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DOI:

[10.1017/S0079497X00000682](https://doi.org/10.1017/S0079497X00000682)

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Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Gearey, B, Chapman, H, Howard, A, Krawiec, K, Bamforth, M, Fletcher, W, Hill, TCB & Marshall, P 2011, 'Beccles triple post alignment, Beccles Marshes, Suffolk: excavation and palaeoenvironmental analysis of an Iron Age Wetland site', *Prehistoric Society, London. Proceedings*, vol. 77, pp. 231-250. <https://doi.org/10.1017/S0079497X00000682>

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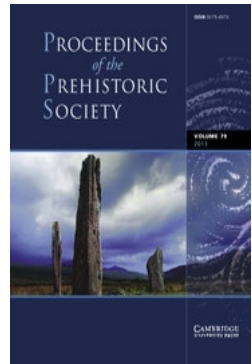
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Proceedings of the Prehistoric Society / Volume 77 / January 2011, pp 231 - 250
DOI: 10.1017/S0079497X00000682, Published online: 05 March 2013

Link to this article: http://journals.cambridge.org/abstract_S0079497X00000682

How to cite this article:

Benjamin R. Gearey, Henry P. Chapman, Andrew J. Howard, Kristina Krawiec, Michael Bamforth, William G. Fletcher, Thomas C.B. Hill, Peter Marshall, Emma Tetlow and Ian Tyers (2011). Beccles Triple Post Alignment, Beccles Marshes, Suffolk: Excavation and Palaeoenvironmental Analyses of an Iron Age Wetland Site. Proceedings of the Prehistoric Society, 77, pp 231-250 doi:10.1017/S0079497X00000682

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Beccles Triple Post Alignment, Beccles Marshes, Suffolk: Excavation and Palaeoenvironmental Analyses of an Iron Age Wetland Site

By BENJAMIN R. GEAREY^{1*}, HENRY P. CHAPMAN¹, ANDREW J. HOWARD¹, KRISTINA KRAWIEC⁸, MICHAEL BAMFORTH²,
WILLIAM G. FLETCHER³, THOMAS C.B. HILL⁴, PETER MARSHALL⁵, EMMA TETLOW⁶ and IAN TYERS⁷

This paper describes the results of two seasons of excavation and associated palaeoenvironmental analyses of a wetland site on Beccles Marshes, Beccles, Suffolk. The site has been identified as a triple post alignment of oak timbers (0.6–2.0 m long), over 100 m in length, and 3–4 m wide, running north-west to south-east towards the River Waveney. It was constructed in a single phase which has been dated dendrochronologically to 75 BC, although discrete brushwood features identified as possible short trackways have been dated by radiocarbon to both before and after the alignment was built. It is unclear if the posts 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. In addition, fragments of both Iron Age and Romano-British pottery were recovered. A substantial assemblage of worked wooden remains appears to reflect the construction of the post row itself and perhaps the on-site clearance of floodplain vegetation. This assemblage also contains waste material derived from the reduction splitting of timbers larger than the posts of the alignment, but which have not been recovered from the site. Environmental analyses indicate that the current landscape context of the site with respect to the River Waveney is probably similar to that which pertained in prehistory. The coleoptera (beetle) record illustrates a series of changes in the on-site vegetation in the period before, during and after the main phase of human activity which may be related to a range of factors including floodplain hydrology and anthropogenic utilisation of Beccles Marshes. The possible form and function of the site is discussed in relation to the later prehistoric period in Suffolk.

The value of wetland environments for providing rich datasets regarding cultural activity and associated palaeoenvironmental context is well documented (eg,

Coles 1992; Gowen *et al.* 2005). However, unlike areas of eastern England such as the Fens and the Humberhead levels, very few wetlands sites have been identified or investigated in Suffolk. The discovery of worked, waterlogged wood in the Waveney valley in 2006 provided the opportunity to begin to remedy this situation. The worked wood was initially identified during flood alleviation works on the edge of the River Waveney on the floodplain marshes to the north of the town of Beccles. The tool marks on the wood were indicative of a prehistoric date for the site and further assessment of the area revealed a significant depth of surviving archaeological remains. Excavation, in conjunction with palaeoenvironmental investigation of the wider floodplain, was undertaken through collaboration between Birmingham Archaeo-Environmental (BA-E) and Suffolk County Council

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Archaeology Service (SCCAS). This work revealed a triple post alignment with associated wooden structures and led to a second season of research. This paper describes the results from these investigations and places them within the context of cultural and environmental changes during later prehistory within the region.

THE STUDY AREA

The site is situated on the rough pastureland of Beccles Marshes, adjacent to the River Waveney and just under 1 km due north of Beccles (NGR TM 2915 6413; Fig. 1). The river forms the county boundary between Norfolk and Suffolk and is an improved channel, the navigation of which first appears in an Act of Parliament of the 17th century (Robertson 1995). Various of the marshes along the river were reclaimed in the medieval period although historical documents (Hodskinson's Map of Suffolk; Dymond & Martin 1988) show that Beccles Marshes was still undrained common land in 1783 but that, by 1838, the area was ditched and under management (Ordnance Survey 1st edition mapping). The canalisation of the Waveney appears to have triggered widespread reclamation of the remaining marshes and riverside common land. The soils are recorded as deep fen peats and silts of the Mendham series, with underlying riverine deposits of gravels and sands of the Newport series which form small sandy islands and ridges along the southern side of the River Waveney.

METHODS

Excavation and survey

The excavations in 2006 (Trench 1; Fig. 2) concentrated on an area 16 m long and 5 m wide determined by the footprint of the area disturbed by the flood alleviation works. In addition, a 20 x 5 m strip directly to the north of Trench 1 was cleaned to the level of the archaeology which was found to continue into this area, although individual features were not excavated. An area measuring 5 x 5 m was excavated directly to the south of Trench 1 to establish whether any archaeological features were present, although none was found. A dyke survey also revealed a number of additional timber posts and

'post-sockets' within the area damaged by the machinery used for the flood alleviation works.

The projected alignment of the posts generated by the work in 2006 provided the location for further excavation in 2007. Trench 2 was excavated to the south-south-east of the flood alleviation works and was aimed at examining an open area of the site within an undisturbed area. This second trench measured 17 x 9 m (Fig. 2) and was positioned 55 m to the south-east of Trench 1, well away from the alleviation works. In addition, a small trench was excavated to the east of Trench 1 (Trench 1b) to examine a possible alignment of archaeological features identified in 2006.

In both Trenches 1 and 2 the decayed tops of large upright wooden posts were identified *c.* 0.7 m below the current ground surface. Successive 0.10 m spits were removed manually in both trenches to allow hand planning. Two open sections (Fig. 3), 1 m wide, were also excavated in Trench 1 to an additional depth of 0.4 m, on an east-west orientation across the alignment of the posts, with three such sections also excavated in Trench 2 (Fig. 4). Despite the use of a mechanical pump, the height of the ground water table restricted the depth of excavation in both trenches. Concentrations of worked wooden remains were recorded to a maximum depth of 1.10 m below the current ground surface. The trenches were surveyed using a combination of Trimble RTK5800 GPS and Automatic Level and all finds were also recorded three dimensionally using a Global Positioning System (GPS).

An auger survey was undertaken to establish the relationship of the 'on site' stratigraphy to that of the surrounding deposits and to identify deeper areas of peat suitable for palaeoenvironmental sampling and analysis. A total of 46 cores (see Fig. 2) were excavated along four transects using a hand operated gouge corer. Spacing between boreholes varied between 10 m and 20 m depending on the stratigraphic complexity encountered during borehole excavation. The locations of all boreholes were recorded three dimensionally using Global Positioning System (GPS). Samples for pollen assessment and radiocarbon dating were taken (see below) from a location (Core 1) 50 m to the east-north-east of Trench 2 (Fig. 2) as part of an English Heritage (Aggregates Levy Sustainability Fund) funded project investigating the chronology of peat formation on the floodplain (Hill *et al.* 2008).

