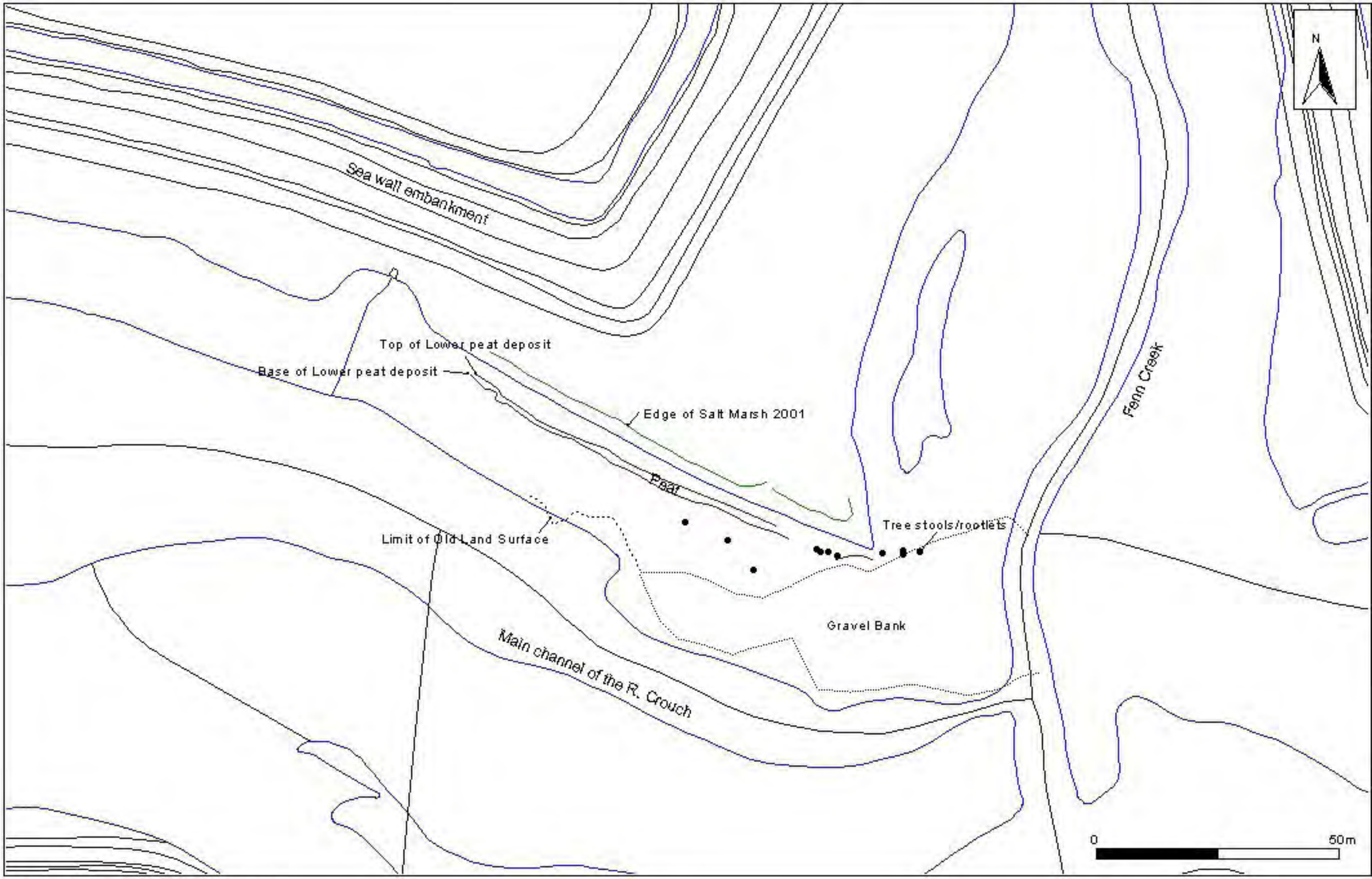



Fig 11 Plan of Fenn Creek, Crouch Site 4


