# Late Bronze Age funerary practices and other activity at Pinden Quarry, Dartford

*by Chris Hayden, David Score and Tim Haynes*

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***SUMMARY***

Excavations at Pinden Quarry revealed a cluster of 31 small late Bronze Age pits, 16 of which contained deposits of cremated human remains. These burials form part of an increasingly clearly evidenced pattern of late Bronze Age burial in Kent which is generally characterised by small numbers of small deposits of cremated remains in small pits which appear to have been either isolated features or to have been associated with field systems. Analysis of the pits at Pinden Quarry suggests that whilst the area was used for activities involving burnt flint, charcoal and charred plant remains throughout the late Bronze Age (*c* 1200 to 800 cal BC), the cremated remains derive from just two brief episodes of activity. Funerary activity thus appears to have been one, episodic aspect of a wider range of longer term activities, and the relatively large number of deposits of cremated remains probably reflects in large part the accidental inclusion of cremated remains in pits rather than deliberate burial. The deposits of cremated remains cannot be precisely related chronologically to the ditches of a late Bronze Age field system, but overall, the activity related to the pit group began before the field system was laid out, and continued afterwards. A comparison of the pits and deposits at Pinden Quarry with those from other sites in Kent is presented. Overall, the results underline the apparently rather casual way in which cremated human remains were deposited in the late Bronze Age (compared to preceding periods), and thus raise the question of why the treatment of human remains had changed so markedly.

Alongside the late Bronze Age evidence, the excavations revealed parts of a Roman field system and five deneholes. Although the few finds from the deneholes indicate that they were post-medieval in date, the excavation provides little evidence to clarify their function.

# LATE BRONZE AGE FUNERARY PRACTICES AND OTHER ACTIVITY AT PINDEN QUARRY, DARTFORD

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## *INTRODUCTION*

This report describes the results of excavations carried out at Pinden Quarry. The most significant discoveries made during these excavations were a group of late Bronze Age pits, sixteen of which contained deposits of cremated human remains. These pits form part of an increasingly clearly evidenced pattern of later Bronze Age burial in Kent which is characterised by the deposition of often small quantities of cremated human remains in small pits. These pits usually occur either as single, isolated features or in small groups of two or three. The group of 16 such pits at Pinden Quarry is the largest so far identified, and a detailed analysis of the pits and their contents is therefore presented. The remaining late Bronze Age pits contained varying deposits of burnt flint, charcoal and occasionally fired clay, pottery and worked flint.

The excavations also revealed parts of a late Bronze Age field system, and, in the area of the main concentration of pits, a spread of burnt material. Activity in later periods was represented by part of a Roman field system and five post-medieval deneholes.

### *Site location*

The site is situated to the north-east of Longfield, near the junction of the B260 and the B255 (to the west of the railway line; Fig. 1). It lies on the north slope of an east-west aligned ridge which forms part of the dip-slope of the North Downs. The ridge line is marked by a hedgerow which defines the boundary between the parishes of Longfield to the south and Southfleet to the north.

The underlying geology of the site consists of Upper Chalk with deposits of the Thanet Beds (sands) and Woolwich Beds (clays, sands and loams) outcropping to the north, and river terrace gravels to the south (BGS sheet 271). The area is characterised by freely draining lime-rich loamy soils (ASE 2006).

### *Archaeological background*

Pinden Quarry lies to the south of an area which has been subject to a number of large archaeological projects related to developments including the construction of the HS1 Channel Tunnel Rail Link, the A2 Pepperhill to Cobham road-scheme, and the South Thames Development Route 4 (Booth *et al*. 2011; Allen *et al.* 2012; Wenban-Smith *et al*. in prep.; Andrews *et al.* 2011) as well as numerous other smaller projects (eg Simmonds *et al*. 2011; Mudd 1994; Philp and Chenery 2001; Philp 1998; 1984; Philp *et al.* 1998; Dawkes 2010). The local archaeology has been summarised and discussed in the volumes cited in more detail than is

possible here. The wider archaeology of Kent has also been the subject of a number of recent syntheses (Williams 2007; Ashbee 2005; SERF: http://www.kent.gov.uk/leisure_and_culture/heritage/south_east_research_framework.aspx). In this section, therefore, only brief comments on periods most relevant to the excavations at Pinden Quarry will be made.

The most significant evidence for Mesolithic activity in the area to the north of Pinden Quarry has been recovered from excavations in the Ebbsfleet Valley where a large early Mesolithic flint scatter was found at Springhead Town (Wenban Smith *et al.*. in prep.). The remaining Mesolithic finds in the area around Pinden largely consist of smaller numbers of pieces of worked flint, usually in residual contexts (Wenban Smith *et al.* in prep.; Garwood 2011). The distribution in the area to the north of Pinden Quarry is consistent with the wider pattern in northern Kent in which finds are relatively common on the Lower Greensand but more scarce on the Chalk (with the exception of a small concentration of find spots in the Darent Valley; Harding 2006).

Excavations in the Ebbsfleet Valley also provide significant evidence for early Neolithic settlement of the area (Wenban Smith *et al*. in prep.). This evidence includes a number of scatters of worked and burnt flint, animal bone and pottery (of which the Ebbsfleet type-site provides an example: Burchell and Piggott 1939) . The pottery consists predominantly of Ebbsfleet Ware, dating from the latter part of the early Neolithic, and little evidence for occupation in the earlier part of that period has been found. The only evidence for early Neolithic monuments in the area consists of an apparently isolated large ramped posthole found on the A2 (Allen *et al*. 2012) and a cropmark at Tollgate which might represent the remains of a mortuary enclosure (Bull 2006).

Evidence for the middle and late Neolithic is scarce, although a few pits associated with Grooved Ware have been found (eg Simmonds *et al*. 2011). The Beaker period and early Bronze Age is evidenced more widely. A number of ring ditches have been identified (eg Wenban-Smith *et al*. in prep.; Garwood 2011; Askew 2006), including a burial associated with amber beads set within a double ditched barrow at Whitehill Road (Bull 2006). At Northumberland Bottom, a possible flat grave containing two adults and a child associated with Beakers was found (Askew 2006). Pits from this period, sometimes associated with rich assemblages of Beaker pottery, have been found at a number of sites around Pinden (eg Allen *et al.* 2012; Bull 2006).

The middle Bronze Age marks the transition of burial away from its association with barrows to the more isolated contexts which characterise the late Bronze Age. Middle Bronze Age ring ditches, associated with both cremation and inhumation burials have been identified on the Eynsford-Horton-Kirby pipeline (Simmonds *et al*. 2012) and at the A2 Activity Area (Dawkes 2010). At both of these sites, however, as well at other sites which are discussed in more detail below (eg Allen *et al.* 2012; Wenban-Smith *et al.* in prep.; Simmonds *et al.* 2012), isolated cremation burials, dating from the middle and late Bronze Age were found which were not associated with ring ditches.

The middle Bronze Age also marks major changes in patterns of settlement and the organisation of the landscape. The earliest field systems in the region around Pinden date from this period (eg Mudd 1994;

Dawkes 2010; Allen *et al*. 2012), as do L-shaped enclosures, one of which, on the A2, was associated with a possible roundhouse, as well as pits, hollows and a cobbled trackway (Allen *et al*. 2012). Elsewhere, however, much of the evidence for occupation in the later Bronze Age is more fragmentary (eg Hutchings 2003; Davis 2006a; Bull 2006; Simmonds *et al*. 2011).

The Iron Age evidence from around Pinden Quarry is characterised by traces of a greater number of foci of settlement (Allen *et al.* 2012; Philp *et al*. 1998; Batchelor 1990; Askew 2006). Burial evidence from the early Iron Age is scarce, but human remains have been recovered from middle Iron Age pits and ditches (Allen *et al.* 2012).

Evidence for Roman activity is widespread. The town of Springhead (*Vaginiacae*), on Watling Street, must have formed the major local centre (Andrews *et al.* 2011; Biddulph 2006). A number of villas have been identified (Andrews *et al*. 2011; Philp 1984) and numerous smaller foci of settlement have also been found (eg Askew 2006; Allen *et al.* 2012). Evidence for the setting out of Roman field systems, enclosures and trackways is also widespread (eg Askew 2006; Bull 2006).

Evidence for occupation in the Anglo-Saxon period is more sparse, although sunken-featured buildings have been found on the A2 (Allen *et al*. 2012) as well as at Springhead and Northfleet (Andrews *et al.* 2012). The remains of three medieval settlements were also found along the A2 to the south of Dartford, consisting of ditched enclosures associated with sunken-floored buildings laid out along a hollow way (Allen *et al*. 2012). A late Saxon settlement, characterised by post-built structures and associated with enclosures and two ovens, was also identified at Northumberland Bottom (Askew 2006).

Longfield is mentioned in a charter of *c* AD 975, and Pinden is listed in a document of the same date associated with the granting of royal land, suggesting that it may have been a settlement of some importance (ASE 2006). Longfield, Southfleet and Pinden are all mentioned in Domesday book. The church at Longfield (St Mary Magdalene) was constructed in the 12th century.

The Kent Historic Land Characterisation Map shows that the site lay within open fields within the recent past. By the 19th century most of the landscape was arable (Whyman 2004; ASE 2006). Small scale exploitation of the chalk is evidenced across the landscape by deneholes. Numerous examples of these features were found during the excavations along the A2 to the south of Dartford (Allen *et al*. 2012). Lime kilns are also characteristic features found in the area, one example of which is located just to the west of the site (ASE 2006). The hedgerow forming the southern boundary of the site corresponds to a pre-1850 parish boundary and forms an integral part of a pre-1845 field system (ASE 2006).

### *Phases of investigation*

The excavation was carried out prior to the extension of Pinden Quarry to the north. Several phases of archaeological investigation, including landscape, hedge, and metal-detector surveys, as well as test pitting, were used to evaluate the site in April to May 2008 before the excavation took place (Brady *et al*. 2011).

The excavation itself was carried out in two phases (Fig. 2). The first phase, which took place between June and August of 2008, covered the northern half of the site; the second phase, which took place between March and May of 2011, the southern. In total, the excavation covered a roughly rectangular area up to 340 m east-west by up to 200 m north-south, covering an area of around 5 hectares, although a narrow strip between the two areas remained unexcavated for safety reasons.

The main cluster of late Bronze Age pits, including all of those containing cremated remains, was found during the Phase 1 excavation near to the southern edge of the excavated area. The area of the Phase 1 excavation was extended twenty metres further to the south in the area of these pits in order to determine whether the cluster extended further in that direction. Although a small number of late Bronze Age pits were discovered in the extension, no further deposits of cremated remains were found.

### *Excavation methodology*

The whole site was stripped under archaeological supervision, using a mechanical excavator with a wide, flat toothless bucket, in two passes, the first removing the topsoil, and the second, the lower deposits down to top of a buried ploughsoil (5008). After the site had been stripped it was cleaned by hand and all features were planned using a total station. Initial excavation by hand was focused upon the intersections of features, sections of ditches, and sample excavation of pits and other individual features. A minimum sample of 10% of each ditch was excavated, but where no finds were recovered, additional slots were excavated. All pits were half-sectioned, but again where no finds were recovered, the second half of the pit was excavated. Pits thought to contain cremated remains were fully excavated, and were sampled in their entirety. Samples of 40 litres were taken from each ditch, and a minimum of 50% of any burnt deposits in pits were sampled. Finds were recovered by hand and bagged by context. Finds of special interest were given their own unique small finds number. Finds from the metal-detector survey were also given unique numbers.

The deneholes were excavated using a specific methodology. The shafts were first half-sectioned by hand to a safe depth. From this point, the shafts were excavated by machine, under archaeological supervision, until gallery entrances were identified. A temporary survey station was then set up so that a reflectorless EDM could be used to create a plan and section survey of the entrances of the galleries and where possible their sides and roofs. The roofs of the galleries were then removed by machine, the galleries were cleared, and their floors and sides were surveyed. The floors and walls of the galleries were checked for tool marks, and numerous photographs were taken.

## *THE EXCAVATION*

### *Site stratigraphy and truncation*

Above the chalk which formed the natural geology, sequences of other deposits were found in certain parts of the site. The most extensive of these was a mixed clay deposit (5092) which overlay the chalk in the northern half of the excavation and in the middle of the southern half. In the northern half of the excavation, an area of this clay to the west of the centre of the site was overlain by a light yellow brown clay silt colluvial deposit (5057). Almost all of the late Bronze Age features and many of the Roman features were cut into this colluvial deposit (5057), but some, in areas beyond the colluvial deposit, cut only the clay deposit (5092). In the areas where the chalk was found directly below the topsoil, only a small number of features, of Roman or more recent date, were identified. The clay layer in particular thus appears to provide an index of the extent to which the site has suffered from truncation. Whilst the limited extent of the clay deposit in the southern half of the site suggests that this area had suffered more severely from truncation than the northern half, and that some archaeological features may not have survived, the paucity of features in the eastern half of the northern area cannot be explained in the same way, and appears to reflect a genuinely lower density of archaeological features.

Even in the areas of the site where archaeological features had survived, it seems likely that many had suffered to some degree from truncation. The segmented character of some of the Roman ditches may well be a product of the truncation of the site rather than reflecting their original form. A series of modern furrows or ruts, running north-south through the middle of the site, provides a further indication of the disturbance from which the site has suffered.

It would be wrong, however, to exaggerate the extent to which the site has suffered from truncation and disturbance. The survival of a spread of burnt late Bronze Age material (5033; Fig. 5) in the area of the main concentration of late Bronze Age pits indicates that in parts of the site at least, relatively ephemeral evidence has survived.

Many of the late Bronze Age and Roman features as well as some of the post-medieval deneholes in the central part of the northern area were sealed by a buried ploughsoil (5008) which may have afforded them some protection. The fact that this ploughsoil covers the deneholes, however, indicates that it was worked and only became buried at a relatively recent date.

### *Activity before the late Bronze Age*

The only evidence for activity on the site prior to the late Bronze Age was provided by probably residual sherds of early Neolithic and Beaker pottery and a small number of pieces of residual Mesolithic or Neolithic flint (Fig. 3).

*The Neolithic*

A few small sherds suggest that there may have been activity on the site in the early Neolithic (Fig. 3). Of these sherds, three (weighing just 6 g) were recovered from a denehole (5202) and were clearly residual. A further sherd in the same, flint-tempered fabric was recovered from a tree-throw hole (5219). Its relationship with the feature is, however, uncertain. Because surface finds may become incorporated into tree-throw holes when the tree falls or as a result of subsequent erosion into the tree-throw hole, it is impossible to be certain of their association with the feature (unless they have clearly been deliberately deposited). Tree-throw hole 5219 also contained a large quantity of burnt, unworked flint and some charcoal. The tree-throw hole itself showed no signs of having been burnt, and no burnt flint was recovered from a nearby section (5217) through a Roman ditch (5312). It therefore seems likely that this flint was deliberately deposited into the tree-throw hole. As is discussed in more detail below, most of the burnt flint on the site was recovered from late Bronze Age features (although there were also substantial quantities from two other undated tree-throw holes (5222 and 5233)). Whilst burnt flint is not, of course, chronologically diagnostic, its strong association with late Bronze Age features at Pinden Quarry at least raises the possibility that features which cannot be dated in any other way, but which contained burnt flint, belonged to that period.

A small number of residual pieces of flint also suggest limited activity in the Mesolithic or Neolithic. These pieces include a fragment of a polished stone tool and a notch from the post-medieval ploughsoil (5008=5011) which covered much of the centre of the northern part of the site, a possibly Mesolithic blade from one of the late Bronze Age cremation pits (5048), and Mesolithic or Neolithic cores from a late Bronze pit (6003) and from a cut (6009) across a late Bronze Age or Roman ditch (6015).

*The Beaker period*

A single small Beaker sherd (3 g) in a grog-tempered fabric, decorated with chevrons, provides the only other evidence of activity prior to the late Bronze Age. The sherd was recovered from a small circular pit or posthole (5211), 0.32 m across and 0.30 m deep, with steep sides and a concave base. The pit was cut by the late Iron Age/early Roman enclosure ditch (5312) but cut a larger pit (5209). Pit 5209 is undated, but did contain burnt unworked flint. It is, then, possible that pit 5209 dates from the late Bronze Age and that the Beaker sherd was residual.

***Late Bronze Age activity***

The late Bronze Age evidence (Fig. 4) can be divided into three components. The most significant of these was the group of 31 pits which lay towards the western side of the site, 16 of which contained cremated human remains (Fig. 5). The remaining 15 pits in this group contained varying deposits of charred plant remains, charcoal and burnt unworked flint as well as small numbers of other finds. A series of ten radiocarbon dates were obtained from these pits. One result, on possibly intrusive hazel roundwood in pit 5118, unexpectedly gave a result in the Anglo-Saxon or early medieval period (cal AD 1010-1160 (95.4%

probability); SUERC-44514: 972 ± 29). The others suggest that the activity represented by the pits continued throughout the late Bronze (*c* 1200 cal BC to *c* 800 cal BC), perhaps beginning at the end of the middle Bronze Age, but that most of the cremation deposits date from a much narrower period (*c* 990-930 cal BC) and could all have been contemporaneous except for one example which was later in date.

The second component consisted of several stretches of ditch, more or less clearly dated to the late Bronze Age, which may have formed parts of a field system. Many of the pits in the group just mentioned were distributed along one of the ditches forming part of this field system. One pit appeared to be cut by this ditch, but another appeared to cut the ditch. It thus appears that the ditch was cut during the period of activity represented by the pits.

The final component consisted of a small number of further pits which were scattered widely across the site.

### *The main concentration of late Bronze Age pits*

#### *Spatial distribution*

The main concentration of late Bronze Age pits (Table 1; Fig. 5) were distributed in a roughly Y-shaped pattern - with the tail of the Y extending roughly east-west along the line of a field system ditch (forming the ditch group of pits) and two extensions to the north-east and the south-east (forming the north-eastern and south-eastern groups of pits).

The density of the pits in these three subgroups varied. The pits in the ditch group formed a quite dense cluster, consisting of 22 pits in an area measuring around 15 m by 3 m (*c* 0.5 pits/$m^2$), whilst the four pits in the south-eastern group were spread over an area measuring roughly 7 m by 2.5 m (*c* 0.2 pits/$m^2$), and the five pits in the north-eastern group were spread over an area of around 12 m by 5.5 m (less than 0.1 pits/$m^2$).

#### *The size and shape of the pits*

All of the pits were relatively small, and in particular shallow, roughly circular or oval features (Figs 5-8; Table 1). Their depth never exceeded 0.30 m, and the shallowest was only 0.04 m deep. Their width varied slightly more, from 0.20 m to 0.94 m. With the exception of three outliers, however, there was a quite strong linear relationship between the depth and the maximum width of the pits (r = 0.69). The three outliers (pits 5120, 5118 and 5348) were all wider than would have been expected for their depth.

There was some patterning in the distribution of pits of differing sizes. Of the three outliers, two were in the north-eastern group and one was in the south-eastern. The remaining pits in these two groups, although they fit broadly within the general linear trend exhibited by most of the pits, were all quite small, all being

less than 0.15 m deep and all but one being less than 0.5 m wide. Otherwise, the largest pits all belonged to the ditch group of pits.

There was also some indication of relationships between the size of the pits and the kinds of finds they contained which are discussed in more detail below.

*The finds from the pits: charcoal, burnt flint and cremated human remains*

The categories of finds most frequently recovered from the pits were cremated human remains, charcoal and burnt, unworked flint (Table 2). Aside from these categories, the numbers of finds were very small, but did include a few sherds of late Bronze Age pottery, a few fragments of amorphous fired clay, and some worked flint. None of the pits showed any signs of having been burnt themselves, and the charcoal, burnt flint and cremated remains they contained thus appear to have derived from fires which burnt elsewhere, perhaps simply on the ground surface. Experiments carried out by Canti and Linford (2000) suggest that it is unlikely that any such fires may not have left any direct archaeological trace on the underlying subsoil layers.

The three main categories of finds occurred in very different quantities in particular pits. The patterning in their distribution, along with the differences in the volume of the pits, has been analysed using correspondence analysis (Fig. 9). Correspondence analysis is a robust technique which allows individual pits to be classified according to the types of finds with which they were associated (Bolviken *et al.* 1982). The artefacts were all quantified by weight, and the data was standardised so that the size of each assemblage was expressed as a fraction of the largest assemblage (with the largest assemblage thus scoring 1). The analysis was run several times, excluding more or less extreme outliers, and removing the volume of the pits as a variable. Each run, however, produced very similar results. The results presented in Figure 9 include all of the pits but excludes volume. Since only three variables are involved, the results of the correspondence analysis are straightforward. The first axis differentiates between pits with large deposits of cremated remains and those without, and the second axis between pits containing large proportions of flint and pits contained large proportions of charcoal.

On the basis of these results, the pits have been divided into three groups, each consisting of pits in which one of the categories of finds predominates (Table 2). The quantities of each of the three main categories of finds in these groups are shown in Figure 10. In addition, the analysis identified one exceptional pit - 5101 - which stood out from all of the others. This pit was characterised by the presence of almost equally large proportions of all three categories of finds. Overall, then, the analysis stresses the fact, that although most of the pits contained more than one of the main categories of finds, except in the case of pit 5101, one category of material predominated. This is reflected in Figure 9 by the blank area around the origin (within which pit 5101 falls), and the more or less clear clustering of the pits around the ends of each axis (especially the areas representing pits in which burnt flint and charcoal predominated).

Although, because only three variables have been included, the overall patterning is perhaps unsurprising, given the extent to which the three categories of finds occur together, the absence of any more evenly mixed assemblages other than pit 5101 is unexpected. Table 3 summarises the numbers of fills which contained cremated remains, burnt flint and charcoal, and the numbers of fills in which combinations of these three groups of finds were found. (All of the pits contained only single fills, except for pit 5120, within which two fills were distinguished.) Charcoal occurred in all of the pit fills, burnt flint in 22 fills and cremated remains in 16. Since charcoal occurred in all of the fills, it was the only category which occurred on its own - although this accounts for only four of the pits. Ten of the pits, in fact, contained all three categories, 12 contained flint and charcoal, and six cremated remains and charcoal. Overall, then, most of the pits contain two or more categories of finds, but in only one pit (5101) is there anything like an even mixture of all three (although two of the other pits in which cremated remains occur - pits 5088 and 5058 - were mixed to some extent). The extent to which the three main categories of finds were mixed in the remaining pits is very limited (ie pits containing large quantities of burnt flint generally contained only small quantities of charcoal or cremated remains etc).

Overall, then, although it appears that many of the pits contained small quantities of background material (perhaps finds which were left stray on the surface of the site), the pattern of deposition suggests that the pits do not contain random assortments of material (such as might be expected if they had been backfilled from mixed surface midden deposits) but that in most cases, more or less specific groups of material - cremated remains or burnt flint or charcoal - were deposited in particular pits. Since the character of the activity related to the pits is uncertain it is difficult to be more specific about the processes that created this pattern. The more widespread distribution of charcoal is perhaps not surprising since charcoal would no doubt have been produced both by the process of cremation and by the heating of the flint. The limited extent to which charcoal was mixed with the other finds, and the extent to which it dominates other assemblages is, therefore, striking. It is possible that charcoal was also generated by a further set of activities which were not related either to the burnt flint or to the cremated human remains. It is also possible, however, that particular kinds of material were selected from originally more mixed deposits for deposition in the pits.

Analysis of the relationships between different types of finds, and the quantities of finds and the volume of the pits, provides further evidence for differences in the way in which the three main categories of finds were deposited.

*The burnt spread*

At this stage, however, it is worth noting the discovery of a spread of burnt material (5330) which lay within the area of the ditch group of pits (Fig. 5). The spread consisted of an irregular deposit, 1.5 m wide and 0.05 m deep, of dark grey brown sandy clay which contained small amounts of charcoal and burnt flint as well as one of the largest groups of late Bronze Age pottery recovered from the site (26 sherds/66 g). Again, there was no indication that this material had been burnt *in situ.* One possible interpretation of this spread is that it derives from disturbance of late Bronze Age pits which have otherwise not survived. The absence of similar spreads in other areas around the late Bronze Age pits, however, suggests that it is more

likely to represent the the remains of surface deposits (or of deposits from a very shallow feature) which have been fortuitously preserved in this location. This interpretation could provide an explanation for some features of the distribution of finds in the late Bronze Age pits. Whilst it has been stressed above that there was relatively little mixing of the three main categories of finds in the pits (ie that generally one category of material predominated), it was also noted that the pits often contained small quantities of other material. It is possible that these small quantities derive from scatters of surface material which became accidentally incorporated into the pits as they were being filled with other finds. This interpretation would imply that although it appears that some of the pits were deliberately filled with a particular type of material, the process was quite messy and that no great effort was made to remove all of the material - including in some cases cremated human remains - from the ground surface.

*Correlations between the main categories of finds and the volume of the pits*

Not surprisingly, given the generally low level of mixing of finds of different kinds, there are no clear correlations between the quantities of the main categories of finds in the pits. The correlation between the quantities of cremated remains and of burnt flint is -0.03, between cremated remains and charcoal it is -0.01, and between burnt flint and charcoal 0.31.

Although there were no clear correlations between the three main categories of finds, there were significant correlations between the volumes of the pits and the quantities of burnt flint and of cremated remains which they contained. There also appear to have been relationships between the volume of the pits and the categories of finds assemblages (as they were defined by the results of the correspondence analysis).

Figure 11 shows the weight of burnt flint in relation to the estimated volume of the pits. (The volume of the pits was estimated on the basis that they were hemi-ovoidal.) Although there appears to be little clear patterning amongst the smaller pits, and most of the larger pits contained more burnt flint than the linear regression line suggests, overall there is a correlation of 0.76 between the two. (It is important, however, to note that pits containing no burnt flint have been excluded from this calculation. The correlation thus applies not to the group of pits as a whole, but only to those which actually contained burnt flint.)

Whilst in the case of the burnt flint there are no very clear outliers from the linear trend, in the case of cremated remains (Fig. 11), the three pits containing the largest groups of cremated remains clearly stand out as outliers. (These three pits include all except one of the pits placed in the cremation group by the correspondence analysis: pits 5314, 5106 and 5058; the exception is pit 5088). If these three pits are removed from the analysis, there is a correlation between the quantities of cremated remains and the volume of the pit equally as strong ($r = 0.77$) as that between the burnt flint and the volume of the pits.

In contrast to the burnt flint and the cremated remains, the estimated quantity of charcoal in the pits shows no correlation with the volume of the pits (Fig. 11). Even if the clearest outliers (which consist of the mixed assemblage in pit 5120 and the pits with the largest quantities of charcoal) are removed from the analysis, the correlation remains very weak ($r = 0.12$).

Comparison of the quantities of the three main categories of finds with the volume of the pits thus suggests differences in the processes of deposition involved in each case. The most striking is perhaps the pattern in the quantities of cremated remains. Whilst overall, the quantity of cremated remains was correlated with the size of the pits, there were three clear outliers from the general linear relationship. These three outliers all contained much larger quantities of cremated remains than the linear relation would suggest should be present. It thus seems likely that the outliers consist of deliberate burials of cremated remains, whilst the other deposits consist of small, stray, residual groups of cremated remains.

*Other finds from the pits*

The only other finds recovered from the pits (Table 2) were a small number of very small sherds of probably late Bronze Age pottery, a small number of fragments of fired clay, small numbers of pieces of worked flint, and charred plant remains (other than charcoal). There are few clear patterns in the distribution of these finds, although some trends can, perhaps, be discerned.

Perhaps the most interesting pattern is in the distribution of charred plant remains. The charred plant remains from samples from ten pits were analysed. The overall sample used for the analysis of charred plant remains is thus too small for much significance to be attached to it. Furthermore, the overall number of finds is small. Nonetheless, it is striking that cereal chaff was recovered only from pits in which burnt flint predominated, and that potentially edible species other than cereals - which consist of pea, vetch/pea, blackthorn/sloe, hawthorn, blackberry and hazel nutshell - were more common in the pits in which charcoal predominated (Fig. 12; Table 15).

The remains of charred cereal grain - consisting of wheat, barley and oats - were found in all kinds of pits, but were noticeably rare in the pits in which cremated remains predominated.

Of the other finds, worked flint was more commonly represented in the pits in which burnt flint predominated and fired clay in the pits in which charcoal predominated. Pottery appears to have been evenly if very thinly distributed amongst all of the pits.

*Spatial patterns in the distribution of finds*

Overall, there is little clear spatial patterning in the differing finds assemblages (Fig. 5). Although the north-eastern group of pits consists entirely of pits in which charcoal predominated, and the assemblages from all but one of the south-eastern group of pits were dominated by flint (the one exception being dominated by charcoal), the ditch group contained a mixture, in little apparent order, of all kinds of assemblages. All of the deposits dominated by cremated remains were in the ditch group, but they were distributed along almost its entire length.

There were, however, some indications of spatially patterning in the types of charcoal recovered from the pits (Fig. 13). The charcoal in the pits at the east end of the group was almost entirely oak, whilst in those at

the eastern end Pomoideae charcoal predominated, except, conspicuously, in the case of the pits in which cremated remains predominated (and one other exceptional pit (5090)). Pits in the middle of the group tended to have more evenly mixed assemblages of charcoal.

The fact that the pits containing large groups of cremated remains at the eastern end of the pit group (pits 5106 and 5088) contained predominantly oak charcoal (in contrast to the other pits in this area in which Pomoideae charcoal predominated) again underlines the apparent separation of the pits with large deposits of cremated remains from the other pits. This separation is also underlined by the chronology of the cremation deposits suggested by radiocarbon dating.

*The chronology of the pits*

A series of 10 radiocarbon dates were obtained from the main group of late Bronze Age pits (Table 4; Figs 14-15). The main aim of the dating programme was to clarify the chronology of the deposits of cremated remains, and, in particular, to assess whether the apparently large number of deposits, reflected sporadic burial over a relatively long period of time, or a relatively large number of burials within a short period. The second aim was to establish the chronological relationship between the pits which contained cremated remains and those which did not. Samples were thus taken from six pits containing cremated remains and four pits without, with the aim of spreading the samples so as to cover, as far as possible, the full spatial extent of the group and as much variation in the contents of the pits as possible.

