Archaeology South-East

ASE

An Archaeological Watching Brief at Rye Harbour Farm Rye East Sussex

NGR TQ 935 178

Application Reference: RR/2010/1149/P

NGR: TQ 935 178

Project No: 4452
Site Code: RHF 10
ASE Report No: 2011109
OASIS id: archaeol6-100990

By Chris Russel
With contributions by
Sarah Porteus

June 2011

An Archaeological Watching Brief at Rye Harbour Farm Rye East Sussex

NGR TQ 935 178

Application Reference: RR/2010/1149/P

NGR: TQ 935 178

Project No: 4452
Site Code: RHF 10
ASE Report No: 2011109
OASIS id: archaeol6-100990

By Chris Russel and Dan Swift
With contributions by
Sarah Porteus

June 2011

Archaeology South-East
Units 1 & 2
2 Chapel Place
Portslade
East Sussex
BN41 1DR

Tel: 01273 426830
Fax: 01273 420866
Email: fau@ucl.ac.uk

Abstract

Archaeology South-East (ASE), the contracting division of the Centre for Applied Archaeology, University College London, was commissioned by Halcrow Group on behalf of the Environment Agency to undertake an archaeological watching brief during flood defence works at Rye Harbour Farm, Rye, East Sussex. The work took place between 31st August 2010 and 12th April 2011.

The deposition of probable alluvial clay, a marine 'peaty' layer, beach shingle, marine alluvium and topsoil was recorded at four wide areas on the site during groundworks associated with the creation of shallow pools and channel outflow devices.

The shingle in Fields 1 and 2 remains undated and it is therefore not possible to relate its deposition to historical storm surge accounts, however, the topsoil strip in Field 6 revealed shingle ridges separated by marine alluvium which contained material which was post-medieval in date. This material would seem to suggest that the alluvium and, by abstraction, the shingle beds beneath were laid down some time before the 17th century AD.

The excavations for the drainage channel from the outflow manifold to the River Rother revealed marine alluvium and an undated palaeochannel cut through the underlying shingle. This may perhaps represent some ancient route of the Rother to the sea.

No significant archaeological finds or features were observed. However, the results from the watching brief, the results from the geophysical survey, a report on the lithostratigraphy and morphology of the gravel beach complex in the vicinity of Camber Castle and the ASE Rye Harbour Farm HBR report separately form useful components in understanding the depositional processes at work during the formation of the modern landscape.

CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION

1.1 Site Background

1.1.1 Archaeology South-East (ASE), the contracting division of the Centre for Applied Archaeology (CAA), University College London (UCL), were commissioned by Halcrow Group on behalf of The Environment Agency to undertake an archaeological watching brief during flood defence works at Rye Harbour Farm, Rye, East Sussex (NGR TQ 935 178; Figure 1) henceforth referred to as 'the site'.

1.2 Geology and Topography

1.2.1 The British Geographical Survey Map (Sheet 320/321) shows the site is located on alternating northeast-southwest trenching units of Marine Alluvium and Storm Beach Gravel (shingle).

1.3 Planning Background

1.3.1 Planning permission has been granted (Reference RR/2010/1149/P) for the proposed development subject to conditions. Condition 12 states:

"The developer shall afford access at all reasonable times to any archaeologist nominated by the local planning authority, and shall allow him/her to observe the excavations and record items of interest and finds".

1.3.2 The archaeology condition was attached on the advice of Casper Johnson, (County Archaeologist, East Sussex County Council), following procedure laid out in Planning Policy Statement 5: Planning for the Historic Environment (PPS 5).

1.3.3 A *Written Scheme of Investigation* (WSI) was produced by ASE (ASE 2010) for the proposed archaeological works. All excavations were monitored by an archaeologist and took place intermittently from the 31st August 2010 to the 12th of April 2011. Casper Johnson (East Sussex County Council) was kept informed of the work via the Environment Agency.

1.3.4 All work was carried out in accordance with the WSI and the relevant *Standards and Guidance* of the Institute for Archaeologists (IFA 2009), as well as with reference to East Sussex Country Council's, *Standards For Archaeological Fieldwork, Recording And Post Excavation Work* (ESCC 2008).

1.4 Aims and Objectives

1.4.1 The general aim of the archaeological work was to ensure that any features, artefacts or ecofacts of archaeological interest that were to be affected by the proposed ground-works were recorded and interpreted to appropriate standards.

1.4.2 The specific aims of the investigation were to:

- Identify and record any further remains or artefacts dating from the early prehistoric period, particularly within peat or alluvial deposits that are exposed.

- Identify any evidence for the post-medieval development and defence works of Rye Harbour.

1.4.3 Additionally, it was an aim of the watching brief to produce a record across the site of the stratigraphy in relation to a geophysical geoarchaeological survey conducted at the site by Martin Bates (included as Appendix 1 of this report).

1.5 Scope of Report

1.5.1 This report details the results of the archaeological watching brief undertaken during ground-works at the site. The work was undertaken from the 31st August 2010 to the 12th of April 2011 by Chris Russel (Archaeologist), Rob Cole (Archaeologist) and Dylan Hopkinson (Archaeologist). The fieldwork was managed by Jon Sygrave (Project Manager) and the post-excavation analysis was managed by Jim Stevenson (Project Manager).

2.0 Archaeological Background

The following archaeological background is drawn from an Archaeological Desk Based Assessment and Survey (DBA) of the coast between Pett Level and Rye Harbour, East Sussex, (ASE 2002). For a more complete background please refer to that document.

2.1 Prehistoric

2.1.1 Evidence for prehistoric activity within the Weald has tended to reflect seasonal exploitation of the formerly extensive forest, and has consisted mainly of isolated finds of artefacts such as bronze axe heads and flint arrowheads.

2.1.2 A cave containing flints of apparently Upper Palaeolithic to Mesolithic date was found in 1900. Subsequent excavation has failed to find any further artefacts but a further worked flake has been found in the intertidal mud below the cliffs close to a 'submerged forest' peat bed, which at the time would have been a coastal plain.

2.1.3 Later flint work of late Mesolithic/Neolithic date has been found on the outskirts of Pett Village, together with twelve undated flint artefacts and flakes.

2.1.4 A Late Bronze Age spearhead was found in the submerged forest below high tide level, together with a blade (identified as a mid-late Bronze Age dagger).

2.1.5 The peat bed which stretches along the foreshore for a distance of approximately 3 kilometres is of prehistoric date and relates to a period of sea-level rise submerging the land behind the barrier, probably occupied by a mix of bog and drier wooded areas resulting in the formation of extensive peat deposits.

2.2 Roman

2.2.1 Settlement in the Weald during the Roman period was relatively sparse. The area was exploited for iron ore extraction and may have originally been an Imperial estate administered by the military authorities. However, the wet, boggy conditions were not conducive to settlement.

2.2.2 There are a small number of find spots within the vicinity of the site, including two Roman coins, pottery, slag and tile.

2.3 Anglo-Saxon

2.3.1 The area of densest early Saxon settlement in Sussex, as identified by cemeteries, is thought to have lain further west between the Ouse and Cuckmere rivers. Later Saxon occupation is attested mainly by place names and the settlement centres were clustered on the surrounding uplands.

2.4 Medieval

2.4.1 During the medieval period the area around the site was in a state of constant topographical change. The main centres of population were Rye and Old Winchelsea, with Winchelsea losing its pre-eminence over Rye following its destruction in 1288 and subsequent relocation further inland. The marshes along the margins of the Rother were gradually reclaimed but were still vulnerable to flooding.

2.4.2 A number of rectilinear pits were cut into the peat during the medieval period. These have been interpreted as salt-pans. The pits, 'or basins', had different depths, as would be required in the settling-out processes during salt-making. Salt-works are mentioned in the Domesday Book, although the exact location is unknown, and other salt-working sites are known from the Romney Marsh area.

2.5 Post-medieval

2.5.1 In 1725 work on the new harbour at the Rother estuary began in earnest with the digging of the canal and the building of two piers. The foundations of the west pier were complete by 1729. Work on the harbour ceased in 1748 as debts mounted but resumed again within ten years. The harbour finally opened in June 1787 when the sea broke down the shingle barrier across the mouth. A petition to close the harbour was agreed upon in November of the same year and so the new harbour was abandoned after four months of use.

2.5.2 Three Martello Towers were built in the Rye Harbour area, commencing in 1805 and completed in 1812. These were built to defend the coast from the threat of invasion by Napoleon Bonaparte. However, by the time they were built the danger had been removed.

2.5.3 As part of the project an HBR report was produced by ASE (Appendix 3). The report concluded however, that the structures appear to be from two distinct phases of activity in the area: the earlier structures are related to gravel extraction and the production of concrete in the 19th century and the later structures date from 1940 and were constructed as part of the network of WWII defences sited along the south-east coast.

3.0 ARCHAEOLOGICAL METHODOLOGY

3.1 The monitored intrusive ground-works (see Fig 2) consisted of the excavation of shallow scrapes in Fields 1 and 2 and a topsoil strip to the level of the underlying shingle banks in Field 6. In addition to this a new primary creek channel was dug to the present course of the River Rother and an outflow manifold was constructed in relation to this.

3.2 Any intrusive ground works associated with the development were monitored by an archaeologist.

3.3 In the event that the new excavations revealed significant archaeological remains, an opportunity was to be made for the careful hand excavation and collection of samples by the archaeologist to identify and record any such remains as far as possible within the limits of the works in order to extract archaeological and environmental information. Environmental sampling was to be undertaken in accordance with the ESCC 2008 Standards (ESCC 2008).

3.4 This approach was to enable any archaeological deposits disturbed during the proposed works to be adequately recorded in line with the advice given in PPS: 5 which has replaced PPG: 16.

3.5 The spoil from the excavations was also inspected by the archaeologists to recover artefacts of archaeological interest.

3.6 The County Archaeology Officer, ESCC was kept informed of progress so that he could monitor the archaeological work. The mechanism for this was that ASE informed Halcrow and the EA of progress, and the EA contacted ESCC with the relevant information.

3.7 Features and deposits were described on standard pro-forma recording sheets used by ASE and a photographic record was kept of progressive works at the site.

Number of Contexts	12
No. of files/paper record	1
Plan and sections sheets	0
Bulk Samples	0
Photographs	40 (digital)
Bulk finds	0
Registered finds	0
Environmental flots/residue	0

Table 1: Quantification of site archive

4.0 RESULTS

4.1 Introduction

4.1.1 The excavation of the shallow ponds in Fields 1 & 2 along with the topsoil strip in Field 6 was monitored. In addition to this excavations associated with the channel and outflow construction were also monitored.

4.1.2 Table 2: List of Recorded Contexts

Number	Type	Description	Max. Length	Max. Width	Deposit Thickness
001	Deposit	Ploughsoil	-	-	0.40m
002	Deposit	Clay Alluvium	-	-	2.00m
003	Deposit	Beach Shingle	-	-	-
004	Deposit	'Peaty' layer	-	-	0.05m
005	Deposit	Clay	-	-	-
006	Deposit	Imported Topsoil	-	-	0.45m
007	Deposit	Marine Alluvium	-	-	-
008	Deposit	Beach Shingle	-	-	-
009	Deposit	'Peaty' layer	-	-	1.20m
010	Deposit	Beach Gravels	-	-	1.00m
011	Cut	Cut of Natural Channel	-	2.0m	
012	Fill	Fill of Natural Channel		2.0m	1.5m

4.1.3 The monitored groundworks at the site did not allow production of a record of site stratigraphy which could be related to the geophysical survey previously conducted at the site by Martin Bates (Appendix 1 of this report).

4.2 Summary

Fields 1 & 2

4.2.1 Fields 1 & 2 contained topsoil [001] of 0.40m maximum depth. This consisted of mid grey brown silty clay with rare sub-spherical flint pebble inclusions. This was seen to overlie a variable sequence of marine deposits.

In places there was a marine alluvium [002] immediately below the topsoil. This consisted of a firm, mid orangey brown clay silt with rare sub-spherical flint pebble inclusions. This alluvium was noted to a maximum depth of 1.0m.

Below the alluvium was a layer of beach shingle [003] consisting of a layer of loose dark grey brown sandy clay with very frequent sub rounded flint pebbles.

Below the shingle was a thin 'peaty' layer [004] and [009] made up of friable dark brown or black silty clay of a maximum depth of 0.05m.

Below this was a mid blue grey stiff alluvial clay [005].

In places the topsoil [001] immediately over-lay the shingle [003] with the blue marine clay [005] at the bottom of the sequence and in other places it was immediately above marine alluvium [002] with the blue clay [005] again the earliest deposit.

This variable sequence of deposits was viewed in the portion of Field 1 north of the existing drainage channel and perhaps correlates with the large area of high resistance noted in the geophysical survey (see Figure 1, Appendix 1). The variable nature of the depositional sequence viewed is also perhaps mirrored by the variable nature of the geophysics results from this area of Field 1. The remainder of the scrapes excavated in Fields 1 and 2 were excavated to a shallower depth and only revealed marine alluvium of an apparently similar nature across both fields.

Field 6

4.2.2 Monitoring of excavations in Field 6 showed a topsoil of 0.45m maximum depth [006]. This consisted of a friable mid grey brown silty clay with sub-spherical flint pebbles.

This was immediately above shingle ridges [008] which consisted of very frequent sub-spherical flint pebbles with a loose dark grey brown sandy clay matrix.

The valleys these ridges filled with a firm mid orangey grey clay marine alluvium [007].

Channel and Outflow Construction

4.2.3 The excavation of the drainage channel from the outflow manifold to the River Rother revealed 1.0m+ of marine alluvium [007] overlying marine beach/storm shingle [010].

The alluvium was as described in 4.2.2 and the shingle deposit consisted of sub-spherical flint pebbles with a mid-orangey yellow sand matrix.

Cut into the shingle a sinuous linear feature was observed [011] this as approximately 2.0m wide and seen to 1.5m+ deep. This linear feature was filled by a friable mid orangey grey brown fine clay silt [012] and was visible from the surface. The feature was natural in appearance.

5.0 THE FINDS

5.1 A small assemblage of CBM was recovered from [007]. A summary is given in Table 3. Finds were all washed and dried or air dried as appropriate. They were counted, weighed and bagged by context and by material. No further conservation is required.

5.1.1 Table 3: Quantification of the finds

Context	CBM	Wt (g)
007	3	82

5.2 The Ceramic Building Material by Sarah Porteus

5.2.1 A total of six fragments of ceramic building material (CBM) weighing 82g were recovered from context [007]. The fragments are heavily abraded by either sea or river action. The fabric of the fragments is orange and fine with sparse fine quartz and sparse black iron rich inclusions. Dating of the fragments is difficult as the abrasion has left little of the original form, however the fabric is more likely to be of post-medieval date and the fragments are well-fired to have withstood significant abrasion by water so a broad post-medieval date is probable.

6.0 DISCUSSION

6.1 No archaeological features were encountered during the course of the ground-works, however it was right to have conducted the monitoring, as the results, whilst negative, highlight the interaction of natural and human forces on the landscape, and elucidate the risk model for future works in the area.

6.2 Excavations in Fields 1 and 2 revealed a variable sequence of marine deposits, including a 'peaty' layer beneath beach shingle above alluvial clay. This 'peaty' layer is not technically 'peat' as it is more likely than not made up of a conglomerate of organic and non-organic marine deposits. Shingle deposits noted in Field 1 appear to correlate with an area of high resistance shown in the geophysical survey (Appendix 1) but it was not possible to ground truth any other parts of the resistance survey as subsequent scrapes were not excavated to sufficient depth. The shingle here remains undated and it is therefore not possible to relate its deposition to historical storm surge accounts.

6.3 The topsoil strip in Field 6 revealed shingle ridges separated by marine alluvium which contained material which was post-medieval in date. This material would seem to suggest that the alluvium and, by abstraction, the shingle beds beneath were laid down some time before the 17th century AD.

6.4 The excavations for the drainage channel from the outflow manifold to the River Rother revealed marine alluvium and an undated palaeochannel cut through the underlying shingle. This may perhaps represent some ancient route of the Rother to the sea.

6.5 The monitored groundworks at the site did not allow production of a record of site stratigraphy which could be successfully related to the geophysical survey previously conducted at the site by Martin Bates (Appendix 1). No significant archaeological finds or features were observed. However, the results from the watching brief, the results from the geophysical survey, a report on the lithostratigraphy and morphology of the gravel beach complex in the vicinity of Camber Castle and the ASE Rye Harbour Farm HBR report separately form useful components in understanding the depositional processes at work during the formation of the modern landscape.

7.0 CONCLUSIONS

7.1 No significant archaeological remains were encountered during the ground-works.

7.2 No impact upon the 4 structures recorded in the HBR study (Appendix 3) was monitored during the watching brief.

7.3 The watching brief was justified from an archaeological perspective and revealed that marine alluvium overlying beach shingle was perhaps deposited in the post-medieval period. A possible ancient course of the River Rother was also identified.

BIBLIOGRAPHY

Archaeology South East, 2002 *An Archaeological Desk-Based Assessment and Survey of the coast between Pett Level and Rye Harbour, East Sussex*

Archaeology South-East, 2007 *Post-Excavation Manual 1: Finds and Environmental Deposition and Processing Guidelines*

Archaeology South-East, 2010 *Written Scheme of Investigation for an Archaeological Watching Brief at Rye Harbour Farm, Rye, East Sussex*

ESCC, 2008 *Recommended Standard Conditions for Archaeological Fieldwork, Recording, and Post-Excavation Work (Development Control) in East Sussex*

ESCC, 2010 *Storm Beach Gravels, (Rye Bay), Assessing The Historic Environment Of The East Sussex. Aggregate Resource.* Aggregates Levy Sustainability Scheme, Desk-based Assessment

English Heritage, 1991 *Management of Archaeological Projects 2*

IFA, 2001 *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials*

IfA 2009: *Standard and Guidance for Archaeological Field Evaluation.* http://www.archaeologists.net/sites/default/files/node-files/ifa_standards_field_eval.pdf. Accessed 7th February 2011

ACKNOWLEDGEMENTS

ASE would like to thank Halcrow for commissioning the work as well as Casper Johnson (ESCC) for his help and guidance throughout the project.

OASIS Form

OASIS ID: archaeol6-100990

Project details

Project name	Rye Harbour Farm
Short description of the project	An Archaeological Watching Brief at Rye Harbour Farm, Rye, East Sussex
Project dates	Start: 31-08-2010 End: 12-04-2011
Previous/future work	Not known / No
Any associated project reference codes	4452 - Contracting Unit No.
Any associated project reference codes	RHF10 - SM No.
Type of project	Field evaluation
Site status	National Nature Reserve
Current Land use	Coastland 4 - Saltmarsh
Monument type	NONE None
Significant Finds	CBM Post Medieval
Methods & techniques	'Visual Inspection'
Development type	Flood Defence Works
Prompt	Planning condition
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	EAST SUSSEX ROTHER RYE Rye Harbour Farm
Postcode	TN31 7TZ
Study area	31.00 Hectares
Site coordinates	TQ 935 178 50.9265351329 0.753745623257 50 55 35 N 000 45 13 E Point

Project creators

Name of Organisation	Archaeology South East

Project brief originator	Environment Agency
Project design originator	East Sussex County Council
Project director/manager	Jon Sygrave
Project supervisor	Chris Russel/Rob Cole/Dylan Hopkinson
Type of sponsor/funding body	Environment Agency

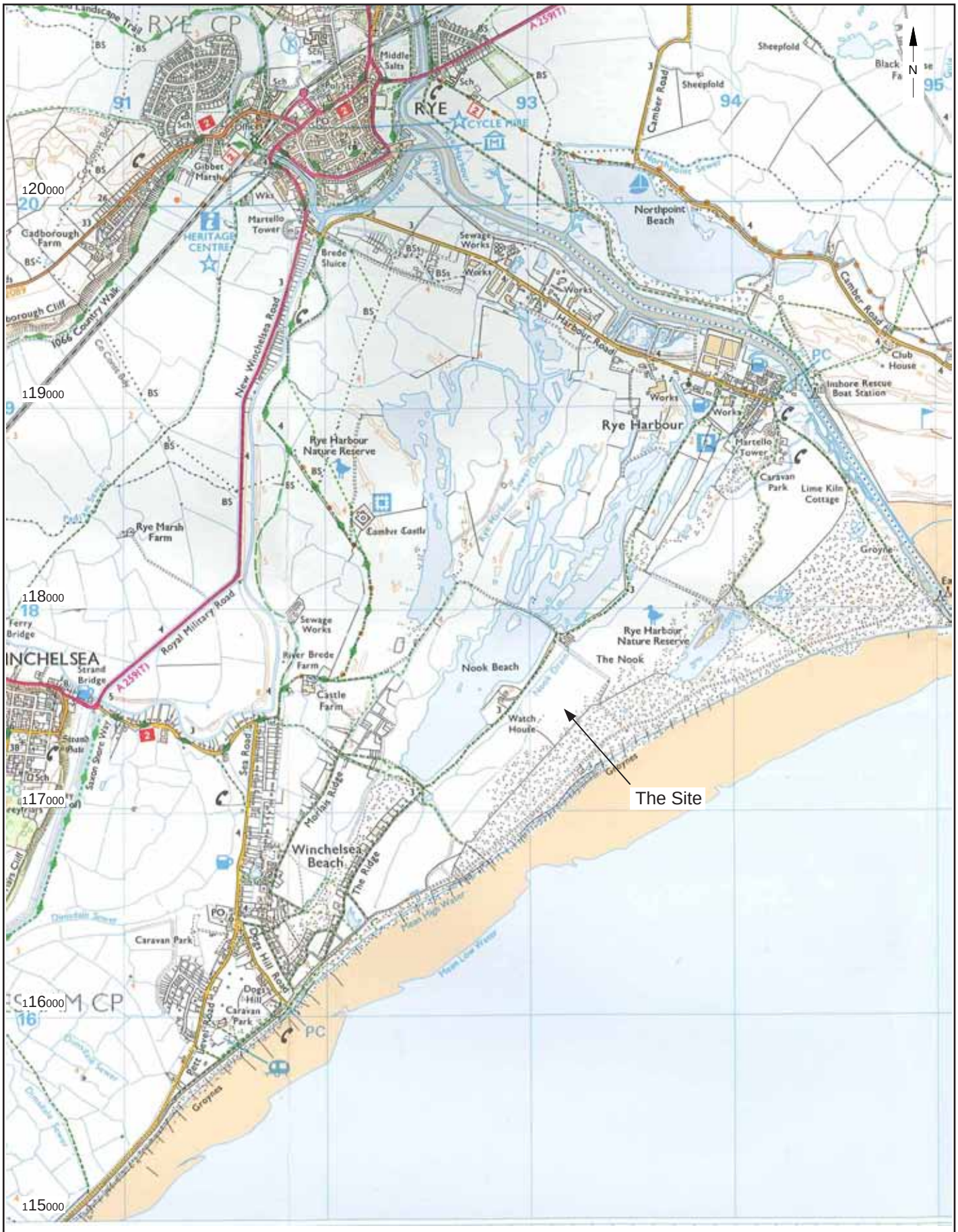
Project archives

Physical Archive recipient	Local Museum
Physical Contents	'other'
Digital Archive recipient	Local Museum
Paper Archive recipient	Local Museum

Project bibliography 1

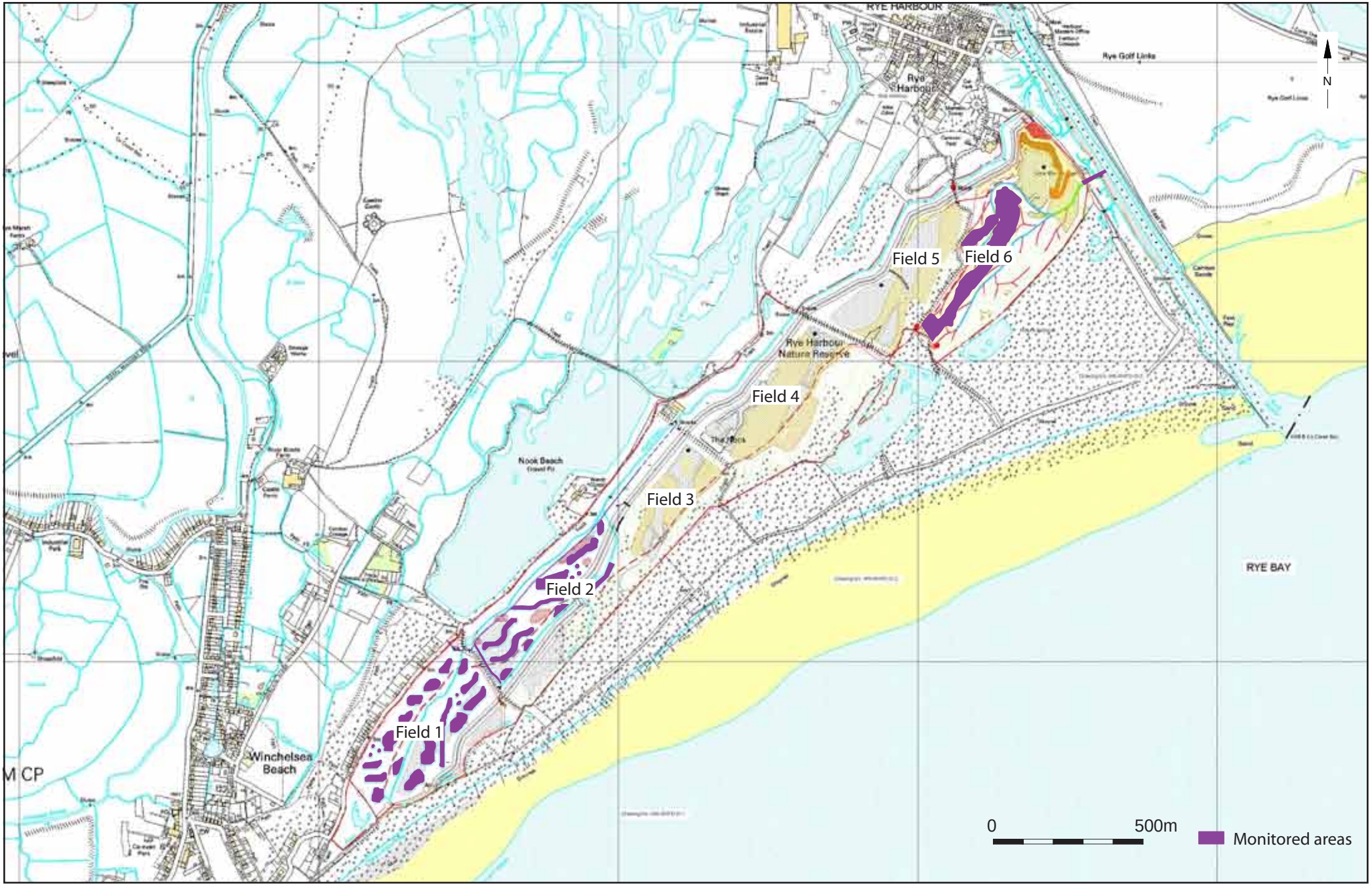
Publication type	Grey literature (unpublished document/manuscript)
Title	An Archaeological Watching Brief at Rye Harbour Farm, Rye,east Sussex
Author(s)/Editor(s)	Russel,C
Other bibliographic details	2011109
Date	2011
Issuer or publisher	Archaeology South East
Place of issue or publication	Portslade

Entered by	Chris Russel (mrchris20042000@yahoo.co.uk)
Entered on	13 May 2011



0 1km

© **Archaeology South-East**		Rye Harbour Farm	Fig. 1
Project Ref: 4452	May 2010	Site location	
Report Ref:	Drawn by: JLR		



© Archaeology South-East		Rye Harbour Farm	Fig. 2
Project Ref: 4452	May 2011	Plan showing monitored areas	
Report Ref: 2011109	Drawn by: LD		

Fig 3.1: Examples of 'scrapes in fields 1 and 2

Fig 3.2: Examples of 'scrapes in fields 1 and 2

Fig 3.2: Topsoil strip over shingle ridges in field 6

Fig 3.3: Topsoil strip over shingle ridges in field 6

Fig 3.3: Excavation of channel to River Rother

© **Archaeology South-East**		Rye Harbour Farm	Fig. 3
Project Ref: 4452	May 2011	Selected photos of works on site	
Report Ref: 2011109	Drawn by: LD		

Appendix 1

Method

The EM-31 methodology was developed in order to provide a rapid, cost effective, evaluation of the sediments in order to supply the client with information useful for archaeological prospection. A surface ground conductivity survey was conducted using a Geonics EM31. The Geonics EM31 uses a varying electromagnetic field to measure changes in near surface conductivity. For example clays and silts are more conductive to electrical currents than sands and gravels. From a measure of changes in ground conductivity on a grid of continuous recording stations across the site it is possible to produce a 2D map as a proxy for the distribution of sands, gravels and finer grained sediments in the near surface zone (i.e. top 3m). Such techniques are ideal for locating buried channels as well as identifying the surface expression of buried sand and gravel islands within the alluvium.

