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A Late Prehistoric Timber Alignment in the Waveney Valley, Suffolk: Excavations at Barsham Marshes

Kristina Krawiec, Benjamin R. Gearey, Henry P. Chapman, Emma-J. Hopla, Michael Bamforth, Catharine Griffiths, Thomas C. B. Hill and Ian Tyers

Abstract

This paper describes the results of excavations and associated palaeoenvironmental analyses at Barsham Marshes, Suffolk, England. The site is a triple post alignment of oak stakes built at the edge of a palaeochannel of the River Waveney. The alignment has been traced for over 30 m but neither terminus of the site has been excavated. Dendrochronological dating of the timbers has produced a range of felling dates between 8 BC and AD 8 indicating a late Iron Age date for the structure. No other cultural material was recovered. Palaeoenvironmental analyses of the associated deposits indicate that the site was located at the edge of a shallow channel of the River Waveney with local aquatic and alder carr vegetation and evidence for more open scrub and pastoral environments in the wider landscape. This channel appears to have infilled by the 11th century AD and is overlain by a thin layer of humified peat, corresponding to the uppermost level of preservation of the stakes. It is likely that any superstructure originally supported by the stakes had finally decomposed or been dismantled by this time. The site is compared to that of Beccles some 3 km down river where excavations have revealed a triple post alignment also dating to the late Iron Age but with evidence for activity during the Romano-British period. The possible form and function(s) of the sites are discussed.

Keywords: Timber, Alignment, Prehistory, Human Activity, Floodplain, Palaeoenvironments

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Introduction

Several late prehistoric wetland sites which may be classed broadly as 'timber alignments' have been excavated in the United Kingdom over the past decade and a half, including Flag Fen, Peterborough (Pryor 2001), Fiskerton, Lincolnshire (Field and Parker Pearson 2003), Caldicot, Monmouthshire (Nayling 1993), Shinewater Park, East Sussex (see Pryor 2001) and Eton Rowing Lake, Dorney, Buckinghamshire (Allen and Welsh 1996). These sites are generally located in wetland contexts and consist of between one and three rows of vertical wooden posts, some with horizontal timbers and jointing. Concentrations of woodworking debris and occasionally 'ritual' deposits of metalwork are also sometimes found. Despite the profusion of archaeological and associated palaeoenvironmental data that such sites can yield, the function and often even the precise form of these structures remains somewhat unclear.

This paper describes the excavation of a post alignment discovered during flood alleviation work in 2007 on Barsham Marshes in the Waveney Valley, Suffolk. A 30 m long section of the site was subsequently excavated and associated palaeoecological analyses were carried out. The possible form and function of the site are considered and compared and contrasted with a similar site discovered previously at Beccles Marshes, also on the southern edge of the River Waveney, approximately 2 km downstream from Barsham (Gearey *et al*. in press). The implications for later prehistoric activity in the Waveney Valley are also discussed.

Study area

Barsham Marshes lie on the southern side of the River Waveney, less than 2 km upstream from the town of Beccles (Figure 1). The Waveney forms the county boundary between Norfolk and Suffolk and is an improved channel, the navigation of which first appears on an act of parliament in the 17th Century (Robertson 1999). The canalisation of the Waveney appears to have triggered widespread reclamation of the marshes and riverside commonland. Currently, the marshes are dominated by rough pasture. The soils are recorded as deep fen peats and silts of the Mendham series, with underlying riparian deposits of gravels and sands of the Newport series forming small sandy islands and ridges along the southern side of the river Waveney (British Geological Survey 1996).

Methods

Excavation

The site was discovered during the excavation of a 'soke' dyke (a flood alleviation ditch) parallel to the river Waveney during bank realignment works. This area of disturbance therefore defined the extent of the initial investigations, with subsequent re-machining of this area identifying a series of upright posts on a north-north-east to south-south-west alignment some 30 m long and 4 m wide (Figure 2, Plate 1). Two sections across the predominant alignment of this structure were excavated by hand to a maximum depth of 0.40 m (Plate 2). The posts were recorded and photographed before being recovered for analyses.

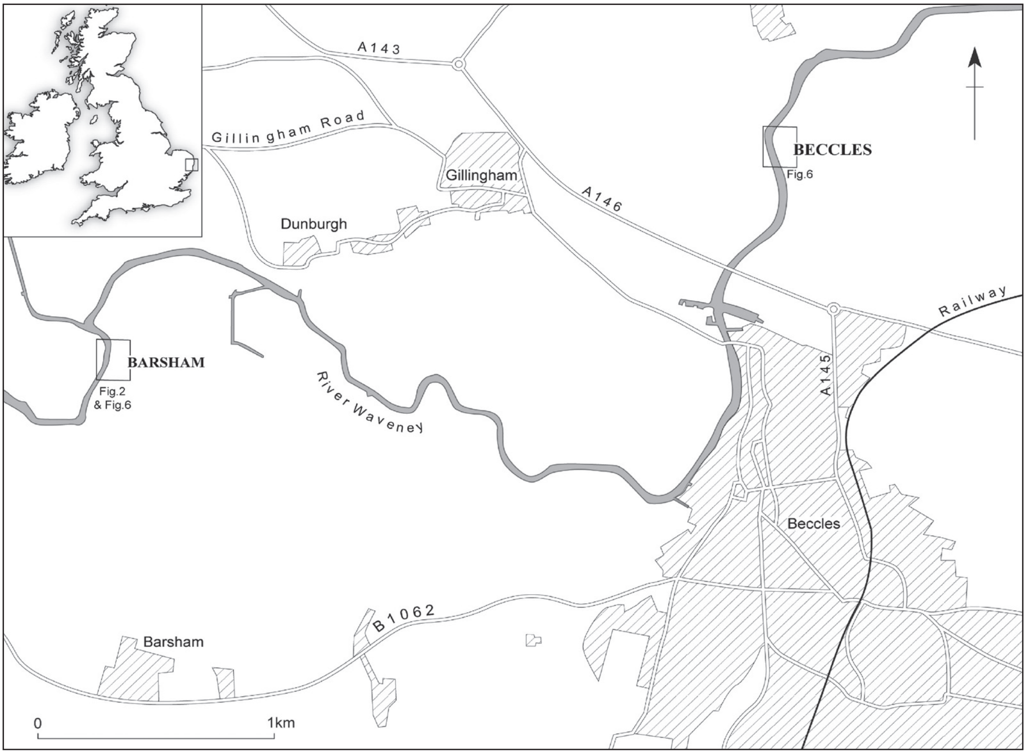

Figure 1. Site location.

Borehole survey and palaeoenvironmental sampling

A series of borehole transects were cored using an Eijkelcamp hand auger at 5m intervals immediately to the west of the excavation (Figure 2), with the spacing between cores increasing to 20 m with distance to the south. Cores were excavated until bedrock or gravels were encountered. A continuous monolith sequence (for pollen and diatom assessments) was recovered and a series of six 'bulk' samples (for plant macrofossil assessments) collected adjacent to the monolith from the exposed section at the eastern edge of the trench (Figure 2).

Pollen analyses

Sub-samples were taken from the monolith at 0.04 m intervals. Pollen preparation followed standard techniques including KOH digestion, HF treatment and acetylation (Moore *et al*. 1991). At least 300 total land pollen grains (TLP) excluding aquatics and spores were counted for each sample. Pollen nomenclature follows Moore *et al.* (1991) with the modifications suggested by Bennett *et al*. (1994).

Figure 2. Plan of Barsham excavations, core and monolith sample locations. Stakes shown in black.