The dates for the pits containing cremated remains were all obtained from cremated human remains; those for the other pits from a range of short-lived charred plant remains (Table 4). Whilst the samples were taken insofar as was possible from large deposits of material which seemed unlikely to have been residual or intrusive, in order to obtain samples from as wide a range of pits as possible it was necessary to take some samples from pits which only contained small quantities of cremated remains or charred plant remains. In these cases it is impossible to be certain that the finds were not residual. One date on hazel roundwood from pit 5118 unexpectedly gave a result of cal AD 1010-1160 suggesting activity in the late Anglo-Saxon or early medieval period. No other evidence for activity in this period was recovered from the site, and it is thus difficult to account for this anomalous result other than to suggest that it reflects the presence of intrusive material in this pit. Pit 5118 has, as a result, been excluded from the analyses presented above. The remaining dates, however, all fall into the late Bronze Age, and even if in some cases it is impossible to be certain that the dated material was contemporaneous with the pits in which it was found, they can still be taken as providing good dates for the funerary and other activity on the site.

An attempt has been made to refine the dates using Bayesian statistics as they are realised in OxCal (v4.2; Bronk Ramsey 2009), using the IntCal13 calibration data (Reimer *et al*. 2013). The model utilised is shown in Fig. 14 and Table 4. Since all of the dated pits belong to a single spatial cluster it has been assumed that they all derive from a single phase of activity and that the nine dates obtained from them are distributed randomly within that phase. Within the overall phase of late Bronze Age activity, the dates from cremated remains were initially combined into a subphase so that estimates could be obtained of the dates at which

burial began and ended. One of the dates, however, from a cremation deposit (in pit 5101) showed very poor agreement with this initial model, and in the second model, the results of which are described here, it was removed from the cremation subphase. The three dates from other (ie non-cremation) deposits were similarly grouped into a second subphase within the overall phase of late Bronze Age activity. No assumptions have been made about the order of the dates within each subphase nor about the chronological relationship of the two subphases, other than that they both form parts of a single larger phase of activity. The second model has a good level of overall agreement ($A_{model}$ = 96.7' $A_{overall}$ = 92.7), although it is worth noting that the date from pit 5348 - the earliest date obtained from the group of pits - has an agreement index of just 60.2.

The dates fall into a quite clear pattern. The dates obtained on charred plant remains (from pits which did not contain cremated remains) span a period which approximates to almost the whole of the late Bronze Age, beginning 1220-1050 cal BC (68% probability; 1350-1010 at 95% probability), and ending 970-830 cal BC (68% probability; 1020-700 cal BC at 95% probability; Figs 14-15). The three dates on charred plant remains all came from pits in which burnt unworked flint was the predominant category of finds.

In contrast, five of the dates obtained from cremated remains gave results which are identical in the model, falling in the period 990-930 cal BC (at 68% probability, and 1010-920 cal BC at 95% probability). These five dates pass a $\chi^2$ test test, indicating that they could all have been contemporaneous ($\chi^2$ test: df=4 T=7.1 (5% = 9.5)).

The one remaining date from cremated remains falls into a later range of 920-840 cal BC (68% probability, and 980-820 cal BC at 95% probability). It is worth noting that this later date comes from pit 5101, which has already been singled out in the analysis above as the only pit which contained a relatively even mixture of cremated remains, charcoal and burnt flint.

*Episodes of activity involving cremation burial*

Overall, then, the dates indicate that whilst activity occurred in the main group of pits throughout the late Bronze Age, the cremated remains appear to be the product of just two relatively brief episodes of activity (Fig. 15). The relatively large number of cremation deposits at Pinden Quarry (compared to other sites in Kent) does not, therefore, reflect the sporadic occurrence of cremation over a long period, but rather derives from probably just two brief episodes of cremation. One of these episodes is represented by the finds from just one, exceptional pit (the mixed assemblage from pit 5101). The dates for the other episode derive from the three largest groups of cremated remains (in pits 5314, 5106 and 5058, all of which belong to the group of assemblages dominated by cremated remains) but also from two very small deposits (in pits 5050 and 5114). These last two pits both belong to the group of assemblages which were dominated by charcoal. In the light of the analysis of the pits presented above, it seems likely that the relatively large number of pits containing cremated remains at Pinden Quarry reflects the incorporation of small quantities of stray cremated remains from the first episode of cremation into later pit fills, and is thus the product of the fact that the cremation deposits at Pinden Quarry occurred in an area that was also used for other activities. At most, it seems that five deposits (and perhaps just four) represent deliberately buried deposits of cremated remains.

The total quantity of cremated remains recovered from the first episode of cremation amounts to 1603 g. Whilst this is lower than the total which could be obtained from the cremation of a single individual (up to 3600 g: McKinley 1993), the remains include those of an adult (probably around 25-45 years old) in pit 5314, of a child (probably less than 15 years old) in pit 5106, and possibly of a younger adult in pit 5058. The remains from this phase thus derive from at least two individuals and possibly more. It is worth noting that the cremated remains in two of the undated deposits (in pits 5089 and 5091) may derive from an infant or very young child, and another undated deposit in pit 5086 probably represents a child or adolescent of over 5 years, possibly adding a further two individuals to this total. Combined with the later burial (in pit 5101), this gives a minimum total of 6 individuals. Whilst this still makes this group the largest collection of late Bronze Age cremation burials in Kent, it does make the difference in size much less striking than the initial figure of 16 deposits.

*Other late Bronze Age pits*

A total of eight other pits and three tree-throw holes were found in other parts of the site which might also have dated from the late Bronze Age (Table 5). These features were widely scattered across the site, and all occurred as apparently isolated features (rather than forming groups; Fig. 4). All of them were small features. Their dimensions fell broadly within the range of those of the main groups of late Bronze Age pits, and they had similar bowl- or saucer-shaped profiles. The one exception to this was feature 5013. This feature extended beyond the western edge of the excavation, and could have been a wide (but shallow) pit or the end of a ditch. Whatever the case, it measured 2.6 m across and was thus much wider than any of the other features. It was also distinguished by the large assemblage of worked flint it contained.

The dating evidence for these features was slight. Five of them contained late Bronze Age pottery, but in three cases this consisted of no more than single sherds, and it is impossible to be certain that it was not residual. Alongside the pottery, four of the pits contained burnt, unworked flint, which might be taken as further proof that they date from the same broad phase of activity as the main group of late Bronze Age pits. Charcoal, however, was noted in only one of the pits. Pit 6011 did not contain any burnt flint or charcoal, but did contain burnt sediment. The remaining finds consisted of a quite large group of fired clay fragments in one pit, and a single fragment in another, and three pieces of worked flint: two flakes and a blade core.

The small assemblages of finds from these pits provide little indication of the uses to which they were put, and their chronology remains uncertain. They do, however, provide some evidence to suggest that late Bronze Age activity was distributed widely, albeit very sparsely across the site, beyond the main group of late Bronze Age pits.

*The late Bronze Age field system*

The only remaining features which probably date from the late Bronze Age were a number of sections of ditch which, together, may have formed part of a field system (Fig. 4).

The chronology of the ditches is, in many cases, uncertain. Late Bronze Age pottery was recovered from three ditches (Table 6): ditch 5313, which ran for 70 m, just off east-west, through the main group of late Bronze Age pits; ditch 5344, which extended roughly north-south for 13 m to the south-west of the late Bronze Age pits, roughly perpendicular to ditch 5313; and ditch 5230, which again ran roughly north-south for a distance of around 15 m, but which lay 80 m away from the other ditches (to the north-east). Given the presence of Roman ditches in the same area, it is difficult to have much confidence that the pottery is not residual.

The stratigraphic relationships of the first ditch (5313) with two of the pits in the main group of late Bronze Age pits, however, provides further proof that the ditch dates from the late Bronze Age. The ditch appeared to cut pit 5278 but was cut by pit 5082. Neither of these pits was dated using radiocarbon, and the chronological relationship between the ditch and the period over which the group of pits formed cannot, therefore, be defined with any precision. The stratigraphic relationships nonetheless suggest that ditch was cut at some point within the period in which the pit group formed.

Together, the three ditches containing late Bronze Age pottery suggest that the field system of which they may have formed a part was laid out on roughly east-west and north-south alignments, ditch 5344 lying roughly at right-angles to ditch 5313, and ditch 5230 lying on roughly the same alignment as ditch 5344 (although ditch 5313 curves slightly towards the south). These three ditches were, however, of very different sizes (Table 6; Fig. 19). Ditch 5313 was a relatively narrow (up to 1.0 m wide) and shallow (up to 0.3 m deep) feature, but ditch 5344, was much wider (up to 2.0 m) but still very shallow (up to 0.1 m), and ditch 5230 was again wide (up to 1.9 m) but much deeper (up to 0.7 m). In part the differences in depth might be a product of the differing extent to which the site has suffered from truncation. It is, however, much more difficult to explain the differences in width in the same way. The two deeper ditches (5230 and 5313) had quite steep sides and concave bases in profile. The remaining, shallower ditch (5344) had much shallower sides and a more or less flat base.

The finds from the ditches (Table 6) were comparable to those from the late Bronze Age pits, consisting of small quantities of pottery, burnt flint (which was recovered in large quantities only from cut 5166 across ditch 5313), and a small number of pieces of worked flint.

Given that the dating evidence for some of the other ditches, attributed here to the Roman period, is equally weak, it is possible that further ditches also dated from the late Bronze Age. Ditch 5334=6036, for example, has been assigned to the Roman period on the basis of its relationship with ditch 5165 and enclosure 5312. The only finds recovered from ditch 5334=6036, however, were a single sherd (17 g) probably of late Bronze Age date, a fragment of animal bone, 8 pieces of worked flint, and burnt flint (109 fragments/56 g), and it could be argued that this ditch was also of late Bronze Age date. Similarly, ditches 5342 and 6015 lie at right angles to late Bronze Age ditch 5313 and contained few finds which give no clear indication of their date (8 piece of worked flint and 11 fragments (132 g) of burnt flint in ditch 5342 and 2 fragments (4 g) of fired clay, 3 pieces of worked flint and 7 fragments (212 g) of burnt flint in ditch 6015). The extent of any late Bronze Age or Roman field system is, therefore, uncertain. Residual late Bronze Age

pottery was also recovered from a late Iron Age/early Roman enclosure ditch (5312, cut 5289), and from a further ditch of uncertain date (5335, cut 5200).

## *Discussion: late Bronze Age funerary and non-funerary activity at Pinden Quarry in context*

### *Introduction*

As has been noted above, the main cluster of late Bronze Age pits at Pinden Quarry contained the largest group of pits containing cremated human remains of this date so far identified in Kent. This discussion will focus primarily upon the contribution these pits can make to our understanding of the tradition of late Bronze Age cremation burial in Kent. The association of the pits containing cremated remains with other pits at Pinden Quarry is unusual and provides a significant element of their context, and, like the association of the pits with a ditch which may have formed part of a field system, must also be taken into consideration.

Here it will be suggested that the finds from the late Bronze Age pits at Pinden Quarry derived from a range of activities. The precise character of those activities remains obscure, although some involved heating flint, and all seem to have produced charcoal. The pit group represents activity which continued throughout most of the late Bronze Age. During this period of activity at least two episodes of funerary activity took place, involving the cremation of at least six individuals. Rather than being the product of an exceptionally large number of burials, the relatively large number of pits containing cremated remains at Pinden Quarry appears to reflect the fact that the burials took place within an area where other activity occurred, and that small quantities of cremated human remains became incorporated into the fills of later pits. The deposits of cremated remains are of very differing sizes. Only one consists of a large deposit which was clearly intentionally deposited. Although there are between two and four other deposits which might also be classified as deliberate deposits, it is difficult to make a clear distinction between deliberate and residual deposits. Whatever the case, it seems that the variation in the size of the cremation deposits reflects an absence of clear ritual procedures concerning the deposition of cremated remains, and may instead reflect a quite casual attitude to the recovery of cremated remains from the pyre and to the burial of those remains. It is suggested below that this was related to a broader de-ritualisation of the final stages of funerary rituals which occurred in the middle and late Bronze Age.

### *The formation of the pit group as a whole*

The radiocarbon dates show that the main scatter of pits formed over a period of several centuries, probably spanning most of the late Bronze Age. Analysis of the finds from the pits suggests that, despite broad similarities in size and shape, differing pits were related to differing forms of activity (or at least different patterns of deposition). The spatial distribution of the pits suggests that the pits associated with

differing activities had slightly different but overlapping distributions. Overall, then, the group of pits appears to have formed as a palimpsest over time, resulting from a range of activities.

*Non-funerary activities related to the pits*

The character of the activities related to most of the pits unfortunately remains unclear. These activities variously left deposits of burnt unworked flint and of charcoal, and occasionally charred plant remains, alongside very small quantities of other finds. Whatever the character of these activities, in most cases they do not appear to have had any clear association with funerary rites.

Whilst the range of finds associated with the pits is quite limited, and suggests some coherence in the range of associated activities, the general lack of mixing of the three main categories of finds suggests that the pits were related to differing tasks (or perhaps to differing stages of a sequence of related tasks).

The suggestion of diversity in the activities related to the pits is supported by differences in the patterns of deposition. Whereas the quantities of burnt flint in the pits were correlated with the volume of the pits, there was no such correlation in the case of the charcoal. Patterns in the distribution of differing kinds of charcoal and of charred plant remains suggest further differences in the activities related to the pits. Cereal chaff was recovered only from pits in which burnt flint occurred whilst potentially edible species other than cereals were more common in pits in which charcoal predominated. The number of samples selected for the analysis of charred plant remains, and the number of specimens present, were, however, both too small for much significance to be attached to these patterns. The east-west differences in the distribution of species represented by charcoal are also difficult to interpret, although they do single out quite clearly the deposits dominated by cremated human remains. Many of the pits dominated by oak charcoal are in the north-eastern group, and those dominated by Pomoideae charcoal lie at the western end of the ditch group (apart from the cremation burials in this area). The more mixed assemblages of charcoal generally occur at the eastern end of the ditch group. No clear trends over time in the distribution of features associated with particular kinds of charcoal were identified, nor was there any clear correlation between the species represented by the charcoal and other finds. Nonetheless, the distribution of the charcoal might reflect a tendency for differing activities to occur in different locations, creating a pattern which became blurred over time.

The use of oak for cremation is unsurprising, since it can be used to provide the high temperatures required for thorough cremation. The predominance of Pomoideae charcoal in many of the other pits could, then, be taken to indicate a different function which did not require such high temperatures (although the various species of Pomoideae burn well). Whatever the case, clearly heat and fire formed an important component of much of the activity at Pinden Quarry. In some respects the range of finds (excluding cremated remains) is reminiscent of those associated with burnt mounds (albeit lacking the association with water). Unfortunately, the interpretation of burnt mounds is itself a matter of debate (Buckley and Condit 1990; Hodder and Barfield 1991; Topping 2011), and thus of little help in elucidating the pits at Pinden.

The charred plant remains are, perhaps, not rich enough to suggest that processing of plant remains was the primary focus of at least some of the activity. This calls into doubt one possible interpretation - that the pits were related to crop drying - with the burnt flint being used as a way to transfer moderate heat to the crops (cf Cunliffe 2005; Beresford 1979; although it is worth noting that rich assemblages of charred plant remains are a sign of crop drying that has gone wrong - and that later features interpreted as crop drying ovens are often not associated with rich assemblages of charred plant remains).

*Late Bronze Age funerary activity at Pinden Quarry and elsewhere in Kent*

The deposits of cremated remains appear to be related to a small number - perhaps just two - episodes of funerary activity, although it seems that the remains of at least 6 individuals were involved. Whilst this number is small, it is still larger than the number of dated deposits at other sites in Kent, where no more than five deposits have been identified (although not all possibly late Bronze Age deposits at other sites have been dated - and the true figures could be higher).

*The chronology of isolated cremation burials at Pinden Quarry and elsewhere in Kent*

Radiocarbon dates have now been obtained from a quite large number of later Bronze Age cremation burials in Kent (Fig. 16) which, together, provide a fairly clear picture of the chronology of the tradition.

Three of the latest dates for cremation burials associated with barrows fall into the 14th century cal BC. This date is broadly consistent with wider evidence from southern England for the end of the tradition of burials associated with round barrows. There is, however, one exceptionally late date, centred on the 11th century cal BC, from a deposit in a ring ditch (one of four such possibly contemporaneous deposits) on the Eynsford-Horton Kirby pipeline (Simmonds *et al.* 2011), and two rather wide dates from the barrow cemetery at Bridge (MacPherson-Grant 1980), one of which is also consistent with burial in the same period. Two sites (Saltwood Tunnel and Ebbsfleet: Riddler and Trevarthen 2006; Wenban-Smith *et al*. 2013) have, however, provided dates for cremation deposits not associated with round barrows and without identifiable grave goods, in the 14th century cal BC. Nonetheless, it seems that a more consistent tradition of burial of this kind was established in the 13th century cal BC. Even accepting the later date, however, implies some chronological overlap between the two traditions of burial, from the 14th century cal BC up to a date perhaps as late as the 11th century cal BC.

The dates for the Pinden Quarry cremation deposits place them at quite a late stage of the late Bronze Age. Indeed, the mixed deposit in pit 5101, broadly dating to the 9th century cal BC, is the latest example so far found in Kent. Deposits with dates similar to the other cremated deposits at Pinden Quarry, broadly in the 10th century cal BC have been identified at Dartford Football Club (Simmonds *et al*. 2011) and Pilgrim's Way (Hayden and Stafford 2006). The Pinden Quarry burials thus appear to represent the last phases of a tradition which began in the later part of the middle Bronze Age.

Aside from exceptional burials - such as that at White Horse Stone (Hayden and Stafford 2006) - cremation burial remained out of fashion in Kent until the late Iron Age (Champion 2011).

*Variation in the deposits of cremated human remains*

Analysis of the quantities of finds in the pits at Pinden suggests a contrast between a small number of relatively large deposits of cremated human remains, and a larger number of small deposits (Fig. 17). Correspondence analysis of the finds assemblages identified five deposits as being dominated by cremated human remains (relative to other kinds of finds). The analysis of the quantities of cremated remains in relation to the volume of the pits, however, singled out just three pits as outliers which contained exceptionally large deposits of cremated remains. It is not clear, then, exactly where the line should be drawn between deliberate (large) deposits, and residual (small) deposits. It is, however, worth noting that the pits which lie close to the regression line in Figure 11 (and which thus have approximately the weight of cremated remains the correlation suggests given the volume of the pit) include some - most noticeably pit 5101 - which contain relatively large deposits of cremated remains (160 g in the case of pit 5101) which would probably normally be interpreted as deliberate deposits.

There are also indications of differences in the way in which the large deposits of cremated remains were deposited. Most noticeable is the contrast between the mixed assemblage in pit 5101 and the other pits which contained large groups of cremated remains. Whereas the later, mixed assemblage in pit 5101 contained considerable quantities of burnt flint and charcoal (weighing more than the cremated remains), the earlier deposits were associated with much smaller quantities of charcoal, and (although with more variation) burnt flint. The largest deposit of cremated remains in pit 5314 was associated with no burnt flint and only very small quantities of charcoal (relative to the quantity of cremated remains). This variation suggests that there was corresponding variation in the care with which cremated remains were recovered from the pyre.

The analysis of the age of the individuals represented by the deposits of cremated remains adds even further complications to the interpretation of the patterns of deposition. The largest deposit represented an adult of 25 to 45 years, and the second and third largest a younger adult and an adolescent of over 15 years. These three deposits all dated from the period 1010-910 cal BC, and represent the remains of at least two but more probably three individuals (since the ageing of the younger adult and the adolescent is not sufficiently clear to exclude the possibility that they were the same individual). There were, however, also much smaller deposits, from the same period, which derive from infants or young children and a child or adolescent of more that 5 years, and which thus represent at least one, and possibly two more individuals. Whilst it could be argued that the small size of the deposits representing children simply reflects age-related differences of size, it still remains the case that certain individuals are represented only by small, partial deposits of cremated remains. Further confirmation of this is provided by the later cremation burial in pit 5101. The remains in this pit derive from an adult, but weigh only 160 g.

The variation in the size of the deposits of cremated remains at Pinden Quarry is generally similar to that found more widely in Kent (Table 7; Fig. 17), although Pinden has a higher proportion of very small deposits

than is present at most sites. There is only one dated pit which contained a deposit of cremated remains of comparable size to the largest deposit at Pinden Quarry at any other site: a pit (852) at the Pilgrim's Way site which contained 1235 g of cremated remains from an adult (Hayden and Stafford 2006; Witkin 2006a). The remaining dated deposits include a number of examples of intermediate size (from around 100 g to just over 400 g) which correspond to the deposits at Pinden Quarry which may have been deliberate deposits (at East Hall Farm, Sittingbourne (Stansbie *et al*. forthcoming), at several sites on the A2 (Allen *et al*. 2012), at Ebbsfleet (Wenban-Smith *et al*. in prep.), Saltwood Tunnel (Ridler and Trevarthen 2006; McKinley 2006), Deals Gateway (Hammond 2010), the Eynsford to Horton Kirby pipeline (Simmonds *et al.* 2011), Dartford Football Club (*ibid.*) and in a second pit at Pilgrim's Way. The remaining examples consist of deposits with generally less that 50 g, and sometimes very small deposits of less than 10 g, which have usually been interpreted as residual. The sites with these small deposits include some - Beechbrook Wood (Brady 2006; Witkin 2006b) and the A2/A282 (Simmonds *et al*. 2011) - where no larger deposits were recovered.

At Pinden it has been suggested that the contrast between large and small deposits could be explained in terms of a distinction between deliberate and residual deposits. The absence of any large deposits at Beechbrook Wood and on the A2/A282 makes it more difficult to support such an interpretation (although it is, of course, possible that larger deposits have not survived or lay beyond the excavated area). Overall, however, it is difficult to see any clear, consistent patterns. This could be taken to imply either that late Bronze Age burial rites involved complex differences of treatment of the dead, the rules governing which cannot yet be discerned in the archaeological evidence, or, as will be suggested below, that the tradition did not involve following strictly defined ritual procedures but, rather, involved a rather casual attitude to the treatment of human remains. It should be stressed, however, that this casual attitude perhaps involved only the final stages of the funerary rite - of the earlier stages, the cremation itself, at least, appears to have remained as thorough as in earlier periods.

*The de-ritualisation of funerary ritual in the late Bronze Age*

Overall, then, it is difficult to see any consistent patterning in the way in which the cremated remains were deposited, or to make a clear distinction between deliberate deposits and residual accumulations of cremated remains. The large deposit in pit 5314 appears clearly to be a deliberate deposits of relatively clean cremated human remains. Comparison with other sites, however, clearly shows that such large deposits were exceptional in the late Bronze Age in Kent - only one other example having been identified. Although it is difficult to distinguish between deliberate and residual deposits of cremated remains, it is clear that certain individuals were represented by only small deposits of cremated remains.

Rather than trying to make sense of this variation in terms of differing burials rites (which could perhaps be related to age, sex or other aspects of an individuals social persona or the circumstance of their death etc.), it is more parsimonious to regard it as reflecting an absence of strictly defined ritual procedures, and, indeed, of a rather casual approach to the way in which cremated human remains were treated. This could imply differing degrees of care in recovering cremated remains from the pyre or in then burying the remains (or, perhaps, that cremated remains were used or treated in some other way which, so far, has not been detected).

Whatever the case, the suggestion that the smallest deposits were residual implies that cremated remains were left on the surface and could thus become incorporated as residual material into unrelated features. This would account for the large number of small residual deposits at Pinden Quarry, and seems consistent with the similar evidence at other sites.

It is also consistent with the abandonment of barrows as a location for burial. The burials at other sites were all placed in small, generally shallow pits, similar in size to those at Pinden Quarry (Fig. 18). Overall, whilst the initial stages of cremation appear to have continued to be observed - the individuals were still well-cremated as they were in the middle Bronze Age - the later stages, involving the construction of barrows or burial in or near them - appear to have been abandoned. It is worth noting at this point that in Van Gennep's (1960) tripartite scheme for rites of transition, it is the middle stage - the *rites de marge* - which are usually longest and most elaborate. Archaeological evidence usually consists of nothing more than the final resting place of the remains, and thus relates only to the very final stages of the rite. Changes in the earlier phases of the rite are largely archaeologically invisible.

It is, nonetheless, perhaps worth noting two changes in the context of burials which were involved in the abandonment of barrows as a location for burial. The first involves the association of burials with other structures, and field system ditches in particular. The pits at Pinden Quarry are unusual in the late Bronze Age in having been located in an area where similar pits were cut for apparently other purposes. Although it is difficult to distinguish between deliberate and residual deposits, it has been suggested that the large number of pits containing cremated remains at Pinden Quarry simply reflects the fact that the area was used for other activity which involved digging pits (rather than the presence of a very large number of burials). Elsewhere, the burials usually appear as isolated features without similar associations. Previously (Allen *et al*. 2012), a distinction has been made between later Bronze Age burials in isolated contexts and those apparently associated with field system ditches (although excavation has rarely been extensive enough to show that the ditches did form parts of field systems rather than other types of enclosures). The evidence from Pinden Quarry suggests that this distinction may have less relevance than was thought. At Pinden many of the pits lie close to what appears to have been a late Bronze Age ditch which may have formed part of a field system. This ditch, however, cut one of the pits but was cut by another. It thus seems that the ditch was cut during the period over which the group of pits formed. A group of initially isolated pits thus came to be associated with a field system ditch. At none of the other sites where cremation burials appear to be associated with field systems is the chronology of the field systems sufficiently precise to demonstrate their chronological relationship with the burials - and in particular, whether the burials were, in fact, associated with the field systems.

It is worth, at this point, considering more generally the context of later Bronze Age cremation burials at Pinden and in Kent. It has been suggested above that deposits in the pits at Pinden derive from a range of activities some of which, at least, were not directly related to funerary activity. In the case of Pinden all of the activities appear to have involved fire, and it is possible that the site was used as a location for cremation because of this association. The wider evidence from Kent does not, however, provide any other clear examples which would suggest that this was a more general pattern. There are certain difficulties, however,

in assessing the wider evidence. Often, pits such as those at Pinden which contain only burnt flint and charcoal, remain undated. Furthermore, many reports make a very clear distinction between pits containing cremated remains and those without, which, to some extent, makes the possible relationships between features less clear than they might be. At many of the other sites, however, the cremation burials genuinely appear to be isolated features which lie in areas without any other features.

The second change in the context of burials involves their relationship with other burials. The number of burials associated with early and middle Bronze Age barrows varies. Early barrows, in particular, may be associated with single or small numbers of burials (Garwood 2007), and though the numbers of burials associated with barrows generally increases over time, Ellison (1981) notes that over 50% of middle Bronze Age burial sites in southern England contained less than 12 burials. Although the numbers of burials at earlier cemeteries are not, therefore, necessarily large, they are still larger than those for the late Bronze Age. Furthermore, it has often been supposed, at least for burials in the early Bronze Age, that there was some particular significance to, and order in, the deposition of secondary burials in earlier barrows (eg Petersen 1972; Mizoguchi 1993). Aside from Pinden Quarry (and the exceptional group of burials at Cliffs End Farm, Isle of Thanet: McKinley *et al.* 2014), few of the later Bronze Age cremations burials in Kent occur in groups of more than two or three, although a total of five deposits were identified at Dartford Football Club (Simmonds *et al*. 2011).

In the discussion of the later Bronze Age cremation burials found along the A2, it was suggested that like the foci of settlement - which appear to have shifted, perhaps with each generation (forming a neo-local pattern of post-marital residence: Brück 1999) - the location of burial was also quite mobile, with the result that no cemeteries formed over time. This pattern appears to be characteristic generally of late Bronze Age burial in Kent. Radiocarbon dates have been obtained from more than one cremation burial at seven sites in Kent, and at all but one of them, the dates pass $\chi^2$ tests, indicating that the burials could have been contemporaneous (Fig. 16). The one exception was the three burials at Dartford Football Club, and these were distributed at distances of around 30 to 40m from each other.

Thus, late Bronze Age burials very clearly do not form cemeteries. The general pattern is for single or very small numbers of burials to be deposited at a particular location, over an apparently brief period. The number at Pinden Quarry is slightly larger than appears to have generally occurred elsewhere, and it is unusual that a later burial was made in the same area, but still, most of the burials appear to date from a quite brief period.

*The wider context of the de-ritualisation of burial in the late Bronze Age*

It is worth concluding by looking briefly at the possible wider relationships of this de-ritualisation of the later phases of funerary rites with other changes. It is worth repeating, however, the fact that the Pinden burials date from the end of this process and do not, therefore, provide the most relevant evidence for its development. Furthermore, any interpretation of this process must take the wider evidence for changes in the later Bronze Age into account. A detailed treatment of these issues is beyond the scope of this discussion.

The broad character of the changes occurring in these periods - such as the appearance of field systems, the more frequent representation of settlements in the archaeological record - usually characterised by the presence of roundhouses, sometimes with four-posters - and the decline in the construction of, and burials associated with, round barrows - have been well known for some time (eg Bradley 1984; Yates 2007; Thomas 1997). Here, the aim is to focus upon how changes in burial practices may have been related to these wider developments.

Funerary rituals have many different facets. They involve, of course, some means of disposing or preserving the bodies of the dead, but may also play a role in expressing, creating or subverting the status, roles, and relations of the dead and living (Huntingdon and Metcalfe 1979). Most immediately, however, funerary rituals are a form of conventional activity - just as today a funeral may follow a form set out in a prayer book, so too in prehistory may funerals have been directed according to conventional forms, perhaps lead by ritual specialists

It is the faithful transmission of such forms of ritual which probably produces much of the consistency in the archaeological evidence for burial. As Humphrey and Laidlaw (1994) and Bloch (2005) note, the form of rituals cannot, therefore, be explained as the spontaneous result of the intentions of the actors involved. Their meaning is, instead, deferred, to the funerary specialists, the prayer book, or the sources of inspiration behind them (such as, perhaps, the ancestors). As in other rituals, the people acting out funerary rites may, as a result, be unaware of the ritual's meaning - whilst still maintaining that it is significant. The role of ritual specialists depends upon their authority and credibility in relation to the ritual.