The Geonics EM 31 Ground Conductivity meter is suitable for the geoelectrical survey because at low electrical induction numbers the terrain conductivity is directly proportional to instrument reading (of secondary to primary magnetic field). The ground conductivity is a function of the electrical conductivity of the material (soil or rock), the fluid content and the thickness or depth of individual layers within the ground. Because the instrument uses an electromagnetic field maps of geologic variations and subsurface features associated with the changes in ground conductivity can be produced without the recourse to directly placing electrodes into the ground. In the field ground conductivity measurements were taken by walking transects across the site at approximately 10m intervals where the data was recorded together with a DGPS location for real time spatial positioning. Some advantages of the Geonics EM31-MK2 over conventional resistivity methods are the speed with which surveys can be performed, the precision with which small changes in conductivity can be measured and the continuous readout and data collection while traversing the survey area.

Data

The survey results (Figures 1-3) indicate that spatially varying patterns electrical conductivity were recorded at the site. The conductivity results recorded indicate that the area can be divided into three zones of different conductivity. These are i) areas of low conductivity/high resistance (in red or hot colours), ii) areas of medium conductivity (pink/yellow colours) and iii) areas of high conductivity/low resistance (cool or green/blue colours). These have been designated terrain types I (low conductivity/high resistance (in red or hot colours)), ii) terrain type II (areas of medium conductivity (pink/yellow colours)) and iii) terrain type III (areas of high conductivity/low resistance (cool or green/blue colours)).

An area of low conductivity/high resistance (type I terrain) is noted on the western side of field 1 (Figures 1 and 3), a similar terrain type has been noted at the northern end of field 2 (Figures 2 and 3). This may represent an area of coarser grained sediments (sands/gravels near surface) or an area in which compaction of clay-silts has reduced the electrical conductance of the sediment (possibly an area of extant terrain prior to marsh reclamation). It is interesting to note that the extant channel

through field 1 appears to respect this boundary reinforcing the notion that the terrain type I has a real existence.

Terrain type II occupies much of the central part of both fields 1 and 2. Sinuous features within the area reflect former channel positions and it is likely that this area is that in which the main (recent) period of marsh reclamation took place.

Terrain type III probably represents channel areas operating in the relatively recent past.

In order to ascertain precisely the nature of the sequences and how these sequences are reflected in the geophysics an element of ground truthing of the geophysics would be useful.

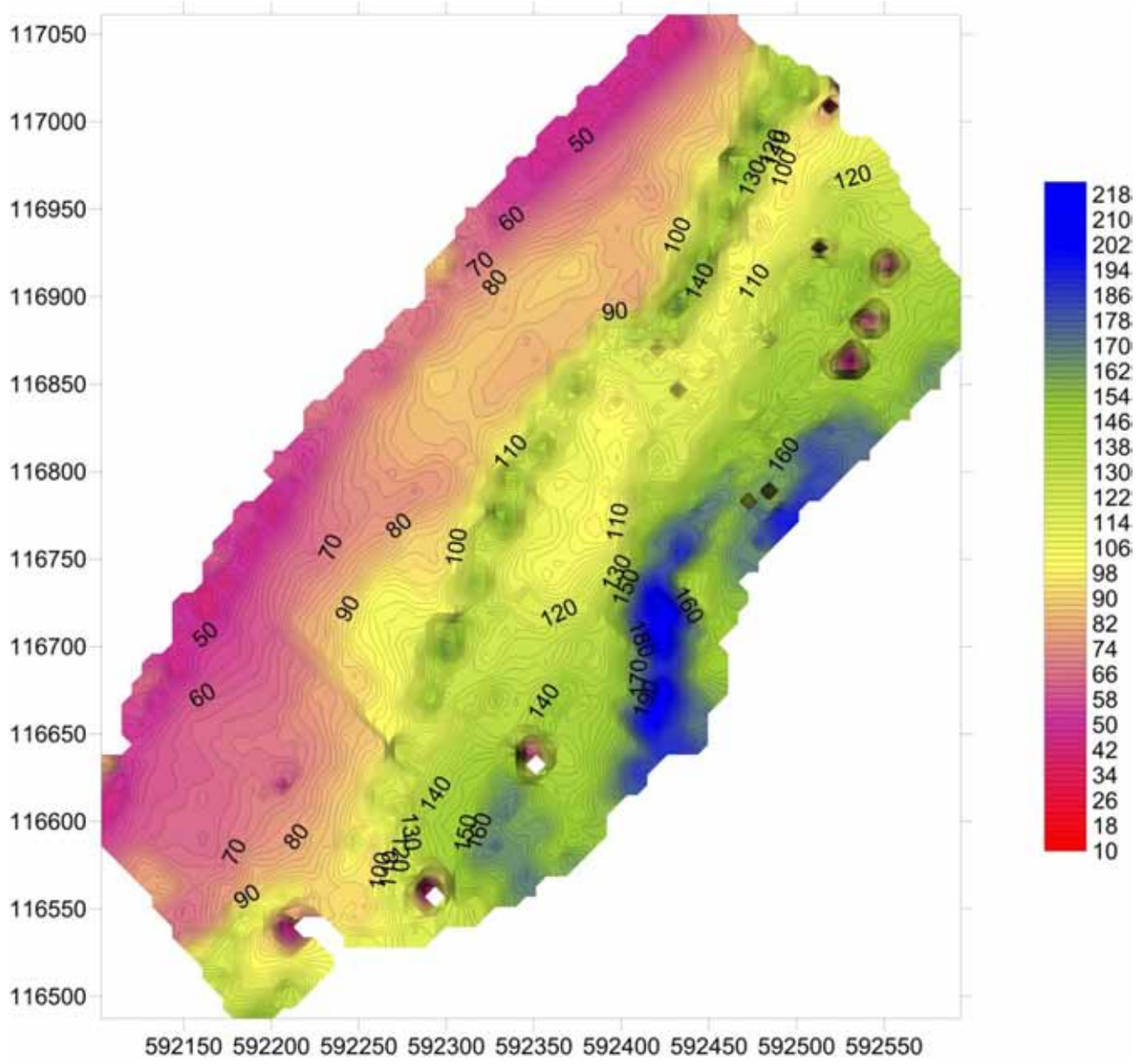


Figure 1. Field 1 conductivity results.

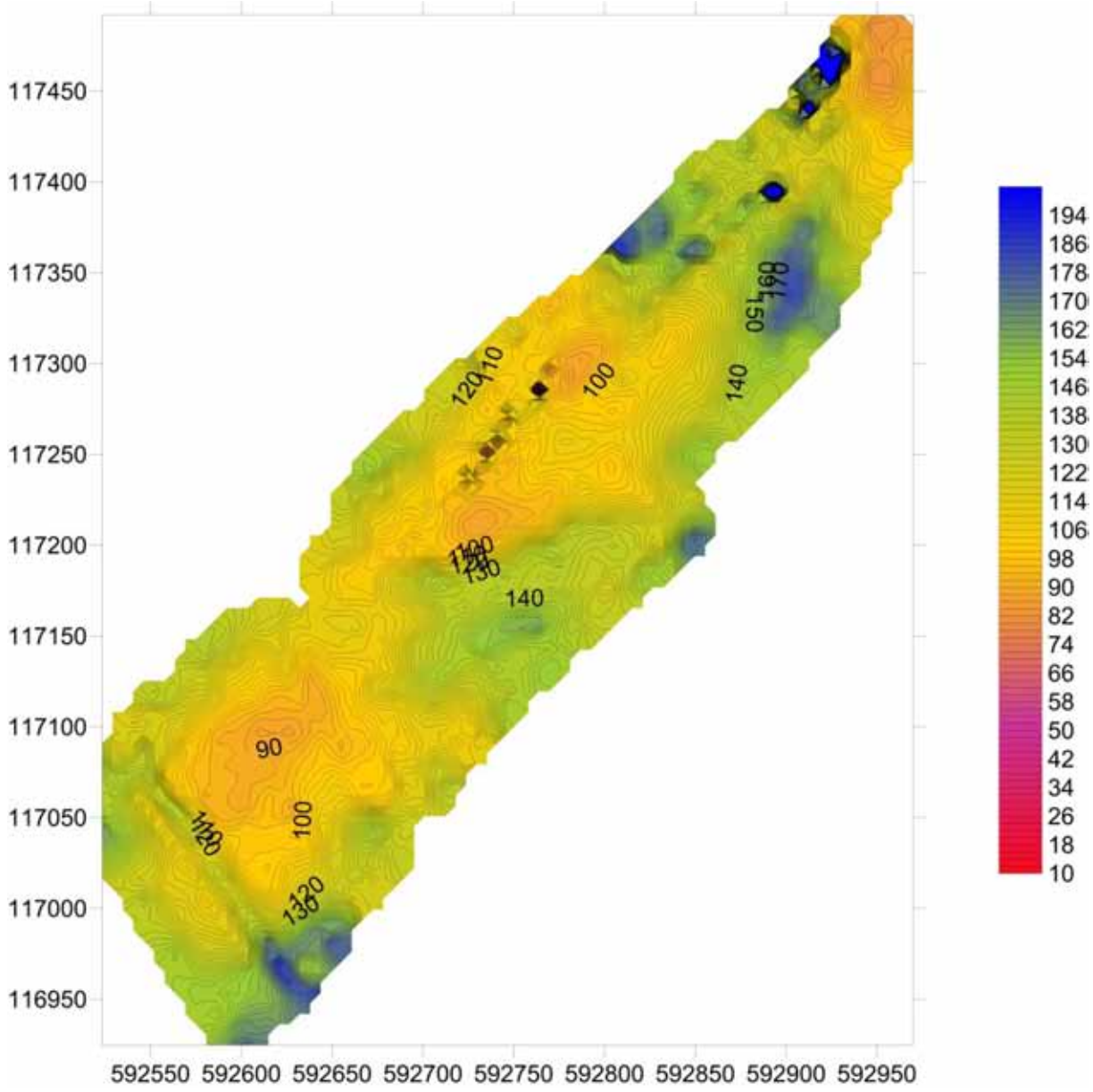


Figure 2. Field 2 conductivity results.

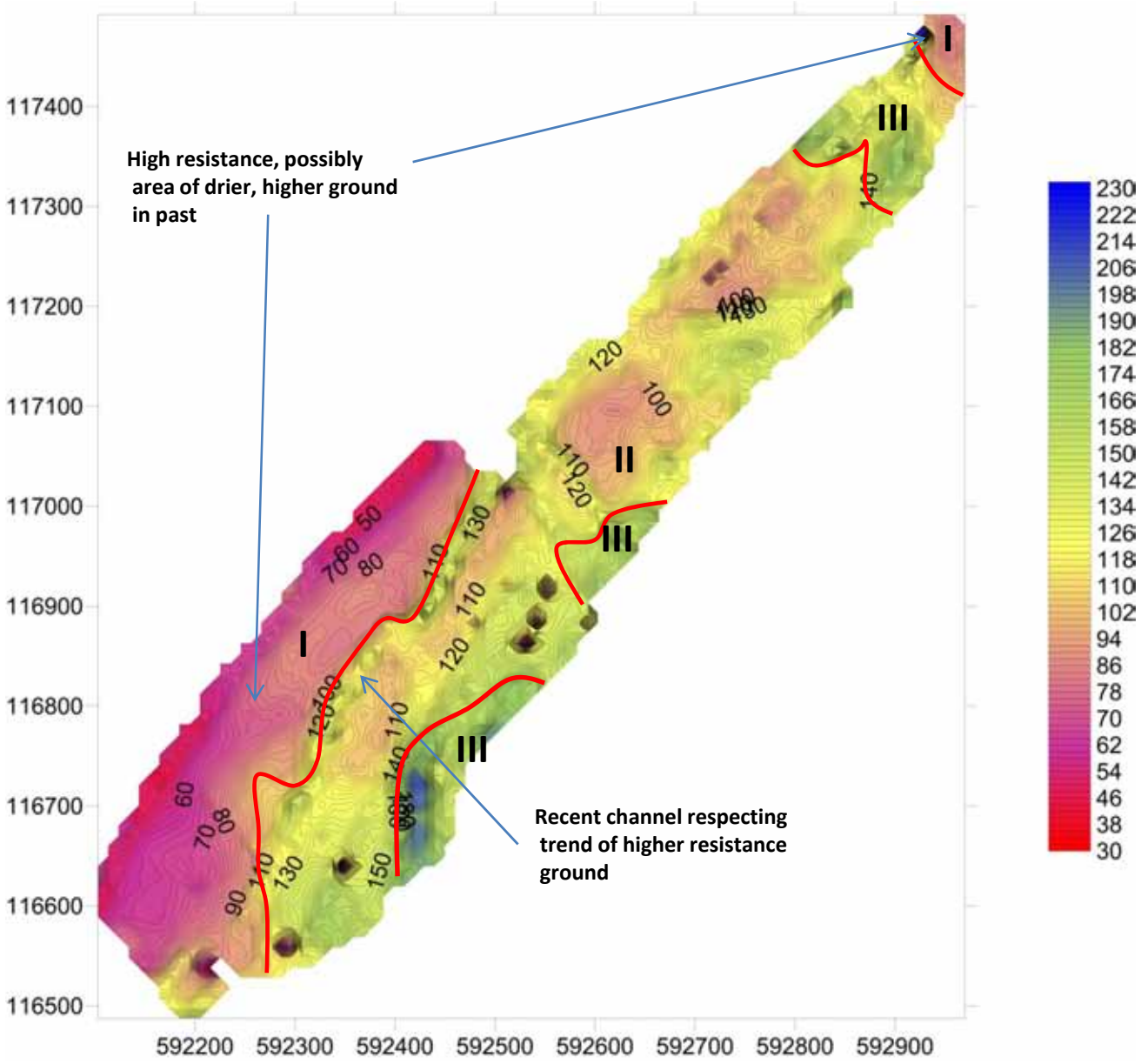


Figure 3. Fields 1 and 2 conductivity results.

Appendix 2

The lithostratigraphy and morphology of the gravel beach complex in the vicinity of Camber Castle, Rye Harbour, East Sussex.

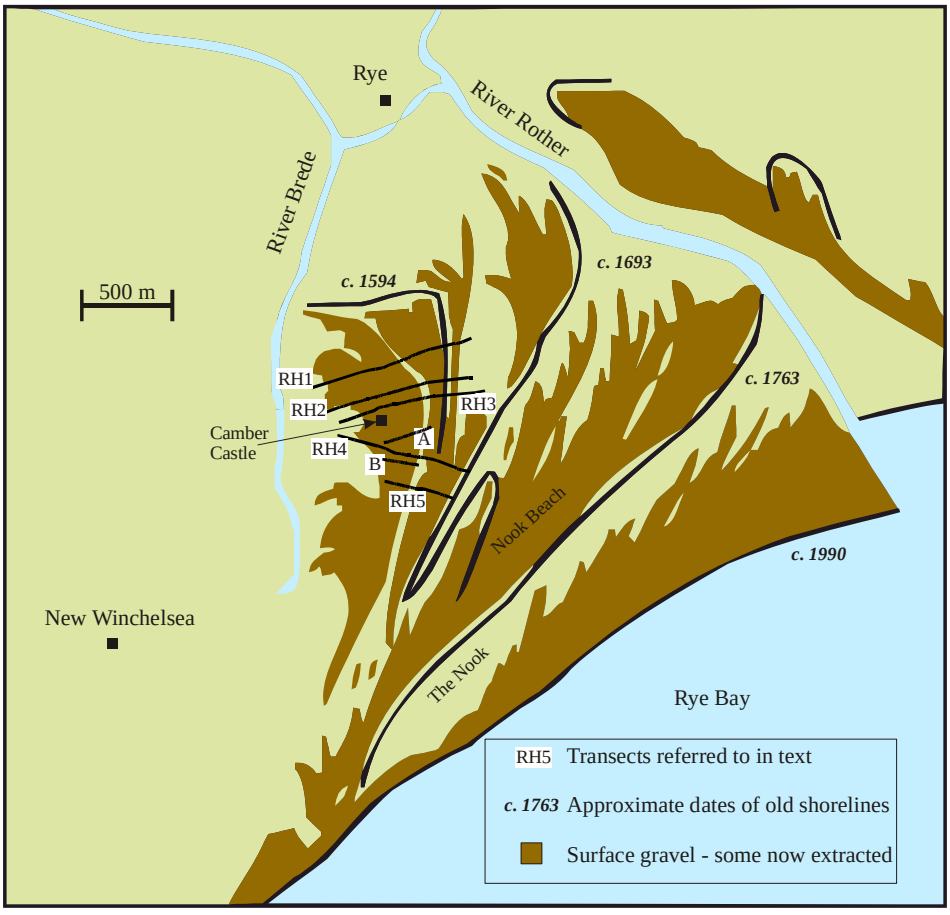
Dr Paul Stupples
Department of Geography, University of Liverpool, Roxby Building, Liverpool, L69 7ZT
stupples@liv.ac.uk

1. Introduction

This report summarises the results of a morphostratigraphic survey of the gravel beach complex of Rye Harbour, in the vicinity of Camber Castle, East Sussex. The work forms part of Phase 2 (objective 2.1) of a much larger project funded by English Heritage via the Aggregate Levy Sustainability Fund: *The Evolution of the Port of Rye, Romney Marsh, Sussex*.

The ridges which surround Camber Castle are part of Lovegrove's (1953) first and second series and a combination of historical, cartographic and geomorphological evidence suggests that they were deposited during the 16th century (Lewis, 1932; Lovegrove, 1953; Eddison, 1983, 1998). The castle itself was built on top of the ridges in AD 1539, overlooking the small estuary that existed at that time. Lovegrove (1953) was able to match field evidence to contemporary accounts and maps of the changing position of shorelines over the past 1000 years or so to indicate that the castle is landward (west) of the AD 1594 shoreline. Shorelines become progressively younger to the east and the modern coast. A topographic survey of the beach ridges will aim to build on the original work of Lovegrove (1953) and this will be supported, for the first time, by a detailed investigation into the sediments which overlie the gravel ridges, infill the swales. and abut the gravel in the former marshland to east and west, to define the stratigraphic relationship between these finer grained deposits and the gravel beaches.

Figure 1 The study site at Camber Castle showing location of lithostratigraphic and topographic transects and the position of some of the old shorelines.



2. Study site and methods

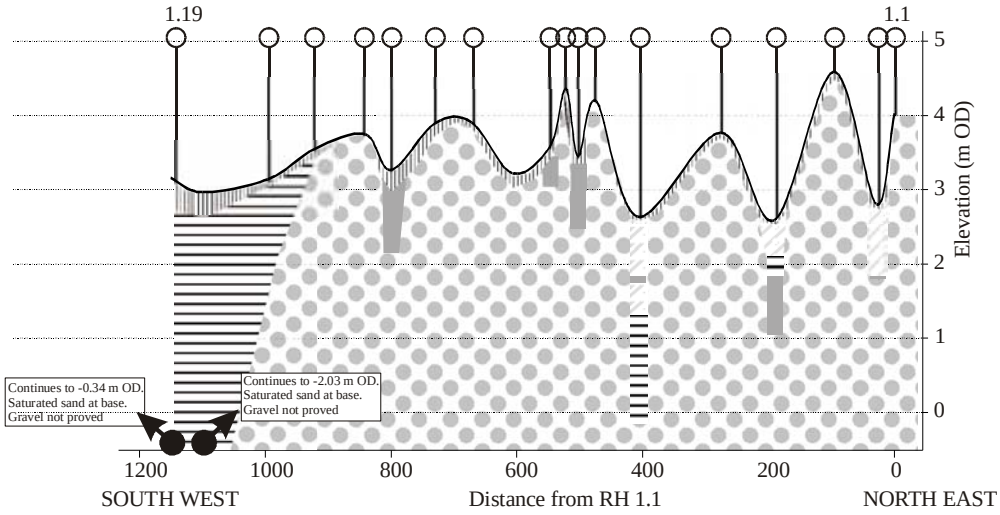
The area of Rye Harbour covered by this report is a little over one square kilometre, with Camber Castle at its centre, and TQ 927193 at the northeast corner and TQ 916178 at the southwest corner. Seven transects (figs. 2-4), orientated approximately east to west (fig. 1), were completed, five recorded both lithostratigraphy and topography of the gravel and the flanking reclaimed marshland (transects RH1 to RH5), a further two were restricted to the topography of the gravel ridges (transects A and B). The transects were located to systematically record changing morphology and stratigraphy across the gravel beaches surrounding the castle, and the flanking marsh sediments to the east and west. Their final extent was determined in the field by practical obstacles such as the river Brede to the west, and drainage ditches in the marshland to the east towards Nook Beach.

A hand operated gouge corer was used to recover the deposits overlying the gravel and the sedimentary succession was described according to the Troels-Smith (1955) classification. Around 20 boreholes, focussing on the gravel ridge complex, were sunk along each of transects RH1-5 which were 0.5 to 1 km long. Boreholes were more widely spaced, every 100 m or so, along transect RH1 as this covered the widest extent of the gravel complex; along the shorter transects RH2-5 sampling resolution was higher, typically every 10-30 m through the gravel beaches, with 2 or 3 more widely spaced boreholes at each end to examine the flanking marsh deposits.

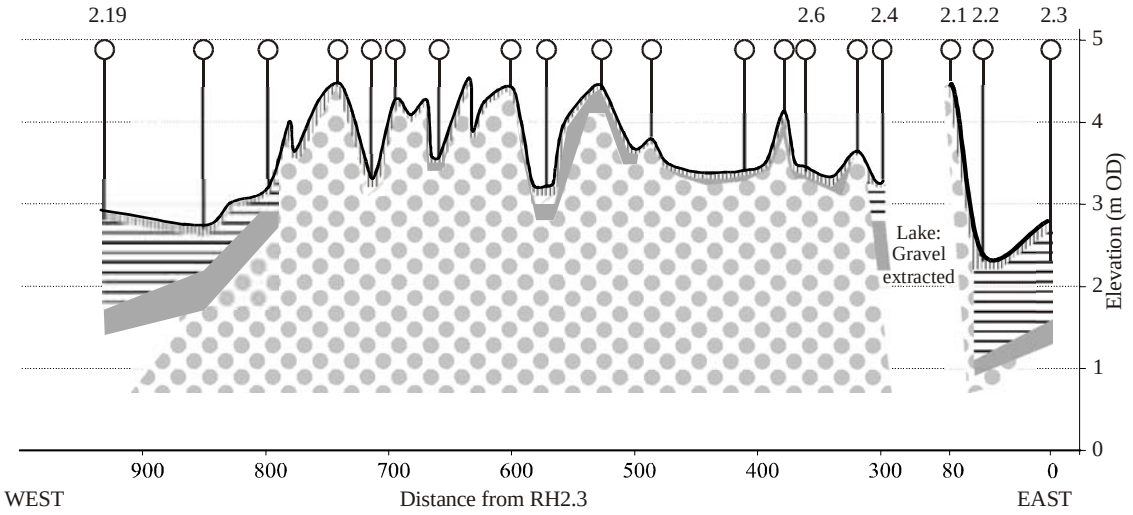
The topographic survey was carried out with a Sokkia SET5 Electronic Total Station and all ridges and lows were recorded along each transect, apart from RH1 where only borehole locations were levelled in. All sites were levelled to UK ordnance datum using the benchmark on the castle itself. Two short sample cores representative of the sequences infilling the gravel swales were also collected for particle size analysis in the laboratory using a Coulter LS130 laser granulometer.

Figure 2 Lithostratigraphic transects RH1 to RH3.

