Northeye

Pevensey Levels

East Sussex

Geoarchaeological Assessment Report

oxfordarchaeology

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Pevensey Levels
East Sussex

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(NGR TQ 6770 0709)

October 2009

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SUMMARY

Oxford Archaeology (OA) was commissioned by Natural England on behalf of Mr and Mrs Kemp, landowners of Northeye Scheduled Monument (S.M. MES93), to undertake a geoarchaeological assessment as part of their Higher Level Stewardship Agreement (AG 00246947). The assessment consisted of a field survey to record the sequence of deposits and recover samples for palaeoenvironmental assessment in the low-lying marsh area that surrounds the scheduled monument.

A transect of five boreholes and two auger holes were taken through the marsh sediments. The sequence of deposits are relatively consistent. Two main phases of rising sea level (marine transgression) and one phase of lower sea-level (regression) have been identified. The main period of regression is characterised by the accumulation of peats and organic deposits that represent a mosaic of different wetland environments. These deposits are prehistoric in date and have been radiocarbon dated to between c 1670-1430 cal BC (Middle Bronze Age) to c 820-530 cal BC (Early Iron Age).

Palaeoenvironmental assessment for pollen, waterlogged plant remains, and insects was undertaken for one representative sequence. The assessment identified good potential for preservation of organic remains below a depth of 1.40 metres (+1.05 m OD), associated with the accumulation of the peats. This sequence therefore has the potential to provide detailed information on vegetation and sea-level change from the late Mesolithic period onwards.

Previous studies have noted that early prehistoric utilisation of the Pevensey Levels is associated with episodes of marine regression. The organic deposits identified during this assessment therefore have the potential to contain evidence of prehistoric activity in the form of artefacts, wooden trackways or platforms and boats. The organic deposits and any archaeological remains therein are vulnerable to both direct impacts through the digging of drainage ditches to depths greater than 1.40 m, or secondary impacts such as the lowering of the water-table.

The natural shallow embayments of the island were likely a significant factor in the growth of salt working in this area. The abandonment of the village was most likely partly due to a decline in the salt works. This was in part due to the declining economy and the spread of disease in the late 13th to 14th centuries. However these affects were probably significantly exacerbated at Northeye by the storms of the late 13th century which likely infilled most of the embayments which were used in salt production. The village never appeared to recover from these events and was subsequently abandoned.

Significant early salt working sites and other medieval features such as jetties may be found around the edges of the Northeye Island. Such discoveries could help inform about the activities associated with the medieval village. Within the area immediately surrounding the bedrock

island these deposits are less than 1 metre from the surface and would therefore be vulnerable to direct impacts.

Acknowledgements

Oxford Archaeology would like to thank Ann Clarke of Natural England and Mr and Mrs Kemp.

The fieldwork and report was undertaken by Carl Champness of OA's Geoarchaeological Services Department. The logging of the cores was undertaken by Christof Heisterman and Laura Strafford. The project was managed by Carl Champness.

NORTHEYE DESERTED MEDIEVAL VILLAGE PEVENSEY LEVELS East Sussex

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1 INTRODUCTION

1.1 Location and scope of work

1.1.1 Oxford Archaeology (OA) was commissioned by Natural England on behalf of Mr and Mrs Kemp, landowners of Northeye Scheduled Monument (S.M. MES93), to undertake a geoarchaeological assessment as part of their Higher Level Stewardship Agreement (AG 00246947). The investigation consisted of a programme of five boreholes and two auger holes across the Northeye Deserted Medieval Village (D.M.V.).

1.1.2 The aim of the investigation was to provide baseline geoarchaeological and palaeoenvironmental data on the sub-surface sedimentary sequence and to assess the likely impacts of proposed ditch clearance and other land management practices. The work was undertaken in accordance to East Sussex County Council Standards and Guidelines (2008).

1.2 Geology and topography

1.2.1 The site is located in the Hooe Levels which forms part of the Pevensey Levels on the outskirts of Bexhill (NGR TQ6770 0709, Figure 1). It is situated on an area of coastal low-lying land that has been drained by artificial channels. The site is approximately 8.3 ha in size and is currently in use as rough pasture. The Pevensey Levels are the largest tract of wetland in East Sussex, an important National Nature Reserve and a Site of Special Scientific Interest (SSSI).

1.2.2 The drift and solid geology is mapped as alluvium overlying Wadhurst Clays (BGS, sheet 319/320). It is at the edge of a coastal lagoon that has been reclaimed from the sea, and deep sequences of Holocene alluvium, consisting of peat and clayey sand and silt deposits, have been identified previously within the area (Jennings and Symth 1982).

1.2.3 The site is dominated by an outcrop of Wadhurst Clay lying at approximately 5 meters OD, forming an island 10 metres above the surrounding area of drained marsh. The bedrock island is occupied by the Northeye DMV.

1.3 Archaeological and historical background

1.3.1 The palaeoenvironmental history of the Pevensey Levels is largely unexplored. Moffat (1986) provides some indication of the stratigraphy of the Levels. The upper two metres comprise silts and clay, overlying two layers of wood peat. A considerable thickness of wood peat, from *c* 1.90 m to *c* 2.70 m in depth, was radiocarbon dated to 1540 ± 80 BC. Bluish grey silts and clays were encountered at the base of a core at a depth of 3 m.

1.3.2 This sequence is consistent with others recorded along the south coast of England, which can be broadly divided into three main stratigraphic units. The lower unit consists of estuarine and marine sands of early Holocene date, the middle unit is characterised by silty clay alluvium and freshwater peats reflecting periods of changing sea-level and river flooding, and the upper deposits consist of a return to estuarine silts that began to accumulate 2500-3000 years ago. The present landscape developed following the reclamation of the area that began in the medieval period.

1.3.3 Thick peat deposits may have begun to accumulate within the bay during the prehistoric period as freshwater fen environments replaced former areas of salt marsh during periods of marine regression. The archaeological and palaeoenvironmental significance of these peat deposits is gradually being revealed by recent archaeological investigations. At Shinewater, on the Willingdon Levels, located at the edge of a similar lagoon, a peat layer that accumulated during the Bronze Age produced evidence of a wooden platform and associated trackways (Jennings *et al* 2003). A thick accumulation of occupation material sealed the platform which contained late Bronze Age settlement evidence. The platform appeared to have been abandoned very quickly as a result of rapid marine inundation. Geoarchaeological work to the north east of Bexhill, in the Combe Haven Valley (OA 2008) has also identified evidence of prehistoric activity associated with a peat sequence.

1.3.4 Widespread marine inundation of low-lying areas along the coastal plain appears to have occurred between the early Iron Age and Roman periods. Organogenic deposition was replaced by the accumulation of minerogenic silty clays, reflecting a return to tidal inundation and the development of a salt marsh environment by the end of the Roman period.

1.3.5 During the Anglo-Saxon period this area was used for salt making. The remains of numerous salt works are known surrounding elevated bedrock islands; or 'eyes,' The ‘eyes’ of Chilleye, Northeye, Horseye and Richeye make up a group of islands forming a miniature archipelago. Until the medieval period, the Levels were tidal, guarded by Pevensey Castle; a Roman fort and then Norman Castle.

1.3.6 The village of Northeye, may once have been a harbour and a limb of the Cinque Port of Hastings. The site comprises earthworks of Northeye DMV situated on an area of high ground within the Pevensey Levels. The site was clearly linked to the deserted medieval village of Barnhouse to which it is still connected by a sunken lane marked on the Tithe Map as the 'Droveway'. The plan of the village can be discerned from

house platforms and hollow ways, that can still be seen today. Only the earthworks within Chapel Field are well-preserved; the rest of the surrounding works have been reduced by ploughing to amorphous banks and ditches. The site of the chapel, on the highest part of the island, is marked by disturbed ground indicating past excavation by L. Beasley of Normandale School in 1939. It is not known when the port of Northeye ceased to exist. The drainage of the Pevensey marshes from the 13th century and a series of severe storms along the Sussex coast in the late 13th century may have resulted in the decline of salt production and general economic hardship.

1.3.7 Over hundreds of years, the Levels gradually changed from saltmarsh to reedy meadows although much of the area was still under water as recently as 700 to 800 years ago. The Levels were drained and reclaimed in the later medieval period, as the demand for arable and pastoral land increased.

2 AIMS

2.1.1 The main objective of the survey was to provide base-line data regarding the character and archaeological potential of the sub-surface stratigraphy. It was intended this data be used to generate an interpretative cross-section, which could aid in the impact assessment of proposed works.

2.1.2 The principle aims of the geoarchaeological survey as outlined within the specification were:

- To establish a permanent record of the stratigraphy in 5 selected locations
- Collect samples to assess the potential for off-site analysis/assessment
- Create preliminary interpretation of the archaeological site formation processes
- Create a preliminary interpretation of the vegetation and aquatic conditions
- Establish the potential for survival of archaeological remains

2.1.3 Site specific research aims:

- Help to establish a link between the sediments on the Northeye island and the stratigraphic equivalent in the marsh sequence
- Try to identify the impacts of Saxon and medieval salt production on the localised environment around the site
- Assess the impacts of the island settlement on the marsh environment
- Attempt to address why the site was abandoned by the 15th century, and whether this was a response to the decline in the salt workings
- To assess the likely impact of any ditch clearance or other land management practices that could affect archaeological deposits

3 METHODOLOGY

3.1.1 The survey was undertaken as a linear transect across the Northeye DMV. The locations were selected in order to take into account the area protected by the S.M. regulations and the bedrock island. Each location was recorded in three dimensions with a GPS unit.