From this perspective, a change in ritual may reflect, most directly, a change in the status or credibility of funerary specialists. And any changes in their status may well have been related to wider developments. The contexts in which metalwork has been found may mark out, in two ways, some aspects of these wider changes. The first is the deposition of an increasingly proportion of metalwork in the lower reaches of the Thames and its estuary (compared to other regions), suggesting broad shifts in the centres of power and of exchange networks towards that region (Yates 2007, 112-16). The second is the change in the contexts in which metalwork was deposited, away from burial contexts in the early Bronze Age to deposition in hoards and watery contexts from the middle Bronze Age onwards (Bradley 1984, 100-104). This latter shift is the most directly related to the changes in burials practices at issue here, but also partially predates it. It may nonetheless provide an index of the kinds of changes in social hierarchy and the distribution of power which contributed to a decline in the authority of the earlier forms of funerary ritual (*ibid*., 104). Another indication of these changes in the distribution of power in society and in particular their movement away from certain kinds of contexts related to ritual (and funerary monuments in particular), is provided by the appearance of aggrandised enclosures containing roundhouses (Yates 2007; Bradley 1984, 120-21). The nearest examples of such sites to Pinden are the ringworks across the Thames estuary at Mucking and South Hornchurch (Yates 2007, chap. 3; Bond 1988; Guttman and Last 2000), although a large circular earthwork east of Wrotham Road, Meopham, has been identified as another possible example (Allen *et al*. 2012, 4).

All of these disparate developments involve shifts in items which appear to be related to high status away from earlier ritual - and often specifically funerary - contexts, and each may thus reflect or have contributed

to undermining the authority of funerary ritual and any specialists who may have been involved. The underlying reasons for the change may, however, lie in rights to land. The widespread appearance of field systems from the middle Bronze Age onwards (Yates 2007; possibly beginning in Kent in the early Bronze Age: Barclay *et al*. 2011) is the clearest indication of changes in the organisation of the landscape, and perhaps in systems of land tenure.

There is a striking contrast between the imposition of apparently more permanent boundaries on the landscape (in the form of field systems) and the fact that, at the same time, the site chosen as the locations for burial appear to have become less fixed. A contrast could be made between this pattern and that which occurred in the Roman period when, as at Pinden Quarry, new field systems were laid out in many parts of southern England, which, in some cases, incorporate enclosures within which cemeteries formed.

It has been suggested above that the changes from the middle Bronze Age onwards involve the disappearance of cemeteries. Burials seems thus to have no longer have been used to reinforce, create or modify genealogical or other relationships. Indeed, the inconspicuous, casual disposal of remains in the later Bronze Age suggests that not much importance was attached to the substantial remains of the dead at all. Such changes could even be seen as a deliberate attempt to remove any traces of the dead - in stark contrast to the funerary monuments of earlier periods, which make the dead an observable presence to the living. This process may have continued into the Iron Age when burials become even more scarce - and many of the human remains which have been found occur in pits in much the same way as animal burials and various kinds of refuse. This downplaying of the dead may, initially, have been part of a deliberate attempt to subvert one form of claim to rights in land (whilst other developments were establishing claims in another way). If that were the case, it is perhaps not surprising that the process appears to have operated at differing times in differing places. Any such change is unlikely to have benefited everyone equally, and it seems likely, therefore, that it would not proceed without a certain degree of resistance. It may be for this reason that the last dates for burials associated with barrows overlap those without such associations.

### *The late Iron Age/early Roman period*

The only feature which can be confidently dated to the late Iron Age/early Roman period is a ditch (5312) which cut a late Bronze Age ditch (5313), and appears to have defined an approximately rectangular enclosure (Fig. 20). A number of other ditches have, however, been attributed to the same period on the basis of their alignments and spatial relationships, although they were not associated with any late Iron Age or Roman finds. As has been noted above, the chronology of these latter ditches is uncertain and some of them, at least, could have formed part of the late Bronze Age field system. Taken together, the possibly Roman features may have formed part of a second system of enclosures or fields which, in part, appears to have respected some of the boundaries defined in the late Bronze Age.

The rectangular enclosure (5312) appears to have measured around 116 m east-west, and around 25 m north-south. Only part of the enclosure was revealed by the excavation. A continuous ditch defined what was

exposed of the southern, western and most of the northern sides of the enclosure. The southern edge of the enclosure, however, was identified over a length of only around 38 m. No continuation of this ditch was identified in the Phase 2 excavation to the south, and it therefore seems likely that it either continued below the unexcavated bund or had been truncated away. The northern side of the enclosure appears to have been extended by two further segments of ditch on the same east-west alignment (5336 and 5165). It seems likely that the gaps along the northern side of the enclosure were at least partially the product of truncation, although it is possible that an entrance originally existed at some point. It is possible that a third feature (5047) may have formed a further continuation of this boundary around 75 m further east still - giving a total length for the boundary of nearly 230 m. However, feature 5047 was a shallow and rather irregular feature, and may have been a plough furrow rather than a ditch. The eastern end of the the enclosure appears to have been defined by ditch 5334=6036, which extended for around 95 m from the northern edge of the excavation before petering out, perhaps as a result of truncation to the south.

A number of short, north-south aligned ditches (5342, 6015, 5196=6035, 5052=5054 and 5016) were found along the boundary between the two phases of excavation. Although these ditches contained no chronologically diagnostic artefacts, their alignment, parallel to ditch 5334=6036, suggests that some of them, at least, might have been late Iron Age or Roman.

The ditches generally varied little in size and profile. All were shallow features, less than 0.5 m deep, and often only around 0.2 m deep, with rounded profiles, often with undulating bases (Fig. 19). There was little variation in their widths, most measuring between 0.6 and 1.3 m wide. Much of the variation in their width is probably due to differing degrees of truncation. Ditch 5016, however, was noticeably wider than the other ditches, measuring 1.6 m across.

Very few finds were recovered from the Roman ditches. Roman pottery was recovered only from the rectangular enclosure ditch 5312. A total of 18 sherds (620 g) of late Iron Age or early Roman pottery was recovered from sections cut along the southern and western sides of this ditch (see Biddulph below). Most of this pottery dates from a period between 50 BC and AD 100, but a single sherd, possibly of North Kent oxidised ware, probably dating from AD 50-300 was also recovered. Whilst the chronology of the ditch cannot be defined with any great precision, the pottery indicates that it could have been cut as early as the late Iron Age, but was probably at least still open in the early Roman period (if it was not cut in that period). A single residual flint-tempered sherd, probably Iron Age in date, was also recovered from the ditch.

The remaining finds from the late Iron Age/early Roman ditches consisted of burnt unworked flint, small quantities of residual worked flint, and a single fragment of horse astragalus. The burnt unworked flint was concentrated especially along the southern stretch of ditch 5312 (in cuts 5255, 5289, 5292 and 5266) although smaller quantities were also recovered from ditches 5334=6036 and 5342. The worked flint, which all consisted of flakes and chips, was concentrated in the same sections across the rectangular enclosure ditch (5312), although smaller quantities, again consisting of flakes and chips were again found elsewhere (in ditches 5334=6036, 5342 and 5052=5054). The distribution of both the burnt unworked flint and the worked flint clearly reflects in part at least, the distribution of late Bronze Age activity. The horse astragalus was recovered from cut 5124 across ditch 5334.

Roman pottery was also recovered from ditch 5335. This ditch, however, did not follow the alignment of the late Iron Age/early Roman ditches, and was stratigraphically later than the rectangular enclosure. It also contained part of a smithing hearth bottom. No other metalworking debris was recovered from Roman contexts, but similar debris was recovered from much later, probably post-medieval contexts (denehole 5018 and buried soil 5008). Ditch 5335 may, therefore, have been later in date.

### *The Anglo-Saxon period*

The only evidence for activity in the Anglo-Saxon period is provided by a radiocarbon date, indicating activity in the period cal AD 1010-1160 (95.4% probability; SUERC-44514: 972 ± 29). The date was obtained on hazel roundwood charcoal from what was thought to be a late Bronze Age pit (5118; Fig. 5). No other indications of Anglo-Saxon activity were identified, and all that can be said is that the charcoal may have been intrusive in the pit or that the radiocarbon analysis may have produced an aberrant result.

### *The post-medieval period*

#### *Deneholes*

The most significant of the post-medieval or modern features on the site were five deneholes (5188, 5202, 5144, 5306 and 5204; Figs 21-25; Table 8). Unfortunately, no clear evidence for the date of these features was recovered. Almost all of the finds - which included relatively recent material - ceramic building material, slag, and fragments of iron nails - were recovered from the upper fills, although a few scraps of probably early Neolithic pottery were recovered from a lower fill of one of the deneholes.

Four of the deneholes consisted of more or less circular vertical shafts, with or without lateral chambers at the base. The shafts varied considerably in width and depth (Table 8). The width varied from 4.6 m to 2.8 m, although the narrowest shaft (belonging to denehole 5144) was distinguished by the fact that whilst it was circular at the based, it widened towards the bottom and had a rectangular base measuring 5.3 m by 3.1 m across. (The other shafts were cylindrical from top to bottom.) Denehole 5144 was also the deepest, having been cut to a depth of 4.5 m, whilst the shallowest were just 2.7 m deep.

Two of the deneholes with shafts (5144 and 5188) had two lateral chambers at the base. In all cases, the lateral chambers had arched roofs and flat floors, and were either roughly semicircular in plan (in the case of denehole 5144) or were slightly elongated into a subrectangular shape in plan (denehole 5188). None of the chambers of the deneholes with shafts was very large. The largest chambers extended for up to 2.6 m from the shaft, and the semicircular examples up to just 1.3 m. They varied in width from 1.8 m to 2.6 m. The semicircular niches were just over 2 m tall. (For safety reasons, the tops of the other niches were removed by

machine, and their precise height was not, therefore, recorded, although it is likely to have been comparable to that of the semicircular niches.)

Denehole 5202 had no clear lateral chambers of its base, although there was a very slight niche cut into the chalk on the northern face of the base of the shaft, which was probably the very beginning of a chamber which was never taken further before the denehole was abandoned. Unfortunately, the section left of denehole 5240 after the upper layers of chalk were machined away collapsed before any observations or records could be made, but there was no clear indication that this denehole was associated with lateral chambers.

The fifth denehole (5360) was entered through a corridor cut into the chalk. The corridor was around 2.4 m long, 1.0 m deep and 1.8 m wide. One chamber (5242) continued from the end of the corridor, whilst the other extended at right-angles from the corridor to the west. Like the lateral chambers of the other deneholes, the chambers had arched roofs and flat floors. They were similar in height and width to the other chambers, measuring between 1.2 and 2.0 m wide and from 1.3 m to 2.2 m tall, but were longer, extending a further 4.6 m in one case and 3.6 m in the other.

The deneholes were filled with more or less complex sequences of silty loam or clay loam fills, interspersed with occasional chalky layers. The only finds recovered at any depth from the deneholes were three small sherds of probably early Neolithic pottery from a lower fill of denehole 5202. The remaining finds were all from upper layers of fill, and comprised fragments of unidentified ceramic building material from deneholes 5144, 5188 and 5202, slag and residual worked from denehole 5144, undateable scraps of pottery and animal bone from denehole 5202, and fragments of iron nails from denehole 5189.

*Other features*

One pit (6016) may have been of recent date. The pit had a very regular, subrectangular shape in plan and contained two small fragments of very abraded post-medieval or modern brick or tile.

A buried soil 5008/5011 which covered most of the northern and central parts of the site also contained material or relatively recent date. It was around 0.5 m in depth and contained a variety of material of mainly post-medieval date, including 39 sherds of pottery (281 g) dated to 1835-1900. A small glass stopper of post-medieval date was also found within this deposit, along with fragments of CBM and slag. The finds also include five sherds of late Bronze Age pottery, one sherd of Iron Age pottery and several small lava quern fragments that were clearly residual.

A series of five parallel linear features - either plough furrows or wheel ruts - traversed the site on a north-south alignment. Pottery dated to 1780-1850 was recovered from the fill of one, along with a second small glass stopper.

***Undated features***

Ditch 6023, which defined a right-angled corner at the northern edge of the Phase 2 excavations, was not associated with any finds. It is perhaps likely that it was related to the late Bronze Age or Roman occupation of the site. It did not, however, have any very clear spatial relationships with other features in this area of the site, although it might have formed a continuation of Roman enclosure ditch 5312 or late Bronze Age ditch 5313.

Several pits, scattered across the site, remain undated, although one of these (5240) cut enclosure ditch 5312, and thus clearly post dates the late Iron Age/early Roman enclosure. A group of small pits were situated to the east of ditch 5334, which is itself only dated on the basis of its relationship with the late Iron Age/early Roman enclosure (5312). Ditch 5236 was aligned parallel with the post-medieval plough furrows and may have been a similar type of feature. It was, however, significantly wider than the furrows.

## *THE FINDS*

### *The struck flint*

*by Michael Donnelly*

*Introduction*

A total of 276 lithics were recovered from the site. Of this total, 87 very scrappy pieces were recovered from test pits. Almost all of the remaining flint was recovered from the Phase 1 excavations. Much of the assemblage was recovered from late Bronze Age pits but there were also many pieces from the topsoil and from later features including Roman ditches and deneholes. The bulk of the assemblage dates to the late Bronze age and includes a range of informal scrapers, piercers and miscellaneous retouched flakes typical of that period. A few pieces, including some systematic blades and two probable burins, suggest earlier activity. This earlier phase appearers to have leaned heavily on Bullhead Beds flint (Dewey and Bromehead 1915) while the later prehistoric assemblage is more expedient and favoured clay with flint deposits; many of its pieces display thermal surfaces, often recorticated.

The artefacts were catalogued according to OA South's standard system of broad artefact/debitage type (Bradley 1999), general condition was noted and dating was attempted where possible. Unworked burnt flint was quantified by weight and number. During the initial analysis additional information on condition (rolled, abraded, fresh and degree of cortication), and the state of the artefact (burnt, broken, or visibly utilised) was also recorded. Retouched pieces were classified according to standard morphological descriptions (eg Bamford 1985, 72-77; Healy 1988, 48-9; Bradley 1999). Metrical and technological attribute analysis was undertaken and included the recording of butt type (Inizan *et al.* 1992), termination type, flake type (Harding

1990), hammer mode (Onhuma and Bergman 1982), and the presence of platform preparation and edge abrasion.

*Burnt flint*

A total of 2359 pieces of burnt, unworked flint weighing 43 kg was recovered. This has been weighed and quantified by context, but no detailed analysis has been carried out. Of this total, 41 kg was recovered from discrete features, the largest amount coming from tree-throw hole 5219 (*c* 500 pieces weighing 13.5 kg) but significant amounts were recovered from several other features including tree-throw holes 5232 and 5235, late Bronze Age pit 5012, and late Bronze Age ditch 5313.

*The assemblage*

*Material and condition*

The raw materials consist for the most part of quite poor material obtained from secondary sources such as clay with flints or gravel material. The cortex tends to be either very worn and abraded or entirely rolled. Many of the pieces from the Bronze Age assemblages display mixed cortex and recorticated surfaces indicating the use of naturally fractured material. They include a quite fine scraper on a thermal flake (Fig. 27, c201). Genuine chalk cortex was entirely absent but some higher quality material was present and included many pieces displaying the olive green cortex and underlying orange band of typical Bullhead Beds material (Dewey and Bromehead 1915). Many of the diagnostically early pieces have been fashioned from this material.

Whilst the majority of the flint from the test pits were in a poor condition with only two pieces considered to be fresh and 31 with light edge damage, the excavated assemblage had a much higher proportion of fresh or lightly damaged pieces, suggesting that much of it was contemporaneous with the contexts in which it was found (although the fairly significant levels of light edge damage imply that the material may have been initially deposited elsewhere prior to incorporation in pits).

*Primary technology*

The assemblage was primarily flake-based but included a small number of genuine blade forms (Fig. 26, c180) as well as a dozen blade-like flakes, that can often be a component of blade reduction strategies but here are more likely to relate to accidental blade like removals (Fig. 27, c188). Cores were rare, and two examples display a mix of blade and flake scars and appear to relate to Mesolithic or more likely early Neolithic knapping episodes. The third core displays flake scars but was fashioned from Bullhead Beds flint and may also be early. A single core rejuvenation flake also appears to be early in date.

Although there is little direct evidence of the typical highly expedient flake core strategies of the late Bronze Age, the flake assemblage testifies to such a strategy, with very little evidence for platform edge abrasion/preparation, and a marked preference for broad plain or cortical platforms. Specialised early prehistoric forms were rare with just three punctiform examples and two faceted. Linear/shattered examples were also common and while these can often be found in blade assemblages, their presence here alongside hard-hammer bulbs indicates that they are later prehistoric in date. Indeterminate hammers were most common while soft hammers accounted for less than 6% of the assemblage, and included a blade, three blade-like flakes and the core rejuvenation flake.

Blade forms accounted for 20 of 199 blanks (10%) of the assemblage but many of the blade-like flakes (12) were so atypical that they should probably be considered as part of the flake population; just eight actual blade/lets were present (4%). Ford's (1987) work on blade percentages in dated assemblages indicates figures of between 4 and 10% are usually associated with Bronze Age assemblages.

The type of blank present indicates that a full range of reduction was practised here, with many of the tools displaying cortical surfaces. Preparatory flakes account for 15% of the assemblage and include several genuine decortical examples including some that were formed into tools (Fig. 27, 200 and 201). Side (20%) and distal trimming (12%) flakes are also common as are miscellaneous trimming flakes (21%). Despite all this, inner material is still the most common (30%) but probably contains a greater proportion of the earlier background scatter. Some of the inner flakes are classic examples of later prehistoric knapping with broad, unprepared plain platforms, extant platform spurs, deep bulbar pits, hard-hammer bulbs, thick squat profiles and multi-directional flaking pasterns. Flake c178 combines all this alongside a step terminal (Fig. 26, c178). At least three tools were formed on non-flake blanks (Fig. 27, 201) or display recorticated surfaces implying scavenging of earlier material (Fig. 26, 176). Both traits are quite common in middle-late Bronze age assemblages (Butler 2005).

For terminals the picture is similar with forms typical of less proficient knapping strategies using lower quality material being quite common (step: 8%; hinge: 20%; and plunge: 9%) but fine/feathered terminals still dominate with 57%, a figure that is quite low for assemblages from Kent.

*Secondary technology*

Retouch was present on 9% of all non-chips in the assemblage (Table 9). Such a figure is high and is usually only associated with domestic assemblages or assemblages in which some form of selective recovery has occurred (with the latter being likely here). Tools are more readily discernible from the background coverage of natural flint fragments and are thus often over represented. Only one of the 79 flints recovered from samples was retouched and this would give figures of around 2% once sieved chips are excluded.

Tool forms include scrapers (6), piercers (4), retouched flakes (4) and fragments (2). Early retouched forms may include the notches (2) and certainly include the burins (2) and the microdenticulate/serrated blade (Fig. 26, c180) while a snapped flake from a polished implement is probably Neolithic in date (Fig. 26,

c131). One of the burins is a dihedral example on a snapped side trimming flake of Bullhead bed flint; the other is a probable multiple angle burin on a preparatory flake, also in Bullhead Bed flint. One notch appears to have had its bulb partially flaked away while the other is undiagnostic.

The remaining tools are likely to be of late Bronze Age date and include a set of piercers on irregular flakes and thermal fragments, several miscellaneous retouched flakes, and a group of scrapers including one slightly irregular thumbnail example that may date to the early Bronze Age and several larger scrapers on decortical flakes (Fig. 27, c200) including a recorticated pot-lid displaying uncorticated retouch scars (Fig. 27, c201). Other end scrapers are present on probable scavenged earlier pieces displaying recorticated surfaces (Fig. 26, c176). One hollow scraper or large shallow notch is also present and is also typical of later prehistoric material.

*Feature 5013*

The fill (5012) of probably late Bronze Age feature 5013 contained the only large assemblage from a single context on the site. Comprising 50 pieces, five of which were retouched, it consisted of 38 flakes (Fig. 26, c178), four blade-like flakes (Fig. 27, c188), two blades, four scrapers (Figs 26-7, c176, c200 and c201) and a microdenticulate on an inner blade (Fig. 26, c180). Although the blades and some regular flakes suggest a degree of contamination, the bulk of the assemblage - including the scrapers - are typical of later prehistoric pit assemblages from this part of Kent. The lack of cores is surprising given that such expedient later prehistoric strategies often result in very high numbers of cores. It is possible that the assemblage was selected in some way prior to internment.

The assemblage contains 54% hard-hammer, 40% indeterminate and 6% soft-hammer bulbs with 6% edge abrasion and had a marked tendency for plain (69%) or linear platforms (17%). Again, given the other evidence on the site, this suggests a late Bronze Age assemblage with low levels of early residual material.

*Discussion*

The bulk of the lithic assemblage from Pinden Quarry appears to date from the late Bronze Age, and, whilst the possibility that some of it is early Iron Age in date should also be considered as it is believed that such flintwork would be largely indistinguishable from later Bronze Age material (Young and Humphrey 1999), the radiocarbon dates and ceramic evidence suggest that it is predominantly of late Bronze Age date. There was also a small component of Mesolithic or more probably, early Neolithic material. A very limited component could also date to the late Neolithic-early Bronze Ages based on two incidences of faceted platforms and the presence of a broken thumbnail scraper.

Numerous recent commercial and infrastructure developments in Kent have brought to light significant collections of middle-late Bronze Age material. The sites often contained a background scatter rich in such lithics alongside earlier forms. Where present, colluvial layers on these sites also often contained significant collections of late-period flint knapping. Many of these sites also contained large assemblages

from contemporaneous pits and ditches to support the general impressions of the character of later prehistoric flint knapping. While the technology may seem to be more basic and of less importance to its users, it still clearly represented an integral component of their material culture.

Several middle to Late Bronze Age sites from near to Pinden - at Sittingbourne, Coldharbour Road and the A2 scheme - yielded sizeable quantities of middle-late Bronze Age material in association with contemporaneous features.

At Sittingbourne (Stansbie *et al.* forthcoming), the middle-late Bronze Age assemblage was mostly recovered from ditch fills, but one pit contained a large assemblage with numerous waste flakes and crude cores. The flints often showed edge damage and may have been middened prior to dispersal and/or inclusion in the pit. At Coldharbour Road (Bradley 1994) structures, pits and ditches yielded a similar flake-dominated assemblage with a limited range of tools, including simple retouched flakes, knifes, basic scrapers and piercers. Along the A2 (Donnelly and Anderson-Whymark 2012) several areas of middle-late Bronze Age activity yielded assemblages similar to that at Pinden. Tools were rarer and mostly consisted of piercers/awls, scrapers and simple retouched flakes. There was some indication of pre-burial middening. Further afield at Margate the assemblage from East Northdown (Smith 1987) contained a group of tools very similar to that at Pinden, with near copies of many of the scrapers from pit 5012 (compare Smith 1987, fig. 13, F5 and F7 with Figs 26-7 c201 and c176). There, however, the levels of retouch were very low and many cores were recovered, suggesting that a more complete reduction assemblage was present. More recently the initial assessment of an extensive flint assemblage from the East Kent Access Road indicated that there was a significant late Neolithic to late Bronze Age component as a background scatter on most sites (Harding 2012).

At all of these sites core reduction was expedient, the range of tool forms was restricted, and the broad squat shape, unprepared platforms and hard-hammer technology that typify middle-late Bronze Age assemblages were very evident. In most cases the assemblages appear to have been exposed for some time and may have been present in midden deposits prior to burial. In each instance a domestic character is implied from the assemblages, albeit one in which tools were made and used in a very expedient manner. Scrapers, piercers or simple retouched flakes may have been formed on the spot for a specific task, from any suitable flint nodule fragment, and then abandoned. In some instances, natural fragments were selected, used for a limited time and abandoned.

### *The prehistoric pottery*

*by David Mullen and Lisa Brown*

*Introduction*

Some 104 sherds (181 g) of earlier prehistoric pottery were recovered from the site (Table 10). Most are poorly preserved and fragmentary but the group includes material of early Neolithic, late Neolithic/early Bronze Age (Beaker) and late Bronze Age date. Most of this material is late Bronze Age but earlier pottery was recovered from three features.

Tree-throw hole 5219 and denehole 5202 produced only one sherd and three sherds respectively, totalling 17g, of early Neolithic pottery. The sherds were fine walled and the fabric had flint and leached shell inclusions. Pit or posthole 5211 yielded a single fragment of a late Neolithic/early Bronze Age Beaker in grog-tempered fabric with chevron decoration.

The small assemblage was dominated by flint tempered sherds of late Bronze Age date. Most are very small, and a rim fragment is the only diagnostic sherd, but the fabric closely resembles that of late Bronze Age Plain Ware jars from Kent. Some of the pottery came from pits containing cremated human remains, but only in very small amounts, and it is unlikely that these sherds represent the remains of cremation urns or deliberately deposited grave goods.

The pottery was quantified by sherd count and weight by context. Fabrics were assessed macroscopically by x10 hand lens and microscope (x20) and classified on the basis of principal inclusion type.

*Fabrics*

Nine fabrics within three ware groups were identified. It is likely that most of the sandy, micaceous clays represented are from the same or related sources, and the flint a product of the underlying Upper Chalk bedrock. The raw materials sources for the prehistoric pottery is, therefore, entirely local or near local to the site.

*Predominantly flint inclusions*

F Sandy micaceous clay with black ferrous pellets and common inclusions of white calcined flint 2 mm and smaller

F1 Fine, slightly sandy micaceous clay incorporating common to abundant pieces of calcined flint 3 mm and below. Slightly soapy texture

F2 Finely sanded micaceous clay with abundant coarse calcined white and grey flint pieces up to 4 mm. Invariably oxidised surfaces with grey core

FG Fine sandy micaceous clay with sparse calcined flint pieces < 4 mm and rare red lumps of grog or clay

*Predominantly grog inclusions*

G Lightly sanded, soapy clay with small lumps of reddish and light grey grog.

GF Lightly sanded, soapy clay with small lumps of reddish and light grey grog and rare white calcined flint pieces < 2 mm

*Predominantly quartz sand*

Q Very finely sanded micaceous clay with black ferrous pellets; no additional visible inclusions

QF Very sandy micaceous clay with sparse white flint inclusions, mostly < 2 mm but occasional pieces up to 4 mm

QS Vesicular sandy micaceous clay with rare white flint inclusions <3 mm. The vesicules are consistent with moderate inclusions of platey shell pieces up to 6 mm

*Early Neolithic*

Fill 5220 of a possible tree-throw hole (5219) and fill 5250 of denehole 5202 produced four sherds (17g) of fine-walled pottery with flint and leached shell inclusions. The single sherd from 5220 had a curving profile and resembles pottery recovered from the A2/A282/M25 Improvement Scheme at Dartford (Simmonds *et al*. 2011).

*Late Neolithic/early Bronze Age*

Fill 5212 of pit or posthole 5211 contained a single Beaker sherd in a grog-tempered fabric decorated with chevrons.

*Late Bronze Age*

Some 70 sherds (170 g) could be dated with some confidence to the late Bronze Age, and another 25 g of crumb-like pieces in similar fabrics are probably of the same date. Most of the very fragmentary assemblage consisted of wall sherds of flint-tempered vessels. At least two flint fabrics were present.

Some 25 g (25 sherds) of very fragmented flint-tempered pottery was present in deposits in the main group of late Bronze Age pits, some of which contained cremated human bone, which was dated by a radiocarbon determination from pit 5058 to 1010-920 cal BC. A single fragment of T-shaped rim from fill 5315 of cremation burial 5314 was the only diagnostic sherd, but the material resembles late Bronze Age Plain Ware jars from Kent. It seems unlikely, given the size of the sherds, that the pottery represents vessels accompanying cremations.

Four sherds (14 g) of undiagnostic pottery in fabric F1 from pit 5349 was associated with material that produced a slightly earlier late Bronze Age date of 1350-1010 cal BC (modelled). The single small sherd from pit 5013 was also in fabric F1, so the pit may have been contemporaneous with pit 5349, although this evidence is too slight to be certain. A considerable part of the small late Bronze Age group (26 sherds/66g) came from a deposit or spread of burnt material (5330), that lay in the same area as the pit group. The courser fabric - F2 - was represented only by two sherds from fill 6004 of pit 6003.

*Discussion*

Early Neolithic pottery and other material has frequently been recovered from features interpreted as tree-throw holes, as for example, at the Eton Rowing Course (Allen *et al*. 2013). It is, therefore, possible that feature 5219 can be dated by the single early Neolithic sherd, but associated burnt, unworked flint suggests that the feature might be late Bronze Age in date, and the pottery could have been incorporated by chance by the fall of the tree. The three sherds from denehole 5202 were undoubtedly residual and testify only to activity of early Neolithic date in the vicinity. Despite the small size of this group, the material enhances the few Neolithic site assemblages from this part of Kent, which includes the Dartford Improvement Scheme (Simmonds *et al.* 2011) and CTRL (Booth *et al.* 2011; see also Dunning 1966).

Activity during the late Neolithic-early Bronze Age was attested only by a single (7 g) small Beaker sherd in a posthole or pit fill. As it may have been residual it adds little to out knowledge of this period in the region.

The more considerable but nonetheless fragmentary late Bronze Age Plain Ware group resembles material recovered from the A2 (Allen *et al*. 2011), the A2/A282/M25 Improvement Scheme (Simmonds *et al.* 2011), from excavations at Gravesend (Mudd 1994) and along the line of the CTRL, in particular from White Horse Stone and Saltwood Tunnel (Barclay *et al*. 2006). This type of pottery is not particularly common in west Kent and there are few parallels, but the Pinden Quarry material compares well with late Bronze Age pottery from elsewhere in southern England (Barrett 1980) and associated material produced a radiocarbon date that sits comfortably in the late Bronze Age.

***Iron Age to Roman Pottery***

*by Edward Biddulph*

A total of 33 fragments of pottery were assigned to the Iron Age or Roman period (Table 11). Most of the assemblage consisted of small fragments that could not be dated very closely. Flint-tempered pottery was broadly dated to the Iron Age, while grog-tempered pottery generally spanned the second half of the 1st century BC and the 1st century AD. A sherd from a necked jar in glauconitic ware, considered to originate in the Medway valley, was probably exclusively late Iron Age in date (Pollard 1988, 31). A fragment of fine oxidised ware, possibly manufactured in the Upchurch area of north Kent, is unlikely to have dated earlier

than AD 50 (Pollard 1988, 211). Apart from the necked jar, no form was identified from rims, but grog-tempered body sherds from ditch 5312 belonged to storage jars.

Almost all of this pottery - including the Iron Age pottery - was recovered from the Roman enclosure ditch (5312). The only exceptions were a single residual Iron Age sherd from a post-medieval ploughsoil (5008), a few sherds from ditch 5335, and some undated, flint-tempered fragments, too small to be dated, from denehole 5202.

Although the assemblage is clearly too small to provide any significant information beyond giving a broad indication of date, its composition is in no way unusual for this part of Kent.