A) Lithostratigraphic transect RH1



B) Lithostratigraphic transect RH2



C) Lithostratigraphic transect RH3

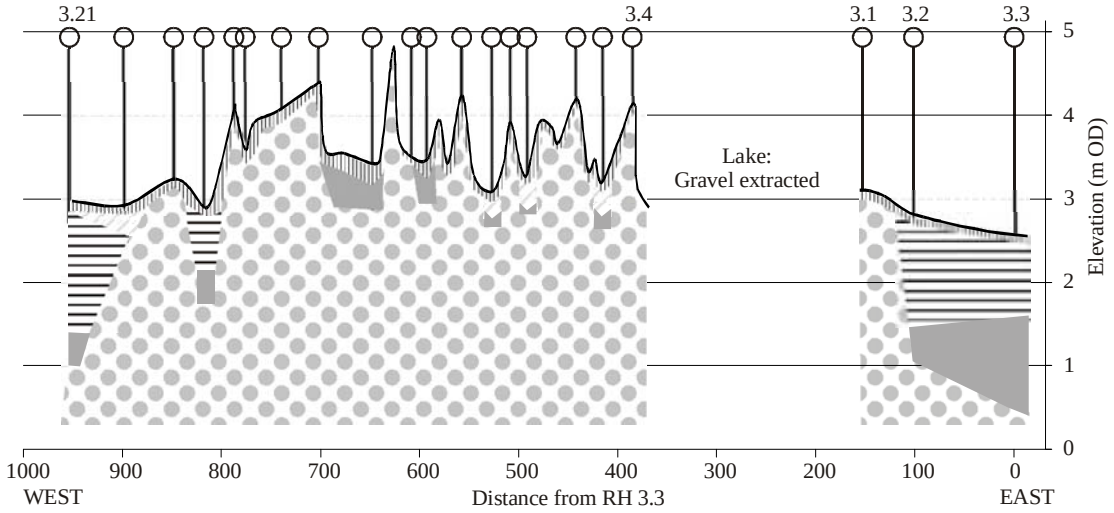
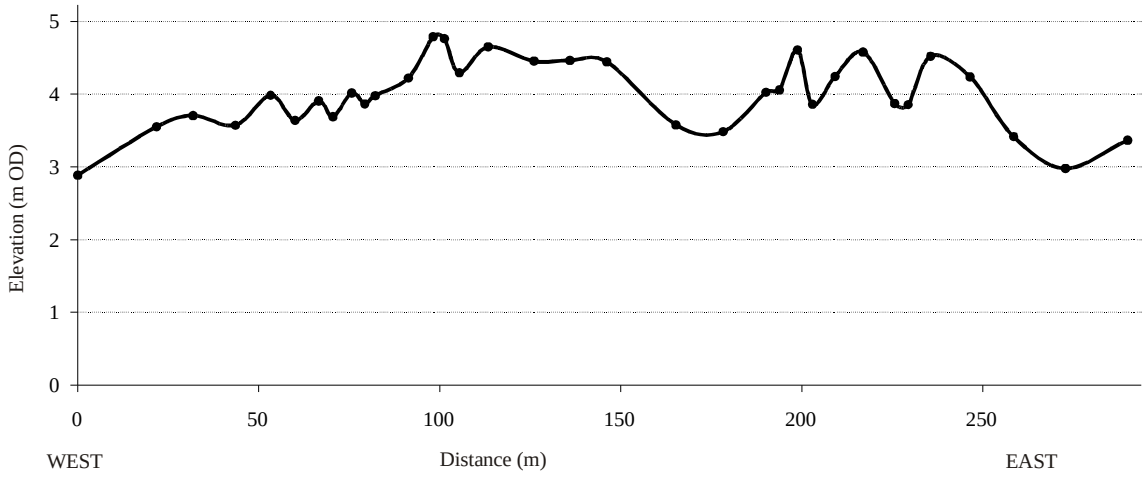
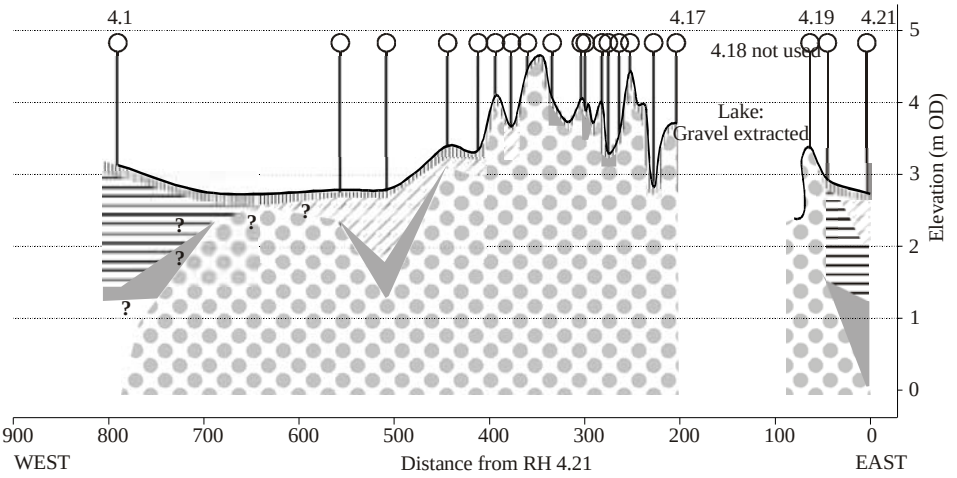


Figure 3 Lithostratigraphic transect 4 and topographic transects A and B.

A) Topographic transect A



B) Lithostratigraphic transect RH4



C) Topographic transect B

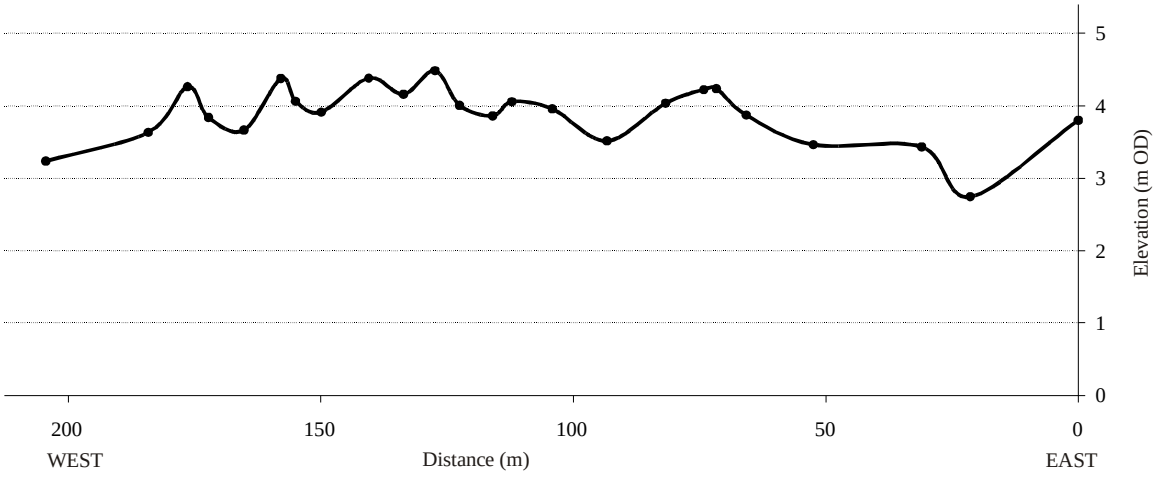
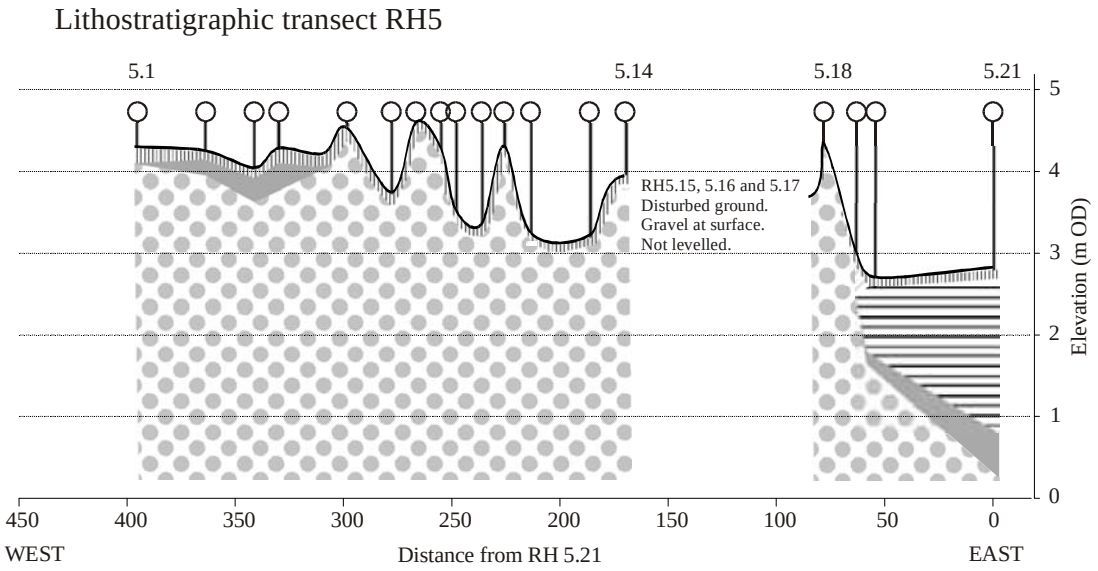
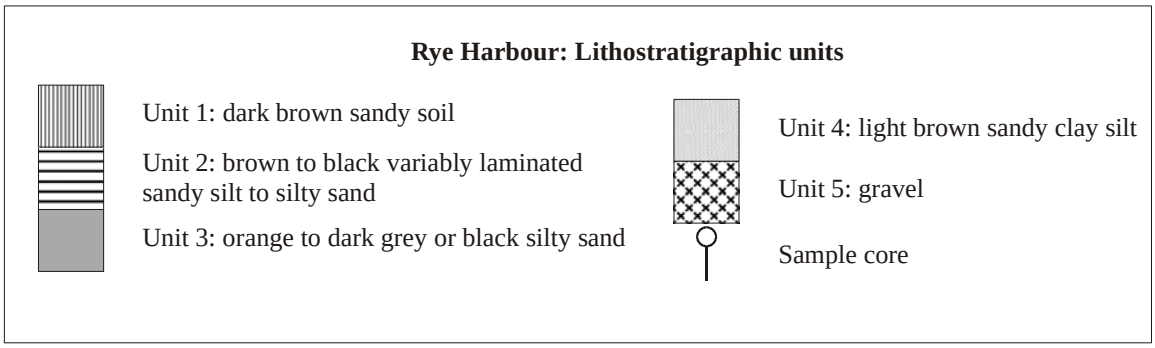


Figure 4 Lithostratigraphic transect 5 and key to lithostratigraphy.





3. Results and interpretation

Results, and a brief interpretation, of the lithostratigraphic data will be followed by a summary of the topographic survey.

3.1. Lithostratigraphy

Two distinct post-gravel successions were identified in the lithostratigraphy of Rye Harbour. At the margins of the gravel ridge complex a relatively deep sequence of minerogenic deposits fines upwards from a basal silty sand, through a laminated sequence of sandy clay silt, to the surface veneer of sandy soil. Gravel was either not proved, or found to be below 1.5 m OD, at either end of the transects. Within the ridge complex the thickness of sediments above the gravel was typically less than 50 cm, with occasional surface gravel exposed on the ridge crests, and the thickest sedimentary sequences in the swales. Here again a fining upwards sequence was recorded from gravel to silty sand and then a sandy soil. In the deeper swales an additional very stiff, sandy clay silt was also recorded occasionally.

Five distinct lithostratigraphic units were identified based on a synthesis of the detailed sediment descriptions (Appendix I) and these simplified units are the basis for the cross sections in figures 2-4.

3.1.1. Unit one: dark sandy brown soil

The surface unit of Rye Harbour typically comprised about 10 cm of sandy silty clay soil bound by a mass of fibrous roots. Soil was thicker and finer grained in the swales, but sandier and thinner, sometimes being absent altogether, on the ridge crests. Gravel and shell fragments were occasionally present as minor components of the soil.

3.1.2. Unit two: brown to black variably laminated silty sand to sandy clay silt

This unit was restricted to the western and eastern margins of the gravel complex where in excess of 1 m of poorly to very well laminated sandy clay silt to silty sand was recovered below the soil. Sand and silt content varied down core but a general coarsening with depth was observed from a very stiff sandy clay silt towards the surface, to an increasingly coarsely laminated silty sand with depth. The degree of lamination was also highly variable from minor sandy lenses in the stiff upper silts, through well laminated sections with parallel, mm to cm scale, alternations of sand and mud, to, in the deepest sections, a sand dominated deposit with minor muddy lenses. Whilst this covers a range of sediment types from mud- to sand-dominated (details in Appendix I) the diagnostic characteristic of this unit was its laminated structure. It was not recorded above 3.10 m OD and was found to extend to depths approaching – 2 m OD to the west of transect RH1, near the river Brede. The transition was often sharp where the laminated unit overlay the silty sand of unit three.

3.1.3. Unit three: orange to dark grey or black silty sand

Found at depth at either end of the transect below the laminated unit (where it was thickest), and found between the thin soil and gravel in the heart of the ridge complex. Typically a few decimetres thick, the sand varied in colour from orange to dark grey, and black where it became saturated with increasing depth. Occasional gravel and muddy lenses were noted; shell fragments were common. Contact with the overlying soil when recovered close to the surface was gradational; contact with the gravel was well defined.

3.1.4. Unit four: light brown sandy clay silt

This stiff, structureless, shelly silt, which became increasingly sandy with depth, was confined to the marginal sites and the deeper swales, sometimes directly overlying the gravel, or alternatively grading down into the silty sand. It was most widely developed in the more variable and finer grained sequences of transect RH1.

3.1.5. Unit 5: gravel

Gravel was encountered, but not recovered, in all but 6 of the boreholes (RH1.18 and 1.19; RH2.1,2.4 and 2.19; RH4.1), here the silty sand became saturated and could neither be recovered nor penetrated. At the other boreholes only the surface elevation of the gravel could be recorded but a minimum thickness approaching 5 m must be assumed on the basis of comparing the highest ridges with the deepest gravel contacts.

3.2. Particle size RH2.4 and RH2.6

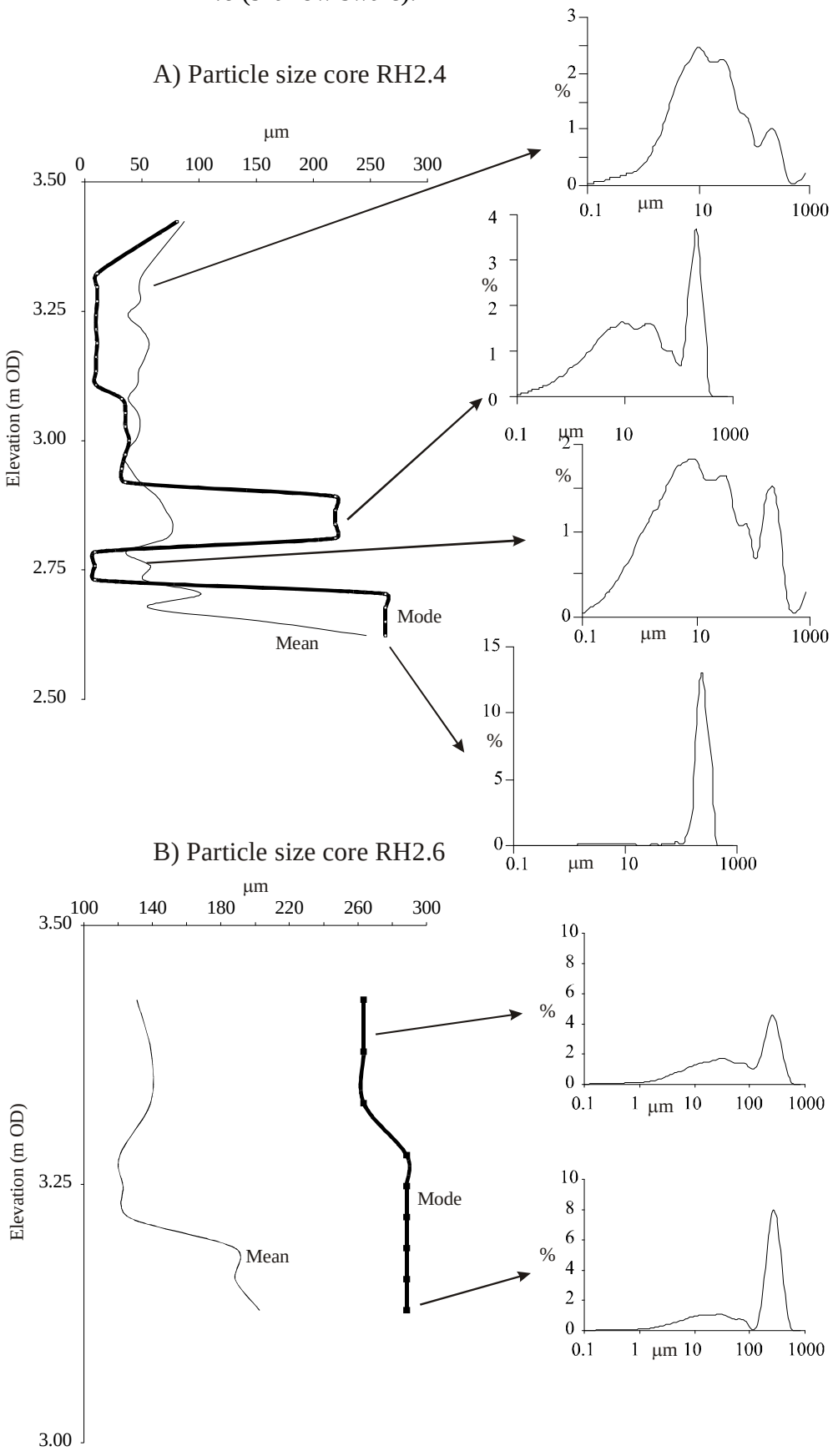
Two short cores were recovered from within the beach ridge complex for particle size analysis (figs. 2b and 5a, b; Appendix II). RH2.4 (fig. 5a) was collected from the eastern edge of the remaining gravel ridges, west of the lake, where a thick, saturated basal sand unit could not be penetrated and so gravel was not proved. A depth of nearly 2 m was reached in attempting to prove the gravel but it was only possible to recover

about 0.8 m of sediment for the laboratory work, although this did include a short section from the top of the saturated sand unit. Borehole RH2.6 (fig. 5b) was more typical of the sedimentary sequence in the majority of swales investigated with only 0.3 m of sediment recovered overlying the gravel. The particle size profiles and frequency distributions (fig. 5) add a little detail to the broad stratigraphy recorded in the field using the Troels-Smith (1955) classification.

The shallower swale (RH2.6, figs. 2b and 5b) records a tripartite sequence and identifies some slight variation (not recorded in the field) within the sandy unit in the form of a siltier phase which is defined by a gradational transition to the sand below, and soil above. Sand content is high throughout (45-68 %), with a mode in excess of 288 μm at depth, but a little finer towards the surface. The slight fining mid-core is due to a small relative increase in silt over sand, rather than a fining of the sand, but this is a subtle shift, and is reversed again in the upper 10 cm or so. Clay content is negligible throughout.

The longer sequence at RH2.4 (figs. 2b and 5a) commences with a sand which is a little finer than the deep sand at RH2.6, with a mode of 263 μm – the same as the surface sand at the previous site, but over 95% of this basal deposit is sand. Overlying the sand is a more variable laminated sandy silt, with a multimodal particle size distribution, and cyclical variability in the mean particle size. Silt is dominant here, being 60-80% of the deposit, but the proportions of sand and silt vary up core, as does the modal size of the sand, being considerably finer in the muddiest sections (< 100 μm), but more typically remaining coarser (180 – 240 μm). Variability declines up core as the well laminated sandy silt is replaced by silt with minor sandy lenses until there is once again a slight coarsening at the surface similar to BH2.6.

Figure 5 Textural characteristics of sample cores Rh2.4 (marginal marsh site) and RH2.6 (shallow swale).



3.3. Interpretation

Variations in the deposits infilling the swales of the gravel beaches appears to have been controlled by the depth of the swales, and hence their position in the tidal frame. All have a silty sand as their basal unit overlying the gravel but only the deeper swales (and the fringing marsh sediments) have any appreciable quantity of the stiff clay silt of unit four. The swales higher in the tidal frame, 3 m OD appears to be a reasonable threshold elevation, where flooded by only the highest tides from the outset and received only coarser sandy material. However, the deeper swales, such as RH2.4 record a fining upwards sequence of initially higher energy conditions (the basal sand) giving way to a period of more protected, lower energy sedimentation which presumably reflects the eastward migration of the shoreline. Only the deeper swales remained low enough in the tidal frame to continue to be inundated by the sediment laden tidal waters as the shoreline retreated. These high tides presumably deposited some of their coarser sand load on the fronting beaches, and this allowed the accumulation of the relatively siltier unit four in the deeper swales and fringing marshes which were also at as much lower elevation relative to the beach ridges.

Rh2.6 possibly represents the narrow finger of marshland which Lovegrove (1953) records east of the castle between his ridge series 2 and 3, the latter having now been extracted with a large lake marking its western extent. The multi-modal particle size distributions, and regular variations in texture and composition of unit two at RH2.6, and presumably within the equivalent fringing marsh sediments, are typical of laminated deposits elsewhere on Romney Marsh, including the interdigitating marsh sediments associated with the Dungeness gravel barrier system (Long *et al.* in prep.; Plater *et al.* 2002; Stupples 2002). These sediments are associated with deposition rates of decimetres per year and are deposited under a range of tidally controlled energy conditions e.g. neap-spring cycles, hence the changing modal particle size. They indicate that initial infill of the fringing marshland (and perhaps the deepest gravel lows?), was perhaps quite rapid following deposition of the protective beach ridges. This phase of deposition passes gradationally to the upper intertidal and marsh deposits of the near surface sediments. This final phase of more gradual silting and marsh formation prior to reclamation is recorded in contemporary maps and documents (Lewis, 1932; Lovegrove, 1953; Eddison, 1983, 1998). These fine grained sediments become increasingly thick moving east and west away from the gravel complex into the surrounding marshland as the contacts with the gravel deepens and accommodation space increases.

3.4. Topography

The gravel ridges which surround Camber Castle are predominantly within Lovegrove's (1953) second series, and are generally steep sided, sub-parallel and trend north west to south east; transect RH5, at the south of the study area, also crosses the edge of his first series where the orientation is more complex and the ridges a little broader and more widely spaced. Ridge crests (fig. 2-4; Appendix III) were between 4 and 5 m OD, with the swales at 3 to 4 m OD; the marsh surfaces at the margins of the ridge complex, from where the deeper stratigraphic sequences were recovered, are below 3 m OD. Ridge amplitude was in the range 0.5 to 1m, exceptionally reaching 1.5 m, and wavelengths of 10 to 30 m were typical, increasing to 50 m or more for the larger ridges. There was a sense of the ridges crests increasing in elevation mid transect and becoming more subdued to the east and west margins (transects RH3, RH4, A and B; figs. 2 and 3); although this trend was less obvious to the north of the castle, especially RH2 (fig. 2b)

and RH5 (fig. 4) shows a declining ridge crest elevation from west to east. The amplitude of the beach ridges here are comparable to those on Denge Beach, part of the Dungeness gravel system to the east (Plater and Long, 1995).

4. Conclusions

This report summaries the results of a period of field- and laboratory work investigating the topography and lithostratigraphy of Rye Harbour and its surrounding marshland. The latter was found to abut the gravel as a thick suite of predominantly fine grained sediments which record evidence of tidal inundation, and possibly rapid deposition, in the form of well developed laminations, prior to a final phase of marsh expansion and reclamation in a lower energy environment higher in the tidal frame. These sediments thicken away from the main gravel ridge complex as the accommodation space made available by the increasing depth to the gravel increases. Within the ridge complex itself little sediment is found above the gravel, often only a thin sandy soil. Occasionally though, the deeper swales record a short fining up sequence which possibly records the movement of the shoreline away from the deposition site, and the decline in tidal energy that this caused. Morphologically the ridge system is comparable to a sequence on Denge Beach that is at least 700 years older at its western end (Plater and Long, 1995). This perhaps supports the latter's conclusion that variations in storm intensity overshadow the impact of sea level rise on ridge crest elevation over these timescales, and that perhaps Captain Lovegrove should have been encouraged to resist the temptation (1953, p. 201) to cite sea level change as a factor in controlling variations in ridge height across Rye Harbour over much shorter periods.

Acknowledgments

Grateful thanks go to the many landowners of Rye Harbour for allowing access to their land and special thanks to Damien Laidler, Ed Schofield and Kate Elmore who all shared with me the boundless joy that was Rye Harbour during the long winter of 2002/3.

References

Eddison, J. **1983** The evolution of the barrier beaches between Fairlight and Hythe, *The Geographical Journal*, 149, 39-53.

Eddison, J. **1998c** Catastrophic changes: a multidisciplinary study of the evolution of the barrier beaches of Rye Bay, In: Eddison, J., Gardiner, M. and Long, A.J. (Eds.) *Romney Marsh: Environmental Change and Human Occupation in a Coastal Lowland*, Oxford University Committee for Archaeology, Monograph 46, Oxford, 65-88.

Lewis, W.V. **1932** The formation of Dungeness Foreland, *The Geographical Journal*. 80, 309-324

Lovegrove, H. **1953** Old Shore Line near Camber Castle, *The Geographical Journal*, 119, 200-207.

Plater, A.J. and Long, A.J. **1995** The morphology and evolution of Denge Beach and Denge Marsh, In: Eddison, J. (Ed.) *Romney Marsh: the debatable ground*, Oxford University Committee for Archaeology, Monograph 41, Oxford, 8-36.

Plater, A.J., Stupples, P., Roberts, H. and Owen, C. **2002**. The evidence for late Holocene foreland progradation and rapid tidal sedimentation from the barrier and marsh sediments of Romney Marsh and Dungeness: A geomorphological perspective. In: A. Long, S. Hipkin and H. Clarke (eds) *Romney Marsh: Coastal and Landscape Change through the Ages*, Oxford University School of Archaeology Monograph 56, Oxford, 40-57.