Fig 12 Fenn Creek

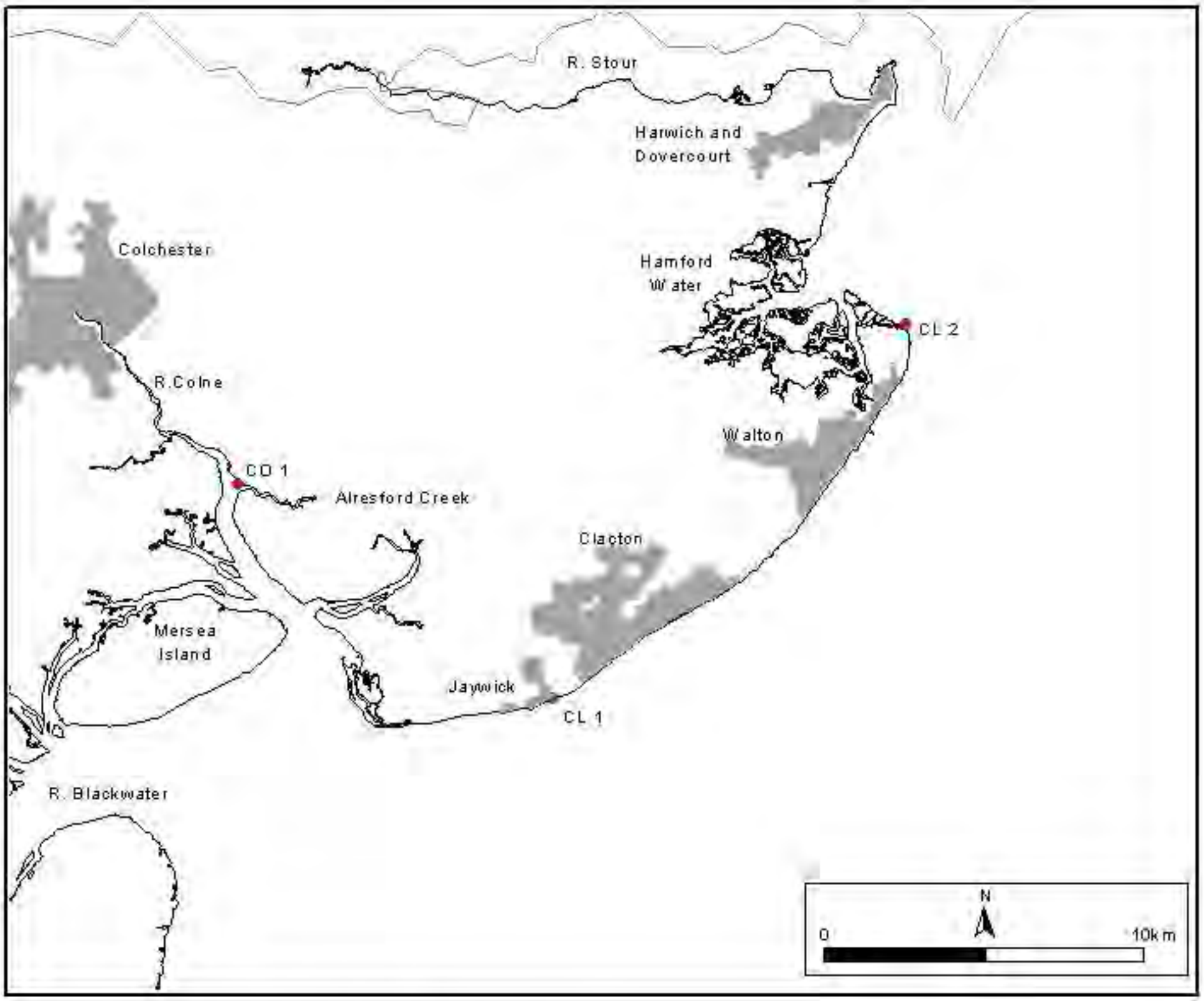
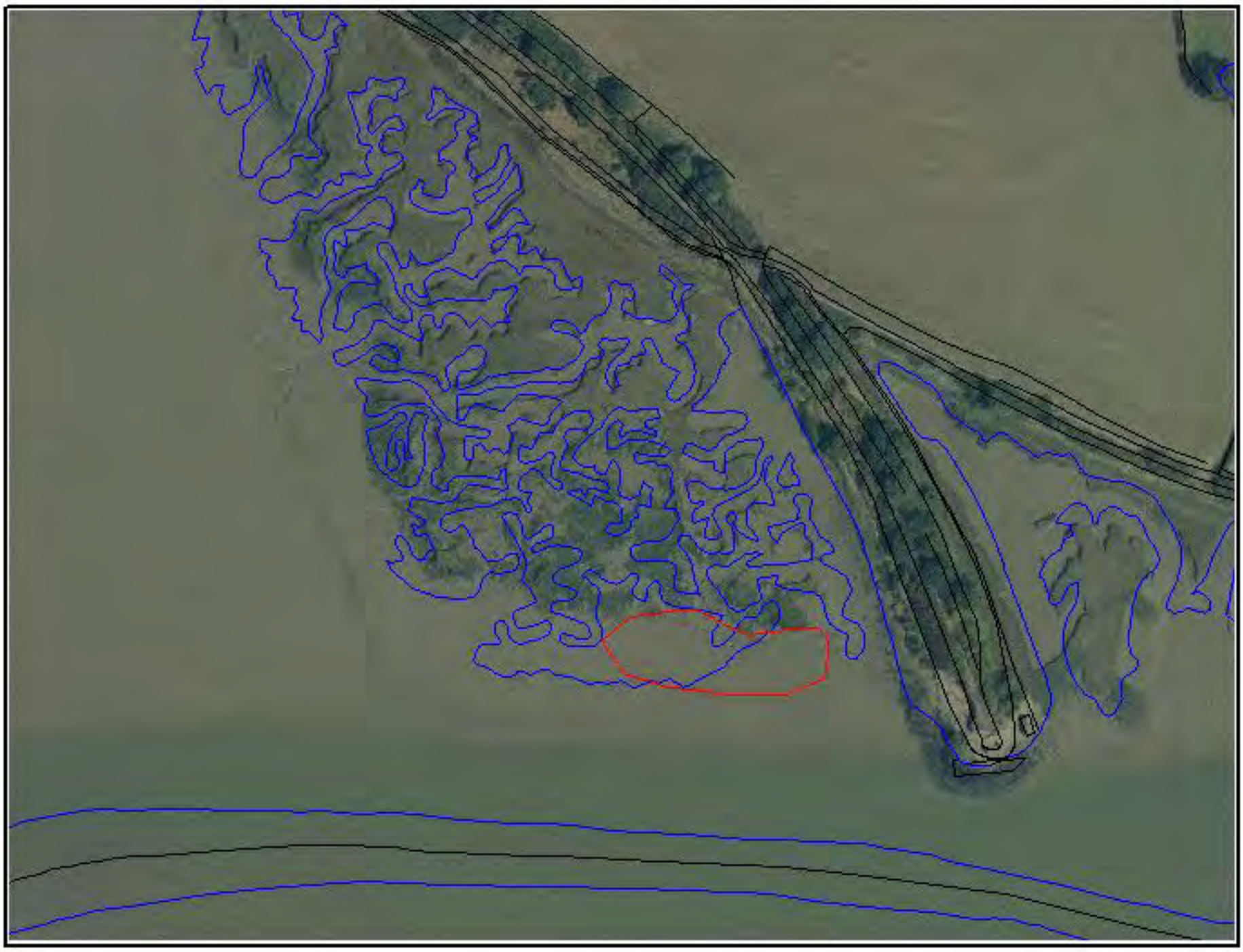