***Post-Roman pottery***

*by John Cotter*

A total of 47 sherds of post-Roman pottery weighing 332 g were recovered from five contexts (Table 12). The assemblage is almost all of post-medieval date although a few residual sherds of medieval date are also present.

Overall the pottery is in a fair but very fragmentary condition with marked wear confined to a few smallish medieval and early post-medieval pieces. The fragmentary condition of the pottery is reflected in a low average sherd weight of just 7 g.

All five contexts produced pottery of 19th- or 20th-century date but the two largest context assemblages (contexts 5008 and 5011, a buried ploughsoil) also produced a range of residual medieval and post-medieval wares. The assemblage is overwhelmingly domestic in character. The 19th-century or 'Victorian' pottery comprises a few sherds of modern English stoneware, and several more sherds of red terracotta flowerpot of local or regional origin. Earlier post-medieval wares include a reasonable quantity of glazed local red earthenwares, here probably of 17th- to 19th-century date. A significant number of late medieval or 'Tudor' sherds were also present - mostly unglazed Medway hard silty-sandy ware (LM34A, *c* 1450-1525/50) and a small worn sherd of green-glazed Tudor Green ware (LM15, *c* 1375-1525) from the Surrey/Hampshire border. Other residual earlier pottery included a sherd of North-West Kent greyware (M38A, probably 13th/14th century) and a probable jug sherd with traces of white slip in Ashford/Wealden sandy ware (M40B, probably 13th/14th century). The earliest piece in the assemblage was a remarkably fresh cooking pot rim in North-West Kent sand-free shelly ware (EM35) which probably dates to the 12th or first half of the 13th century.

The range of pottery present is typical of this part of north-west Kent. It is likely that all the pottery - possibly including the small number of earlier types - was deposited or redeposited in the 19th and early 20th centuries, although the medieval and Tudor pottery testifies to earlier occupation in the general area.

***Ceramic building material***

*by Ruth Shaffrey*

A total of 241 fragments of ceramic building material, weighing just under 3kg were recovered. These were all small fragments of medieval/post-medieval material. Most of the ceramic building material was recovered from the buried post-medieval ploughsoil (5008). Smaller quantities were recovered from the deneholes, a rectangular pit (6016) which contained no other finds, and the topsoil. Like the post-medieval pottery, it seems likely that this material was deposited on the site quite recently rather than necessarily reflecting the presence of buildings in the immediate vicinity.

The majority of the fragments by count (152) were of indeterminate form (14% by weight). Of those that could be assigned to type, the most dominant component of the assemblage is peg tile, of which there are 42 fragments (1.2 kg), some with a hole surviving, including two fragments with square holes and one with a circular hole which were recovered from the buried soil. A further 31 fragments (715g) appeared to be of flat/peg tile but are too small to be certain. Three definite fragments of post-medieval brick were recovered as well as a further 11 fragments of likely brick fabric, although they are too small for positive identification of form. No other forms were identified.

A fairly limited range of fabrics was identified. All were fine-grained with a variable sand component and were generally of orange colour. Fabric B contained frequent clay pellet inclusions up to 8 mm in size but was otherwise similar to Fabrics A, C, D and E. The poorly mixed Fabric G contains very frequent chalk inclusions and was only used for brick. This is also true of Fabric F, which is a distinctive red colour and quite porous. Other than the brick fabrics, there are no patterns of fabrics and forms, although this is likely a reflection of the limited range of forms present.

***Fired clay***

*by Dan Stansbie*

A total of 108 fragments of fired clay, weighing 467 g were recovered during the course of the excavations (Table 13). The fired clay was rapidly scanned and the fabrics described according to major inclusion type (for example sandy/shelly). Preservation was poor, with most of the material comprising small abraded and broken up fragments. No objects were completely preserved.

The assemblage is dominated by unidentified material in sandy and sandy/shelly fabrics, with some structural material probably derived from oven covers or walls also present. Some heavily fired fragments in a shelly/sandy fabric, possibly from bricks came from medieval ploughsoil 5008, as did the end of a possible fire bar in a sandy/shelly fabric. Many of the unidentified fragments were recovered from late Bronze Age pits (including one of the pits containing cremated remains). The remaining fragments were recovered from a possibly Roman ditch and undated pits.

***Worked stone***

*by Ruth Shaffrey*

Two tiny fragments of slate and 10 small fragments of lava quern from two contexts (5008, a buried ploughsoil, and 5022, the fill of a recent furrow or rut) were the only pieces of worked stone recovered from the site. The fragments of lava quern are all small and heavily worn suggesting that their period of use significantly predates their deposition. The two very small fragments of slate are imported and are probably (residual) fragments of roof slates.

***Metalwork and glass***

*by Ian Scott*

The remaining finds consist largely of relatively recent objects all of which were recovered from the buried post-medieval ploughsoil (5008=5011), recent ruts or furrows, and the topsoil.

A wide range of metalwork was recovered. Most of this consists of relatively mundane, items of recent date. The most interesting finds are three coins of widely different dates. The earliest is a Roman coin from the post-medieval ploughsoil (context 5008; identified by P Booth):

Nummus of Constantine I, damaged round edges. Soli Invicto Comiti.

RIC VII, Trier 42, AD 313-5.

A silver medieval penny - a ‘Long Cross’ coin probably of the reign of Edward III - well-preserved but much worn, was recovered from the same ploughsoil (context 5011).

The third coin is a halfpenny of George III, dated 1807, which was recovered from context 5025, the fill of a modern rut or furrow.

The remaining iron objects include a padlock hasp, a chain link, a small fragment of a saw blade, a curved iron handle, 16 nails, fragments of two horseshoes, a horseshoe nail and 9 fragments from unidentified objects. There is also a post-medieval snaffle bit of a type which was in use from the 16th to the 18th century.

The remaining copper alloy objects include two small medieval buckles with buckle plates, a recent button with an unidentified heraldic charge and motto, a river, a crotal or pellet, and a bell as well as two pieces of melted copper alloy waster and six unidentified fragments.

The lead objects consist largely of melted waste, but there were also a disc with a lug on one face and a small rectangular block. A finger ring formed from a strip of lead or tin and stamped with the 12 signs of the zodiac was also recovered from the buried post-medieval ploughsoil (5011).

A small number of fragments of modern bottle and window glass were also recovered as well as a a small, modern stopper in blue green glass.

### *The human bone assemblage*

*by Ceridwen Boston*

#### *Introduction*

Sixteen truncated pits contained cremated human remains and varying amounts of charcoal and burnt flint. This group represents an unusually large burial assemblage, as late Bronze Age cremation burials more commonly occurring as singletons or in very small groups.

#### *Osteological methodology*

The cremated human bone was analysed in accordance with modern standards (Brickley and McKinley 2004). The cremation pit fills were 100% sampled, wet sieved, dried and sorted into >10 mm, 4-10 mm and 4- 2 mm fractions. The sorted bone was weighed, assessed for minimum number of individuals, colour, warping and fragment size, and fragments with identifiable anatomical landmarks were sorted into their respective elements or body parts (such as upper and lower limb long bones and skull). Each of these was weighed and described.

Age was estimated using accepted standards for dental development (Moorrees *et al.* 1963), ectocranial suture closure (Meindl and Lovejoy 1985) and epiphyseal fusion (Scheuer and Black 1990). No sexually diamorphic landmarks had survived to ascertain sex.

#### *Results*

#### *Disturbance and condition*

Although cremated bone tends to preserve better than unburnt bone in a hostile burial environment, very little trabecular bone had survived, and cortical bone appeared to have suffered slight to moderate chemical erosion. Thus, diagenesis has contributed to low bone weights.

*Bone weight and representation*

The weight of bone recovered from a modern adult cremation varies between 1000 and 3600 g, depending on age, sex and build (McKinley 1993). Only one cremation deposit at Pinden approached this weight (deposit 5315 weighed 1115 g), and represents a high proportion of that adult, possibly male skeleton. Deposits 5058 and 5107 weighed more than 200 g, and deposit 5102 weighed 160 g, but the remaining deposits were very small, nine weighing less than 10 g (Table 14). Indeed, many of the cremated bone deposits were so tiny (1 g) that species identification was problematic. General texture did, however, suggest that they were human.

Pit dimensions and bone weights in different pits indicate a greater density of bone in some pits than in others. The larger cremation deposits, in particular, did have higher densities of bone in their fills, whilst in others the occasional fleck of cremated bone was all that was present.

The representation of body parts in the larger deposits do not suggests that specific parts of the body were deliberately excluded.

*Bone colour*

The bone assemblage consisted predominantly of fully oxidised, white calcined bone with occasional fragments being pale to dark grey (Table 14). Deposits 5059, 5102 and 5315 showed greatest colour variation ranging from white to grey to black, but the latter two colours were a very small proportion of the whole deposit.

Efficiency of cremation is influenced by the duration of the conflagration and the achieved temperate, the latter depending on the quantity of fuel, pyre construction, the position of the body on the pyre, tending of the pyre, and the weather (McKinley 1994; McKinley 2000). It takes approximately three hours to efficiently cremate a body on a pyre when a minimum temperature of $600^{0}$C is maintained (McKinley 2000). The colour of cremated bone reflects the temperatures achieved during the cremation process, completely oxidised burnt bone being white or calcined, with less completely burnt bone taking on hues of blue and grey, through to poorly oxidised charred bone of black colour.

The overwhelming predominance of white fully oxidised bone in the Pinden assemblage indicates that cremation was generally very complete, and that late Bronze Age mourners undertaking this ritual had sufficient fuel, were conversant with efficient pyre construction and the maintenance of the conflagration, and presumably, that thorough cremation was ideologically important to them.

*Fragmentation*

Bone fragment size was generally small, the maximum fragment size ranging from 1.4 mm to 35 mm, with the larger deposits (5059, 5107 and 5315) having the greatest proportions of the deposit in the >10 mm

fraction. These comprised 21%, 3% and 28% of the total deposit by weight in these three contexts. These proportions are considerably smaller than the 51- 71.2% achieved in modern cremations prior to crushing (McKinley 1993).

The significance of this fragmentation following cremation is difficult to unpick. Due to the loss of collagen and micro-fissuring, cremated bone is very brittle and breaks easily on handling, particularly when disturbed when still warm (McKinley 1994). Fragmentation may occur during handling at several stages, including during collection of bone from the burnt-out pyre following cremation, during the burial act itself, and on archaeological excavation and processing (McKinley 1993). Soil pressures and chemical erosion in the burial environment may also result in fragmentation. Deliberate crushing before burial is practiced today in modern crematoria, and may also have formed part of the funerary rite in the past, but given the complexity of the above sequence, it is impossible to be certain if this had occurred in the Pinden cremation deposits. The lack of uniformity in fragment size makes this unlikely, however.

Small size limited the identification of large proportions of most fragments to element, the bulk of unidentified bone comprising long bone shafts.

*Palaeodemography*

There was no repetition of elements or marked differences in size or age-at-death in any deposit to suggest that it contained more than one individual. Neither was there any clear evidence of unburnt or cremated animal bone in any of the deposits.

Due to the incompleteness of the deposits and the high degree of fragmentation, very few anatomical landmarks were present to precisely age or sex the individuals. Deposit 5315 was sexed as a possible male on the basis of general robusticity alone - not the most accurate tool in assigning sex. Epiphyseal fusion was complete in deposits 5059, 5102, 5107 and 5315, indicating that they had attained an age greater than 15 years, and probably were adults at the time of their deaths. Endo- and ectocranial suture fusion was absent in deposit 5059, suggesting a younger adult, whilst endocranial suture closure but not ectocranial fusion had commenced in deposit 5315, suggesting a slightly older age (tentatively 25-45 years). These age estimates are very approximate given the propensity of the skull to burst open at the suture lines during burning.

Cranial vault fragments from deposits 5087, 5089 and 5091 are extremely thin in cross-section, even after taking into account the shrinkage that normally occurs in the cremation process. This tentatively suggests that these individuals were subadult. Complete tooth roots in deposit 5087 indicated that this individual had attained a minimum age of five years at death, whilst the delicate eggshell-like appearance and small dimensions of cranial vault fragments from deposits 5089 and 5091 both suggested an infant or very young child. The close proximity of pits 5088 and 5090, and the smallness of deposit 5091 (1.4 g) makes it possible that the deposits within these two pits may include the remains of a single individual.

***The wood charcoal and charred plant remains***

*by Sheila Boardman*

*Introduction*

Following the detailed assessment of forty five bulk soil samples by Thompson and Summers, and Nicholson (in Brady *et al.* 2011, 85-91), twenty three samples were selected for fuller analysis, sixteen for wood charcoal, and ten for charred plant remains (CPR). Where possible, the results from the previous assessments have been incorporated into this report, with some limited additional work taking place in order to broaden the results.

*Aims*

The wood charcoal investigation was undertaken to investigate the following:

- The nature of the evidence for pyre debris
- Whether particular tree and shrub taxa were selected
- Choice of fuels in relation to age, sex and possible status of the individuals cremated, where known
- Is it possible to identify pyre debris when human bone is not present?
- Evidence for the nature of the surrounding woodland during the late Bronze Age?

The charred plant investigation was undertaken to investigate the following:

- Whether inclusion of seeds, fruits and tubers, etc. in the late Bronze Age deposits was largely incidental or part of cremation rituals?
- Local food resources and land-use practices in the late Bronze Age, and in Iron Age to early Roman periods (using data from Pinden Quarry and from neighbouring sites)

*Methodology*

The samples were processed using a modified Siraf-type water separation machine. Flots were collected in a 250µm mesh and the heavy residues in a 500µm mesh. Flots and residues were sorted and identified using a low power binocular microscope at magnifications of x10 to x40. Wood charcoal fragments greater than 4 mm in size, and a selection of the material in the 2-4 mm range, were extracted from flots and residues and initially examined at magnifications of x10 to x40. The fragments were fractured by hand and sorted into groups based on features observed in transverse sections. They were then sectioned longitudinally, along their radial and tangential planes and examined at magnifications of up to x350 using a Biolam Metam P1 metallurgical microscope. Identifications of wood charcoal were made with reference to Schweingruber (1990), Hather (2000) and Gale and Cutler (2000). In general, the majority of the wood charcoal greater than

4 mm in size was examined, together with a selection of the 2-4 mm material. Nomenclature of plant material follows Stace (2010). Identifications of the charred grains, chaff and seeds were carried out using standard morphological criteria for the cereals (eg Jacomet 2006) and other plants (eg Berrgren 1969; 1981), and by comparison with modern reference material.

*Results*

*Wood charcoal*

The results are listed by fragment count in Table 15, and presented graphically for most samples in Figure 13. More than 100 fragments were identified for each sample. At least seven taxa are present. These include *Quercus* (oak), Pomoideae (hawthorn group), *Prunus avium/padus* (wild/bird cherry), *Acer campestre* (field maple), *Corylus avellana* (hazel), *Prunus spinosa* (blackthorn/sloe), *Fraxinus excelsior* (ash), and possibly *Alnus* (alder). The level of identification reflects preservation condition, the anatomy of the taxa and their biogeographical range. Pomoideae includes *Malus* (crab apple), *Pyrus* (pear), *Crataegus* (hawthorn) and *Sorbus* (rowan/whitebeam/service). Frequent triseriate rays and spiral thickenings could indicate that hawthorn and/or *Sorbus* species were more common at Pinden Quarry, but unfortunately it is not possible to distinguish between the different Pomoideae taxa.

Twelve samples were analysed from the late Bronze Age pit group adjacent to ditch 5313, of which seven also produced identifiable human remains (Fig. 13). Of the twelve samples, six were dominated by hawthorn group (Pomoideae) charcoal. Oak charcoal dominated five ditch group samples, while hawthorn group and oak were present in roughly equal amounts in one other sample (5002). The other taxa were present in much smaller quantities, except for *Prunus* species in 5012, where cherries and blackthorn together account for more than 23% of the identified material.

The oak charcoal from four of the five oak-dominated ditch group samples (5010, 5015 5009 and 5006) was largely sapwood and/or roundwood. One other sample (5012) produced a mixture of heartwood and sapwood. Evidence for the different parts of the various trees and shrubs represented is discussed further below.

All four samples from the north-eastern pit group (one with cremated bone) were dominated (94% or more) by oak charcoal. In contrast to the ditch group samples, the majority of this was oak heartwood. There were few other differences among the four samples, despite one (5020) having a very late radiocarbon date of 1016-1155 cal AD (972±29BP; SUERC: 44514). It is possible that the hazel roundwood was intrusive here, but all of the material in this feature could be of much more recent origin.

Overall, as has been noted above, with the exception of the pits containing large deposits of cremated remains (in which oak charcoal predominates), it is generally the case that Pomoideae charcoal predominates in the western pits whilst oak predominates to the east. The reasons for this pattern remain uncertain.

*Charred plant remains*

The charred plant remains are listed in Table 16. The counts are for individual grains, seeds, nutlets, etc. unless otherwise stated. F refers to fragments. Complete pignut (*Conopodium majas*) tubers and false oat grass (*Arrhenatherum elatius* ssp. *bulbosus*) swollen culm segments were also counted as one. Tuber (and other) fragments have been roughly scored in Table 16 (see key). Indeterminate tuber-type fragments generally accompanied identifiable finds of either pignut *or* false oat grass, so may derive largely from these species, but other plants cannot be ruled out.

The samples generally contained moderate amounts of charred plant remains, with up to twenty cereal grains, a few chaff fragments, occasional larger pulses, some edible wild plants and a range of smaller seeds. The latter, including possible weeds of cultivation and collected grassy material, were generally the larger component of these samples. There were over a hundred smaller seeds in one cremation sample (5008). Cultivated plants included glume wheats, all probably emmer (*Triticum dicoccum*), although spelt (*Triticum spelta*) may also be present, plus free threshing wheat (*Triticum* sp), hulled barley (*Hordeum* sp.) and one grain of oat (*Avena* sp). Two peas (*Pisum sativum*) and one possible horse bean (*Vicia* cf. *faba*) were recovered, together with some large Vicieae fragments which may represent these or other legumes. In additional to pignut tubers (above), wild edible species included sloe (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), probable blackberry (*Rubus* cf. *fruticosus*) and hazelnut (*Corylus avellana*). These remains are confined to the late Bronze Age samples.

*Discussion*

*Wood charcoal*

*Evidence for pyre debris*

The presence of quantities of charcoal in the Pinden Quarry pits and varying amounts of cremated human bone in some would seem to point to probable pyre debris. However, the charcoal (and other charred plant material) could have come from a variety of sources, including domestic fires. Whether due to this or to truncation by ploughing or during excavation, many pits produced no human bone. Nevertheless, oak and/or hawthorn group charcoal generally dominate all of the pit samples. This seems to point to deliberate selection of particular fuel woods, despite the clear availability of a range of other tree and shrub taxa locally. Deliberate selection of particular woods, and possibly of individual trees, for cremation pyres has been noted on a range Bronze Age sites in southern England (Thompson 1999; and see below).

In terms of the parts of the trees and shrubs represented in the ditch group of pits, almost all the hawthorn group charcoal (in samples with and without bone) exhibited clear curvature of the growth rings, suggesting immature timber or branch wood. Smaller roundwood fragments were also common. The oak charcoal was largely sapwood in four of five oak-dominated ditch group samples (5010, 5015, 5009 and 5006 - the first three with human bone), and oak sapwood or roundwood fragments were more common than

oak heartwood, even in the hawthorn group dominated samples. One oak rich sample from the ditch group (5012, no bone) produced a more even sapwood-heartwood mixture, and may indicate use of different parts of a single tree, or the mixing of timber from mature and immature trees. Nearly all the cherry/blackthorn, and alder or hazel charcoal finds were of small roundwood (with 3–20 growth rings), so they could include possible tinder materials. As noted above, all four samples from the north-eastern pit group were dominated by oak charcoal and this was predominantly oak heartwood.

*Selection of tree and shrub taxa*

Some deliberate selection of fuel wood seems to have taken place in relation to the samples with human bone, in that either hawthorn group or oak charcoal was used, so this material may be considered as *putative* pyre debris. In the ditch group samples more generally, younger trees and/or branch wood seem to have been preferred, possibly because they were a more easily available, renewable resource. One ditch group sample (5012) and all the north-eastern pit group samples had significant quantities of mature oak timber but little or no human bone, so it is impossible say more about why this material was selected.

*Wood charcoal in relation to the human bone*

Table 17 provides a comparison of the charcoal evidence and human bone remains for six samples. There does not seem to be a clear pattern in the taxa, the parts of the trees and shrubs represented, and the ages of the cremated individuals.

*Pyre debris without human remains?*

From the very similar range of wood charcoal found in the other pit samples that produced no human bone, and from the location of the pits and the other materials they contained (burnt flint, sparse mixed charred plant remains, and so on), it would be possible to conclude *very* cautiously, that some or most also contained probable pyre debris. However, the contrasts between the contents of the pits (described above), the relative lack of mixing of finds of different kinds, and the difference in the chronology of the pits with and without cremated remains, can also be taken to suggest that a range of activities were represented by contents of the pits.

*Charred plant remains*

*Tubers and plant remains in the cremation deposits*

Pignut (*Conopodium majus*) tubers have been identified at a number of Neolithic and Bronze Age sites, including Windmill Hill (Fairbairn 2000), Barrow Hills, Oxfordshire (Moffett 1991; 1999) and Beacon Hill,

Somerset (McKinley *et al* 2008), where they have been investigated as a possible food resource, ritual offering or part of the plant material collected as tinder for cremation pyres. Mears and Hillman (2007) have suggested that accidental harvesting of pignut tubers is unlikely, unless whole turfs were burnt. The white stems form at right angles to the tubers and detach easily or break when pulled so pignut tubers have to be dug out. This can take place at different times of year but is easiest when above-ground tissue is visible in spring and summer (Fairbairn 2000). Pignut tubers are similar in texture to chestnuts, with a good, nutty flavour and they can be eaten raw or cooked. Pignuts may indicate some non-cultivated land lay nearby because they do not tolerate tilling (Grigson 1958).

False oat or couch grass (*Arrhenatherum elatius* spp. *bulbosus*) also produces tuber-like growths, which are in fact heavily swollen culm internodes (Stace 2010). They are more widely found than pignut tubers, and in deposits of all ages. They are inedible and more easily pulled up than pignuts (for example, with grassy material collected as tinder: Mears and Hillman 2007). False oat grass is an effective coloniser of arable land but it is susceptible to grazing pressure. Without weeding it can drastically reduce crop yields. Its presence in charred plant samples generally may point to only lightly grazed land, or even abandoned areas, locally.

Pignut tubers were only found in one sample with human remains (5008) from Pinden Quarry, so their role in cremation rituals here remains unknown. They may be best considered part of a suite of wild, edible foods that were available to the local inhabitants, which also included sloe, hawthorn, hazelnut and bramble.

*Crop remains and other plant resources (Table 16)*

Emmer wheat was identified in four late Bronze Age samples, and one late Iron Age/early Roman sample, and may have been the main wheat in use in this area. Some cereal chaff was identified as emmer or spelt, so the latter is also a possible crop (see below). Some hulled and indeterminate barley grains provide a hint of another important prehistoric crop. A single free-threshing wheat rachis fragment was recovered from one late Bronze Age sample (5040), and a grain from one late Iron Age/early Roman sample (5034). This may point to an additional crop, presumably bread wheat (*Triticum aestivum*) which would be unusual in the late Bronze Age. The oat grains in one late Bronze Age sample (5023) probably represent weeds of other crops.

Together, with the seeds of wild plants, the crop remains may represent scattered debris from small-scale crop cleaning activities taking place in the vicinity. Given the range of species present, it is also possible that some are intrusive in these deposits. The wild plant species identified in sample 5008 are all common weeds of cultivation in prehistoric crop assemblages, but there were few cereal remains. Many of these species could also have come onto sites with grassy material collected as animal fodder or bedding. The fruit stones, nutshells and other edible plants represent casual food waste thrown onto domestic fires or even onto the cremation pyres. Due to the nature of the deposits investigated, all comments made in relation to these sparse plant remains are highly speculative.

*Other sites*

*Wood charcoal*

The charcoal from Bronze Age cremations in Kent (eg Challinor 2012; Aldritt 2006; Druce 2011; Boardman in Stansbie *et al*. forthcoming), as elsewhere in southern Britain (eg Challinor 2009; Campbell 2007), tends to be dominated by oak charcoal, and there is clear evidence at many sites for predominantly immature oak being used. There is also some evidence for hawthorn group charcoal, including roundwood, being used as the sole fuel on cremation pyres, for example, on the A2 (Challinor 2012), near Margate (Challinor 2009) and elsewhere. The assemblage from Pinden Quarry is possibly a little unusual in the number of funerary-related deposits in which hawthorn type charcoal dominates (although many of the deposits may only have contained stray or residual deposits of cremated human remains), so it is a little frustrating not to be able to say which tree species were involved. Apple, pear, rowan and hawthorn all burn well, with little smoke, and many with a good scent (Edlin 1949).

Elsewhere in Kent, in domestic features on sites dating to the Neolithic and Bronze Age, the overall range of woody taxa is more or less identical to that from Pinden Quarry (eg Challinor 2012), give or take a few minor species such as yew or birch (Druce 2011). The wood charcoal evidence from Pinden Quarry is therefore consistent with comparative sites in Kent for this period and, together with the macrofossil evidence for additional tree fruits and nuts (see above), this probably provides a fairly accurate picture of the range of woody resources available to local inhabitants during the late Bronze Age.

*Charred plant remains*

Even away from funerary deposits and field boundaries, such as those excavated at Pinden Quarry, charred plant remains tend to be very sparse across Kent as a whole during the Neolithic and Bronze Age. This is in sharp contrast to some Iron Age and Roman sites where very large scale cereal processing can be seen. Recent work on the A2 (Smith 2012), at Northumberland Bottom and Tollgate West (Davis 2006b; 2006c), in the Ebbsfleet Valley (Andrews *et al.* 2011), and on east Kent sites (Hunter pers. com.), has revealed a great deal of 'background noise'. Small amounts of cereals and other remains are found scattered in deposits, often poorly preserved, and it is generally unclear whether they represent food debris, animal fodder or fuel. As at Pinden Quarry, wild tree fruits and nuts are often found (eg Smith 2012), suggesting gathering continued to be an important activity.

One other trend which has been noted recently is the early (Middle Bronze Age) adoption of spelt wheat, for example, at Princes Road in north-west Kent (Pelling 2003), in the A2/Darent Valley area, north-west Kent (Smith, in Simmonds *et al* 2011, 165), and at East Hall Farm, Sittingbourne (Boardman in Stansbie *et al*. forthcoming). Whether this was associated with the cultivation of new areas, or adoption of a new (winter) sowing season, remains unclear. There is no evidence for early spelt cultivation at Pinden Quarry. Only emmer wheat chaff was definitively identified, in both the late Bronze Age samples, and in the

late Iron Age/early Roman ditch deposits. So, as elsewhere in Kent at this time, cultivation at Pinden Quarry seems to have been small scale.

### *Conclusions*

The charcoal assemblage from Pinden Quarry has provided new evidence for probable cremation pyre material from a funerary context. Two taxa seem to have been preferred: oak and hawthorn group. The latter includes a range of trees and shrubs (ie apple, pear, hawthorn and rowan/whitebeam/service) but it was not possible to say which ones were used. There seems to have been a preference for immature trees or wood, although mature timbers were also found. There is a fairly consistent picture of fuel use across the site over the period it was in use. This adds to the picture produced elsewhere that the local inhabitants understood and used cremation technology well.

The charred plant remains, from the late Bronze Age cremation deposits and from the late Iron Age/ early Roman field boundaries, reveal a background of crop plants, possible weeds of cultivation and a range of collected plants. Unsurprisingly for these deposits, they provide little good economic evidence for agriculture and land use in the wider region at these times. Of possible note are the number of collected plants present (including tree fruits, hazelnut and pignut tubers), and several remains (eg false oat grass culms and pignut tubers) which hint that the area may have been only lightly cultivated or grazed in the late Bronze Age.

### *Animal bone*

*by Lena Strid*

A total of 36 fragments of animal bone were recovered. Almost all of these bones were recovered either from the post-medieval ploughsoil (5008: 23 fragments), from denehole 5202 (3 fragments) or from undated contexts (8 fragments). Just two fragments were recovered from contexts of any archaeological interest: a horse astragalus from probably Roman ditch 5334, and a fragment from a large mammal in ditch 5335 (which was of uncertain date). The bone from the post-medieval ploughsoil (5008) included parts of a partially articulated spine and ribs (comprising 11 thoracic vertebrae and 8 rib fragments) probably from a horse. Most of the bone, however, was in such a poor condition that it was unidentifiable.

