SCOTLAND HALL FARM, SCOTLAND STREET STOKE-BY-NAYLAND, SUFFOLK

ARCHAEOLOGICAL EVALUATION

Report Number: 1062 October 2014

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ARCHAEOLOGICAL EVALUATION

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Abstract

In July 2014 Britannia Archaeology Ltd (BA) undertook an archaeological trial trench evaluation land north at Scotland Hall Farm, Scotland Street, Stoke-by-Nayland, Suffolk (NGR: TL 99680 36880).

Background research for the project indicated that the site had potential for features associated with pre-historic and later activity associated with settlement and exploitation of the natural environment along the edge of the River Box valley.

The evaluation yielded interesting results relating to the sequence of deposition on the River Box flood plain in the early Holocene period. The changing nature of the landscape and local environment during the transition from the middle Mesolithic to early Neolithic periods has been established to a reasonable degree of certainty, based on comparison models.

C14 dating of material contained within the above stratigraphic sequence produced anomalous results compared with the initial assessment. This is a documented problem with fluvial flood plain environments in parts of East Anglia due to complex floral and faunal composition and activity (see Suffolk River Valleys Project, 2006). The C14 dates were also not consistent with the 'a priori' established deposition of material in the stratigraphic sequence and therefore cannot be relied upon as accurate. The late Neolithic date returned by both samples suggests some contamination either in this period or an addition of carbon contamination later that topped up the existing carbon.

No finds or features were identified during the evaluation; however the evidence of middle Mesolithic to early Neolithic environment and landscape identified in the initial pollen analysis represents a rare and valuable opportunity to examine the changes in vegetation and landscape that occurred in the early-temperate part of the Holocene in this part of Suffolk.

1.0 INTRODUCTION

In July 2014 Britannia Archaeology Ltd (BA) undertook an archaeological trial trench evaluation land north at Scotland Hall Farm, Scotland Street, Stoke-by-Nayland, Suffolk (NGR: TL 99680 36880) in response to a design brief issued by Suffolk County Council Archaeology Service Conservation Team (SCCAS/CT) (Tipper. J, dated 11th November 2013). The work was commissioned as a condition of planning application reference B/13/0750, in advance of the construction of a conservation lake (Fig. 1).

The works comprised the excavation of three trial trenches measuring 30.00 x 2.00m arranged to maximise the potential to discover any underlying archaeological remains (Fig. 3).

2.0 SITE DESCRIPTION

The site is located to the east of Stoke-By-Nayland along Scotland Hall Street in a field that is currently given over to pasture (Fig. 1). It lies equidistant between Scotland Hall House to the east and the River Box to the west and is bounded by Scotland Street to the south. The site sits at the base of the river flood plain at a height of 15m aOD with a moderately steep slope running up to the east.

The underlying bedrock geology is described as Thanet Sand Formation and Lambeth Group Clay, Silt and Sand; a sedimentary bedrock formed in the Palaeogene Period when the local environment was dominated by shallow seas. The superficial deposits are described as Alluvium Clay and Silts, formed in the Quaternary Period when the local environment was dominated by rivers forming river terrace deposits, with fine silt and clay from overbank floods creating floodplain alluvium, and some bogs depositing peat (BGS, 2014).

3.0 PLANNING POLICIES

The archaeological investigation was carried out on the recommendation of the local planning authority, following guidance laid down by the *National Planning and Policy Framework* (NPPF, DCLD 2012) which replaced *Planning Policy Statement 5: Planning for the Historic Environment* (PPS5, DCLG 2010) in March 2012. The relevant local development framework is *The Babergh Development Framework Core Strategy (2011-2031)*.

3.1 National Planning Policy Framework (NPPF, DCLG March 2012)

The NPPF recognises that 'heritage assets' are an irreplaceable resource and planning authorities should conserve them in a manner appropriate to their significance when considering development. It requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. The key areas for consideration are:

- The significance of the heritage asset and its setting in relation to the proposed development;
- The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance;
- Significance (of the heritage asset) can be harmed or lost through alteration or destruction, or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification;
- Local planning authorities should not permit loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred;
- Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

3.2 Babergh Development Framework Core Strategy (2011-2031) Submission Draft

The local development framework for Babergh states the following:

- Provide support and guidance to ensure that development which may affect historic assets and ensure new development makes a positive contribution to local character and distinctiveness (Section 3.3.6).
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4.0 ARCHAEOLOGICAL BACKGROUND (Fig. 2-3)

The following archaeological background utilises the Suffolk Historic Environment Record (HER) (1km search centred on the site), English Heritage PastScape (www.pastscape.org.uk), and the Archaeological Data Service (www.ads.ahds.ac.uk) (ADS) (Figure 2). There are 25 monument entries and three events within and just outside the 1km search radius. Thirty-three listed building entries were also returned within the 1km search area, therefore it was decided to reduce the radius to 250m to investigate those closest to the site, the new total comprises seven listed buildings.

No prehistoric entries are recorded in the 1km search radius.

A single Roman entry of a 4th to 5th century Roman bronze buckle with animal head returns (MSF5676) was found 841m to the north-west.

A small late Saxon coin hoard and bronze strap end (MSF5677) were recovered by metal detector 841m to the north-west of the site. A late Saxon to early medieval pottery scatter (MSF19570) was located during archaeological monitoring of a water main 987m to the east of the site, a thirteenth century papal bull of Gregorius VIII (MSF19905) was found during metal detecting in 1992, 819m to the north-west.

The historic settlement core of Stoke-By-Claire (MSF27488) located 1142m to the south-west partially around the green is defined from historic maps and locations of listed buildings and artefact scatters, the church is mentioned in Domesday.

The post-medieval period returned the highest number of records (19 entries). Scotland Hall (DSF1258) is an eighteenth century red brick fronted south block, with older timber-framed and plastered wings present to the rear. It has two storeys and attics, a three window range, double-hung sashes with glazing bars in flush cased frames with louvred shutters. The central doorway has a rectangular fanlight and cornice. It has a tiled roof with three hipped dormers. The Hall is located 115m to the north-east of the proposed pond.

Several other Grade II listed buildings are noted close to the site. A Grade II Listed barn (DSF296) to the south of Scotland Hall dates from the seventeenth to eighteenth centuries; it lies 167m to the south-east of the site. Scotland Place (DSF1213) is a Grade II Listed sixteenth to seventeenth century timber-framed and plastered house located 163m to the south-west. A Grade II listed Late eighteenth century dovecote (MSF25124, DSF1764) and garden pavilion is also recorded at Scotland Place 131m to the south-west. Scotland Place Farm is a sixteenth century farmhouse (MSF25274) with a range of outbuildings recorded 169m to the south-west. An eighteenth century Grade II Listed cart lodge (DSF1248) is also present to the north-west of Scotland Place, 167m to the south-west of site. A Grade II Listed seventeenth to eighteenth century timber framed and plastered house (DSF1761) is located 228m to the south-west. Scotland House (DSF3235) is a Grade II Listed seventeenth to eighteenth timber-framed building recorded 138m to the south-east.

A desk-based assessment (ESF21604), photographic survey (ESF22219) and watching brief (ESF22225) was undertaken by SCCAS Field Team in 2013, before the renovation of the nineteenth century Scotland Street cast iron bridge (MSF15822, MSF27525) 145m to the south of site. An original bridge may have stood on this site from at least the 14^{th} century. Polstead Bridge (MSF15824) located 990m to the north-west is recorded on Hodskinson's 1783 map and is believed to be of eighteenth to nineteenth century date. A Grade II Listed post medieval Polstead Watermill (MSF25183) is fabricated of red brick date and located 1079m to the north-west. The former site of a red barn (MSF25272) that was burnt down in 1842 is located 835m to the north-east. Withermarsh Green postmill (with roundhouse) is of post-medieval date (MSF12551) and recorded 937m to the east. One hundred and ten hectares at Tendring Hall Park (MSF14413) was landscaped by Humphrey Repton for Sir William Rowley in 1791, it is located 1291m to the south-west.

Undated entries were also fairly numerous within the search radius. A D-shaped enclosure with possible entrance (MSF10219) within a series of field boundaries and a trackway (MSF10220) have been recorded on air photographs 432m and 437m to the north-east. An urn of unknown date was excavated in the meadow behind Bridge Farm (MSF5672)

951m to the north-west. An undated concentric ring ditch cropmark (MSF10223), located within, and cut by a rectilinear field boundary system with trackway and two adjoining rectangular enclosures (MSF10224) has been recorded on air photographs 998m and 1047m to the north-west. A possible droveway, series of field boundaries and a watercourse (MSF10211) have been recorded on air photographs 1220m to the east. A 20m diameter ring ditch (MSF10221) has been located on air photographs 930m to the north-east. Undated linear ditches forming field boundaries (MSF12302) have been recorded 796m to the south-west. Mark Wood (MSF18951) is 12 hectares of Ancient Woodland located 1204m to the north-east. Hazel Grove/Long Wood are 10 hectares of Ancient Woodland located 1480m to the north-east. Brick Field (MSF19680) is recorded on the Stoke-By-Nayland Tithe Map and apportionment in the Suffolk Record Office, the name suggests a potential brickworks, 826m to the south-east of the site.

Given the above records the site has a specific potential for post-medieval and medieval features and finds, even though no record entries were returned within the 1km search radius for this period the site appears to be topographically favourable for prehistoric activity.

5.0 PROJECT AIMS

Research objectives for the project are in line with those laid out in *Research and Archaeology Revisited: a revised framework for the East of England,* East Anglian Archaeology Occasional Paper 24 (Medlycott, 2011).

The brief also states that the project will need to consider the following objectives:

- The characterisation of the sequence, and patterns of the accumulation of palaeo-environmental/geoarchaeological deposits across the development area, including the depth and lateral extent of major stratigraphic units, and the character of any potential land surfaces/buried soils within or pre-dating these sediments.

- Identify significant variations in the deposition sequences indicative of localised features, particularly in relation topographic variation and the presence of features such as palaeo-channels.

- Identify the location and extent of any waterlogged organic deposits and where appropriate and practical, to retrieve suitable samples in order to assess the potential for the preservation of environmental remains and material for scientific dating.

- Clarify the relationship between sediment sequences and other deposit types, including periods of 'soil', peat growth, and archaeological remains.

- To provide for the absolute dating of critical contacts.

- To focus academically upon the high potential for this site to produce palaeoenvironmental evidence, with the potential to inform on our understanding of past environments, palaeo-climates, sea-level changes and human interaction.

- To make the results of the investigation available through suitable reporting.

6.0 PROJECT OBJECTIVES

Research objectives for the project are in line with those laid out in *Research and Archaeology Revisited: a revised framework for the East of England,* East Anglian Archaeology Occasional Paper 24 (Medlycott, 2011).

7.0 FIELDWORK METHODOLOGY

A Leica Viva Smart Rover GS08 differential global positioning system (DGPS) was used to accurately set-out the evaluation trenches. These were located in suitable positions across the site to properly evaluated the potential archaeology and avoid areas of environmental sensitivity. The trenches were excavated using a 14 tonne 360° mechanical excavator fitted with a toothless ditching bucket under the control of a qualified professional archaeologist (Fig. 4). Topsoil and subsoil layers were removed carefully down to the first archaeological horizon, thereafter all excavation was undertaken by hand (Fig. 4).

Topographic survey, trench edges, section locations and archaeological and natural feature survey points were accurately recorded using the DGPS to produce a pre and post-excavation plan tied into the Ordnance Survey National Grid. The archaeology was preserved by record using pro-forma sheets, plan and section drawings and appropriate photographic records, as agreed in the Written Scheme of Investigation (Schofield, 2014). All features, finds and samples were given unique context numbers assigned during the recording phases on site.

8.0 DESCRIPTION OF RESULTS (Figs. 4-5)

Archaeological features and deposits are described below in trench order. Detailed information on all features and deposits can be found at Appendix 1.

The trenches were all excavated to a depth that exposed the full stratigraphic sequence down to the natural geological deposits.

This was observed to vary across site between 11.62 and 12.64m aOD with the underlying deposits sloping down to the north and north-west.

A sequence of well stratified alluvial and peat deposits were present in all trenches and were consistent across the site (see Section 9).