Plant macrofossils

The plant macrofossil analyses were carried out on bulk samples (*c.* 10 l) collected from adjacent to the pollen monolith. The samples were sieved through 2 mm, 1 mm, 500 µm and 250 µm sieves and sorted using a Wild M5 stereomicroscope. All the fractions were scanned and notes were made on the quantity and preservation quality of the plant remains. Material was identified using Beijerinck (1947), Berggren (1969, 1981) and Schoch *et al.* (1988), plant nomenclature follows Stace (1991). The samples were also assessed for coleoptera (beetles) but the preservation of these was poor and of little interpretable value and as such will not be discussed further.

Diatoms

Three sub-samples of 0.5 cm^3 were taken from the clay-silt units (see below) in the monolith sequence at depths of 0.17 m, 0.27 m and 0.36 m. These were prepared following the standard procedure as described by Plater *et al*. (2000), mounted on slides with naphrax and identification carried out with reference to Hendy (1964) and van Der Werff and Huls (1958–1974).

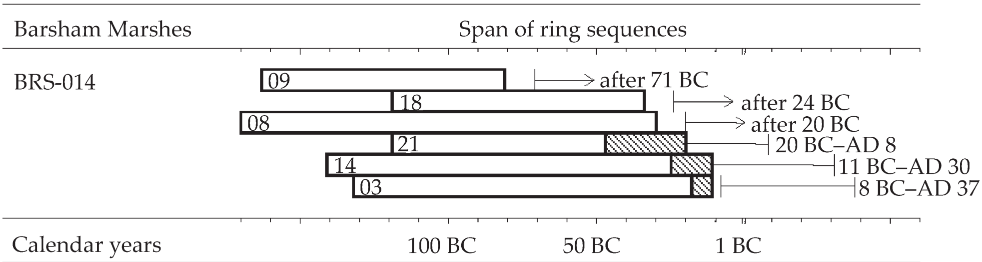

Figure 3. Bar diagram showing the absolute dating positions of the 6 tree ring sequences from Barsham. Interpreted felling dates are also shown. White bars = heartwood; hatched bars = sapwood.

Chronology

Twenty nine *Quercus* posts between 150–250 mm in diameter samples were submitted for dendrochronological analysis (Figure 3). A sub-set of the material comprised quartered *Quercus* timbers, none of which retained complete sapwood and bark. Summary details of the analysed timbers are provided in Table 1. Fourteen samples out of the 29 submitted were prepared for analysis, measured with multiple radii synchronised and combined to form sample composite series. Five sub-samples from the pollen monolith were also submitted for AMS radiocarbon dating (Table 4). These were all single macrofossils of *Alnus.* Three samples were submitted to SUERC, University of Glasgow and two samples to Beta Analytic Inc., Miami, Florida.

Results

The Structure

The excavation identified a total of 29 upright posts on a north-north-east to south-south-west alignment running for over 30 m parallel to the current course of the River Waveney (Figure 2), although it was noted that other posts are likely to have been removed by the soke dyke excavation prior to archaeological intervention. The majority of the tops of the posts lay between -0.30 m A.O.D. and -0.50 m A.O.D., and varied in surviving length between 0.50 m to 1.00 m. The tops of the posts were poorly preserved indicating that conditions had resulted in the degradation of much of the above ground structure (see below) and few survived entirely *in situ* having been disturbed during excavation of the soke dyke. One post was discovered within the south west trench edge. No cultural remains or artefacts were recovered and the sediment around the posts was free of any further archaeological wood although occasional natural roots and roundwood debris were recorded.

The Wooden Stakes

All 29 posts recovered from the site were identified as *Quercus* sp. (oak) timbers in both converted and unconverted form (Table 2). There was evidence that some of the material had been derived from coppice and hence from managed woodland. The

Sample	Size (mm)	Rings	Sap	Date of measured sequence	Interpreted result
01	245 × 195	86	-	undated	-
02	185 × 125	53	-	undated	-
03	215 × 155	122	7	132 BC–11 BC	8 BC–AD 37
04	230 × 215	*c.* 40	?H/S	unmeasured	-
05	195 × 180	66	-	undated	-
06	180 × 180	*c.* 20	H/S	unmeasured	-
07	260 × 200	*c.* 25	?H/S	unmeasured	-
08	185 × 155	141	-	170 BC–30 BC	after 20 BC
09	210 × 190	83	-	163 BC–81 BC	after 71 BC
10	200 × 190	*c.* 40	-	unmeasured	-
11	120 × ?	< 20	-	unmeasured	-
12	160 × 150	*c.* 20	?H/S	unmeasured	-
13	155 × 105	57	-	undated	-
14	150 × 140	131	14	141 BC–11 BC	11 BC–AD 30
15	150 × 130	*c.* 15	5	unmeasured	-
16	180× 150	< 20	-	unmeasured	-
17	140 × 140	*c.* 40	H/S	unmeasured	-
18	195 × 180	86	-	119 BC–34 BC	after 24 BC
19	145 × 115	75	H/S	undated	-
20	150 × 115	*c.* 15	?H/S	unmeasured	-
21	160 × 95	100	27	119 BC–20 BC	20 BC–AD 8
22	140 × 140	*c.* 25	H/S	unmeasured	-
23	200 × 105	59	-	undated	-
24	150 × ?	< 20	-	unmeasured	-
25	140 × 130	74	-	undated	-
26	120 × 95	*c.* 45	-	unmeasured	-
28	45 × 35	< 20	-	unmeasured	-
29	180 × 130	55	H/S	undated	-
30	30 × ?	< 20	-	unmeasured	-

Table 1. Details of the 29 oak dendrochronological samples from Barsham.

Conversion	Frequency	% of Timber Assemblage
Unconverted	14	46.67
Radial 1/2 split	2	6.67
Radial 1/3 split or less	10	33.33
Boxed or partially boxed heart	4	13.33
Total	*30*	*100*

Table 2. Timber conversions.

Timber	Toolmark	Curvature Index %
(01)	48:7	14.58
(02)	Partial 45:1	2.22
(03)	Partial 27:2	7.41
(04)	Partial 48:3	6.25
(05)	43:5	11.63
(05)	41:4	9.76
(07)	40:3	7.5
(09)	41:6	14.63
(11)	38:5	13.16
(17)	Partial 28:3	10.71
(22)	Partial 27:1	3.70

Table 3. Tool mark curvature ratios.

wood working (Figure 4) is typical of the driven prehistoric piles recorded recently at a number of other sites although there is more of a tendency at Barsham for 'squared up' timbers (Taylor 2001, Taylor 2003, Bamforth 2008). Evidence of wet rot suggests some of the material was exposed and possibly partially seasoned prior to working, but there is no discernible spatial patterning in the location of these timbers. Between eight and eleven tools are represented by the corpus of toolmarks (Table 3) recorded from eight timbers, a relatively high diversity of tools for this number of samples.

Dendrochronology

A summary of the results for the 6 component samples of the composite sequence is provided in Figure 3. This composite sequence cross-matched against late Iron Age data from the longer-lived Roman chronologies of London, the Midlands and East Anglia where these were made from 200–400 year old oaks and was dated to 170–11 BC inclusive. These dates do not necessarily indicate the date of the structure since these timbers may have been reused or represent repairs to the structure. A total of three of the dated samples retained sapwood whilst the other three dated sequences were derived from exclusively heartwood samples.