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*Table 1: Summary of the main group of late Bronze Age pits*

| Pit | Fill | Finds group | Spatial group | Max width (m) | Depth (m) | Estimated volume (m3) |
|---|---|---|---|---|---|---|
| 5110 | 5111 | Charcoal | Ditch group W | 0.25 | 0.07 | 0.002 |
| 5278 | 5279 | Charcoal | Ditch group W | 0.25 | 0.11 | 0.004 |
| 5106 | 5107 | Med crem | Ditch group W | 0.42 | 0.16 | 0.015 |
| 5062 | 5063 | Charcoal | Ditch group W | 0.35 | 0.18 | 0.012 |
| 5099 | 5100 | Charcoal | Ditch group W | 0.37 | 0.1 | 0.007 |
| 5086 | 5087 | Flint | Ditch group W | 0.42 | 0.23 | 0.021 |
| 5108 | 5109 | Flint | Ditch group W | 0.3 | 0.05 | 0.002 |
| 5101 | 5102 | Mixed | Ditch group W | 0.56 | 0.27 | 0.044 |
| 5084 | 5085 | Charcoal | Ditch group W | 0.29 | 0.11 | 0.005 |
| 5314 | 5315 | Large crem | Ditch group W | 0.43 | 0.19 | 0.018 |
| 5088 | 5089 | Med crem | Ditch group W | 0.49 | 0.22 | 0.028 |
| 5090 | 5091 | Charcoal | Ditch group W | 0.42 | 0.11 | 0.010 |
| 5093 | 5094 | Charcoal | Ditch group E | 0.36 | 0.13 | 0.009 |
| 5321 | 5322 | Flint | Ditch group E | 0.31 | 0.1 | 0.005 |
| 5328 | 5329 | Flint | Ditch group E | 0.2 | 0.08 | 0.002 |
| 5082 | 5083 | Flint | Ditch group E | 0.48 | 0.13 | 0.016 |
| 5060 | 5061 | Charcoal | Ditch group E | 0.26 | 0.04 | 0.001 |
| 5058 | 5059 | Med crem | Ditch group E | 0.42 | 0.24 | 0.022 |
| 5095 | 5096 | Charcoal | Ditch group E | 0.33 | 0.13 | 0.007 |
| 5055 | 5056 | Charcoal | Ditch group E | 0.37 | 0.06 | 0.004 |
| 5048 | 5049 | Flint | Ditch group E | 0.3 | 0.09 | 0.004 |
| 5112 | 5113 | Flint | Ditch group E | 0.52 | 0.17 | 0.024 |
| 5348 | 5349 | Flint | SE group | 0.94 | 0.09 | 0.042 |
| 5350 | 5351 | Charcoal | SE group | 0.25 | 0.09 | 0.003 |
| 5352 | 5353 | Flint | SE group | 0.24 | 0.06 | 0.002 |
| 5354 | 5355 | Flint | SE group | 0.38 | 0.14 | 0.011 |
| 5114 | 5115 | Charcoal | NE group | 0.41 | 0.08 | 0.007 |
| 5120 | 5121 | Charcoal | NE group | 0.68 | 0.03 | 0.007 |
| 5120 | 5122 | Charcoal | NE group | 0.66 | 0.15 | 0.034 |
| 5134 | 5135 | Charcoal | NE group | 0.51 | 0.11 | 0.015 |
| 5118 | 5119 | Charcoal | NE group | 0.74 | 0.06 | 0.017 |
| 5050 | 5051 | Charcoal | NE group | 0.35 | 0.09 | 0.006 |

*Table 2: Summary of finds in the main group of late Bronze Age pits*

| Pit | Fill | Finds group | Cremated remains weight (g) | Burnt flint weight (g) | Estimated charcoal weight (g) in 40 litre sample | Pot (no./ weight (g)) | Pot date | Flint (no. pieces) | Fired clay (no./ weight (g)) |
|---|---|---|---|---|---|---|---|---|---|
| 5348 | 5349 | Flint | | 429 | 1 | 6/16 | LBA | 9 | |
| 5354 | 5355 | Flint | | 68 | 2 | 1/1 | LBA | 6 | |
| 5086 | 5087 | Flint | 35 | 230 | 8 | | | 4 | |
| 5048 | 5049 | Flint | 9 | 139 | 6 | | | 3 | |
| 5352 | 5353 | Flint | | 145 | 10 | | | 3 | |
| 5112 | 5113 | Flint | | 419 | 32 | | | 3 | |
| 5082 | 5083 | Flint | | 193 | 15 | | | 7 | |
| 5108 | 5109 | Flint | 1 | 117 | 10 | | | | |
| 5321 | 5322 | Flint | | 22 | 3 | | | | |
| 5328 | 5329 | Flint | 1 | 102 | 16 | | | 2 | |
| 5106 | 5107 | Med crem | 191 | 41 | 17 | | | | |
| 5088 | 5089 | Med crem | 56 | 46 | 8 | | | | |
| 5058 | 5059 | Med crem | 171 | 213 | 26 | 1/1 | LBA | 2 | |
| 5314 | 5315 | Large crem | 1004 | | 11 | 1/7 | LBA | 2 | |
| 5101 | 5102 | Mixed | 136 | 512 | 184 | 15/5 | | 8 | 2/4 |
| 5055 | 5056 | Charcoal | | 7 | 6 | | | 2 | |
| 5134 | 5135 | Charcoal | | 36 | 38 | | | | |
| 5090 | 5091 | Charcoal | 1 | 14 | 20 | | | | |
| 5095 | 5096 | Charcoal | | 89 | 164 | | | | |
| 5050 | 5051 | Charcoal | 3 | 2 | 5 | | | | |
| 5120 | 5121 | Charcoal | | 12 | 52 | | | | 4/11 |
| 5350 | 5351 | Charcoal | | 1 | 7 | | | 1 | |
| 5114 | 5115 | Charcoal | 8 | | 20 | 1/3 | | | |
| 5062 | 5063 | Charcoal | 14 | | 54 | | | | |
| 5110 | 5111 | Charcoal | 2 | | 8 | | | | |
| 5278 | 5279 | Charcoal | 4 | | 20 | | | | |
| 5060 | 5061 | Charcoal | | | 13 | 4/5 | LBA | 2 | |
| 5093 | 5094 | Charcoal | | | 91 | 4/4 | LBA | | |
| 5099 | 5100 | Charcoal | | | 65 | | | | |
| 5120 | 5122 | Charcoal | 1 | | 13 | | | | 6/23 |
| 5084 | 5085 | Charcoal | | | 4 | | | | |
| 5118 | 5119 | Charcoal | | 5 | 120 | | | 1 | |

*Table 3: Summary of numbers of fills in the main groups of late Bronze Age pits containing the three main categories of finds, and the numbers of fills with combinations of finds*

| | ***Cremated human remains*** | ***Burnt unworked flint*** | ***Charcoal*** | ***Cremated human remains and charcoal*** | ***Burnt unworked flint and charcoal*** | ***Cremated human remains, burnt unworked flint, and charcoal*** | ***Charcoal only*** |
|---|---|---|---|---|---|---|---|
| *No. of fills* | 16 | 22 | 32 | 6 | 12 | 10 | 4 |

*Table 4: Radiocarbon dates from the main group of late Bronze Age pits*

| ***Name*** | ***Pit*** | ***Material*** | ***Lab. no.*** | ***Uncalibrated (BP)*** | ***Unmodelled (cal BC)*** | | ***Modelled (cal BC)*** | | ***Indices Amodel 96.2 Aoverall 92.2*** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ***68.2%*** | ***95.4%*** | ***68.2%*** | ***95.4%*** | ***A*** | ***C*** |
| Sequence Pinden Quarry | | | | | | | | | | |
| Boundary Start LBA activity | | | | | | | 1340-1060 | 1630-1030 | | 97.6 |
| Phase Pinden LBA activity | | | | | | | | | | |
| Sequence Cremation | | | | | | | | | | |
| Boundary Start main cremation | | | | | | | 1020-950 | 1050-920 | | 99.2 |
| Phase Main cremation | | | | | | | | | | |
| R_Date 5114 Few NE Crem | 5114 | Cremated human bone | SUERC44217 | | 1020-930 | 1060-900 | 990-930 | 1010-920 | 112.8 | 99.7 |
| R_Date 5058 Med crem DGE Crem | 5058 | Cremated human bone | SUERC44223 | | 1010-930 | 1050-900 | 990-930 | 1010-920 | 113.9 | 99.6 |
| R_Date 5106 Med crem DGW Crem | 5106 | Cremated human bone | SUERC44225 | | 1000-920 | 1040-890 | 990-930 | 1010-910 | 112.6 | 99.8 |
| R_Date 5314 Large crem DGW Crem | 5314 | Cremated human bone | SUERC44222 | | 1000-920 | 1040-890 | 990-930 | 1010-910 | 113.1 | 99.5 |
| R_Date 5050 Few NE Crem | 5050 | Cremated human bone | SUERC44218 | | 980-900 | 1020-850 | 990-930 | 1010-910 | 109.8 | 99.7 |
| *Span Span main cremation* | | | | | | | *0-40* | *0-80* | | *99.6* |
| Boundary End main cremation | | | | | | | 970-910 | 1000-870 | | 99 |
| R_Date 5101 Mix DGW Crem | 5101 | Cremated human bone | SUERC44224 | | 910-840 | 970-820 | 920-840 | 980-820 | 95.8 | 99.6 |
| Sequence Other activity | | | | | | | | | | |
| Boundary Start other activity | | | | | | | 1220-1050 | 1350-1010 | | 99.1 |
| Phase CPR & charcoal | | | | | | | | | | |
| R_Date 5348 Flint SE Barley | 5348 | Charred barley grain | SUERC44509 | | 1260-1120 | 1300-1050 | 1180-1010 | 1250-1000 | 60.6 | 99.2 |
| R_Date 5321 Flint DGE Wheat | 5321 | Charred wheat grain | SUERC44508 | | 1120-1010 | 1200-940 | 1090-1000 | 1130-930 | 104.2 | 99.7 |
| R_Date 5112 Flint DGE Haw | 5112 | Hawthorn charcoal | SUERC44510 | | 920-840 | 980-820 | 1010-880 | 1010-840 | 72.1 | 99.6 |
| *Span Span other activity* | | | | | | | *80-270* | *20-350* | | *99.2* |
| Boundary End other activity | | | | | | | 970-830 | 1020-700 | | 99.5 |
| Boundary end LBA activity | | | | | | | 910-710 | 930-350 | | 97.8 |
| Excluded date | | | | | | | | | | |

*Table 5: Summary of other possibly late Bronze Age pits and tree-throw holes*

| Cut | Width (m) | Depth (m) | Fill | Charcoal | Pot No/weight (g) | Date | Flint No. | Burnt flint No./weight (g) | Fired clay No./weigh (g) |
|---|---|---|---|---|---|---|---|---|---|
| *Pits* | | | | | | | | | |
| 5339 | 0.42 | 0.17 | 5339 | | 10/6 | LBA | | 5/57 | |
| 6003 | 0.54 | 0.16 | 6004 | present | 6/32 | LBA | 3 | 4/144 | 1/1 |
| 6000 | 0.66 | 0.15 | 6002, 6001 | | | | | 3/119 | |
| 6011 | 0.52 | 0.3 | 6012 | | | | | | |
| 5209 | 1.08 | 0.32 | 5210 | | | | | 2/111 | |
| 5013 | 2.6 | 0.32 | 5012 | | 1/9 | LBA | 50 | 21/862 | 53/255 |
| 5205 | 0.5 | 0.1 | 5206 | | 1/3 | LBA | | | |
| 5097 | 0.26 | 0.3 | 5098 | | 1/2 | LBA | | | |
| *Tree-throw holes* | | | | | | | | | |
| 5219 | 1.33 | 0.31 | 5220, 5221 | ++ | 1/13 | | | 500/13,500 | |
| 5222 | 1.5 | 0.4 | 5223, 5232 | +++ | | | | 210/3511 | |
| 5233 | 1.02 | 0.36 | 5234, 5235 | | | | | 400/10,000 | |

*Table 6: Summary of finds from late Bronze Age ditches*

| Ditch | Cut | Max width (m) | Max depth (m) | Pottery (no./weight (g)) | Flint (no.) | Burnt flint (no./weight (g)) | Charcoal |
|---|---|---|---|---|---|---|---|
| 5313 | 5166 | 0.36 | 0.16 | | | 300/3500 | present |
| | 5257 | 0.56 | 0.21 | | 1 | 17/542 | |
| | 5287 | 0.46 | 0.16 | 1/6 | 2 | 2/55 | |
| 5344 | 5344 | 2 | 0.09 | 8/11 | | | |
| 5230 | 5230 | 1.9 | 0.66 | 2/3 | | | |

*Table 7: Summary of selected later Bronze Age cremation burials in Kent*

| Site | Feature no. | Width (m) | Depth (m) | Cremated remains weight (g) | Age and sex | Other finds/notes | Reference |
|---|---|---|---|---|---|---|---|
| **A2 Site B** | 7758 | 0.4 | 0.14 | 194.9 | adult | | Allen *et al.* 2012 |
| **A2 Site C** | 5017 | 0.5 | 0.09 | 234 | | 1 frag glass, Weed seeds, charcoal | Allen *et al.* 2012 |
| **A2 Site C** | 5276 | 0.67 | 0.16 | 100 | | charcoal - oak, 2 pieces flint; burnt animal bone | Allen *et al.* 2012 |
| **A2 Site C** | 5278 | 0.36 | 0.13 | 113 | | weed seeds, charcoal. pot 65 sherds/6 g | Allen *et al.* 2012 |
| **A2 Site D** | 6010 - 6008 | 0.22 | 0.32 | 402.7 | adult | charcoal | Allen *et al.* 2012 |
| **A2/A282** | 10296 | 0.55 | 0.19 | 6 | | | Simmonds *et al.* 2011 |
| **Beechbrook Wood** | 1290 | - | - | 52 | adult | charcoal; CPR - wheat (inc, spelt and chaff), corn spurrey, *Vicia/Lathyrus/ Pisum; onion couch grass tuber; grass, and various other weeds* | Brady 2006a |
| **Beechbrook Wood** | 1294 | 0.33 | 0.06 | <1 | | charcoal; CPR | Brady 2006a |
| **Broadley Road** | | | | | | NZA-29152 2867+/-65 BP; intrusive in Neolithic mortuary chamber beam slot (7439), within undated ring ditch | Andrews *et al*. 2009 |
| **Dartford Football Club** | 5220 | 1.07 | 0.19 | 134 | | dimensions are means for whole group | Simmonds *et al.* 2011 |
| **Dartford Football Club** | 5296 | 1.07 | 0.19 | 32 | | | Simmonds *et al.* 2011 |
| **Dartford Football Club** | 5565 | 1.07 | 0.19 | 67 | | burnt flint | Simmonds *et al.* 2011 |
| **Dartford Football Club** | 5179 | 1.07 | 0.19 | 160 | | | Simmonds *et al.* 2011 |
| **Dartford Football Club** | 5291 | 1.07 | 0.19 | 23 | | | Simmonds *et al.* 2011 |
| **Dartford Football Club** | 5433 | 4 | 0.56 | 305 | | pyre debris | Simmonds *et al.* 2011 |
| **Deal's Gateway, Deptford** | 52 | 0.32 | 0.12 | 171 | adult? | mostly alder charcoal, some oak plus purgin g buckthorn and hawthorn, little burnt flint | |
| **East Hall Farm, Sittingbourne** | 2022 | 0.38 | 0.14 | 8.3 | adult | charcoal | Stansbie *et al*. forthcoming |
| **East Hall Farm, Sittingbourne** | 2027 | 0.3 | 0.26 | 431 | adult | charcoal; animal bone | Stansbie *et al*. forthcoming |
| **Ebbsfleet** | 20716 - 20715 | 0.42 | 0.12 | 24 | infant, >5 yrs | charcoal | Wenban-Smith *et al*. in prep. |
| **Ebbsfleet** | 15030 - 15028 | | 0.08 | 251.5 | adult >25 yrs, female? | urned, cremated animal bone; charcoal | Wenban-Smith *et al*. in prep. |
| **Ebbsfleet** | 15086 | 0.18 m2 | 0.01 | 14 | adult >35 yrs, female? | surface spread - severely truncated | Wenban-Smith *et al*. in prep. |
| **Eynsford-Horton Kirby pipeline** | 631 | 0.6 | 0.13 | 114 | adult | charcoal; *c* 100 m from ring ditch | Simmonds *et al.* 2011 |
| **Eynsford-Horton Kirby pipeline** | 686 + 3 others | | | 29 to 338 g | | deposits in ring ditch | Simmonds *et al.* 2011 |
| **Iwade** | 1151 | | | 137 | | | Bishop and Bagwell 2005 |
| **Iwade** | 2014 | | | 525 | | | Bishop and Bagwell 2005 |
| **Pilgrims' Way** | 852 | 0.5 | 0.26 | 1235 | adult male | onion couch tuber; wheat; weeds; oak charcoal; unburnt animal bone; worked flint; burnt flint | Hayden and Stafford 2006 |
| **Pilgrims' Way** | 948 | 0.3 | 0.26 | 130 | adult, female? | onion couch tuber; weed seeds; oak charcoal; worked flint | Hayden and Stafford 2006 |
| **Saltwood Tunnel** | 3602 | 0.82 | 0.4 | 134 | adult, female? | CPR - (unurned) | Riddler and Trevarthen 2006 |
| **Tutt Hill** | 98 | 0.7 | 0.18 | 6 | | charcoal, calcined flint | Brady 2006b |

*Table 8: Summary of the form and dimensions of the deneholes*

| Structure | Entrance | | | | Chambers | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **type** | **shape in plan (and section)** | **max width/ length (m)** | **depth (m)** | **number** | **shape in profile** | **shape in plan** | **height (m)** | **width (m)** | **length (m)** |
| **5144** | shaft | circular at top; rectangular at base | top: 2.8 base: 5.3 x 3.1 | 4.5 | 5310 | arched; flat floor | semicircular | 2.3 | 1.8 | 0.9 |
| | | | | | 5311 | arched; flat floor | semicircular | 2.1 | 2.6 | 1.3 |
| **5188** | shaft | circular | 3.2 | 2.7 | 5305 | arched; flat floor | subrectangular | - | 1.9 | 2.6 |
| | | | | | 5304 | arched; flat floor | subrectangular | - | 1.9 | 2.0 |
| **5202** | shaft | circular | 4.6 | 3.5 | - | very slight niche at base of shaft on north face only | - | - | - | - |
| **5240** | shaft | irregular oval | 3.9 | 2.7 | none observed | (section collapsed following excavation) | | | | |
| **5360** | adit | linear (rounded base and steep sides) | 1.8/2.4 | 1.0 | 5242 | arched; flat floor | subrectangular | 2.2 | 2.0 | 4.6 |
| | | | | | 5243 | arched; flat floor | ovate | 1.3 | 1.2-1.8 | 3.6 |

*Table 9: Summary of the flint assemblage*

| CATEGORY TYPE | No. pieces |
|---|---|
| Flake | 179 |
| Blade | 5 |
| Bladelet | 2 |
| Blade-like | 13 |
| Irregular waste | 18 |
| Sieved Chips10-4mm | 32 |
| Rejuvenation flake | 1 |
| Janus flake | 1 |
| Core single platform blade | 1 |
| Core multi platform flake | 1 |
| Core fragment | 1 |
| Scraper end | 2 |
| Scraper side | 1 |
| Scraper thumbnail | 1 |
| Scraper thermal/other | 2 |
| Piercer | 4 |
| Burin | 2 |
| Ground implement flake | 1 |
| Microdenticulate/ | 1 |
| Notch | 2 |
| Retouch miscellaneous | 2 |
| Retouched flake | 4 |
| Total | 276 |

| | |
|---|---|
| Burnt unworked flint No./g | 2359 / 43058g |
| No. burnt (exc. sieved chips) (%) | 9/244 (3.69%) |
| No. broken (exc. sieved chips) (%) | 43/244 (17.62%) |
| No. retouched (exc. sieved chips) (%) | 22/244 (9.02%) |

*Table 10: Summary of prehistoric pottery*

| *Feature/cut* | *Context* | *No. sherds* | *Weight (g)* | *Fabric* | *Decoration* | *Date* |
|---|---|---|---|---|---|---|
| LBA? TTH 5219 | 5220 | 1 | 11 | QS | | Early Neo |
| Post-med Denehole 5202 | 5250 | 3 | 6 | QS | | Early Neo |
| LN/EBA pit or ph 5211 | 5212 | 1 | 3 | G | chevon | LN/EBA |
| LBA crem pit 5058 | 5059 | 1 | 1 | F | | LBA, 1010-920 cal BC |
| LBA crem pit 5314 | 5315 | 1 | 7 | F | | LBA, 1010-920 cal BC |
| LBA mixed pit 5101 | 5102 | 15 | 5 | F | | crumbs |
| LBA charc pit 5060 | 5061 | 4 | 5 | F | | LBA |
| LBA charc pit 5093 | 5094 | 4 | 4 | F | | LBA |
| LBA charc pit 5114 | 5115 | 1 | 3 | FG | | LBA, 1010-920 cal BC |
| LBA burnt flint pit 5348 | 5349 | 4 | 14 | F1 | | LBA, 1350-1010 cal BC |
| LBA burnt flint pit 5348 | 5349 | 2 | 2 | Q | | |
| LBA burnt flint pit 5354 | 5355 | 1 | 1 | F | | LBA |
| LBA burnt spread | 5330 | 23 | 55 | F1 | | LBA |
| LBA burnt spread | 5330 | 3 | 11 | QF | | |
| Other LBA pit 5339 | 5340 | 10 | 5 | F | | LBA |
| Other LBA pit 5097 | 5098 | 1 | 1 | F | | LBA |
| Other LBA pit 5205 | 5206 | 1 | 3 | F | | LBA |
| Other LBA pit 5339 | 5340 | 10 | 5 | F | | LBA |
| Other LBA pit 5097 | 5098 | 1 | 1 | F | | LBA |
| Other LBA pit 5205 | 5206 | 1 | 3 | F | | LBA |
| Other LBA pit 6003 | 6004 | 3 | 21 | F | | LBA |
| Other LBA pit 6003 | 6004 | 2 | 10 | F2 | | LBA |
| LBA ditch 5313, cut 5287 | 5288 | 1 | 5 | G | | |
| LBA ditch 5230 | 5231 | 2 | 2 | GF | | |
| LBA ditch 5344 | 5343 | 8 | 10 | F1 | | LBA |
| LBA? pit or ditch 5013 | 5012 | 1 | 7 | F1 | | LBA |
| Roman ditch 5312, cut 5289 | 5291 | 1 | 3 | F1 | | LBA |
| Roman ditch 5334=6036, cut 6027 | 6028 | 1 | 17 | F1 | | LBA |
| Undated ditch 5335, cut 5200 | 5201 | 1 | 2 | GF | | |
| Post-med ploughsoil | 5008 | 3 | 5 | F1 | | LBA |
| Post-med ploughsoil | 5008 | 2 | 6 | GF | | |

*Table 11: Summary of late Iron Age and Roman pottery*

| ***Group*** | ***Cut*** | ***Fill/layer*** | ***No. sherds*** | ***Weight (g)*** | ***Comments*** | ***Group date*** |
|---|---|---|---|---|---|---|
| Roman enclosure 5312 | 5266 | 5267 | 1 | 4 | Flint-tempered fabric | Iron Age |
| Roman enclosure 5312 | 5298 | 5299 | 1 | 14 | Rim from necked jar in glauconitic fabric | 50 BC-AD 50 |
| Roman enclosure 5312 | 5213 | 5214 | 1 | 1 | Flint-tempered body sherd | 50 BC-AD 100 |
| | | | 5 | 116 | Grog-tempered storage jar body sherds; reduced fabric, oxidised externally | |
| Roman enclosure 5312 | 5292 | 5293 | 4 | 484 | Grog-tempered storage jar with stabbed decoration on shoulder | 50 BC-AD 100 |
| Roman enclosure 5312 | 5255 | 5256 | 1 | 1 | Fine oxidised ware - ?North Kent oxidised ware | AD 50-300 |
| | | | 6 | 4 | Fragments in flint-tempered fabric | |
| Denehole 5202 | 5202 | 5224 | 8 | 2 | Very small ?flint-tempered fragments | Undated |
| Post-medieval ploughsoil | | 5008 | 1 | 6 | Neck sherd in reduced fabric, oxidised externally; fine sand and flint temper | Iron Age |
| Ditch 5335 | 5009 | 5010 | 5 | 16 | Oxidised fabric with grog and organic inclusions | 50 BC-AD 100 |
| | | *Total* | *33* | *648* | | |

*Table 12: Summary of the post-Roman pottery (fabric codes follow those of the Canterbury Archaeological Trust)*

| *Feature/layer* | *Context* | *Date* | *No. sherds* | *Weight (g)* | *Comments* |
|---|---|---|---|---|---|
| Topsoil | 5000 | *c* 1825-1900 | 2 | 31 | 1x LPM2 flowerpot base (14g). 1x LPM10 Modern English stoneware (18g) - late brown salt-glazed jar rim |
| Post-medieval ploughsoil | 5008 | *c* 1835-1900 | 22 | 145 | 1x LPM10 Mod stoneware with 'Bristol' glaze (11g). 5x LPM2 (32g). 7x PM1 post-med red earthenware (38g) prob 17-18C. 5x LM34A Medway hard silty-sandy ware (37g) prob E16C, fairly fresh bodysherds (bss). 1x LM32 Late med Wealden orange-buff sandy (7g). 1x prob LM15 Tudor Green ware (2g) worn ?jug sherd - v fine white fabric. 1x M38A NW Kent greyware (7g) poss from 13/14C jug spout or handle junction - worn. 1x EM35 NW Kent shelly ware, sand-free (11g) cooking pot rim prob 12/13C, fresh, shell dissolved |
| Post-medieval ploughsoil | 5011 | *c* 1825-1900 | 17 | 136 | 1x LPM10 brown salt-glazed jar rim. 6x LPM2. 8x PM1 prob 17-19C. 1x LM34A. 1x M40B prob Ashford/Wealden sandy ware (2g) poss jug bs w tiny trace white slip ext, worn |
| Recent furrow or rut | 5022 | *c* 1780-1850 | 2 | 5 | 1x LPM21 Midlands/NE England black glazed redware - poss square profile jug handle etc? 1x scrap PM1 |
| Topsoil | 6007 | 13th-20th century | 4 | 15 | 1 glazed 13th-14th C sherd;<br>2 19th-20th C;<br>1 late medieval? |
| *Total* | | | *47* | *332* | |

*Table 13: Summary of the fired clay*

| *Feature/layer* | *Context* | *No. frags* | *Weight (g)* | *Fabric (type)* |
|---|---|---|---|---|
| LBA mixed pit 5101 | 5102 | 2 | 4 | sandy (UNID) |
| LBA charcoal pit 5120 | 5121 | 6 | 23 | sandy/shelly (structural, UNID) |
| LBA charcoal pit 5120 | 5122 | 4 | 11 | sandy/shelly (UNID) |
| LBA charcoal pit 5134 | 5135 | 18 | 46 | sandy/shelly (UNID) |
| LBA other pit 5013 | 5012 | 53 | 255 | sandy (structural, UNID) |
| LBA other pit 6003 | 6004 | 1 | 1 | (UNID) |
| ?Roman ditch 6015, cut 6009 | 6010 | 1 | 4 | voids - organic temper (UNID) |
| Post-medieval buried soil | 5008 | 7 | 49 | shelly/sandy (heavily fired frags - PMED?), sandy/flint (UNID), shelly/sandy (object - frag of fire bar?) |
| Modern deposit | 5027 | 11 | 67 | sandy (structural) |
| Undated pit 5075 | 5077 | 1 | 2 | sandy/flinty (UNID) |
| Undated pit 5064 | 5066 | 4 | 5 | sandy (UNID) |
| *Total* | | *108* | *467* | |

*Table 14: Summary of deposits of cremated human bone*

| *Context* | *Feature* | *Sample* | *Weight (g)* | *Colour* | *Max frag size (mm)* | *Body parts identified* | *Age* | *Sex* |
|---|---|---|---|---|---|---|---|---|
| **Ditch group** | | | | | | | | |
| 5049 | 5048 | 5000 | 7.3 | white | 11 | cranium, long bones | possible child | |
| 5059 | 5058 | 5002 | 214 | mostly white; grey and black | 8 | cranium, humerus, ulna, femur, tibia | adult, probably younger adult | |
| 5063 | 5062 | 5005 | 13.6 | mostly white with some pale grey | 5 | vertebral arch, long bone shafts | unknown | |
| 5087 | 5086 | 5008 | 36 | largely white with some pale grey | 20 | cranial vault, tooth roots, long bones probably ulna, radius or fibula | probable child or adolescent > 5 years | |
| 5089 | 5088 | 5009 | 57 | mostly white | 25 | cranial vault including petrous bone, rib, humerus, femur | possible infant or young child | |
| 5091 | 5090 | 5010 | 1.4 | white | 1.4 | cranium, long bone shafts | possible infant or young child | |
| 5102 | 5101 | 5014 | 160 | mostly white but with dark grey- black | 20 | cranium, hand phalanges, metacarpals and metatarsals, tibia | probable adult | |
| 5107 | 5106 | 5015 | 263 | mostly white with some grey | 32 | cranial vault, tooth roots, humerus, hand phalanges, scapula, ulna, lower leg long bones | >15 years | |
| 5109 | 5108 | 5016 | <1 | white | 3 | long bone | unknown | |
| 5111 | 5110 | 5017 | 1 | white | 5 | nil identified | unknown | |
| 5279 | 5278 | 5030 | 1 | white | 5 | nil identified | unknown | |
| 5315 | 5314 | 5035 | 1114.6 | mostly white with some grey and black | 35 | cranial vault, tooth roots, zygoma, all major long bones, calcaneus, seasamoid, ribs, vertebrae | adult *c* 25-45 years | male ? |
| 5329 | 5328 | 5037 | <1 | grey-white | 3 | long bone | unknown | |
| **NE Group** | | | | | | | | |
| 5051 | 5050 | 5001 | 5 | white | 5 | lower limb long bone | unknown | |
| 5115 | 5114 | 5019 | 6.1 | white- pale grey | 2 | nil identified | unknown | |
| 5122 | 5120 | 5021 | <1 | grey | 2 | spongy bone (element unknown) | unknown | |