8.1 Trench 1 (Figs. 4-5)

Trench 1 was located in the northern third of the site on base of the former lake bed. It was aligned east to west at 13.66m aOD at its eastern end. A well intact, stratified sequence was revealed to a depth of 2.04m below the surface; however the trench quickly filled with water from large pockets of residual lake water trapped between the layers.

Natural rooting was noted in the trench base.

No archaeological features or finds were present.

8.2 Trench 2 (Figs. 4-5)

Trench 2 was located in the centre of the former lake bed. It was aligned north to south-south at 13.84m aOD at its southern end. As with Trench 1, a well intact, stratified sequence was revealed to a depth of 1.65m below the surface. This trench also filled with water from large pockets of residual lake water trapped between the layers.

No archaeological features or finds were present.

8.3 Trench 3 (Figs. 4-5)

Trench 3 was located in the southern third of the site, aligned east to west at 14.02m aOD at its eastern end. As with the other trenches, Trench 3 contained a well preserved stratigraphic sequence to a depth of 1.71m aOD below the surface. It also filled quickly with trapped water released during machining.

No archaeological features were present.

9.0 DEPOSIT MODEL (Fig. 4-5)

The deposit model was consistent across the site, with the layers in Trench 1 found to be deeper than Trenches 2 and 3.

The upper most layer (1000) related to deposition from the recently drained lake and comprised a mid red brown, compact clay silt. This overlay a buried topsoil layer (1001) which predated the lake which had been created with a bund in the south of the site and represented a fairly dry period in the sequence.

Buried topsoil 1001 overlay an upper alluvial layer (1002) of light blue grey, compact silty clay, the presence of which suggests an extended period of alluvial deposition on the flood plain. It was generally free on inclusions and humic material suggesting a fluvial environment.

Mid alluvial layer 1003 was sealed below upper alluvial layer 1002 and comprised a mid red brown, compact organic clay silt with roots and wood fragments. The composition suggests a slow moving or static water environment and the layer could constitute and emergent peat layer. This layer formed the bulk of the sequence depth.

Peat layer 1004 was sealed by mid alluvial layer 1003. It was a dark grey brown, soft peat with organic material, roots and tree remains. Further specialist analysis (see Appendix X) shows that this was a complex organic sequence. It represented a long period of static, water-inundated forest.

Lower alluvial layer 1005 was present below peat layer 1004 and comprised a grey blue, firm sandy silt with no inclusions. The layer is indicative of a faster moving fluvial environment.

Natural deposits 1006 formed the base of the sequence and consisted of light chalky grey, very compact silty clay.

The sequence was well preserved with clear horizons between the majority of the layers except peat 1004 and mid alluvial layer 1003 which was more diffuse.

10.0 SPECILIST REPORTS

Three monolith samples were taken (one from each trench) sampling layers 1006, 1005, 1004 and 1003, with the aim of establishing more detailed information on environmental conditions and dating. Two samples, one from either end of Monolith 1, were sent for AMS C14 Radiocarbon analysis to provide dating to bracket the sequence.

10.1 Monolith Samples (Full report at Appendix 2)

By Dr Steve Boreham

This study focuses on the palynology of sediments obtained from a 72cm-long monolith (Sample 1) taken from the site of a proposed pond at Stoke by Nayland, Suffolk (SPN099).

The basal context (1006) was identified as 'clay natural' and extended 0 - 14 cm. It comprised a buff grey slightly organic silt with a little clay and was sub-sampled for pollen at 10cm. The next context (1005) was identified as 'alluvium' and extended 14 - 22 cm. It comprised a grey silty clay with a little organic material and was sub-sampled for pollen at 20cm.

Above this context (1004) was identified as 'peat', but appeared to be a complex organic sequence;

22 - 35 cm Grey black silty organic material with reed stems and pieces of wood
35 - 42 cm Dark grey organic silt
42 - 48 cm Light grey brown wood peat
48 - 53 cm Grey brown organic silt
Pollen sub-samples were taken at 30cm, 40cm, 43cm and 50cm.

Above this context (1003) was identified was 'alluvium'. This comprised a light grey brown organic silty clay extending 53 - 65cm, which was sub-sampled for pollen at 60cm, and a grey brown organic silt extending 65 - 72 cm, which was sub-sampled for pollen at 70cm.

The eight pollen sub-samples were prepared using the standard hydrofluoric acid technique, in the Geography Science Laboratories, University of Cambridge, and counted for pollen using a high-power stereo microscope at x400 magnification. The percentage pollen data from these 8 sub-samples is presented in Appendix 1 and in Figures 1a & 1b.

Pollen analyses

Sediment sub-samples for pollen analysis were taken from the following points along the monolith (Sample 1); 10, 20, 30, 40, 43, 50, 60 & 70cm. The results of the pollen analysis appear in Appendix X and are presented graphically as percentage pollen diagrams in Figure 1a (Trees, Shrubs & Summary) and Figure 1b (Herbs, Spores & Aquatics). The sub-samples had pollen concentrations that ranged between 36,152 and 263,801 grains per ml. Pollen preservation was rather good for all but the two basal samples, where the pollen was sparse and degraded. Finely divided organic material hampered pollen counting to some degree in all the samples. Assessment pollen counts were made from single slides for these sub-samples. The pollen sums achieved for these slides were all above 50 grains, five were greater than 200 grains, and one reached 301 grains. Since some of these samples did not exceed the statistically desirable total of 300 pollen grains main sum, caution must be employed during the interpretation of these results.

It is immediately clear that the two basal sub-samples (10cm & 20cm) are dominated by grass (Poaceae) pollen (c.35-42%), together with pine (Pinus) (10-15%, hazel (Corylus) (13-15%), alder (Alnus) (7-11%) and a limited assemblage of herbs such as sedges (Cyperaceae) (2-3%, members of the lettuce and thistle families (Asteraceae) (together 5-8%) and meadowsweet (Filipendula) c.2%). Lower plants in these samples are represented by undifferentiated fern spores (together 13-15%) and by the spores of the clubmoss (Selaginella) which often grows on the banks of wooded streams in damp habitats with neutral to alkaline soils. Obligate aquatic plants in these samples were represented by the emergent bur-reed (Sparganium) (4-10%), reedmace (Typha) (0-2%), and by the yellow water-lily (Nuphar) (c.2%), which prefers to grow in open water around 2m deep.

The pollen sub-sample from 30cm is in some ways transitional between the basal sub-samples and the upper part of the sequence in that it also has a significant amount of pine (Pinus) pollen (11.4%), but for the first time contains oak (Quercus) (6.9%) and lime (Tilia) (6.4%), which are the essential elements of mixed-oak woodland, accompanied by hazel (Corylus) (15.8%) and alder (Alnus) (11.4%). The range of herbs represented is slightly greater, and for the first time spores of the polypody fern (Polypodium) appear. This plant is associated with mature tree boles and is taken to represent mature woodland nearby. The proportion of undifferentiated fern spores rises to more than 30% of the total count, presumably indicating damp shady conditions beneath a tree canopy. The spores of Sphagnum moss also occur, confirming the damp nature of the environment, whilst the emergent aquatics bur-reed (Sparganium) (3.5%) and reedmace (Typha) (0.5%) persist.

The pollen sub-samples in the upper part of the sequence (40, 43, 50, 60, 70cm) are all rather similar in that they present a striking mixed-oak woodland signal with oak (Quercus) (6-10%), lime (Tilia) (5-13%), elm (Ulmus) (up to 2%), hazel (Corylus) (10-16%), willow (Salix) (up to 2%) and juniper (Juniperus) (up to 2%). Alder (Alnus) rises to 23.4% of the total count in the 40cm sub-sample suggesting that a dense alder carr (wet woodland) occupied the valley floor at this time. Mature trees are again indicated by the presence of the polypody fern (Polypodium) (4-7%), and large proportions of undifferentiated fern spores (27-47%) continue to dominate the spectrum. There is also a broader range of herbs associated with these sub-samples, although none are particularly abundant. Towards the top of the sequence sub-samples 60cm & 70cm have duckweed (Lemna) pollen, which suggests open water with warm summer conditions. The upper sample also has water milfoil (Myriophyllum alterniflorum) pollen, which suggests open water up to about 1m deep. It is notable that pine (Pinus) and juniper (Juniperus) are also absent from the top two sub-samples.

Discussion & Conclusions

It is evident that the pollen sequence from Stoke by Nayland (SPN099) must represent a pre-clearance landscape of mixed-oak woodland. The basal pine and hazel-dominated signal seems consistent with the middle part of the Mesolithic period (c.8,500 – 9,500 years Calendar year BP), and it seems likely that this sequence records the transition from open hazel-pine scrub to mature mixed-oak forest, which is known to persist until at least the early Neolithic (c. 6,000 years Calendar year BP). The local environment appears to change from deep open water with yellow water-lilies and damp riparian (bank side) habitats with abundant emergent vegetation, to dense alder carr woodland, and finally open water with duckweed and water milfoil.

Usually, these Mesolithic sediments are located in deep palaeochannels beneath the existing floodplains of rivers in Southern England. This site represents a rare and valuable opportunity to examine the changes in vegetation and landscape that occurred in the early-temperate part of the Holocene in this part of Suffolk. Radiocarbon (ams or bulk) dating of material from the basal and upper parts of this sequence would confirm the antiquity of the deposits and their place them within a secure chronological framework.

In summary, the narrow 'time slice' represented here probably extends from the mid Mesolithic through to potentially the early Neolithic, although local conditions could make that age-estimate unreliable. As with all assessment pollen counts it is important not to over-interpret the data, however the clear transition from pine-hazel to mixed-oak woodland pollen assemblages would make this interpretation hard to account for by other means.

10.2 Radio Carbon Dating and Assessment

By Beta Analytic and Dr Steve Boreham

C14 Radiocarbon Dating Results (Beta Analytic)

SAMPLE	BETA NO.	CONVENTIONAL AGE	CALIBRATED AGE (2 SIGMA)
SPN099 1 (9-11cm) (Oldest in Sequence)	390126	4020±30BP	2615 to 2605 Cal BC and 2580 to 2470 Cal BC
SPN099 1 (70-72cm) (Youngest in Sequence)	390127	4120±30BP	2870 to 2800 Cal BC and 2780 to 2575 Cal BC

Table 1 – Radiocarbon dating results

Assessment (Dr Steve Boreham)

Both of these dates fall in the Late Neolithic. The dates appear to be reversed in order (youngest at the base, oldest at the top) although they are probably not statistically different to each other.

In my pollen report I concluded;

"The basal pine and hazel-dominated signal seems consistent with the middle part of the Mesolithic period (c.8,500 – 9,500 years Calendar year BP), and it seems likely that this sequence records the transition from open hazel-pine scrub to mature mixed-oak forest, which is known to persist until at least the early Neolithic (c. 6,000 years Calendar year BP)."

Indeed, the pollen diagram appears to show the classic Mesolithic vegetation succession. However, this is plainly not borne out by the radiocarbon dating.

There are a number of possibilities that might explain this situation;

a) The samples were contaminated with younger carbon during sampling in the field or during preparation in the laboratory

b) The samples were contaminated with younger carbon *in situ* post-deposition, either by rootlets from above or by some other younger source of carbon (perhaps brought by groundwater)

c) The samples are genuinely Late Neolithic in age, and the pollen signal is an artefact of unusual local conditions (either environmental or taphonomic)

The expectation from the pollen analysis is that not only should the sediment be much older than reported, but that there should be an interval of at least a thousand years (and probably more) between the base and top of the sequence.

The fact that the dates are much younger and appear to be reversed, hints that options a) or b) - (contamination with younger carbon) might be an explanation for these results, rather than c) - (an artefact of unusual local conditions).

The samples themselves appeared to be cohesive and uncontaminated on inspection in the laboratory, and careful laboratory protocols are in place to minimise contamination of the samples during the preparation process. These things make option a) - (contamination during sampling in the field or during preparation in the laboratory) rather unlikely, leaving option b) - (contaminated with younger carbon *in situ*) as the most likely scenario.

It is of course possible to construct a narrative whereby some local major disturbance of the Neolithic woodland, and its subsequent recovery, or some unusual change in sediment and pollen supply, gave the impression of a Mesolithic vegetational succession, but with the Neolithic. I would be much more inclined to believe such a scenario if the radiocarbon dates were not reversed and were separated by an interval.

I am sorry that we have this outcome and that it does not take us much further forward at this site. The possibility is that the material from other samples from the same site might also be contaminated with younger carbon, and would also yield 'young' radiocarbon dates.