Fig 13 Location of monitoring survey sites along the Colne and in the Clacton/ Walton area



Area in which timbers were present (approximate)

N

0 100 m

Fig 14 CO 1 Alresford Creek; Modern map overlaid on 2000 vertical photograph showing the degree of erosion in the area

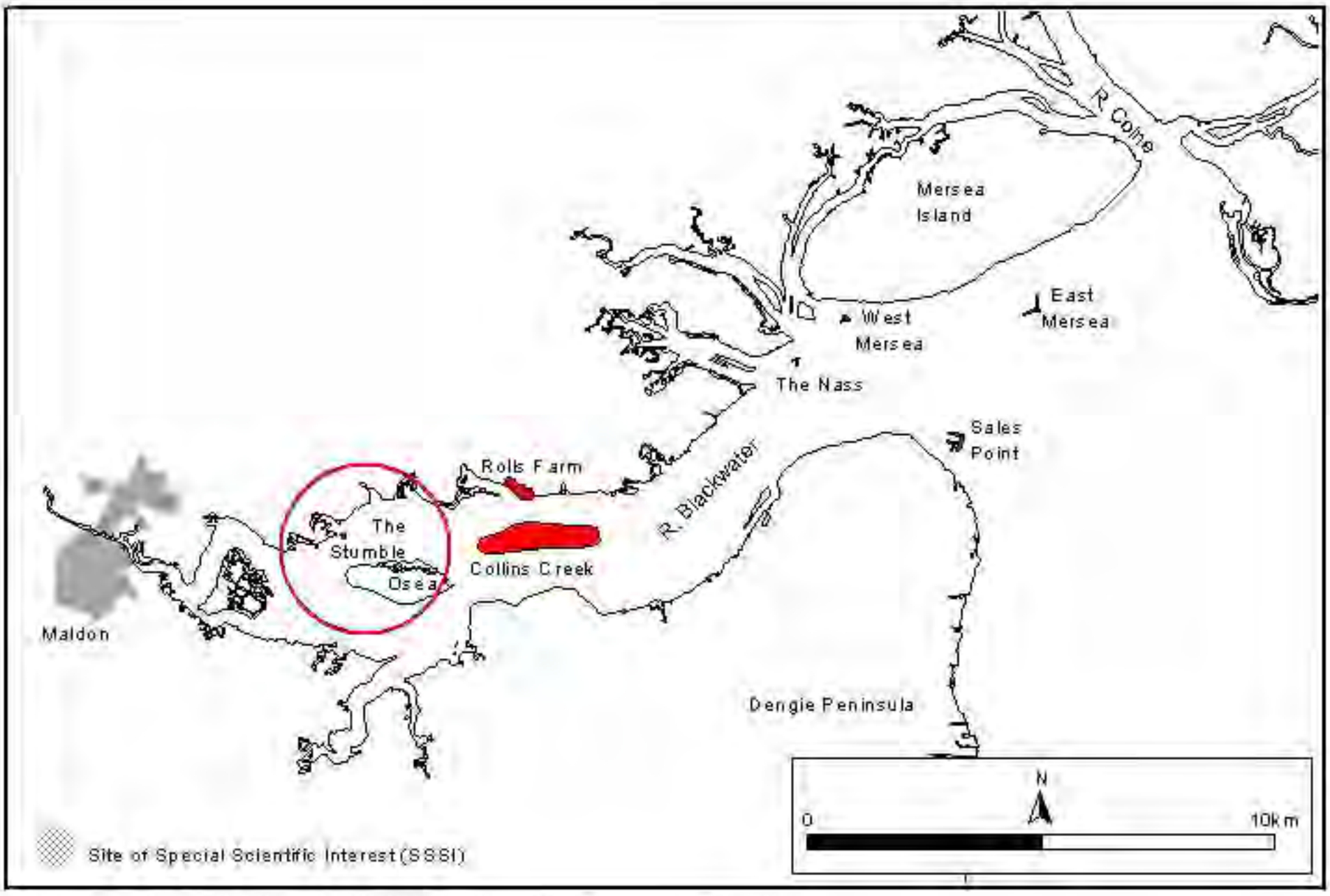