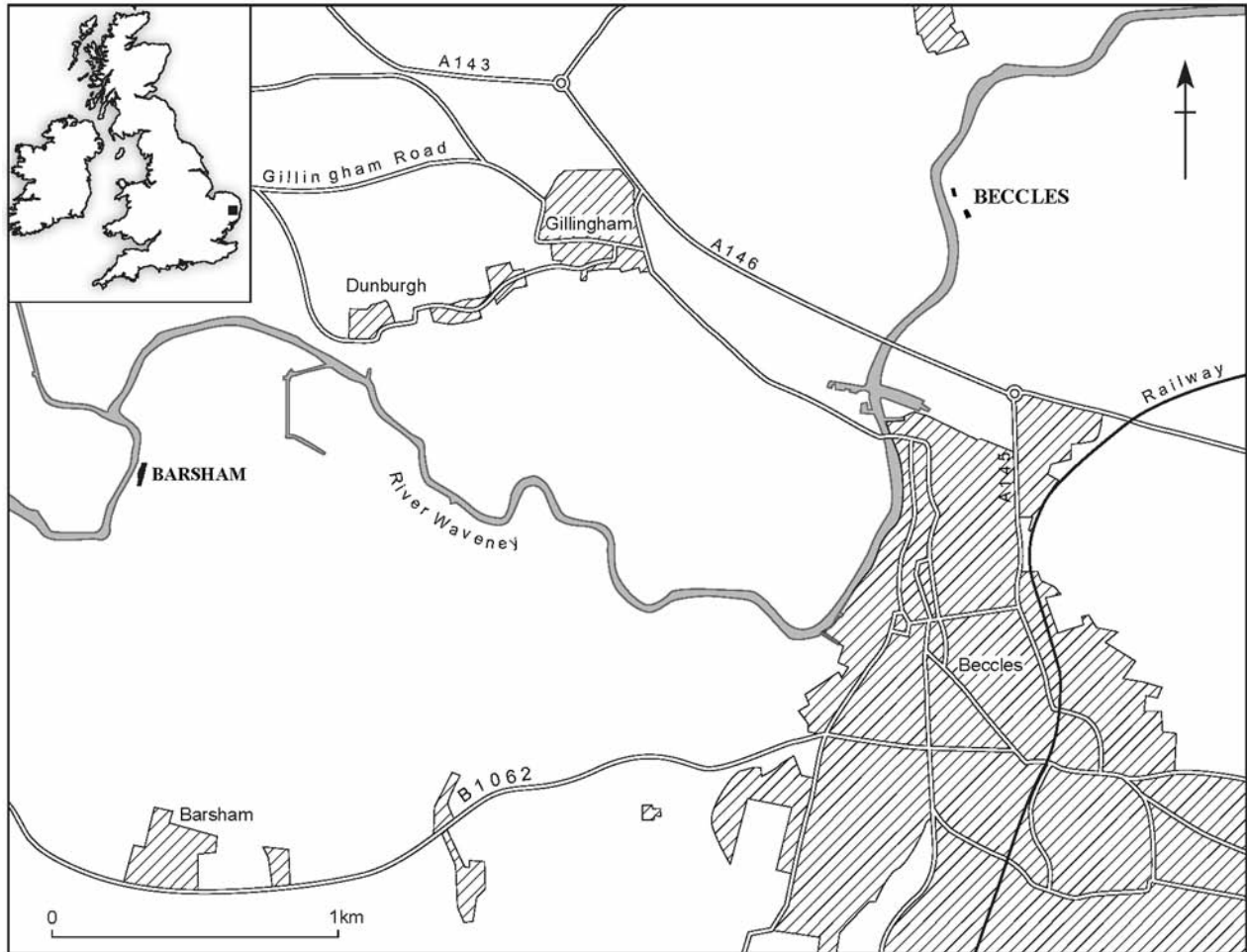


Fig. 1.
Location map

Dendrochronology

In total, 53 samples (28 from Trench 1 and 25 from Trench 2) were taken from the large upright posts for dendrochronological analyses. These were oak (*Quercus* spp.) with the exception of two samples from Trench 2 which were subsequently identified as alder (*Alnus* spp.) and excluded from further analyses. Standard methods were applied to the 51 remaining samples (see English Heritage 1998) of which 23 were discounted from further analysis on the grounds of too few rings, aberrant anatomical characteristics, or other issues. The remaining 28 samples were measured, any multiple radii synchronised, and the data combined to form sample composite series and then cross compared.

Wood analyses

The significant quantities of waterlogged wood encountered necessitated the design and implementation of a sub-sampling strategy to recover material for detailed recording and analyses. The collection of this material was determined by purposive or 'judgemental' sampling, complimented by total collection within the two defined sections. Although this strategy is likely to have produced a bias towards larger, worked items, a sizable sample of smaller woodworking debris and other 'bulk' material was also collected. The system for recording and analysis of prehistoric wooden remains followed Taylor (1998; 2001). In total, 636 items were analysed in detail (381 from Trench 1 and 255 from