3.1.2 Five boreholes were drilled using a Terrier percussion rig in order to recover undisturbed core samples suitable for palaeoenvironmental assessment and sediment description. The drilling was carried out by a specialist subcontractor and was monitored by a qualified OA geoarchaeologist. The cores were returned to OA where they were extruded, photographed and logged using standard sediment terminology according to Jones *et al* 1999. This included information on colour, composition, texture, structure, compaction, erosional contacts, artefactual and ecofactual inclusions. Sub-sampling for palaeoenvironmental remains was carried out under laboratory conditions.

3.1.3 Two auger holes were originally proposed in order to link the borehole data to the sequences on the bedrock island. Only one auger hole (OAAH1) was completed, immediately outside the S.M boundaries. The other auger hole (OAAH2) was abandoned as Scheduled Monument Consent could not be obtained within the scope of this investigation. The equipment comprised a standard hand-operated soil auger. A selection of different auger heads was employed in order to deal with the variety of sediment types that might be encountered (Dutch, Bucket, Stoney soil, Gouge and Screw auger). The sediment recovered at each location was laid out according to depth from borehole ground level (bgl). Care was taken to minimise contamination of samples through soil sloughing into the hole upon inserting the auger. Relative depths were noted and a description of the deposits was undertaken.

3.1.4 The lithological data from both the auger and boreholes was inputted into geological modelling software (Rockworks 14) to allow correlation of key stratigraphical units. A cross-section across the site has been produced in order to illustrate the inter-relationship between deposits (Figure 3).

3.1.5 One representative sedimentary sequence was selected for the assessment of the preservation of palaeoenvironmental remains (e.g. macroscopic plant remains and pollen) and material suitable for radiocarbon dating. The selection of the samples was based on the perceived character, interpretative importance and chronological significance of the strata under investigation.

4 RESULTS

4.1 Ground conditions

4.1.1 At the time of the fieldwork the site comprised rough pasture, drainage ditches and the flattened remains of the Northeye DMV. The survey was undertaken in good conditions, without significant ground water problems.

4.2 Deposit Model

4.2.1 Based on the results of the survey a deposit model has been developed to aid in the assessment of the archaeological and palaeoenvironmental potential of the site. The following key stratigraphic units were identified:

- Bedrock
- Lower clayey silts/sands
- Peat/organics
- Upper silty clays
- Archaeological fills
- Topsoil

Pre- Holocene deposits

4.2.2 The bedrock was recovered within only two boreholes at the edge of the bedrock island (OABH3 and OABH4) as light yellow clayey sand with occasional reddish mottling. The bedrock was encountered at the edge of the island at 2 m OD dipping down towards the marsh. The bedrock was also encountered in the single auger hole (OAAH1), which was located on top of the bedrock island at 3.5 m OD.

Lower clayey silts and sands

4.2.3 The lower minerogenic deposits were only recovered in the boreholes drilled towards the west of the bedrock island (OABH1 and OABH2) which were excavated to a maximum depth of 5 m bgl. The deposits were recovered as bluish grey clayey silt and sand with no coarse inclusions, between 5.00 m and 1.70 m bgl (-2.50 m OD to +0.32 m OD). The base of this unit was not reached. These sediments were finely laminated reflecting their tidal influence.

4.2.4 The lower units represents medium to coarse-grained deposits that represent tidal fluctuations in water depth and in the energy of deposition. These deposits are likely to have accumulated within a coastal salt marsh environment with frequent inundation resulting in the deposition of silts and sands.

Organic silts and peats

4.2.5 A complex series of organic deposits were recovered from three of the boreholes (OABH1, OABH2 and OABH5). These deposits consisted of organic silts and wood peat, interstratified with light bluish grey clay between 2.13 m and 1.40 m bgl (+0.32 m OD and +1.05 m OD). The peat primarily occurred between 2.05 m to 1.94 m bgl (+0.40 m OD and +0.51 m OD) and consisted of a compacted blackish brown wood peat.

4.2.6 These deposits form a blanket spread over much of the lower-lying topography. The fine grain nature of the deposits represent lower energy deposition within slow or stagnant water. The more organic parts of the sequence may be representative of wetland environments such as carr deposits. Other more minerogenic parts of the sequence may indicate periodic flooding at the edge of active channels. Any archaeological material associated with these deposits is likely to have undergone

in thickness between 0.13 m and 0.25 m, with the thickest soil occurring near to the top of the bedrock island. No finds were recovered from the topsoil.

4.3 Biostratigraphy

4.3.1 Palaeoenvironmental assessment of borehole OABH1 was undertaken as this was the deepest and best preserved sequence of the organic silts and peats. Sub-samples were taken from each context for waterlogged plant remains, pollen and dating evidence. The sample locations are shown within the sediment logs in Appendices 1. The specialist assessments can be found in Appendices. A discussion of the main findings of these reports is presented below.

4.3.2 The accumulation of estuarine sands and silts between -2.5 m OD and +0.32 m OD represents marine inundation of the Levels as a result of the continued rise in sea level following the end of the last glaciation. The samples taken from the lower silts deposits (2.54-2.59 m, 3.40-3.45 m and 4.80-4.85 m bgl) produced decreasing quantities down the sequence of indeterminate plant material. No waterlogged plant macrofossils (e.g. seeds, fruits) were noted. Pollen was also not preserved within these contexts.

4.3.3 It is likely that areas of woodland, formed during the early to mid-Holocene, would have gradually given way to salt marshes as the marine influence extended to higher elevations on the coastal plain and up the river valleys. Previous investigations of fossil remains and diatoms confirm that these marine deposits accumulated under estuarine conditions, radiocarbon dated to between 8000 and 5000 BP (Jennings *et al* 2003).

4.3.4 At a depth of 1.40 m bgl (+1.05 m OD) a major change in sedimentation occurs from sandy clays to organic clays and peat. This transition represents a significant slowdown in the rate of sea-level rise. Salt marsh environments appear to have been replaced, initially by reed swamp, and then carr vegetation. Evidence for this regression (lower sea-level) is present in the remains of a submerged forest bed that can be observed at low-tide seaward of Pevensey. The same forest bed has also been identified offshore near Combe Haven, Rye Bay and Pett.

4.3.5 The sample from the main wood peat unit (1.96-2.01 m bgl) was the richest encountered and produced a Middle Bronze Age Date (1670-1430 cal BC: SUERC-23950). The waterlogged plant remains were not particularly diverse, but a range of wetland taxa were noted. The plant remains indicate alder carr woodland was growing nearby. The recovery of pondweed (*Potamogeton* sp.) suggests relatively deep, slow-flowing water was present and certainly celery-leaved buttercup can occur in deeper water (e.g. ditches/ ponds), in addition to marshy fields and streamsides (Stace 1997, 90). Waterside taxa such as gypsywort (*Lycopus europaeus* L.), sedge (*Carex* spp.) and rushes (*Juncus* spp.) are also typical of wetland/ alder carr habitats (e.g. Stace 1997). In addition to plant macrofossils, charophytes (green algae) were also noted, which suggest a freshwater, wetland environment. Fragments of beetles

(Coleoptera) and mites (Acarina) were frequently noted in the sample from 1.96-2.01 m and it seems likely that the lower alder peat can produce interpretable insect assemblages.

4.3.6 The pollen record from the peat intercalated with bluish grey clay (1.45-2.05 m bgl), suggests that the local environment was a fen carr in which royal fern dominated the understorey. Today royal fern is found growing in fens, bogs, wet woods and heaths on peaty soils (Stace 1997). Initially birch was the major tree in this wet woodland (fen carr, 1.96-1.97 m bgl) but was partly replaced by alder towards the top of the deposit (1.40-1.41 m bgl). As alder became more important in the fen carr there was an increase in both number and diversity of the herbaceous pollen. It is significant that pollen from the goosefoot family was recorded, possibly suggesting an increasing marine influence towards the top of this unit.

4.3.7 The sample from the upper peat deposits (1.75-1.70 m bgl) contained hundreds of small-sized (<2mm) wood fragments, as well as occasional larger fragments. A few blackberry (*Rubus* spp.) seeds, one of which was quite poorly preserved, and one pondweed (*Potamogeton* sp.) seed were noted. These seeds were dated to the Early Iron Age, which provided a date for the formation of the upper peat deposits (820-530 cal BC: SUERC-23949). The wood fragments were sometimes coated in a white substance (possibly salt) and the plant remains generally had a metallic appearance, which is consistent with material that has been dried-out at some point in the past. This may explain why only the woody blackberry (*Rubus* spp.) pips were preserved in this sample.

4.3.8 The overlying silts (1.25-1.20 m bgl) were relatively sterile, only rare macrofossils were noted, other than fine fragments of plant stem/rootlets (described as 'plant frass'). There were fewer pollen grains and spores preserved in these samples. Tree and shrub pollen made up 53% of the pollen sum with 30% pollen from herbaceous taxa and 17% fern spores. Alder was the major tree pollen type with some oak, hazel, birch and pine. There was a diverse assemblage of herbaceous pollen with quite high values of pollen of the goosefoot family and a single grain of sea thrift (*Armeria maritima*). Bracken and other fern spores were well represented but no spores of the royal fern were recorded. Microscopic charcoal fragments were more frequent at this depth.