Where several timbers are dated from a single structure but none retain bark-edge, then the individual estimated felling date ranges can be combined to provide an estimated date for the structure. The felling date ranges calculated for the three samples with sapwood are: 20 BC–AD 8 (W21), 11 BC–AD 30 (W14) and 8 BC–AD 37 (W3). If this material is from a single event, which is not certain, the combination of these estimated ranges would yield a suggested construction (or repair?) date of 8 BC–AD 8 for this group.

Stratigraphy

The auger survey revealed deposits varying in thickness from *c.* 0.95 m to *c.* 1.90

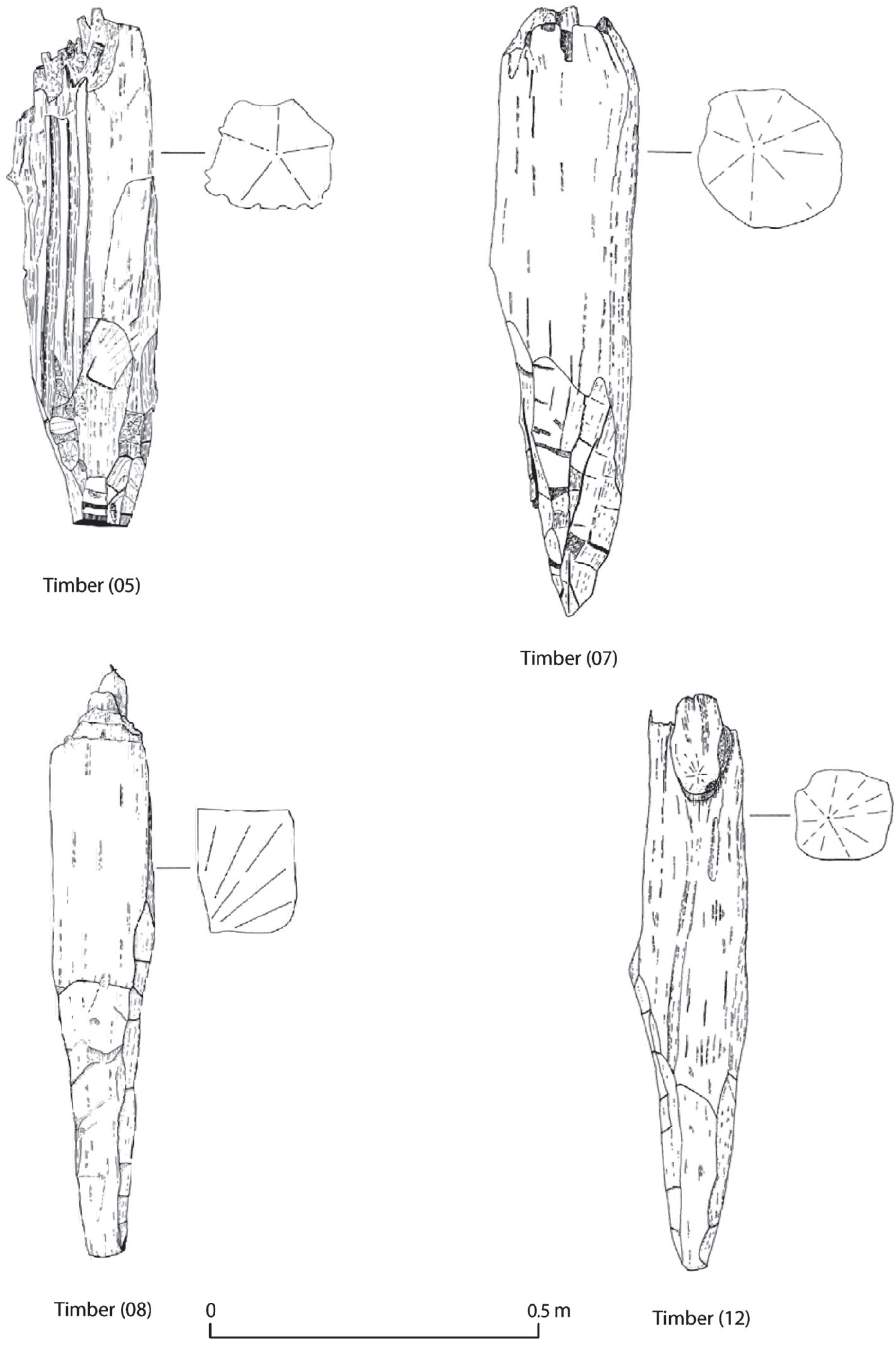

Figure 4. Line drawings of Barsham posts.

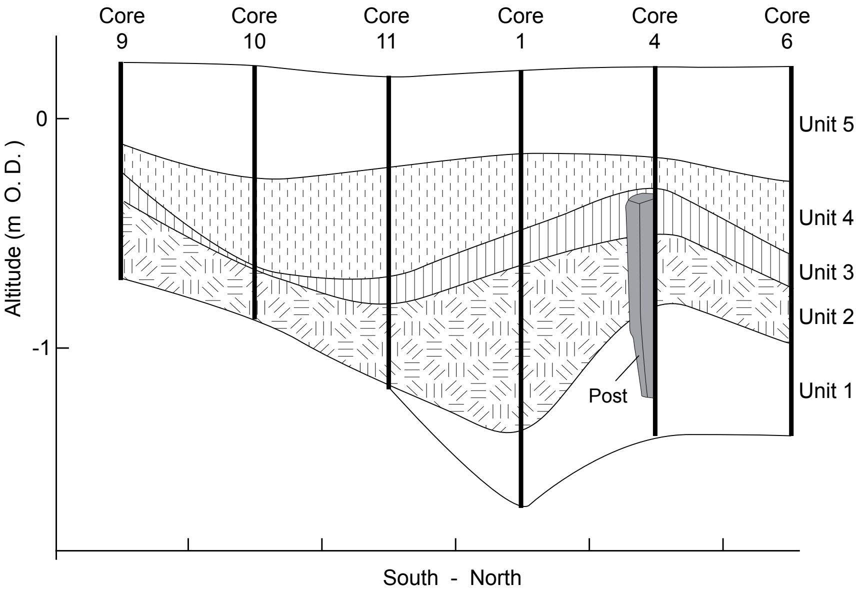

Figure 5. Stratigraphy and post location.

m to the east of the Trench. These deposits thinned out towards the gravel outcrop immediately to the south of the excavation site. The basal gravels were overlain by olive-grey silty sand (Unit 1) (Figure 5). These sands were sealed by grey-brown silts and clays of varying organic content up to 0.40 m thick (Unit 2). An orange-brown silt unit with abundant rootlets and occasional organic detritus (Unit 3) overlay these silts and clays. Above this, a humified dark brown peat with abundant herbaceous remains, woody fragments and varying silt content (Unit 4) was identified. This unit was capped by dense grey-brown silts and clays, trending into the modern floodplain topsoil (Unit 5).

Diatoms

All three samples assessed produced very low species concentrations and the majority of the diatom frustules encountered were heavily disarticulated or had been affected by partial dissolution. This is likely to have been a result of the influence of iron oxide precipitation within the clayey silt unit as a result of fluctuations in redox conditions. Whilst preservation improved somewhat with depth, the limited species diversity encountered suggested preferential species preservation, with weaker biogenic silica frustules having been removed through post depositional silica dissolution (Ryves *et al.* 2001). However, some general comments can be made based on the species encountered. The presence of disarticulated fragments of *Pinnularia* spp., *Synedra spp.* and *Epithemia spp.* indicates that the upper clay silts (Unit 5) were lain down under freshwater conditions. However, the records of *Diploneis bombus*, *Diploneis didyma* and *Nitzschia navicularis*, although in lower abundances, indicate some estuarine influence at this time.