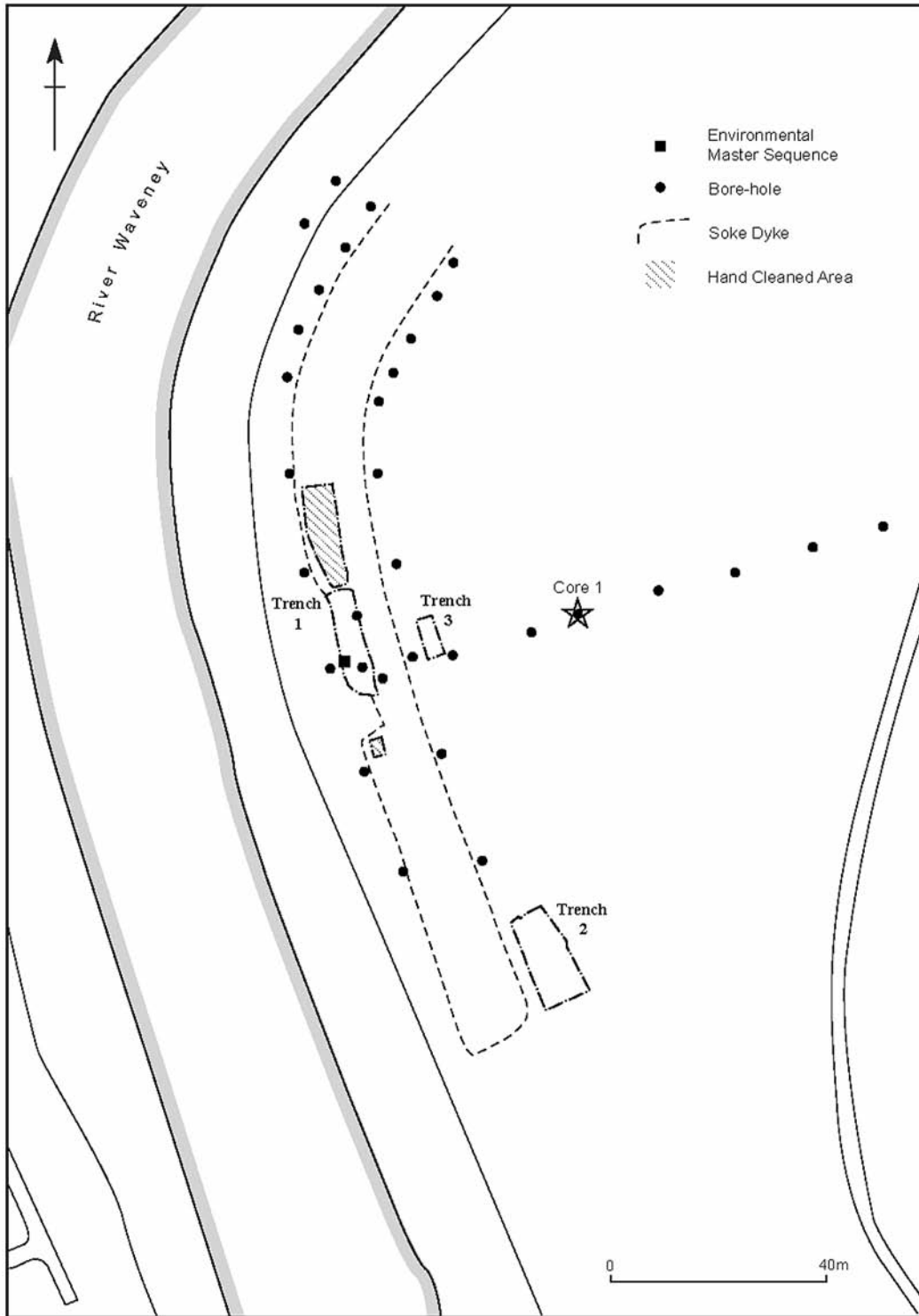


Fig. 2.
Trench and borehole locations

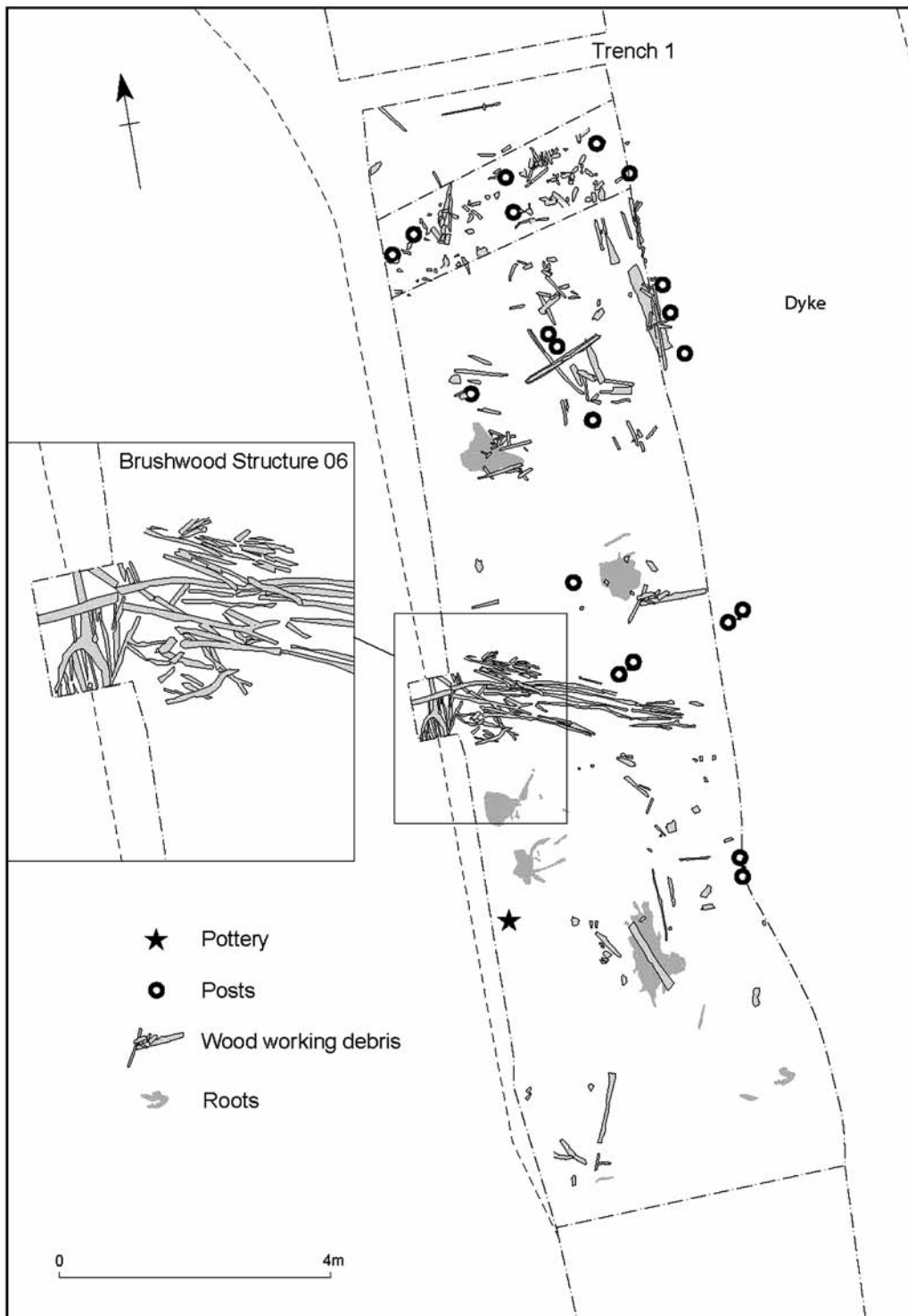


Fig. 3.
Trench 1 plan

TABLE 1 RADIOCARBON DATES FROM BECCLES

Sample	Lab code	Sample ID	Material	$\delta^{13}\text{C}$ (‰)	Radiocarbon age(BP)	Weighted mean(BP)	Calibrated date (95% confidence)
Core 1	GrN-31116	0.84 m	Peat (Humin)	-28.9	2130±40		
Core 1	GrN-31151	0.84 m	Peat (Humic acid)	-28.9	2160±50	2142±32 (T'=0.2; v=1; T'(5%) = 3.8)	360–50 cal BC
Core 1	GrN-31118	4.60 m	Peat (Humin)	-28.4	8460±50		
Core 1	GrN-31153	4.60 m	Peat (Humic acid)	-28.0	8340±80	8427±43 (T'=1.6; v=1; T'(5%) = 3.8)	7580–7370 cal BC
Worked wood	Beta-216738	Chisel point	Wood	-30.0	1940±40	–	50 cal BC– cal AD 140
Worked wood	Beta-216739	Bark edge- upright post	Wood	-27.0	2150±40	–	360–270 cal BC & 260–50 cal BC
Brushwood structure 06	Beta-240310	Coppiced rod S1	Wood	-30.1	2000±40	2105±29 (T'=0.0; v=1; T'(5%) =3.8)	200–40 cal BC
Brushwood structure 06	Beta-240311	Coppiced rod S2	Wood	-29.2	1990±40		
Brushwood Structure 07	Beta-240327	Coppiced rod S3	Wood	-25.8	2130±40	1995±29 (T'=0.3; v=1; T'(5%) =3.8)	50 cal BC– cal AD 80
Brushwood Structure 07	Beta-240238	Coppiced rod S4	Wood	-29.2	2080±40		

Trench 2). All the upright posts from Trench 1 were retained, but since these were subsequently found to be broadly uniform, only four were lifted and retained from Trench 2. Samples of oak (*Quercus* sp.) and ash (*Fraxinus excelsior*) were identified as such on the basis of observable macroscopic features with additional verification through thin section analysis.

Radiocarbon dating

Six samples of worked wood in total from the site were submitted for radiocarbon dating (Table 1), consisting of two samples submitted as initial 'rangefinder' dates and four from two excavated brushwood structures (see below). Radiocarbon dates from Core 1 are also relevant to understanding the relationship between the archaeology and peat accumulation on the floodplain. The results of the radiocarbon dating, relating the measurements directly to calendar dates are presented in Table 1. The dates 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

calibrated date ranges cited are those for 95% confidence calculated according to the maximum intercept method (Stuiver & Reimer 1986) and quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years.

Palaeoenvironmental: sampling strategy and the 'Master sequence'

Palaeoenvironmental analyses (sub-fossil pollen, plant macrofossils, and beetles) of deposits from the site were targeted on a 'Master' sequence approximately 1.15 m deep sampled from the western edge of Trench 1 (Fig. 2). Eight bulk samples (see Table 2) were processed using the standard method of paraffin flotation outlined in Kenward *et al.* (1980). The insect remains were then sorted from the paraffin flot and the sclerites identified under a binocular microscope at $\times 10$ magnification assisted by comparison with specimens in the Gorham and Girling Collections housed at the University of Birmingham. The taxonomy used for the coleoptera (beetles) follows that of Lucht (1987). Sub-samples from the Master

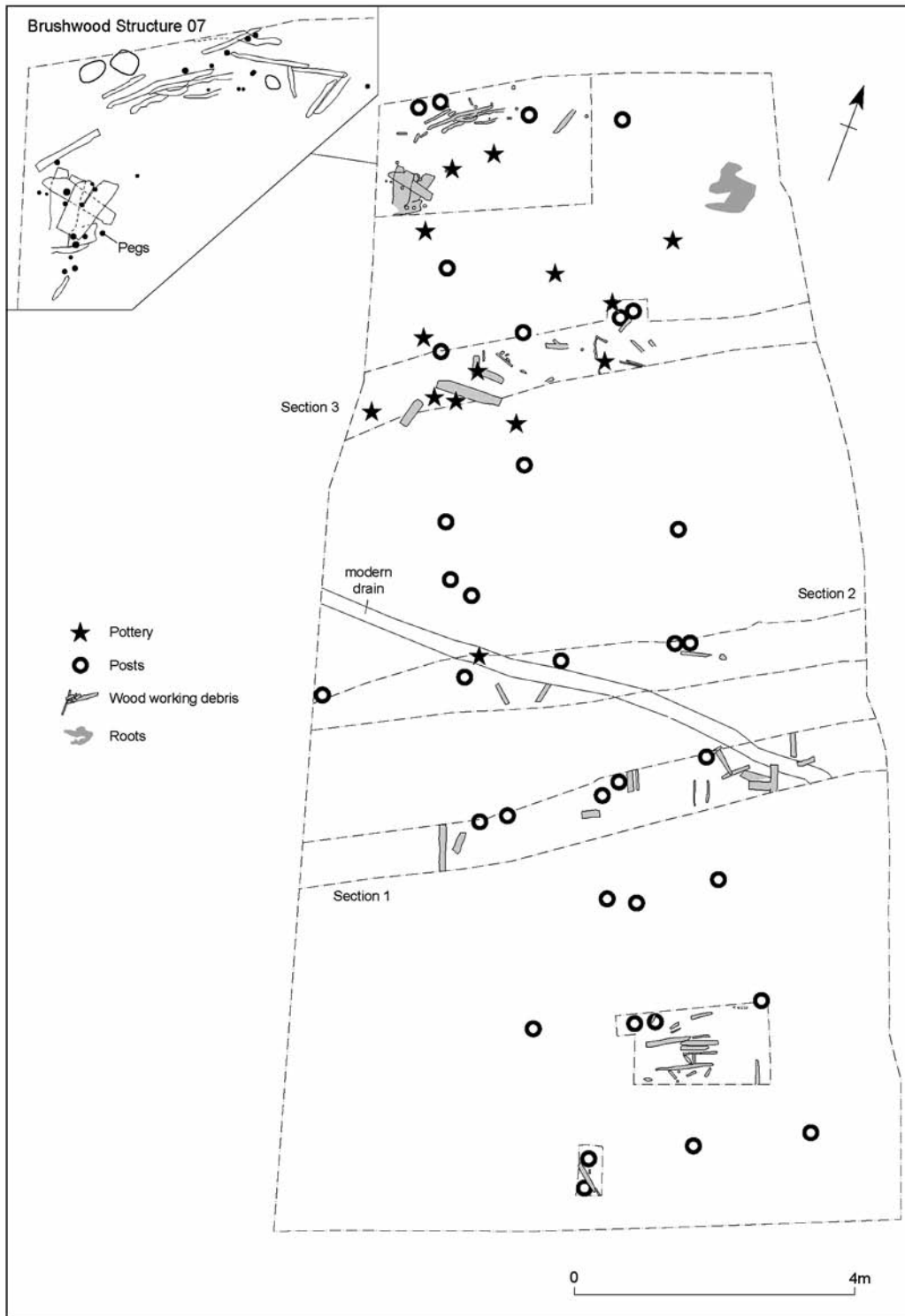


Fig. 4.
Trench 2 plan

sequence were also assessed for pollen and waterlogged plant macrofossils, but the preservation of these proxies was poor and these data will not be discussed further in this paper.