4.3.9 Previous studies of pollen and diatoms from stratigraphically equivalent deposits indicate the establishment of salt marsh conditions on what had been previously alder woodland, including the seaward forest beds. Similar major incursions by the sea at this time are recorded in the Lower Thames Valley, and a number of other locations along the south coast of England. This frequently occurred between the late Bronze Age and Early Iron Age, with a number of potential causes cited for the increased sea-level.

4.3.10 Away from the low-lying ground of the Pevensey Levels the pollen record suggests the presence of mixed deciduous woodland of hazel, birch, oak with some beech but

no elm (*Ulmus*). As marine influence increased the woodland became more open and herbaceous plants and bracken probably expanded. There is no evidence of anthropogenic activity until 1.21-1.20 m bgl when the vegetation became more open and microscopic charcoal fragments became abundant, although some possible cereal-type pollen was recorded at 1.71-1.70 m bgl.

4.3.11 The sandy clay deposits identified within the upper silts in OABH3 may represent major storm events that significantly increased sedimentation across the Levels. Historical sources record the silting up of harbours and waterways during the late 13th and 14th centuries across most of the South-East Coast of England. However insufficient organic material was persevered within this context for radio-carbon dating.

4.3.12 The medieval village of Northeye developed on the bedrock island to exploit the rich resources of the salt marshes. The natural shallow embayments of the island were likely a significant factor in the growth of salt workings in this area. The decline in the salt works were most likely partly due to a decline in the economy and the spread of disease in the late 13th century. However these were probably significantly exacerbated at Northeye by the storms of the late 13th century which may have in-filled most of the embayments used in salt production and as waterways. The village never appeared to recover from these events and subsequently was abandoned.

5 DISCUSSION AND INTERPRETATION

5.1 Reliability of field investigation

5.1.1 The widely spaced sample locations occasionally made interpretation and correlation of deposits difficult. However, all samples achieved their intended depth and provided good quality intact cores for paleoenvironmental work. While not all deposits could be fully correlated across the whole of the site, the general sequence is broadly understood. The assessment also provided sufficient information to indicate the range and preservation of palaeoenvironmental material associated with these deposits.

5.2 Discussion

5.2.1 The investigation has served well in characterising the broad sedimentary architecture of the area surrounding Northeye Island. It has identified a sequence of mid-late Holocene sediments that have the potential to preserve evidence of vegetation and sea-level change which could help elucidate the landscape history of the site. It also helps to place the Northeye Medieval village within a wider environmental and sedimentary context.

5.2.2 The palaeoenvironmental assessment has identified good potential for the preservation of ecofactual material below a depth of 1.40 m bgl (+1.05 m OD) associated with the main peat sequence. The sample taken through the wood peat at 1.96 m bgl was the richest and most informative, with potential for the preservation

only minimal modification in terms of lateral transport, though again a higher degree of reworking may be present at channel edge locations.

4.2.7 Broadly, this sequence represents a significant phase of marine regression. The complexity of the deposits, however, indicates that on a local scale a diverse range of freshwater wetland environments may have existed at any one time across the site. Towards the edges of the island the peat is less easily divided into distinct units and occurs at higher elevations (OABH2). If peat formation was diachronous, then this peat may be significantly younger than in other locations. During periods of marine inundation, peat may have continued to form around the edges of the island, concurrent with minerogenic accumulation at lower elevations.

Archaeological fills

4.2.8 An archaeological deposit was identified within one borehole (OABH3) at the edge of the bedrock island at a depth of 0.89 m to 0.63 m bgl (+1.66 m OD to +1.92 m OD). The deposit was found overlying the bedrock and sealed by flood deposits associated with the Upper Silty Clays.

4.2.9 The deposit consisted of friable dark brown clayey silt mixed deposits with flecks of charcoal and an un-diagnostic tile fragment. This deposit potentially represents early medieval activity at the interface between the wetland and dryland zones.

Upper silty clays

4.2.10 These deposits consisted of soft light-grey to greyish-brown, sandy clays and silty clays, occasionally with thin organic peat lenses near to the base. They range in thickness from 0.40 m to 1.60 m, and are found between +1.0 m OD to +2.5 m OD. The deposits are structureless with no coarse inclusions, although reddish brown Iron mottling indicates at some point an episode of drying and oxidisation.

4.2.11 These deposits are notably deeper in one borehole (OABH1) possibly indicating the location of a buried palaeochannel that has eroded the underlying peat. It is likely numerous tidal creek systems would have existed across the Levels at this time associated with a salt marsh environment.

4.2.12 The generally fine-grained nature of the sediments suggests fairly low energy deposition. Any archaeological material present within these deposits may have suffered low-level lateral movement, though a higher level of reworking is to be expected in the sandier deposits possibly representing deposition in small channels dissecting the marsh or accumulating during major storm events.

Topsoil

4.2.13 The topsoil across the site is relatively thin and consists of friable light yellowish brown clayey silts and silty loams with occasional coarse inclusions. The soils vary

of insect remains, as well as pollen and macroscopic plant remains. These deposits will be vulnerable to both direct impacts through the digging of drainage ditches to depths greater than 1.40 m and secondary impacts such as the lowering of the water-table.

5.2.3 Any floodplain islands or promontories at the edges of the wetland zone would have been very attractive locations for prehistoric communities to exploit the diverse array of natural resources. Archaeological remains; artefacts or structures, associated with these peat deposits are likely to have undergone only limited lateral transportation and would have been rapidly sealed and buried by later marine flooding. Within the low-lying area of the site, between 1 m to 2 m of later marine sediments have been recorded overlying the peat deposits. Early prehistoric activity (Middle Bronze Age-Early Iron Age) associated with the formation of the peat sequence could be found buried between, sealed within or just above the peat. Comparison with the sites at Shinewater and Combe Haven provide useful parallels as to the archaeological potential and significance of these sequences (see archaeological background). The potential for similar prehistoric activity to be present within the deposits at Northeye can not be discounted.

5.2.4 The upper minerogenic deposits show signs of oxidation and drying out, with only the more resilient of waterlogged plant remains being preserved. The digging of drainage ditches above 1.40 m is unlikely to significantly impact upon the palaeoenvironmental potential of this sequence. However, an archaeological deposit identified outside of SM limits at the edge of the island in OABH3, occurred at a depth of 0.63 m and could easily be directly affected by any proposed drainage ditches. Significant early salt working sites and other medieval features like jetties could be found around the edges of the Northeye Island. These low-lying areas may well contain a wealth of archaeological and sedimentary evidence that could help inform about the activities of the occupants of the village.

5.2.5 Environmental and artefactual evidence could also be vulnerable to any changes in pH that may occur with the use of any agri-chemicals at the site.

6 CONCLUSIONS

6.1.1 Based on the results of the data collected during the survey the following conclusions can be drawn:

- The general stratigraphic sequence conforms to the regional patterns of vegetation and sea-level change, comprising a tripartite system of two main phases of marine transgressions and one phase of regression.
- The survey has successfully identified the main sub-surface stratigraphical units across the site. It has established the depth of organic preservation lies below 1.40 m bgl and has good potential for waterlogged plant remains, insects, and pollen.

- The fortunes of the medieval village of Northeye appear to have been very much linked with that of the salt works. The village appears to have been abandoned following a decline in the economy and the spread of disease in the late 13th and 14th centuries, but suffered particularly due to an increased in sedimentation of its embayments following major storms.

- An important peat deposit extends across the low-lying area surrounding the site at elevations of +0.32 m to +0.97 m OD, dating from Middle Bronze Age to the early Iron Age. Previous archaeological investigations within the region have identified prehistoric activity associated with these deposits. These deposits will be vulnerable to both direct and indirect impacts if the proposed works extend beyond a depth of 1.40 m bgl (+1.05 m OD).

- The interface zone between the bedrock island and the wetland zone has the potential to contain important archaeological deposits that relate to salt works and other early medieval activity. Within the areas immediate surrounding the island these deposits are less than 1 m from the surface and would be vulnerable to direct impacts.

- Any changes in the pH of the soil through addition of new agri-chemicals to the soil could be detrimental to the preservation of environmental evidence and artefacts within the upper sequence.

