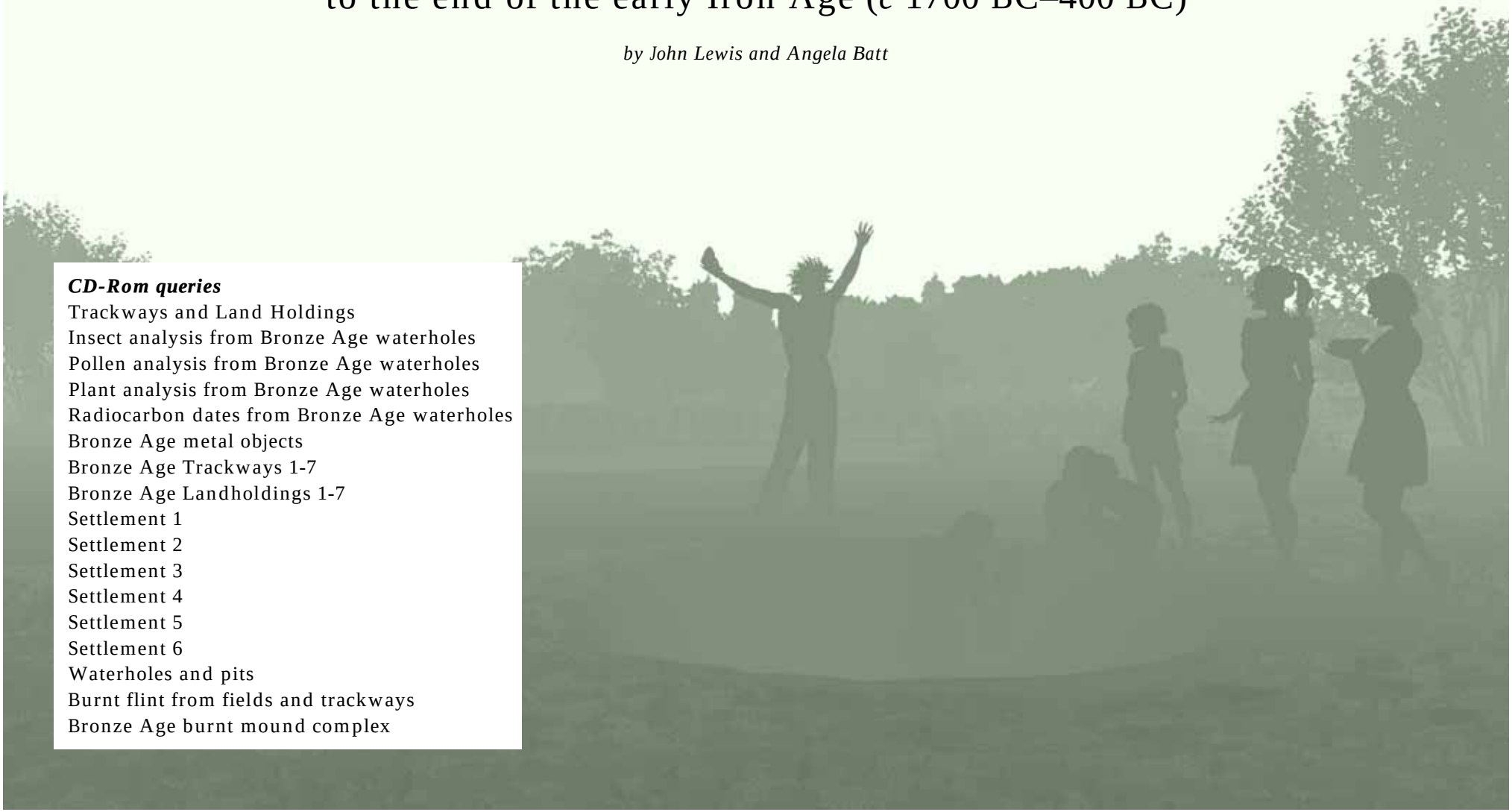
CHAPTER 3

The emergence of the agricultural landscape from the early-middle Bronze Age to the end of the early Iron Age (*c* 1700 BC–400 BC)