Fig 17 Location of major archaeological sites in the Blackwater Estuary

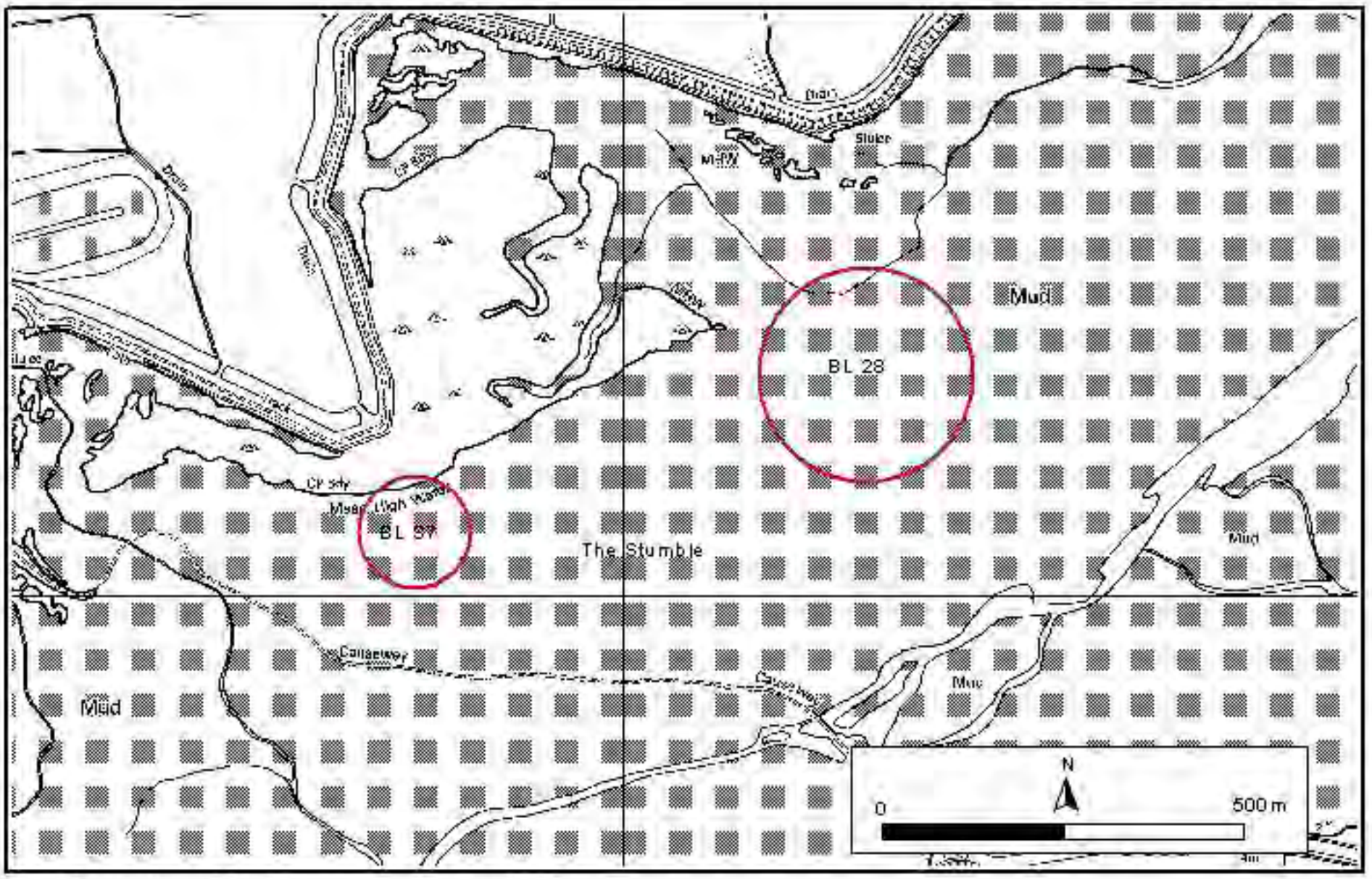



Fig 18 Location of BL 28 (excavated in the 1980s)
and BL 37 (new exposure proposed for 2004-5 survey)

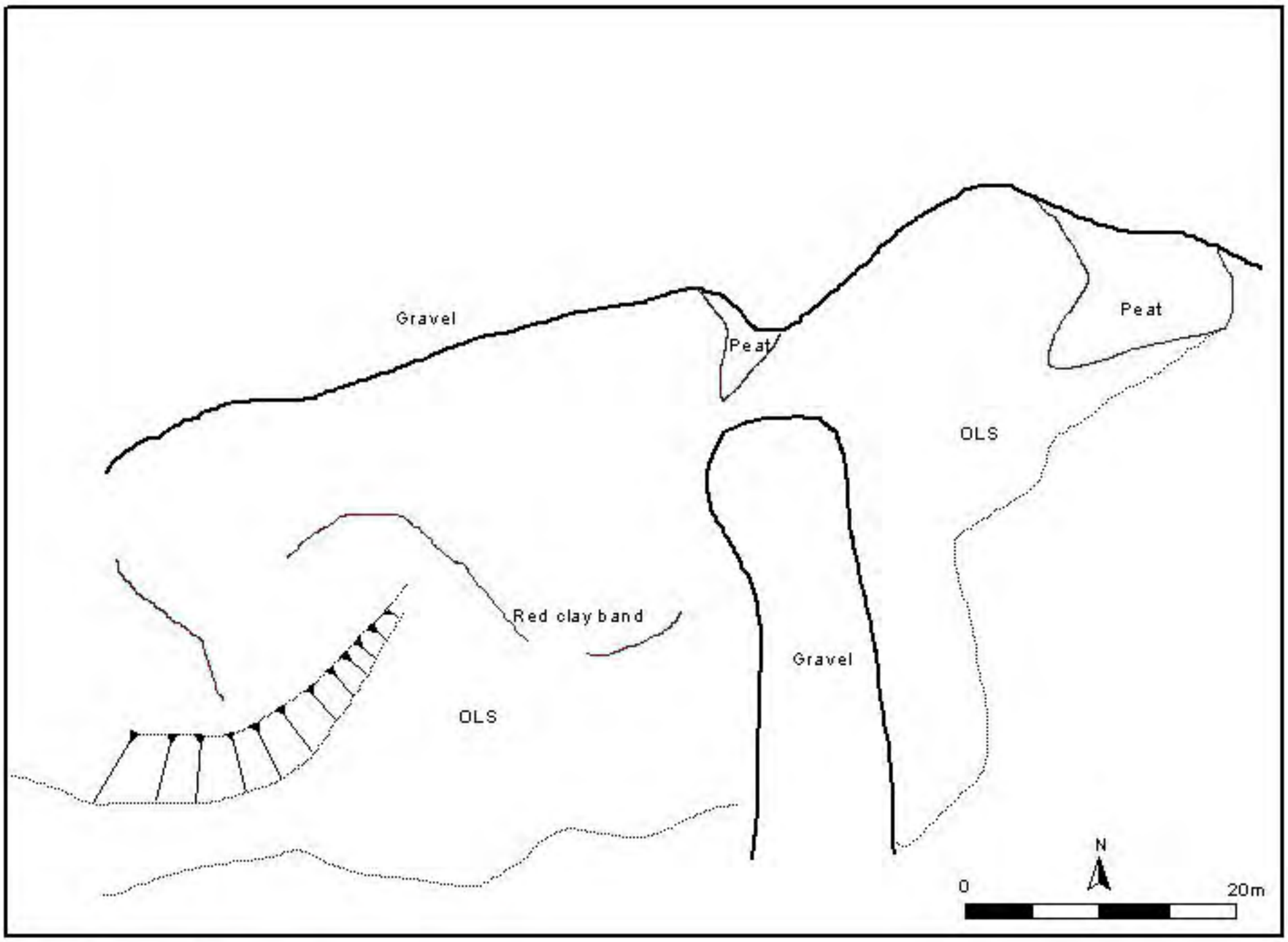
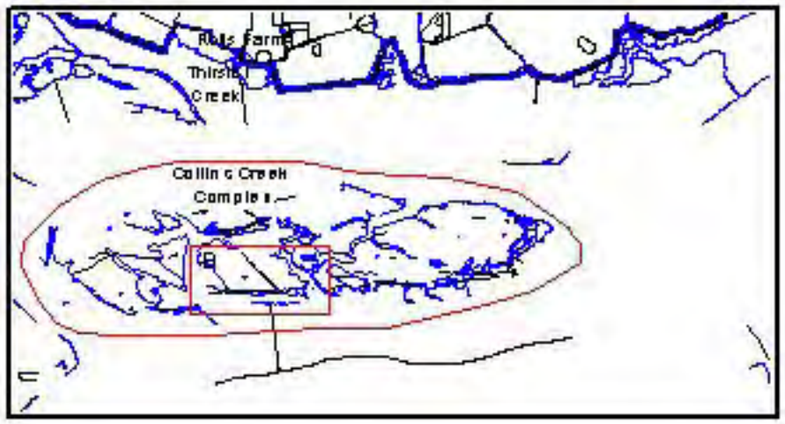