RESULTS

Contextualising the site: the floodplain deposits

The main sedimentary units identified during the auger survey are summarised in Table 3. Units 1–3 are regarded as comparable to the onsite excavated contexts (Table 2). Up to 5.5 m of humified peat, with wood and monocotyledonous remains (sedges, grasses), were recorded in the boreholes (Units 1 & 3). In Trenches 1 and 2, the upper *c.* 1.0 m of these deposits was silt rich (Unit 2), and gradually increased in thickness further north of the trenches as the underlying peats (Unit 1) pinched out, such that in the northernmost core (23), Unit 2 was around 5 m thick. Adjacent to the River Waveney these deposits were grey-brown/blue-grey organic-rich silts and clays. This unit (2) is probably the same facies represented in boreholes in the western part of the survey area by a thin organic-rich silt encountered at around 0.90 m depth. A date of 8427±43 BP, 7580–7370 cal BC (Table 1, R_Combine GrN-31118 and 31153) 8427±43 BP (T' = 1.6; = 1; T' (5%) = 3.8) was obtained for the base of the peat deposits at a depth of 4.60 m in Core 1 (see also Hill *et al.* 2008).

Excavation

The two seasons of excavation recorded a total of 67 upright *Quercus* posts and two *Alnus* posts aligned north-west to south-east over a distance of 95 m, sealed by red-brown, highly humified peat (Unit 1, see above) (Figs 5 & 6). The tops of the posts *c.* 0.70 m below the modern ground surface were poorly preserved, reflecting the effects of recent drainage of the floodplain and/or an hiatus in peat accumulation in the past (see below). All of the recorded posts remained in the round and the lower tips of 26 of these had been trimmed into tapered points (see Fig. 11, below). Many of these posts had morphological features which are indicative of coppiced material; including even diameters with few side branches and

the proximal ends (normally the lower, worked end) tending to curve slightly, reminiscent of a coppiced rod. The well preserved broad, flat facets were indicative of working using iron tools (see Coles & Orme 1980).

The posts were all vertically set, earthfast, driven piles which formed three discrete rows spanning 3–4 m wide and were generally single, but in places occurred in pairs and in one instance a group of three (Fig. 7). Post lengths range 0.61–1.96 m and in diameter 0.14–0.26 m, hence representing a relatively uniform size of raw material. As all of the posts survived to a broadly similar height, surviving length is dictated by depth of insertion as opposed to original timber length. Using a generally applied 'rule' for driven posts of one-third below ground and two-thirds above ground, suggests approximate maximum post lengths of 1.83–5.88 m, in turn equating to possible heights visible above the original ground surface of *c.* 1.20–3.90 m.

Nine of the recorded posts had either intact or broken cross-halving lap joints (Spence 1994) whilst two of these jointed timbers also had small notches cut into them at a level of between –1.15 m AOD and –1.94 m AOD (Fig. 11, below). In both cases, it appeared as if the woodworker had started to cut a halving lap joint, but then decided that the position was wrong and altered it. The notches of three of these posts in Trench 2 had *in situ* lateral wooden cross bars, each of which had been worked into a square cross-section. Wood remains including timber, roundwood, and wood-working debris were found within the peat deposits of Unit 3 and concentrated within the alignment (see Figs 3 & 4). Natural wood in the form of coppice stools, tree boles, and roots were also present, four examples of which were sampled and identified as *Alnus glutinosa* (alder).

Two features interpreted as short sections of trackway or platforms were identified in Trench 1 and 2. In the southernmost section of Trench 1 (Fig. 3), a concentration of coppiced *Alnus* rods had been placed on an east–west alignment, at right-angles to the main post alignment and continuing under the baulk of the western edge of the trench but not to the east (Trench 1b). Although no binding remained, the positioning of the rods suggest they may have originally formed a bundle, with three driven stakes (two of split *Quercus*, one of *Fraxinus*) found in close association possibly used to secure this in place. The crude construction suggests that this brushwood feature may be

TABLE 2: SUMMARY OF PEAT UNITS, COLEOPTERA SAMPLES AND INFERRED LOCAL ENVIRONMENT (SEE ALSO TABLE 3)

Depth/ (Unit)	Stratigraphy	Coleoptera samples depth (mOD)	Inferred local environment/beetles recorded
0 (1)	Dark red-brown well humified herbaceous peat with wood frags & rootlets. Occasional silt-rich clasts	0–0.25 m (-0.67 to -0.92)	Grassland -reedswamp-sedges-muddy pools Grass feeding orthoperid <i>Corylophous cassidoides</i> , reed beetle <i>Plateumaris braccata</i> , large numbers of Curculionidae <i>Apion</i> spp. & <i>Sitona</i> spp. associated with disturbed grassland & pasture
		0.25–0.50 m (-0.92 to -1.17)	Dry grassland-muddy pools Similar taxa to 0.50–0.62 m
0.52m (2)	Light yellow brown (oxidising to grey-brown) v. silty, well-humified peat with abundant monocot remains & occasional small flint frags. Occasional fine grey sand layers	0.50–0.62 m (-1.17 to -1.29)	Dry grassland-muddy pools Hydraenid family (hygrophilous taxa), particularly <i>Hydraena</i> spp. & <i>Octhebius</i> spp, mud at edge of shallow pools
		0.62–0.74 m (-1.29 to -1.41)	Grasses and sedges-tall reed swamp-deeper pools <i>Plateumaris braccata</i> (reed beetles), & sedge feeding Curculionidae <i>Thryogenes</i> spp. & <i>Notaris acridulus</i> found on sweet grasses (<i>Glyceria</i> spp.) Dytiscidae <i>Hydroporus</i> spp. & Hydrophilidae family.
		0.74–0.85 m (-1.41 to -1.52)	Tall reed swamp-pools <i>Plateumaris braccata</i> (reed beetles) dominant. Anobid <i>Anobium punctatum</i> , (common ‘woodworm’) present
0.86 m (3)	Red-brown, moderately humified herbaceous peat with abundant monocot & wood remains & abundant small flint frags. Thin grey sand horizons towards top of unit	0.85–0.95 m (-1.52 to -1.62)	Tall reed swamp-deep pools-carr <i>Agonum thoreyi</i> & chrysomelid <i>Plaetumaris braccata</i> (common reed beetle), bulrush (<i>Typha</i> spp.) & burr-reed (<i>Sparganium</i> spp.). Aquatic taxa inc. Dytiscidae, <i>Hydroporus</i> spp. & <i>Graptodytes</i> spp. & Hydrophilidae, <i>Cymbiodyta marginella</i> & <i>Hydrobius fuscipes</i> . Few <i>Aphodius</i> spp. Chrysomelid, <i>Agalestica alni</i> , an obligate monophagous species found exclusively on <i>Alnus</i>
		0.95–1.05m (-1.62 to -1.72)	Grasses-Sedges <i>Thryogenes</i> spp. & orthoperid <i>Corylophous cassidoides</i> found in tussocky grasses/sedge. <i>Aphodius</i> spp. (dung beetle) recorded in large numbers
		1.05–1.15m (-1.72 to -1.82)	Sedges-pools-grasses-carr The curculionid <i>Thryogenes</i> spp. (<i>Carex</i> spp.), <i>Bagous</i> spp. found amongst waterside plants inc. sweet grasses (<i>Glyceria</i> spp.) & milfoil (<i>Myriophyllum</i> spp.) Large numbers Scarabaeidae (‘dung beetles’) <i>Aphodius</i> spp. Halobionitic carabid <i>Dyschirius salinus</i> – taxon exclusively found on salt marshes, <i>Phyllobius calcaratus</i> found in damp, carr woodland scolytid, <i>Hylugops palliates</i> , found on coniferous species
Base			

interpreted as a short trackway (Brushwood Structure 06), perhaps intended to bridge or stabilise a patch of wetter peat. Three unmatched tool signatures and a single tool mark were recorded, indicating that a minimum of four tools were involved in the harvesting and construction of the structure. Two samples of wood for radiocarbon dating were taken from this feature (Table 1; Brushwood Structure 06).