by John Lewis and Angela Batt



CD-Rom queries

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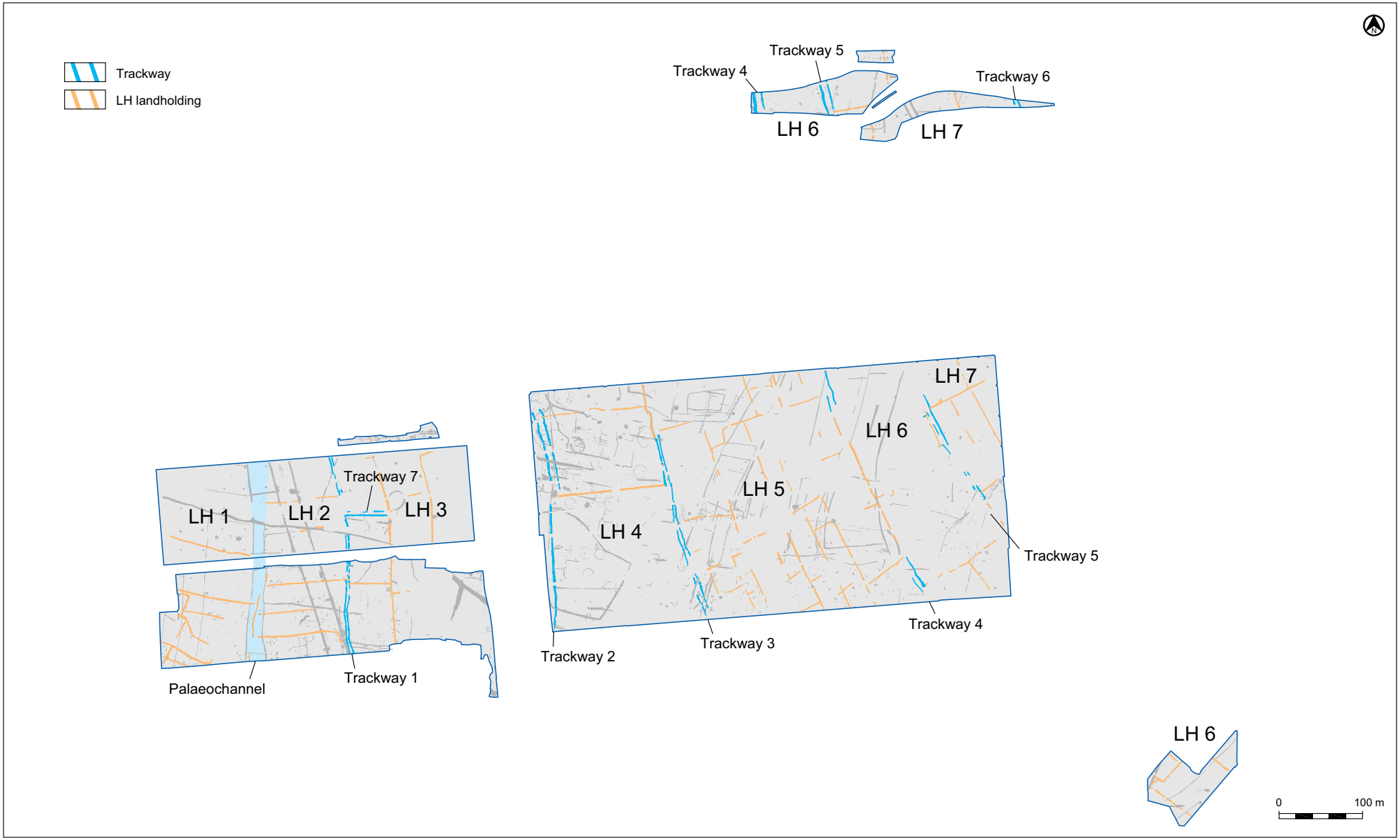