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Appendix 1: Sediment logs

GEOARCHAEOLOGICAL SERVICES

FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 567379.33	DATE: 18.07.08
BH NO: OABH1	ELEVATION: 2.45	NG NORTHING: 107099.87	LOGGER: CH

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00 – 0.20					clayey silt: Compacted clayey silt dark brown (10YR 4/3) humic with frequent roots diffuse boundary
0.20 – 1.40					clayey silt: Firm clayey silt light brown (10YR 5/4) with light blueish grey and orange mottles sharp basal boundary
1.40 – 1.80					clayey peat: interspaced peats and clay. Peat firm silty blackish (10YRI 7/1) Clay firm blueish grey (7.5Y 4/1)
1.80 – 2.00					peat: Firm main peat very dark blackish brown (10YRI 7/1) contains plant remains and wood
2.00 – 2.20					silty clay: Firm to plastic silty clay dark grey broen 5Y 3/2) contains small peat patches clear basal boundary
2.20 – 2.40					clayey sand: Firm fine sand Blue grey (10 Y 5/1) lighter towards base
2.40 – 2.60					clayey sand: Firm clayey sand greyish brown (2.5Y 4/2) mottled at base
2.60 – 4.00					clayey silt: Firm clayey silt blueish grey (5Y 5/1) frequent light brown and orange mottling with occasonal sandy clayey silt patches

NOTES:

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GEOARCHAEOLOGICAL SERVICES

FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08 | SECTION NO: | NG EASTING: 567379.33 | DATE: 18.07.08

BH NO: OABH1 | ELEVATION: 2.45 | NG NORTHING: 107099.87 | LOGGER: CH

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
4.00					
4.20					
4.40					sandy silt: Moderately firm sandy silt greyish brown (5Y 5/2) occasional blueish grey mottles clear boundaries to top and base
4.60					
4.80					silty clay: Firm silty clay brown (3.5Y 5/4) with orange mottles occasional bands of loose fine sand yellow (2.5Y 6/6) 0.03m thick

NOTES:

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FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 567526	DATE: 18.07.08
BH NO: OABH2	ELEVATION: 2.19	NG NORTHING: 107092.02	LOGGER: CH

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00 – 0.20					loam: Friable loam light yellowish brown very rare coarse inclusions clayey to base
0.20 – 0.80					silty clay: Soft structureless silty clay light brownish yellow no coarse inclusions occasional reddish mottling and black staining diffuse lower boundary
0.80 – 1.00					silty clay: Very soft structureless silty clay light blueish grey no inclusions slightly oxidized near base
1.00 – 1.40					peat: Compact peat dark brown poorly humified frequent wood fragments absent upper boundary
1.40 – 1.60					ORGANIC SILT: Very soft organic silt dark brown occasional organic remains very diffuse lower boundary
1.60 – 2.60					silty sand: Loose / compacted fine silty sand light brownish yellow no coarse inclusions
2.60 – 2.80					sandy clay: Firm compacted sandy clay light browish yellow with blueish mottling no coarse inclusions

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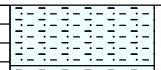
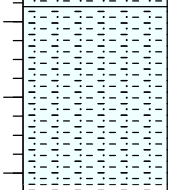
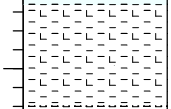
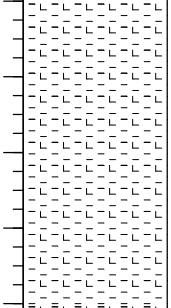
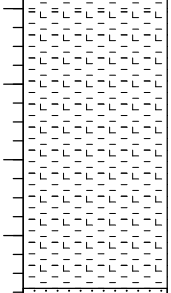
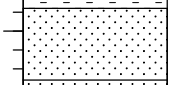
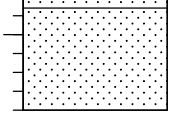
FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 567716.98	DATE: 25.07.08
BH NO: OABH3	ELEVATION: 2.55	NG NORTHING: 107090	LOGGER: CH

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00 – 0.20					sandy silt: Loose friable sandy silt (2.5Y 4/2) A horizon diffuse boundary
0.20 – 0.60					sandy silt: Friable sandy silt (10YR 5/4) with orange mottles laminated estuarine sediment mixed material at base
0.60 – 0.80					clayey silt: Firm dark brown clayey (10YR4/2) silt
0.80 – 1.00					silty sand: Firm silty sand reddish brown (7.5YR 4/6)
1.00 – 1.80					clayey silt: Clayey silt yellowish brown (2.5Y 6/8) strong mottling
1.80 – 2.40					clayey silt: Firm clayey silt yellowish brown (2.5Y 6/6) with grey and orange mottling
2.40 – 2.60					sand: Moderate firm sand yellow (2.5Y 7/6) becomes red and slightly clayey at base
2.60 – 2.80					sand: Firm fine sand very light yellow (5Y 8/3) with light grey and light orange horizontal mottling and bands

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FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 568413.01	DATE: 15.07.08
BH NO: OABH4	ELEVATION: 2.13	NG NORTHING: 107125	LOGGER: LS

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00					loam: Turf
0.20					clayey silt: Loose dark greyish brown (10YR 4/2) clayey silt with occassional modern rootlets.Frequent sub-rounded flint pebbles
0.40					clayey silt: Loose clayey silt dark yellowish brown (10YR4/4) with no coarse inclusions.
0.60					silty clay: Compacted olive brown (2.5Y4/4) mottled silty clay with rare sub-rounded to sub-angular flint pebbles (up to 5cms)
0.80					silty clay: Firm light olive brown (2.5Y) silty clay with occassional coarse inclusions of sub-rounded coarse inclusions flint pebbles up to 6cm. Occassional to rare organic and wood fragment inclusions.
1.00					sandy silt: Loose sandy silt light brownish grey (2.5Y 6/2) with occasional light olive brown (2.5Y 5/6) mottles with rare subangular pebbles > 0.01m
1.20					sandy silt: Loose sandy silt light yellowish brown(2.5Y 6/3) no visible inclusions
1.40					silty clay: Compact firm silty clay light olive brown (2.5Y 5/4) no inclusions
1.60					sandy clay: Compact mederate firm sandy clay yellowish brown (10YR 5/8) no inclusions diffuse top boundary clear at base
1.80					silty clay: Compact firm silty clay olive grey (5 Y 5/2) occasional brownish yellow (10YR 6/6) mottles no inclusions
2.00					silty clay: Compact firm silty clay 10% sand yellowish brown (10YR 5/8) no inclusions diffuse base boundary
2.20					clayey silt: Compact clay silt light yellowish brown (2.5Y 6/3) no coarse inclusions diffuse at base
2.40					
2.60					silty clay: Compact firm silty clay light yellowish brown (2.5Y 6/3) no inclusions very diffuse top and base boundary
2.80					clayey silt: compact clay silt mottled grey (2.5Y 6/1) and light yellowish brown (2.5Y 6/4) no inclusions diffuse top and base
					sandy silt: Loose fine crumbly sandy silt light grey (2.5Y 7/1) no coarse inclusions

NOTES:

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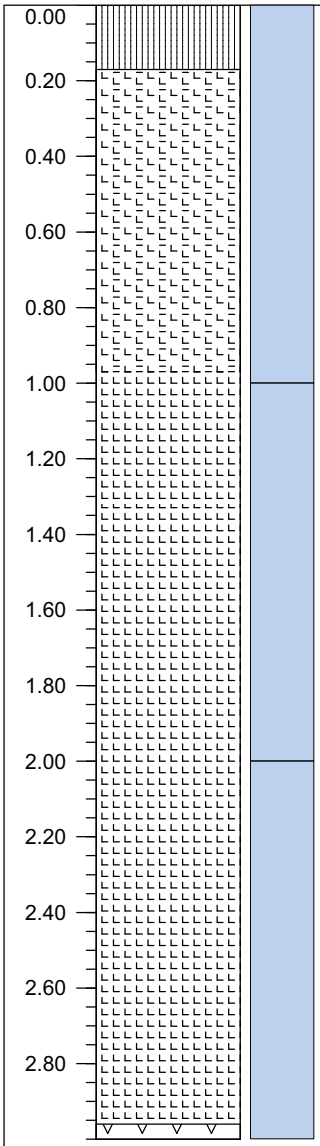
FIELD SEDIMENT LOGGING SHEET

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 568570	DATE: 15.07.08
BH NO: OABH5	ELEVATION: 2.33	NG NORTHING: 107228.98	LOGGER: LS

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00 – 0.20					loam: Moist loose dark brown (10YR3/3) loam with frequent modern rootlets and reed fragments. Diffuse lower boundary.
0.20 – 1.00					silty clay: Compacted brown (10YR4/3) silty clay with no coarse inclusions and rare modern rootlets. Occassional signs of oxidation within decayed root voids
1.00 – 1.40					clay: Firm olive brown (2.5Y4/4) clay with frequent reddish mottling. No coarse inclusions
1.40 – 2.40					clay: Compact and moderately soft greyish brown (2.5Y5/2) clay with reddish mottling.
2.40 – 2.80					peat: Loose moist black (10YYR 2/1) peat with frequent identifiable plant material. Very distinct and sharp upper boundary possibly intcating erosion.

NOTES:

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FIELD SEDIMENT LOGGING SHEET

Oxford Archaeology

SITE CODE: BEXPEV08	SECTION NO:	NG EASTING: 567914	DATE: 15.07.08
BH NO: OAAH1	ELEVATION: 3.5	NG NORTHING: 107047	LOGGER: CC

Depth	Lithology	Cores	Sub-samples P	Sub-samples WPR	Description
0.00					loam
0.20					sandy clay
0.40					sandy clay

NOTES:

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Appendix 2: Assessment of waterlogged plant remains

Dr Wendy Smith (Oxford Archaeology South)

Introduction

Seven sub-samples from Borehole 1, representing 5cm intervals of between 250 ml and 300 ml of sediment, were selected from between 1.20 to 4.85 m below modern ground surface through the main sedimentary sequence sampled at Northeye, Pevensey, East Sussex. Three main sedimentary deposits were sampled – an upper sandy/ silt (120-125cm and 140-145cm), a woody peat (1.70-1.75 m and 1.96-2.01 m) and a lower sandy/ silt (2.54-2.59 m, 3.40-3.45 m and 4.80-4.85 m).