10.0 DISCUSSION

Despite the lack of archaeological features, the evaluation revealed an interesting and important stratigraphic sequence. The depth of stratigraphy shows a considerable build-up of material associated with River Box flood plain and suggests a variety of changing environmental conditions.

Detailed analysis of the samples taken show that layers 1006, 1005, 1004 and 1003 probably relate to a pre-clearance landscape spanning a significant change from open hazel and pine in the mid Mesolithic to a mature mixed oak forest in the early Neolithic. The local environment appears to change from deep open water with yellow water-lilies and damp riparian (bank side) habitats with abundant emergent vegetation, to dense alder carr woodland, and finally open water with duckweed and water milfoil (Boreham, 2014).

The C14 dates appear to dispute the initial assessment; however the dates are also not consistent with the *a priori* established deposition of material in the stratigraphic sequence and therefore cannot be relied upon as accurate. The late Neolithic date returned by both samples suggests some contamination either in this period or an addition of carbon contamination later that 'topped up' the existing carbon.

Research conducted into C14 dating of peat deposits in alluvial flood plains in Suffolk (Howard *et al*, 2009), also return similar anomalous results. It was likewise concluded that neither the field sampling methods nor laboratory protocols such as pre-treatment methods (see Boreham, 2014 this report) of well-established radiocarbon facilities could adequately explain the anomalies observed within the dataset.

This study demonstrates very clearly that the complexity of valley floor stratigraphy and processes is such, that using single radiocarbon dates, whether AMS or bulk samples to reconstruct chronologies of 'geomorphic system response' may be unreliable. Intrusive roots from overlying layers are more prone to contaminate the layers below than in other water logged environments. It concluded that further study of the methodologies for dating valley floor deposits is necessary and that a muti-fraction (dating humic, humin and plant macrofossils from each layer) approach is preferable.

The dating sequence established in the initial pollen and macrofossil analysis is therefore likely to stand despite the C14 dating anomaly.

13. CONCLUSIONS

The evaluation yielded interesting results relating to the sequence of deposition on the River Box flood plain in the early Holocene period. The changing nature of the landscape and local environment during the transition from the middle Mesolithic to early Neolith periods has been established to a reasonable degree of certainty, based on comparison models (see Boreham, 2014).

The anomalous C14 results appear to be a common problem with fluvial flood plain environments due to their complex floral and faunal composition and activity. More intensive C14 dating comprising a muti-fraction carbon approach assessing humic, humin and plant macrofossil remains from each context would produce more reliable results. Funding three C14 samples per context may prove to be an prohibitively expensive during the evaluation phase unless specifically allowed for prior to work commencing.

The site had potential for features associated with pre-historic and later activity associated with settlement and exploitation of the natural environment along the edge of the River

Box valley. No finds or features were identified during the evaluation; however evidence of the middle Mesolithic to early Neolithic environment and landscape was identified and this site represents a rare and valuable opportunity to examine the changes in vegetation and landscape that occurred in the early-temperate part of the Holocene in this part of Suffolk (Boreham, 2014).

14. RECOMMENDATIONS

The work already undertaken during the evaluation has gone a long way to mitigate the proposed development. The lack of features or finds would suggest that there is little to gain from further work and the environmental analysis has already provided strong results for palaeoloenvironmental reconstruction (see Appendix 2).

Further archaeological work along the Box Valley would benefit from the use of geoarchaeological borehole analysis and a muti-fraction approach to C14 radiocarbon dating as part of evaluation phase.

15.0 PROJECT ARCHIVE AND DEPOSITION

A full archive will be prepared for all work undertaken in accordance with guidance from the *Selection, Retention and Dispersion of Archaeological Collections,* Archaeological Society for Museum Archaeologists, 1993. Deposition will be with the relevant museum or Suffolk County Council Archaeology Store subject to agreement with the legal landowner where finds are concerned and in accordance with *Deposition of Archaeological Archives in Suffolk*, 2010.

The archive will be quantified, ordered, indexed, cross-referenced and checked for internal consistency. The material will be catalogued, labelled and packaged for transfer and storage in accordance with the guidelines set out in the United Kingdom Institute for Conservation's *Conservation Guidelines No.2* and the Archaeological Archives Forum's *Archaeological Archives, A guide to best practice, compilation, transfer and curation* (Brown, 2007).

16.0 ACKNOWLEDGEMENTS

Britannia Archaeology would like to thank Mr Jim Lawrence and Mr Martin Freeman for commissioning the project and for their help throughout. We would also like to thank Dr Jess Tipper (SCCAS/CT), Dr Steve Boreham (Cambridge University), Dr Will Fletcher (English Heritage) and Dr Zoe Outram (English Heritage) for their work, advice and guidance during the project.

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DEFRA Magic http://magic.defra.gov.uk/website/magic

APPENDIX 1 DEPOSIT TABLES AND FEATURE DESCRIPTIONS

TRENCH 1

Deposit Tables

Trench No 1	Orientation W-E	Height AOD 13.54m	Shot No DP. 1
Sample Section No 1A	Location N Side	Facing S Facing	
Context No	**Depth**	**Deposit Description**	
1000	0.00 – 0.28m	Pond Silt - Mid brown red, compact clay silt	
1001	0.28 – 0.41m	Buried Topsoil - Dark grey brown, friable organic silt	
1002	0.41 – 0.56m	Upper Alluvial - Light blue grey, compact silty clay	
1003	0.56 – 1.20m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments	
1004	1.20 – 1.54m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains	
1005	1.54 – 1.83m	Lower Alluvial - Light grey blue, firm sandy silt	
1006	1.83m+	Natural - Light chalky grey, v. compact silty clay	

Trench No 1	Orientation W-E	Height AOD 13.66m	Shot No DP. 2
Sample Section No 1B	Location N Side	Facing S Facing	
Context No	**Depth**	**Deposit Description**	
1000	0.00 – 0.19m	Pond Silt - Mid brown red, compact clay silt	
1001	0.19 – 0.29m	Buried Topsoil - Dark grey brown, friable organic silt	
1002	0.29 – 0.48m	Upper Alluvial - Light blue grey, compact silty clay	
1003	0.48 – 1.40m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments	
1004	1.40 – 1.68m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains	
1005	1.68 – 1.91m	Lower Alluvial - Light grey blue, firm sandy silt	
1006	1.91m+	Natural - Light chalky grey, v. compact silty clay	

TRENCH 2

Deposit Tables

Trench No 2	Orientation N-S	Height AOD 13.78m	Shot No DP. 4
Sample Section No 2A	Location W Side	Facing E Facing	
Context No	**Depth**	**Deposit Description**	
1000	0.00 – 0.31m	Pond Silt - Mid brown red, compact clay silt	
1001	0.31 – 0.47m	Buried Topsoil - Dark grey brown, friable organic silt	
1003	0.47 – 0.79m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments	
1004	0.79 – 0.96m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains	
1005	0.96 – 1.63m	Lower Alluvial - Light grey blue, firm sandy silt	
1006	1.63m+	Natural - Light chalky grey, v. compact silty clay	

Trench No	Orientation	Height AOD	Shot No
2	N-S	13.84m	DP. 5
Sample Section No 2B	**Location** W Side	**Facing** E Facing	

Context No	Depth	Deposit Description
1000	0.00 – 0.34m	Pond Silt - Mid brown red, compact clay silt
1001	0.34 – 0.40m	Buried Topsoil - Dark grey brown, friable organic silt
1003	0.40 – 1.20m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments
1004	1.20 – 1.47m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains
1006	1.47m+	Natural - Light chalky grey, v. compact silty clay

TRENCH 3

Deposit Tables

Trench No	Orientation	Height AOD	Shot No
3	W-E	13.91m	DP. 8
Sample Section No 1A	**Location** N Side	**Facing** S Facing	

Context No	Depth	Deposit Description
1000	0.00 – 0.28m	Pond Silt - Mid brown red, compact clay silt
1001	0.28 – 0.50m	Buried Topsoil - Dark grey brown, friable organic silt
1003	0.50 – 1.08m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments
1004	1.08 – 1.31m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains
1005	1.31 – 1.71m	Lower Alluvial - Light grey blue, firm sandy silt
1006	1.71m+	Natural - Light chalky grey, v. compact silty clay

Trench No	Orientation	Height AOD	Shot No
3	W-E	14.02m	DP. 9
Sample Section No 1B	**Location** N Side	**Facing** S Facing	

Context No	Depth	Deposit Description
1000	0.00 – 0.35m	Pond Silt - Mid brown red, compact clay silt
1001	0.35 – 0.42m	Buried Topsoil - Dark grey brown, friable organic silt
1003	0.42 – 0.94m	Mid Alluvial - Mid red brown, compact organic clay silt with roots and wood fragments
1004	0.94 – 1.13m	Peat - Dark grey brown, soft peat with organic material, roots and tree remains
1005	1.13 – 1.38m	Lower Alluvial - Light grey blue, firm sandy silt
1006	1.38m+	Natural - Light chalky grey, v. compact silty clay

APPENDIX 2 SPECIALIST REPORTS

1. SPECIALIST POLLEN ANALYSIS

Pollen Analyses of Sediments from Stoke by Nayland, Suffolk (SPN099)
Steve Boreham BSc. PhD.

Introduction

This study focuses on the palynology of sediments obtained from a 72cm-long monolith (Sample 1) taken from the site of a proposed pond at Stoke by Nayland, Suffolk (SPN099).

The basal context (1006) was identified as 'clay natural' and extended 0 - 14 cm. It comprised a buff grey slightly organic silt with a little clay and was sub-sampled for pollen at 10cm. The next context (1005) was identified as 'alluvium' and extended 14 - 22 cm. It comprised a grey silty clay with a little organic material and was sub-sampled for pollen at 20cm.

Above this context (1004) was identified as 'peat', but appeared to be a complex organic sequence;
22 - 35 cm Grey black silty organic material with reed stems and pieces of wood
35 - 42 cm Dark grey organic silt
42 - 48 cm Light grey brown wood peat
48 - 53 cm Grey brown organic silt
Pollen sub-samples were taken at 30cm, 40cm, 43cm and 50cm.

Above this context (1003) was identified was 'alluvium'. This comprised a light grey brown organic silty clay extending 53 - 65cm, which was sub-sampled for pollen at 60cm, and a grey brown organic silt extending 65 - 72 cm, which was sub-sampled for pollen at 70cm.

The eight pollen sub-samples were prepared using the standard hydrofluoric acid technique, in the Geography Science Laboratories, University of Cambridge, and counted for pollen using a high-power stereo microscope at x400 magnification. The percentage pollen data from these 8 sub-samples is presented in Appendix 1 and in Figures 1a & 1b.

Pollen analyses

Sediment sub-samples for pollen analysis were taken from the following points along the monolith (Sample 1); 10, 20, 30, 40, 43, 50, 60 & 70cm. The results of the pollen analysis appear in Appendix 1 and are presented graphically as percentage pollen diagrams in Figure 1a (Trees, Shrubs & Summary) and Figure 1b (Herbs, Spores & Aquatics). The sub-samples had pollen concentrations that ranged between 36,152 and 263,801 grains per ml. Pollen preservation was rather good for all but the two basal samples, where the pollen was sparse and degraded. Finely divided organic material hampered pollen counting to some degree in all the samples. Assessment pollen counts were made from single slides for these sub-samples. The pollen sums achieved for these slides were all above 50 grains, five were greater than 200 grains, and one reached 301 grains. Since some of these samples did not exceed the statistically desirable total of 300 pollen grains main sum, caution must be employed during the interpretation of these results.

It is immediately clear that the two basal sub-samples (10cm & 20cm) are dominated by grass (Poaceae) pollen (c.35-42%), together with pine (*Pinus*) (10-15%, hazel (*Corylus*) (13-15%), alder (*Alnus*) (7-11%) and a limited assemblage of herbs such as sedges (Cyperaceae) (2-3%, members of the lettuce and thistle families (Asteraceae) (together 5-8%) and meadowsweet (*Filipendula*) c.2%). Lower plants in these samples are represented by undifferentiated fern spores (together 13-15%) and by the spores of the clubmoss (*Selaginella*) which often grows on the banks of wooded streams in damp habitats with neutral to alkaline soils. Obligate aquatic plants in these samples were represented by the emergent bur-reed (*Sparganium*) (4-10%), reedmace (*Typha*) (0-2%), and by the yellow water-lily (*Nuphar*) (c.2%), which prefers to grow in open water around 2m deep.