Sample depth	Lab code	Sample ID	Material	δ13C (‰)	Radiocarbon Age (BP)	Calibrated date (95% confidence)
0.20–0.30m	SUERC-22068	BAE1822 0.20–0.30m	Wood: *Alnus glutinosa*	-29.2	1095±30	890–1020 AD
0.30–0.40m	SUERC-22069	BAE1822 0.30–0.40m	Wood: *Alnus glutinosa*	-29.2	1155±30	770–980 AD
0.40–0.55m	SUERC-22070	BAE1822 0.40–0.55m	Wood: *Alnus glutinosa*	-28.5	1150±30	770–980 AD
0.83m–0.93m	Beta-255688	BA1822–0.83m	Wood: *Alnus glutinosa*	-26.8	3020±40	1400–1130 BC
1.05m–1.25m	Beta-255689	BA1822–1.25m	Wood: *Alnus glutinosa*	-26.6	2430±40	760–680 BC and 670–400 BC

Table 4. Radiocarbon dates from Barsham pollen sequence.

Radiocarbon Dating

The results of radiocarbon dating of the five samples from the pollen monolith are presented in Table 4. They have been calibrated using the curves of Reimer *et al.* (2004) and the computer program OxCal (4.0.5) (Bronk Ramsey 1995; 1998, 2001; 2008). The ranges have been calculated according to the maximum intercept method (Stuiver and Reimer 1986). The calibrated date ranges cited in the text and tables are those for 95 % confidence and are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years.

The uppermost three dates of 1095±30 BP (0.20–0.30 m; SUERC-22068, 890–1020 cal. AD), 1155±30 BP (0.30 m-0.40 m; SUERC-22069, 770–980 cal. AD) and 1150±50 BP (0.40–0.55 m; SUERC-22070, 770–880 cal. AD) indicate that this part of the sequence dates to the Anglo-Saxon period. However, the two dates from 0.83–0.93 m of 3020±40 BP (Beta-255688; 1400–1130 cal. BC) and 2430±40 BP (Beta-255689; 760–680 and 670–400 cal. BC) display an inversion. The problems of dating floodplain sequences in Suffolk have recently been highlighted with evidence that *Alnus* macrofossils are often younger than the associated humic and humin fractions (Howard *et al.* 2009). It is possible the anomalous results are due to intrusive material, but it is not easy to establish which if either of these dates may be accurate. A robust chronology for sediment accumulation is therefore unavailable although it can be concluded that the upper organic deposits date to the 8th–11th centuries AD.

The Pollen Record

The pollen diagram (Figure 6) has been produced using the computer program TILIA (Grim 1991) and has been divided into three local pollen assemblage zones with the prefix BAR to aid interpretation. Table 5 summarises the major features and interpretation of these zones. The diagram is notable for the relative stability of the majority of the pollen spectra until BAR-3. It is clear that *Alnus glutinosa* (alder) was dominant on and near the sampling site during BAR-1 and 2. Percentages of *Corylus* (most likely to be hazel in this context) and perhaps *Quercus* indicate that these trees were growing in the wider landscape, either as scattered scrub on the drier gravel

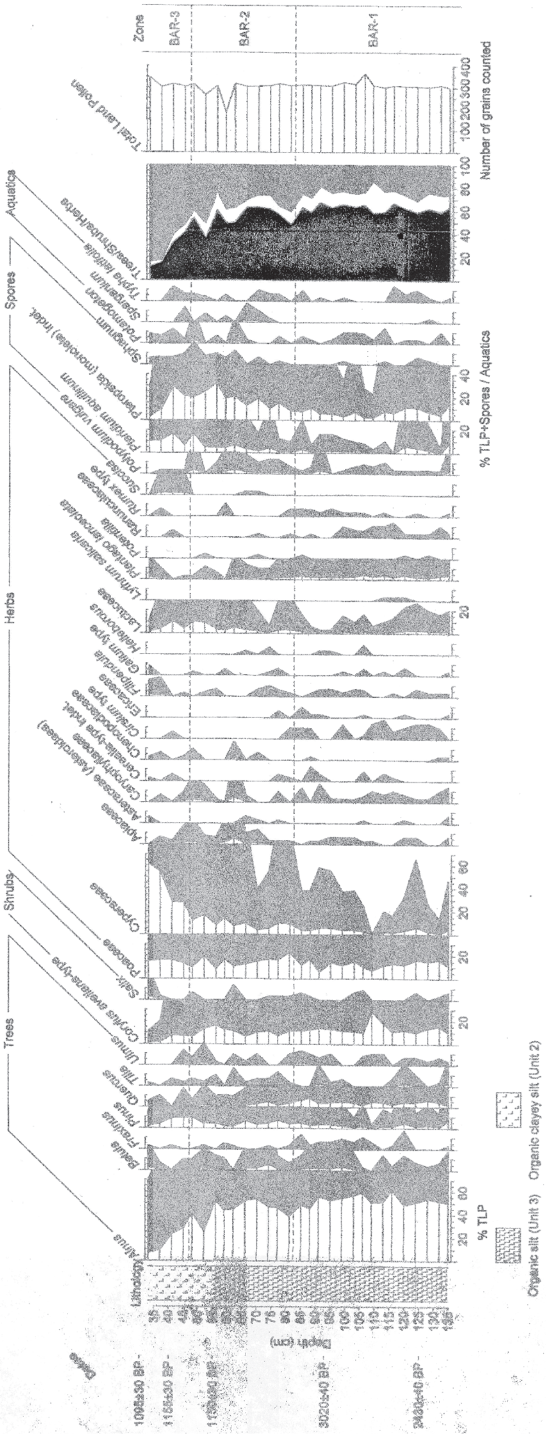

Figure 6. Barsham pollen diagram. All percentages are of total land pollen unless otherwise stated. Shading = x10 exaggeration.

Zone/Depth m	Main Taxa	Interpretation
BAR-3 0.35–47.5	Cyperaceae-Poaceae-Lactuceae-*Pteridium*	Decline in *Alnus* carr and associated reduction in *Corylus* and *Pinus* wood/scrub. Expansion in open ground herb communities including local Cyperaceae (sedges) and pastoral vegetation with Lactuceae (dandelions) and *Pteridium* (bracken).
BAR-2 0.475–0.825	*Alnus-Corylus-Poaceae-Cyperaceae-Plantago lanceolata*	*Alnus* carr on damper soils around sampling site with associated understorey vegetation, scattered *Corylus* scrub with some *Pinus* growing, probably on drier soils of floodplain. Steady expansion in damp, open pastoral/meadow vegetation with Cypercaeae (sedges), Lactuceae (dandelions) perhaps at the expense of *Quercus* (oak) woodland apparent.
BAR-1 0.825–1.35	*Alnus-Corylus-Poaceae-Plantago lanceolata*	*Alnus* carr with *Corylus-Quercus* scrub, other trees including *Pinus* and *Betula* limited in extent. Pastoral vegetation with *Plantago lanceolata* and Lactuceae (dandelions) indicated.

Table 5. Summary of the Barsham pollen diagram zonation.

islands of the floodplain or forming more extensive woodland beyond the wetland edge. The continuous curve for anthropogenic indicator (*sensu* Behre 1981) *Plantago lanceolata* (ribwort plantain) and Lactuceae (dandelions) demonstrates that open pastoral vegetation was present and is likely to have been created/maintained by grazing. Other taxa recorded sporadically including *Potentilla* (tormentil) and Caryophyllaceae (the pink family) are also apparent in the macrofossil record and are likely to reflect local herb communities on damp soils (see below).