Rapid assessment of these samples was carried out in order to establish:

- if waterlogged plant macrofossils were present and of interpretable value
- if other forms of environmental remains were present

Method

Samples were processed by bucket flotation by an environmental assistant at Oxford Archaeology. The flot (the material which floats) was sieved over a 0.25 mm geological sieve and the residue (the material which does not float) was retained in a 0.5 mm nylon mesh. For this assessment, only the flots were scanned, although heavy residues have been retained. Samples were scanned by the author using a low-power binocular microscope at magnifications between x8 and x35. For the purposes of this assessment, comparative material was not consulted and, therefore, identifications should be viewed as provisional. Plant remains are scored on a semi-quantitative scale and because of the speed of assessment, it is likely that small-sized plant remains (e.g. rush (*Juncus* spp.) seeds) or fragmentary material may be under-represented in this assessment. As a result, quantification of the plant remains presented here should be seen as notional, and only used as a guide to their relative quantity. Nomenclature for plant remains follows Stace (1997).

Results

Table 1 presents the results for all seven samples assessed. The uppermost sample (1.20-1.25 m) was relatively sterile, with no plant macrofossils noted other than a fine fragments of plant stem/ rootlets (described as 'plant frass' in Table 1). The next sample (1.40-1.45 m) contained a larger quantity of unidentified 'plant frass' but also many small (<2 mm) fragments of waterlogged wood. No plant macrofossils (i.e. seeds, fruits, etc...) were noted in this sample. The third sample (1.70-1.75 m) contained hundreds of small-sized (<2 mm) wood fragments, as well as some larger fragments. A few blackberry (*Rubus* spp.) pips, one of which was quite poorly preserved, and one pondweed (*Potamogeton* sp.) seed were noted. The wood fragments were sometimes coated in a white substance and the plant remains generally had a metallic appearance, which is consistent with material that has been dried-out at some point in the past. This may explain why only the woody blackberry (*Rubus* spp.) pips were recovered in this sample. The next sample (1.96-2.01 m) was the richest encountered.

Waterlogged plant remains were not particulrly diverse, but a range of wetland taxa such as celery-leaved buttercup (*Ranunculus seleratus* L.), alder (*Alnus glutinosa* (L.) Gaertn), gypsywort (*Lycopus europaeus* L.), pondweed (*Potamogeton* spp.), sedge (*Carex* sp.) and rush (*Juncus* spp.) were noted. This sample contained abundant wood fragments and, therefore, it is likely that smaller-sized seeds/ fruits or their fragments may have been missed during rapid scanning of this sample. Preservation was relatively good in this deposit. The final three samples (2.54-2.59 m, 3.40-3.45 m and 4.80-4.85 m) produced decreasing quantities of indeterminate/ unidentifiable plant frass. No waterlogged plant macrofossils (e.g. seeds, fruits, etc...) were noted.

Comperanda

Comparable data to the Northeye, Pevensey borehole samples is not currently listed on the English Heritage Environmental Archaeological Database (http://ads.ahds.ac.uk/catalogue/specColl/ eab_eh_2004 - consulted 9/9/08), as a result, any opportunity in future to date and fully analyse this deposit (including sampling up to 10L of sediment for insects) is highly recommended.

Potential

The plant remains are well-preserved at 1.96-2.01 m, and suggest alder carr woodland was nearby, if not in the immediate vicinity. The recovery of pondweed (*Potamogeton* sp.) suggests relatively deep, slow-flowing water was present. Certainly celery-leaved buttercup can occur in deeper water (e.g. ditches/ ponds), in addition to marshy fields and streamsides (Stace 1997, 90). Waterside taxa such as gypsywort (*Lycopus europaeus* L.), sedge (*Carex* spp.) and rushes (*Juncus* spp.) are also typical of wetland/ alder carr habitats (e.g. Stace 1997).

In addition to plant macrofossils, charophytes (green algae) were noted, which also suggest a freshwater, wetland environment. Fragments of beetles (Coleoptera) and mites (Acarina) were frequently noted in the sample from 1.96-2.01 m and it seems likely that the lower alder peat can produce interpretable insect assemblages.

The upper limit of the woody-peat deposit at 1.70-1.75 m is less-well preserved than that sampled at 1.96-2.01 m. The wood fragments are slightly metallic in appearance and in some cases are coated in a white powdery substance. The only plant macrofossils preserved are blackberry/bramble (*Rubus* spp.), and pondweed (*Potamogeton* spp.) seeds are relatively scarce and in some cases fairly poorly preserved. Both taxa produce very thick coated, woody seeds that frequently survive when other, less robust plant macrofossils cannot. As a result, this strongly suggests that the upper peat was dried out, possibly exposed above the water table, at some point(s) in the past.

Conclusions

The lower sample (1.96-2.01 m) from the peat deposit was the only sample to show good potential for waterlogged plant and insect remains. The plant macrofossils suggest that alder

carr was in the vicinity, if not the immediate area and a range of taxa indicative of wetland environments also are present. The recovery of taxa such as pondweed (*Potamogeton* spp.) suggest that areas of still, deep water were also present.

The upper sample (1.70-1.75 m) from the peat deposit contained abundant wood fragments, but these were somewhat metallic in appearance and only small quantities of blackberry and pondweed seeds, some of which were fairly poorly preserved. The poor preservation of these extremely woody seeds, coupled with the somewhat metallic appearance of the wood fragments suggests that the upper reaches of the peat deposit dried out at some point(s) in the past. Although this could be due to relatively recent drought conditions (e.g. the summer of 1976), it is also possible that the peat deposit was raised above the water table and exposed in the past.

Samples from the upper and lower sandy silts were relatively sterile, producing no identifiable plant macrofossil remains.

References

Stace, C, 1997 *New Flora of the British Isles* (Second edition), Cambridge University Press

Table 1: Assessment results for sub-samples from Borehole 1, Northeye, Pevensey, East Sussex

Depth	**120-125 cm**	**140-145 cm**	**170 - 175 cm**	**196 - 201 cm**	**254 - 259 cm**	**340 - 345 cm**	**480 - 485 cm**	
Volume processed	**350 ml**	**300 ml**	**250 ml**	**250 ml**	**250 ml**	**300 ml**	**250 ml**	
Proportion Scanned	**100%**	**100%**	**25%**	**20%**	**100%**	**100%**	**100%**	
Latin Binomial								**English Common Name**
Ranunculus seleratus L.				+				celery-leaved buttercup
Betula spp. (wings damaged/ missing)				+				birch
Alnus glutinosa (L.) Gaertn. - seed				+				alder
Alnus glutinosa (L.) Gaertn. - infrustructure				+				alder (cone)
Rubus spp.			+	+				blackberry/ bramble
?*Rubus* spp. - internal structure			+					possible blackberry/ bramble
Lycopus europaeus L.				+				gypsywort
Potamogeton spp.				+				pondweed
cf. *Potamogeton* spp.			+					possible pondweed
Juncus spp.				+				rush
Carex spp. - 2-sided				+				sedge
POACEAE - small-seeded	+							small-seeded grass
Other Plant Remains								
plant frass		+++			+++	++	+	
plant frass - ?modern	+							
rootlets - ?modern	+							
wood fragments		+++	+++++	+++++				
Other Remains								
Charophyte		+						green algae
Coleoptera			+	++				beetles
Acarina				+				mites
WPR Assessment	**POOR**	**POOR**	**POOR**	**POOR to GOOD**	**POOR**	**POOR**	**POOR**	

Scale: + = < 5 items, ++ = 5-10 items, +++ = 10-25 items, ++++ = 25-100 items and +++++ = >100 items. Potential: POOR = <20 items, GOOD = approx. 100 items and RICH = >300 items

Appendix 3: Assessment of pollen

Elizabeth Huckerby (Oxford Archaeology North)

Introduction

Seven sub-samples were taken from the sediment sequence at depths of 1.20-1.21m, 1.40-1.41 m, 1.70-1.71 m, 1.96-197 m, 2.54-2.55 m 3.40-3.41 m and 4.80-4.81 m and Oxford Archaeology North was asked to assess the potential of these for pollen analysis and to characterise the sediments.

Pollen

Volumetric samples were taken from the three samples, and two tablets containing a known number of *Lycopodium* spores were added so that pollen concentrations could be calculated (Stockmarr 1971). The samples were prepared using a standard chemical procedure (method B of Berglund & Ralska-Jasiewiczowa 1986), using HCl, NaOH, sieving, HF, and Erdtman's acetolysis, to remove carbonates, humic acids, particles > 170 microns, silicates, and cellulose, respectively. The samples were then stained with safranin, dehydrated in tertiary butyl alcohol, and the residues mounted in 2000cs silicone oil. Slides were examined at a magnification of 400x (1000x for critical examination) by ten equally-spaced traverses across at least two slides to reduce the possible effects of differential dispersal on the slides (Brooks & Thomas 1967) or 100 total land pollen and spores. Pollen identification was made following the keys of Moore *et al* (1991), Faegri & Iversen (1989), and a small modern reference collection. Andersen (1979) was followed for the identification of cereal grains. Indeterminable pollen was also recorded as an indication of the state of pollen preservation. Plant nomenclature follows Stace (1997). The preservation of the pollen was noted and an assessment was made of the potential for further analysis.

Results

Pollen

The assessment of the seven samples has demonstrated that pollen and spores were preserved in the four upper samples but not from those lower in the sequence, although a single corroded grain and three fern spores were noted at a depth of 4.80-4.81m. Microscopic charcoal fragments were present in the four upper samples and were more frequent at 1.20-1.21 m.