The pollen sub-sample from 30cm is in some ways transitional between the basal sub-samples and the upper part of the sequence in that it also has a significant amount of pine (*Pinus*) pollen (11.4%), but for the first time contains oak (*Quercus*) (6.9%) and lime (*Tilia*) (6.4%), which are the essential elements of mixed-oak woodland, accompanied by hazel (*Corylus*) (15.8%) and alder (*Alnus*) (11.4%). The range of herbs represented is slightly greater, and for the first time spores of the polypody fern (*Polypodium*) appear. This plant is associated with mature tree boles and is taken to represent mature woodland nearby. The proportion of undifferentiated fern spores rises to more than 30% of the total count, presumably indicating damp shady conditions beneath a tree canopy. The spores of *Sphagnum* moss also occur, confirming the damp nature of the environment, whilst the emergent aquatics bur-reed (*Sparganium*) (3.5%) and reedmace (*Typha*) (0.5%) persist.

The pollen sub-samples in the upper part of the sequence (40, 43, 50, 60, 70cm) are all rather similar in that they present a striking mixed-oak woodland signal with oak (*Quercus*) (6-10%), lime (*Tilia*) (5-13%), elm (*Ulmus*) (up to 2%), hazel (*Corylus*) (10-16%), willow (*Salix*) (up to 2%) and juniper (*Juniperus*) (up to 2%). Alder (*Alnus*) rises to 23.4% of the total count in the 40cm sub-sample suggesting that a dense alder carr (wet woodland) occupied the valley floor at this time. Mature trees are again indicated by the presence of the polypody fern (*Polypodium*) (4-7%), and large proportions of undifferentiated fern spores (27-47%) continue to dominate the spectrum. There is also a broader range of herbs associated with these sub-samples, although none are particularly abundant. Towards the top of the sequence sub-samples 60cm & 70cm have duckweed (*Lemna*) pollen, which suggests open water with warm summer conditions. The upper sample also has water milfoil (*Myriophyllum alterniflorum*) pollen, which suggests open water up to about 1m deep. It is notable that pine (*Pinus*) and juniper (*Juniperus*) are also absent from the top two sub-samples.

Discussion & Conclusions

It is evident that the pollen sequence from Stoke by Nayland (SPN099) must represent a pre-clearance landscape of mixed-oak woodland. The basal pine and hazel-dominated signal seems consistent with the middle part of the Mesolithic period (c.8,500 – 9,500 years Calendar year BP), and it seems likely that this sequence records the transition from open hazel-pine scrub to mature mixed-oak forest, which is known to persist until at least the early Neolithic (c. 6,000 years Calendar year BP). The local environment appears to change from deep open water with yellow water-lilies and damp riparian (bank side) habitats with abundant emergent vegetation, to dense alder carr woodland, and finally open water with duckweed and water milfoil.

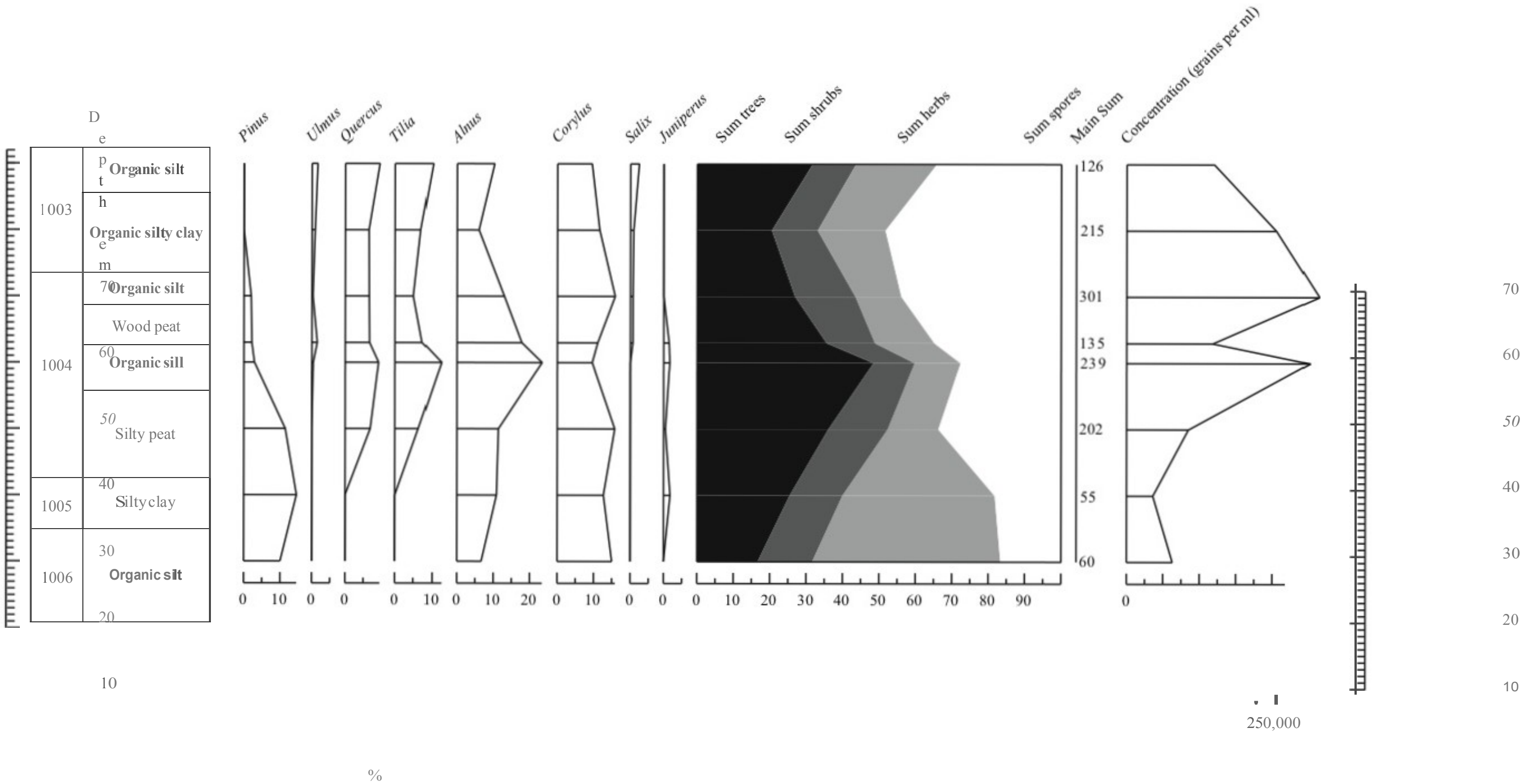
Usually, these Mesolithic sediments are located in deep palaeochannels beneath the existing floodplains of rivers in Southern England. This site represents a rare and valuable opportunity to examine the changes in vegetation and landscape that occurred in the early-temperate part of the Holocene in this part of Suffolk. Radiocarbon (ams or bulk) dating of material from the basal and upper parts of this sequence would confirm the antiquity of the deposits and their place them within a secure chronological framework.

In summary, the narrow 'time slice' represented here probably extends from the mid Mesolithic through to potentially the early Neolithic, although local conditions could make that age-estimate unreliable. As with all assessment pollen counts it is important not to over-interpret the data, however the clear transition from pine-hazel to mixed-oak woodland pollen assemblages would make this interpretation hard to account for by other means.