There is little detectable change in this vegetation across BAR-1, although a steady rise in Lactuceae during BAR-2 suggests an expansion in meadow communities with an associated decline in the already low percentages of *Quercus* indicating that populations of this tree were affected. *Pteridium* (bracken) also increases during this zone, perhaps indicating the spread of this species onto pasture land, since a peak in *Pteridium* corresponds with a fall in *P. lanceolata* towards the close of the zone. BAR-3 records a general reduction in trees and shrubs, with *Alnus, Pinus* (Scots pine) and *Corylus* declining steadily. This is accompanied by a pronounced rise in Cyperaceae (sedges) reflecting local expansion in sedges and the demise of the *Alnus* carr. This was probably associated with a fall in local watertables, rather than human activity. The continuing record of *Pteridium* and Lactuceae imply the maintenance of pastoral vegetation with a low curve for *Succisa* (Devil's-bit scabious) perhaps also indicates the effects of grazing, since this species often grows in areas where grazing suppresses the growth of potential dominants (Grime *et al*. 1991).

The Macrofossil Record

Tables 6 and 7 summarises the results of the macrofossil analyses alongside the stratigraphic units. Sands and gravels overlie the basal chalk bedrock throughout much

Depth/m	**Macrofossils**	**Stratigraphy**	**Unit**
0–0.20	-	Light grey brown organic silt	5
0.20–0.30	Abundant wood Damp conditions, *Phragmites australis* (common reed), *Ranunculus* (buttercups), *Urtica dioica* (nettles), *Carex* (sedges) and aquatic/muddy habitats – *Callitriche* (Water star wort)	Dark brown herbaceous well humified peat	4
0.30–0.40	Abundant wood/moncots Wet/damp conditions with *Ranunculus* spp. (buttercups), and aquatic vegetation including *Alisma* and *Eleocharis palustris/uniglumis* (Common/slender spike rush)	Dark brown organic silt	3
0.40–0.55	Sparse remains but abundant indet. wood and monocots: *Mentha arvensis/aquatica, Carex* (sedge) and *Schoenoplectus lacustris/tabernaemontani* (common/grey club rush)	Dark brown organic silt	
0.55–0.90	Sparse remains Damp/disturbed ground with *Juncus* (rushes), *Alisma, Rubus fruticosus* (brambles), *Plantago major* (greater plantain) and *Eupatorium cannabium* (Hemp agrimony)	Dark brown organic clayey silt (vivianite precipitation)	2
0.90–1.15	*Alnus* carr Shrubs including *Betula* and *Corylus* Aquatic vegetation including *Alisma Plantago-aquatica* (Water-plantain) and *Potamogeton* (Pond-weeds)	Dark brown organic silt with some herbaceous remains and coarse sand	
1.15–1.40	*Alnus* carr Herbs associated with carr including *Rumex* (docks), *Chenopodium* (Fat hen) and *Lycopus europaeus* (Gypsy wort); aquatic vegetation including *Calltriche*	Dark brown organic sandy silt with some gravel	
1.40+	-	Olive-grey silty sands	1

Table 6. Summary of macrofossil analyses and stratigraphy. The uppermost sample (0–0.20m) was omitted from the analyses.

of the Waveney Valley and are likely to have accumulated through a combination of glacial, periglacial and proglacial processes during the Devensian (Coxon 1993; West 2009). The overlying olive-grey silty sands (Unit 1) were probably deposited in a former channel of the Waveney, probably during the early-mid Holocene as relative sea levels rose leading to channel aggradation. The grey-brown silts and clays (Unit 2) indicate a reduction in depositional energy and imply a shallow channel or channel edge context. Macrofossil samples (1.15–1.40 m and 0.90–1.15 m) from this unit contain broadly similar plant remains indicative of aquatic vegetation and damp conditions associated with an *Alnus* carr woodland, most likely of *Alnus glutinosa-Urtica dioica* (common nettle) type (Rodwell 1991) given the abundant fruits and seeds of these species in this sample.

This confirms the evidence from the pollen diagram for the local dominance of *Alnus* during BAR-1 (see above).

The two macrofossil samples (0.55–0.90 m 0.40–0.55 m) are distinguished by an increase in iron oxide and other minerogenic material and an absence of *Alnus* although indeterminate wood fragments are recorded and the pollen record indicates that *Alnus* remained present nearby at least during BAR-2. The plant remains in both these samples are sparse; with that from 0.55–90 m containing species associated with both damp conditions and disturbed ground. The stratigraphic transition to Unit 3 is concurrent with the beginning of a steady fall in *Alnus* and rise in Cyperaceae in the pollen record.

The presence of iron oxide rich material in the associated macrofossil sample (0.44–0.55 m) suggests that deeper watertables were quite probably responsible for both the poor preservation of macrofossil material as well as the associated local demise of *Alnus*. The lithostratigraphy of Unit 3 suggests drier conditions, probably when the channel had effectively in-filled or migrated away from the sampling site, resulting in the colonisation and establishment of vegetation typical of somewhat disturbed soils.

The shift from orange-brown clayey silts to the overlying organic horizon (Unit 4) is relatively abrupt, suggesting that an erosive episode on the floodplain took place prior to biogenic sedimentation. Falling local water tables are likely to have resulted in the transition from minerogenic to biogenic sedimentation, with vegetation colonising the location, perhaps in a backswamp floodplain setting. The grey-brown silts and clays (Unit 5) which seal these deposits are interpreted as evidence for inundation of the site, perhaps as a result of overbank flooding or channel migration.

The upper macrofossil samples (0.30–40 m and 0.20–30 m) show an increase in taxa associated with reed swamp type vegetation and bank side habitats (Units 3 and 4). *Phragmites* (common reed) rhizomes are present in sample 0.20–0.30 m with probable under storey vegetation represented by the presence of *Eupatorium cannabium* (hemp agrimony). The pollen record does not extend above 0.32 m but the rise in Cyperaceae recorded in BAR-3 can probably be correlated with the presence of *Carex* (sedge) nutlets in the macrofossil samples, suggesting the on site expansion of these plants. Emergent or bank side habitats are indicated by the presence of *Eleocharis palustris* (common/slender spike-rush).

The stratigraphy and macrofossil analyses therefore demonstrate a shift from relatively coarse sediments (sands and silts) deposited within a fluvial context such as a channel edge, to the deposition of silts and peats typical of a floodplain or backswamp environment. *Alnus* carr was probably significant locally for much of this period with aquatic and bankside vegetation communities present. A subsequent transition to deeper watertables and eventually the growth of the thin humified peat (Unit 4) is associated with the demise of this local *Alnus* carr. These changes can probably be attributed to the fluctuations in the level of the River Waveney during the Holocene, which was probably in turn controlled by a range of factors including fluctuations in base level associated with changes in relative sea level. The uppermost silts and clays indicate a final phase of raised watertables and the deposition of sediment by freshwater, but with some tidal influence indicated by the single well preserved diatom assemblage.