Figure 3.1: Bronze Age trackways and land holdings

Introduction

This chapter is concerned with the history of the 2nd and early 1st millennium BC, roughly from *c* 1700 to 400 BC. During these 1300 years the landscape was transformed from one dominated by the monuments and practices of the preceding two millennia to a landscape of fields, hedgerows, settlements and trackways: the kind of landscape we would recognise today. Figure 3.1 shows the landscape as it had developed by *c* 750 BC. We have divided the landscape into a series of landholdings (LH) divided by north-south trackways (and one east-west trackway), and the development of this system will be examined in some detail. We will explore the reasons for and mechanisms of this transformation, and how the development of the landscape through the 2nd millennium BC drove changes in society.

Throughout this chapter we will continue the theme developed in the preceding chapter: the dynamics of the relationship between the individual, the kin-group and the wider community. We will discuss how sometimes during the 2nd millennium BC the community may have been weakened at the expense of the kin-groups, but how through various social mechanisms and the success of the mixed agricultural farming regime, the kin-groups became subsumed into the community once more during the period 1150–750 BC.

Pottery type	Date range BC
Beaker	2400 - 1700
Collared Urn	2000 - 1500
Deverel Rimbury	1700 - 1150
Post-Deverel Rimbury	1150 - 750

Table 3.1: Date range of Bronze Age pottery

Chronological framework

We will attempt to follow the chronology outlined by Needham (1996) wherever possible, and Figure 3.2 is a simplified amalgamation of the tables presented in that paper. The main chronological indicators will be discussed throughout this chapter, but can be summarised as: radiocarbon dates, pottery assemblages and metalwork.

A total of 25 radiocarbon dates were obtained, ranging from 1610–1390 cal BC to 840–480 cal BC at two standard deviations, with majority clustering in the period 1600–1100 cal BC. Unfortunately the two standard deviation range of most of these dates is not very precise, only allowing us to assign activity to the general periods 4, 5 or 6 in Needham's scheme, and usual only to the latter two.

The ceramic assemblages from Perry Oaks contain residual scraps of Beaker and Collared Urn, but are dominated by Deverel Rimbury and Post-Deverel Rimbury ceramics (Table 3.1). These allow us to differentiate between the periods 1700 to 1150 BC and 1150 to 750 BC. However, Figure 3.2 implies a chronological overlap between these two ceramic assemblages, and many features, such as field ditches and waterholes, contained both types of pottery. Common sense might dictate that the two types coexisted at some time, but we are unable to be precise about this at Perry Oaks.

Only two pieces of Bronze Age metalwork were recovered from Perry Oaks: a spiral finger- or thumb-ring and a side looped spearhead. Both date to the Taunton metalwork phase, between 1500 and 1200 BC, and are discussed more fully in the next section.

The inception of the 2nd millennium BC field system

This section explores the chronology of the enclosed landscape of the 2nd millennium BC and considers how it emerged from the Neolithic landscape of the 3rd millennium BC. Such a transformation from the open, monumental Neolithic landscape to the Bronze Age pattern of enclosed fields and trackways is a crucial development in the history of the British landscape, and four sources of information have been used in establishing a chronology for this period (see Fig. 3.2):

- radiocarbon dates
- stratigraphy
- metalwork
- palaeoenvironmental evidence

This evidence has indicated that the enclosure system originated sometime between 2000 and 1700 BC and reached its maturity around 1600–1500 BC, although in Landholding 4 the development of enclosure may have begun later in the Bronze Age, after 1500 BC.