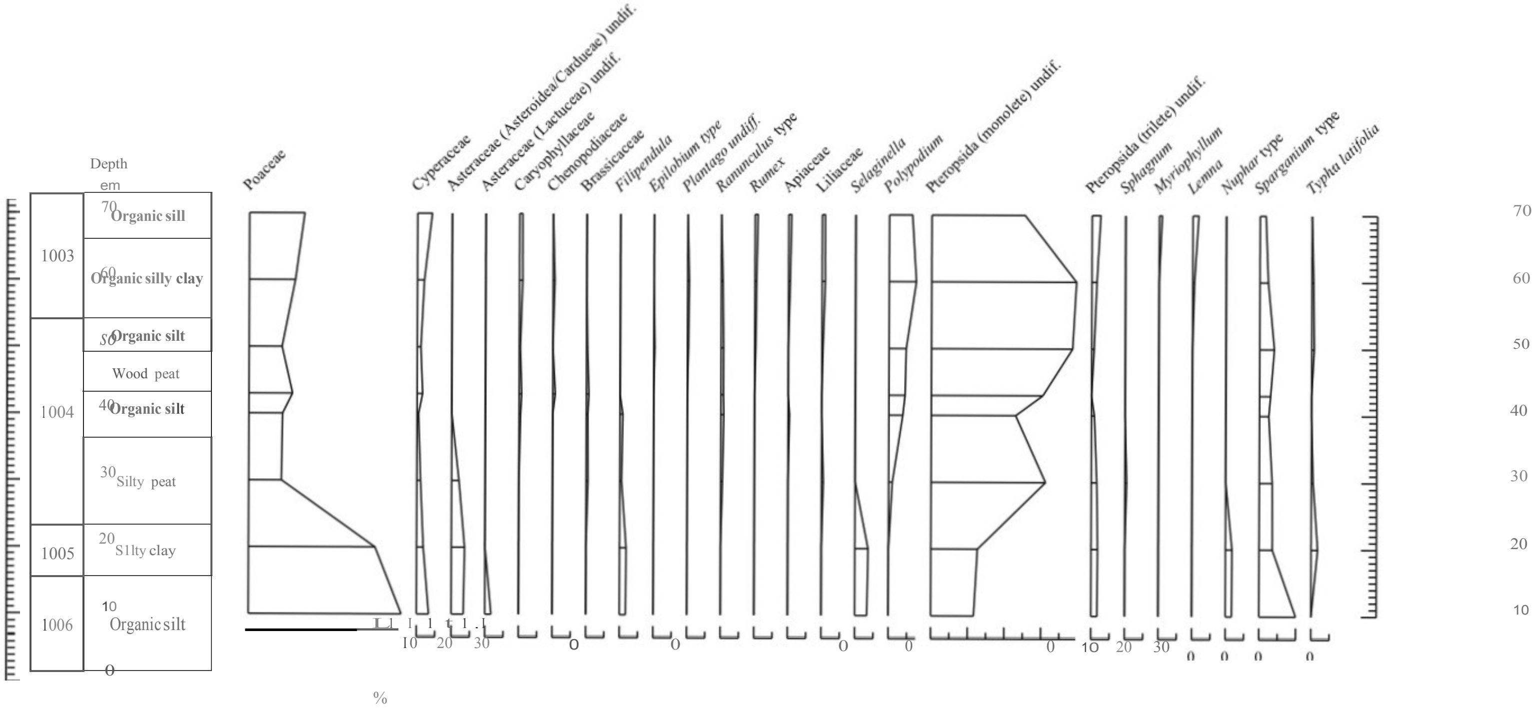
Dr Steve Boreham 2nd September 2014

Stoke by Nayland SPN099 - Percentage Pollen Data								
Context	1006	1005	1004	1004	1004	1004	1003	1003
Pollen sub-sample	10cm	20cm	30cm	40cm	43cm	50cm	60cm	70cm
Trees & Shrubs								
Pinus	10.0	14.5	11.4	2.9	2.2	2.0	0.0	0.0
Ulmus	0.0	0.0	0.0	0.4	1.5	0.3	0.9	1.6
Quercus	0.0	0.0	6.9	9.2	6.7	6.6	6.5	9.5
Tilia	0.0	0.0	6.4	12.6	7.4	5.0	7.0	10.3
Alnus	6.7	10.9	11.4	23.4	17.8	13.0	6.0	10.3
Corylus	15.0	12.7	15.8	9.6	11.1	15.9	11.6	9.5
Salix	0.0	0.0	0.0	0.0	0.7	0.7	0.9	2.4
Juniperus	0.0	1.8	0.5	1.7	1.5	0.0	0.0	0.0
Herbs								
Poaceae	41.7	34.5	8.9	9.2	11.9	9.0	12.6	15.1
Cyperaceae	3.3	1.8	1.0	0.4	1.5	1.0	1.9	4.0
Asteraceae (Asteroidea/Cardueae) undif.	3.3	3.6	2.0	0.0	0.0	0.0	0.0	0.0
Asteraceae (Lactuceae) undif.	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caryophyllaceae	0.0	0.0	0.0	0.4	0.7	0.3	0.9	0.8
Chenopodiaceae	0.0	0.0	0.0	0.0	0.7	0.0	0.5	0.0
Brassicaceae	0.0	0.0	0.5	0.4	0.7	0.3	0.0	0.0
Filipendula	1.7	1.8	0.5	0.8	0.0	0.0	0.0	0.0
Epilobium type	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Plantago undif.	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0
Ranunculus type	0.0	0.0	0.5	0.8	0.7	0.7	0.5	0.0
Rumex	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.8
Apiaceae	0.0	0.0	0.0	0.4	0.0	0.0	0.5	0.8
Liliaceae	0.0	0.0	0.5	0.0	0.0	0.3	0.9	0.8
Lower plants								
Selaginella	3.3	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Polypodium	0.0	0.0	1.0	3.8	4.4	4.7	7.4	6.3
Pteropsida (monolete) undif.	11.7	12.7	31.2	23.0	30.4	38.5	39.5	25.4
Pteropsida (trilete) undif.	1.7	1.8	1.5	0.8	0.0	0.7	1.4	2.4
Sphagnum	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Aquatics								
Myriophyllum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Lemna	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.6
Nuphar type	1.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Sparganium type	10.0	3.6	3.5	2.5	3.0	4.0	2.3	1.6
Typha latifolia	0.0	1.8	0.5	0.0	0.0	0.7	0.5	0.0
Sum trees	16.7	25.5	36.1	48.5	35.6	26.9	20.5	31.7
Sum shrubs	15.0	14.5	16.3	11.3	13.3	16.6	12.6	11.9
Sum herbs	51.7	41.8	13.9	12.6	16.3	12.6	18.6	22.2
Sum spores	13.3	14.5	33.7	27.6	34.8	43.9	48.4	34.1
Main Sum	60	55	202	239	135	301	215	126
Concentration (grains per ml)	63102	36152	84977	251356	118316	263801	205560	120467

Stoke by Nayland (SPN099) Percentage Pollen- Trees, Shrubs & Summary



Stoke by Nayland (SPN099) Percentage Pollen - Herbs, Spores & Aquatics



 Report Number 1062

Addendum to Pollen Analyses of Sediments from Stoke by Nayland, Suffolk (SPN099)
Steve Boreham BSc. PhD.

The radiocarbon dates from Stoke-by-Nayland came back from Beta Analytic.

Here is a summary;

SAMPLE	BETA NO.	CONVENTIONAL AGE	CALIBRATED AGE (2 SIGMA)
SPN099 1 (9-11cm) (Oldest in Sequence)	390126	4020±30BP	2615 to 2605 Cal BC and 2580 to 2470 Cal BC
SPN099 1 (70-72cm) (Youngest in Sequence)	390127	4120±30BP	2870 to 2800 Cal BC and 2780 to 2575 Cal BC

Both of these dates fall in the Late Neolithic. The dates appear to be reversed in order (youngest at the base, oldest at the top) although they are probably not statistically different to each other.

In my pollen report I concluded;

"The basal pine and hazel-dominated signal seems consistent with the middle part of the Mesolithic period (c.8,500 – 9,500 years Calendar year BP), and it seems likely that this sequence records the transition from open hazel-pine scrub to mature mixed-oak forest, which is known to persist until at least the early Neolithic (c. 6,000 years Calendar year BP)."

Indeed, the pollen diagram appears to show the classic Mesolithic vegetation succession. However, this is plainly not borne out by the radiocarbon dating.

There are a number of possibilities that might explain this situation;

a) The samples were contaminated with younger carbon during sampling in the field or during preparation in the laboratory

b) The samples were contaminated with younger carbon *in situ* post-deposition, either by rootlets from above or by some other younger source of carbon (perhaps brought by groundwater)

c) The samples are genuinely Late Neolithic in age, and the pollen signal is an artefact of unusual local conditions (either environmental or taphonomic)

The expectation from the pollen analysis is that not only should the sediment be much older than reported, but that there should be an interval of at least a thousand years (and probably more) between the base and top of the sequence.

The fact that the dates are much younger and appear to be reversed, hints that options a) or b) - (contamination with younger carbon) might be an explanation for these results, rather than c) - (an artefact of unusual local conditions).

The samples themselves appeared to be cohesive and uncontaminated on inspection in the laboratory, and careful laboratory protocols are in place to minimise contamination of the samples during the preparation process. These things make option a) - (contamination during sampling in the field or during preparation in the laboratory) rather unlikely, leaving option b) - (contaminated with younger carbon *in situ*) as the most likely scenario.

It is of course possible to construct a narrative whereby some local major disturbance of the Neolithic woodland, and its subsequent recovery, or some unusual change in sediment and pollen supply, gave the impression of a Mesolithic vegetational succession, but with the Neolithic. I would be much more inclined to believe such a scenario if the radiocarbon dates were not reversed and were separated by an interval.

The possibility is that the material from other samples from the same site might also be contaminated with younger carbon, and would also yield 'young' radiocarbon dates.

2. CARBON 14 DATING

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Steven Boreham — Report Date: 9/29/2014

University of Cambridge — Material Received: 9/12/2014

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 390126	4040 +/- 30 BP	-26.3 o/oo	4020 +/- 30 BP

SAMPLE : SPN099_1_9-11cm
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (organic material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 2615 to 2605 (Cal BP 4565 to 4555) and Cal BC 2580 to 2470 (Cal BP 4530 to 4420)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 390127	4160 +/- 30 BP	-27.5 o/oo	4120 +/- 30 BP

SAMPLE : SPN099_1_70-72cm
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (organic sediment): acid washes
2 SIGMA CALIBRATION : Cal BC 2870 to 2800 (Cal BP 4820 to 4750) and Cal BC 2780 to 2575 (Cal BP 4730 to 4525)

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

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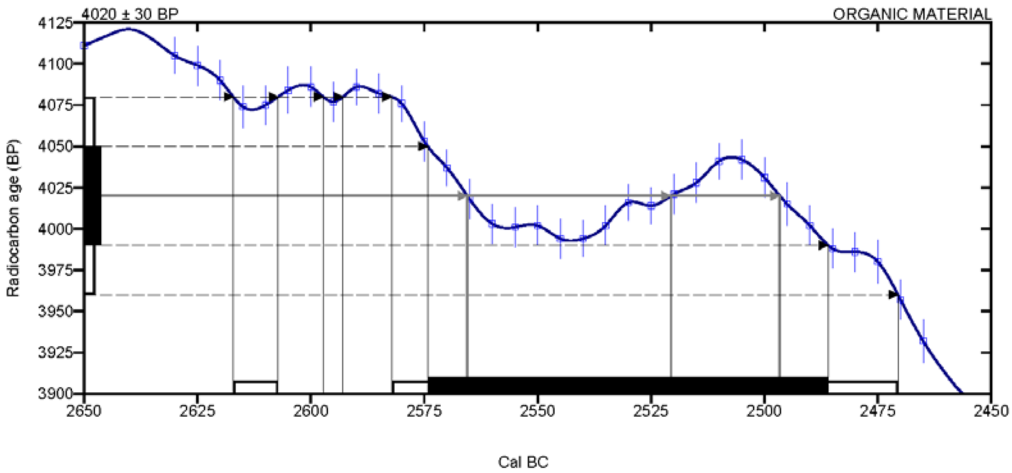
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -26.3 o/oo : lab. mult = 1)

Laboratory number	**Beta-390126**
Conventional radiocarbon age	**4020 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal BC 2615 to 2605 (Cal BP 4565 to 4555)** **Cal BC 2580 to 2470 (Cal BP 4530 to 4420)**
Intercept of radiocarbon age with calibration curve	Cal BC 2565 (Cal BP 4515) Cal BC 2520 (Cal BP 4470) Cal BC 2495 (Cal BP 4445)
1 Sigma calibrated results 68% probability	Cal BC 2575 to 2485 (Cal BP 4525 to 4435)



Database used
INTCAL13

References

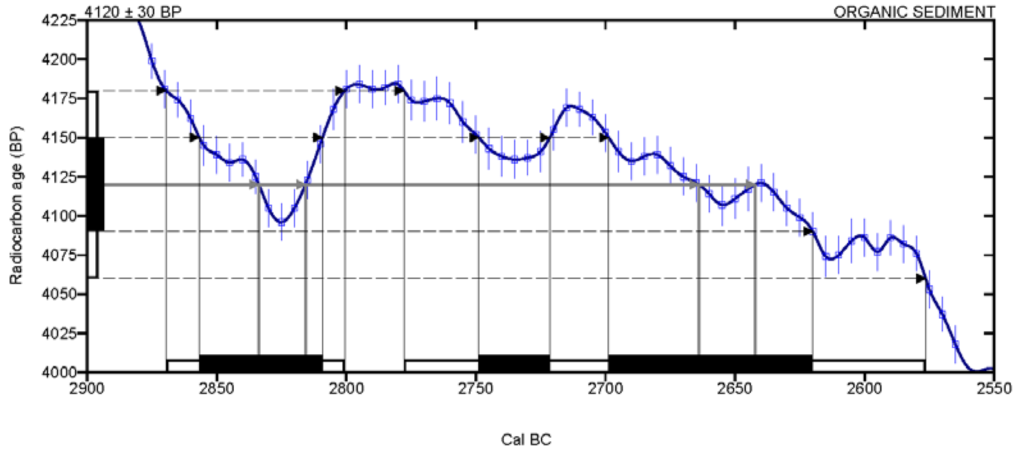
Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322
References to INTCAL13 database
Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887.

Beta Analytic Radiocabon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -27.5 o/oo : lab. mult = 1)

Laboratory number	**Beta-390127**
Conventional radiocarbon age	**4120 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal BC 2870 to 2800 (Cal BP 4820 to 4750)** **Cal BC 2780 to 2575 (Cal BP 4730 to 4525)**
Intercept of radiocarbon age with calibration curve	Cal BC 2835 (Cal BP 4785) Cal BC 2815 (Cal BP 4765) Cal BC 2665 (Cal BP 4615) Cal BC 2640 (Cal BP 4590)
1 Sigma calibrated results 68% probability	Cal BC 2855 to 2810 (Cal BP 4805 to 4760) Cal BC 2750 to 2720 (Cal BP 4700 to 4670) Cal BC 2700 to 2620 (Cal BP 4650 to 4570)



Database used
INTCAL13

References

Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322
References to INTCAL13 database
Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887.