Stupples, P. **2002** Tidal cycles preserved in late Holocene tidal rhythmites, the Wainway Channel, Romney Marsh, southeast England, *Marine Geology*, 182, 3-4, 231-246.

Troels-Smith, J. **1955** Characterisation of Unconsolidated Sediments, *Geological Survey of Denmark. Series IV*, 3, 1-75.

5. Appendix I: Rye Harbour Lithostratigraphic transects

Stratigraphy recorded as depth (cm) below ground surface.

5.1. Transect 1

RH1.1 4.03 m OD
0-10 Gravel at the surface.

RH1.2 2.81 m OD
0-4 Medium brown silty clay with modern rootlets.
As3 Ag1 Sh+ Th^0+
nig 2+ sicc 3+ strf 0 elas 0

4-94 Pale brown clay with rootlets, shell fragments and towards the base sand.
As4 Th^0+ Lf+ Ga+ Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

94-97 Grey brown silty sand. Upper contact very sharp.
Ga2 Ag2
nig 2 sicc 2 strf 0 elas 0 lim 4

97- Gravel.

RH1.3 4.59 m OD
0-10 Medium brown clay with gravel and modern rootlets.
10- Gravel.

RH1.4 2.59 m OD
0-2 Medium brown silty clay with modern rootlets.
As3 Ag1 Sh+ Th^0+
nig 2+ sicc 3+ strf 0 elas 0

2-50 Pale brown clay with rootlets, shell fragments and towards the base sand.
As4 Th^0+ Lf+ Ga+ Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

50-73 Blue-grey and pale brown clayey, silty sand. Weakly laminated.
Ga1 Gs1 Ag1 As1
nig 2 sicc 2+ strf 0+ elas 0 lim 0

73-155 Yellow brown coarse sand. Saturated. Upper contact very sharp.

Gs3 Ga1 Ptm+
nig 2 sicc 1 strf 0+ elas 0 lim 4

155- Gravel.

RH1.5 3.77 m OD
0-2 Medium brown clay with gravel and modern rootlets.
2- Gravel.

RH1.6 2.64 m OD
0-6 Medium brown silty clay with modern rootlets.
As3 Ag1 Sh+ Th^0+
nig 2+ sicc 3+ strf 0 elas 0

6-80 Pale brown clay with rootlets, shell fragments and towards the base sand.
As4 Th^0+ Lf+ Ga+ Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

80-91 Grey and yellow-brown coarse sand.
Gs3 Ga1
nig 2 sicc 2 strf 0 elas 0 lim 0

91-111 Orange-brown silty clay.
As2 Ag2 Lf+
nig 2 sicc 2+ strf 0 elas 0 lim 0

111-135 Blue-grey silt with occasional rootlets.
Ag4 As+ Th^0+
nig 2 sicc 2 strf 0 elas 0 lim 0

135-279 Black sandy silt with laminations.
As2 Ga2 Gs+
nig 4 sicc 2 strf 2 elas 0 lim 0

279- Gravel.

RH1.7 4.19 m OD
0-10 Gravel at the surface.

RH1.8 3.45 m OD
0-1 Medium brown sand with modern rootlets.

1-95 Yellow brown sand with occasional gravel.
Ga4 Gs+ Gg(maj) Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

95- Gravel.

RH1.9 4.36 m OD
0-10 Medium brown clay with gravel and modern rootlets.
10- Gravel.

RH1.10 3.59 m OD
0-12 Medium brown sand with modern rootlets.

12-50 Yellow brown sand with occasional gravel.
Ga4 Gs+ Gg(maj) Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

50- Gravel.

RH1.11 3.22 m OD
0-15 Medium brown clay with gravel and modern rootlets.

15- Gravel.

RH1.12 3.91 m OD
0-6 Medium brown clay with gravel and modern rootlets.

6- Gravel.

RH1.13 3.90 m OD
0-15 Medium brown clay with gravel and modern rootlets.

15- Gravel.

RH1.14 3.27 m OD
0-25 Medium brown silty clay with modern rootlets.
As3 Ag1 Sh+ Ga+ Th^0+
nig 3 sicc 3+ strf 0 elas 0

25-112 Orange-brown clayey sand with rootlets and shell fragments.
Ga3 As1 Ptm+
nig 2 sicc 3+ strf 0 elas 0 lim 0

112- Gravel.

RH1.15 3.75 m OD
0-10 Gravel at the surface.

RH1.16 3.55 m OD
0-5 Medium brown silty clay with modern rootlets.

5- Gravel.

RH1.17 3.14 m OD
0-7 Medium brown silty clay with modern rootlets.
Ag2 As1 Sh1 Th^0+
nig 3 sicc 3 strf 0 elas 0

7-105 Pale brown silty clay with rootlets, shell fragments and sand laminations below 80 cm.
As3 Ag1 Th^0+ Gg(maj)+ Lf+ Ga+
nig 2 sicc 3 strf 0 elas 0 lim 0

105- Gravel.

RH1.18 2.97 m OD
0-30 Grey-brown clayey silt with modern rootlets.
As3 Ag1 Sh+ Th^0+
nig 2+ sicc 3 strf 0 elas 0

30-95 Pale brown clay with modern rootlets and sand lamination below 50 cm.
As4 Th^0+ Lf+ Ga+
nig 2 sicc 3 strf 0/1 elas 0 lim 0

95-156 Grey-brown silty sand. Strongly laminated.
Ag2 Ga2 As+
nig 2 sicc 2+ strf 3 elas 0 lim 0

156-470 Black sandy silt. Strongly laminated. Clay lens at 450-455 cm and gravel at 460 cm. Upper contact very sharp.
Ag3 Ga1
nig 4 sicc 2+ strf 3 elas 0 lim 4

470-500 Black sands. Saturated.
Ga4 Gs+
nig 4 sicc 1 strf 0 elas 0 lim 0

RH1.19 3.16 m OD
0-35 Grey-brown clayey silt with modern rootlets.
As3 Ag1 Sh+ Th^0+
nig 2+ sicc 3 strf 0 elas 0

35-80 Pale brown clay with modern rootlets and sand lamination below 50 cm.
As4 Th^0+ Lf+ Ga+
nig 2 sicc 3 strf 0/1 elas 0 lim 0

80-192 Grey-brown silty sand. Strongly laminated.
Ag2 Ga2 As+
nig 2 sicc 2+ strf 3 elas 0 lim 0

192-330 Blue-grey sandy silt. Sand content increases with depth, strongly laminated with shell fragments.
Ag2 Ga2 Ptm+
nig 3 sicc 2+ strf 3 elas 0 lim 0

330-350 Dark grey sands. Saturated.
Ga4 Ag+
nig 3+ sicc 1 strf 3 elas 0 lim 0

5.2. Transect 2

RH2.1 4.45 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH2.2 2.39 m OD
0-10 Dark brown silty sand with modern rootlets.
Th2 Ag1 Ga1 Ptm+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-100 Brown sandy clayey silt, with occasional shell fragments. Poorly laminated from 55 cm.
Ag3 As1 Ga+++ Dh+ Ptm+ Gg(maj)+
nig 2 sicc 3 strf 0/1 elas 0 lim 0

100-135 Light brown well laminated sandy silt.
Ag2 Ga2
nig 2 sicc 2 strf 3 elas 0 lim0

135-158 Dark grey laminated silty sand.
Ga4 Ga++
nig 3 sicc 2 strf 2 elas 0 lim0

158- Gravel.

RH2.3 2.79 m OD
0-10 Dark brown silty sand with modern rootlets
Th2 Ag2 As++ Ga++ Sh+
nig 3 sicc 3 strf 0 elas 0

10-68 Stiff brown silt. Sand lenses from 25 cm and regular laminae from 50 cm.
Ag3 As1 Ga+/+++ Dh+
nig 2+ sicc 3 strf 0/1 elas 0 lim 0

68-140 Brown well laminated sandy silty clay.
Ag2 As1 Ga1
nig 2 sicc 2+ strf 3 elas 0 lim 0

140-151 Black coarsely laminated silty sand.
Ga2 Ag2
nig 4 sicc 2 strf 3 elas 0 lim 0

151-190 Grey silty sand with shell fragments.
Ga4 Ptm+++
nig 4 sicc 2 strf 0 elas 0

190-220 Grey sand. Saturated.
220- Gravel.

RH2.4 3.24 m OD
0-10 Dark brown clayey silt with modern rootlets.
$Th^0$2 Ag1 As1 Ga++ Ptm+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-75 Brown laminated sandy clayey silt. Sand lenses from 25 cm, well laminated from 40 cm.
As1 Ag3 Ga++/+++ Dh+ Ptm+
nig 2+ sicc 3 strf 0/1 elas 0 lim 0

75-83 Orange silty sand, with shell fragments. Upper contact quite well defined.
Ga4 Ag+ Ptm+
nig 2 sicc 2 strf 0 elas 0 lim 1

83-191 Saturated grey sand – gravel not proved.

RH2.5 3.62 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH2.6 3.43 m OD
0-10 Dark red-brown silty sand with modern rootlets.
$Th^0$2 Ag1 Ga1 Sh+
nig 3 sicc 3 strf 0 elas 0

10-25 Light red-brown silty sand with gravel.
Ga3 Ag1 Dh+ Gg(maj)+
nig 2 sicc 3 strf 0 elas 0 lim 0

25-34 Brown sand with gravel.
Ga4 Gg(maj)+
nig 2 sicc 3 strf 0 elas 0 lim 0

34- Gravel.

RH2.7 4.10 m OD
0-12 Brown sand with modern rootlets.
$Th^0$2 Ga2 Sh+ Ag+
nig 3 sicc 3 strf 0 elas 0

12-50 Brown silty sand with shell fragments.
Ga4 Ag+ Ptm+
nig 2 sicc 3 strf 0 elas 0 lim 0

50- Gravel.

RH2.8 3.38 m OD
0-12 Dark brown silty sand with modern rootlets.
$Th^0$2 Ag1 Ga1 Sh+ Ptm+
nig 3 sicc 3 strf 0 elas 0

12-40 Orange-brown silty sand with shell fragments and gravel.
Ga4 Ag+ Dh+ Ptm+
nig 2 sicc 2+ strf 0 elas 0 lim 0

40- Gravel.

RH2.9 3.76 m OD
0-5 Dark brown sand with gravel and modern rootlets.
$Th^0$2 Ga1 Gg(maj)1 Sh+
nig 3 sicc 3 strf 0 elas 0

5-20 Orange-brown sand and gravel with shell fragments.
Ga2 Gg(maj)2 Ag+ Ptm+ Dh+
nig 2 sicc 2 strf 0 elas 0 lim 0

20- Gravel.

RH2.10 4.41 m OD

0-5 Dark brown sand with gravel and modern rootlets.
$Th^0$2 Ga2 Sh+ Gg(maj)+ Ag+
nig 3 sicc 3 strf 0 elas 0

5-48 Light brown sand with shell fragments.
Ga4 Ptm+ Dh+ Ag+
nig 2 sicc 3 strf 0 elas 0 lim 0

48- Gravel.

RH2.11 3.19 m OD
0-10 Dark sandy clayey silt with modern rootlets.
$Th^0$2 Ag1 As1 Ga++ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-35 Light brown clayey silt with shell fragments.
Ag3 As1 Ga++ Dh+ Ptm+
nig 2+ sicc 2+ strf 0 elas 0 lim 0

35-80 Orange-brown silty sand with gravel and shell fragments. Saturated sand from 65 cm.
Ga4 Ag++ Dh+ Ptm+ Gg(maj)+ Gg(min)+
nig 2 sicc 2/1 strf 0 elas 0 lim 0

80- Gravel.

RH2.12 4.40 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH2.13 3.54 m OD
0-10 Dark brown sand with modern rootlets.
$Th^0$2 Ag1 As1
nig 3 sicc 3 strf 0 elas 0

10-20 Brown sand.
Ga4
nig 2 sicc 3 strf 0 elas 0 lim 0

20- Gravel.

RH2.14 4.24 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH2.15 3.30 m OD
0-10 Dark brown clayey silt with modern rootlets.
Th2 Ag1 As1 Ga+ Ptm+ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-30 Brown clayey silt with shell fragments.
Ag3 As1 Ga+++ Ptm+ Dh+
nig 2 sicc 3 strf 0 elas 0 lim 0

30- Gravel.

RH2.16 4.44 m OD
0-12 Dark brown sand with modern rootlets.
$Th^0$2 Ga2
nig 3 sicc 3 strf 0 elas 0

12- Gravel.

RH2.17 3.17 m OD
0-10 Dark red-brown clayey silt with modern rootlets.
$TH^0$2 Ag1 As1 Ga+ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-46 Brown laminated clayey silt.
Ag2 As2 Ga++/+++
nig 3 sicc 2+ strf 0/1 elas 0 lim 0

46-76 Orange silty sand, saturated with shells fragments and occasional gravel near base.
Ga4 Ag+++ Gg(maj)+ Ptm+
nig 2 sicc 2+ strf 0+ elas 0 lim 0

76- Gravel.

RH2.18 2.71 m OD
0-10 Dark red-brown silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-88 Brown very stiff clay with sand lenses below 30 cm.
As2 Ag2 Ga++
nig 2 sicc 3 strf 0/1 elas 0 lim 0

88-174 Orange-brown saturated sand – not recovered.

174- Gravel.

RH2.19 2.90 m OD
0-10 Dark red-brown silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-145 Brown sandy silty clay. Below 65 cm well laminated and with an increasing sand content.
Ag2 As2 Ga++/+++ Lf+
nig 2 sicc 2 strf 0/2 elas 0 lim 0

145-210 Dark grey well laminated sandy silt
Ag3 Ga1
nig 3 sicc 2 strf 2 elas 0 lim 0

210-265 Grey saturated silty sand. Upper contact sharp.

Ga4
nig 2 sicc 2/1 strf 0 elas 0 lim 1

5.3. Transect 3

RH3.1 2.54 m OD
0-10 Dark brown sandy silt with modern rootlets.
$Th^0$1 Ag2 Ga1 Gg(min)+ Sh+
nig 3 sicc 3 strf 0 elas 0

10- Gravel.

RH3.2 2.82 m OD
0-10 Dark brown silty clay with modern rootlets.
$Th^0$2 Ag1 As1Ga+++ Sh+ Ptm+
nig 3 sicc 3 strf 0 elas 0

10-70 Brown sandy clayey silt. Sand lenses below 35 cm.
Ag2 As1 Ga1 Dh++ Ptm+
nig 2 sicc 3 strf 0+ elas 0 lim0

70-88 Brown laminated sandy silt.
Ag2 Ga2 Ptm+
nig 2 sicc 2 strf 1 elas 0 lim0

88-114 Brown well laminated silty sand
Ga3 Ag1 Ptm+ Lf+
nig 2 sicc 2 strf 2 elas 0 lim 0

114-136. Black laminated silty sand.
Ag2 Ga2 Ptm+
nig 4 sicc 2 strf 2+ elas 0

136-178 Grey saturated sands. Not recovered.

178- Gravel.

RH3.3 3.11 m OD
0-10 Dark brown silty clay with modern rootlets.
$Th^0$2 Ag1 As1Ga+++ Sh+ Ptm+
nig 3 sicc 3 strf 0 elas 0

10-60 Brown sandy clayey silt.
Ag2 As1 Ga1 Dh++ Ptm+
nig 2 sicc 3 strf 0+ elas 0 lim0

60-75 Brown laminated sandy silt
Ag2 Ga2 Gg(min)+
nig 2 sicc 2 strf 2/3 elas 0 lim0

75-94 Brown laminated silty sand.
Ag1 Ga3 Ptm+
nig 2 sicc 2 strf 2/3 elas 0 lim0

94-205 Grey silty sand.
Ga4 Ag+++
nig 3 sicc 2/1 strf 0 elas 0 lim 0

Impenetrable below 205 cm, gravel not proved.

RH3.4 4.11 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH3.5 3.19 m OD
0-10 Dark brown silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+++ Dh+
nig 3 sicc 3 strf 0 elas 0

10-48 Brown sandy clayey silt.
Ag2 As1 Ga1 Dh+
nig 2 sicc 3 strf 0 elas 0 lim0

48-61 Orange sand with shell fragments.
Ga4 Ptm+ Ag+
nig 2 sicc 2 strf 0 elas 0 lim0

61-Gravel.

RH3.6 4.19 m OD
0-8 Brown sand with modern rootlets.
$Th^0$2 Ga2 Sh+
nig 3 sicc 3 strf elas 0

8- Gravel.

RH3.7 3.28 m OD
0-10 Dark red-brown sandy silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+++ Sh+ Gg(maj)+
nig 3 sicc 3 strf 0 elas 0

10-38 Brown sandy clayey silt.
Ag3 As1 Ga+++ Dh+
nig 3 sicc 3 strf 0 elas 0 lim0

38-43 Orange-brown silty sand with gravel.
Ga4 Ag+ Gg(maj)+ Dh+
nig 3 sicc 2 strf 0 elas 0 lim0

43-Gravel.

RH3.8 3.92 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH3.9 3.09 m OD
0-10 Dark red-brown sandy silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+++ Sh+
nig 3 sicc 3 strf 0 elas 0

10-30 Brown sandy clayey silt.

Ag3 As1 Ga+++ Dh+
nig 3 sicc 3 strf 0 elas 0 lim0

30-40 Brown saturated sand.
Ga4?
nig 2 sicc 1 strf 0 elas 0 lim0

40-Gravel.

RH3.10 4.24 m OD
Thin (< 10 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH3.11 3.48 m OD
0-23 Dark red-brown sandy silty clay with modern rootlets.
$Th^0$2 Ag1 As1 Ga+++ Sh+
nig 3 sicc 3 strf 0 elas 0

23-54 Orange silty sand with occasional gravel.
Ga4 Gg(maj)+ Gg(min)+ Ag+ Dh+
nig 2 sicc 2 strf 0 elas 0 lim0

54-Gravel.

RH3.12 3.50 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH3.13 3.42 m OD
0-10 Dark brown sand with modern rootlets.
$Th^0$2 Ga2 Ag++ Gg(Maj)+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-34 Dark brown silty sand with occasional gravel.
Ga4 Ag++ Gg(maj)+ Gg(min)+ Dh+ Sh+
nig 3 sicc 3 strf 0 elas 0 lim0

34-Gravel.

RH3.14 4.40 m OD
Very thin (< 5 cm) dark brown very sandy soil over gravel
$Th^0$2 Ga2 Ag++ Sh++

RH3.15 4.06 m OD
Very thin (< 15 cm) dark brown very sandy soil over gravel
$Th^0$2 Ga2 Ag++ Sh++

RH3.16 3.59 m OD
Very thin (< 15 cm) dark brown very sandy soil over gravel
$Th^0$2 Ga2 Ag++ Sh++

RH3.17 4.07 m OD
Very thin (< 10 cm) dark brown very sandy soil over gravel
$Th^0$2 Ga2 Ag++ Sh++

RH3.18 2.89 m OD
0-10 Dark brown silt with modern rootlets.
$Th^0$2 Ag2 As++ Ga+ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-53 Dark brown stiff sandy clayey silt with occasional laminations.
Ag3 As1 Ga+/++ Ptm+ Dh+
nig 3 sicc 2 strf 0/1 elas 0 lim0

53-74 Light brown laminated silty sand.
Ga3 Ag1 Ptm+
nig 2 sicc 2+ strf 2+ elas 0 lim0

74-117 Orange sand with silt lenses.
Ga4 Ptm++ Ag+
nig 2 sicc 2+ strf 0+ elas 0 lim0

117- Orange saturated sand with gravel.

RH3.19 3.24 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^0$3 Ag1 Ga+++ Sh++

RH3.20 2.92 m OD
0-10 Dark brown silt with modern rootlets.
$Th^0$2 Ag2 As++ Ga+ Sh+
nig 3 sicc 2+ strf 0 elas 0

10-37 Brown sandy clayey silt with shell fragments.
Ag3 As1 Ga+ Ptm+ Dh+
nig 2 sicc 2+ strf 0 elas 0 lim0

37- Gravel.

RH3.21 2.98 m OD
0-10 Dark brown silt with modern rootlets.
$Th^0$2 Ag2 As++ Ga+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-135 Dark brown stiff sandy clayey silt increasingly sandy and well laminated with depth.
Ag3 As1 Ga+/++ Ptm+ Dh+
nig 2 sicc 3 strf 0/3 elas 0 lim0

135-160 Grey coarsely laminated sandy silt with occasional gravel towards base.
Ga2 Ag2 Ptm+ Gg(min)+
nig 3/4 sicc 2+ strf 2+ elas 0 lim0

160-203 Grey saturated sand – not recovered.

203- Gravel.

5.4. Transect 4

RH4.1 3.13 m OD
0-10 Dark brown silt with modern rootlets.
$Th^{0}2$ Ag2 Ga+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-70 Light brown stiff sandy clayey silt increasingly sandy and laminated below 45 cm.
Ag3 As1 Ga+/++ Dh+ Dl+
nig 2 sicc 3 strf 0/1 elas 0 lim0

70-124 Brown laminated sandy silt.
Ag3 Ga1
nig 2 sicc 2 strf 2/3 elas 0 lim0

124-170 Dark grey laminated sandy silt.
Ag2 Ga2
nig 3 sicc 2 strf 3/4 elas 0 lim0

170-190 Light brown sand with silt lenses.
Ga4 Ag+
nig 3 sicc 2/1 strf 1 elas 0 lim0

190- Light brown saturated sand, gravel not proved

RH4.2 2.78 m OD
0-13 Dark brown silt with modern rootlets.
$Th^{0}2$ Ag2 As+ Ga+
nig 3 sicc 3 strf 0 elas 0

13-40 Dark brown stiff sandy clay silt with sand increasing and becoming poorly laminated with depth.
Ag3 As1 Ga+/++ Dh+
nig 3 sicc 3 strf 0/1 elas 0 lim0

40- Gravel.

RH4.3 2.79 m OD
0-10 Dark brown clayey silt with modern rootlets and shell fragments.
$Th^{0}2$ Ag1 As1 Ga+ Ptm+
nig 3 sicc 3 strf 0 elas 0

10-25 Dark brown clayey silt with shell fragments.
Th^{01} Ag2 As1 Ga+ Ptm+
nig 3 sicc 3 strf 0 elas 0 lim 0

25-45 Dark brown stiff sandy clayey silt with irregular sand lenses.
Ag3 As1 Ga++ Dh+
nig 2 sicc 2+ strf 0/1 elas 0 lim 0

45-97 Dark brown stiff silt with irregular sand lenses.
Ag4 Ga+
nig 2 sicc 2+ strf 0+ elas 0

97-148 Grey saturated sand – not recovered

148- Gravel.

RH4.4 3.40 m OD
0-15 Dark brown sandy silt with modern rootlets and minor gravel.
$Th^{0}2$ Ag1 Ga1 Gg(min)+
nig 3 sicc 3 strf 0 elas 0

15-25 Dark red-brown sandy silt. with gravel
Ag2 Ga1 Gg(min)1 Dh+
nig 3 sicc 3 strf 0 elas 0 lim 0

25- Gravel.

RH4.5 3.33 m OD
0-10 Dark brown sandy silt with modern rootlets and minor gravel.
$Th^{0}2$ Ag1 Ga1 Gg(min)+ Sh++
nig 3 sicc 3 strf 0 elas 0

10-30 Dark brown sandy silt with occasional gravel and shell fragments.
Ag2 Ga2 Gg(min)+ Ptm+ Dh+
nig 3 sicc 3 strf 0 elas 0 lim 0

30-41 Orange sand with occasional gravel and shell fragments.
Ga4 Ptm+ Ag+ Lf+ Gg(min)+
nig 2 sicc 2 strf 0 elas 0 lim 0

41- Gravel.

RH4.6 4.10 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ag1 Ga1 Sh++

RH4.7 3.67 m OD
0-40 Dark brown sandy silt with gravel and modern rootlets.
$Th^{0}2$ Ag1 Ga1 Sh++ Gg(min)+
nig 3 sicc 3 strf 0 elas 0

40- Gravel.

RH4.8 4.47 m OD
Thin (< 10 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ag1 Ga1 Sh++ Gg(min)+

RH4.9 4.08 m OD
0-10 Dark red brown silty sand with shell fragments and modern rootlets.
$Th^{0}2$ Ga2 Ptm++ Ag+ Sh++
nig 3 sicc 3 strf 0 elas 0

10-40 Orange sand with shell fragments and occasional gravel.
Ga4 Ptm++ Ag+ Dh+ Gg(min)+
nig 2 sicc 3 strf 0 elas 0 lim 0

40- Gravel.

RH4.10 4.06 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ga2 Sh+

RH4.11 3.89 m OD
0-10 Dark brown sand with modern rootlets.
$Th^{0}2$ Ga2 Sh+
nig 3 sicc 3 strf 0 elas 0

10-40 Orange sand with shell fragments and occasional gravel.
Ga4 Dh+ Ptm+ Ag+ Gg(min)+
nig 2 sicc 2+ strf 0 elas 0 lim 0

40- Gravel.

RH4.12 4.00 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ga2 Sh+

RH4.13 3.31 m OD
0-10 Dark brown sand with modern rootlets.
$Th^{0}2$ Ga2 Sh+
nig 3 sicc 3 strf 0 elas 0

10-21 Orange sand with shell fragments and occasional gravel.
Ga4 Dh+ Ptm+ Ag+ Gg(min)+
nig 2 sicc 2+ strf 0 elas 0 lim 0

21- Gravel.

RH4.14 3.55 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ga2 Sh+

RH4.15 4.43 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ga2 Sh+

RH4.16 2.83 m OD
0-15 Dark brown sandy silt with shell fragments and modern rootlets.
$Th^{0}2$ Ag1 Ga1 Ptm+
nig 3 sicc 3 strf 0 elas 0

15-20 Brown sandy clayey silt with shell fragments and occasional gravel.
Ag2 As1 Ga1 Gg(min)+ Dh+ Ptm+
nig 2 sicc 2 strf 0 elas 0 lim 0

20- Gravel.