A second brushwood structure (Brushwood Structure 07) was identified at the north-western end of Trench 2 (Figs 4 & 8), again at right-angles to the main post alignment. This feature consisted of eight lengths of roundwood (four *Quercus* and three *Alnus*), also displaying evidence of coppicing and pegged into place using short roundwood stakes with trimmed ends (Fig. 8). Two samples for radiocarbon

TABLE 3: SUMMARY OF THE FLOODPLAIN STRATIGRAPHY AT BECCLES

Depth	Unit	Description
0.00–0.90 m	Unit 1	Dark grey-brown herbaceous well humified slightly silty PEAT
0.90–1.00 m	Unit 2	Light grey organic rich SILT
1.00–1.90 m	Unit 3	Dark grey-brown herbaceous humified slightly silty PEAT
1.90–4.50 m	Unit 4	Dark red-brown herbaceous humified PEAT with wood frags
4.50–5.50 m	Unit 5	Dark brown-black very well humified PEAT
> 5.50 m	Unit 6	SANDS and GRAVELS

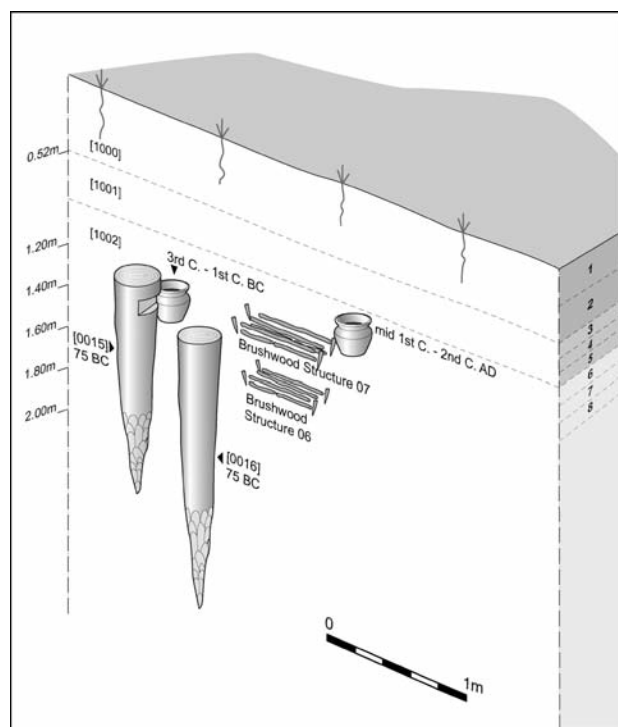


Fig. 5.

Isometric projection of the results of the archaeology of the Beccles post alignment

dating were also taken from this feature (Table 1; Brushwood Structure 07). Associated with this bundle was a tangentially faced, small *Quercus* plank (L: 0.69, W: 0.21, T: 0.05 m) with a small, square, naturally occurring hole in one end, into which a tangentially aligned *Fraxinus* peg (L: 0.205, W: 0.41, T: 0.038 m) had been inserted, apparently to secure the plank in place. Although heavily disturbed and damaged and in poorer condition than the bulk of the material recovered from the site, the pegged plank and the coppiced bundle may have formed

some kind of *ad-hoc* working platform/trackway alongside the post alignment.

Dating the site: radiocarbon and dendrochronology

Twelve of the 28 dendrochronological samples of upright posts were found to cross-match each other (Table 4). These data were combined to create a single composite dataset which was then compared with prehistoric, Roman, and early medieval tree-ring data from England and Wales, yielding a short but robust sequence which strongly matched the inner part of many of the 1st century AD Roman reference chronologies where these were made from 200–400 year old *Quercus*. This cross-matching indicated a 1st century BC date for this group of timbers with the composite sequence dated to 157–76 BC (inclusive). Eleven of the dated samples were complete to bark-edge; the other dated sequence were derived from an exclusively heartwood sample. The felling date of all 11 of the datable timbers complete to bark-edge was identified as the early spring of 75 BC, since each timber includes the preliminary cells of the growth ring for that year (Fig. 9).

Given that the mixture of posts over the 80 m length of the structure yielded this same date, it seems highly likely that the original construction event was within the year 75 BC. The final dated sample appears likely to have been felled at the same time, but in the absence of sapwood this cannot be proven. The 43% success rate for the dating of posts is low compared to the success rate obtained at the only other excavated Iron Age structure of a similar form at Fiskerton, in the Witham Valley, Lincolnshire (~56%; Tyers 2002, see below). However, given that short sequences such as the Beccles assemblage naturally have a lower chance of reliable and conclusive cross-matching, the results of the dendrochronological analyses can be regarded as broadly successful.

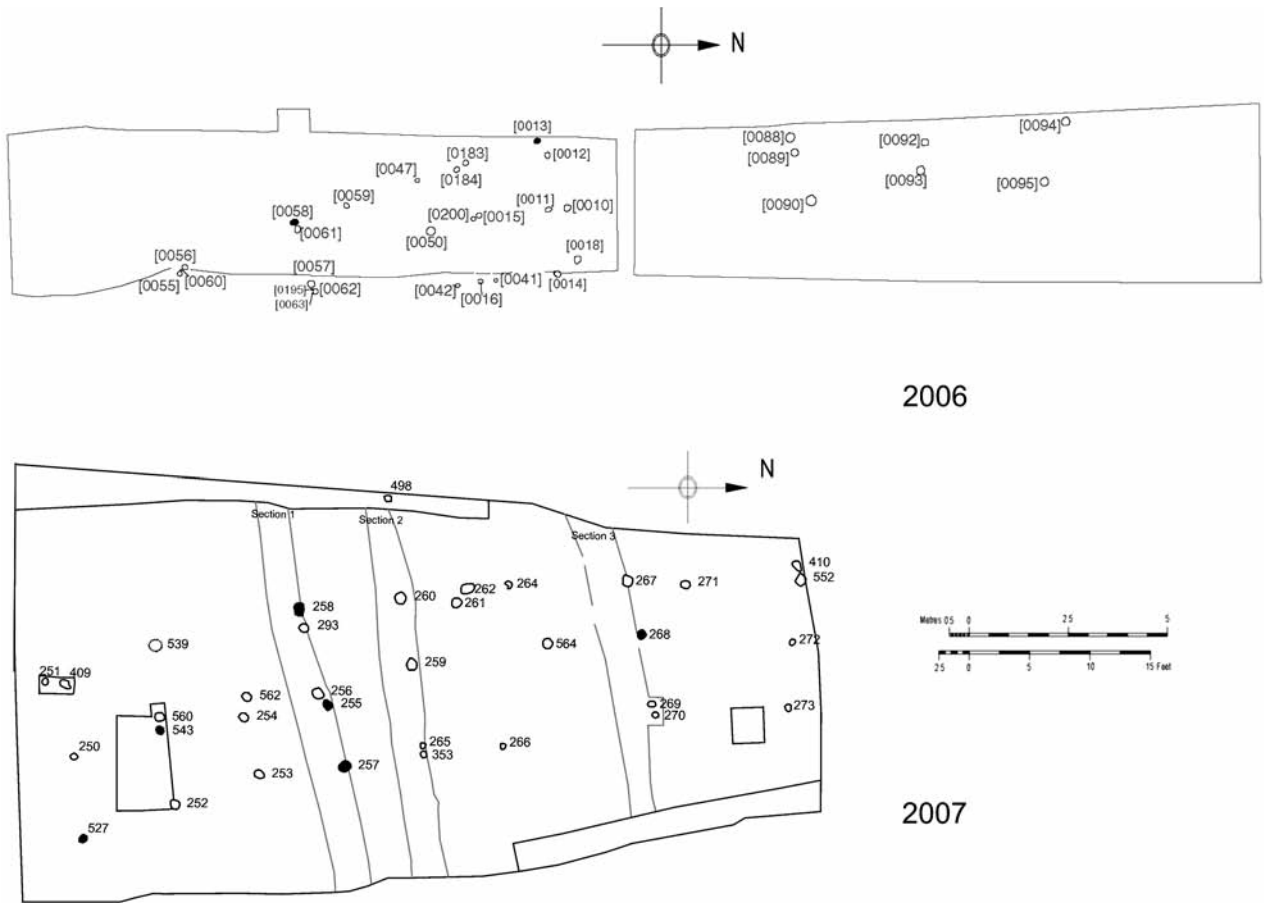


Fig. 6.

Plan showing Beccles Trench 1 (top) and Trench 2 showing the location of the dendrochronologically dated posts (black). Samples 3–5 were recovered from the excavation of the flood alleviation scheme

Comparison of the results of the radiocarbon dating of the two brushwood structures (see above and Table 1; Figs 3 & 4) with that of the dendrochronology indicates subtleties regarding the phasing of the site. Both sets of radiocarbon dates from Brushwood Structure 06 and Brushwood Structure 07 are statistically consistent (Beta-240237; 2130±40 BP and Beta-240238; 2080±40 BP; $T^*=0.3$; $v=1$; $T^*(5\%)=3.8$; Ward and Wilson 1978) and (Beta-240310; 1990±40 BP and Beta-240311; 2000±40 BP; $T^*=0.0$; $v=1$; $T^*(5\%)=3.8$; Ward and Wilson 1978), implying that each structure was built of wood of the same age. However, the determinations are not statistically consistent *between* these structures ($T^*=8.4$; $v=3$; $T^*(5\%)=7.8$; Ward and Wilson 1978) suggesting that Brushwood Structure 06 and

Brushwood Structure 07 were built at different times.