1.96-1.97 m

Tree and shrub pollen was at its highest level (74%) in this sample and was dominated by birch (*Betula*) with alder (*Alnus*), hazel-type (*Corylus avellana*- type), willow (*Salix*) and oak (*Quercus*) and occasional grains from a number of other taxa including beech (*Fagus*) and alder buckthorn (*Frangula alnus*). Fern spores (19%) were identified with quite large numbers of spores from royal fern (*Osmunda regalis*) as well as undifferentiated ferns. Pollen from herbaceous taxa was also recorded (7%) with similar amounts of pollen from both grasses (Poaceae) and sedges (Cyperaceae). Very occasional microscopic charcoal fragments were noted.

1.70-1.71 m

Pollen and spores were very abundant in this sample and was dominated by pollen from trees and shrubs (60%) with high values of fern spores (33.8%). The tree and shrub pollen was dominated by hazel and birch with some oak, willow and alder and occasional grains of beech and pine (*Pinus sylvestris*) pollen. The high percentage of fern spores was nearly all from the royal fern with a few bracken (*Pteridium aquilinum*) and undifferentiated fern spores. Pollen from herbaceous taxa was recorded (6.5%) but not in large numbers and was mainly from grasses with some possible cereal-type pollen. Cereal-type pollen may also be from wild grasses (Andersen 1978) such as couch grass (*Agropyron)*, often to be found close to the sea, or from the aquatic taxon *Glyceria* (sweet grasses). Some microscopic charcoal fragments were noted.

1.40-1.41 m

Pollen and spores were very abundant in this sample and although the surface of the pollen grains was corroded the pollen was well preserved. Tree and shrub pollen dominated the pollen sum and was mainly from alder, hazel and birch with lesser amounts from oak and occasional grains of lime (*Tilia*), ash (*Fraxinus excelsior*) yew (*Taxus baccata*) and willow pollen. Pollen from herbaceous taxa was recorded (15%) in this sample and of that 5% came from the goosefoot family (Chenopodiaceae). Fern spores were present (17%) and again were mainly from the royal fern. Some microscopic charcoal fragments were noted.

1.20-1.21 m

There were fewer pollen grains and spores in this sample than in the other three upper ones. Tree and shrub pollen made up 53% of the pollen sum with 30% pollen from herbaceous taxa and 17% fern spores. Alder pollen was the major tree pollen type with some oak, hazel, birch and pine. There was a diverse assemblage of herbaceous pollen with quite high values of pollen the goosefoot family and a single grain of sea thrift (*Armeria maritima*). Bracken and other fern spores were well represented but no spores of the royal fern were recorded. Microscopic charcoal fragments were more frequent at this depth.

Table Results of the pollen assessment from Northeye, Pevensey Levels, East Sussex. The data are expressed as percentage values of the pollen sum, which includes all land pollen and spores. Charcoal is recorded as present + or abundant ++.

Sample depth (m)	**1.20-1.21**	**1.40-1.41**	**1.70-1.71**	**1.96-1.97**	**2.54-2.55**	**3.40-3.41**	**4.80-4.81**
	%	**%**	**%**	**%**	**No**	**No**	**No**
Total Trees + Shrubs	53	68	60	74			
Total Herbs	30	15	6.5	7			1
Total Ferns	17	17	33.8	19			3
Number of pollen grains in the pollen sum)	93	179	308	287	0	0	4
Trees and shrubs							
Alnus glutinosa- alder	15	23.5	2.2	11.1			
Betula – birch	6.5	14	24.4	31.4			
Corylus avellana-type - hazel	9	19.5	25	18.8			
Fagus sylvatica -beech			0.6	0.7			
Fraxinus excelsior - ash		0.6		0.3			
Frangula alnus - alder buckthorn				1			

Pinus sylvestris - pine	65	0.6	0.3				
Quercus - oak	14	6.7	3.6	5.9			
Rosaceae shrub pollen				0.3			
Salix - willo	2.2	1.7	3.2	3.8			
cf *Sambucus* - elderberry				0.3			
Taxus baccata - yew		0.6					
Tilia - lime		1.1					
Herbs							
Armeria maritima - sea thrift	1.1						
Apiacea - cow parsley family		1.1					
Asteraceae undiff - daisy family	2.2	1.1	1				
Taraxacum-type - dandelion-type							
Brassicaceae - mustard family	1.1						
Sinapis -mustards							
Caryophyllaceae - pink family	1.1						
Chenopodiaceae - goosefoot family	13	5					
Cyperaceae - sedges	2.2	2.2	1	2.8			
Lamiaceae - dead-nettle family		0.6					
Plantago lanceolata - ribwort plantain	1.1						
Plantago sp - plantains undiff	1	0.6					
Poaceae - grasses	2.2	1.7	3.6	3.1			
Cereal - type			0.1				
Potentilla - cinquefoils				0.3			
Ranunculus - buttercup	1.1						
Rubiaceae - bedstraw family							
Rumex -sorrels		0.6		0.3			
Urtica - nettles		0.6		0.3			
Unknown herbs	3.2	1		0.3			
Typha latifolia - bulrush		0.6		0.3			
Sphagnum – sphagnum moss	1.1	0.6	1.6	1			
Fens							
Osmunda regalis - royal fern		9.5	31	12.9			
Polypodium – polypody		0.6	0.3	0			
Pteridium aquilinum - bracken	7.5	1.7	1.3	1			
Pteridopsida (monolete) – monolete ferns	3.3	5.6	1	4.9			
Indeterminate grains	13	3.9	0.3	0.6			
Charcoal	++	+	+	+			

Interpretation and Discussion

The pollen record of the three samples taken from the sediments between 1.45-2.05 m, the peat beds intercalated with bluish grey clay, suggest that the local environment was a fen carr in which royal fern dominated the understorey. Today royal fern is found growing in fens, bogs, wet woods and heaths on peaty soils (Stace 1997). Initially birch was the major tree in this wet woodland (fen carr, 1.96-1.97 m) but was partly replaced by alder towards the top of the deposit (1.40-1.41 m). As alder became more important in the fen carrr there is an increase in both number and diversity of the herbaceous pollen. It is significant that pollen from the goosefoot family was recorded possibly suggesting an increasing marine influence

towards the top of this stratigraphic unit. This trend continues in the firm silty clays (0.18-1.48 m) when pollen from seathrift and several other taxa that may be indicative of salt marsh conditions and more open conditions, for example daisy family (Asteraceae) and mustard family (Brassicaceae), were recorded with high values of goosefoot family pollen and foraminifera. The low-lying areas of East Sussex are thought to have been subjected to marine inundation in the late Iron Age and Roman periods.

Away from the low-lying ground of the Pevensey Levels the pollen record suggests the presence of a mixed deciduous woodland of hazel, birch, oak with some beech but no elm (*Ulmus*). As marine influence increased the woodland became more open and herbaceous plants and bracken probably expanded. There is no evidence of anthropogenic activity until this period when the vegetation became more open and microscopic charcoal fragments became abundant. Although some possible cereal-type pollen was recorded at 1.70-1.71 m

In the absence of any scientific dating it is difficult to place the pollen record in a firm chronology but the total absence of elm and lime pollen (except at a depth of 1.40-1.41 m) suggests that the sediment sequence above 1.97 m post dates both the elm and lime declines. The first 'elm decline', a more of less synchronous event throughout North Western Europe dated to c. 5000 yrs BP, in the early Neolithic, probably caused by the interaction of several factors including human interference within the woodland and a pathogenic attack (Peglar 1993). The 'elm decline' has been dated in the area to 4930+/110 yrs BP at Stone Marsh (Devoy 1979) and to 4650+/_90 yrs BP, slightly above the 'elm decline' depth, at Mar Dyke (Scaife 1988). However, the lime decline is thought to associated with anthropogenic forest clearance and varies at different sites, but has been shown to occur about 3000-3700 years BP in this area (West Heath Spa, Hampstead Heath (Greig 1991), Tilbury (Devoy 1979).

The pollen evidence from this study together with a radiocarbon date of 1540±80BC (Moffatt 1986) of the lower peat bed at Pevensey Levels suggest that the peat beds were laid down in the prehistoric period. Earlier work at Shinwater (Jennings et al 2003) and at Bexhill and Combe Haven Valley (OA 2008) has identified archaeological and palaeoenvironmental evidence of prehistoric activity associated within the peat beds and it is therefore likely that a similar situation existed at Pevensey Levels. The presence of well-preserved pollen within the peat beds at this site provides an excellent opportunity to study the paleaoenvironmental record of the Pevensey Levels in an archaeologically rich area.