RH4.17 3.71 m OD
Thin (< 5 cm) dark brown sandy soil over gravel
$Th^{0}2$ Ag1 Ga1 Sh++

RH4.18 Not Recorded

RH4.19 3.38 m OD
Gravel at surface
Gg(maj) 4

RH4.20 2.92 m OD
0-10 Dark brown clayey silt with modern rootlets and shell fragments.
$Th^{0}2$ Ag1 As1 Ga+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-125 Dark brown stiff sandy clayey silt with increasing sand and laminated below 40 cm.
Ag3 As1 Ga++ Dh+
nig 2 sicc 3 strf 0/1/2 elas 0 lim 0

125-141 Black silt with occasional sand lenses.
Ag4 As+ Ga+
nig 4 sicc 2 strf 0+ elas 0 lim 0

141-146 Grey saturated sand with sharp upper contact.
Ga4 Ag++
nig 3 sicc 1 strf 0 elas 0 lim 1

146- Gravel.

RH4.21 2.73 m OD
0-10 Dark brown clayey silt with modern rootlets and shell fragments.
$Th^{0}2$ Ag1 As1 Ga+ Sh+
nig 3 sicc 3 strf 0 elas 0

10-70 Light brown stiff sandy clayey silt.
Ag3 As1 Ptm+ Ga+ Dh+
nig 2 sicc 3 strf 0+ elas 0 lim 0

70-117 Light brown laminated sandy clay silt.
Ag3 As1 Ga+++ Ptm+ Lf+
nig 2 sicc 2 strf 2+ elas 0 lim 0

117-137 Black well laminated sandy clay silt
Ag3 As1 Ga+++ Ptm+ Lf+
nig 4 sicc 2 strf 3 elas 0 lim 0

137-148 Black silt with occasional sand lenses.
Ag4 Ga+
nig 4 sicc 2 strf 0+ elas 0 lim 0

148-271 Dark grey saturated silty sand with shell fragments. Upper contact sharp.
Ga4 Ag+ Ptm+
nig 3 sicc 1 strf 0 elas 0 lim 1

271- Gravel.

5.5. Transect 5

RH5.1 4.31 m OD
0-20 Light brown silty sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

20- Gravel.

RH5.2 4.26 m OD
0-12 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

12-32 Light brown silty sand.
Ga4 Sh+ Ag+
nig 2 sicc 2 strf 0 elas 0 lim 0

32- Gravel.

RH5.3 4.05 m OD
0-12 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

12-40 Orange brown silty sand.
Ga4 Sh+ Ag+
nig 2 sicc 2 strf 0 elas 0 lim 0

40- Gravel.

RH5.4 4.29 m OD
0-15 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

15-50 Orange brown silty sand with gravel.
Ga4 Dh+ Ag+ Gg(min)+ Lf+
nig 2 sicc 3 strf 0 elas 0 lim 0

50- Gravel.

RH5.5 4.54 m OD
0-15 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+ Lc+
nig 3 sicc 3 strf 0 elas 0

15- Gravel.

RH5.6 3.75 m OD
0-15 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

15- Gravel.

RH5.7 4.60 m OD
0-15 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

15- Gravel.

RH5.8 4.28 m OD
0-8 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+
nig 3 sicc 3 strf 0 elas 0

8- Gravel.

RH5.9 3.53 m OD
0-17 Light brown sandy silt with modern rootlets
$Th^0$1 Ag1 Ga1
nig 3 sicc 3 strf 0 elas 0

17- Gravel.

RH5.10 3.36 m OD
0-8 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+ Lc+
nig 3 sicc 3 strf 0 elas 0

8- Gravel.

RH5.11 4.31 m OD
0-8 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+ Lc+
nig 3 sicc 3 strf 0 elas 0

8- Gravel.

RH5.12 3.25 m OD
0-15 Dark brown sandy silt with modern rootlets
$Th^0$1 Ga1 Ag2
nig 3 sicc 3 strf 0 elas 0

15-20 Dark brown sandy silt.
Ag3 Ga1
nig 3 sicc 3 strf 0 elas 0 lim 0

20- Gravel.

RH5.13 3.23 m OD
0-6 Light brown sand with modern rootlets
$Th^0$2 Ga1 Sh1 Ag+ Lc+
nig 3 sicc 3 strf 0 elas 0

6- Gravel.

RH5.14 3.95 m OD

0-15 Dark brown sandy silt with modern rootlets
$Th^0$1 Ag3 Ga++
nig 3 sicc 3 strf 0 elas 0

15-20 Dark brown silt.
Ag4 Dh++ Ga++

20- Gravel.

RH5.15 N/R
0-15 Dark brown sandy silt with shell fragments and modern rootlets
$Th^0$1 Ag3 Ga++ Ptm+
nig 3 sicc 3 strf 0 elas 0

15-36 Light brown sandy silt.
Ag3 Ga1 Dh+
nig 2 sicc 3 strf 0 elas 0 lim 0

36- Gravel.

RH5.16 N/R
Gravel at surface

RH5.17 N/R
Gravel at surface

RH5.18 4.35 m OD
Gravel at surface

RH5.19 3.02 m OD
0-15 Dark brown sandy silt with modern rootlets
$Th^0$1 Ag3 Ga++
nig 3 sicc 3 strf 0 elas 0

15-50 Brown silt with occasional sand lenses.
Ag4 Dh+ Ga++
nig 2 sicc 2 strf 0+ elas 0 lim 0

50-54 Brown sandy silt with occasional gravel.
Ag2 Ga2 Gg(min)+
nig 2 sicc 2 strf 0 elas 0 lim 0

54- Gravel.

RH5.20 2.71 m OD
0-10 Dark brown sandy clayey silt with modern rootlets.
$Th^0$2 Ag2 As+ Ga+
nig 3 sicc 3 strf 0 elas 0

10-73 Dark brown clayey silt with sand lenses.
Ag3 As1Dh+ Ga+ Lc+
nig 2 sicc 3 strf 0/1 elas 0 lim 0

73-81 Brown very well laminated sandy silt. Upper contact sharp.
As3 Ga1
nig 2 sicc 2 strf 4 elas 0 lim 1

81-90 Brown clayey silt.
Ag3 As1 Ga+
nig 2 sicc 2 strf 0+ elas 0 lim 0

90-105 Grey silty sand. Sharp upper contact.
Ga3 Ag1 Ptm+
nig 2+ sicc 2 strf 0 elas 0 lim 1

105- Gravel.

RH5.21 2.83 m OD
0-10 Dark brown sandy clayey silt with modern rootlets.
$Th^0$2 Ag2 As+ Ga+
nig 3 sicc 3 strf 0 elas 0

10-40 Dark brown stiff clay silt with minor sand lenses
Ag3 As1 Ga+ Dh+
nig 2 sicc 3 strf 0+ elas 0 lim 0

40-129 Dark brown well laminated sandy silt. Sand content increases and laminations more clearly defined with depth.
Ag4 Ga++/+++ Ptm+ Lf+
nig 2 sicc 3 strf 2/3/4 elas 0 lim 0

129-141 Grey laminated silty sand with shell fragments.
Ga2 Ag2 Ptm+
nig 2+ sicc 2 strf 3 elas 0 lim 0

141-200 Black laminated sandy silt.
Ag3 Ga1
nig 4 sicc 2 strf 2 elas 0 lim 0

200-260 Grey saturated sand - not recovered.

260- Gravel.

6. Appendix II: Particle size data RH2.4 and RH2.6

Sample core RH2.6

Sample ID:	RH2.6_1	RH2.6_2	RH2.6_3	RH2.6_4	RH2.6_5	RH2.6_6	RH2.6_7	RH2.6_8	RH2.6_9
Depth (cm)	0	5	10	15	18	21	24	27	30
Elevation (m OD)	3.428	3.378	3.328	3.278	3.248	3.218	3.188	3.158	3.128
Mean:	131	139.2	138.9	121.1	122.9	126.2	188.3	188.3	202.5
Median:	66.4	76.73	71.03	41.97	45.77	46.03	211	214	230.6
Mode:	263.3	263.3	263.3	288.4	288.4	288.4	288.4	288.4	288.4
S.D.:	133.2	137.9	139.4	136.2	136.9	139	144.6	146.2	145.6
Skewness:	0.881	0.801	0.776	0.949	0.992	0.922	0.172	0.141	0.00697
Kurtosis:	-0.32	-0.431	-0.543	-0.326	-0.173	-0.359	-1.117	-1.167	-1.123
Particle Diameter um	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %
0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01
0.11	0.02	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.01
0.12	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02
0.131	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
0.144	0.03	0.03	0.03	0.04	0.04	0.04	0.02	0.03	0.02
0.158	0.04	0.04	0.04	0.05	0.04	0.05	0.03	0.03	0.02
0.173	0.04	0.04	0.04	0.05	0.05	0.05	0.03	0.04	0.03
0.189	0.05	0.05	0.05	0.06	0.06	0.06	0.03	0.04	0.03
0.207	0.05	0.05	0.05	0.07	0.06	0.06	0.04	0.04	0.03
0.227	0.05	0.05	0.06	0.07	0.07	0.07	0.04	0.05	0.04
0.249	0.06	0.06	0.06	0.08	0.07	0.07	0.04	0.05	0.04
0.272	0.06	0.06	0.06	0.08	0.07	0.08	0.05	0.05	0.04
0.298	0.07	0.07	0.07	0.09	0.08	0.08	0.05	0.06	0.05
0.327	0.07	0.07	0.07	0.09	0.08	0.09	0.05	0.06	0.05
0.358	0.07	0.07	0.07	0.10	0.09	0.09	0.05	0.06	0.05
0.392	0.07	0.08	0.08	0.10	0.09	0.09	0.06	0.07	0.05
0.429	0.08	0.08	0.08	0.11	0.09	0.10	0.06	0.07	0.05
0.47	0.08	0.08	0.08	0.11	0.09	0.10	0.06	0.07	0.06
0.515	0.08	0.08	0.09	0.12	0.10	0.10	0.06	0.07	0.06
0.564	0.08	0.09	0.09	0.12	0.10	0.11	0.06	0.08	0.06
0.618	0.08	0.09	0.09	0.13	0.10	0.11	0.07	0.08	0.06
0.677	0.09	0.09	0.10	0.14	0.11	0.11	0.07	0.08	0.07
0.741	0.09	0.10	0.10	0.15	0.11	0.12	0.07	0.09	0.07
0.812	0.09	0.11	0.11	0.16	0.12	0.13	0.08	0.09	0.08
0.889	0.10	0.11	0.12	0.17	0.13	0.14	0.08	0.10	0.08
0.974	0.11	0.12	0.13	0.18	0.14	0.15	0.09	0.11	0.09

Sample ID:	RH2.6_1	RH2.6_2	RH2.6_3	RH2.6_4	RH2.6_5	RH2.6_6	RH2.6_7	RH2.6_8	RH2.6_9
Depth (cm)	0	5	10	15	18	21	24	27	30
Elevation (m OD)	3.428	3.378	3.328	3.278	3.248	3.218	3.188	3.158	3.128
1.067	0.11	0.13	0.14	0.20	0.15	0.16	0.09	0.11	0.10
1.168	0.12	0.14	0.15	0.22	0.17	0.17	0.10	0.12	0.10
1.28	0.13	0.16	0.17	0.24	0.18	0.19	0.11	0.13	0.12
1.402	0.15	0.17	0.18	0.27	0.21	0.21	0.12	0.15	0.13
1.536	0.17	0.20	0.21	0.31	0.23	0.24	0.14	0.17	0.14
1.682	0.19	0.22	0.24	0.35	0.27	0.27	0.16	0.19	0.16
1.842	0.22	0.25	0.27	0.39	0.31	0.31	0.18	0.22	0.19
2.018	0.25	0.29	0.31	0.45	0.35	0.36	0.20	0.25	0.21
2.21	0.29	0.33	0.36	0.51	0.40	0.41	0.23	0.28	0.24
2.421	0.34	0.38	0.41	0.57	0.46	0.47	0.26	0.32	0.27
2.652	0.38	0.43	0.46	0.65	0.53	0.54	0.30	0.36	0.31
2.905	0.44	0.48	0.52	0.72	0.59	0.61	0.34	0.41	0.35
3.181	0.49	0.54	0.58	0.80	0.66	0.68	0.38	0.46	0.39
3.485	0.55	0.59	0.64	0.88	0.74	0.75	0.42	0.51	0.43
3.817	0.61	0.65	0.71	0.96	0.81	0.83	0.47	0.55	0.48
4.181	0.67	0.71	0.77	1.03	0.88	0.90	0.51	0.60	0.52
4.579	0.72	0.76	0.83	1.10	0.95	0.97	0.55	0.65	0.56
5.016	0.78	0.81	0.88	1.16	1.01	1.04	0.59	0.69	0.59
5.494	0.83	0.86	0.93	1.22	1.08	1.10	0.63	0.73	0.63
6.017	0.89	0.91	0.99	1.28	1.15	1.17	0.67	0.78	0.67
6.591	0.96	0.98	1.05	1.36	1.23	1.25	0.72	0.83	0.72
7.219	1.04	1.05	1.13	1.44	1.32	1.34	0.78	0.89	0.77
7.907	1.13	1.13	1.21	1.53	1.42	1.44	0.83	0.95	0.82
8.661	1.22	1.20	1.29	1.61	1.51	1.54	0.89	1.00	0.87
9.487	1.30	1.27	1.36	1.68	1.60	1.62	0.95	1.05	0.92
10.39	1.38	1.33	1.41	1.73	1.68	1.69	0.99	1.09	0.96
11.38	1.44	1.38	1.46	1.76	1.73	1.75	1.03	1.11	0.98
12.47	1.50	1.41	1.49	1.77	1.77	1.78	1.05	1.12	0.99
13.65	1.55	1.44	1.51	1.77	1.80	1.80	1.07	1.12	1.00
14.96	1.59	1.46	1.52	1.75	1.81	1.81	1.08	1.12	1.00
16.38	1.63	1.48	1.53	1.74	1.82	1.81	1.09	1.11	1.00
17.94	1.67	1.51	1.55	1.74	1.84	1.81	1.11	1.10	1.00
19.65	1.72	1.54	1.58	1.75	1.86	1.82	1.13	1.11	1.01
21.53	1.77	1.59	1.61	1.76	1.88	1.84	1.15	1.11	1.02
23.58	1.82	1.63	1.66	1.78	1.91	1.86	1.18	1.13	1.04
25.83	1.87	1.68	1.69	1.79	1.94	1.88	1.20	1.14	1.06
28.29	1.90	1.71	1.72	1.79	1.95	1.89	1.22	1.14	1.06
30.99	1.92	1.73	1.72	1.76	1.93	1.87	1.23	1.13	1.05
33.94	1.90	1.72	1.70	1.71	1.89	1.83	1.21	1.10	1.02
37.17	1.86	1.69	1.65	1.62	1.82	1.75	1.18	1.05	0.97
40.72	1.80	1.63	1.58	1.51	1.72	1.64	1.13	0.98	0.91
44.6	1.72	1.56	1.50	1.38	1.60	1.51	1.07	0.91	0.84

Sample ID:	RH2.6_1	RH2.6_2	RH2.6_3	RH2.6_4	RH2.6_5	RH2.6_6	RH2.6_7	RH2.6_8	RH2.6_9
Depth (cm)	0	5	10	15	18	21	24	27	30
Elevation (m OD)	3.428	3.378	3.328	3.278	3.248	3.218	3.188	3.158	3.128
48.85	1.64	1.49	1.42	1.27	1.49	1.39	1.02	0.86	0.79
53.51	1.59	1.44	1.36	1.18	1.39	1.29	0.98	0.82	0.75
58.61	1.57	1.42	1.34	1.14	1.33	1.22	0.97	0.80	0.74
64.2	1.57	1.43	1.34	1.13	1.30	1.19	0.97	0.81	0.75
70.32	1.58	1.44	1.33	1.12	1.26	1.16	0.96	0.80	0.74
77.02	1.54	1.42	1.29	1.09	1.20	1.10	0.90	0.76	0.69
84.36	1.45	1.34	1.19	0.99	1.08	0.98	0.78	0.64	0.58
92.4	1.31	1.22	1.05	0.84	0.92	0.82	0.61	0.47	0.39
101.2	1.16	1.09	0.91	0.70	0.77	0.66	0.44	0.29	0.18
110.9	1.05	1.02	0.82	0.60	0.67	0.56	0.34	0.20	0.08
121.4	1.05	1.04	0.83	0.60	0.68	0.55	0.37	0.22	0.08
133	1.17	1.19	0.98	0.73	0.80	0.68	0.57	0.41	0.25
145.7	1.44	1.49	1.28	1.00	1.06	0.95	1.03	0.87	0.72
159.6	1.85	1.93	1.76	1.43	1.47	1.39	1.79	1.67	1.60
174.8	2.39	2.51	2.37	2.00	2.01	1.97	2.83	2.75	2.77
191.4	3.01	3.15	3.08	2.65	2.61	2.65	4.06	4.03	4.17
209.7	3.60	3.79	3.77	3.30	3.21	3.33	5.31	5.33	5.62
229.7	4.07	4.29	4.33	3.84	3.70	3.89	6.37	6.45	6.89
251.6	4.31	4.56	4.65	4.15	3.98	4.23	7.04	7.16	7.74
275.5	4.25	4.52	4.65	4.15	3.99	4.28	7.18	7.32	7.98
301.8	3.89	4.17	4.32	3.85	3.73	4.00	6.77	6.91	7.59
330.6	3.29	3.57	3.71	3.29	3.23	3.45	5.88	6.01	6.65
362.1	2.56	2.82	2.94	2.58	2.58	2.75	4.67	4.77	5.31
396.6	1.82	2.06	2.13	1.84	1.90	1.99	3.35	3.42	3.83
434.4	1.17	1.37	1.40	1.16	1.26	1.30	2.12	2.15	2.42
475.8	0.65	0.81	0.81	0.62	0.74	0.74	1.11	1.11	1.26
521.2	0.29	0.40	0.38	0.26	0.35	0.34	0.44	0.42	0.49
570.9	0.09	0.14	0.12	0.07	0.12	0.11	0.11	0.10	0.12
625.3	0.01	0.03	0.02	0.01	0.02	0.02	0.01	0.01	0.01
684.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
821.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand %	50.57	52.80	51.46	44.00	44.64	45.09	66.01	65.08	68.91
Silt %	48.70	46.43	47.78	55.02	54.46	53.98	33.41	34.29	30.56
Clay %	0.75	0.76	0.77	0.99	0.90	0.94	0.55	0.66	0.51

Sample core RH2.4

Sample ID:	T2.4_1	T2.4_2	T2.4_3	T2.4_4	T2.4_5	T2.4_6	T2.4_7	T2.4_8	T2.4_9	T2.4_10
True depth (cm)	**0**	**10**	**13**	**15**	**18**	**21**	**23**	**26**	**29**	**32**
Elevation (m OD)	**3.42**	**3.32**	**3.30**	**3.27**	**3.24**	**3.22**	**3.19**	**3.16**	**3.13**	**3.11**
Mean:	87.07	51.07	47.53	48.35	37.81	49.72	56.3	52.91	47.23	45.97
Median:	38.55	17.96	14.96	16.01	12.69	13	18.11	14.97	12.99	12.67
Mode:	80.61	10.88	10.88	10.88	9.929	9.929	10.88	9.929	9.929	9.929
S.D.:	130.8	78.94	90.7	77.37	63.97	99.92	96.86	102.5	96.48	92.66
Skewness:	3.182	2.386	4.392	2.443	2.881	4.168	3.609	4.145	4.459	4.47
Kurtosis:	12.31	5.445	26.89	5.664	8.675	22.92	18.65	22.72	26.39	27.26
Particle	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.
Diameter	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%	%	%	%	%	%
0.1	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.05
0.11	0.02	0.04	0.04	0.04	0.05	0.06	0.04	0.05	0.06	0.06
0.12	0.03	0.04	0.04	0.04	0.06	0.06	0.04	0.05	0.06	0.06
0.131	0.03	0.05	0.05	0.05	0.07	0.08	0.05	0.06	0.08	0.08
0.144	0.04	0.06	0.06	0.06	0.08	0.09	0.06	0.08	0.09	0.09
0.158	0.04	0.07	0.07	0.07	0.10	0.11	0.07	0.09	0.11	0.11
0.173	0.05	0.08	0.08	0.08	0.11	0.12	0.08	0.10	0.12	0.13
0.189	0.05	0.09	0.09	0.09	0.13	0.14	0.09	0.12	0.14	0.14
0.207	0.06	0.10	0.10	0.10	0.14	0.16	0.10	0.13	0.15	0.16
0.227	0.06	0.11	0.11	0.11	0.16	0.18	0.11	0.15	0.17	0.18
0.249	0.07	0.11	0.12	0.12	0.17	0.19	0.12	0.16	0.19	0.20
0.272	0.07	0.12	0.13	0.13	0.19	0.21	0.13	0.17	0.21	0.22
0.298	0.07	0.13	0.14	0.14	0.20	0.23	0.13	0.19	0.22	0.24
0.327	0.08	0.13	0.15	0.14	0.22	0.25	0.14	0.20	0.24	0.26
0.358	0.08	0.14	0.15	0.15	0.24	0.28	0.15	0.22	0.26	0.29
0.392	0.08	0.15	0.16	0.16	0.26	0.30	0.16	0.23	0.28	0.31
0.429	0.08	0.15	0.17	0.17	0.28	0.32	0.16	0.25	0.30	0.33
0.47	0.09	0.16	0.18	0.18	0.30	0.35	0.17	0.27	0.32	0.36
0.515	0.09	0.17	0.19	0.19	0.33	0.38	0.18	0.29	0.35	0.39
0.564	0.09	0.17	0.21	0.20	0.35	0.41	0.19	0.31	0.38	0.43
0.618	0.09	0.18	0.22	0.21	0.38	0.44	0.20	0.33	0.40	0.46
0.677	0.10	0.19	0.24	0.23	0.41	0.48	0.22	0.36	0.43	0.50
0.741	0.10	0.21	0.26	0.25	0.45	0.52	0.23	0.39	0.47	0.55
0.812	0.11	0.23	0.29	0.28	0.50	0.57	0.26	0.43	0.51	0.60
0.889	0.12	0.25	0.32	0.31	0.54	0.61	0.28	0.46	0.56	0.64
0.974	0.13	0.28	0.36	0.34	0.59	0.66	0.31	0.50	0.60	0.69
1.067	0.14	0.31	0.40	0.38	0.64	0.71	0.34	0.54	0.64	0.74
1.168	0.16	0.35	0.45	0.42	0.68	0.76	0.38	0.58	0.69	0.79
1.28	0.18	0.39	0.50	0.47	0.74	0.80	0.42	0.63	0.74	0.84

Sample ID:	T2.4_1	T2.4_2	T2.4_3	T2.4_4	T2.4_5	T2.4_6	T2.4_7	T2.4_8	T2.4_9	T2.4_10
True depth (cm)	**0**	**10**	**13**	**15**	**18**	**21**	**23**	**26**	**29**	**32**
Elevation (m OD)	**3.42**	**3.32**	**3.30**	**3.27**	**3.24**	**3.22**	**3.19**	**3.16**	**3.13**	**3.11**
1.402	0.20	0.44	0.56	0.53	0.79	0.86	0.47	0.68	0.79	0.89
1.536	0.23	0.50	0.63	0.60	0.86	0.92	0.53	0.74	0.86	0.95
1.682	0.27	0.57	0.72	0.68	0.94	0.99	0.60	0.81	0.93	1.01
1.842	0.31	0.65	0.81	0.77	1.02	1.06	0.68	0.89	1.00	1.08
2.018	0.36	0.74	0.91	0.86	1.11	1.14	0.77	0.97	1.09	1.16
2.21	0.41	0.84	1.02	0.97	1.20	1.22	0.87	1.07	1.18	1.24
2.421	0.48	0.95	1.14	1.08	1.31	1.31	0.98	1.16	1.28	1.32
2.652	0.54	1.07	1.27	1.21	1.41	1.40	1.09	1.27	1.38	1.41
2.905	0.62	1.19	1.39	1.33	1.52	1.50	1.20	1.37	1.48	1.50
3.181	0.69	1.31	1.52	1.45	1.63	1.59	1.32	1.47	1.59	1.59
3.485	0.77	1.43	1.64	1.57	1.73	1.68	1.43	1.57	1.68	1.67
3.817	0.84	1.54	1.75	1.68	1.82	1.76	1.54	1.67	1.78	1.75
4.181	0.92	1.64	1.85	1.78	1.90	1.83	1.64	1.75	1.86	1.82
4.579	0.99	1.74	1.93	1.86	1.97	1.88	1.72	1.82	1.92	1.88
5.016	1.05	1.81	2.00	1.93	2.02	1.92	1.80	1.88	1.97	1.92
5.494	1.12	1.89	2.06	1.99	2.06	1.95	1.86	1.93	2.01	1.95
6.017	1.19	1.96	2.12	2.06	2.10	1.98	1.93	1.98	2.05	1.98
6.591	1.27	2.04	2.19	2.13	2.15	2.02	2.01	2.04	2.10	2.02
7.219	1.36	2.14	2.27	2.21	2.21	2.06	2.09	2.10	2.15	2.06
7.907	1.46	2.24	2.35	2.29	2.26	2.10	2.18	2.17	2.20	2.10
8.661	1.56	2.32	2.42	2.36	2.30	2.13	2.26	2.22	2.24	2.13
9.487	1.65	2.38	2.45	2.40	2.31	2.13	2.31	2.25	2.25	2.14
10.39	1.72	2.41	2.46	2.41	2.29	2.10	2.33	2.25	2.24	2.12
11.38	1.78	2.41	2.43	2.39	2.25	2.06	2.33	2.22	2.19	2.07
12.47	1.83	2.38	2.39	2.34	2.20	2.00	2.30	2.18	2.14	2.02
13.65	1.86	2.34	2.33	2.29	2.15	1.95	2.26	2.13	2.08	1.97
14.96	1.89	2.30	2.26	2.24	2.10	1.91	2.22	2.08	2.03	1.92
16.38	1.92	2.26	2.22	2.20	2.08	1.88	2.18	2.05	2.00	1.90
17.94	1.96	2.24	2.19	2.18	2.08	1.89	2.17	2.03	2.00	1.90
19.65	2.01	2.24	2.19	2.19	2.10	1.91	2.17	2.04	2.01	1.92
21.53	2.08	2.26	2.21	2.21	2.13	1.94	2.19	2.06	2.03	1.95
23.58	2.16	2.29	2.24	2.24	2.16	1.98	2.22	2.09	2.06	1.99
25.83	2.24	2.31	2.25	2.26	2.18	2.01	2.24	2.10	2.07	2.02
28.29	2.31	2.32	2.24	2.25	2.18	2.02	2.23	2.10	2.07	2.04
30.99	2.36	2.29	2.20	2.21	2.14	2.01	2.20	2.07	2.05	2.04
33.94	2.38	2.23	2.12	2.14	2.07	1.98	2.13	2.01	2.00	2.00
37.17	2.38	2.13	2.01	2.03	1.96	1.90	2.03	1.92	1.91	1.93
40.72	2.35	1.99	1.86	1.88	1.80	1.78	1.90	1.78	1.78	1.80
44.6	2.30	1.83	1.69	1.71	1.61	1.62	1.75	1.62	1.62	1.65
48.85	2.26	1.67	1.52	1.53	1.42	1.45	1.60	1.46	1.44	1.48
53.51	2.24	1.54	1.38	1.39	1.27	1.31	1.47	1.33	1.29	1.33
58.61	2.26	1.46	1.30	1.30	1.19	1.21	1.40	1.26	1.19	1.24