The archaeological evidence indicates that the two brushwood structures were each constructed in a single phase and thus weighted means of the radiocarbon dates can be calculated to provide a single date for the construction of each feature. This demonstrates that Brushwood Structure 06 (200–400 cal BC) pre-dates Brushwood Structure 07 (50 cal BC–cal AD 80). These dates can then be compared to the dendrochronological date of 75 BC for the posts (discussed above) demonstrating (Fig. 10) that it is 84.3 % probable that Brushwood Structure 06 (R_Combine Beta-240237/8) was constructed *before* 75 BC and 98.1% probable that Brushwood Structure 07 (R_Combine Beta-240310/11) was constructed *after* 75 BC.



Fig. 7.
A cluster of three posts *in situ* at the southern end of Trench 1



Fig. 8.
Brushwood Structure 07 looking east

TABLE 4: WOOD RECOVERED FROM TRENCHES
1 & 2 BY CATEGORY

Category	Number	% Total
Artefact	2	0.4
Debris	381	75.3
Root	7	1.4
Roundwood	108	21.3
Timber	8	1.6
Total	506	100

Wood technology

In addition to the posts of the alignment and the two brushwood structures described above, worked wooden debris was also recorded in both trenches (see Figs 2 & 3) largely within the post alignment. The 506 samples of wood analysed can be classified broadly as ‘debris’ (75%) with ‘roundwood’ accounting for 21% and ‘timber’ less than 2% (Tables 4 & 5). Only two items from this assemblage may be regarded as artefacts: a rough dowel fashioned from *Quercus* heartwood with one end sharpened to a blunt point (L: 399, W: 55, T: 50) is probably part of a handle; whilst a small, well finished item with a hidden mortice in each end shows evidence of having been broken in antiquity (L: 116, W: 50, T: 40). However, no parallels for the latter have been found and the function of this item remains unknown.

The wood debris was roundwood, probably derived from trees with natural growth regimes and was identified as largely *Alnus* but with *Quercus*, *Salix* (willow) and *Fraxinus* also present. The material classified as ‘timber’ was small in size and only a single item showed any evidence of finishing whilst there is no indication of jointing; it is likely this material represents by-products rather than finished items. The ‘debris’ which formed over three-quarters of the analysed assemblage (326 items total) can be further classified by type (Table 6) and by the technique of woodworking conversion that produced them (Table 7). Over 60% of the assemblage was ‘woodchips’, with ‘timber debris’ forming nearly 18%. The trimming of the ends of the large posts of the alignment to points (Fig. 11) would have generated large quantities of woodchips; perhaps as many as 800 chips per post (Sands 1997). The nature of such woodworking, detaching chips aligned with the circumference of the post, would have produced predominantly tangentially aligned chips and possibly

cross-grained chips. Similarly, the fashioning of the halving laps in these posts would also have resulted in tangentially aligned chips.

However, this process could not have produced the non-*Quercus/Alnus* material, the high numbers of radially aligned woodchips, nor the square cross-sectioned radially and tangentially aligned woodchips (Table 7). The latter two categories were probably derived from splitting rather than shaping timbers. These long, thin chips closely resemble the fibrous ‘streamers’ of wood that briefly join two surfaces during the process of splitting. There are also three, lozenge shaped woodchips in the assemblage that are indicative of on-site felling of trees or trimming of large timber rounds to length. This ‘timber debris’ is comparatively large, with breadths ranging 31–200 mm, a figure which can be doubled, particularly in the case of the radial items, to indicate a minimum original diameter of the tree from which it was derived. This suggests that the wood being worked on-site to produce these large off-cuts was in many cases slightly larger than the posts of the alignment. Hence, a considerable bulk of the ‘debris’ category recovered from the site could *not* have been produced by the shaping of the upright posts or of any of the other wooden remains in the recovered assemblage.

The Master sequence: on-site environmental

The master sequence does not currently have an independent chronology due to problems associated with radiocarbon dating of peat deposits at the site (Hill *et al.* 2008; see also Howard *et al.* 2009). However, radiocarbon dating of Core 1 from 80 m to the north-east of Trench 2 provides information regarding the chronology of on-site peat accumulation (Table 1).

The results of the coleopteran analyses are summarised in Table 2. It is clear stratigraphically that the three basal samples (1.05–1.15 m; 0.95–1.05 m; and 0.85–0.95 m: Unit 4) pre-date the main phase of archaeological activity on the site, whilst the three middle samples (0.74–0.85 m; 0.62–0.74 m; and 0.50–0.62 m: Unit 2) are associated with the main phase of activity as represented by the concentration of archaeological wood in this unit. In addition, on an approximate age-depth correlation between Core 1 and the excavated trenches, the mean date of 2142±32 BP, 360–50 cal BC (R_Combine SUERC-15973 and 15974; GrN-31116 and 1151) (T’=0.2; v=1; T’(5%) = 3.8) from a depth of 0.84 m in Core 1 confirms that the lower sample (0.74–0.85 m) from Unit 2 dates to the Iron Age. The uppermost two samples (0–0.25 and 0.25–0.50 m: Unit 1) are from the peat unit which seals the archaeology and forms the uppermost sediment unit across the floodplain.

The analyses show a series of changes in the floodplain vegetation before, during, and after the main phase of human activity. Towards the base of the sequence (1.05–1.15 m), in the period pre-dating the construction of the post row, the coleoptera indicate a wet sedge dominated environment with areas of open water and trees in the form of both *Alnus* (alder) and probably *Pinus sylvestris* (Scots pine). The former was probably growing as alder fen carr on or close to the site, while the latter was present on the drier areas or

TABLE 5: DEBRIS CATEGORY (SEE TABLE 2) FROM TRENCHES 1 & 2 BY CLASS

Category	Number	% Total
Bark	41	10.8
Charcoal	1	0.3
Roundwood debris	13	3.4
Timber debris	67	17.6
Unclassified debris	22	5.8
Woodchips	237	62.2
Total	381	100

TABLE 6: CONVERSION AND SPECIES OF ALL WOODWORKING DEBRIS (TABLE 3)

Species/Conversion	<i>Alnus</i>	<i>Fraxinus</i>	<i>Prunus</i>	<i>Quercus</i>	<i>Salix/Populus</i>	<i>Unid.</i>
Tangential	8	14	1	141	–	19
Radially & tangentially aligned, square cross-section	–	–	–	34	–	–
Radial	2	3	–	96	1	4
Boxed half	–	–	–	1	–	–
Unclassified	–	1	–	1	–	–
Total	10	18	–	273	1	23

TABLE 7: THE T VALUES BETWEEN THE INDIVIDUAL SERIES FROM THE 12 DENDROCHRONOLOGICALLY DATED TIMBERS FROM BECCLES

	257	258	268	527	543	0013	0058	0204	3	4	5
255	7.49	6.16	–	–	3.09	–	6.46	–	–	–	3.02
257		9.15	–	3.24	3.52	–	5.18	–	–	–	5.29
258			–	3.48	4.03	–	5.02	3.16	–	3.60	4.67
268				–	–	3.02	3.24	5.09	3.76	3.51	3.64
527					3.26	–	3.53	–	–	3.38	–
543						3.03	3.86	3.36	–	4.57	4.50
0013							–	3.70	3.65	–	3.14
0058								3.34	–	4.92	3.28
0204									13.27	5.26	3.54
3										3.39	3.09
4											–

t-value less than 3.0 (Baillie & Pilcher 1973). The high correlation between samples 0204 and 3 (highlighted in bold) may indicate these were derived from the same timber, or that two different timbers may have been derived from the same tree

exposed sand/gravel islands on the floodplain. The records of dung beetles point to the presence of large herbivores nearby, although it is not known if these were domesticated and/or wild and, since these beetles are ready fliers, whether their presence indicates herbivores on the floodplain itself or the dryland margins.

Subsequently (1.05–0.95 m), a slightly drier local environment is attested with low growing, tussocky sedge fen and fewer beetle taxa typical of aquatic habitats. The following sample (0.95–0.85 m) seems to reflect increased wetness with *Phragmites* reedswamp and *Typha* spp. (reedmace) as well as deeper pools with plants such as *Sparganium* (bur-reeds). This is accompanied by a fall in the number of dung beetles, suggesting a reduction in grazing. *Alnus* remained present locally, as demonstrated by the presence of the rare obligate monophagous species *Agalestica alni*.