The failure of the radiocarbon dates to establish a robust chronology for sediment

Depth of Sample (cm)	**20–30**	**30–40**	**40–55**	**55–90**	**90–115**	**115–140**	**Habitat**
Volume/litres	**5**	**5**	**5**	**5**	**5**	**5**	
Ranunculus repens L. (Creeping buttercup)	17	11	-	-	20	36	M, Gd, D, Cst, Da, Cst
Ranunculus sceleratus L. (Celery-leaved buttercup)	-	1	-	-	31	57	M, Bs, A
Ranunculus cf. *flamula* L. (Lesser spearwort)	-	7	-	-	-	-	A
Ranunculus. Subgenus *batrachium* (DC) A. Gray (Crowsfoot)	-	4	-	-	17	11	B, A
Urtica dioica L. (Common nettle)	9	10	-	-	62	77	M, G, D, Da
Betula spp. (Birch)	-	-	-	-	11	3	M, W
Alnus glutinosus (L.) Gaerner fruit (Alder)	-	-	-	-	151	120	M, W
Alnus glutinosus (L.) Gaerner cones	-	-	-	-	4	4	
Corylus avellana L. (Hazel) shell frags	-	-	-	-	3	-	W, H, S
Chenopodium album L. (Fat-hen)	-	-	-	-	6	2	D, Da
Atriplex sp. (Oraches)	-	-	-	-	-	1	B, D, Da
Stellaria spp. (Stitchworts)	-	-	-	-	-	2	B, Bs, M, G, Gd, D, Da, H, W
Caryophyllaceae (Pinks)	-	-	-	-	3	8	
Persicaria hydropiper (L.) Spach (Water pepper)	-	-	-	-	-	21	A
Persicaria spp. (Knotweeds)	-	-	-	-	-	3	A
Rumex spp. (Docks)	-	-	-	-	8	13	B, A, Bs, G, Gd, D, Da, H, W
Malva sylvestris L. (Common mallow)	-	-	-	-	1	-	D
Viola sp. (Violets)	-	-	-	-	1	-	M, G, Gd, W
Rorippa nasturtium-aquaticum (L.) Hayeck (Water-cresses)	-	-	-	-	80	30	A, Bs, M
Rubus fruticosus agg. (Brambles)	1	-	-	1	2	3	All habitats
Potentilla anserina L. (Silver weed)	-	-	-	1	-	5	B, Gd, D
Potentilla spp. (Cinquefoils)	-	-	-	-	-	2	B,M,Ht,Gd,D,Cst,H
Aphanes arvensis L. (Parsley piert)	1	-	-	-	-	-	D, Da
*Epilobum hirsutum*L. (Great willowherb)	-	-	-	-	3	-	Bs, M
Apium nodiflorum (L.) Lag. (Fool's water-cress)	-	-	-	-	2	-	A, Bs, M
Angelica sylvestris L. (Wild angelica)	-	-	-	1	20	5	Gd, M, Bs, Wd
Apiaceae. – frags (Carrots)	-	-	-	-	14	-	M, Bs, B, A

Depth of Sample (cm)	**20–30**	**30–40**	**40–55**	**55–90**	**90–115**	**115–140**	**Habitat**
Volume/litres	**5**	**5**	**5**	**5**	**5**	**5**	
Solanum dulcamara L. (Bittersweet)	-	-	-	-	2	-	D, H, W, M, Cst
*Lycopus europaeus*L. (Gypsywort)	-	-	-	-	2	2	M, Bs,
Mentha arvensis L./*aquatica* L. (Corn/water mint)	5	-	84	-	-	14	Bs, M
Callitriche spp. (Water-starworts)	9	-	-	-	14	232	A
Plantago major L. (Greater plantain)	-	-	-	1	-	-	D, B
Sambucus nigra L. (Elder)	1	-	-	1	1	3	S, W, H
cf. *Carduus* sp. (Thistles)	-	-	-	-	1	-	Bs, G, D, Cst
Eupatorium cannabium L. (Hemp-agrimony)	9	3	-	2	1	1	Bs, M
Alisma plantago-aquatica L. (Water-plantain)	-	1	-	2	52	28	A, Bs
Potomogeton spp. (Pondweed)	-	-	-	-	32	8	A
Juncus spp. (Rushes)	+++	+++	-	+	+++	+++	M, B, damp habitats
Eleocharis palustris (L.) Roemer and Schultes/ *uniglumis* (Link) Schultes (Common/slender spike rush)	13	20	-	-	25	11	M, Bs, M
Schoenoplectus lacustris L. (Palla)/ *tabernaemontani* (C. Gmelin) Palla (Common/grey club-rush)	-	1	1	-	6	4	B, M, A
Cladium mariscus (L.) Pohl (Great fen-sedge)	-	-	-	-	2	2	Bs, M
cf. *Cladium mariscus*	-	-	-	-	-	1	Bs, M
Carex sp. trigonous (Sedges)	30	2	1	-	1	3	B,Bs,M,Gd,S,W
Carex sp. biconvex	1	1	-	-	-	2	B,Bs,M,Gd,S,W
Poaceae (Grass)	-	11	-	-	9	7	B, Bs, M, Ht, G, Gd, D, Da, H, S, W, Wd, Cst
Wood fragments	+++++	+++++	+++++	+++++	+++++	+++++	
Monocotolyden stem and rhizome frags.	++++	++++	+++	+++	++++	++++	
Wood charcoal	+	+	+	6	10	11	

Table 7. The plant macrofossil results from Barsham.

Key: B = brackish; salt-marsh; A = aquatic; Bs = bankside; M = fen, swamp, marsh; Ht = heathland; G = grassland; D = disturbed; Da = disturbed agricultural; H = hedges; S = scrub; W = woodland; d = damp; Cst = coastal+++++ = Very abundant 100+, ++++ = abundant 75–100, +++ = frequent 50–100, ++ = occasional 25–50, + = rare 1–25 deposition hampers detailed discussion of the process and timing of the environmental changes discussed above. The alignment appears to have been located at the edge of a shallow channel of the Waveney with the stakes were driven through the silts and clays of Unit 3. The tops of the stakes correspond to the humified peat deposit (Unit 4), the top of which has been radiocarbon dated to 1095±30 BP (0.20–0.30 m; SUERC-22068, 890–1020 cal. AD). The pollen record demonstrates the presence of pastoral habitats probably connected with the use of the floodplain as seasonal grazing for much of the period of sediment deposition.

Discussion

The Barsham site consisted of a minimum of 29 earthfast, driven *Quercus* posts arranged in three broadly parallel rows with four double clusters of posts identified: (28)/(04), (08)/(29), (30)/(19), (22)/(26). Whilst the dendrochronological analyses of these posts had a relatively low success rate, three of the dateable samples indicate that construction occurred between 8 BC–AD 8. There was no evidence of construction phases or repair although the grouping of adjacent multiple timbers may represent the replacement of a broken or rotted timber.

The chronology of sedimentation is unclear, but based on comparison with other pollen data from the Waveney Valley (e.g. Hill *et al.* 2007), accumulation of the organic silts (Unit 2) dates to around the mid-Holocene. The stratigraphic and plant macrofossil analyses indicate that the site was constructed in shallow open water at the edge of the River Waveney. *Alnus* carr seems to have been a feature of the local vegetation during the earliest stages of sediment accumulation with the pollen record suggesting open grassland habitats in the wider landscape and evidence for meadow/pastoral vegetation communities.

There was no evidence in the form of associated horizontal timbers/debris or jointing on the timbers themselves to hint at the presence of a superstructure. It seems probable that if any such superstructure once existed it has now been lost. This was probably related to the period of drier local conditions associated with the shift from inorganic sedimentation to the development of the thin well humified peat (Unit 4) during the 10th–11th centuries AD, which corresponds to the upper preservation level of the top of the posts. However, it is likely that the posts would have originally extended well above the contemporary ground surface. Using an approximate ‘rule of thumb’ for earthfast stakes of one third below ground to two thirds above, indicates that the original posts may have projected to between 1.5–3 m above the ground surface (or river bed).