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APPENDIX 3 CONCORDNACE OF FINDS

FEATURE CONTEXT	FEATURE TYPE	LAYER/FILL CONTEXT	LAYER/FILL DESCRIPTION	SPOT DATE	POTTERY /g(sherds)	CBM /g(number)	ANIMAL BONE /g(number)	HUMAN BONE /g(number)	STRUCK FLINT /g(number)	BURNT FLINT /g(number)
None										

APPENDIX 4 OASIS SHEET (Copied from OASIS page)

OASIS ID: britanni1-181960

Project details	
Project name	Scotland Hall Farm, Scotland Street, Stoke-By-Nayland, Suffolk; Archaeological Evaluation
Short description of the project	The evaluation yielded interesting results relating to the sequence of deposition on the River Box flood plain in the early Holocene period. The changing nature of the landscape and local environment during the transition from the middle Mesolithic to early Neolithic periods has been established to a reasonable degree of certainty, based on comparison models. C14 dating of material contained within the above stratigraphic sequence produced anomalous results compared with the initial assessment. This is a documented problem with fluvial flood plain environments in parts of East Anglia due to complex floral and faunal composition and activity (see Suffolk River Valleys Project, 2006). The C14 dates were also not consistent with the 'a priori' established deposition of material in the stratigraphic sequence and therefore cannot be relied upon as accurate. The late Neolithic date returned by both samples suggests some contamination either in this period or an addition of carbon contamination later that topped up the existing carbon. No finds or features were identified during the evaluation; however the evidence of middle Mesolithic to early Neolithic environment and landscape identified in the initial pollen analysis represents a rare and valuable opportunity to examine the changes in vegetation and landscape that occurred in the early-temperate part of the Holocene in this part of Suffolk.
Project dates	Start: 02-07-2014 End: 04-07-2014
Previous/future work	No / No
Any associated project reference codes	SBN099 - Sitecode
Any associated project reference codes	P1063 - Contracting Unit No.
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Current Land use	Open Fresh Water 2 - Standing water
Monument type	WATERCOURSE Late Mesolithic

Significant Finds	NONE None
Methods & techniques	"Targeted Trenches"
Development type	Lake creation
Prompt	Planning condition
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	SUFFOLK BABERGH STOKE BY NAYLAND SBN099 Scotland Hall Farm, Scotland Street, Stoke-By-Nayland, Suffolk
Postcode	CO6 4QG
Study area	2.00 Hectares
Site coordinates	TL 996 368 51.9930555556 0.9075 51 59 35 N 000 54 27 E Point
Lat/Long Datum	WGS 84 Datum
Height OD / Depth	Min: 11.60m Max: 12.10m

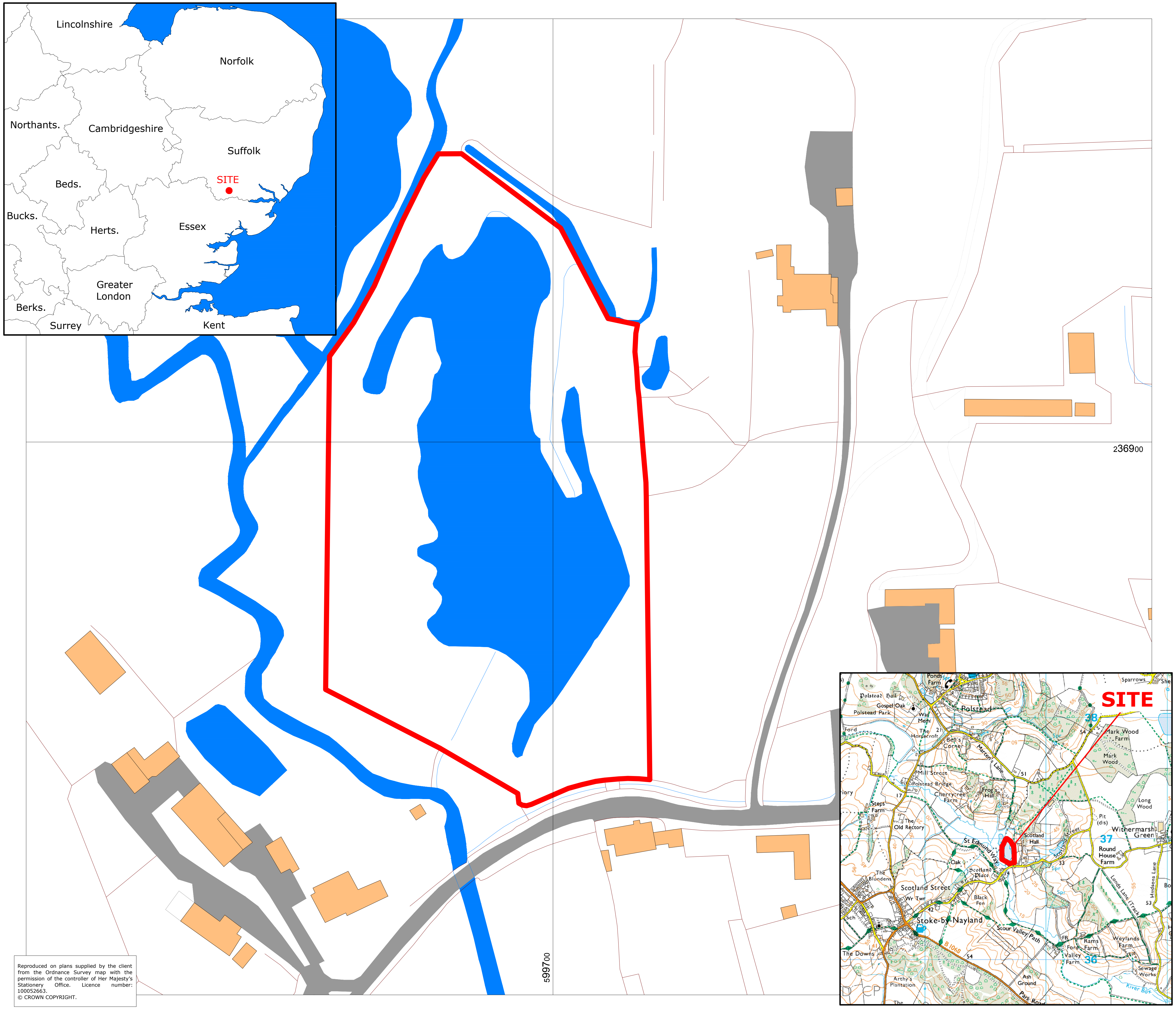
Project creators

Name of Organisation	Britannia Archaeology Ltd
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Tim Schofield
Project director/manager	Matthew Adams
Project supervisor	Martin Brook
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Jim Lawrence

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Suffolk HER

Digital Archive ID	SBN099
Digital Contents	"none"
Digital Media available	"GIS","Images raster / digital photography","Text"
Paper Archive recipient	Suffolk HER
Paper Archive ID	SBN099
Paper Contents	"none"
Paper Media available	"Context sheet","Drawing","Map","Miscellaneous Material","Plan","Report","Section","Unpublished Text"
Entered by	Matt Adams (matt@britannia-archaeology.com)
Entered on	1 December 2014



N

Site Boundary

NGR:	PROJECT NUMBER:
599700 236900	1063

PROJECT:
SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT:
MR JIM LAWRENCE

DESCRIPTION:
GENERAL LOCATION PLAN

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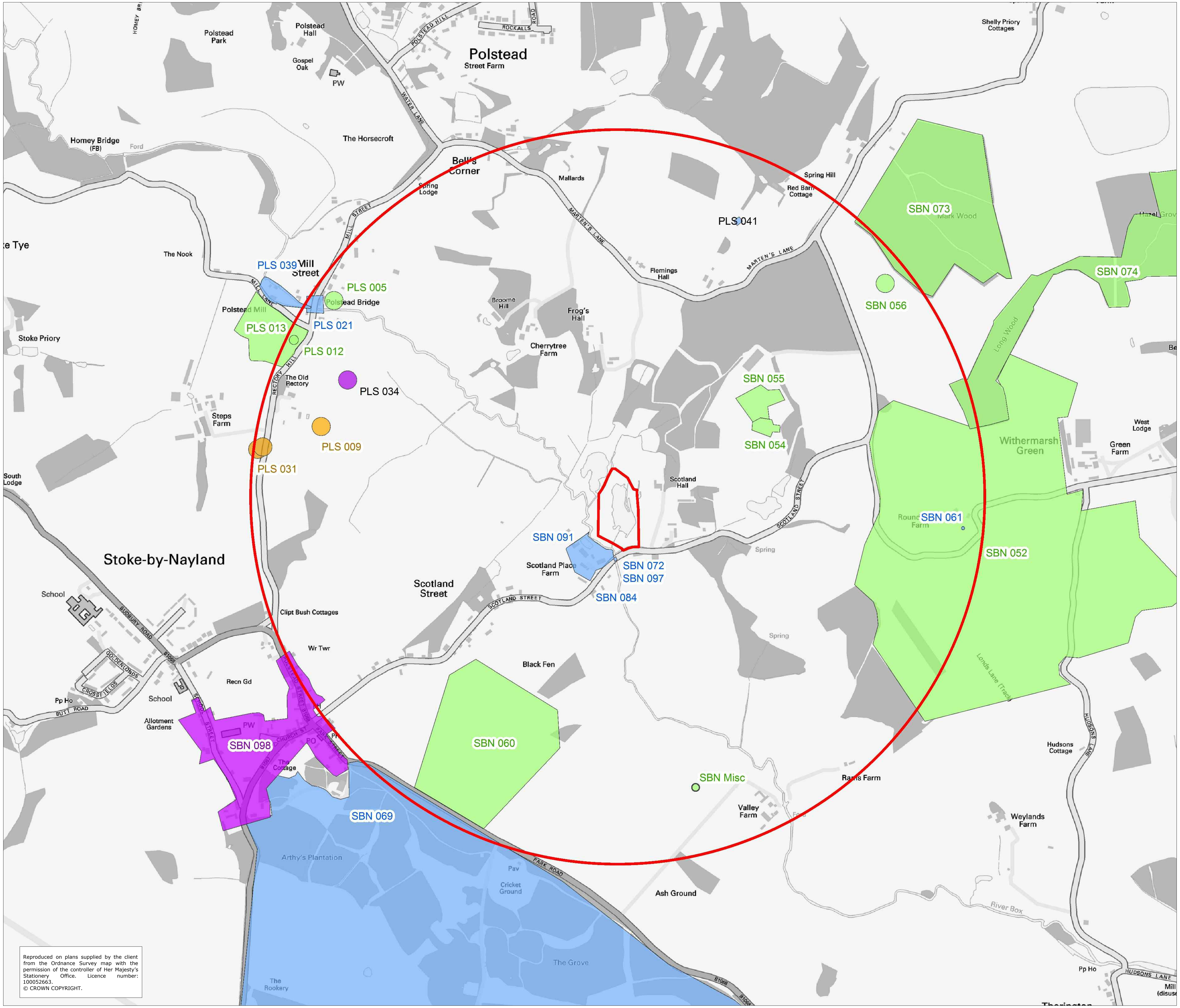
SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	TPS	01
DATE:	**AUTHOR:**	**FIGURE:**
OCT 2014	MCA	01



N

	HER Search Area
	Undated Monument Record
	Post-Medieval Monument Record
	Medieval Monument Record
	Anglo-Saxon Monument Record
	Site Boundary

NGR: 599700 236900

PROJECT NUMBER: 1063

PROJECT: SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT: MR JIM LAWRENCE

DESCRIPTION: SHER DATA - MONUMENTS

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PLOT:	APPROVED:	VERSION:
A3	TPS	01
DATE:	AUTHOR:	FIGURE:
OCT 2014	MCA	02

N

	Event Region
	Grade II
	Conservation Area
	Site Boundary

NGR:	PROJECT NUMBER:
599700 236900	1063

PROJECT:
SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT:
MR JIM LAWRENCE

DESCRIPTION:
SHER DATA - LISTED BUILDINGS, CONSERVATION AREAS & EVENTS

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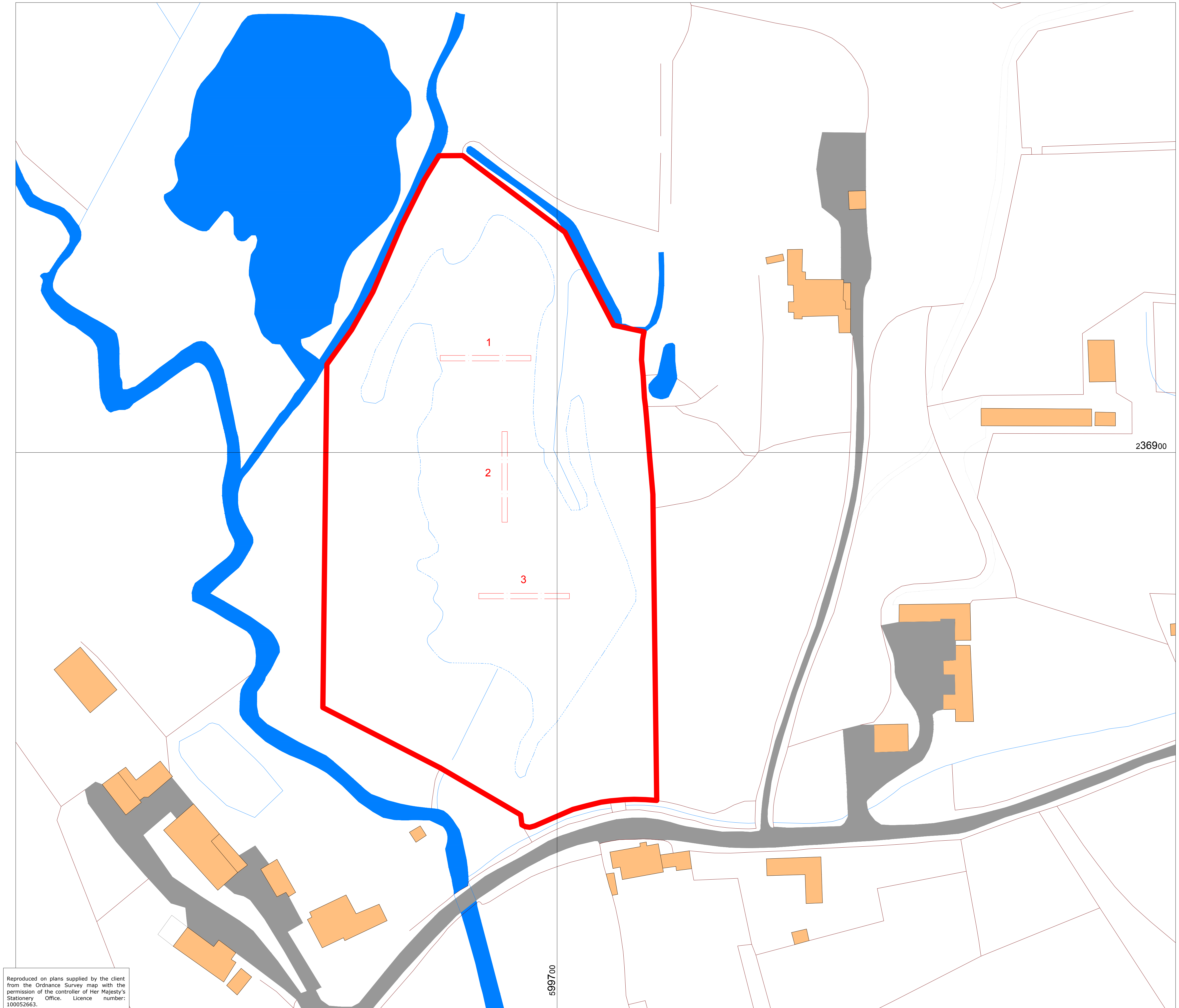
SCALE: 1:10000 0 50m