Table 15: Summary of charcoal (**KEY:** Symbols used in fragment counts: h - heartwood; s - sapwood; r - roundwood. *Pomoideae (syn. Maloideae) includes: *Pyrus* (pear), *Malus* (apple), *Crataegus* (hawthorn), *Sorbus* (rowan, service, whitebeam)

| **Context No** | | 5091 | 5107 | 5087 | 5089 | 5102 | 5063 | 5100 | 5085 | 5059 | 5096 | 5094 | 5083 | 5121 | 5122 | 5135 | 5119 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample vol. (litres)** | | 20 | 19 | 20 | 30 | 20 | 20 | 8 | 9 | 42 | 9 | 14 | 24 | 20 | 21 | 20 | 27 |
| **Feature group** | | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp E | Ditch gp E | Ditch gp E | Ditch gp E | NE gp | NE gp | NE gp | NE gp |
| **Feature no.** | | 5090 | 5106 | 5086 | 5088 | 5101 | 5062 | 5099 | 5084 | 5058 | 5095 | 5093 | 5082 | 5120 | 5120 | 5134 | 5118 |
| **Feature type** | | Crem? | Crem | Crem | Crem | Crem | Crem | Crem | Pit | Crem | Crem? | Crem? | Pit | Crem | Crem | Pit | Pit |
| **Period** | | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA | LBA |
| **Fagaceae** | | | | | | | | | | | | | | | | | |
| *Quercus* | oak | 93s | 102s(h) | 8s | 132s(h) | 1s | | | 19s | 65s(h) | 90sh | 40rs | 83s | 123h(s) | 129h(s) | 108h(s) | 143h(sr) |
| **Betulaceae** | | | | | | | | | | | | | | | | | |
| *Alnus/Corylus* | alder/hazel | | | | | | | | | | | 1r | | | | | 1 |
| *Corylus avellana* | hazel | | | | | 1 | | | | | | | | | | | 5r |
| **Rosaceae** | | | | | | | | | | | | | | | | | |
| *Prunus avium/padus* type | wild/bird cherry | 5 | | | | 5 | | | | | 15r | | 5r | | | | |
| *Prunus spinosa* type | blackthorn | | | | | | | | | | 1r | | 1 | | | | |
| *Prunus* sp. | cherry/blackthorn | 4r | | 2r | | 2r | 2 | | 2 | | 12r | | 1 | | | | |
| cf. *Prunus* sp. | | | | | | | 2r | | | | 1 | | | | | | |
| Pomoideae* (see key) | syn. Maloideae | 1 | | 86 | 2 | 101r | 102 | 117r | 80r | 55r | 2r | 101r | 7 | | | | |
| cf. Pomoideae | | | 1 | 6 | | 1 | | 5 | | 1 | | | | | 1 | | 3 |
| **Aceraceae** | | | | | | | | | | | | | | | | | |
| *Acer campestre* | field maple | | | | | 2 | | | | 1 | | | | | | | |
| cf. *Acer campestre* | | 3 | | | | | | 1 | | | | | | | | | |
| **Oleaceae** | | | | | | | | | | | | | | | | | |
| *Fraxinus excelsior* | ash | | | | | | | | 1 | | | | | | | | |
| cf. *Fraxinus* | | | | | | | | | 1 | | | | | | | | |
| Indet. charcoal fragments | | | 1 | 8 | 2 | 4 | 2 | 3 | 2 | 1 | 2 | 2 | 6 | | | 1 | 4 |
| **Total charcoal fragments** | | **106** | **104** | **110** | **136** | **117** | **108** | **126** | **105** | **123** | **123** | **144** | **103** | **123** | **130** | **109** | **156** |
| **Mineralised wood** | | | | | | | | | | | | | | | | | |
| *Quercus* | | | | | | | | | | | | | | | 3 | | |

*Table 16: Summary of charred plant remains*

| **Sample No** | | **5010** | **5015** | **5013** | **5008** | **5007** | **5002** | **5018** | **5036** | **5043** | **5023** | **5040** | **6000** | **5034** | **5033** | **5032** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Context No** | | **5091** | **5107** | **5106** | **5087** | **5085** | **5059** | **5113** | **5322** | **5344** | **5135** | **5349** | **6004** | **5177** | **5277** | **5293** |
| **Sample Vol. (litres)** | | **20** | **19** | **8** | **20** | **9** | **42** | **20** | **13** | **39** | **20** | **39** | **26** | **36** | **40** | **38** |
| **Feature** | | **Crem** | **Crem** | **Crem** | **Crem** | **Pit** | **Crem** | **Pit** | **Pit** | **Ditch** | **Pit** | **Pit** | **Pit** | **Ditch** | **Ditch** | **Ditch** |
| **Period/Phase** | | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **IA/ERC** | **IA/ERC** | **IA/ERC** |
| **Feature group** | | **Ditch gp W** | **Ditch gp W** | **Ditch gp W** | **Ditch gp W** | **Ditch gp W** | **Ditch gp E** | **Ditch gp E** | **Ditch gp E** | **Ditch** | **NE gp** | **SE gp** | **2011 area** | | | |
| **Feature No.** | | **5090** | **5106** | **5106** | **5086** | **5084** | **5058** | **5112** | **5321** | **5344** | **5134** | **5348** | **?** | | | |
| **Full analysis or scan** | | Scan | Full | Scan | Full | Scan | Scan | Full | Full | Full | Full | Ful | Full | Full | Scan | Full |
| **% examined** | | 100 | 100 | 100 | 100 | 100 | 50 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | | | | | | | | | | | | | | | | |
| **Cereal grain** | | | | | | | | | | | | | | | | |
| *Triticum* cf. *dicoccum* | cf. emmer wheat grain | | | | | 1 | | | 4 | | | | | | | |
| *Triticum* sp. | free threshing wheat grain | | | | | | | | | | | | | 1 | | |
| *Triticum* sp. | wheat grain | | | | 1 | | | | 5 | | | | | | | |
| *cf. Triticum* sp. | cf. wheat grain | 1 | | | | | | | 5 | | | | 1 | | | 1 |
| *Hordeum* sp | hulled barley | | | | | | | | | 2 | | | 2 | | | |
| *Hordeum* sp | cf. hulled barley | | | | | | | | | | | 1 | | | | 1 |
| *Hordeum* sp. | barley | 2 | | | | | | | | | | | | | | |
| cf. *Hordeum* sp. | cf barley | | | | | | | 1 | | | | | | | 1 | |
| *Avena* sp. | oat grain | | | | | | | | | | 11 | | | | | |
| cf. *Avena* sp. | cf. oat | | | | | | | | | | 4 | | | | | 1 |
| Cereal indet. | indeterminate cereal | 2 | | | 6 | | 5 | | 3 | 7 | 1 | 4 | 5 | 1 | 2 | 1 |
| Cereal/large grass | indet. cereal/grass | | | | 1 | | | | | | Fs | | | | | |
| | | | | | | | | | | | | | | | | |
| **Cereal chaff & straw** | | | | | | | | | | | | | | | | |
| *Triticum dicoccum* | emmer wheat spikelet fork | | | | | | | | 4 | | | 1 | | | | |
| *Triticum dicoccum* | emmer wheat glume base | | | | | | | | | 2 | | | 1 | 1 | | |
| *Triticum cf. dicoccum* | cf. emmer wheat glume base | | | | | | | 1 | | | | 1 | 1 | | | |
| *Triticum* dicoccum/spelta | emmer or spelt glume base | | | | 1 | | | | | | | 2 | 3 | 1 | 1 | 1 |
| *Triticum* dicoccum/spelta | emmer or spelt spikelet fork | | | | | | | | | | | | | | | 1 |
| *Triticum* spp. | glume wheat rachis | | | | | | | | | 1 | | | | 1 | | |
| *Triticum* spp. | free threshing wheat rachis | | | | | | | | | | | 1 | | | | |
| Cereal indet. | cf. culm base | | | | | | | | | | | | | 1 | | |
| Cereal/large grass | cereal/large grass culm node | | | | | | | 1 | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Pulses, edible plants** | | | | | | | | | | | | | | | | |
| *Pisum sativum* | pea | | | | | | | 2 | | | | | | | | |
| *Vicia* cf. *faba* | cf. celtic/broad/horse bean | | | | | | | | | | | | 1 | | | |
| Vicieae | Vicia/Lathyrus/Pisum | | | | | | | | | | 1 | | 2 | | | |
| *Prunus spinosa* | blackthorn/sloe | 1 | | | | | | | | | | | | | | |
| *Prunus* cf. *spinosa* | cf. blackthorn/sloe | | | | | | | | | | | | 1 | | | |
| *Prunus* cf. *spinosa* | cf. blackthorn/sloe fragments | ** | | | | | | | | | | | | | | |
| *Crataegus monogyna* | hawthorn | | | 1 | | | | 1 | | | | | | | | |
| *Cratageus* cf. *monogyna* | hawthorn | | | | | | | 1 | | | | | | | | |
| *Rubus* cf. *fruticosus* | cf. blackberry/bramble | | | | | | | 1 | | | | | | | | |
| *Corylus avellana* | hazelnut, shell fragments | | | * | | | | | | | *** | * | | | | |
| *Conopodium majus* | pignut tubers | | | | 2 | 15 | | 2 | | | | | | | | |
| cf. *Conopodium majus* | cf. pignut tubers | | | | 1 | | | 3 | | | 2 | | | | | |
| | | | | | | | | | | | | | | | | |
| **Wild plants** | | | | | | | | | | | | | | | | |
| *Ranunculus acris/repens/bull* | meadow/creeping/bulbous buttercup | | | | 1 | | | 1 | | | | | | | | |
| *Vicia/Lathyrus* | vetch/tare (> 2mm) | | | | | | | | 1 | | | | | | | 1 |
| *Vicia/Lathyrus* | vetch/tare (< 2mm) | | | | | | | 1 | | | 4 | | 2 | 1 | | 1 |
| *Melilotus/Medicago/Trifolium* | small seeded legume | | | | 41 | | | | | | 12 | | | | | |
| Fabaceae - Trifolieae | small seeded legume | | | | | | | 1 | | | | | | | | |
| *Carpinus betulus* | hornbeam | | | | | | | | | | | | | | | |
| *Brassica sp.* | cabbage, mustard, etc | | | 1 | 15 | | | | | | | | | | | |
| *Brassica/Sinapis* | cabbage, mustard, etc | 1 | | | | | | | | | | | | | | |
| Brassicaceae undiff. | cabbage family | | | | 2 | | | | | | | | | | | |
| Brassicaceae undiff. | capsule fragments | | | | 1 | | | | | | | | | | | |
| *Persicaria maculosa* | redshank | | | | | | | | 1 | | | | 1 | | | |
| *Persicaria lapathifolia* | pale persicaria | | | | | | | | 1 | | | | | | | |
| *Persicaria sp.* | persicaria | | | | | | | | | | | | 2 | | | |
| *Fallopia convolvulus* | black bindweed | | | | | | | | 1 | | | F | 2 | | | |
| *Rumex acetosella* | sheep's sorrel | | | | 4 | | | | | 1 | | | | | | |
| *Rumex acetosa* | common sorrel | | | | | | | | | | | | 1 | | | |
| *Rumex crispus/obtusifolius* | curled/broad-leaved dock | | | | | | | | | | | | 1 | | | |
| *Rumex* sp. | dock | | | | 9 | | 2 | | | | | | | | | |
| cf. *Rumex sp.* | cf. dock | 1 | | | 1 | | | | | | | | | | | |
| *Silene* sp. | campions | | | | | | | | | | | | 1 | | | |
| *Spergula arvensis* | corn spurrey | | | | | | | | | | | | 1 | | | |
| *Stellaria* sp. | stitchwort/mouse-ear | | | | 1 | | | | | | | | | | | 1 |
| *Stellaria/Cerastium* | stitchwort | | | | | | | | | | | | | | | |
| Caryophyllaceae undiff. | pink family | | | | 2 | | | | | | | | | | | |
| *Chenopodium album* type | fat hen | | | | 1 | | | | | | | | | | | |
| *Chenopodium* sp. | goosefoot | | | | 2 | | | | | | | | | | | |
| Chenopodiaceae undiff. | goosefoot family | | | 1 | 1 | | | | | | | | | | | |
| *Montia fontana* cf. ssp. *chond* | blinks | | | | 5 | | | | 13 | | | | | | | |
| *Galium aparine* | cleavers | | | | | | | 1 | | | | | 21 | | | |
| *Galium* cf. *aparine* | cf. cleavers | | | | | | | | | | | | 3 | | 1 | |
| *Galium* sp. | bedstraw | | | | 1 | | | | | | | | | | | |
| *Plantago lanceolata* | ribwort plantain | | | | 2 | | | | | | | | | | | |

| **Sample No** | | **5010** | **5015** | **5013** | **5008** | **5007** | **5002** | **5018** | **5036** | **5043** | **5023** | **5040** | **6000** | **5034** | **5033** | **5032** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Context No** | | **5091** | **5107** | **5106** | **5087** | **5085** | **5059** | **5113** | **5322** | **5344** | **5135** | **5349** | **6004** | **5177** | **5277** | **5293** |
| **Sample Vol. (litres)** | | **20** | **19** | **8** | **20** | **9** | **42** | **20** | **13** | **39** | **20** | **39** | **26** | **36** | **40** | **38** |
| **Feature** | | **Crem** | **Crem** | **Crem** | **Crem** | **Pit** | **Crem** | **Pit** | **Pit** | **Ditch** | **Pit** | **Pit** | **Pit** | **Ditch** | **Ditch** | **Ditch** |
| **Period/Phase** | | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **LBA** | **IA/ERC** | **IA/ERC** | **IA/ERC** |
| *Plantago* sp. | plantain | | | | 1 | | | | | | | | | | | |
| *Prunella vulgaris* | self-heal | | | | | | | | | | 8 | | | | | |
| *Lapsana communis* | nipplewort | | | | | | | 1 | | | | | | | | |
| *Anthemis cotula* | stinking chamomile | | | | | | | | | | 4 | | | | | |
| Asteraceae undiff. | daisy family | | | | | | | | | | | | | | | |
| *Sambucus nigra* | elder | | | | | | | | 1 | | | | | | | |
| *Juncus* sp. | rush | | | | | | | | | | | | 1 | | | |
| *Carex* sp. | sedge, two sided nutlet | | | | | | | | | | | | 1 | | | |
| *Arhenatherum elatius* ssp. *bu* | false oat grass, swollen culn | 4 | | 1 | | | | | | | | | 1 | | | |
| *Anisantha sterilis* | barren brome | | | | | | | | | | 2 | | | | | |
| *Bromus* sp. | brome | | | | | | | | | | 2 | | | | | |
| Poaceae undiff. large | grass family | | | | 1 | | | | 1 | | | | | | | |
| Poaceae undiff. medium | grass family | | | | 3 | | | | | 1 | | | | | | |
| Poaceae undiff. small | grass family | | | | | | | | | 1 | | | | | | |
| Poaceae undiff. | grass family, culm node | | | | 8 | | | | 1 | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Indeterminate | seed/fruit/nut | | | 1 | 6 | | 2 | 2 | 4 | | 1 | 2 | 1 | | | 3 |
| Indeterminate | tubers | 2 | | | 49 | 13 | | 1 | | | 20 | | | | | |
| Indeterminate | tuber fragments | | | | * | * | | * | | | | | | | | |
| Indeterminate | nutshell fragments | * | | | | | | * | | | | | | | | |

*Table 17: Comparison of wood charcoal with human bone remains (X = dominant/co-dominant; (X) = >30% of sample; x = present)*

| **Sample No** | **5010** | **5015** | **5008** | **5009** | **5014** | **5005** | **5002** | **5021** |
|---|---|---|---|---|---|---|---|---|
| **Context No** | **5091** | **5107** | **5087** | **5089** | **5102** | **5063** | **5059** | **5122** |
| **Feature no.** | **5090** | **5106** | **5086** | **5088** | **5101** | **5062** | **5058** | **5120** |
| **Feature group** | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp W | Ditch gp E | NE gp |
| **Feature type** | Cremation | Cremation | Cremation | Cremation | Cremation | Cremation | Cremation | Cremation |
| **Radiocarbon date - calibrated range** | | 1010-910 BC | | | 980-820 BC | | 1010-920 BC | |
| **Summary of bone findings** | infant/ young child | >15 years | child/ adolescent > 5 years | infant/ young child | probable adult | unknown | younger adult | unknown |
| **Taxon & part of tree/ shrub (where known)** | | | | | | | | |
| *Quercus* heartwood | | x | | x | | x | x | **X** |
| *Quercus* sapwood | **X** | **X** | x | (X) | X | **X** | **X** | x |
| *Quercus* roundwood (rw) | x | | | x | | | | |
| *Quercus* bark | x | | | x | | | | |
| *Quercus* unassigned | | x | x | **X** | | x | | |
| Pomoideae timber | x | | **X** | x | **X** | (X) | x | |
| Pomoideae large rw >2 cm | | | (X) | | (X) | x | **X** | |
| Pomoideae small rw <2 cm | | | | | X | x | x | |
| *Prunus* rw <2 cm | x | | x | | | x | | |
| *Prunus* unassigned | | | | | X | | | |
| **Species data only** | | | | | | | | |
| *Acer campestre* | x | | | | X | | x | |
| *Alnus glutinosa/Corylus avellana* | | | | | X | | | |

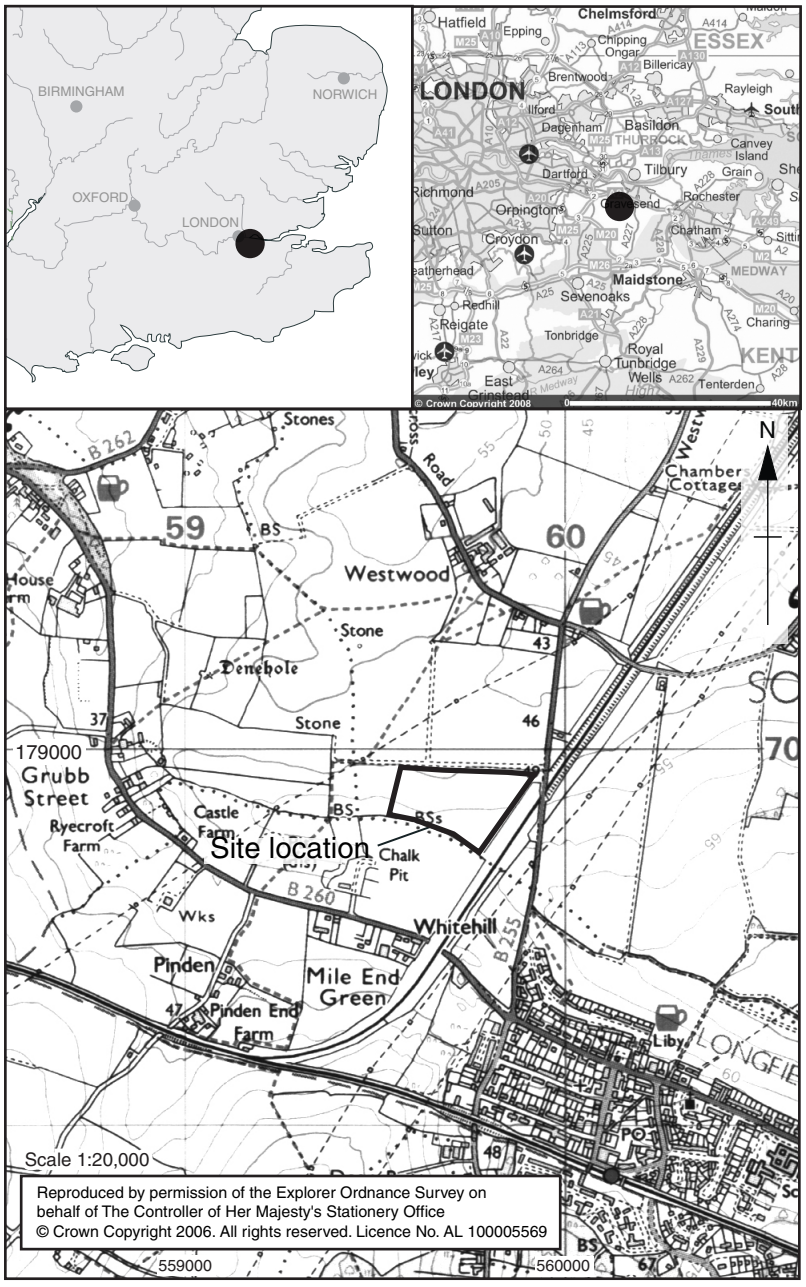
BIRMINGHAM
NORWICH
OXFORD
LONDON
Hatfield
Epping
Chelmsford
Chipping Ongar
ESSEX
Billericay
Brentwood
LONDON
Rayleigh
Ilford
Dagenham
Basildon
THURROCK
Canvey Island
Dartford
Tilbury
Grain
Richmond
Orpington
Rochester
Sutton
Croydon
Chatham
MEDWAY
Maidstone
Sevenoaks
Redhill
Reigate
Tonbridge
Royal Tunbridge Wells
Charing
KENT
East Grinstead
Tenterden
© Crown Copyright 2008
0
40km
Stones
B 262
Cross Road
Chamber Cottages
N
59
BS
60
Westwood
Stone
Denehole
43
37
46
179000
Grubb Street
Castle Farm
Ryecroft Farm
BS
BSs
Site location
Chalk Pit
B 260
Wks
Whitehill
B 255
Pinden
Mile End Green
47
Pinden End Farm
Liby
LONGFIE
Scale 1:20,000
48
559000
560000
67
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Figure 1

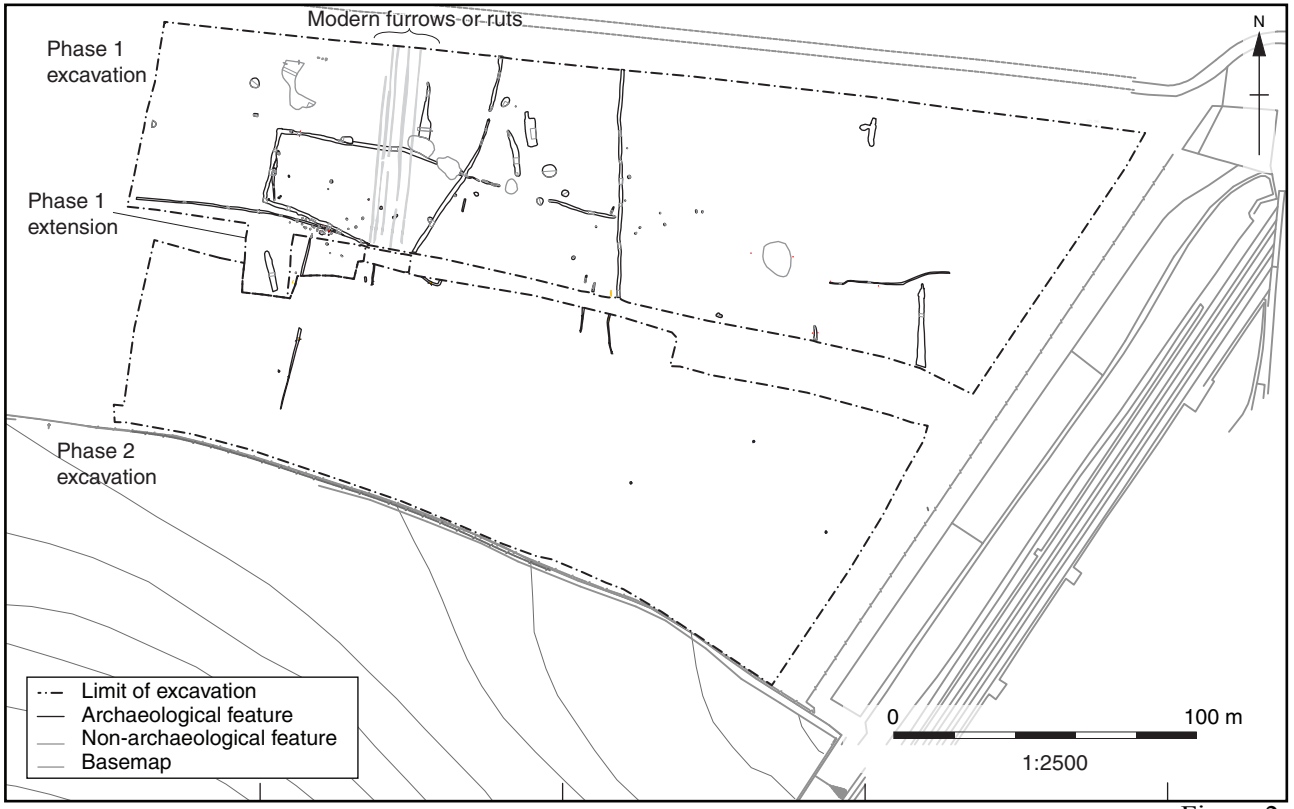

Modern furrows or ruts
Phase 1
excavation
Phase 1
extension
Phase 2
excavation
N
Limit of excavation
Archaeological feature
Non-archaeological feature
Basemap
0
100 m
1:2500

Figure 2

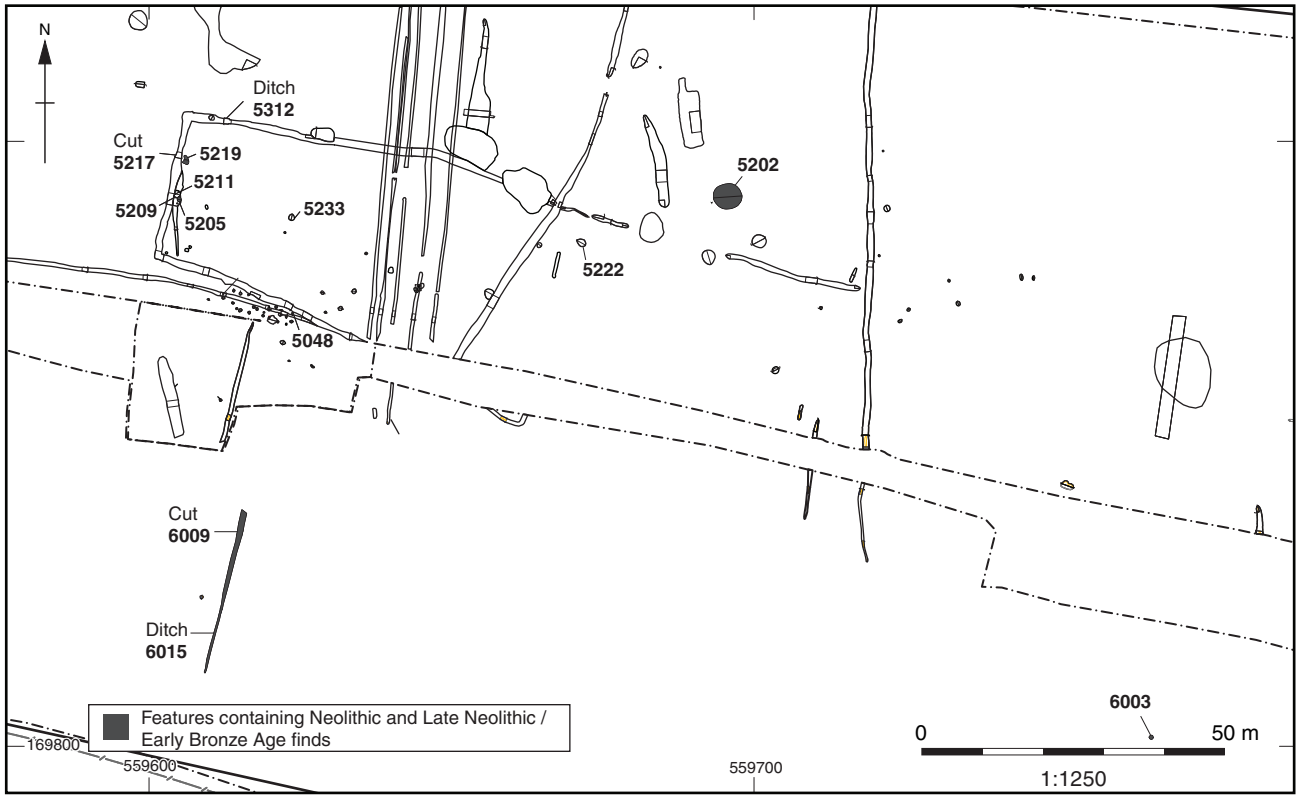

N
Ditch
5312
Cut
5217
5219
5211
5209
5205
5233
5202
5222
5048
Cut
6009
Ditch
6015
Features containing Neolithic and Late Neolithic / Early Bronze Age finds
6003
0
50 m
1:1250
169800
559600
559700

Figure 3

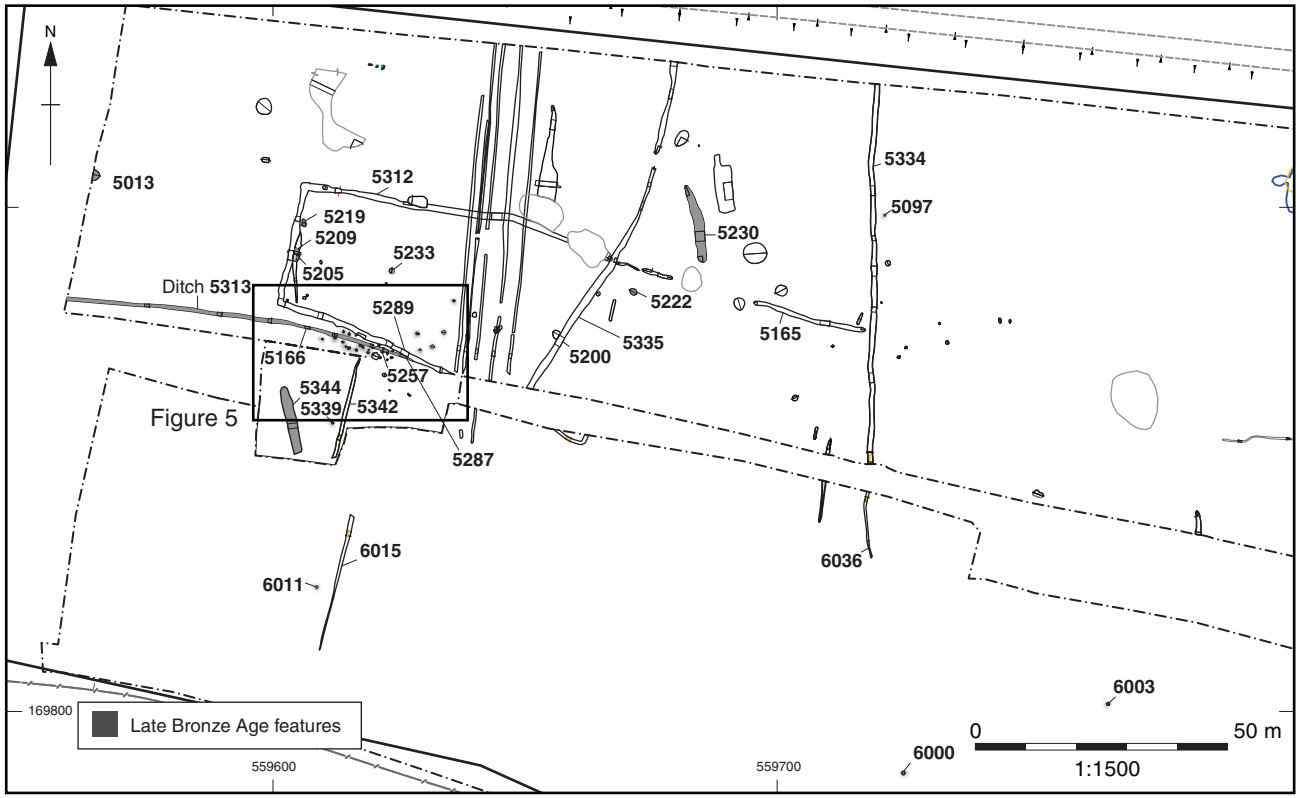

N
5013
5312
5219
5209
5205
5233
Ditch 5313
5289
5166
5257
5344
5339
5342
Figure 5
5287
5334
5097
5230
5222
5335
5200
5165
6015
6011
6036
6003
6000
Late Bronze Age features
169800
559600
559700
0
50 m
1:1500