The piles were fashioned from moderate to good quality converted and unconverted timbers, some of which may have been obtained from coppiced woodland. The ends of the stakes had been trimmed to a point with axes. Although a range of conversion methods were noted, no clear patterning has emerged. The difference in woodworking technique can perhaps be assigned to differing sizes of raw material and the personal preference of the woodworker. The toolmarks represent a minimum of eight different tools and although none of the measurements are identical, several of the curvature ratios are very similar (Table 3). The marks from timbers (03) and (07) have a difference in curvature ratio of only 0.09 %, whilst those from (01) and (09) have a difference of

0.05 %. In both cases, these values may represent the same tool leaving a complete and then a partial mark. The toolmarks recorded from (05) were located next to and in line with each other. Brennand and Taylor (2003) have suggested that a tool may be representative of an individual; in which case the toolmarks might imply that a relatively large number of individuals were involved in shaping the timbers of the structure. This also indicates that the construction was potentially undertaken by a group of woodworkers.

The alignment extends outside the excavated area to the north and south and hence the full extent of the site is unknown. A gravel spur is located approximately 90 m to the south-south-west (British Geological Survey 1996) and assuming no deviation, this may mark landfall. To the north the site extends tangentially towards the River Waveney.

There is no clear area of dryland (such as gravel islands) or evidence for contemporary settlement in this direction on either side of the river and hence it seems likely that the alignment must have terminated at some point on the rivers edge to the north. In terms of the wider area, there is some evidence for later Roman activity in the form of occasional scatters of pottery, whilst a possible high status building dating to the Romano-British period has been identified 2 km to the north west of the site at Geldeston (SMR-Number 23325). The precise character of activity during this period remains unclear.

The Beccles triple post row alignment

Barsham can be compared with a very similar later prehistoric site at Beccles, some 3 km downstream and also on the southern side of the river (Figure 1), where excavations over two seasons (2006 and 2007) have identified a triple post alignment of *Quercus* timbers (0.6–2.00 m in length) (Gearey *et al*. in press). The alignment was some 3–4 m wide and has been traced for over 100 m, running north-west to south-east towards the current river channel (Figure 2). It appears to have been constructed in a single phase which has been dated dendrochronologically to 75 BC. In addition, fragments of both Iron Age pottery and Romano-British pottery were recovered suggesting that the site remained in use for some time. There is no unequivocal evidence that the posts supported either a raised or ground level platform or trackway structure, although the preservation of wood associated with the Iron Age levels is poor, indicating a phase of deeper watertables which may have led to the degradation of any structural timbers at or above ground level. However, two discrete brushwood features associated with the alignment have been identified as possible short trackways crossing small areas of wet or boggy ground. Radiocarbon dating suggests that one was likely to have been constructed just before 75 BC and the second shortly afterwards.

As at Barsham, it is unclear if the posts at Beccles ever supported a superstructure but notches ('halving lap joints') in some of the posts appear to have held timbers to support the posts and/or aid in their insertion. A substantial assemblage of worked wooden debris appears to reflect the construction of the post row itself as well as the on-site clearance of floodplain *Alnus* carr vegetation. This assemblage also contains waste material derived from the splitting of timbers larger than the posts of the alignment, but which are not represented in the assemblage of timber recovered from the site.

Unlike Barsham, the post alignment was constructed across the floodplain and at an oblique angle to the River Waveney, rather than parallel to the edge of the channel (Figure 6). The orientation of the Beccles site indicates that it terminates at the channel edge but neither terminus nor landfall has been excavated. The palaeoenvironmental evidence demonstrates that the site was built across a *Phragmites* and *Alnus* carr dominated floodplain. Stratigraphic and LiDAR survey of the wider context of the floodplain indicates that the River Waveney has been relatively stable in its channel for much of the Holocene; hence the current orientation of the Beccles alignment with respect to the river channel is likely to have been similar to that in later prehistory (Hill *et al.* 2007).

It can be noted that the dendrochronologically dated material from Barsham does not match the Beccles trackway sequence especially well (*t*-value 4.69). Considering their close proximity this raises the possibility that both groups of timbers are representative of highly localised environmental conditions. It is notable that the timbers from both sites seem to have been sourced in part at least from overgrown coppice. Several multiple timber groupings of the Fiskerton post alignment were shown via dendrochronology to represent replacement and repair (Hillam 2003). There is possible evidence for repair at both Beccles and Barsham but these phases remain undated.

The morphology and the orientation of the two structures are thus similar but the full extent and precise completed form of both alignments has yet to be established. There is also a lack of cultural remains at the two sites, although small amounts of Iron Age and Roman pottery were recovered from Beccles (Gearey *et al.* in press). The absence of any such timber debris is probably the most striking feature of Barsham, although given the river edge location of this site it is possible that any debris derived from on-site working may have been washed away. Despite the surviving portions of each site being broadly similar, it is possible that they appeared very different in completed form and function. Given the stratigraphic context at Barsham, it is likely that any superstructural elements must have been raised above the level of the channel, in a similar way to a jetty. The diatoms were too poorly preserved to provide much useful information although the presence of freshwater diatoms indicates these conditions prevailed at Barsham whilst a small number of estuarine species may indicate the site was subject to episodic inundation during high tide.

Discussion of the function of prehistoric post alignments has been well rehearsed (Allen and Welsh 1996, Milne 2002, Field and Parker Pearson 2003, Pryor 2001). These sites are markedly different from the many ground level prehistoric trackways that have been recorded in mire systems in Britain and Ireland. The latter type of structures are generally assigned a 'practical' function as providing access across or into wetlands which would have been too wet to access unaided on foot (e.g. Coles and Coles 1986, Crockett *et al.* 2002, Raferty 1996). Post alignments are more enigmatic structures, due largely to the fact that only the lower portions of the sites tend to survive. Some alignments have been interpreted as ground level trackways, such as Flag Fen (Pryor 2001) and Fiskerton (Field and Parker Pearson 2003), others as bridges (e.g. Dorney, Eton Rowing Lake; Allen and Welsh 1996) or jetties (e.g. Vauxhall; Milne 2002). In the case of those interpreted as supporting raised structures as at Dorney and Vauxhall, it can be noted that no unequivocal evidence for any such superstructure has survived and interpretation thus rests primarily on the stratigraphic context of the archaeology.

The absence of votive deposits of metalwork makes it unlikely that either Beccles or Barsham can be regarded as 'ritual' in the sense of Fiskerton or Flag Fen (Field and Parker Pearson 2003; Pryor 2001) although it is possible that any such ritual deposition was taking place in the river itself. It can also be observed that the main phases of 'votive' metalwork deposition at both Fiskerton and Flag Fen post-date the construction of the alignments themselves by some time, raising the possibility that causeway or crossing points only acquired such significance with time (Field and Parker Pearson 2003).

Despite certain morphological similarities, it could be argued that the two sites had differing functions. Whilst both were situated adjacent to the River Waveney, the landscape contexts are less similar than it might appear (Figure 7). At Beccles, the alignment extends from the northern edge of the dryland, now occupied by the town of Beccles. This area of sands and gravels effectively defines the dryland at the southern edge of the floodplain of the River Waveney. In contrast, whilst the site at Barsham appears to be oriented on a gravel area at the edge of the river, this is effectively an 'island', separated from the main dryland to the south by floodplain deposits. Further study is required to investigate the timing and pattern of floodplain evolution and its relationship to human activity, although the location of the Barsham site terminating on an island within the wetland might invoke themes of liminality (Brown 2004).