Fig 19 The Stumble; Plan of BL 37

Fig 20 Selection of artefacts recovered at The Stumble



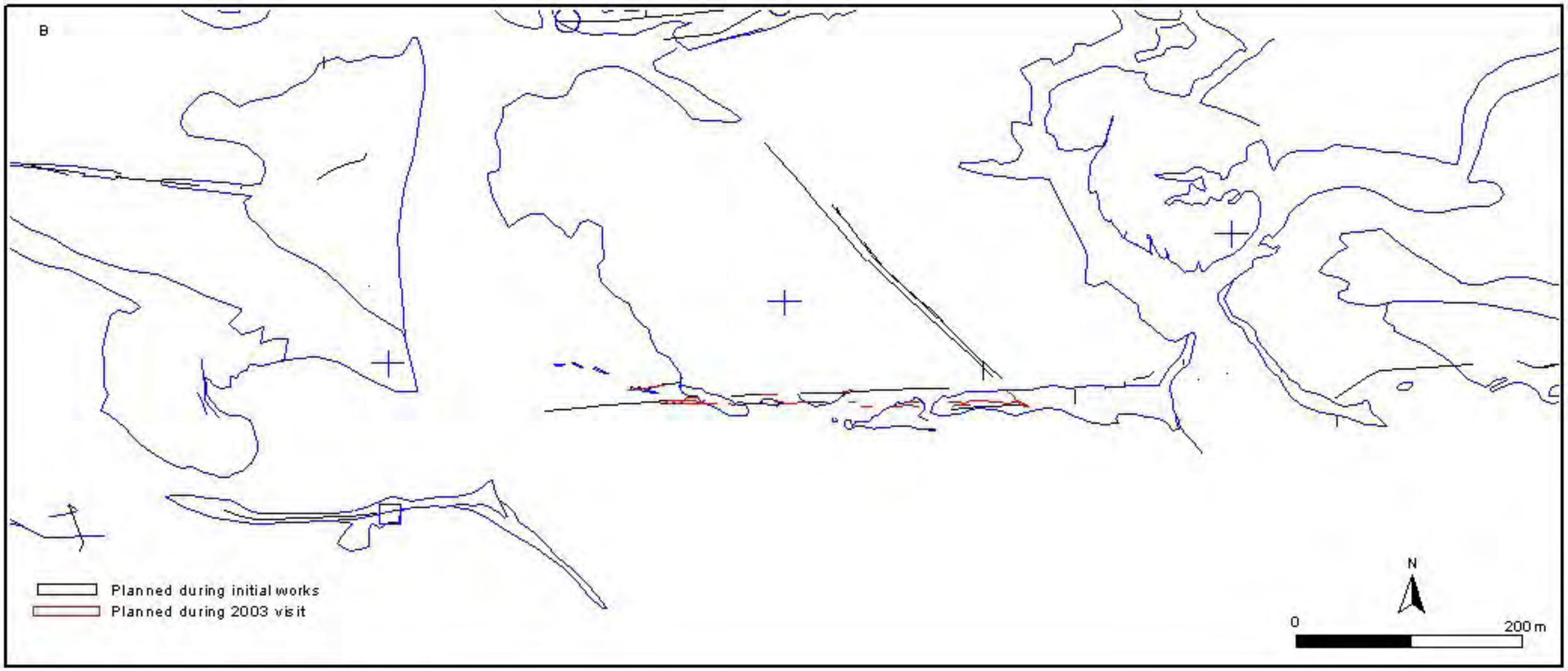
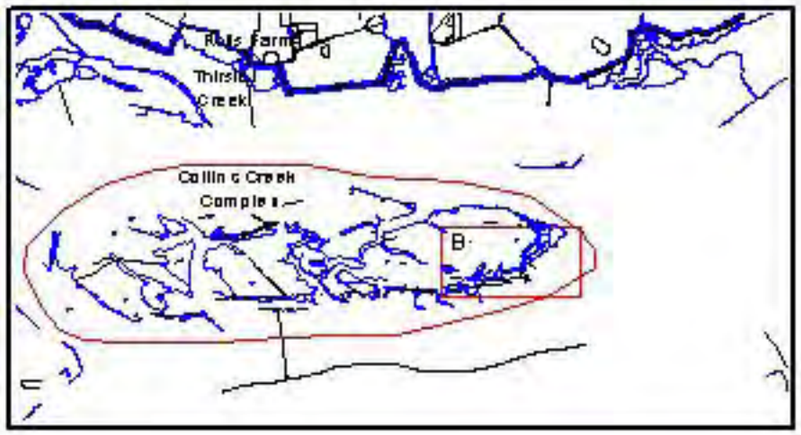