Figure 4

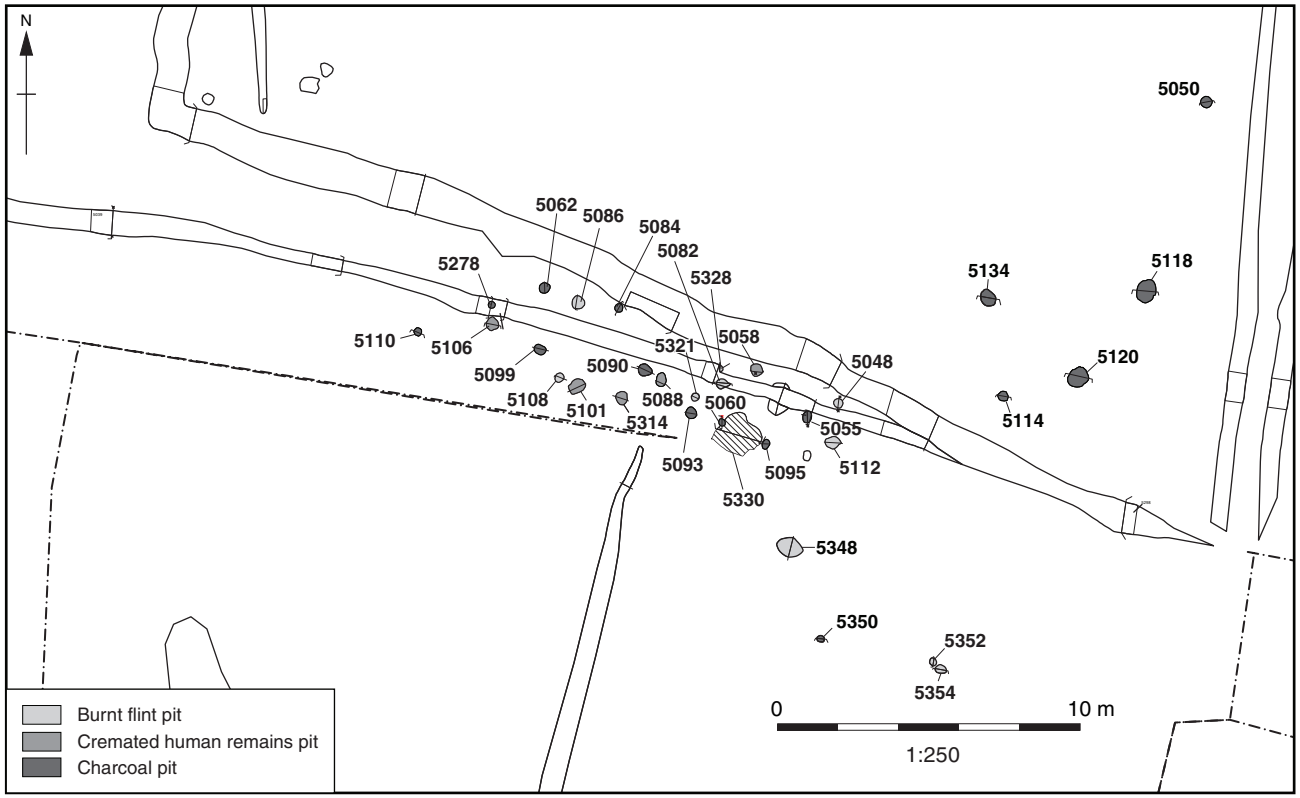

N
5050
5062
5086
5084
5082
5328
5278
5134
5118
5110
5106
5321
5058
5048
5120
5099
5090
5108
5101
5088
5060
5314
5114
5055
5093
5095
5112
5330
5348
5350
5352
5354
0
10 m
1:250
Burnt flint pit
Cremated human remains pit
Charcoal pit

Figure 5

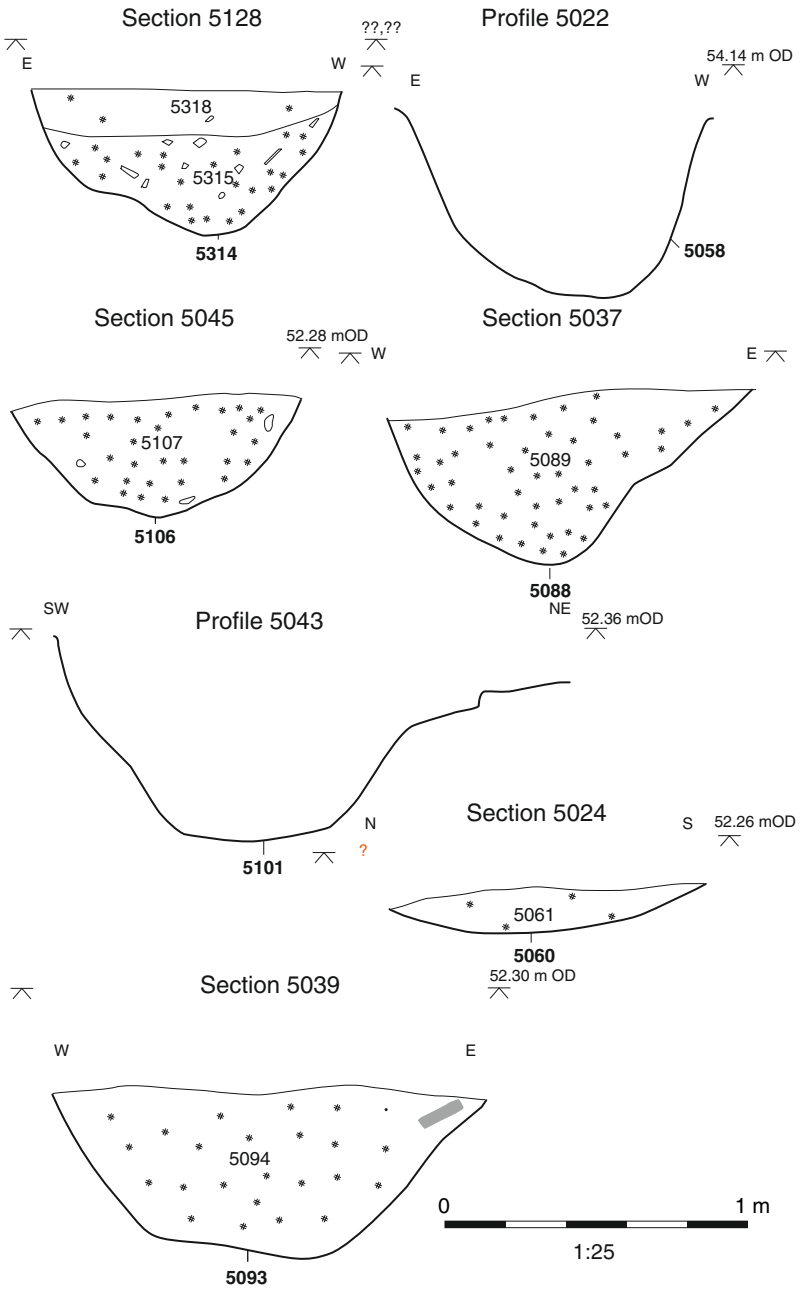

Section 5128
??.??
E
W
5318
5315
5314
Profile 5022
E
W
54.14 m OD
5058
Section 5045
52.28 mOD
W
5107
5106
Section 5037
E
5089
5088
NE
52.36 mOD
SW
Profile 5043
N
?
5101
Section 5024
S
52.26 mOD
5061
5060
52.30 m OD
Section 5039
W
E
5094
5093
0
1 m
1:25

Figure 6

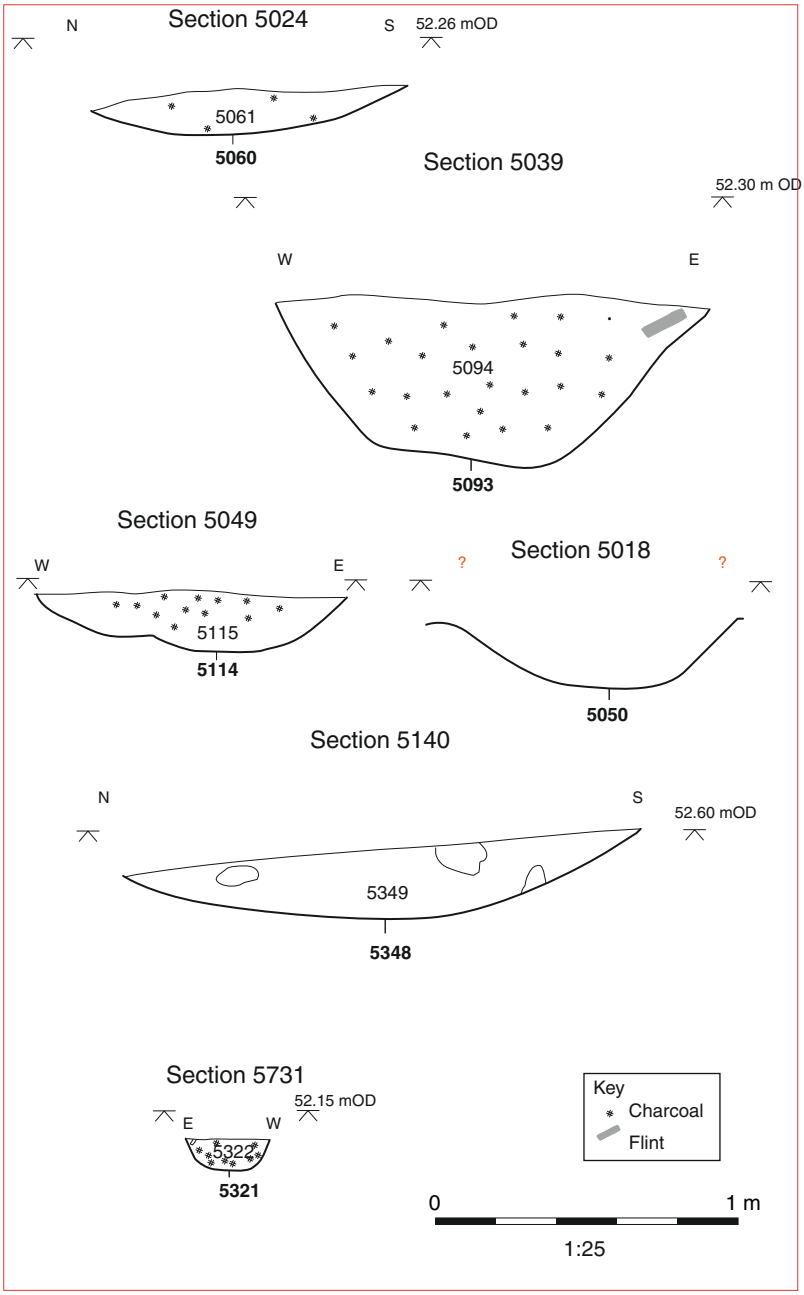

Section 5024
N
S
52.26 mOD
5061
5060
Section 5039
52.30 m OD
W
E
5094
5093
Section 5049
W
E
5115
5114
Section 5018
?
?
5050
Section 5140
N
S
52.60 mOD
5349
5348
Section 5731
52.15 mOD
E
W
5322
5321
Key
Charcoal
Flint
0
1 m
1:25

Figure 7

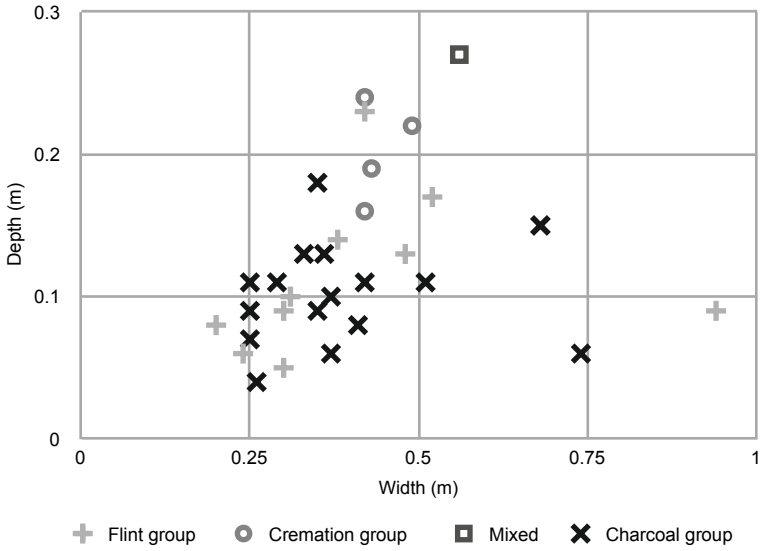

0.3
0.2
0.1
0
Depth (m)
0
0.25
0.5
0.75
1
Width (m)
Flint group
Cremation group
Mixed
Charcoal group

Figure 8

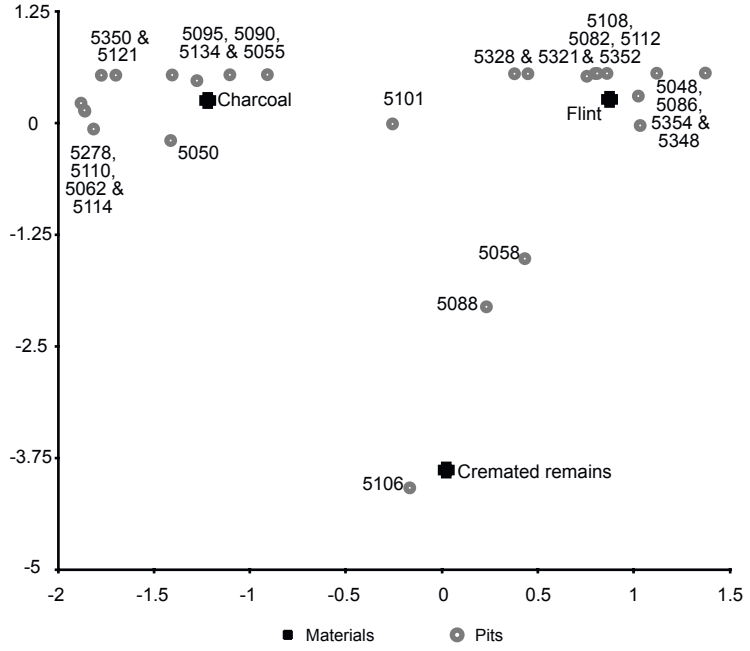

1.25
0
-1.25
-2.5
-3.75
-5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
5350 & 5121
5095, 5090, 5134 & 5055
Charcoal
5101
5108, 5082, 5112
5328 & 5321 & 5352
5048, 5086, 5354 & 5348
Flint
5278, 5110, 5062 & 5114
5050
5058
5088
5106
Cremated remains
Materials
Pits

Figure 9

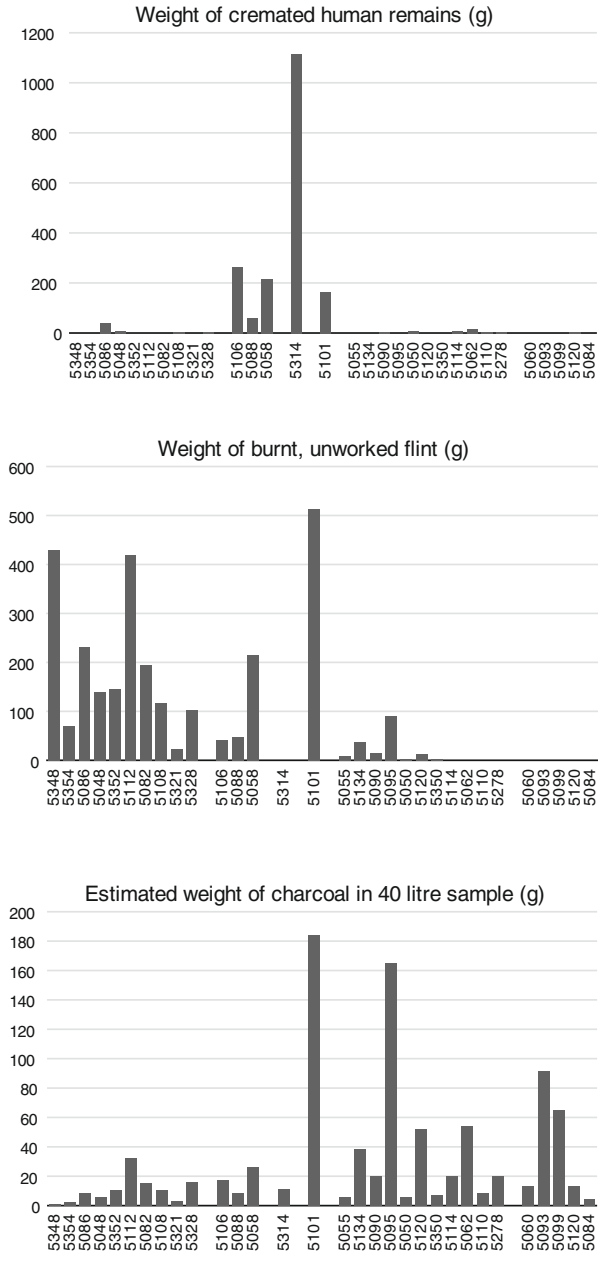

Weight of cremated human remains (g)
1200
1000
800
600
400
200
0
5348 5354 5086 5048 5352 5112 5082 5108 5321 5328 5106 5088 5058 5314 5101 5055 5134 5090 5095 5050 5120 5350 5114 5062 5110 5278 5060 5093 5099 5120 5084
Weight of burnt, unworked flint (g)
600
500
400
300
200
100
0
5348 5354 5086 5048 5352 5112 5082 5108 5321 5328 5106 5088 5058 5314 5101 5055 5134 5090 5095 5050 5120 5350 5114 5062 5110 5278 5060 5093 5099 5120 5084
Estimated weight of charcoal in 40 litre sample (g)
200
180
160
140
120
100
80
60
40
20
0
5348 5354 5086 5048 5352 5112 5082 5108 5321 5328 5106 5088 5058 5314 5101 5055 5134 5090 5095 5050 5120 5350 5114 5062 5110 5278 5060 5093 5099 5120 5084

Figure 10

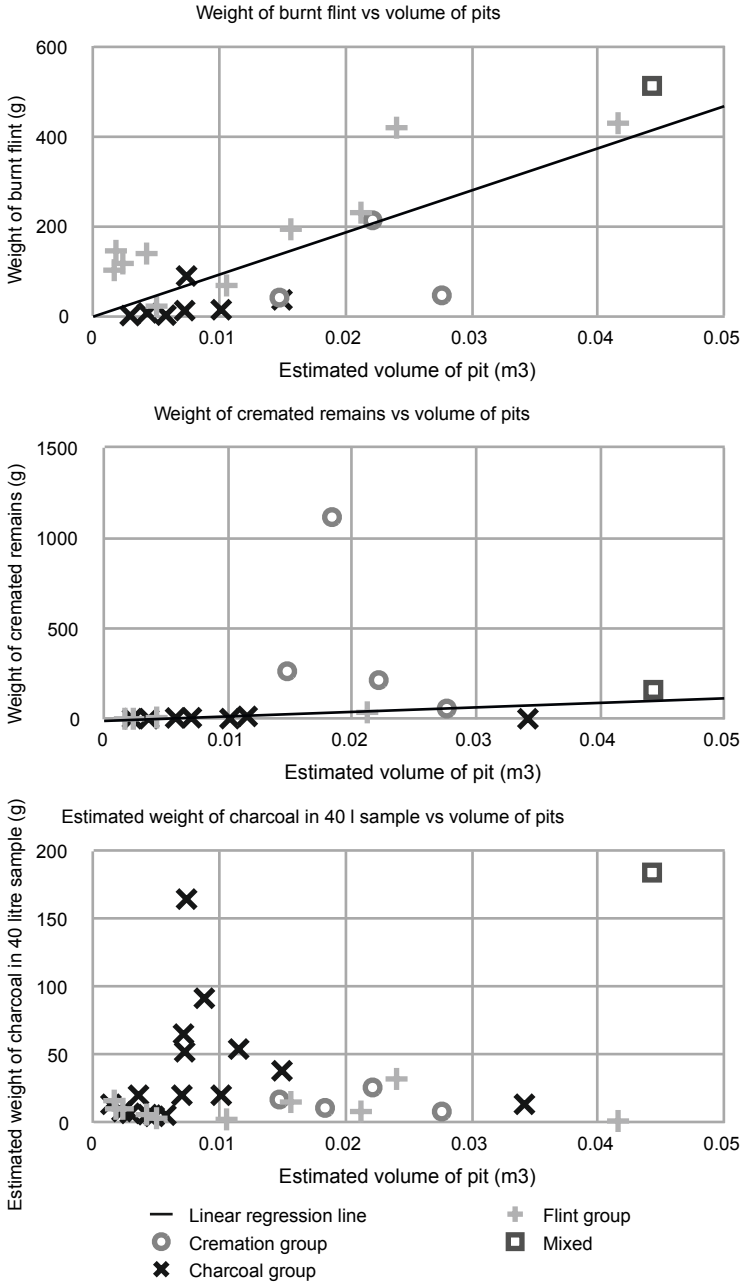

Weight of burnt flint vs volume of pits
Weight of burnt flint (g)
600
400
200
0
0
0.01
0.02
0.03
0.04
0.05
Estimated volume of pit (m3)
Weight of cremated remains vs volume of pits
Weight of cremated remains (g)
1500
1000
500
0
0
0.01
0.02
0.03
0.04
0.05
Estimated volume of pit (m3)
Estimated weight of charcoal in 40 l sample vs volume of pits
Estimated weight of charcoal in 40 litre sample (g)
200
150
100
50
0
0
0.01
0.02
0.03
0.04
0.05
Estimated volume of pit (m3)
Linear regression line
Cremation group
Charcoal group
Flint group
Mixed

Figure 11

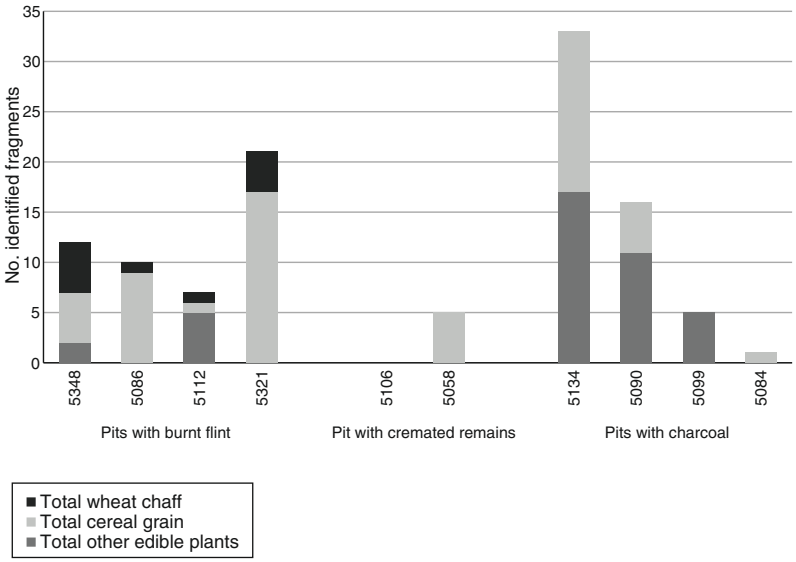

35
30
25
20
15
10
5
0
No. identified fragments
5348
5086
5112
5321
5106
5058
5134
5090
5099
5084
Pits with burnt flint
Pit with cremated remains
Pits with charcoal
Total wheat chaff
Total cereal grain
Total other edible plants

Figure 12

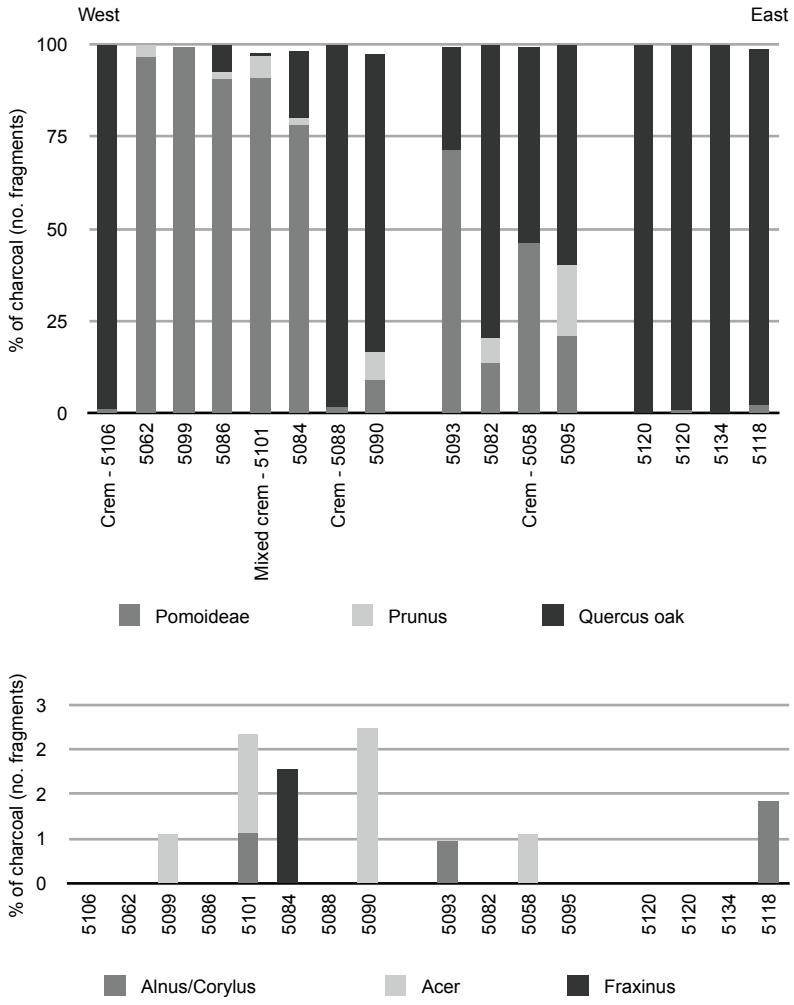

West
East
100
75
50
25
0
% of charcoal (no. fragments)
Crem - 5106
5062
5099
5086
Mixed crem - 5101
5084
Crem - 5088
5090
5093
5082
Crem - 5058
5095
5120
5120
5134
5118
Pomoideae
Prunus
Quercus oak
3
2
2
1
0
% of charcoal (no. fragments)
5106
5062
5099
5086
5101
5084
5088
5090
5093
5082
5058
5095
5120
5120
5134
5118
Alnus/Corylus
Acer
Fraxinus

Figure 13

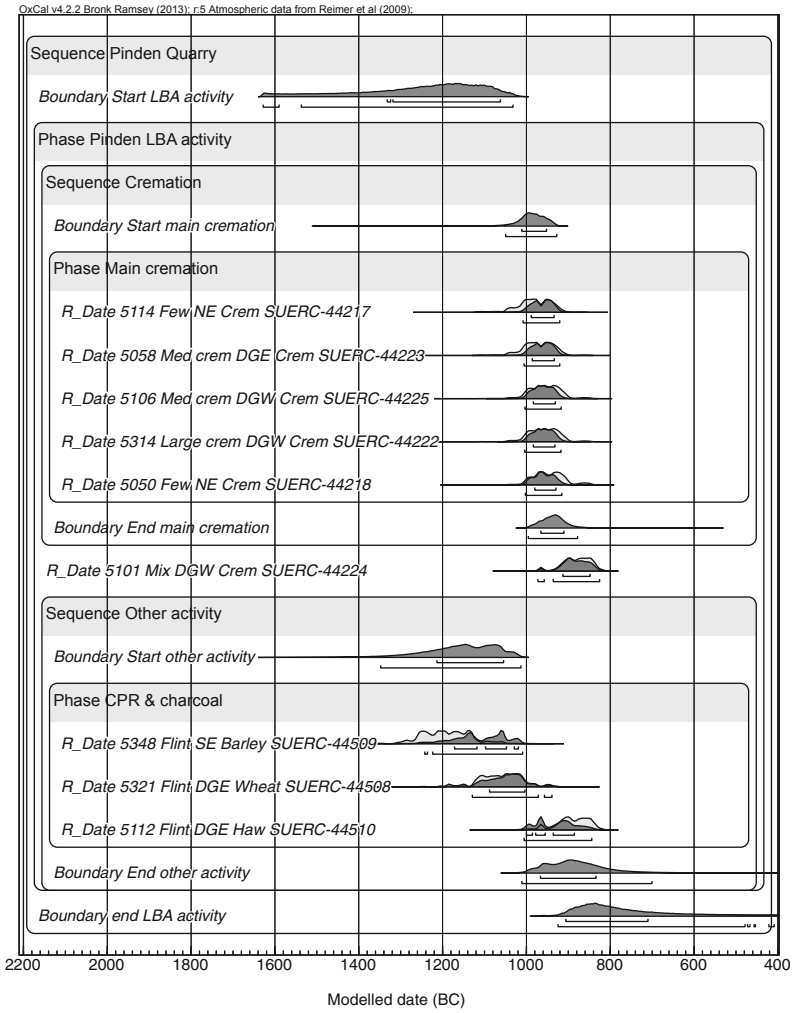

OxCal v4.2.2 Bronk Ramsey (2013); r:5 Atmospheric data from Reimer et al (2009);
Sequence Pinden Quarry
Boundary Start LBA activity
Phase Pinden LBA activity
Sequence Cremation
Boundary Start main cremation
Phase Main cremation
R_Date 5114 Few NE Crem SUERC-44217
R_Date 5058 Med crem DGE Crem SUERC-44223
R_Date 5106 Med crem DGW Crem SUERC-44225
R_Date 5314 Large crem DGW Crem SUERC-44222
R_Date 5050 Few NE Crem SUERC-44218
Boundary End main cremation
R_Date 5101 Mix DGW Crem SUERC-44224
Sequence Other activity
Boundary Start other activity
Phase CPR & charcoal
R_Date 5348 Flint SE Barley SUERC-44509
R_Date 5321 Flint DGE Wheat SUERC-44508
R_Date 5112 Flint DGE Haw SUERC-44510
Boundary End other activity
Boundary end LBA activity
2200
2000
1800
1600
1400
1200
1000
800
600
400
Modelled date (BC)