In terms of the broader regional context, it would appear that the River Waveney was situated within the centre of *Iceni* territory which probably occupied north Suffolk and Norfolk (Martin 1988). Settlement during this period apparently favoured the lighter soils of the north-west and south-east of Suffolk and it has been argued that the general proximity of sites in this period to water indicates a heavy pastoral bias, with the interfluves generally bare of settlement (Dymond and Martin 1988). The Beccles and Barsham sites are further evidence of the importance of these river valleys during later prehistory, although the precise nature of human interest and activity requires further work and thought.

The Waveney may have been an obstacle to north-south movement but also a resource and transport link, one which was especially important in terms of external connections to the wider North Sea region. Parker Pearson and Field (2003) have observed that the wealth and political power of communities in eastern England may have been related to broader developments within the North Sea basin. Journeys by sea between the eastern coast and the Rhine and other continental North Sea rivers were likely to have been much shorter than from central/western Britain.

Whatever the precise completed form, the monumental character of both sites is notable; it is likely that these structures would have been clearly visible from the river. The social climate may have been very different in 75 BC compared with that of *c*. 8 BC–AD 8, as in the time between the construction of the two sites of Beccles and Barsham, Gaul had been conquered and Julius Caesar had landed in south-eastern Britain. The practical function of the sites in terms of access to or across the river is clearly an important one, but the role of monuments in reinforcing themes of identity and territory may also be relevant. The link between the merging of the 'ritual' and domestic spheres of life during later prehistory (see Bradley 2003) and the significance of water (e.g. Cavers 2006) can perhaps also be highlighted. In this sense, it may be unhelpful to seek either a purely 'ritual' or 'practical' function for these timber alignments.

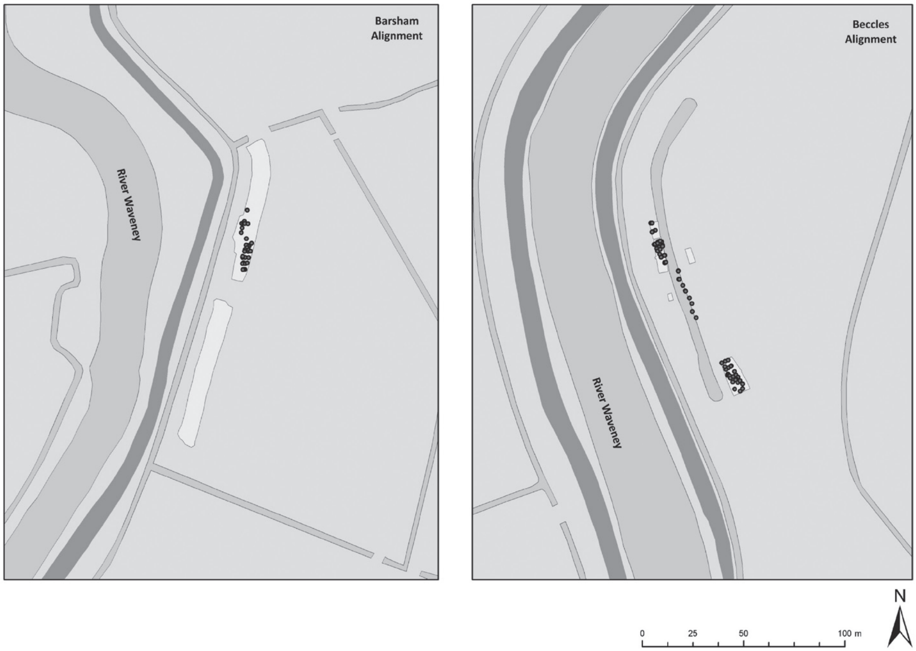

Figure 7. Plan of the Barsham and Beccles alignments.

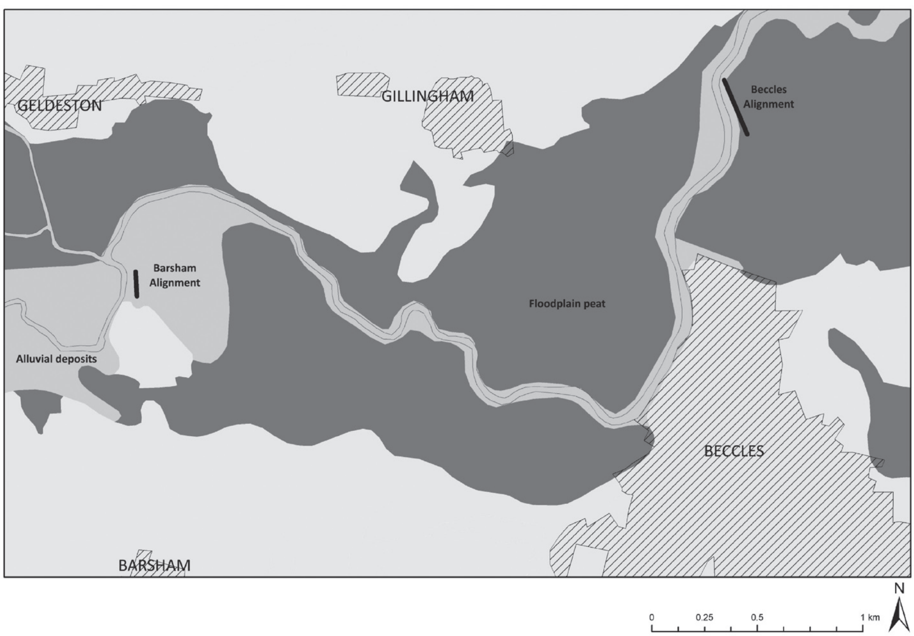

Figure 8. Landscape context of Barsham and Beccles.

Plate 1. Site looking north, pegs show location of the posts.

Plate 2. North section looking west, showing posts 21, 22, 23 and 26.

Conclusions

The sites at both Beccles and Barsham are characterised by a triple row of upright oak stakes. There is little surviving evidence that either alignment supported a superstructure. It seems likely that the upper parts of the stakes at both sites decayed in antiquity and hence the full length of the timbers and indeed the remains of any structure they might have supported are unknown. Beccles yielded abundant evidence for onsite woodworking and the reduction of timbers, some of which were larger than the upright stakes. It is possible that this reflects the construction of a platform or walkway but no remains of larger structural timbers have been recovered. Both sites date to the very late Iron Age, although the evidence from Beccles indicates some sort of activity continuing on the site during the Romano-British period. This activity may of course have been of an entirely different character to that in the Iron Age.

The post alignment at Barsham is much smaller in comparison to Beccles both in terms of the excavated area of the site as well as the size of the timbers themselves, whilst the lack of woodworking or extensive cultural remains suggests that the site may have been relatively short-lived. The lack of an identified or excavated terminus at either site further hinders interpretation as well as limited excavation of sites of a similar date in the area. The channel edge context at Barsham may indicate that the structure provided direct access to the river itself, perhaps as a wharf or jetty, linking to the higher and drier gravel spur some 100 m from the southern end of the site that the alignment appears to be oriented upon. The excavated portion of the Beccles alignment seems to reflect access across the floodplain towards the river but in this case the floodplain edge is around 450 m to the south.

These issues aside, the alignments demonstrate a focus on the River Waveney during the later prehistoric period which was probably related to the status of the river as an obstacle, a resource or a boundary and conceivably a combination of all three. Access to and from the river would have been problematic across the broad floodplains which had developed by this period and the alignments may reflect one solution to this but might also have operated as territorial markers in both a physical and symbolic manner. Further work is required to establish the form and function of these sites and also to establish if other such alignments are present in the Waveney Valley.

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