Sample ID:	T2.4_1	T2.4_2	T2.4_3	T2.4_4	T2.4_5	T2.4_6	T2.4_7	T2.4_8	T2.4_9	T2.4_10
True depth (cm)	**0**	**10**	**13**	**15**	**18**	**21**	**23**	**26**	**29**	**32**
Elevation (m OD)	**3.42**	**3.32**	**3.30**	**3.27**	**3.24**	**3.22**	**3.19**	**3.16**	**3.13**	**3.11**
64.2	2.31	1.43	1.26	1.26	1.16	1.17	1.38	1.23	1.15	1.20
70.32	2.37	1.41	1.24	1.23	1.17	1.15	1.37	1.22	1.12	1.18
77.02	2.39	1.35	1.19	1.18	1.14	1.09	1.33	1.18	1.07	1.13
84.36	2.35	1.24	1.08	1.08	1.05	0.98	1.24	1.09	0.96	1.02
92.4	2.25	1.07	0.94	0.94	0.90	0.82	1.10	0.96	0.79	0.85
101.2	2.12	0.91	0.80	0.80	0.75	0.66	0.96	0.83	0.64	0.69
110.9	1.99	0.80	0.70	0.71	0.66	0.56	0.87	0.74	0.54	0.59
121.4	1.89	0.75	0.68	0.69	0.63	0.55	0.84	0.74	0.53	0.57
133	1.82	0.79	0.71	0.74	0.66	0.61	0.89	0.80	0.59	0.62
145.7	1.76	0.87	0.78	0.84	0.72	0.72	0.98	0.89	0.69	0.71
159.6	1.70	0.99	0.86	0.96	0.78	0.84	1.10	0.99	0.81	0.82
174.8	1.64	1.11	0.93	1.08	0.82	0.95	1.21	1.08	0.91	0.90
191.4	1.57	1.22	0.98	1.18	0.84	1.03	1.29	1.13	0.99	0.96
209.7	1.50	1.29	1.00	1.25	0.84	1.08	1.34	1.15	1.03	0.98
229.7	1.40	1.31	0.98	1.26	0.82	1.08	1.33	1.12	1.03	0.97
251.6	1.27	1.25	0.92	1.20	0.77	1.03	1.24	1.04	0.96	0.91
275.5	1.12	1.11	0.80	1.07	0.67	0.91	1.09	0.90	0.84	0.80
301.8	0.93	0.90	0.64	0.87	0.53	0.74	0.87	0.72	0.66	0.64
330.6	0.75	0.66	0.46	0.64	0.37	0.54	0.64	0.51	0.46	0.46
362.1	0.58	0.43	0.29	0.41	0.20	0.36	0.41	0.33	0.28	0.29
396.6	0.45	0.23	0.16	0.20	0.07	0.21	0.24	0.19	0.14	0.16
434.4	0.36	0.10	0.08	0.07	0.01	0.12	0.12	0.10	0.07	0.08
475.8	0.31	0.03	0.04	0.01	0.00	0.07	0.06	0.07	0.04	0.04
521.2	0.30	0.00	0.03	0.00	0.00	0.07	0.04	0.06	0.04	0.03
570.9	0.31	0.00	0.04	0.00	0.00	0.08	0.04	0.08	0.07	0.05
625.3	0.36	0.00	0.07	0.00	0.00	0.12	0.08	0.13	0.11	0.08
684.9	0.41	0.00	0.12	0.00	0.00	0.16	0.12	0.18	0.16	0.13
750.2	0.44	0.00	0.16	0.00	0.00	0.20	0.15	0.23	0.21	0.17
821.7	0.47	0.00	0.21	0.00	0.00	0.25	0.19	0.29	0.26	0.23
Sand %	37.12	21.25	18.15	19.67	15.56	18.15	22.52	19.98	17.15	17.26
Silt %	62.06	77.33	80.28	78.76	82.17	79.35	75.94	77.93	80.38	80.18
Clay %	0.85	1.46	1.53	1.52	2.23	2.51	1.51	2.04	2.43	2.58

Sample ID:	T2.4_11	T2.4_12	T2.4_13	T2.4_14	T2.4_15	T2.4_16	T2.4_17	T2.4_18	T2.4_19	T2.4_20
True depth (cm)	**34**	**37**	**40**	**42**	**45**	**48**	**50**	**53**	**56**	**58**
Elevation (m OD)	**3.08**	**3.05**	**3.03**	**3.00**	**2.97**	**2.95**	**2.92**	**2.89**	**2.87**	**2.84**
Mean:	38.11	46.47	48.58	44.31	33.76	39.54	48.62	63.07	70.7	76.97
Median:	12.43	13.65	11.38	15.27	11.81	11.32	15.77	16.78	20.28	22.8

Sample ID:	**T2.4_11**	**T2.4_12**	**T2.4_13**	**T2.4_14**	**T2.4_15**	**T2.4_16**	**T2.4_17**	**T2.4_18**	**T2.4_19**	**T2.4_20**
True depth (cm)	**34**	**37**	**40**	**42**	**45**	**48**	**50**	**53**	**56**	**58**
Elevation (m OD)	**3.08**	**3.05**	**3.03**	**3.00**	**2.97**	**2.95**	**2.92**	**2.89**	**2.87**	**2.84**
Mode:	32.43	35.52	35.52	38.91	35.52	32.43	35.52	219.4	219.4	219.4
S.D.:	66.19	95.03	104.5	67.75	56.71	69.12	73.29	89.49	94.56	97.25
Skewness:	3.176	4.855	4.495	2.314	3.191	2.833	2.057	1.566	1.328	1.154
Kurtosis:	11.69	31.02	25.27	5.115	11.86	8.772	3.588	1.35	0.457	-0.0286
Particle	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.	Diff.
Diameter	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
um	%	%	%	%	%	%	%	%	%	%
0.1	0.05	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.04
0.11	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05
0.12	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06
0.131	0.08	0.08	0.09	0.08	0.09	0.09	0.08	0.08	0.07	0.07
0.144	0.10	0.10	0.11	0.10	0.10	0.11	0.10	0.09	0.09	0.08
0.158	0.12	0.12	0.13	0.12	0.13	0.13	0.12	0.11	0.10	0.10
0.173	0.13	0.14	0.16	0.14	0.15	0.15	0.14	0.13	0.12	0.11
0.189	0.15	0.16	0.18	0.16	0.17	0.17	0.16	0.15	0.14	0.13
0.207	0.17	0.17	0.20	0.18	0.19	0.19	0.18	0.17	0.16	0.14
0.227	0.19	0.20	0.23	0.20	0.21	0.22	0.20	0.19	0.18	0.16
0.249	0.22	0.22	0.25	0.22	0.24	0.25	0.23	0.21	0.20	0.18
0.272	0.24	0.24	0.28	0.25	0.27	0.27	0.25	0.24	0.22	0.20
0.298	0.26	0.27	0.31	0.27	0.29	0.30	0.28	0.26	0.24	0.22
0.327	0.29	0.29	0.34	0.30	0.32	0.33	0.31	0.29	0.26	0.24
0.358	0.32	0.32	0.38	0.33	0.35	0.37	0.34	0.31	0.29	0.26
0.392	0.35	0.35	0.41	0.37	0.39	0.40	0.37	0.34	0.32	0.29
0.429	0.37	0.38	0.45	0.40	0.42	0.44	0.40	0.37	0.34	0.31
0.47	0.41	0.41	0.49	0.43	0.46	0.48	0.44	0.41	0.38	0.34
0.515	0.44	0.45	0.53	0.47	0.50	0.52	0.48	0.44	0.41	0.36
0.564	0.48	0.49	0.58	0.52	0.55	0.57	0.52	0.48	0.45	0.40
0.618	0.52	0.53	0.63	0.56	0.59	0.61	0.56	0.52	0.48	0.43
0.677	0.57	0.57	0.68	0.61	0.64	0.67	0.61	0.56	0.52	0.46
0.741	0.62	0.62	0.74	0.66	0.70	0.72	0.66	0.61	0.57	0.50
0.812	0.67	0.68	0.80	0.72	0.76	0.79	0.72	0.67	0.62	0.54
0.889	0.73	0.73	0.87	0.78	0.82	0.85	0.77	0.72	0.67	0.59
0.974	0.78	0.78	0.92	0.83	0.88	0.90	0.82	0.77	0.71	0.63
1.067	0.83	0.83	0.97	0.87	0.92	0.95	0.86	0.81	0.75	0.66
1.168	0.88	0.87	1.02	0.91	0.97	1.00	0.90	0.85	0.78	0.70
1.28	0.92	0.91	1.06	0.95	1.01	1.04	0.94	0.89	0.82	0.73
1.402	0.97	0.95	1.10	0.99	1.06	1.09	0.97	0.93	0.85	0.77
1.536	1.02	1.00	1.15	1.03	1.11	1.13	1.01	0.97	0.89	0.81
1.682	1.08	1.05	1.20	1.08	1.16	1.18	1.05	1.01	0.93	0.85
1.842	1.14	1.11	1.25	1.12	1.21	1.23	1.10	1.06	0.98	0.90

Sample ID:	T2.4_11	T2.4_12	T2.4_13	T2.4_14	T2.4_15	T2.4_16	T2.4_17	T2.4_18	T2.4_19	T2.4_20
True depth (cm)	**34**	**37**	**40**	**42**	**45**	**48**	**50**	**53**	**56**	**58**
Elevation (m OD)	**3.08**	**3.05**	**3.03**	**3.00**	**2.97**	**2.95**	**2.92**	**2.89**	**2.87**	**2.84**
2.018	1.21	1.17	1.30	1.17	1.26	1.29	1.14	1.11	1.02	0.95
2.21	1.28	1.23	1.35	1.22	1.32	1.34	1.19	1.16	1.07	1.00
2.421	1.35	1.29	1.41	1.27	1.39	1.40	1.24	1.22	1.12	1.06
2.652	1.43	1.36	1.47	1.33	1.45	1.47	1.29	1.27	1.17	1.12
2.905	1.50	1.43	1.53	1.38	1.52	1.53	1.34	1.33	1.23	1.18
3.181	1.58	1.50	1.60	1.44	1.58	1.60	1.39	1.39	1.28	1.24
3.485	1.65	1.57	1.66	1.49	1.65	1.66	1.45	1.44	1.33	1.30
3.817	1.72	1.63	1.71	1.54	1.71	1.72	1.50	1.50	1.38	1.35
4.181	1.78	1.68	1.76	1.58	1.76	1.77	1.54	1.54	1.43	1.40
4.579	1.82	1.73	1.79	1.61	1.79	1.81	1.57	1.58	1.46	1.44
5.016	1.85	1.75	1.82	1.63	1.82	1.83	1.59	1.60	1.48	1.47
5.494	1.88	1.78	1.83	1.64	1.84	1.85	1.61	1.61	1.50	1.49
6.017	1.90	1.80	1.84	1.65	1.85	1.87	1.62	1.63	1.51	1.51
6.591	1.93	1.82	1.85	1.66	1.88	1.90	1.64	1.65	1.54	1.54
7.219	1.97	1.86	1.87	1.68	1.90	1.92	1.66	1.67	1.56	1.57
7.907	2.00	1.89	1.89	1.70	1.93	1.95	1.69	1.70	1.59	1.61
8.661	2.02	1.90	1.89	1.70	1.94	1.97	1.70	1.71	1.60	1.63
9.487	2.02	1.90	1.87	1.69	1.94	1.96	1.70	1.70	1.61	1.63
10.39	2.00	1.88	1.83	1.67	1.91	1.93	1.68	1.68	1.59	1.62
11.38	1.96	1.84	1.78	1.63	1.87	1.89	1.65	1.64	1.57	1.59
12.47	1.92	1.80	1.73	1.59	1.83	1.84	1.62	1.60	1.55	1.55
13.65	1.88	1.76	1.69	1.57	1.79	1.81	1.59	1.56	1.53	1.52
14.96	1.86	1.74	1.66	1.56	1.77	1.78	1.59	1.54	1.53	1.50
16.38	1.86	1.75	1.66	1.57	1.78	1.78	1.61	1.53	1.54	1.49
17.94	1.88	1.77	1.68	1.60	1.80	1.80	1.65	1.54	1.57	1.50
19.65	1.92	1.82	1.71	1.66	1.86	1.84	1.71	1.56	1.62	1.52
21.53	1.98	1.88	1.75	1.72	1.92	1.89	1.78	1.59	1.66	1.55
23.58	2.04	1.95	1.80	1.80	2.00	1.93	1.87	1.63	1.71	1.58
25.83	2.09	2.02	1.84	1.89	2.08	1.97	1.95	1.66	1.74	1.60
28.29	2.12	2.09	1.88	1.98	2.16	2.00	2.02	1.68	1.76	1.60
30.99	2.14	2.14	1.92	2.06	2.22	2.00	2.07	1.68	1.76	1.59
33.94	2.13	2.16	1.92	2.14	2.26	1.97	2.09	1.66	1.72	1.56
37.17	2.07	2.14	1.89	2.18	2.25	1.89	2.07	1.60	1.64	1.49
40.72	1.96	2.07	1.80	2.18	2.17	1.76	1.98	1.50	1.52	1.40
44.6	1.80	1.94	1.66	2.12	2.02	1.58	1.86	1.36	1.36	1.28
48.85	1.63	1.79	1.50	2.03	1.83	1.39	1.70	1.22	1.20	1.16
53.51	1.47	1.64	1.35	1.93	1.64	1.23	1.57	1.11	1.07	1.06
58.61	1.37	1.53	1.24	1.85	1.49	1.14	1.48	1.05	1.00	1.01
64.2	1.33	1.46	1.19	1.78	1.40	1.12	1.43	1.05	0.99	1.00
70.32	1.31	1.40	1.16	1.69	1.33	1.12	1.40	1.07	0.99	1.01
77.02	1.26	1.31	1.10	1.54	1.24	1.09	1.33	1.05	0.97	0.99

Sample ID:	T2.4_11	T2.4_12	T2.4_13	T2.4_14	T2.4_15	T2.4_16	T2.4_17	T2.4_18	T2.4_19	T2.4_20
True depth (cm)	**34**	**37**	**40**	**42**	**45**	**48**	**50**	**53**	**56**	**58**
Elevation (m OD)	**3.08**	**3.05**	**3.03**	**3.00**	**2.97**	**2.95**	**2.92**	**2.89**	**2.87**	**2.84**
84.36	1.14	1.16	0.97	1.31	1.09	0.99	1.18	0.98	0.88	0.90
92.4	0.97	0.96	0.79	1.04	0.88	0.83	0.99	0.86	0.74	0.76
101.2	0.79	0.78	0.63	0.81	0.69	0.66	0.82	0.77	0.63	0.67
110.9	0.66	0.66	0.54	0.67	0.57	0.57	0.74	0.78	0.63	0.68
121.4	0.62	0.63	0.54	0.66	0.53	0.56	0.78	0.92	0.78	0.87
133	0.64	0.68	0.63	0.76	0.58	0.64	0.94	1.20	1.10	1.25
145.7	0.69	0.77	0.77	0.93	0.65	0.78	1.17	1.57	1.58	1.80
159.6	0.74	0.86	0.90	1.11	0.71	0.92	1.42	1.97	2.14	2.45
174.8	0.76	0.91	1.00	1.25	0.72	1.02	1.60	2.31	2.66	3.06
191.4	0.76	0.92	1.04	1.31	0.69	1.06	1.68	2.52	3.05	3.51
209.7	0.74	0.90	1.03	1.28	0.63	1.05	1.65	2.56	3.22	3.69
229.7	0.71	0.85	0.97	1.18	0.57	0.99	1.50	2.41	3.11	3.54
251.6	0.66	0.77	0.87	1.01	0.50	0.88	1.25	2.10	2.72	3.05
275.5	0.59	0.66	0.72	0.79	0.42	0.73	0.95	1.66	2.12	2.33
301.8	0.49	0.51	0.56	0.54	0.33	0.55	0.63	1.17	1.42	1.50
330.6	0.37	0.35	0.38	0.29	0.23	0.37	0.33	0.69	0.74	0.74
362.1	0.26	0.20	0.23	0.11	0.14	0.21	0.12	0.31	0.26	0.25
396.6	0.16	0.09	0.13	0.02	0.07	0.11	0.02	0.09	0.05	0.04
434.4	0.09	0.04	0.08	0.00	0.03	0.05	0.00	0.01	0.00	0.00
475.8	0.05	0.02	0.07	0.00	0.01	0.03	0.00	0.00	0.00	0.00
521.2	0.02	0.03	0.09	0.00	0.00	0.02	0.00	0.00	0.00	0.00
570.9	0.01	0.06	0.13	0.00	0.00	0.01	0.00	0.00	0.00	0.00
625.3	0.00	0.11	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
684.9	0.00	0.18	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750.2	0.00	0.23	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
821.7	0.00	0.30	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand %	15.82	17.80	17.55	20.08	14.01	16.36	21.93	28.05	30.78	34.09
Silt %	81.40	79.36	79.17	77.04	82.94	80.43	75.21	69.27	66.67	63.64
Clay %	2.80	2.84	3.28	2.90	3.09	3.17	2.94	2.74	2.55	2.33

Sample ID:	T2.4_21	T2.4_22	T2.4_23	T2.4_24	T2.4_25	T2.4_26	T2.4_27	T2.4_28
True depth (cm)	**61**	**64**	**67**	**69**	**72**	**75**	**77**	**80**
Elevation (m OD)	**2.81**	**2.78**	**2.76**	**2.73**	**2.70**	**2.68**	**2.65**	**2.62**
Mean:	71.69	36.11	57.48	51.81	101.8	55.59	158.9	246.5
Median:	23.44	9.843	12.2	8.651	23.04	10.83	187.4	247.3
Mode:	219.4	9.065	9.065	9.065	263.3	263.3	263.3	263.3
S.D.:	91.6	65.47	107.5	116	124	95.15	127.2	79.95
Skewness:	1.259	3.104	3.512	3.997	0.908	2.026	0.0853	-0.648
Kurtosis:	0.331	10.89	16.98	19.44	-0.625	3.053	-1.349	1.341

Sample ID:	T2.4_21	T2.4_22	T2.4_23	T2.4_24	T2.4_25	T2.4_26	T2.4_27	T2.4_28
True depth (cm)	61	64	67	69	72	75	77	80
Elevation (m OD)	2.81	2.78	2.76	2.73	2.70	2.68	2.65	2.62
Particle Diameter um	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %	Diff. Volume %
0.1	0.05	0.06	0.06	0.07	0.05	0.06	0.03	0.00
0.11	0.05	0.07	0.06	0.08	0.06	0.07	0.03	0.00
0.12	0.06	0.08	0.07	0.09	0.06	0.08	0.03	0.00
0.131	0.07	0.10	0.09	0.11	0.08	0.10	0.04	0.00
0.144	0.08	0.12	0.11	0.13	0.09	0.12	0.05	0.00
0.158	0.10	0.14	0.13	0.16	0.11	0.14	0.06	0.00
0.173	0.12	0.16	0.15	0.18	0.13	0.17	0.07	0.00
0.189	0.14	0.19	0.17	0.21	0.15	0.19	0.08	0.00
0.207	0.15	0.21	0.20	0.24	0.17	0.21	0.09	0.00
0.227	0.17	0.24	0.22	0.27	0.20	0.24	0.10	0.00
0.249	0.20	0.27	0.25	0.30	0.22	0.27	0.11	0.00
0.272	0.22	0.30	0.28	0.33	0.24	0.31	0.12	0.00
0.298	0.24	0.33	0.30	0.37	0.27	0.34	0.14	0.00
0.327	0.27	0.37	0.34	0.41	0.30	0.37	0.15	0.00
0.358	0.29	0.41	0.37	0.45	0.33	0.41	0.17	0.00
0.392	0.32	0.45	0.41	0.49	0.36	0.45	0.18	0.00
0.429	0.35	0.48	0.44	0.54	0.39	0.49	0.20	0.00
0.47	0.38	0.53	0.48	0.59	0.43	0.54	0.22	0.01
0.515	0.42	0.58	0.53	0.64	0.47	0.59	0.24	0.01
0.564	0.45	0.63	0.58	0.70	0.51	0.64	0.26	0.02
0.618	0.49	0.68	0.62	0.75	0.55	0.69	0.28	0.03
0.677	0.53	0.74	0.67	0.82	0.59	0.75	0.30	0.03
0.741	0.58	0.80	0.73	0.89	0.64	0.81	0.32	0.04
0.812	0.63	0.87	0.80	0.96	0.70	0.88	0.35	0.04
0.889	0.67	0.94	0.86	1.03	0.75	0.95	0.37	0.05
0.974	0.72	1.00	0.91	1.10	0.79	1.00	0.40	0.05
1.067	0.76	1.06	0.96	1.15	0.83	1.05	0.42	0.06
1.168	0.79	1.10	1.00	1.20	0.86	1.10	0.43	0.06
1.28	0.82	1.15	1.04	1.24	0.89	1.14	0.45	0.07
1.402	0.85	1.19	1.08	1.28	0.92	1.17	0.46	0.07
1.536	0.89	1.24	1.12	1.33	0.95	1.21	0.48	0.08
1.682	0.92	1.29	1.17	1.37	0.98	1.25	0.49	0.08
1.842	0.96	1.34	1.22	1.42	1.01	1.29	0.51	0.08
2.018	0.99	1.39	1.26	1.47	1.05	1.33	0.53	0.09
2.21	1.03	1.44	1.31	1.52	1.08	1.38	0.55	0.09
2.421	1.08	1.50	1.37	1.57	1.12	1.42	0.57	0.09
2.652	1.12	1.56	1.42	1.63	1.16	1.47	0.59	0.09
2.905	1.17	1.63	1.48	1.69	1.20	1.52	0.62	0.10

Sample ID:	T2.4_21	T2.4_22	T2.4_23	T2.4_24	T2.4_25	T2.4_26	T2.4_27	T2.4_28
True depth (cm)	**61**	**64**	**67**	**69**	**72**	**75**	**77**	**80**
Elevation (m OD)	**2.81**	**2.78**	**2.76**	**2.73**	**2.70**	**2.68**	**2.65**	**2.62**
3.181	1.21	1.69	1.54	1.74	1.24	1.58	0.65	0.10
3.485	1.26	1.75	1.59	1.80	1.28	1.63	0.67	0.10
3.817	1.30	1.80	1.65	1.86	1.32	1.68	0.70	0.10
4.181	1.34	1.85	1.69	1.91	1.35	1.72	0.72	0.10
4.579	1.37	1.88	1.73	1.95	1.38	1.75	0.74	0.10
5.016	1.39	1.90	1.75	1.97	1.40	1.77	0.76	0.10
5.494	1.40	1.91	1.77	1.98	1.41	1.78	0.77	0.09
6.017	1.42	1.92	1.78	1.99	1.42	1.80	0.78	0.09
6.591	1.43	1.94	1.80	2.01	1.43	1.82	0.80	0.09
7.219	1.46	1.96	1.82	2.03	1.44	1.84	0.81	0.10
7.907	1.48	1.98	1.84	2.05	1.45	1.86	0.83	0.10
8.661	1.49	1.98	1.84	2.05	1.45	1.87	0.84	0.10
9.487	1.49	1.97	1.83	2.03	1.44	1.86	0.85	0.09
10.39	1.48	1.93	1.80	1.98	1.41	1.84	0.85	0.09
11.38	1.45	1.87	1.75	1.92	1.38	1.80	0.84	0.09
12.47	1.43	1.81	1.69	1.85	1.33	1.75	0.84	0.08
13.65	1.41	1.76	1.64	1.78	1.30	1.71	0.83	0.08
14.96	1.40	1.72	1.60	1.72	1.27	1.68	0.84	0.08
16.38	1.41	1.70	1.58	1.68	1.25	1.67	0.85	0.07
17.94	1.43	1.70	1.58	1.64	1.24	1.66	0.87	0.07
19.65	1.46	1.72	1.58	1.61	1.23	1.67	0.90	0.07
21.53	1.50	1.74	1.60	1.58	1.22	1.67	0.93	0.07
23.58	1.54	1.76	1.62	1.54	1.20	1.67	0.96	0.07
25.83	1.58	1.78	1.64	1.50	1.18	1.65	0.98	0.07
28.29	1.62	1.79	1.65	1.45	1.15	1.63	1.01	0.08
30.99	1.66	1.79	1.65	1.39	1.12	1.59	1.02	0.09
33.94	1.67	1.77	1.63	1.32	1.07	1.53	1.01	0.09
37.17	1.66	1.72	1.57	1.22	1.00	1.43	0.99	0.09
40.72	1.60	1.63	1.47	1.08	0.91	1.29	0.93	0.07
44.6	1.52	1.51	1.34	0.92	0.80	1.12	0.86	0.07
48.85	1.42	1.36	1.20	0.76	0.69	0.94	0.78	0.08
53.51	1.34	1.24	1.10	0.64	0.61	0.81	0.72	0.08
58.61	1.29	1.17	1.05	0.60	0.59	0.74	0.69	0.08
64.2	1.28	1.16	1.05	0.63	0.62	0.74	0.69	0.09
70.32	1.26	1.17	1.09	0.70	0.69	0.77	0.69	0.13
77.02	1.20	1.14	1.09	0.75	0.72	0.78	0.65	0.19
84.36	1.08	1.05	1.02	0.72	0.69	0.71	0.53	0.23
92.4	0.92	0.90	0.88	0.63	0.58	0.56	0.34	0.22
101.2	0.81	0.75	0.75	0.53	0.46	0.41	0.19	0.19
110.9	0.82	0.65	0.68	0.48	0.39	0.32	0.15	0.20
121.4	1.01	0.62	0.70	0.51	0.44	0.32	0.28	0.36
133	1.39	0.66	0.82	0.61	0.64	0.43	0.72	0.88