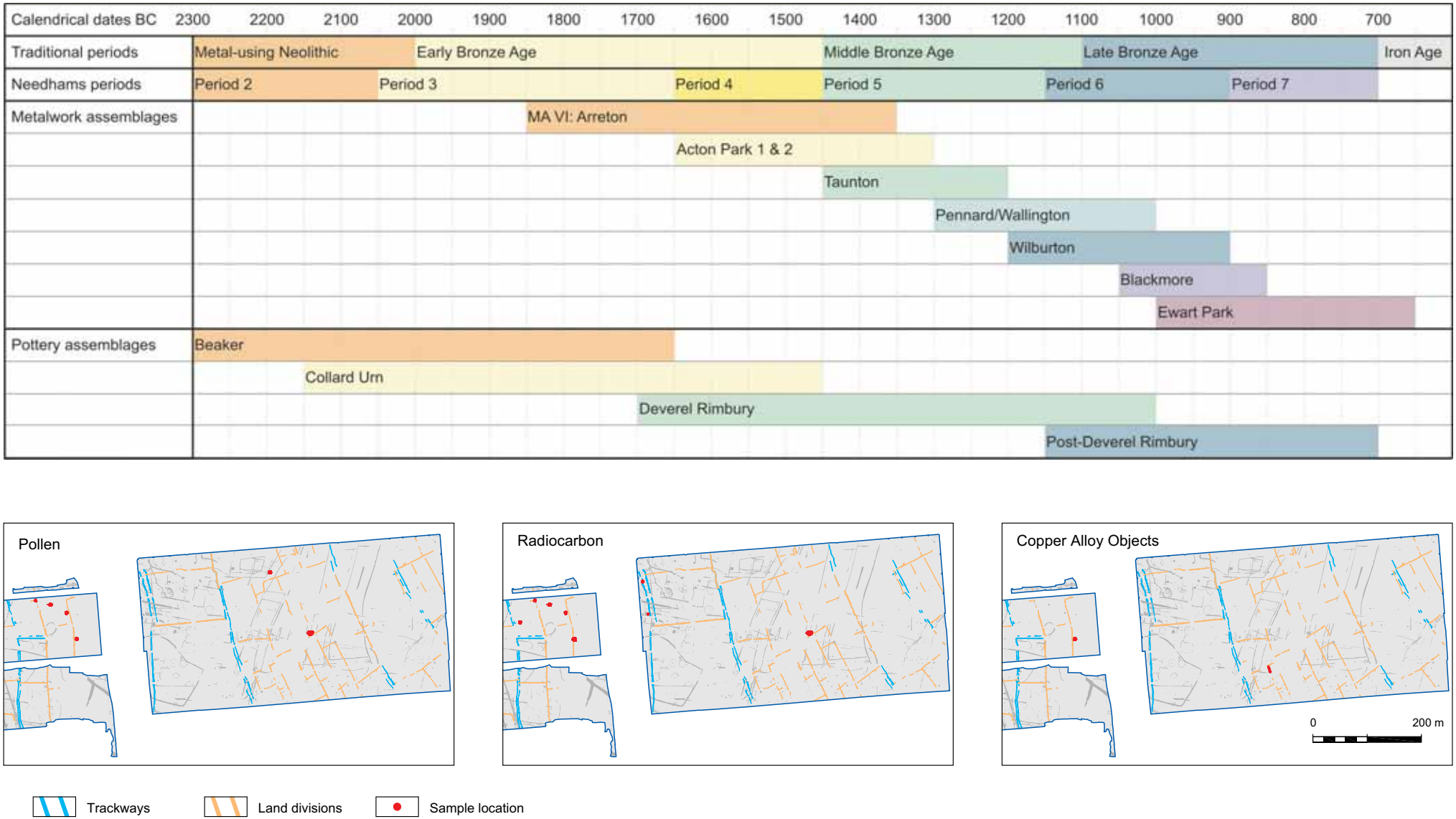


Figure 3.2: Late Neolithic/Bronze Age chronology (simplified version of Needhams 1996 figures 1, 2 and 3) and location of chronological evidence at Perry Oaks

Radiocarbon dates

The radiocarbon sampling strategy sought to establish a chronological framework for the emerging landscape of the 2nd millennium BC, and was designed to address several key questions:

- to date the formation and filling of features;
- to date deposits containing coherent groups of pottery in order to provide absolute dating for the ceramic type series;
- to date the manufacture and use of organic artefacts;
- to secure dates from the palynological sequences.