The sample from 0.74–0.85 m probably relates to the earliest phase of activity on the site, on the basis of

the presence of worked wood debris in this unit (discussed above) and the radiocarbon dating of an equivalent depth in Core 1 (see above). Sedge fen with open pools fringed by tall reeds and emergent aquatic vegetation is implied, whilst there is evidence for the accumulation of decaying organic matter. The presence of the ‘common woodworm’ *Anobium punctatum* reflects dry, seasoned wood, presumably the upright posts of the alignment. The continuing accumulation of peat appears to have been in a sedge and wet grassland environment but with indications that the local environment had become slightly drier by the top of the sequence.

Pottery

(Sarah Percival & Cathy Tester)

Thirty-nine Iron Age pottery sherds, representing the remains of at least three vessels, were recovered from Trench 2 (Fig. 4). These were identified as shouldered jars with short slightly everted necks in sandy

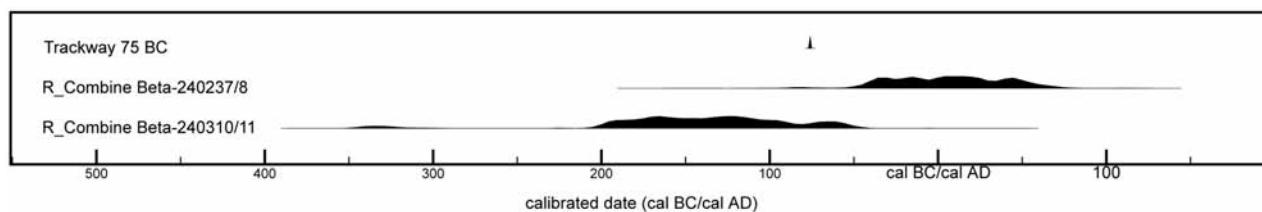


Fig. 10.

Comparison of the dendrochronological date of the post alignment with mean dates of Brushwood structure 06 (bottom) and Brushwood structure 07 (see Table 2)



Fig. 11.

One of the oak posts with a halving lap joint after extraction from Trench 1, showing working to the point

burnished fabrics, suggesting a date in the later Iron Age, perhaps 3rd–1st centuries BC. A substantial proportion of a single Roman vessel was collected from two findspots in the southern end of Trench 1 (Fig. 3). The vessel is a narrow-mouthed flask or bottle with a cordon at the base of its neck similar to *Camulodunum* form Cam 231b described by Hawkes and Hull (1947) as fully Romanised. It probably dates to the early Roman period (mid/late 1st–early 2nd century).

DISCUSSION

Late Holocene environmental change and floodplain development in the Waveney Valley

Accumulation of peat on the valley floor at Beccles was probably a result of paludification of the basal gravels around 8427 ± 43 BP, 7580–7370 cal BC (Table 1, R_Combine GrN-31118 and 31153) 8427 ± 43 BP ($T' = 1.6$; $v = 1$; $T'(5\%) = 3.8$) (Hill *et al.* 2008) associated with relative sea level rise in the early Holocene. Peat accumulation continued on the floodplain until the Iron Age at least, as outlined above. The results of the auger survey, aerial photographic and LiDAR data from the Waveney Valley (Hill *et al.* 2008) indicate that, in this reach, the River Waveney has remained remarkably stable in its course for much of the Holocene, in accordance with models for lowland river development proposed by Howard and Macklin (1999). The floodplain environment at Beccles was thus one of relative

ecological stability for much of the Holocene, with the accumulation of substantial thicknesses of peat through vertical accretion.

The coleopteran analyses of the upper layers of these deposits in Trench 1 demonstrate the floodplain vegetation consisted of alder carr with sedge fen communities. Just prior to the main phase of activity on site during the Iron Age, the local environment changed from one of alder carr, reed swamp/damp grassland to reed swamp with evidence for the expansion of open pools of water. The presence of dung beetles in the samples preceding the main phase of activity during the Iron Age may reflect pastoral activity on the dryland fringes or perhaps even seasonal grazing of the floodplain.

It is clear from palaeoenvironmental research elsewhere in Suffolk that major landscape changes took place during the Iron Age, with the clearance of the previously dense woodland cover and the expansion of both arable and pastoral farming during later prehistory. Further up the River Waveney at Scole, the Early Iron Age landscape was similar to that of the Late Bronze Age (Wiltshire forthcoming), with a pastoral economy initially dominating prior to the expansion of arable agriculture towards the Middle Iron Age. After the Middle Iron Age there was a brief re-expansion of woodland (Wiltshire & Murphy 1999) before a major phase of woodland clearance during the Late Iron Age or early Roman period (c. 250 cal BC–cal AD 60), and evidence for arable agriculture. Woodland proximal to the palaeochannel of the River Waveney was being felled, coppiced, or pollarded during this period, leading to the spread of weedy grassland.

In the absence of comparative palynological data from the site, it is not possible to establish to what extent this picture of later prehistoric landscape change at Scole applied to the landscape around Beccles. However, it is tempting to relate the disappearance of evidence for alder from the coleoptera record (Table 2; sample 0.74–0.85 m) at Beccles to the direct effects of clearance of the on-site alder carr and subsequent use of some of this wood in the post alignment. The presence of coppiced alder stools on the site indicates the presence of carr which must have been cleared prior to the laying out of the alignment. The other fragments of roundwood from the debris field (see above) from trees with natural growth regimes presumably also derive from the clearance of trees from the floodplain at or shortly before 75 BC.

The wet–dry shifts indicated by the coleoptera were presumably related to hydrological processes connected to the River Waveney as well as autogenic changes within the peatland itself, although the precise chronology of these changes remains to be established. The contact between the silts and clays with the underlying peat to the north of the site is erosive, probably reflecting the effects of a positive sea level tendency (ie, rising relative sea level). An increase in marine influence would have resulted in the gradual landward transgression of estuarine conditions, submerging the former semi-terrestrial land surface with fine-grained silts, as evidenced by the thickening of the minerogenic unit immediately to the north of the site recorded by the auger survey (see above).

Whilst further work is required to clarify the chronology of floodplain sedimentation, a shift from freshwater peat to estuarine silt deposition similar to that observed at Beccles has been recorded at Stanley Carr just to the north-east of the site and dated to 1985±40 BP (Q-2184; 90 cal BC–cal AD 140) (Alderton 1983). It has been argued that the widespread accumulation of peats in Norfolk during the Iron Age reflects rising water tables (Wiltshire & Murphy 1999), while factors such as deforestation, increased precipitation and surface run-off, or rising base levels (influenced by eustatic sea level) may all have contributed to wetter conditions. A major marine transgressive stage has been identified in the Fenlands between 550 cal BC and cal AD 150, with estuarine silts being deposited as far inland as Redmere in north-west Suffolk (Waller 1994). It is unknown to what extent this event may also have

affected the Waveney valley, but it is possible that rising relative sea levels were responsible for the wetter conditions on the site reflected by the coleoptera samples from Unit 2 (see above).

The triple post row and the wood assemblage

It is clear that the majority of the large posts were obtained from managed oak woodland and hence sourced from dryland areas. Posts similar to the Beccles examples have been recorded from other sites including the Middle Bronze Age phases of Flag Fen (Pryor 2001), the Iron Age site of Fiskerton (Field & Parker Pearson 2003), and the Roman site at Barsham Marshes (see Fig. 1) 5 km upstream from Beccles (Krawiec *et al.* in press). The overriding factor for the posts used at Fiskerton was diameter of the raw material, as opposed to the age of the tree. Although only limited data are currently available from the dendrochronological analysis, the choice of posts at Beccles seems to have been driven by similar factors. The use of ‘overgrown coppice’ is notable, since there is increasing evidence for the use of this material in the Late Bronze Age and Early Iron Age (eg, Must Farm, Cambridgeshire and Alverstone, Isle of Wight: Bamforth 2008; Bamforth & Taylor 2008).

The dendrochronology shows the earliest trees at Fiskerton were felled in 456 BC and the last in 321 BC (at the earliest), representing a period of at least 135 years of construction and maintenance, with a minimum of nine phases of repair and consolidation identified across this period (Hillam 2003, 36). The longevity of the structure and the regularity of repair and consolidation at this site are also apparent in the ‘clusters’ of posts, many consisting of more than five posts and some having more than ten. In comparison, at Beccles post ‘clusters’ tend to consist of only one or two posts, with a single three post cluster, suggesting a shorter comparative life for this structure.

The Fiskerton timbers were dominated by short-lived oak roundwood used as vertical piles in clusters and rows but superstructure planks were recovered which dated to a later phase and provided 100–150 year tree-ring sequences with which to anchor the rest of the material. To date *c.* 150 stakes or piles have been analysed from this alignment with dates obtained for 85 of these. The dated samples complete to bark-edge form 20 different felling groups over a 116 year period. It is likely that additional repairs have not yet been identified, because of the use of unsuitable

material, the spatially localised nature of some repairs, or that repairs occurred beyond the robust part of the tree-ring sequence so far produced for the site (Field & Parker-Pearson 2003; Tyers 2002). Whilst it seems likely that the Beccles post row was also maintained and repaired, there is no evidence from the current data for the frequent major repairs at 5–7 year intervals implied at Fiskerton. However, despite analysis of an assemblage of samples less than 20% of the size of the Fiskerton material, the Beccles 75 BC felling group is already larger than all but one of the individual felling events identified at the former site.