Sample ID:	T2.4_21	T2.4_22	T2.4_23	T2.4_24	T2.4_25	T2.4_26	T2.4_27	T2.4_28
True depth (cm)	**61**	**64**	**67**	**69**	**72**	**75**	**77**	**80**
Elevation (m OD)	**2.81**	**2.78**	**2.76**	**2.73**	**2.70**	**2.68**	**2.65**	**2.62**
145.7	1.91	0.74	1.01	0.77	1.04	0.63	1.59	1.99
159.6	2.48	0.79	1.20	0.93	1.63	0.91	2.82	3.85
174.8	2.96	0.82	1.37	1.06	2.36	1.23	4.28	6.38
191.4	3.25	0.81	1.48	1.16	3.15	1.54	5.75	9.15
209.7	3.28	0.78	1.53	1.21	3.86	1.81	6.98	11.60
229.7	3.03	0.73	1.50	1.21	4.35	1.98	7.71	13.00
251.6	2.52	0.67	1.40	1.14	4.48	2.00	7.74	13.02
275.5	1.86	0.58	1.23	1.00	4.20	1.85	7.04	11.66
301.8	1.16	0.47	1.00	0.81	3.54	1.55	5.72	9.27
330.6	0.55	0.35	0.74	0.58	2.64	1.15	4.07	6.89
362.1	0.18	0.23	0.49	0.36	1.69	0.74	2.44	4.70
396.6	0.03	0.13	0.29	0.21	0.84	0.38	1.11	1.79
434.4	0.00	0.07	0.15	0.12	0.29	0.15	0.35	0.15
475.8	0.00	0.03	0.07	0.09	0.05	0.04	0.06	0.00
521.2	0.00	0.02	0.04	0.10	0.00	0.00	0.00	0.00
570.9	0.00	0.01	0.05	0.15	0.00	0.00	0.00	0.00
625.3	0.00	0.00	0.08	0.22	0.00	0.00	0.00	0.00
684.9	0.00	0.00	0.15	0.29	0.00	0.00	0.00	0.00
750.2	0.00	0.00	0.21	0.34	0.00	0.00	0.00	0.00
821.7	0.00	0.00	0.30	0.40	0.00	0.00	0.00	0.00
Sand %	32.98	15.33	22.37	17.71	39.35	21.00	61.90	95.94
Silt %	64.51	81.14	74.42	78.44	57.83	75.48	36.66	4.07
Clay %	2.53	3.50	3.21	3.89	2.82	3.53	1.45	0.00

7. Appendix III: Rye Harbour topographic data

Elevations and Cartesian coordinates from four of five stratigraphic transects (RH2-5) and the two topographic transects (A and B) have been adjusted to express them relative to the same point - the benchmark on Camber Castle. Levelling data from RH1 is below the main table

Survey line	X m	Y m	Dist m	m OD	Comments
Benchmark	-70	371	BM	5.180	Camber Castle
RH2 east of lake	429	700	0	2.788	bh 2.3
	404	700	25	2.392	bh 2.2
	350	700	79	4.454	bh 2.1
RH2 west of lake	133	660	300	3.243	bh 2.4
	114	651	320	3.616	bh 2.5
	96	641	341	3.308	midpoint
	76	631	363	3.428	bh 2.6
	69	627	371	3.480	midpoint
	61	625	380	4.096	bh 2.7
	47	619	395	3.488	midpoint
	31	612	412	3.383	bh 2.8
	17	606	428	3.361	midpoint
	-3	595	451	3.359	midpoint
	-26	585	476	3.478	midpoint
	-37	579	488	3.763	bh 2.9
	-51	571	503	3.660	midpoint
	-74	563	528	4.405	bh 2.10
	-66	566	536	4.383	midpoint
	-87	555	560	3.926	midpoint
	-95	553	568	3.225	midpoint
	-100	551	573	3.191	bh 2.11
	-109	546	584	3.208	midpoint
	-118	542	594	3.975	midpoint
	-126	539	602	4.400	bh 2.12
	-144	527	624	4.213	midpoint
	-136	532	633	3.866	midpoint
	-139	531	637	4.501	midpoint
	-162	523	661	3.543	bh 2.13
	-168	521	667	3.557	midpoint
	-171	519	670	4.227	midpoint
	-181	511	683	4.060	midpoint
	-194	511	697	4.237	bh 2.14
	-204	501	710	3.453	midpoint
	-209	499	716	3.296	bh 2.15
	-223	492	731	4.095	midpoint
	-233	488	742	4.443	bh 2.16
	-248	482	759	4.230	midpoint
	-265	473	778	3.620	midpoint
	-270	472	782	3.969	fence
	-285	464	800	3.174	bh 2.17
	-312	449	830	2.990	midpoint
	-332	441	852	2.713	bh 2.18
	-402	397	935	2.897	bh 2.19
RH3 east of lake	533	617	0	2.535	bh 3.3
	435	586	102	2.820	bh 3.2
	385	570	155	3.108	bh 3.1
RH3 west of lake	170	537	373	2.868	edge of ditch
	161	537	382	4.110	bh 3.4

Survey line	X m	Y m	Dist m	m OD	Comments
	145	532	398	3.718	midpoint
	128	526	416	3.194	bh 3.5
	121	524	423	3.474	midpoint
	115	521	430	3.333	midpoint
	105	519	441	4.192	bh 3.6
	87	512	460	3.670	midpoint
	93	514	466	3.855	midpoint
	80	509	480	3.910	midpoint
	69	506	492	3.281	bh 3.7
	63	504	498	3.387	midpoint
	53	501	508	3.919	bh 3.8
	46	499	515	3.423	midpoint
	35	495	527	3.088	bh 3.9
	19	487	545	3.283	midpoint
	8	483	557	4.239	bh 3.10
	-6	478	571	3.425	midpoint
	-14	475	580	3.947	midpoint
	-25	472	592	3.478	bh 3.11
	-42	470	608	3.504	bh 3.12
	-54	469	621	3.736	midpoint
	-58	467	625	4.811	midpoint
	-61	466	629	4.681	midpoint
	-68	457	640	3.475	midpoint
	-75	455	647	3.421	bh 3.13
	-102	445	676	3.545	midpoint
	-121	439	696	3.596	midpoint
	-125	437	700	4.380	midpoint
	-126	436	701	4.398	bh 3.14
	-156	407	743	4.059	bh 3.15
	-178	398	768	3.909	midpoint
	-185	393	776	3.590	bh 3.16
	-194	388	786	4.073	bh 3.17
	-194	388	787	4.119	midpoint
	-213	376	808	3.044	over fence midpoint
	-220	372	817	2.893	bh 3.18
	-245	357	846	3.237	bh 3.19
	-290	331	898	2.921	bh 3.20
	-337	306	951	2.975	bh 3.21
RH4 east of lake	260	-100	0	2.733	bh 4.21
	218	-88	44	2.918	bh 4.20
	201	-80	63	3.377	bh 4.19 (bh 4.18 not used)
	192	-78	72	3.222	midpoint
	190	-70	80	2.384	lake water level east side
RH4 west of lake	87	-4	203	3.714	bh 4.17
	64	5	227	2.831	bh 4.16
	56	9	236	3.943	midpoint
	48	11	244	3.971	midpoint
	40	14	253	4.428	bh 4.15
	30	17	264	3.553	bh 4.14
	18	20	276	3.305	bh 4.13
	12	22	282	3.999	bh 4.12
	4	25	291	3.716	midpoint
	0	28	296	3.970	midpoint
	-4	27	299	3.889	bh 4.11
	-8	28	303	4.058	bh 4.10
	-20	21	317	3.725	midpoint
	-32	34	335	4.084	bh 4.9
	-41	30	344	4.636	midpoint

Survey line	X m	Y m	Dist m	m OD	Comments
	-53	40	360	4.471	bh 4.8
	-70	39	376	3.672	bh 4.7
	-85	48	393	4.099	bh 4.6
	-102	54	412	3.335	bh 4.5
	-133	61	444	3.398	bh 4.4
	-162	81	479	3.016	midpoint
	-184	100	509	2.788	bh 4.3
	-227	124	557	2.783	bh 4.2
	-349	177	690	2.739	midpoint
	-440	218	790	3.129	bh 4.1 - west
RH5 east	173	-336	0	2.827	bh 5.21
	125	-311	54	2.707	bh 5.20
	117	-306	63	3.021	bh 5.19
	104	-300	78	4.345	bh 5.18
	99	-295	85	3.691	midpoint
	23	-256	170	3.949	bh 5.14
	8	-254	186	3.229	bh 5.13
	-20	-252	213	3.249	bh 5.12
	-32	-248	226	4.313	bh 5.11
	-41	-244	236	3.361	bh 5.10
	-52	-241	248	3.532	bh 5.9
	-59	-238	255	4.282	bh 5.8
	-70	-234	267	4.601	bh 5.7
	-80	-230	278	3.749	bh 5.6
	-99	-222	299	4.540	bh 5.5
	-110	-218	309	4.222	midpoint
	-129	-211	330	4.285	bh 5.4
	-139	-208	341	4.045	bh 5.3
	-160	-198	364	4.256	bh 5.2
	-191	-187	397	4.307	bh 5.1 - west
Topog A	-99	129	0	2.885	start - west
	-79	135	22	3.552	midpoint
	-70	139	32	3.706	midpoint
	-59	145	44	3.570	midpoint
	-51	150	53	3.984	midpoint
	-45	153	60	3.638	midpoint
	-39	156	67	3.910	midpoint
	-36	158	70	3.689	midpoint
	-31	161	76	4.014	midpoint
	-28	162	79	3.866	midpoint
	-25	163	82	3.981	midpoint
	-17	168	91	4.223	midpoint
	-12	172	98	4.789	midpoint
	-9	172	101	4.765	midpoint
	-5	174	105	4.296	midpoint
	2	178	113	4.652	midpoint
	13	185	126	4.453	midpoint
	21	190	136	4.464	midpoint
	30	195	146	4.446	midpoint
	47	204	165	3.580	midpoint
	57	212	178	3.484	midpoint
	69	216	190	4.025	midpoint
	72	217	194	4.058	midpoint
	76	220	199	4.608	midpoint
	80	221	203	3.864	midpoint
	86	224	209	4.242	midpoint
	92	228	217	4.579	midpoint

Survey line	X m	Y m	Dist m	m OD	Comments
	100	233	226	3.873	midpoint
	103	235	229	3.858	midpoint
	108	238	236	4.520	midpoint
	117	244	246	4.236	midpoint
	127	250	259	3.418	midpoint
	139	258	273	2.981	midpoint
	152	270	290	3.366	end - east
Topog B	86	-70	0	3.801	start - east
	65	-63	21	2.747	midpoint
	56	-60	31	3.432	midpoint
	35	-55	52	3.466	midpoint
	22	-52	66	3.874	midpoint
	17	-50	72	4.236	midpoint
	19	-50	74	4.224	midpoint
	12	-48	82	4.036	midpoint
	1	-46	93	3.514	midpoint
	-10	-43	104	3.960	midpoint
	-17	-40	112	4.057	midpoint
	-21	-39	116	3.863	midpoint
	-27	-38	123	4.006	midpoint
	-32	-36	127	4.485	midpoint
	-38	-35	134	4.163	midpoint
	-45	-33	140	4.381	midpoint
	-54	-31	150	3.914	midpoint
	-59	-30	155	4.062	midpoint
	-62	-29	158	4.376	midpoint
	-69	-27	165	3.663	midpoint
	-76	-26	172	3.843	midpoint
	-80	-25	176	4.263	midpoint
	-87	-23	184	3.634	midpoint
	-106	-16	204	3.236	end - west

Levelling data transect RH1

Borehole	Distance from RH1 (m)	Elevation (m OD)
RH1.1	0	4.03
RH1.2	29	2.81
RH1.3	97	4.59
RH1.4	191	2.59
RH1.5	276	3.77
RH1.6	408	2.64
RH1.7	474	4.19
RH1.8	503	3.45
RH1.9	522	4.36
RH1.10	547	3.59
RH1.11	607	3.22
RH1.12	672	3.91
RH1.13	730	3.9
RH1.14	800	3.27
RH1.15	841	3.75
RH1.16	921	3.55
RH1.17	996	3.14
RH1.18	1100	2.97
RH1.19	1150	3.16

Appendix 3

Archaeology South-East

ASE

Rye Harbour Farm

(NGR 594600 118550)

HISTORIC BUILDING RECORD

Project No. 4452
Report No. 2010172

Application Reference: RR/2010/1149/P

On behalf of
The Environment Agency

ASE Project no. 4452

Site Code: RHF 10

October 2010

Prepared by Justin Russell
with assistance from Rob Cole

Rye Harbour Farm

(NGR 594600 118550)

HISTORIC BUILDING RECORD

Project No. 4452
Report No. 2010172

Application Reference: RR/2010/1149/P

On behalf of
The Environment Agency

ASE Project no. 4452

Site Code: RHF 10

October 2010

Prepared by Justin Russell
with assistance from Rob Cole

Archaeology South-East
Units 1 & 2
2 Chapel Place
Portslade
East Sussex
BN41 1DR

ABSTRACT

In September 2010 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a survey of the remains of four concrete structures to the south of Lime Kiln Cottage, near Rye Harbour, in advance of construction of a new culvert as part of flood defence works at Rye Harbour Farm.

The structures appear to be from two distinct phases of activity in the area: the earlier structures are related to gravel extraction and the production of concrete in the 19th century and the later structures date from 1940 and were constructed as part of the network of WWII defences sited along the south-east coast.

CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

1.1 In September 2010 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) was commissioned by Halcrow Group, on behalf of the Environment Agency to record the remains of four concrete structures to the south of Lime Kiln Cottage, near Rye Harbour, in advance of construction of a new culvert as part of flood defence works at Rye Harbour Farm.

1.2 The Environment Agency owns Rye Harbour Farm and has developed a scheme to enhance the nature conservation value of the farm, which lies adjacent to Rye Harbour Nature Reserve. The proposed scheme comprises the creation of intertidal saltmarsh, saline lagoon, wet grassland, lowland meadow and shingle ridge restoration totalling approximately 31 ha.

1.3 The site (relating specifically to the four structures) has played an important part in the modern industrial and military history of the Rother and Rye Harbour, the significance resulting from its connection to the construction of Dover Harbour and as an element of the wider series of invasion deterrents from the Second World War.

1.4 Planning permission has been granted (Reference RR/2010/1149/P) for the proposed development subject to conditions. The archaeological condition was attached on the advice of Casper Johnson, County Archaeologist, East Sussex County Council), following Planning Policy Statement 5: Planning for the Historic Environment (PPS 5).

1.5 The work was undertaken in order to record the four concrete structures within their current landscape context in advance of the creation of the culvert and intertidal saltmarsh. This work will substantially alter the environment surrounding the structures and will have a direct impact on most of the structures themselves. The structures are shown as A-D on Figure 2. Structures B, C and D will be either partly or completely removed by the works. Structure A will not be directly affected.

2.0 SCOPE & METHODOLOGY

2.1 The aim of the survey was to provide an overview of the date, sequence of construction, layout, materials and principal architectural features of the structural remains. The main elements of the project involved the compilation of a written description and analysis of the remains and the creation of a drawn and photographic record.

2.2 The site was visited by Justin Russell and Rob Cole in September 2010 in order to compile the description of the structures and undertake the drawing and digital photographic recording. The survey was conducted by Rob Cole using a Leica System 1200 GPS.

3.0 LOCATION

3.1 The site lies on the western bank of the river Rother and is approximately 500m south-west of Rye Harbour, which in turn is situated 2km south-west of Rye, East Sussex (Fig. 1). The four structures themselves are arranged roughly parallel with the footpath heading to the mouth of the Rother, to the immediate south of Lime Kiln Cottage information centre (Fig. 2).

4.0 BACKGROUND

4.1 Post-medieval

4.2 Three Martello Towers were built in the Rye Harbour area between 1805 and 1812 to defend the coast at Pett from the threat of invasion by Napoleon Bonaparte. However, by the time they were built the danger had receded. Also built at the same time was the Royal Military Canal, a defended waterway stretching from Cliff End to Hythe.

4.3 By the mid 1800s, Rye Harbour had become a busy industrialised area with an oil refinery, chemical works and various producers of brick and concrete. Tramways criss-crossed the area, connecting to the main rail line and down to the coast for transport of goods via barge.

4.4 During the Second World War, the coastal area once again saw intense military activity, being well within the proposed German landing zone in the event of an invasion. Defensive scaffolding and barbed wire would have lined the tidal zone, while further up the beach, minefields, pillboxes and anti-tank blocks were positioned at key locations. Two unique machine gun pillboxes remain on the west bank of the mouth of the Rother (Pett Levels Pillbox, ASE report 2033). Two more have been absorbed into the caravan park at Rye Harbour and a number of anti-tank cylinders lie in various positions at the end of Harbour Road. Across the river in the dunes at Camber Sands a number of pillboxes and related structures remain, gradually being consumed by the sand.

5.0 DESCRIPTION OF THE STRUCTURES AS EXISTING (SEPTEMBER 2010).

5.1 Structure A

5.1.1 The southern most of the structures, south of Lime Kiln Cottage and east of the bank that the cottage and road sit on, comprises a series of rectangular cuboid concrete blocks, arranged to form an inverted 'L' shape in plan, measuring 26.5m long and 7.7m wide (Fig. 3). Nineteen blocks measuring 2.7m long and 1.37m wide laid side by side to form the base of the structure, with three smaller irregular cuboids in the toe of the L. Only the top of these lower blocks is now visible, silting from the river having left the ground level almost flush with the upper surface on the western side and up to 300mm below the upper surface on the eastern side. Sitting on top of these are nine blocks lain end to end (on their long length) with a further two placed at 90 degrees to them at the north-western end. The length and width match those in the base with a depth of 1.25m.

5.1.2 All of the blocks are made of concrete mixed with coarse shingle and the upper blocks are joined with cement. All edges of the blocks exhibit a chamfer 50mm wide effectively smoothing off the corners. On the top face are two rectangular cast slots (140mm x 50mm), presumably designed to aid in transport (Fig. 3.3). The three southern most blocks maintain these slots open

while the remainder have had the slots filled with concrete. The three smaller blocks (approximately 1.45m long, 1.37 wide, depth unknown) also display the chamfer along all edges and sit somewhat offset to the blocks above, causing the top blocks to overhang on the northern side by some 300mm.

5.1.3 Two irregular concrete gobbets lie either side of the toe, the southern segment sunk to ground level while the northern piece is considerably more exposed (1.27m long, 0.76m wide, depth unknown) although it's rough and irregular appearance suggest it has been somewhat damaged and the outer surface removed.

5.1.4 On the eastern side of the structure, facing the river side, two iron bars (370mm in length, 40mm wide and deep) protrude from the base of the top row of blocks (Fig. 3.4). They sit in the centre of the second and third northern most blocks and have been inserted after the construction of the block, a slot cut into which the bars were inserted and cemented fast.

5.1.5 Three drilled holes were noted in the top of the lower level of blocks, one on the eastern side, the other two on the western side all 25mm in diameter. Also in this surface, on the western side, five characters have been scored which appear to read '30 8 68' (Fig. 3.5). Whether this is a date, an identification number or relates to something else entirely is unclear. It appears that the characters have been created while the concrete was setting but it is possible that they were incised after the drying process.

5.1.6 The top row of blocks are in fair condition, though do show signs of cracking along the original lines of pouring (concrete generally being built up in layers, so to provide consistent drying) while the lower row of blocks exhibit more substantial cracking and roughened edges.

5.2 **Structure B**

5.2.1 This structure lays 11.3m north-west of and in line with Structure A and consists of 10 slabs of concrete mostly 2.6m long and 1.5m wide with one larger slab at the north measuring 3m in width (Fig. 4). The depth of the slabs could not be ascertained, but due to subsidence on the unstable shingle the western side has been raised and a minimum depth of 0.5m can be seen. Two rectangular cast slots are visible in the fourth block from the southern side, measuring 80mm by 150mm. The concrete mix has a high proportion of coarse shingle, with pebbles up to 80mm in diameter. Originally covering the slabs and now only remaining in a few locations is a 60mm render of fine concrete (Fig. 4.3). The general condition of the slabs is poor, blighted by subsidence and cracking.

5.3. **Structure C**

5.3.1 Structure C is located 8.0m to the west of Structure B, between it and the track to the coast. It is rectangular concrete slab, measuring 6.0m east-west and 5.0m north-south (Fig. 5). Set 0.6m in from each corner is a smaller concrete

pad measuring 0.94m x 0.94m and consisting of finer concrete. Three of these pads have four 25mm steel bolts and between three and four smaller bolts of 15mm diameter embedded within them (Fig. 5.3), the fourth (in the south-west corner) having 3 larger bolts and one of the smaller. To the north of the main slab concrete pad measuring 0.70m x 0.70m with a single 15mm steel bolt centrally placed. A similar bolt is set an equal distance into the main slab (Fig. 5.4). All of the steel bolts have been cut so that they are now flush with the concrete.

5.4. **Structure D**

5.4.1 Approximately 3.0m to the north of Structure C, adjacent to the garden of Lime Kiln Cottage and directly adjacent to the path to the coast, is Structure D (Fig. 6). This is composed of five strips of concrete, each 2.4m wide and approximately 8.5m long, forming a broadly rectangular area, although the poor condition of the slabs and the abundant covering of vegetation and spoil make exact measurements difficult. The slabs are visible to a depth of 350mm and the concrete mix contains medium coarse shingle inclusions (pebbles up to 40mm in diameter). No other features were evident relating to the structure.

6.0 INTERPRETATION AND SIGNIFICANCE

In the mid 19th century a concrete works was situated at Tram Road in Rye Harbour, producing concrete blocks containing locally extracted shingle for the construction of Admiralty Pier in Dover Harbour, 1847-50. The blocks recorded in Structure A, known locally as Jackson's Stage (Sam Smith, Rye Harbour Nature Reserve, pers comm.), are from that period of production and were collected in this formation as a loading area for the transportation of the blocks to Dover. The 1870 1st edition Ordnance Survey map shows the blocks in their current position, sited at the high tide water level (Fig. 7). The blocks produced at Rye Harbour can be seen *in situ* in Dover harbour (Fig. 8.1), with the chamfered edges clearly visible. This structure had previously been interpreted as part of a coastal battery in the Defence of Britain database (DOB: S0012462 Council for British Archaeology website, 2006).

6.2 Structure B has a similar alignment and type of concrete to Structure A perhaps acted as a hard-standing for the unloading of the blocks from the transport that brought them from the concrete works before being loaded onto barges headed for Dover. Alternatively, 300m to the south, along the track to the coast, a similar concrete platform serves as the base for a tin fishing hut (TQ 94750,18315) which appears on the OS 25" 3rd edition, 1909 and is recorded in a photograph from 1904 (ryeharbour.net) (Fig. 8.2).

6.3 Structure C appears to have been the base to which a scaffold tower was bolted. Figure 9.1 shows the tower in 1947 with Structure A in the foreground right - note that the lower level of blocks are more prominently exposed and the fence like structure at the rear, possibly part of the anti-invasion fencing also constructed at Camber Sands and recorded in a photograph taken in

1945 (ryeharbour.net). It is reasonable to assume that this was a WWII observation post, for apart from the high ground to the north of Rye, the harbour area is extremely low lying and an elevated position such as this would afford great potential for advance spotting of aircraft and landing craft and for monitoring movement up the river and along the coast.

6.4 Structure D is likely a platform for a temporary building associated with the tower, bearing in mind their relative proximity. There is no building visible in Fig. 9.1 but it is possible that it had been removed by 1947.

7.0 SOURCES CONSULTED

CBA Research Reports: *Beaches, Fields, Streets, and Hills: The Anti-Invasion Landscapes of England, 1940*, William Foot

Sussex Industrial Archaeology Newsletter No. 139 July 2008: *Rye Harbour and Winchelsea Beach*, Ron Martin

Archaeology South-East report, March 2002: *An Archaeological Desk Based Assessment and Survey of the Coast between Pett Level and Rye Harbour, East Sussex*, Richard James

Archaeology South East report, March 2005: *Pett Levels Pillbox, Rye Harbour*, Justin Russell and Luke Barber

ryeharbour.net

ADS Defence of Britain Database

Appendix 1 HER Summary Sheet

Site Code	RHF 10					
Identification Name and Address	Rye Harbour					
County, District &/or Borough	East Sussex					
OS Grid Refs.	**594600 118550**					
Geology	Shingle gravel (Storm beach deposits)					
Arch. South-East Project Number	4452					
Type of Fieldwork	**Eval.**	**Excav.**	**Watching Brief**	**Standing Structure** ✓	**Survey**	**Other**
Type of Site	**Green Field**	**Shallow Urban**	**Deep Urban**	**Other**		
Dates of Fieldwork	**Eval.**	**Excav.**	**WB.**	**Other** 17th Sept 2010		
Sponsor/Client	Halcrow Group, on behalf of the Environment Agency					
Project Manager	Jon Sygrave					
Project Supervisor	Justin Russell					
Period Summary	**Palaeo.**	**Meso.**	**Neo.**	**BA**	**IA**	**RB**
	AS	**MED**	**PM**	**Other Modern** ✓WWII		

100 Word Summary.

In September 2010 Archaeology South-East carried out a historic building survey of four concrete structures at Rye Harbour. The two earlier structures date from c. 1850 and relate to shingle extraction and concrete production in the vicinity. The later structures date from 1940 and were constructed as part of the network of defences sited along the south-east coast.