PLOT:	APPROVED:	VERSION:
A3	TPS	01
DATE:	AUTHOR:	FIGURE:
OCT 2014	MCA	03



NGR: 599700 236900	PROJECT NUMBER: 1063
PROJECT: SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK	
CLIENT: MR JIM LAWRENCE	
DESCRIPTION: TRENCH & FEATURE PLAN	

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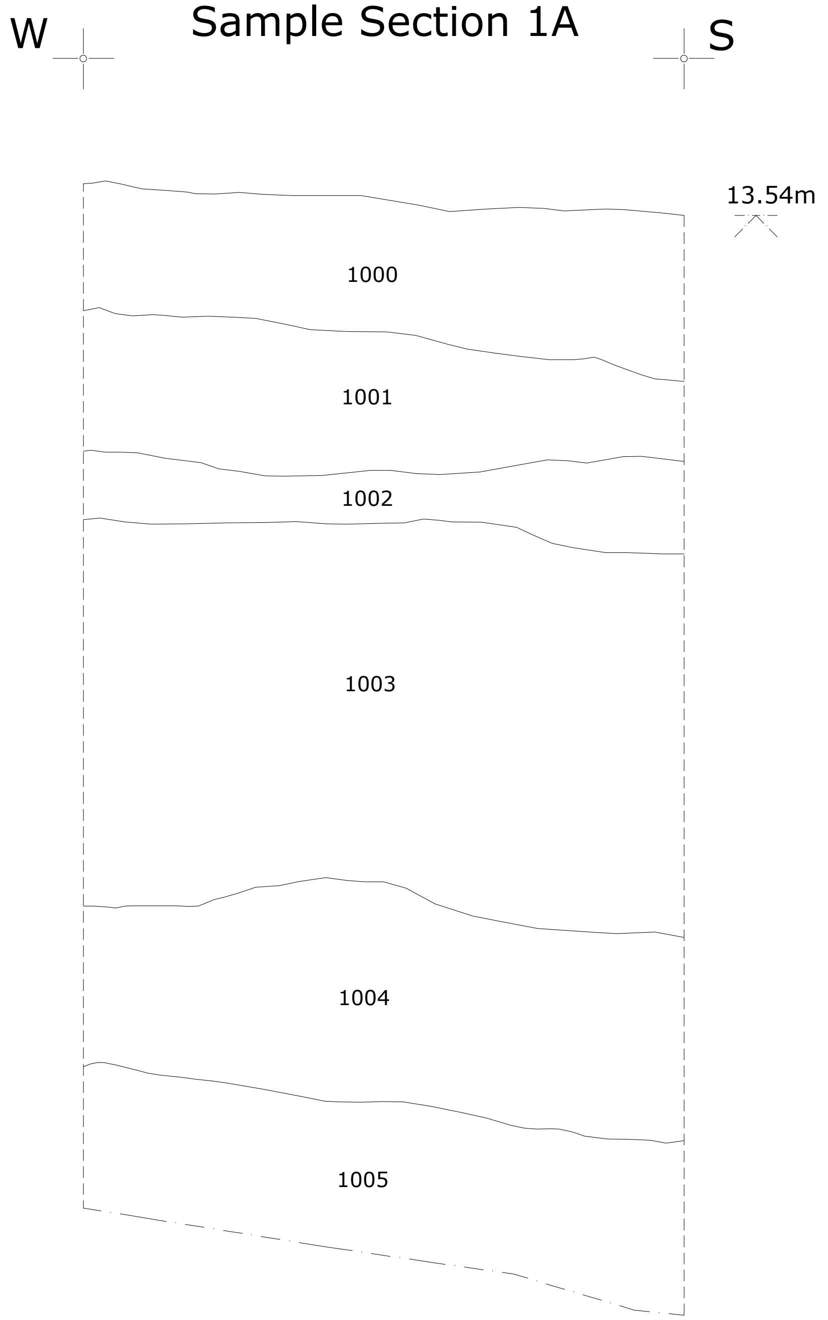
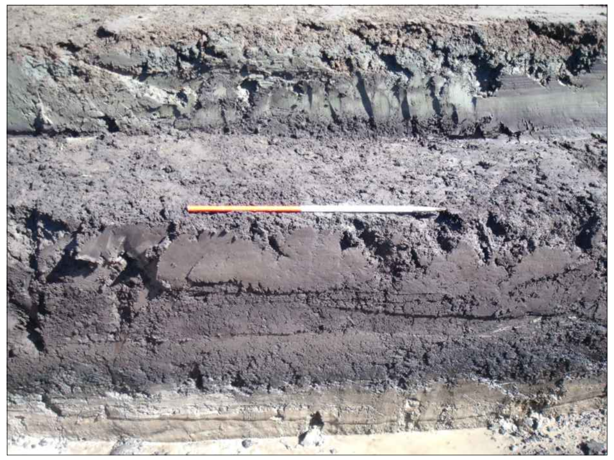
SCALE: 1:1250	0 — 50m	
PLOT: A3	APPROVED: TPS	VERSION: 01
DATE: OCT 2014	AUTHOR: MCA	FIGURE: 04

TRENCH 1

Sample Section 1A



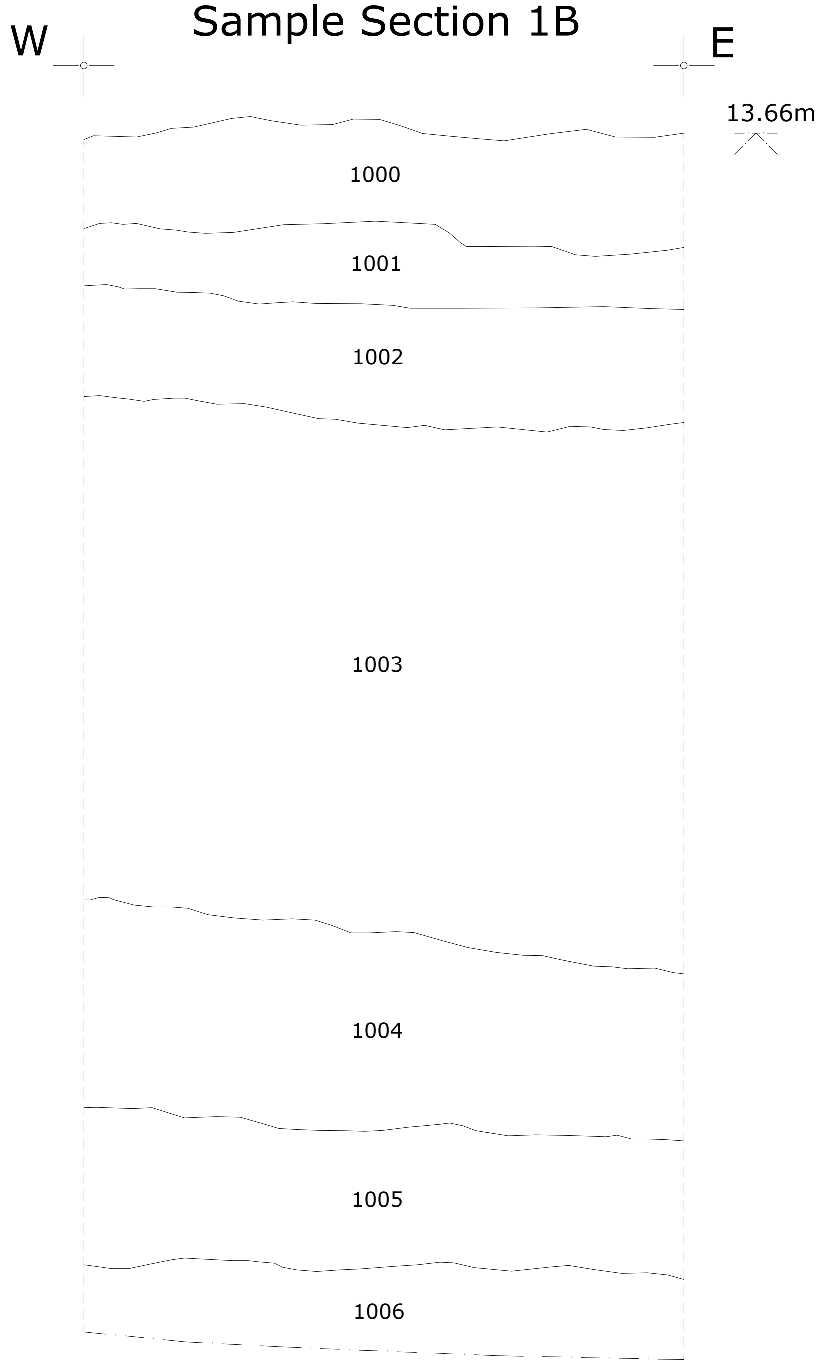
DP1: Sample Section 1A - View N



DP2: Sample Section 1B - View N

DP3: Trench 1 Post Exc - View W

Sample Section 1B



NGR: 599700 236900	PROJECT NUMBER: 1063

PROJECT:
SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT:
MR JIM LAWRENCE

DESCRIPTION:
SECTIONS & PHOTOGRAPHS

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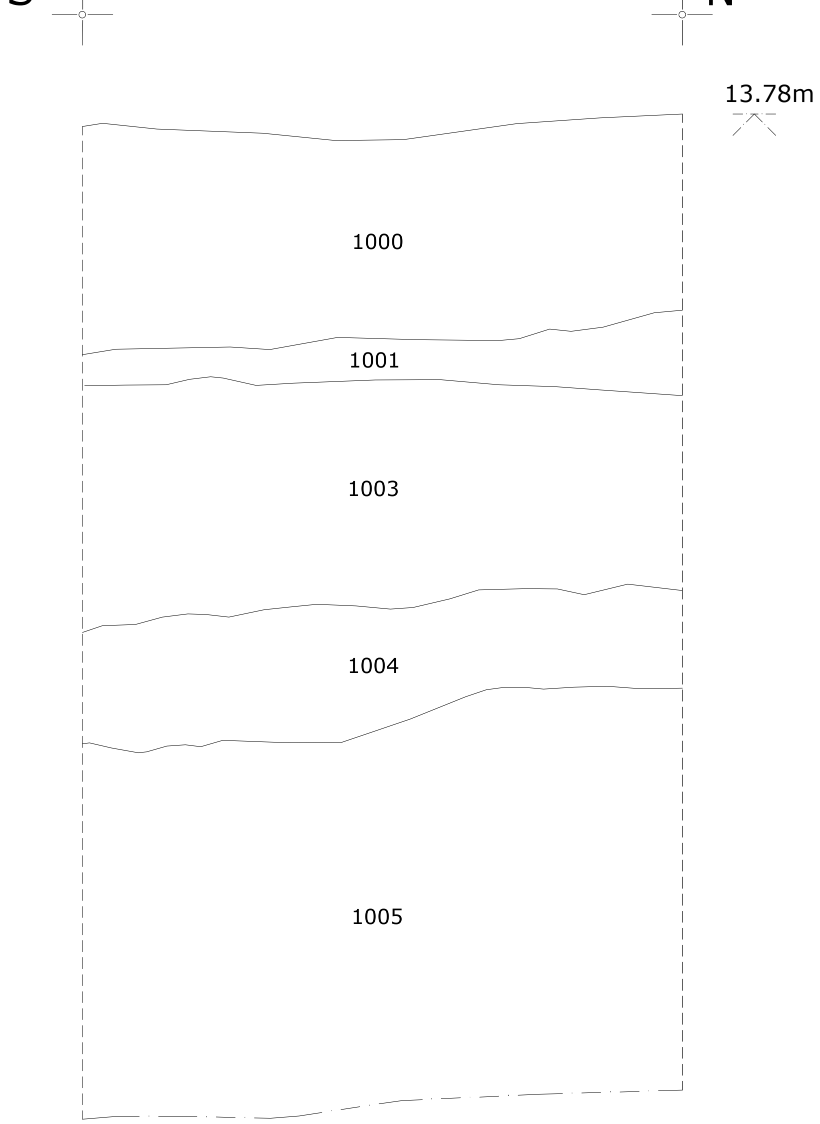
SCALE: 1:10 (0 – 50cm)