Figure 14

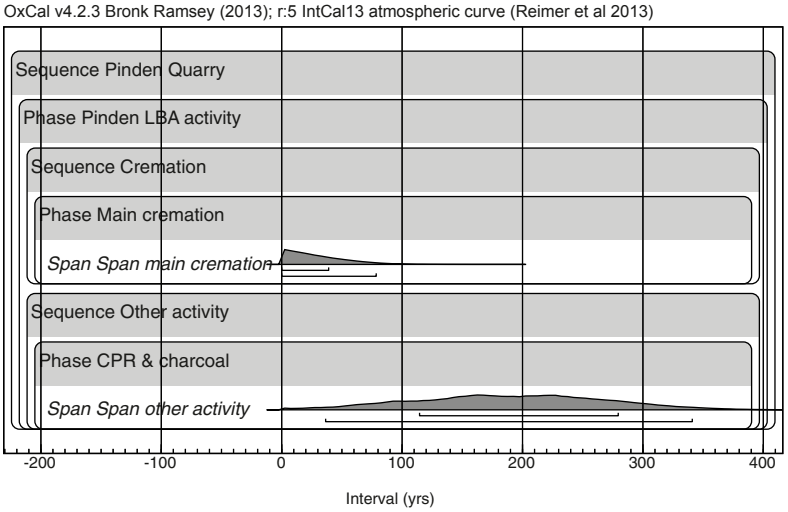

OxCal v4.2.3 Bronk Ramsey (2013); r:5 IntCal13 atmospheric curve (Reimer et al 2013)
Sequence Pinden Quarry
Phase Pinden LBA activity
Sequence Cremation
Phase Main cremation
Span Span main cremation
Sequence Other activity
Phase CPR & charcoal
Span Span other activity
-200
-100
0
100
200
300
400
Interval (yrs)

Figure 15

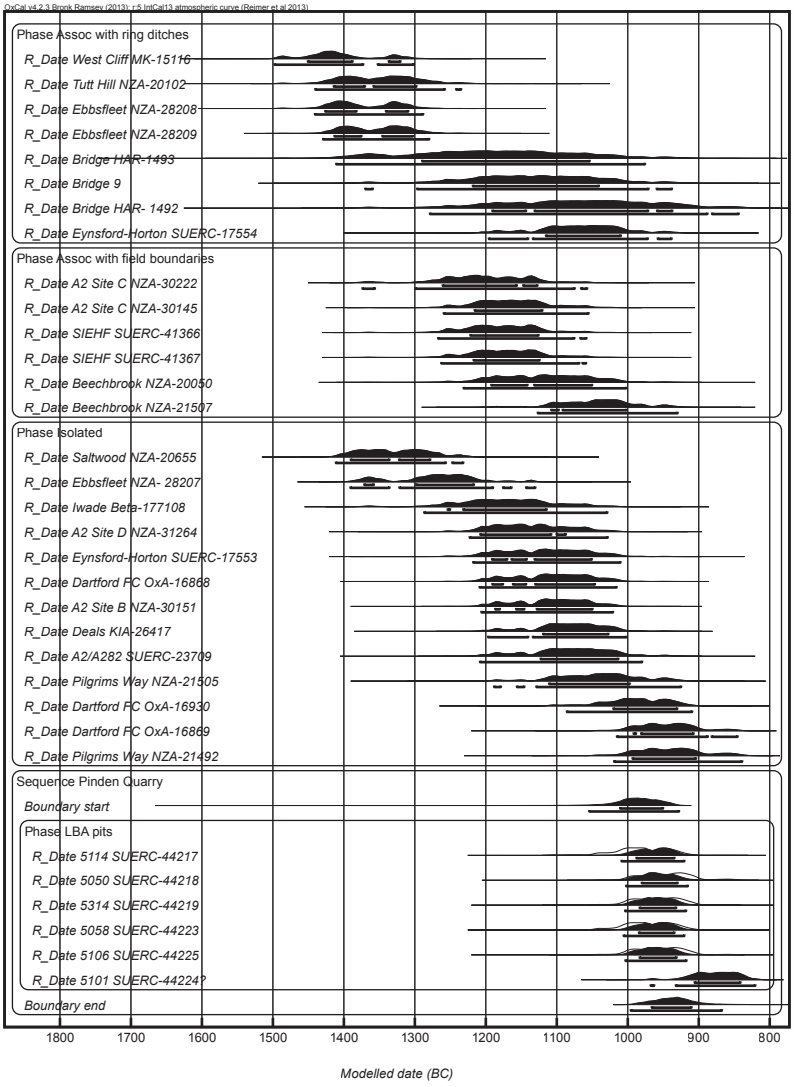
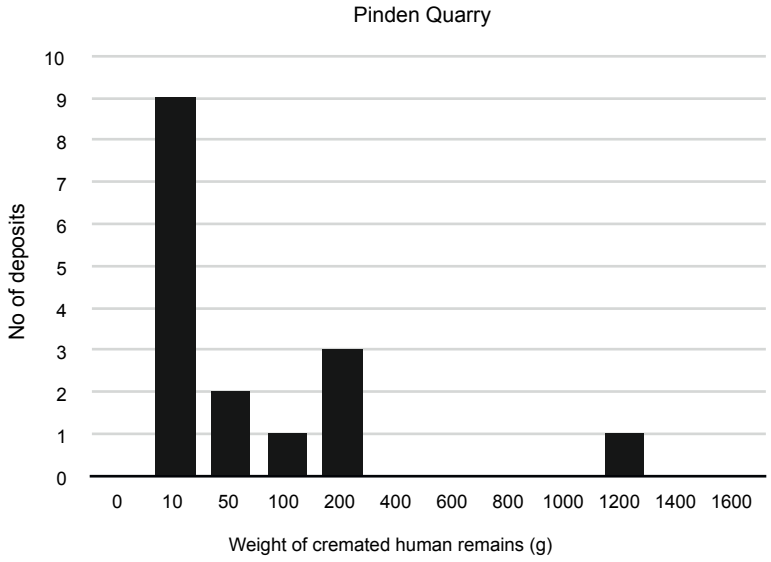

OxCal v4.2.3 Bronk Ramsey (2013); r:5 IntCal13 atmospheric curve (Reimer et al 2013)
Phase Assoc with ring ditches
R_Date West Cliff MK-15116
R_Date Tutt Hill NZA-20102
R_Date Ebbsfleet NZA-28208
R_Date Ebbsfleet NZA-28209
R_Date Bridge HAR-1493
R_Date Bridge 9
R_Date Bridge HAR- 1492
R_Date Eynsford-Horton SUERC-17554
Phase Assoc with field boundaries
R_Date A2 Site C NZA-30222
R_Date A2 Site C NZA-30145
R_Date SIEHF SUERC-41366
R_Date SIEHF SUERC-41367
R_Date Beechbrook NZA-20050
R_Date Beechbrook NZA-21507
Phase Isolated
R_Date Saltwood NZA-20655
R_Date Ebbsfleet NZA- 28207
R_Date Iwade Beta-177108
R_Date A2 Site D NZA-31264
R_Date Eynsford-Horton SUERC-17553
R_Date Dartford FC OxA-16868
R_Date A2 Site B NZA-30151
R_Date Deals KIA-26417
R_Date A2/A282 SUERC-23709
R_Date Pilgrims Way NZA-21505
R_Date Dartford FC OxA-16930
R_Date Dartford FC OxA-16869
R_Date Pilgrims Way NZA-21492
Sequence Pinden Quarry
Boundary start
Phase LBA pits
R_Date 5114 SUERC-44217
R_Date 5050 SUERC-44218
R_Date 5314 SUERC-44219
R_Date 5058 SUERC-44223
R_Date 5106 SUERC-44225
R_Date 5101 SUERC-44224?
Boundary end
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
Modelled date (BC)

Figure 16


Pinden Quarry
No of deposits
10
9
8
7
6
5
4
3
2
1
0
0
10
50
100
200
400
600
800
1000
1200
1400
1600
Weight of cremated human remains (g)

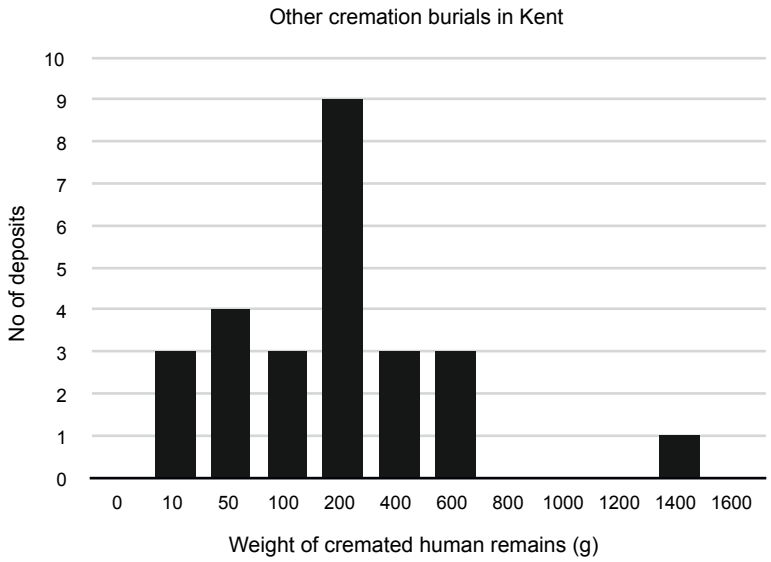

Other cremation burials in Kent
No of deposits
10
9
8
7
6
5
4
3
2
1
0
0
10
50
100
200
400
600
800
1000
1200
1400
1600
Weight of cremated human remains (g)

Figure 17

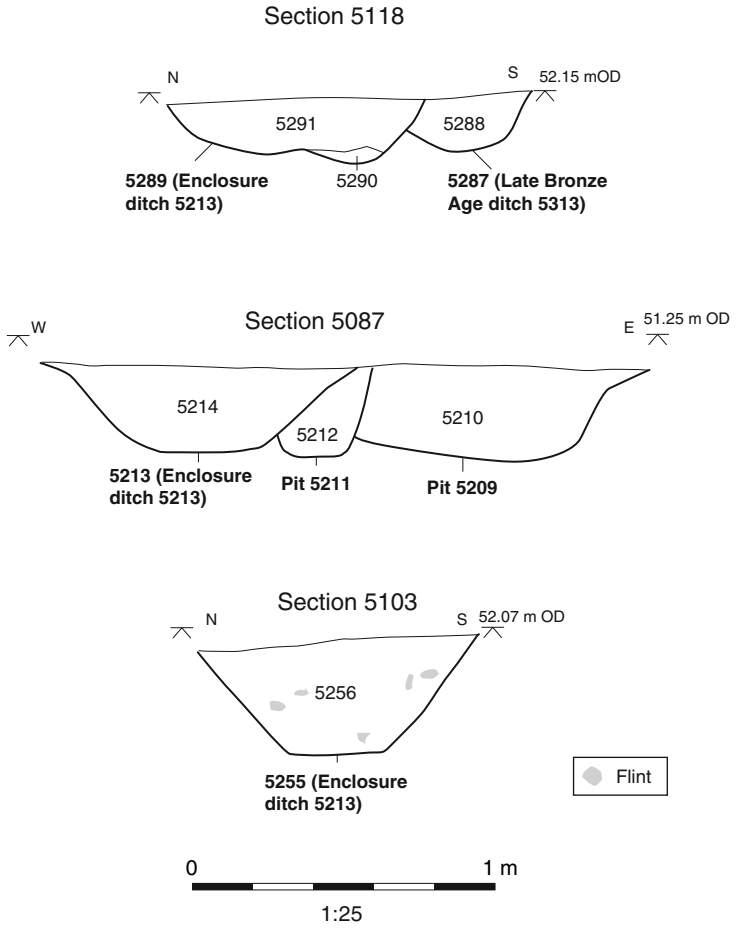

Section 5118
N
S
52.15 mOD
5291
5288
5289 (Enclosure ditch 5213)
5290
5287 (Late Bronze Age ditch 5313)
Section 5087
W
E
51.25 m OD
5214
5212
5210
5213 (Enclosure ditch 5213)
Pit 5211
Pit 5209
Section 5103
N
S
52.07 m OD
5256
5255 (Enclosure ditch 5213)
Flint
0
1 m
1:25

Figure 18

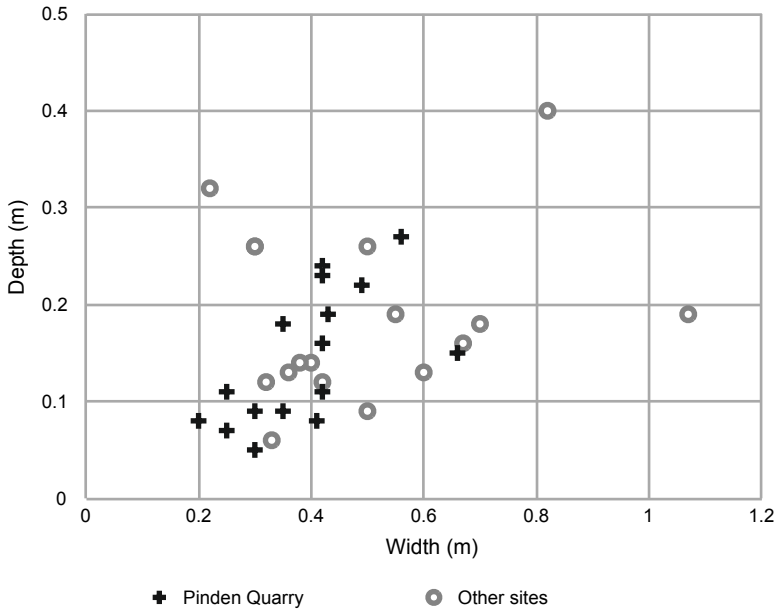

0.5
0.4
0.3
0.2
0.1
0
Depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
Width (m)
Pinden Quarry
Other sites

Figure 19

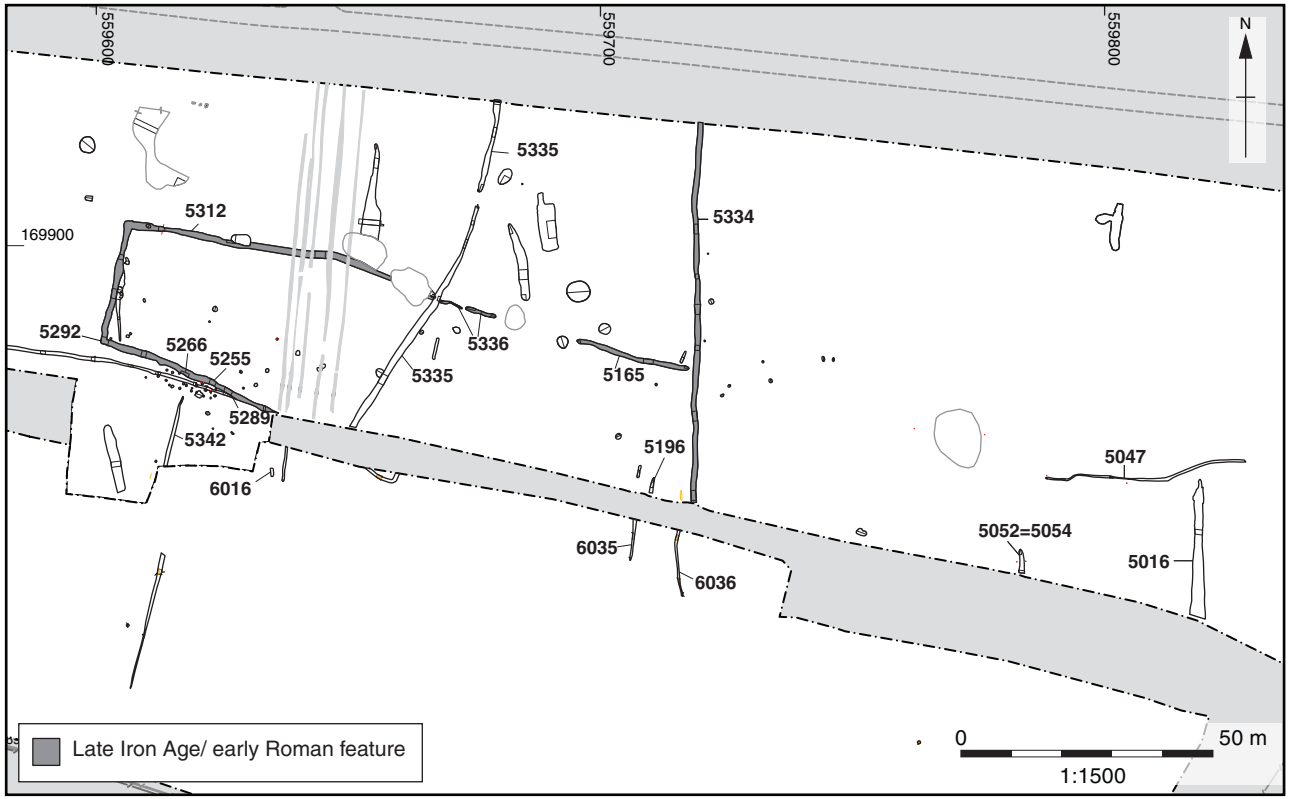

559600
559700
559800
N
169900
5312
5335
5334
5292
5266
5255
5289
5342
5336
5335
5165
5196
6016
5047
5052=5054
6035
6036
5016
Late Iron Age/ early Roman feature
0
50 m
1:1500

Figure 20

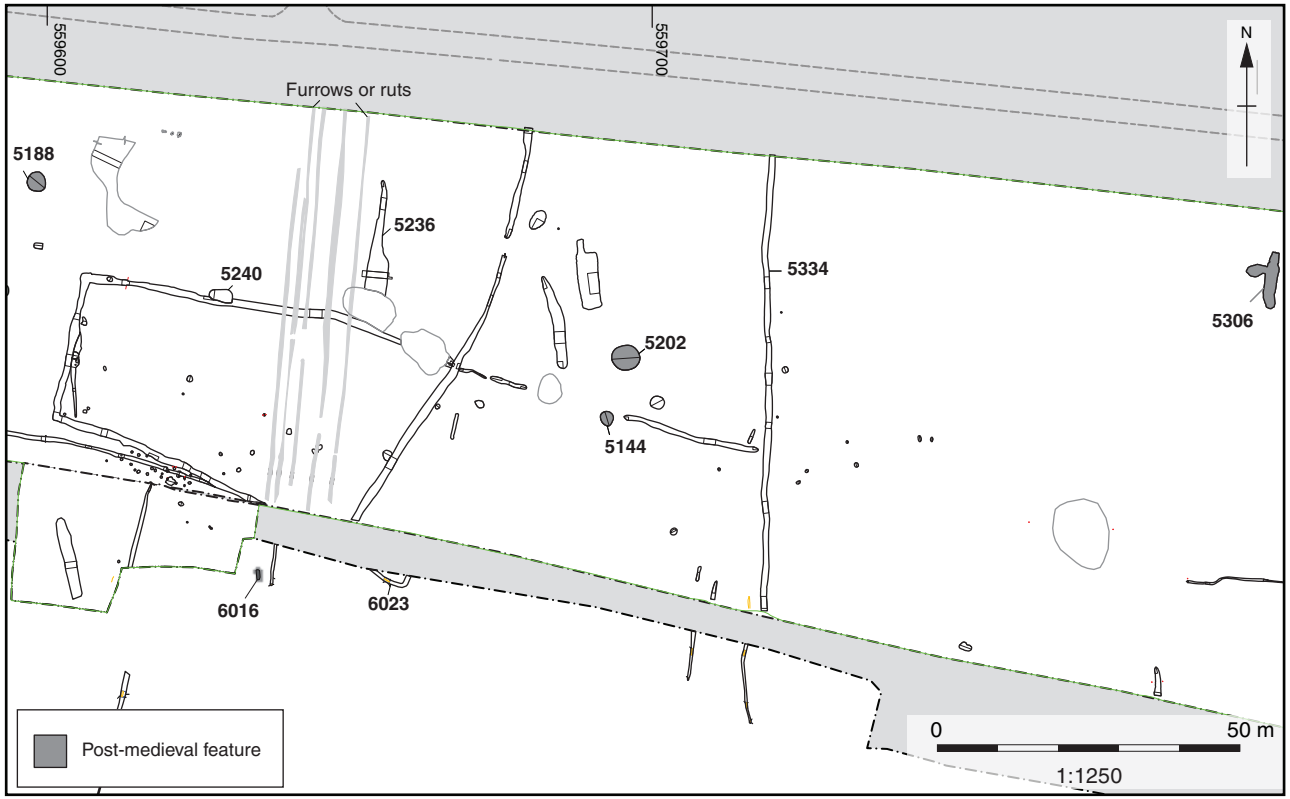

559600
559700
N
Furrows or ruts
5188
5236
5240
5334
5306
5202
5144
6016
6023
Post-medieval feature
0
50 m
1:1250

Figure 21

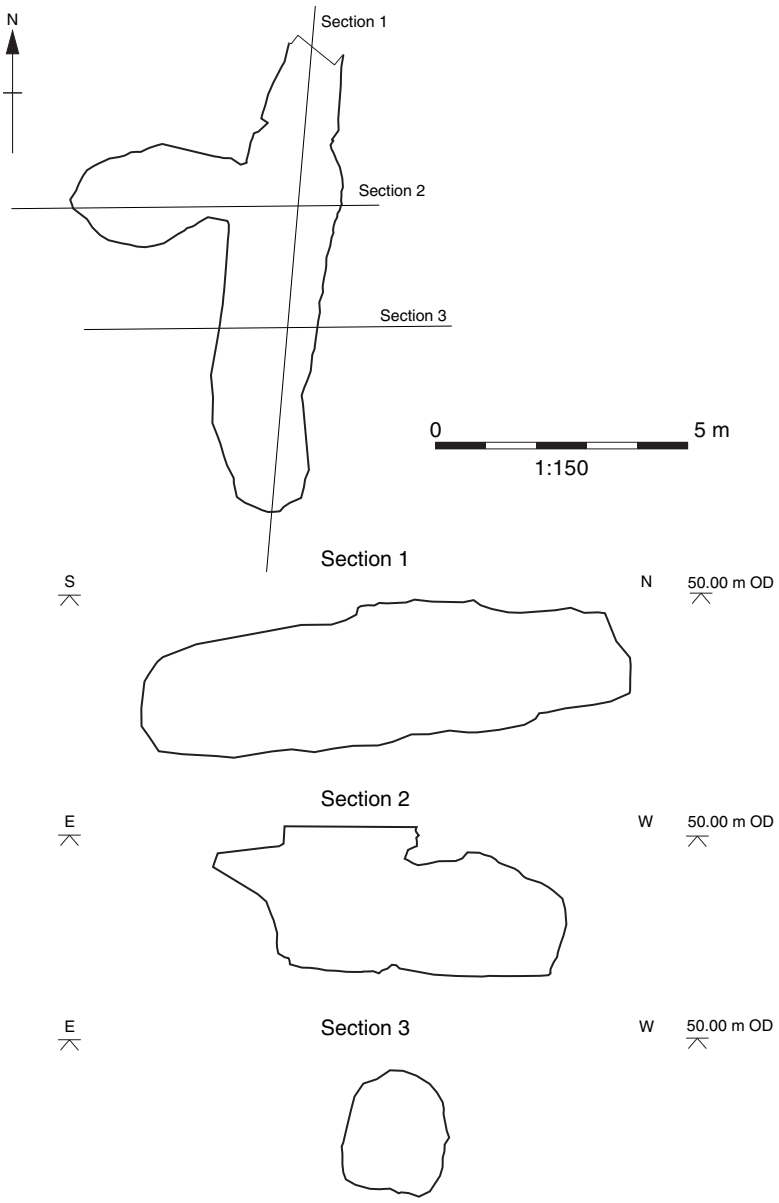

N
Section 1
Section 2
Section 3
0
5 m
1:150
Section 1
S
N
50.00 m OD
Section 2
E
W
50.00 m OD
E
Section 3
W
50.00 m OD

Figure 22

Figure 23

Figure 24

Figure 25

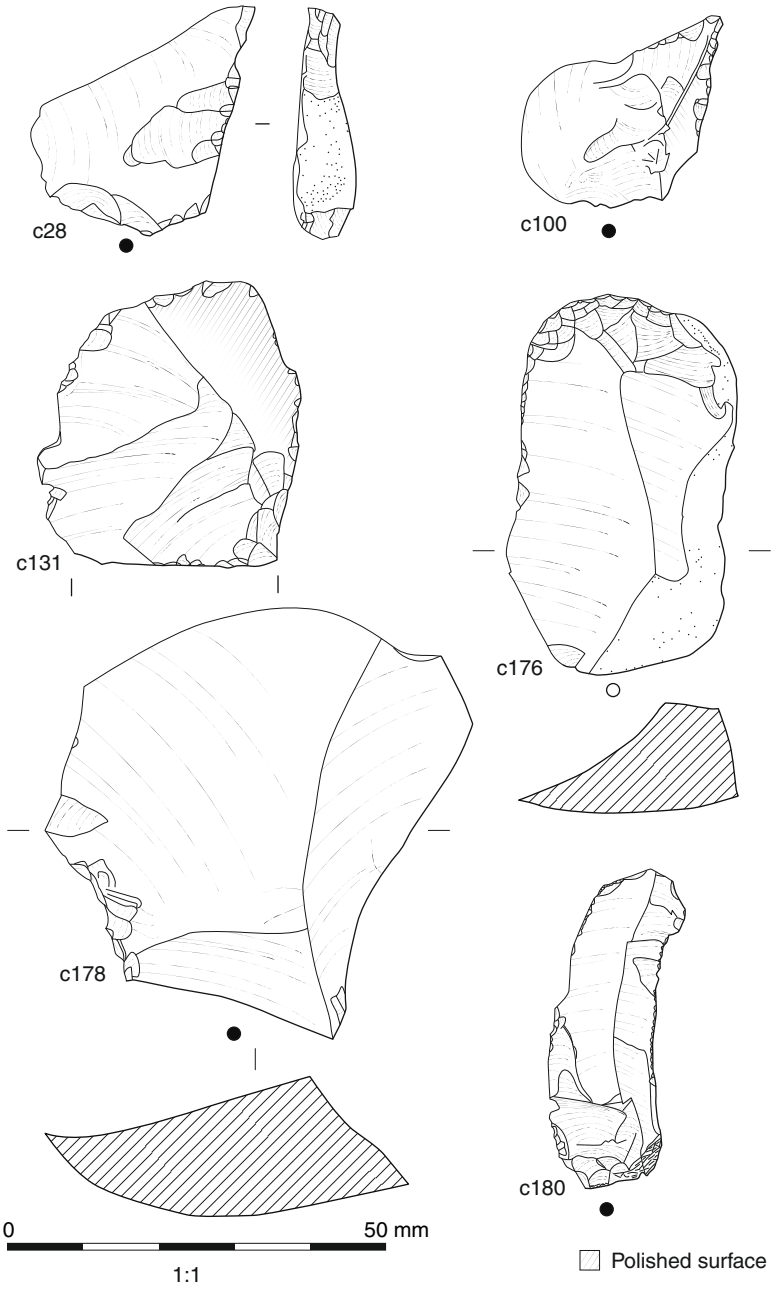



Figure 26: Selected pieces of worked flint

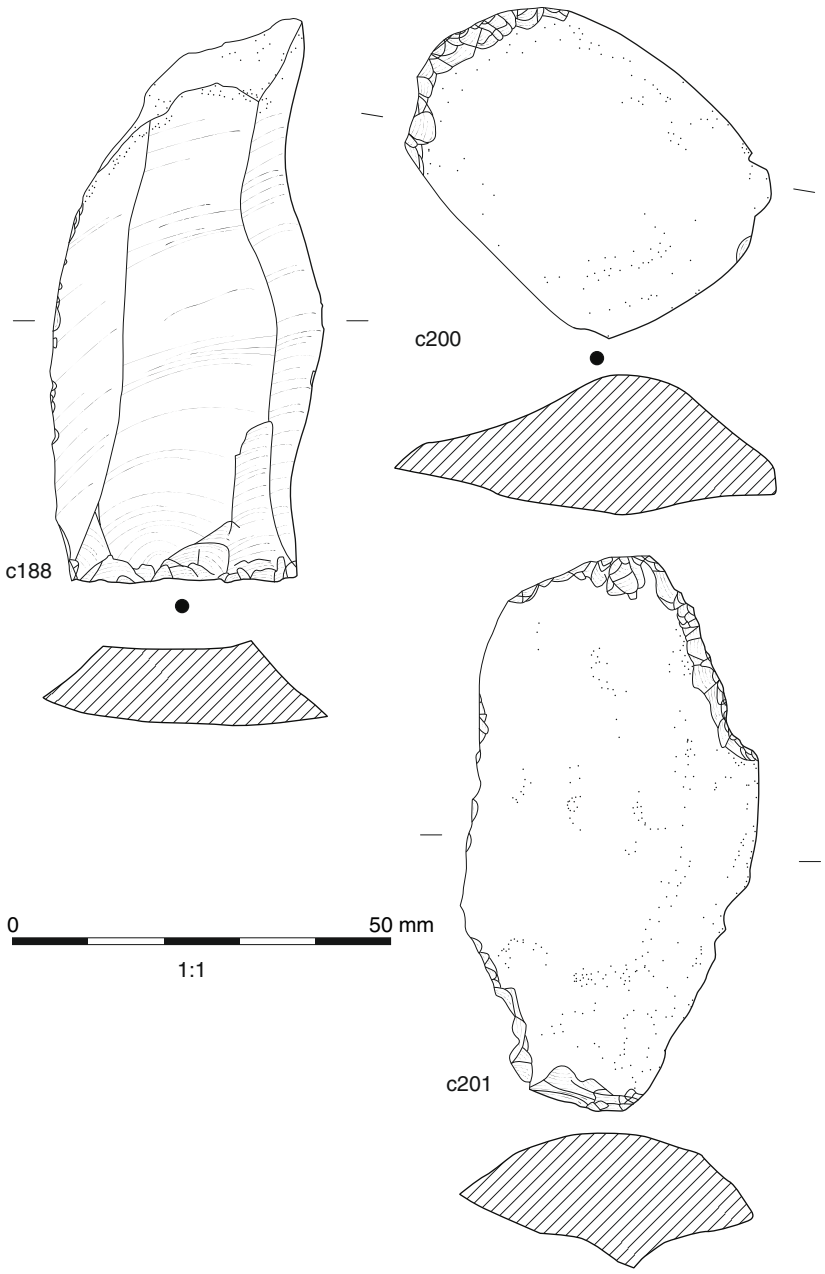



Figure 27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