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Appendix 4: Radio-Carbon Dating

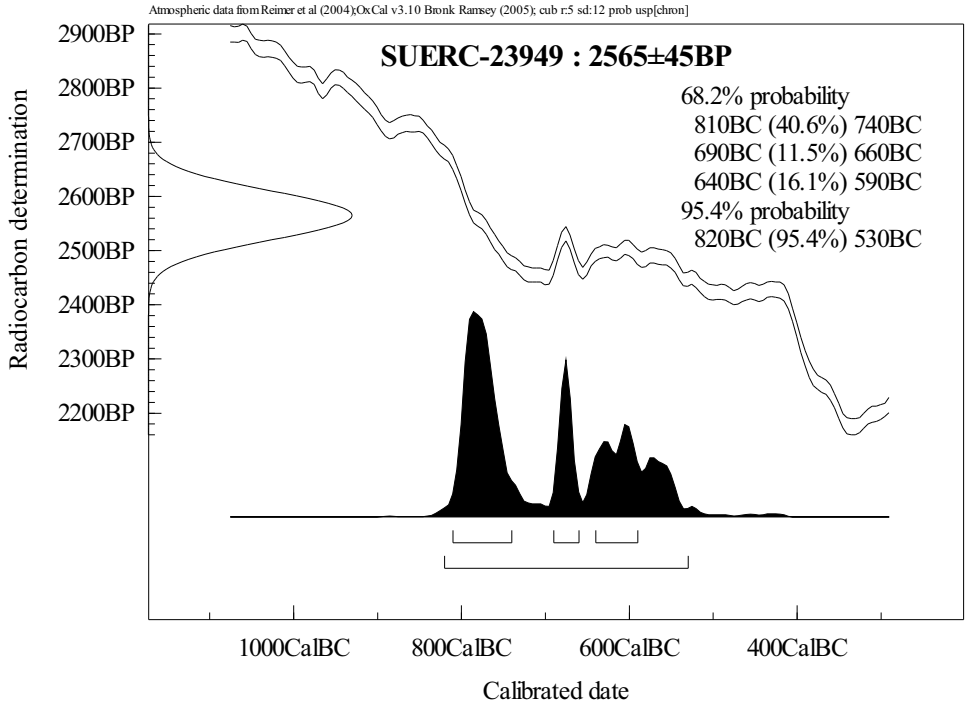
A sequence of two radiocarbon dates were obtained on samples of Blackberry seeds that were extracted from the upper and lower peat sequences from Borehole 1 (Fig. 2). A third sample taken from the upper alluvium proved to have insufficient carbon to be suitable for dating. This was a well-stratified sequence selected since it was the deepest and best-preserved on the site. The remains are believed to be *in situ*, forming part of the on-site vegetation community.

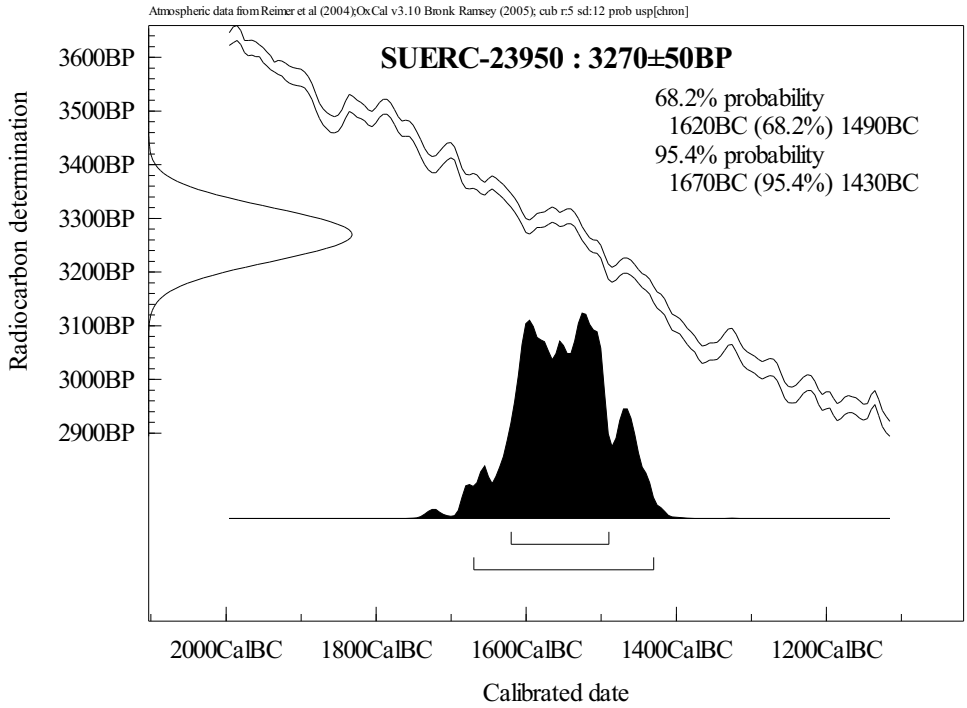
The determinations were made at the Edinburgh Research Laboratory at the Scottish Universities Environmental Research Centre. The determinations are expressed as uncalibrated dates in radiocarbon years BP (Before Present - AD 1950) using the half life of 5568 years. Isotopic fractionation has been corrected for using the measured $\delta^{13}C$ values quoted (to ± 0.3 per mil relative to VPDB).

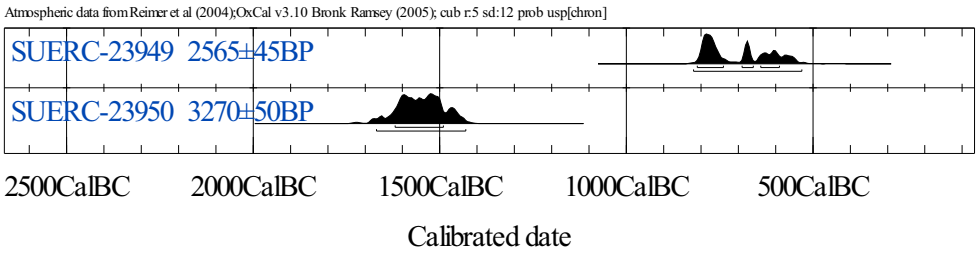
Stratigraphy	***Depth***	***Material***	***Lab Ref***	***δC13‰***	***Result bp***	***Calibrated date (95.4%) BC***
Upper alluvium sequence	0.45-0.50m	*Phragmites australis*				
Upper peat sequence	1.70-1.75m	*Rubus Section Rubus*	SUERC-23949	-25.0	2565 ± 45 BP	820BC-530BC (95.4%)
Lower peat sequence	196-2.01m	*Rubus Section Rubus*	SUERC-23950	-25.0	3270 ± 50 BP	1620BC-1490BC (5.1%) 1670BC-1430BC (95.4.%)

The results suggest that the lower peat sequence formed during the Middle Bronze Age (1670-1430 cal BC) and that the upper peat sequence accumulated in the Early Iron Age (820-530 cal BC).

Calibration Plots







Appendix 5: Summary of site details

Site name: Northeye Deserted Medieval Village (S.M. MES93)
Site code: BEXPEV08
Grid Ref: TQ 6770 0709
TYPE OF EVALUATION: Auger and borehole survey and palaeoenvironmental analysis
Date and duration of project: April-May 2008
Area of site: 8.3 ha
Summary of results: A geoarchaeological survey of 5 boreholes and 2 auger holes were taken across the Northeye deserted medieval village (SM MES93), and surrounding low-lying marsh sequence. Samples were retrieved for sediment analysis and palaeoenvironmental assessment. Good palaeoenvironmental potential was identified at a depth of 1.40m (+1.05 m OD) associated with the formation of organic and peat deposits. An archaeological deposits was also identified at the edge of the marsh potentially associated with the village.
Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited in line with Bexhill Museum.