Fig 21 Collins Cree; Plan of the west part of the complex



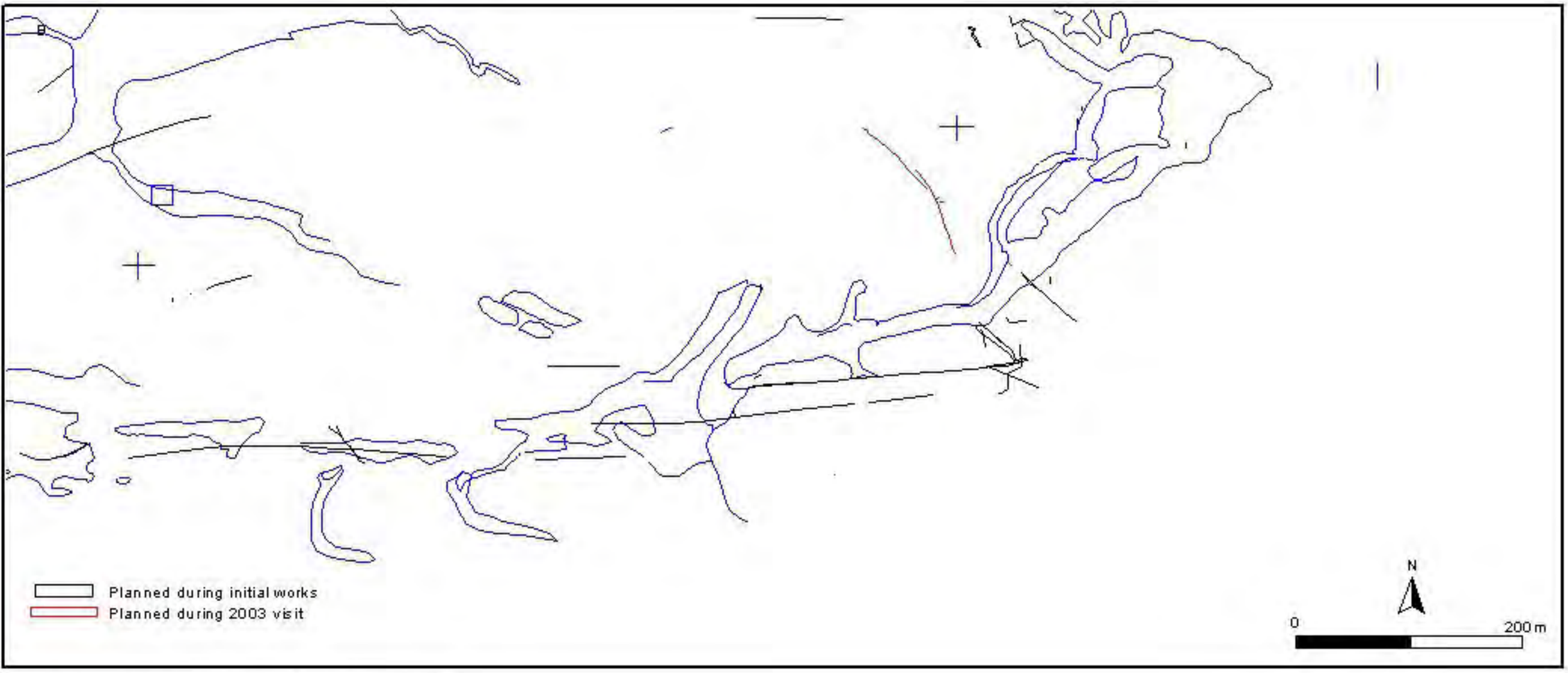




Fig 22 Collins Creek; Plan of the east part of the complex

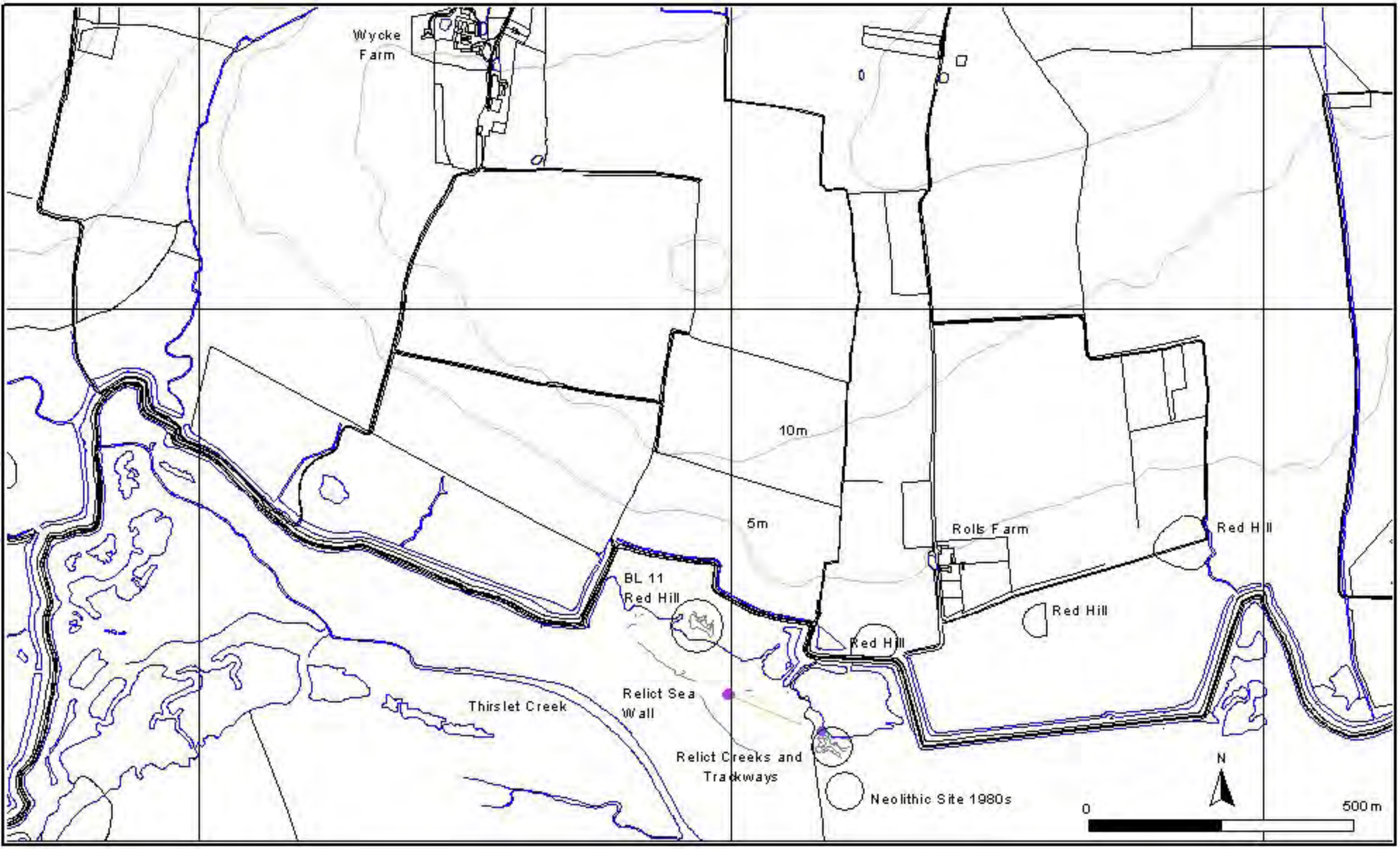



Fig 23 BL28 Rolls Farm; General Site Plan