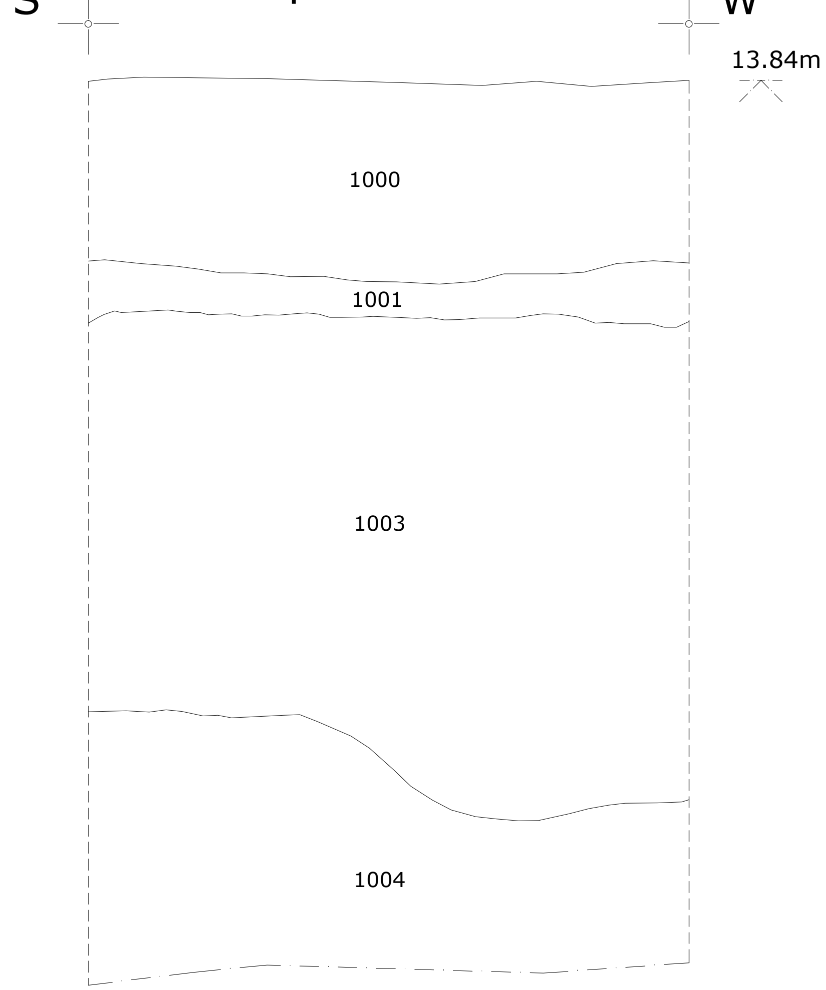
PLOT: A3	APPROVED: TPS	VERSION: 01
DATE: OCT 2014	AUTHOR: MCA	FIGURE: 05

TRENCH 2

Sample Section 2A



Sample Section 2B



DP6: Trench 2 Post Exc N End - View S

DP7: Trench 2 Post Exc S End - View N

DP4: Sample Section 2A - View W

DP5: Sample Section 2B - View W

NGR: 599700 236900	PROJECT NUMBER: 1063

PROJECT: SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT: MR JIM LAWRENCE

DESCRIPTION: SECTIONS & PHOTOGRAPHS

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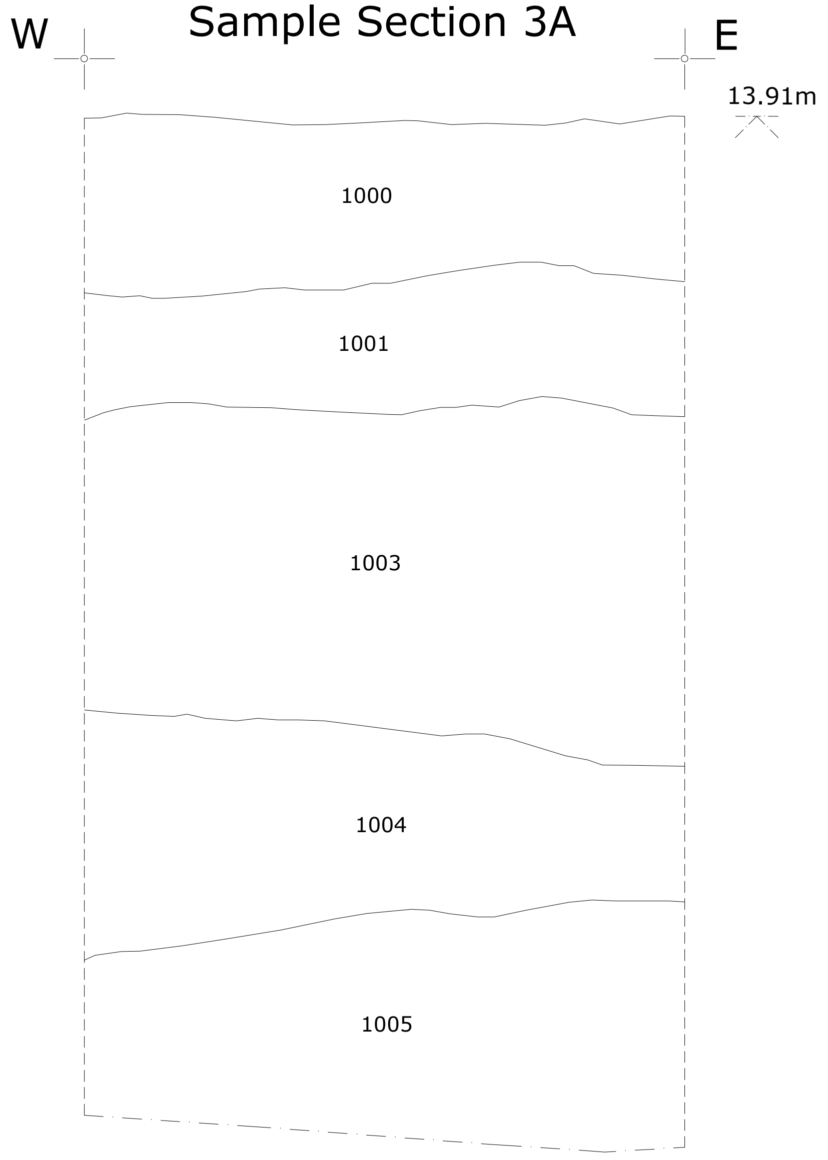
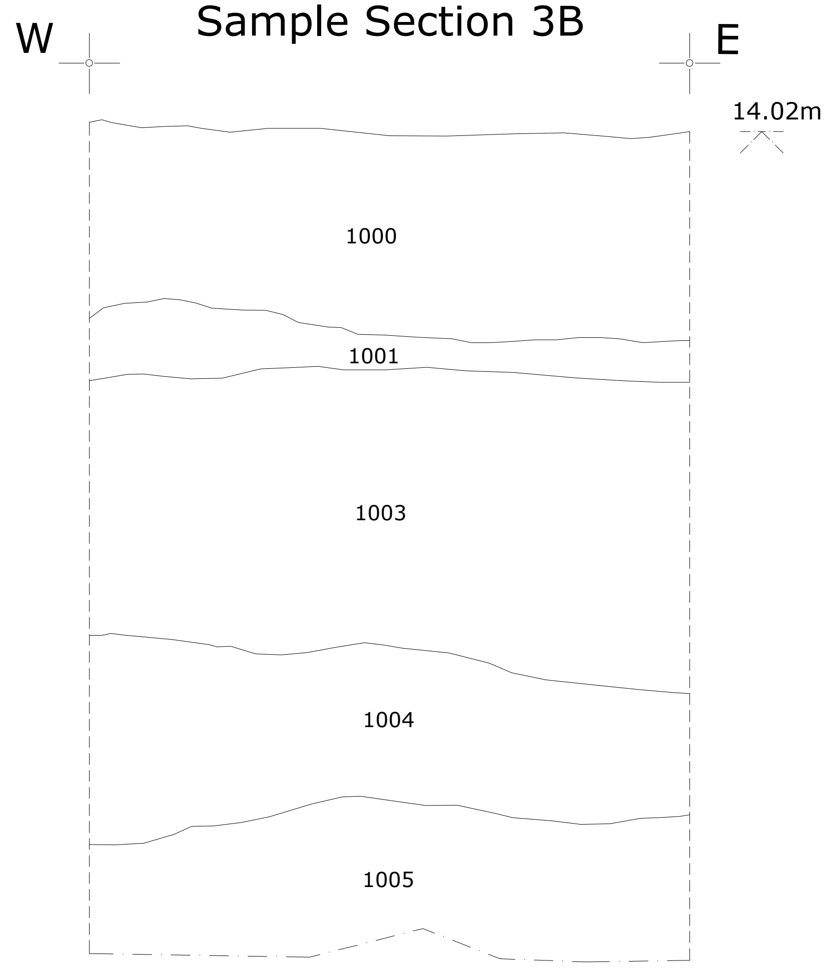
PLOT: A3	APPROVED: TPS	VERSION: 01
DATE: OCT 2014	AUTHOR: MCA	FIGURE: 06

TRENCH 3

Sample Section 3A

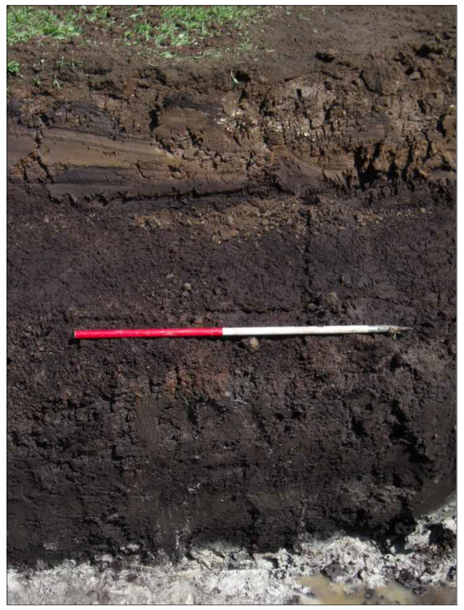


Sample Section 3B



DP9: Sample Section 3B + Monolith Sample 3 - View N

DP11: General Site Shot - View W



DP8: Sample Section 3a - View N

DP12: General Site Shot - View SE

DP10: Trench 3 Post Exc - View W

NGR: 599700 236900	PROJECT NUMBER: 1063

PROJECT: SCOTLAND HALL FARM, SCOTLAND STREET, STOKE-BY-NAYLAND, SUFFOLK

CLIENT: MR JIM LAWRENCE

DESCRIPTION: SECTIONS & PHOTOGRAPHS

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SCALE: 1:10 (0 – 50cm)

PLOT: A3	APPROVED: TPS	VERSION: 01
DATE: OCT 2014	AUTHOR: MCA	FIGURE: 07