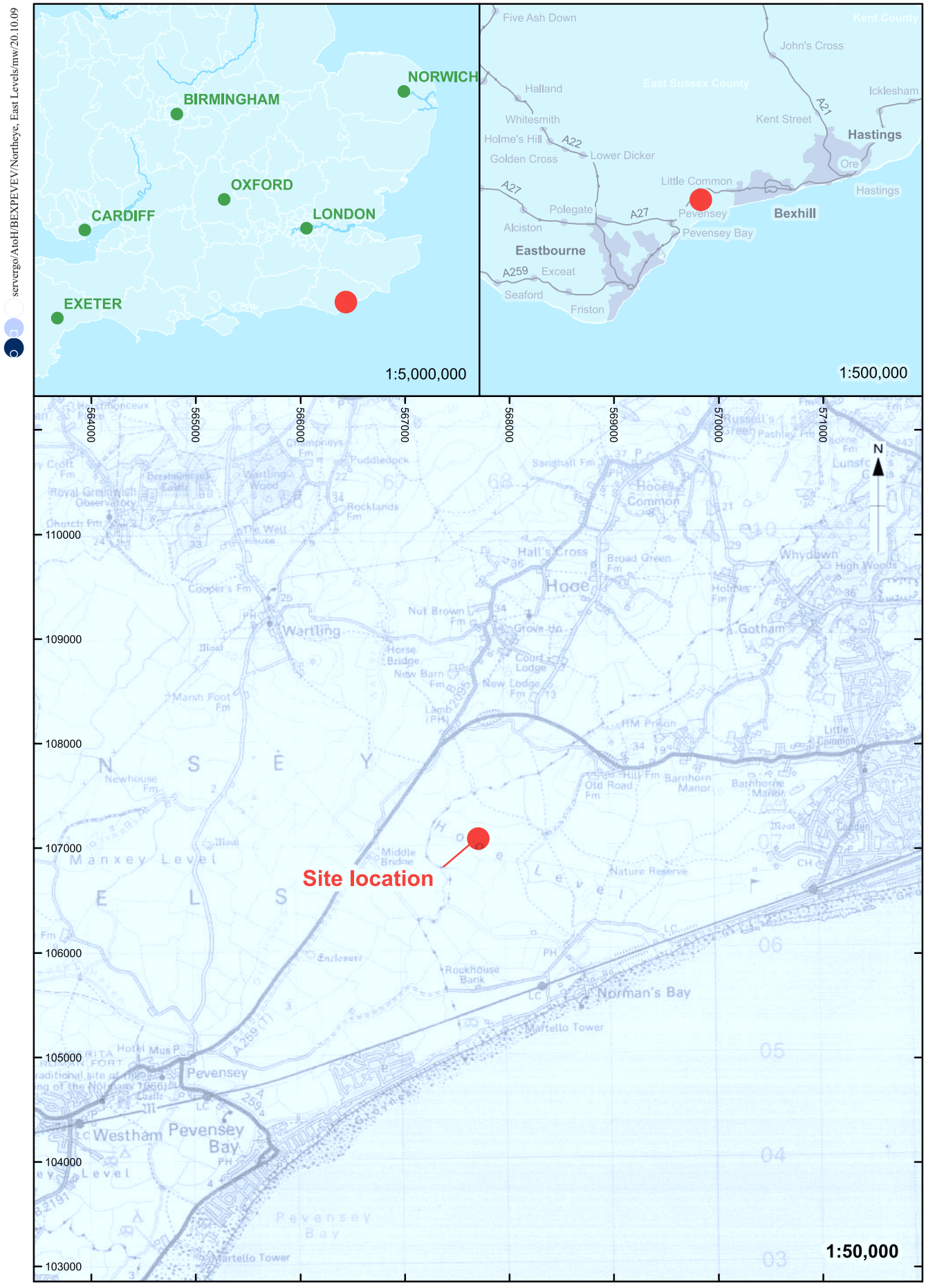


Figure 1: Site location

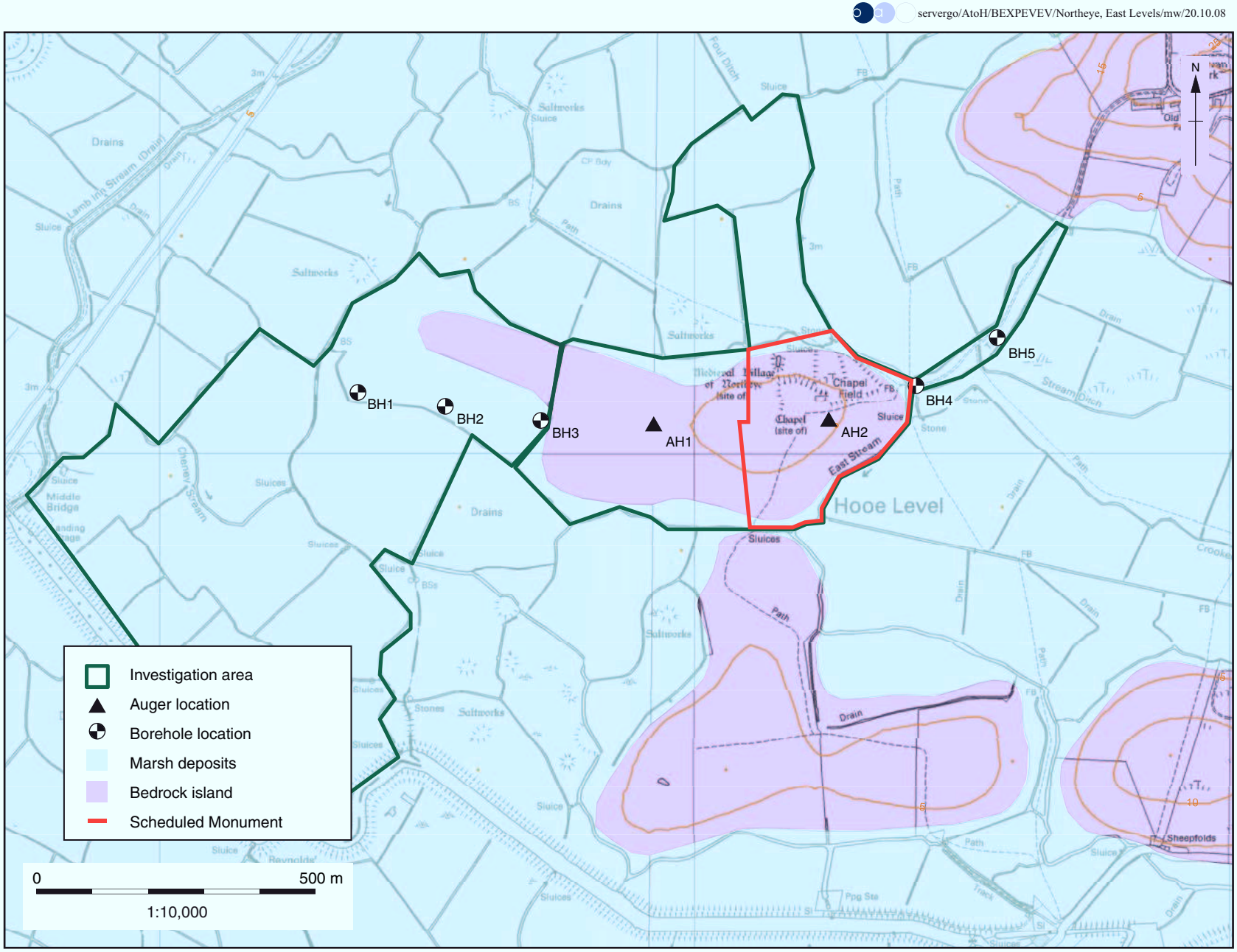
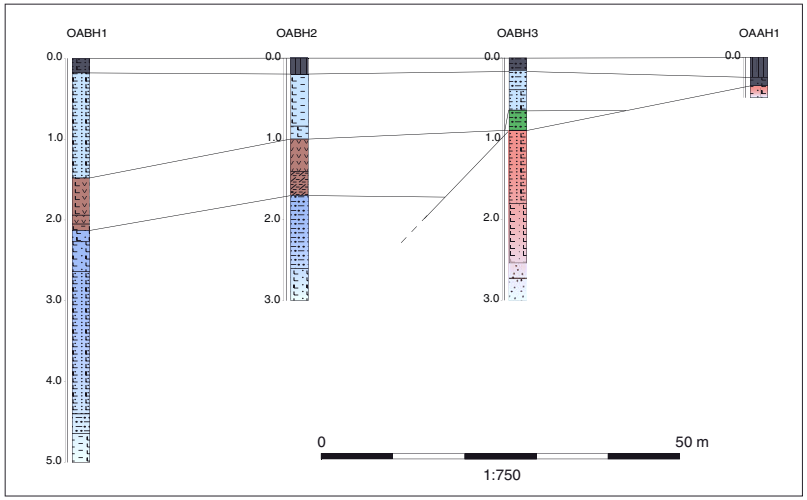
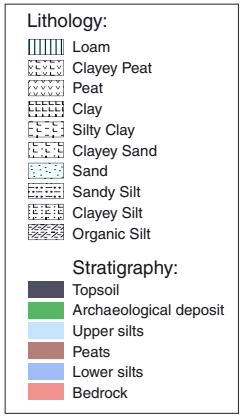
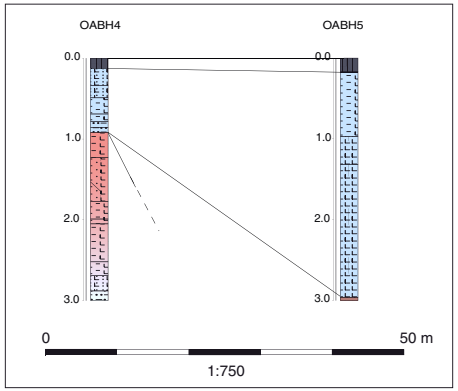


Figure 2: Borehole and auger locations







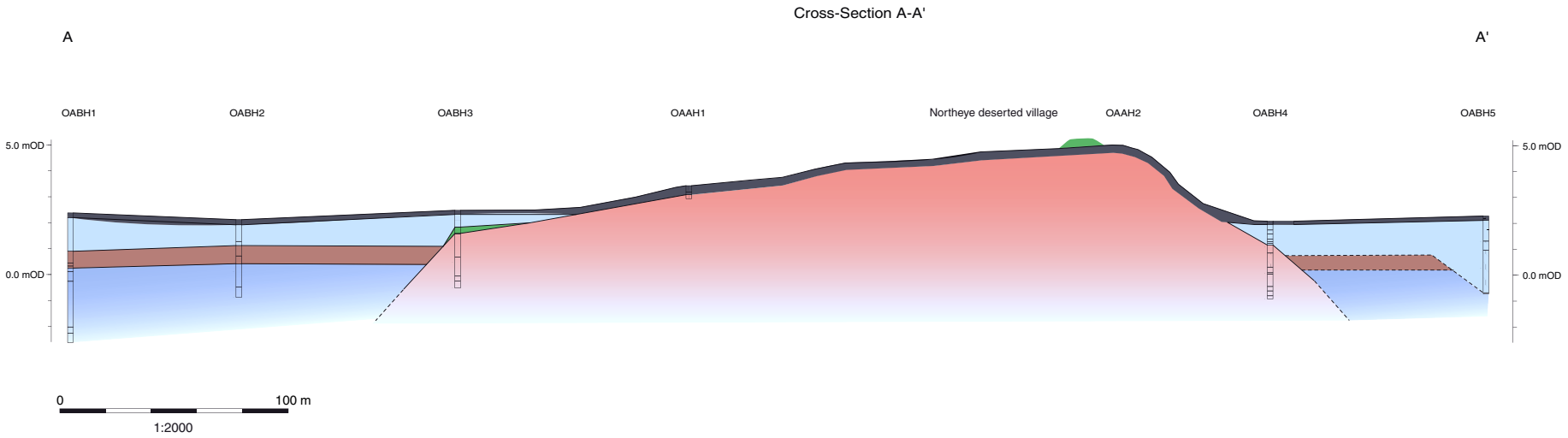


Figure 3: Cross-section

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