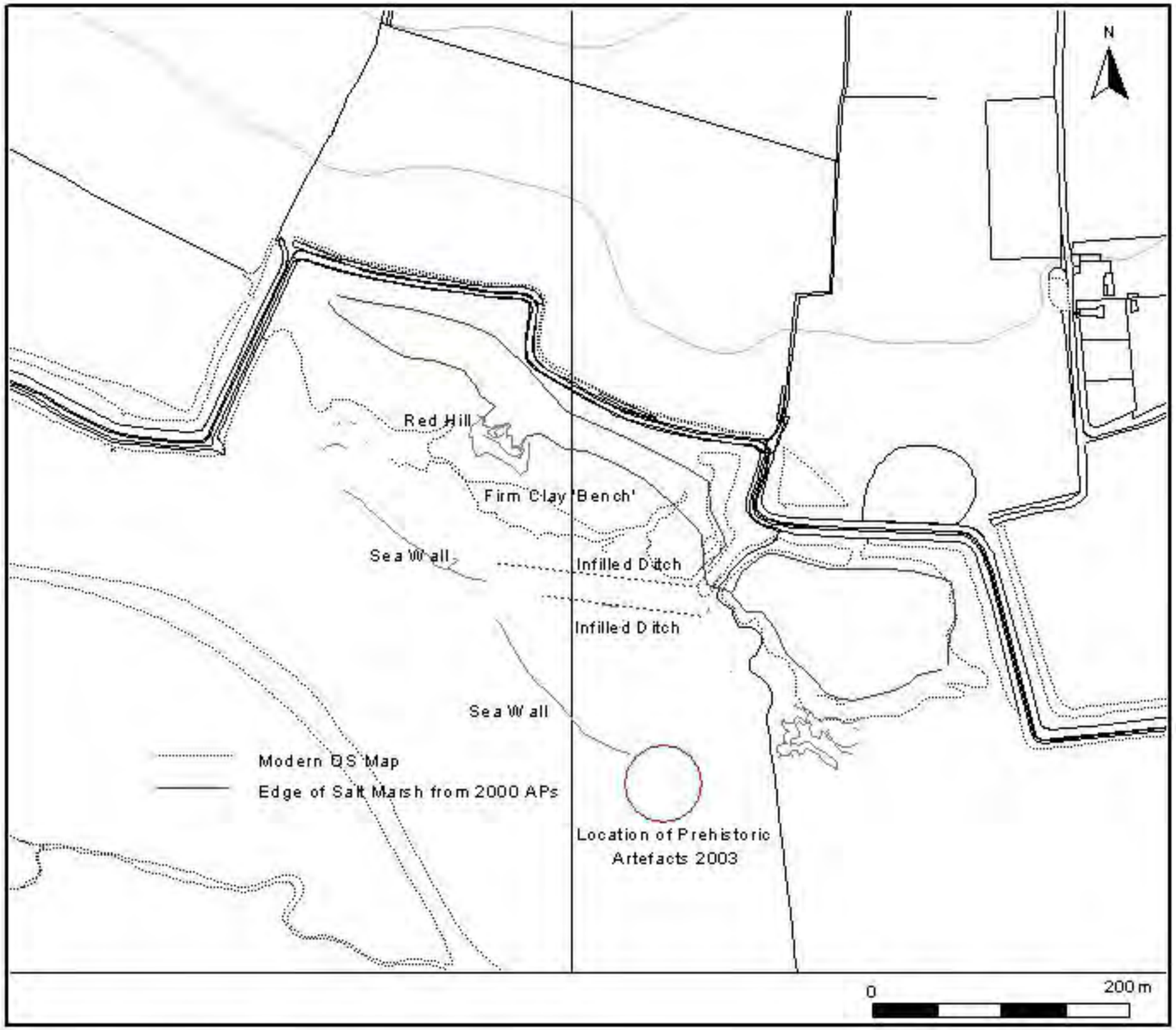




Fig 24 BL 28 Rolls Farm; Location of prehistoric artefacts

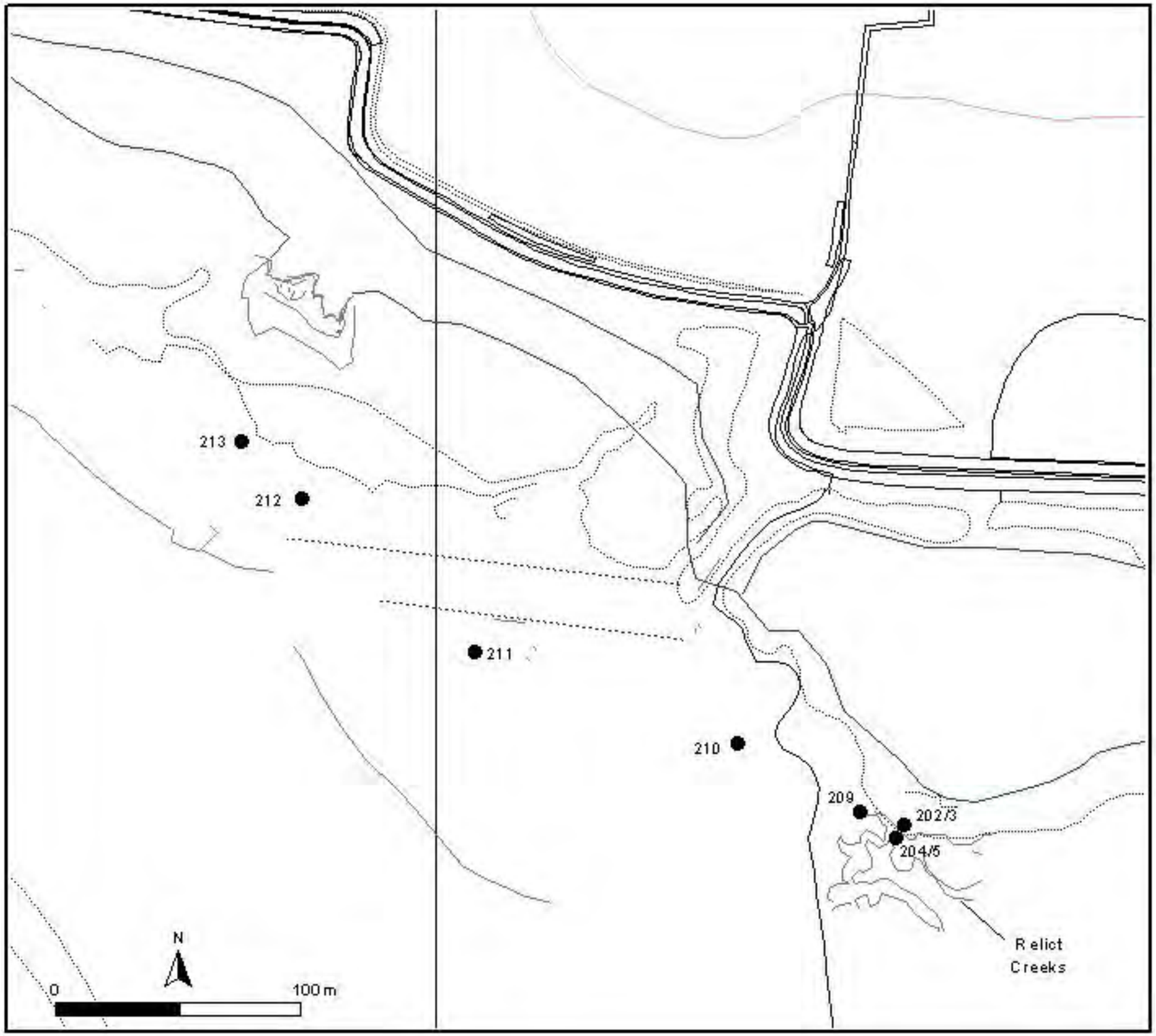



Fig 25 Location of sections of trackway

Planning the trackways, the hollows to the rear are the relict creeks

If you would like this document in a different format, please contact our Customer Services department:
Telephone: 0870 333 1181
Fax: 01793 414926
Textphone: 01793 414878
E-mail: customers@english-heritage.org.uk