The likelihood that Brushwood Feature 07 was constructed after 75 BC might also suggest that repair phases to the main structure may be ‘hidden’ within the current data. One of the undated timbers has bark-edge in the spring of its unknown felling year, but the undated samples include no fewer than 12 other timbers felled in the ‘winter’ of their felling years. However since ‘winter’ in tree-ring terms represents anything from leaf-fall in around October through to leaf-bud in or around March, then by the law of averages a proportion close to 50% of any randomly felled group would include timbers identified as ‘winter felled’ material.

It is also evident that none of the winter felled dendrochronological material cross-matches the 75 BC group, while all but one of the spring felled group does. This suggests that it is quite possible that the winter felled material represents a number of *ad hoc* small repairs to the structure. Unfortunately since none of these ‘winter felled’ undated sequences cross-match each other, there is no evidence for the spatial distribution of major repair events, nor any indication from these data as to how long the alignment might have remained in use.

The single mid/late 1st–early 2nd century vessel in Trench 1 is contemporary with pottery from several other sites further up the Waveney Valley such as Flixton and Barnham (Martin 1993, 15) which lies to the south-west in the Little Ouse Valley. The precise form of the activity on site represented by this pottery is a matter of speculation; it is possible the post row may have been partially collapsed or modified by this time and/or used in an entirely different manner to that during the late Iron Age.

The presence of halving lap joints on the timbers is very rare in prehistoric wood assemblages. Although several upright posts from Flag Fen (Taylor 2001) were jointed towards the pointed tips, this was

generally rare. The two abandoned ‘proto-notches’ on the Beccles jointed timbers suggests that the position of the halving lap was important for its use. The relatively short, small timbers housed in the joints seem to preclude their use as a support for a large timber superstructure. If this was the case, it would be expected that larger, jointed timbers would be married with the halving laps of the upright posts. It seems more likely that the joints and lateral cross bars were utilised either for insertion and/or stabilisation of the posts once in position.

There is no equivocal evidence that the posts ever supported a superstructure and only one item that could be classed as a ‘plank’ was found on site. This means that the large quantity of debris probably represents *in situ* woodworking associated with the initial construction, later repair of the post alignment, or a combination of the two. The analysis of the debris provides a picture of the woodworking taking place on the site, with much of the smaller material probably being derived from the cleaning up, trimming to length, pointing of ends, and fashioning of joints for the large posts of the alignment. The remainder of the debris is clearly derived from the working of timbers that were not represented in the excavated assemblage. Of particular note are the long, thin items of debris that are probably the streamers resulting from splitting and finishing of timbers, some of which were longer than the posts of the alignment.

The site in context

Traditional Iron Age studies (eg, Cunliffe 1991) have often largely ignored Suffolk and East Anglia, which might be due in part to the lack of hillforts in the region (Martin 1999). Existing settlement models from other areas may be inappropriate for East Anglia; whilst there are several examples of surveyed and excavated enclosed Iron Age settlements in the region (eg, Fletcher 2007; Martin 1993; 1998) the bulk of evidence from aerial photography, fieldwalking, and excavation, indicates that large open settlements and extensive field systems were a key feature of this period (Martin 1999; Boulter unpublished; Newman pers. comm.). In general, Iron Age settlement appears to have favoured the lighter sandier soils of the coastal Sandlings and the north-western Breckland areas, but excavations at aggregate extraction sites such as Flixton and Carlton Colville, and Broome in Norfolk (Robertson 2003), indicate

that the floodplain at these locations was significant throughout prehistory and into the Roman and Saxon periods.

The high Suffolk central claylands have often been regarded as having heavy soils that were unsuitable for prehistoric agriculture, but this picture is also beginning to be re-evaluated. Recent re-analysis of Suffolk's co-axial field systems (Martin 1999; Martin & Satchell 2008), which have been identified in the north-eastern part of the county including the area around Beccles, suggests that, although such land divisions and boundaries are likely to be of Saxon date, the distinctive layout of the roads and tracks can be traced back into the Iron Age. The morphology of these systems appears to reflect a pastoral farming regime suited to the heavy clay soils, although such indications of extensive and organised land management are somewhat at odds with the sparse evidence for associated settlement in these areas (Dymond & Martin 1988). Northern Suffolk also has clear distinctions in the distributions of material culture compared to the south of the county and hence the Waveney valley was thus not the boundary of later periods, but during the later Iron Age was in fact at the core of *Iceni* territory (*ibid.*).

Interpreting the site

The dendrochronological evidence indicates that the post rows were built in a single phase in 75 BC, suggesting that the triple row form was the intended one from the outset. The precise landfall of the alignment is unknown but if it extends across the full width of the floodplain this would represent a sizable monument with perhaps as many as 2000 posts along the projected *c.* 1 km to the current dryland edge. The form and function of the site otherwise remains somewhat enigmatic but there is evidence for activity during the Iron Age and Romano-British periods. Whilst there is no surviving indication that the posts ever supported a superstructure, analysis of the woodworking debris suggests that timbers larger than the surviving posts of the alignment were being split on site. However, it is unclear whether this timber waste material derived from a superstructure or represents something else entirely. The absence of any surviving above ground portion of the large posts may be relevant in this context, as a period of very dry conditions on the site must have resulted in the

subsequent rotting away of much of the timber exposed above contemporary ground level.

The general orientation of the post row along the edge of the river may suggest it was built as some form of water frontage, although the auger survey shows that the alignment was not immediately parallel to the river channel and hence the site cannot have functioned as a 'wharf' or river side revetment. Although the northern terminus of the site has not been identified, it is likely that, as the alignment heads towards the river, it defined a routeway across the floodplain to the eastern edge of the channel, possibly to a crossing or ferrying point. The site is at the narrowest part of the extant floodplain west of the current coast and, hence, at what was a relatively convenient access point to the river, despite the obstacle of the extensive floodplain. However, the practical function of the alignment as a means of transporting people or goods over the boggy ground of the floodplain depends very much on the presence or absence of a superstructure.

The monumental character of a triple row of posts of this form is notable and the site may not necessarily have been primarily or solely 'practical' in function. The alignment appears to have been carefully and deliberately set-out, and as such may be considered within the context of the planned co-axial field patterns in north-eastern Suffolk during this period (see above). The scale and form of the structure might recall the monumentality of earlier periods of prehistory and the 'elaboration' of other structures in the later Iron Age. The triple row of posts would have been visually striking both from the dryland and perhaps more significantly from the River Waveney itself. If the river provided an arterial trade and access route through *Iceni* territory during later prehistory, then the Beccles triple post alignment may have acted as a clear expression of territory and regional identity to any such river traffic.

A very similar triple post row dating to the later Iron Age–early Romano-British period has been excavated up stream at Barsham (see Fig. 1) (Krawiec *et al.* 2008; forthcoming) and a section of a third timber alignment site on the floodplain across the river from Barsham has also recently been excavated although not yet dated (Heather Wallis, pers. comm.). It thus appears that Beccles was just one of a complex of similar sites in the lower Waveney valley, although the precise form and function of all these structures remains frustratingly unclear.

CONCLUSIONS

The triple post alignment at Beccles was constructed in a single phase in 75 BC using predominantly oak timbers sourced from managed woodland. The alignment has been traced for nearly 100 m and was built across a reedswamp and alder carr dominated floodplain from the dryland towards the edge of the open channel of the River Waveney, which appears to have been in the heart of *Iceni* territory during the Iron Age. There are indications for human activity both before and after 75 BC, with evidence for possible repair and maintenance of the post clusters, while the presence of Roman pottery indicates that the site may have been used in this period, but the precise character and chronology of these events remains unclear. There is no unequivocal evidence that the post alignment supported a superstructure such as a raised platform or walkway, but it may have acted as a causeway or marked a routeway across the floodplain, providing access to and/or across the river. Finally, the monumental character of the alignment can be highlighted and as well as a practical function related to access, the site could have been intended to provide a clear indication of territory and identity.

Acknowledgements: Samples for radiocarbon dating, pollen and diatom analyses of Core 1 were carried out as part of the English Heritage funded 'Suffolk River Valleys Project Phases I and II' (Hill et al. 2008). Lisa Gray carried out the thin-section identification of wood samples. Thanks are due to Beccles Town Council, Paul Mitchlemore and Phil Catherall (Environment Agency), John Maloney, Christian Whiting (HALCROW/BESL), Drs Jane Siddell and Jen Heathcote (English Heritage), The Beccles Amateur Yacht Club, The Broads Authority, and the Institute of Archaeology students who excavated the site in 2006 and 2007, especially Will Swift, Ed Jackson, Emma Kitchen, Alex Selleck, and Pete Spencer. The publishers acknowledge with gratitude a grant from English Heritage towards the cost of publishing this paper.

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