Appendix 2 OASIS FORM

OASIS ID: ARCHAEOL6-83900

Project details

Project name	**Rye Harbour Farm**
Short description of the project	**In September 2010 Archaeology South-East carried out a historic building survey of four concrete structures at Rye Harbour. The two earlier structures date from c. 1850 and relate to shingle extraction and concrete production in the vicinity. The later structures date from 1940 and were constructed as part of the network of defences sited along the south-east coast**
Project dates	**Start: 17-09-2010 End: 06-10-2010**
Previous/future work	**Yes / Yes**
Type of project	**Building Recording**
Site status	**None**
Current Land use	**Coastland 3 - Above high water**
Monument type	**LANDING STAGE Post Medieval**
Monument type	**WATCH TOWER Modern**
Methods techniques	**'Annotated Sketch', 'Measured Survey', 'Photographic Survey', 'Survey/Recording Of Fabric/Structure'**
Prompt	**Direction from Local Planning Authority - PPS**

Project location

Country	**England**
Site location	**EAST SUSSEX ROTHER ICKLESHAM Rye Harbour**
Study area	**512.00 Square metres**
Site coordinates	**TQ 94600 18550 50.9329006531 0.769780914211 50 55 58 N 000 46 11 E Point**
Height OD / Depth	**Min: 3.59m Max: 4.83m**

Project creators

Name of Organisation	Archaeology South-East
Project brief originator	Halcrow Group Limited
Project design	East Sussex County Council

originator

Project director/manager	Jon Sygrave
Project supervisor	Justin Russell
Type of sponsor/funding body	Environment Agency

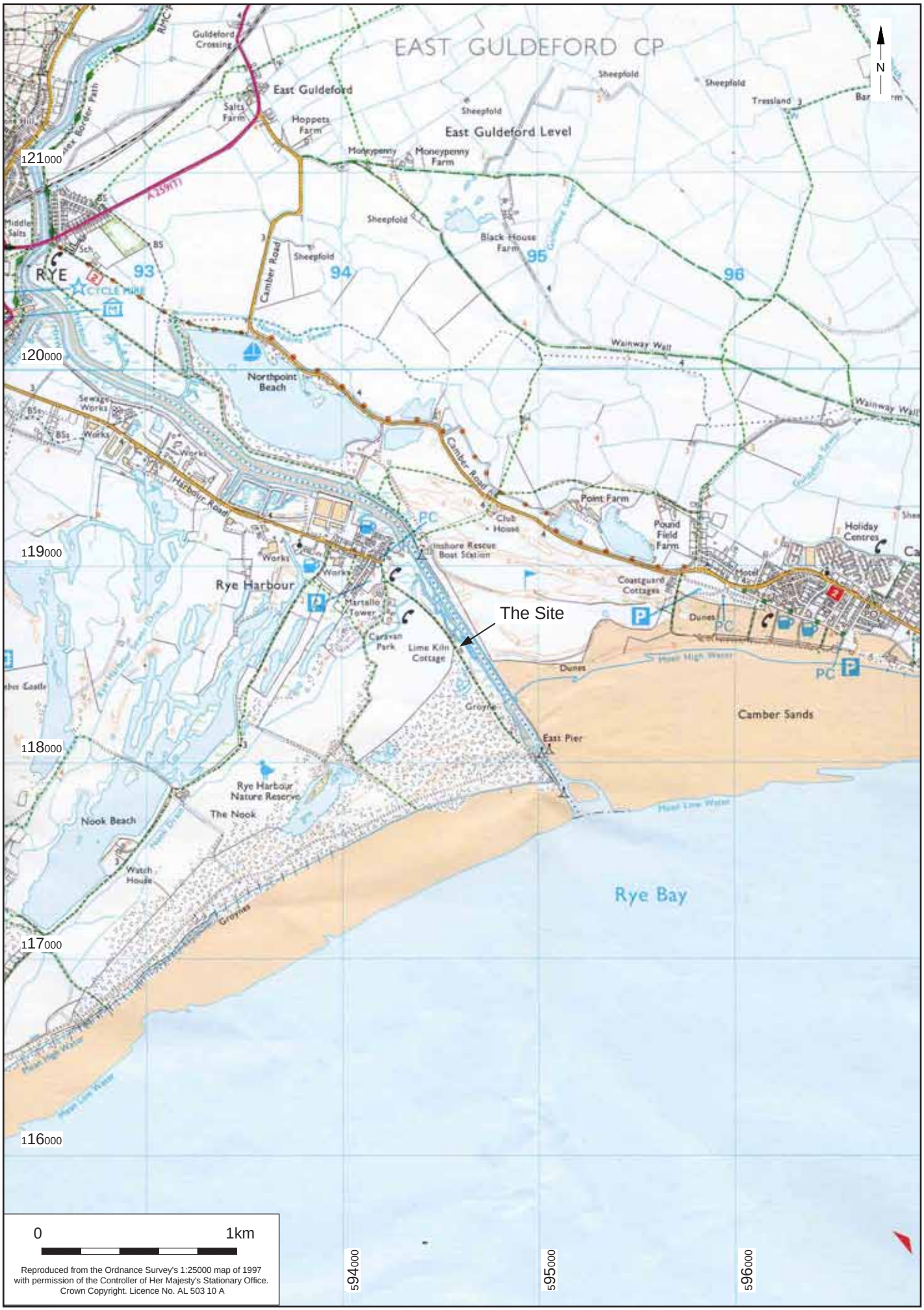
Project archives

Physical Archive recipient	n/a
Digital Archive recipient	Local Museum
Paper Archive recipient	Local Museum

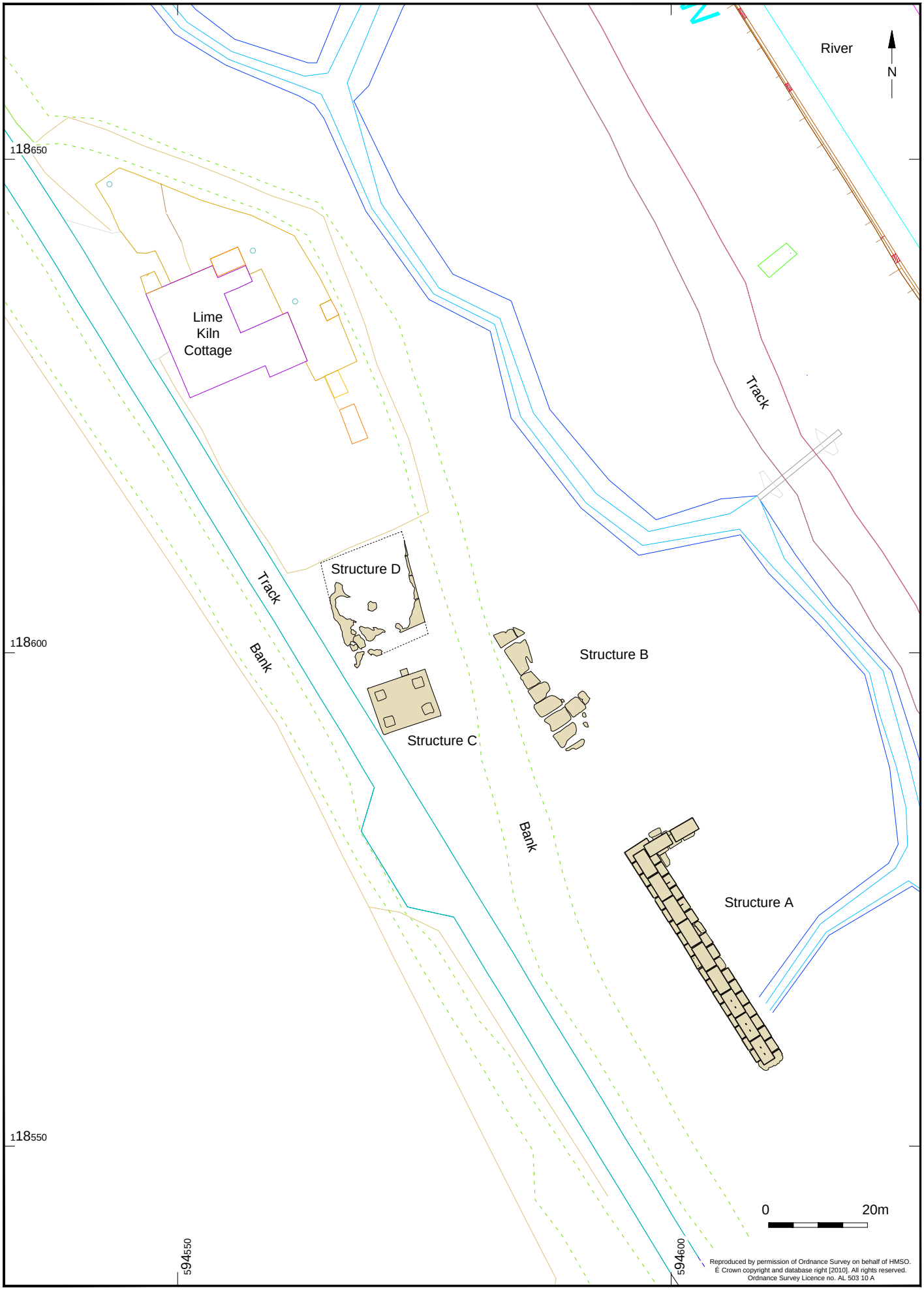
Project bibliography 1

Publication type	**Grey literature (unpublished document/manuscript)**
Title	**Rye Harbour Farm**
Author(s)/Editor(s)	**Justin Russell**
Other bibliographic details	**2010172**
Date	**2010**
Issuer or publisher	**Archaeology South-East**
Place of issue or publication	**Archaeology South-East**
Description	**Bound report with text, illustrations and photographs**

Entered by	**Justin Russell (justin.russell@ucl.ac.uk)**
Entered on	**6 October 2010**



© **Archaeology South-East**		Rye Harbour	Fig. 1
Project Ref: 4452	Oct 2010	Site location	
Report Ref: 2010172	Drawn by: JLR		



© **Archaeology South-East**		Rye Harbour	Fig. 2
Project Ref: 4452	Oct 2010	Site plan	
Report Ref: 2010172	Drawn by: JLR		

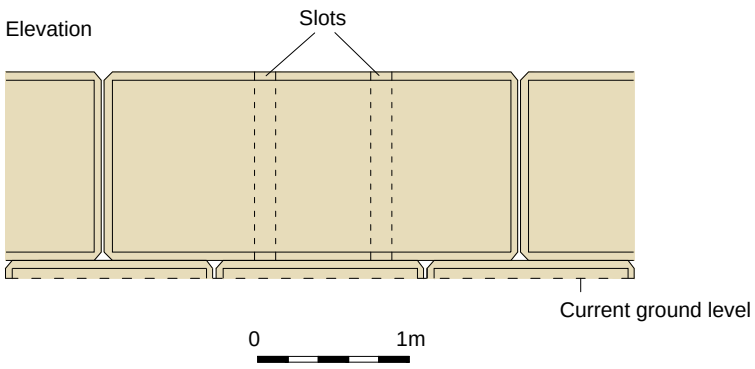


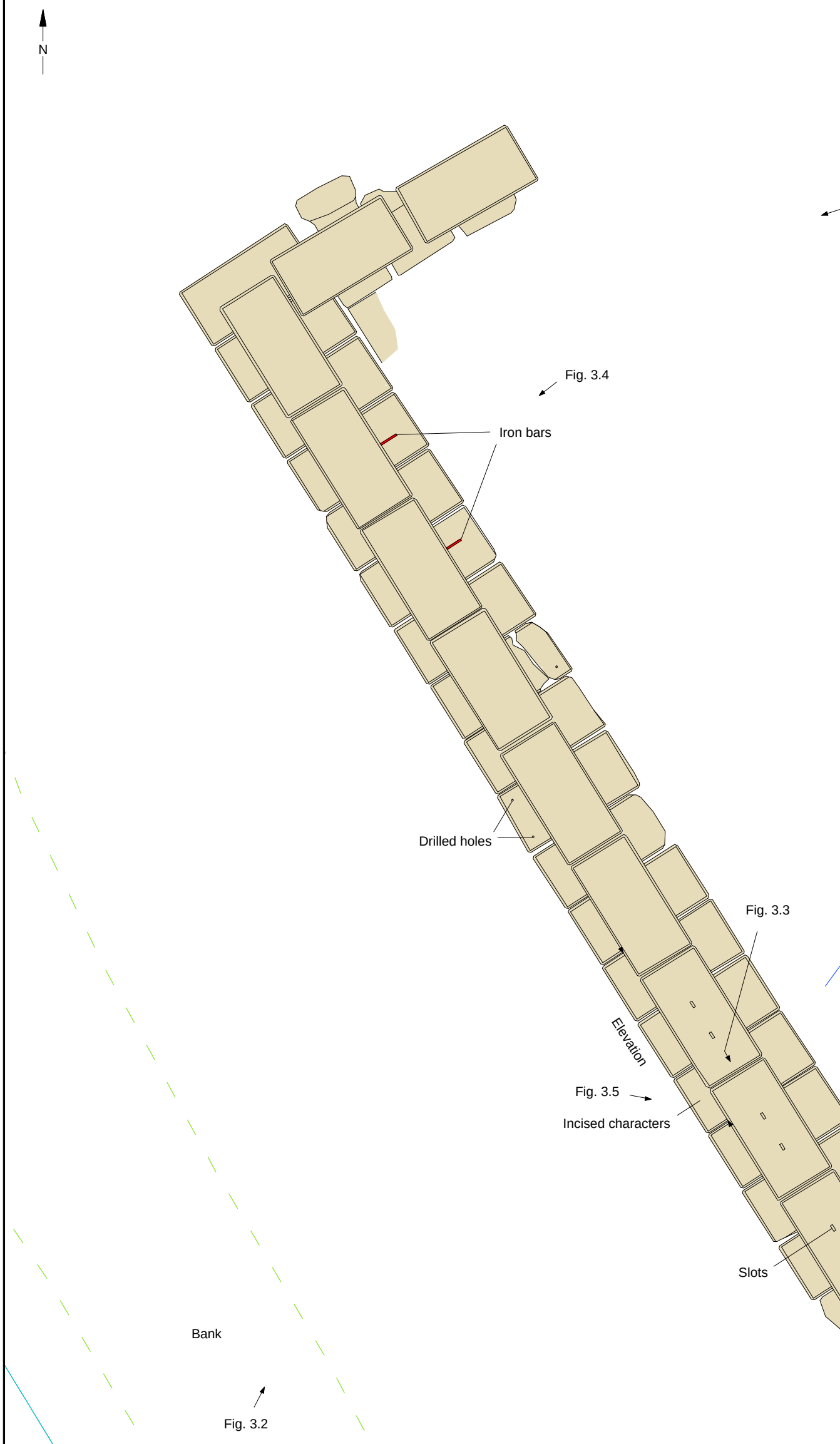
Fig. 3.1: Structure A, looking south-west

Fig. 3.2: Structure A, looking north

Fig. 3.3: Cast slots and chamfered edges

Fig. 3.4: Iron bars, looking south-west

Fig. 3.5: Incised characters



É **Archaeology South-East**		Rye Harbour	Fig. 3
Project Ref: 4452	Oct 2010	Structure A: Plan, elevation and photographs	
Report Ref: 2010172	Drawn by: JLR		

Fig. 4.1: Structure B, looking south-east

Fig. 4.2: Structure B, looking north-west

Fig. 4.3: Structure B detail, showing fine grained concrete render

É **Archaeology South-East**		Rye Harbour	Fig. 4
Project Ref: 4452	Oct 2010	Structure B: Plan and photographs	
Report Ref: 2010172	Drawn by: JLR		

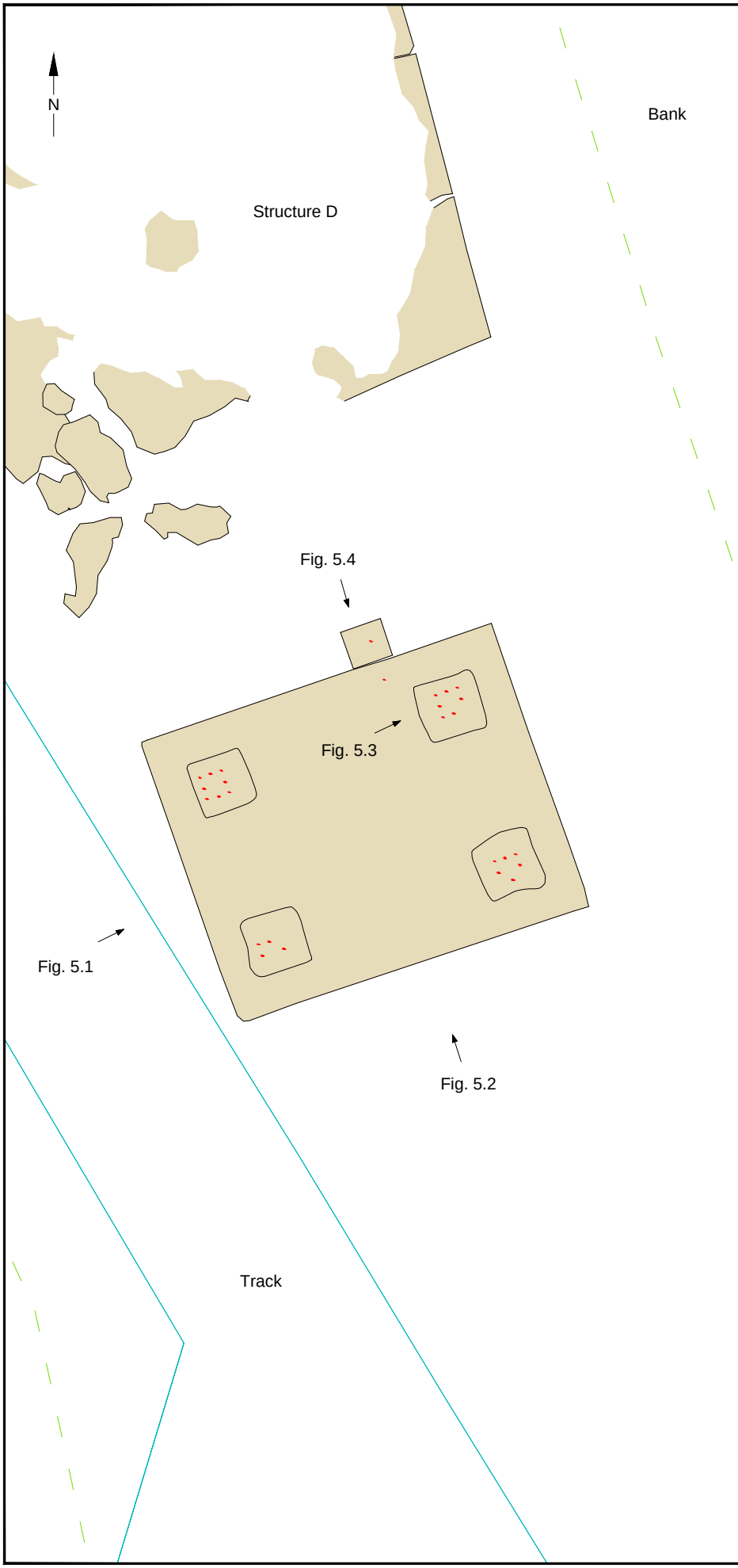


Fig. 5.1: Structure C, looking east

Fig. 5.2: Structure C, looking north

Fig. 5.3: Internal concrete pad with razed bolts

Fig. 5.4: External concrete pad, looking south

É **Archaeology South-East**		Rye Harbour	Fig. 5
Project Ref: 4452	Oct 2010	Structure C: Plan and photographs	
Report Ref: 2010172	Drawn by: JLR		

Fig. 6.1: Structure D, looking east

Fig. 6.2: Structure D, looking west to Structure C

N

Lime Kiln Cottage garden

Fig. 6.2

Vegetation and spoil

Structure D

Bank

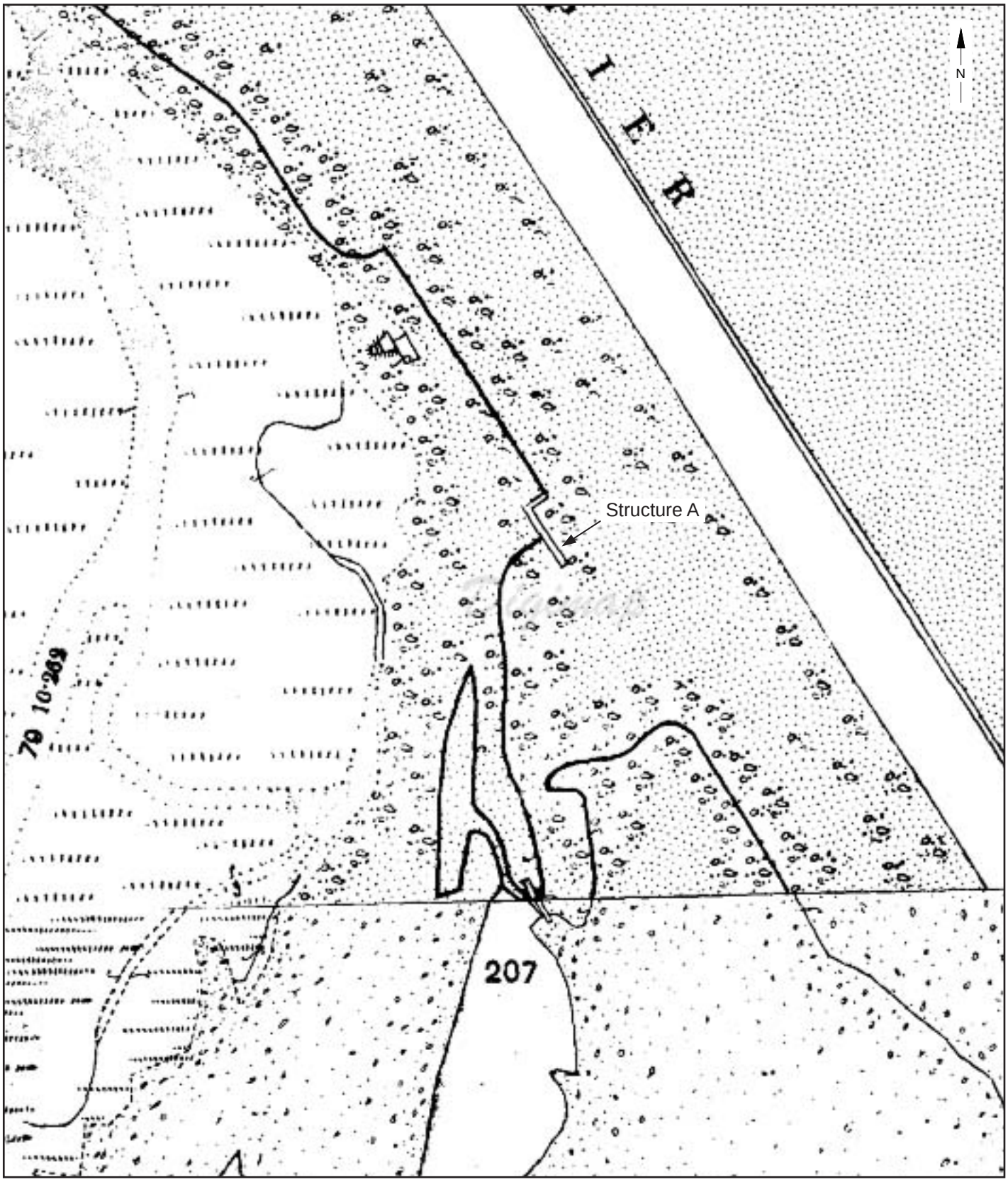
Fig. 6.1

Approximate extent of concrete

Track

0 2m

É **Archaeology South-East**		Rye Harbour	Fig. 6
Project Ref: 4452	Oct 2010	Structure D: Plan and photographs	
Report Ref: 2010172	Drawn by: JLR		



© **Archaeology South-East**		Rye Harbour	Fig. 7
Project Ref: 4452	Oct 2010	Ordnance Survey 1st edition, 1872	
Report Ref: 2010172	Drawn by: JLR		

Fig. 8.1 Concrete blocks in wall of Admiralty Pier, Dover harbour (Photo: R. Cole)

Fig. 8.2 Concrete base to fishing hut at the mouth of the Rother

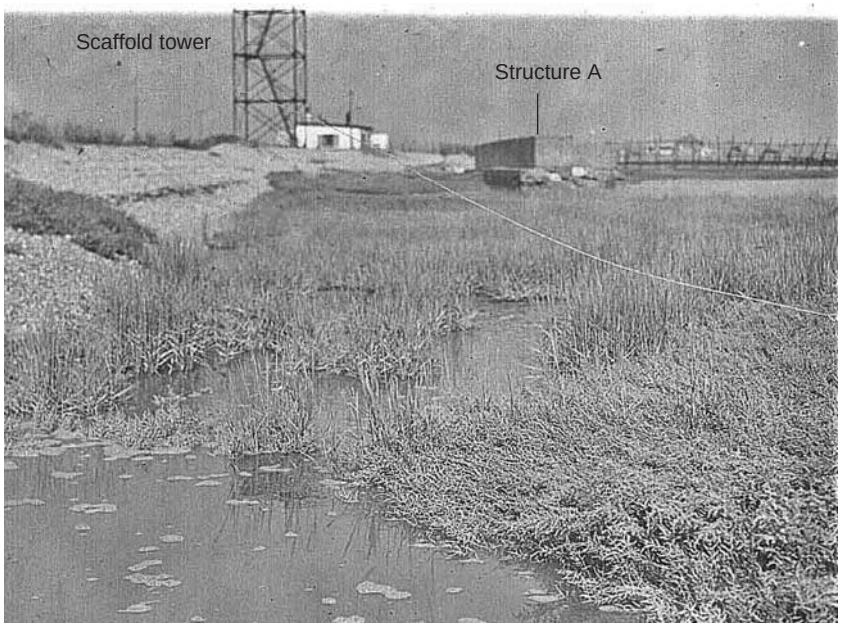


Fig. 9.1: 1947 view, looking north-west towards Lime Kiln Ciottage

Fig. 9.2: Contemporary view from the same location

Head Office
Units 1 & 2
2 Chapel Place
Portslade
East Sussex BN41 1DR
Tel: +44(0)1273 426830 Fax:+44(0)1273 420866
email: fau@ucl.ac.uk
Web: www.archaeologyse.co.uk

London Office
Centre for Applied Archaeology
Institute of Archaeology
University College London
31-34 Gordon Square, London, WC1 0PY
Tel: +44(0)20 7679 4778
Fax:+44(0)20 7383 2572
Web: www.ucl.ac.uk/caa

The contracts division of the Centre for Applied Archaeology, University College London