This section is concerned with radiocarbon dates obtained from the fills of large waterholes and associated organic objects (Fig. 3.3). Many of the best-preserved waterlogged sediments and wooden objects were located within c 100 m of each other in Landholding 3 (see Fig. 3.4), the earliest part of the developed landscape. The dated materials comprised two wooden socketed axe/tool hafts, two wooden 'beaters', stakes from pit revetments, cereal glume bases and organic sediments. The dates obtained range from 1610 BC to 1210 BC.

Results

Although the dates are spread, it is clear that the waterholes were excavated and began filling at a time when Deverel Rimbury pottery was in use. The major land divisions occurred *c* 1600–1300 BC, with the boundary ditches subsequently silting up. Waterholes 110107 and 156031 in Landholding 3 cut two of these silted major north-south land divisions, indicating that they were later insertions into the landscape.

A date was obtained from a wooden haft preserved in the socket of a copper alloy spearhead, recovered from the re-cut of a silted field ditch in Landholding 5. The significance of the 1308–940 BC date is discussed below. The date is somewhat late compared to those from Landholding 3, but provides a benchmark for comparison of metalwork typology with an absolute date.

Radiocarbon dates were obtained from waterhole 124100 in Landholding 5 (WK 10023, WK10033 and WK10034). The date range of 1520–1100 BC (cal BC 2 sigma) is contemporary with those from Landholding 3 to the west.

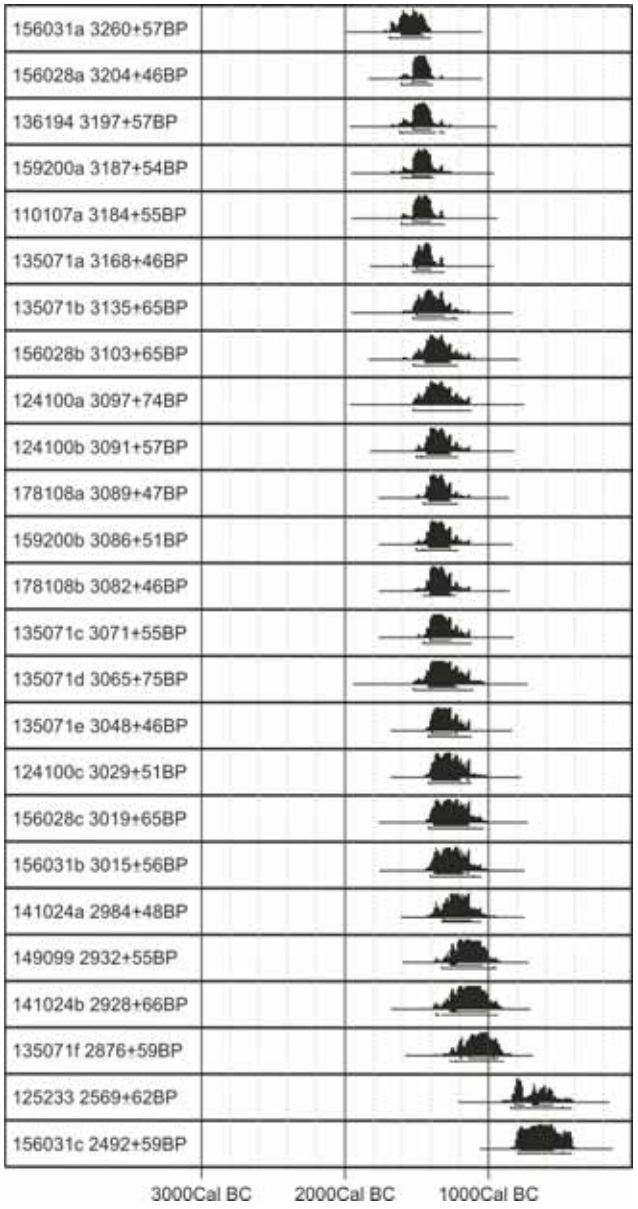


Figure 3.3: Bronze Age radiocarbon dates

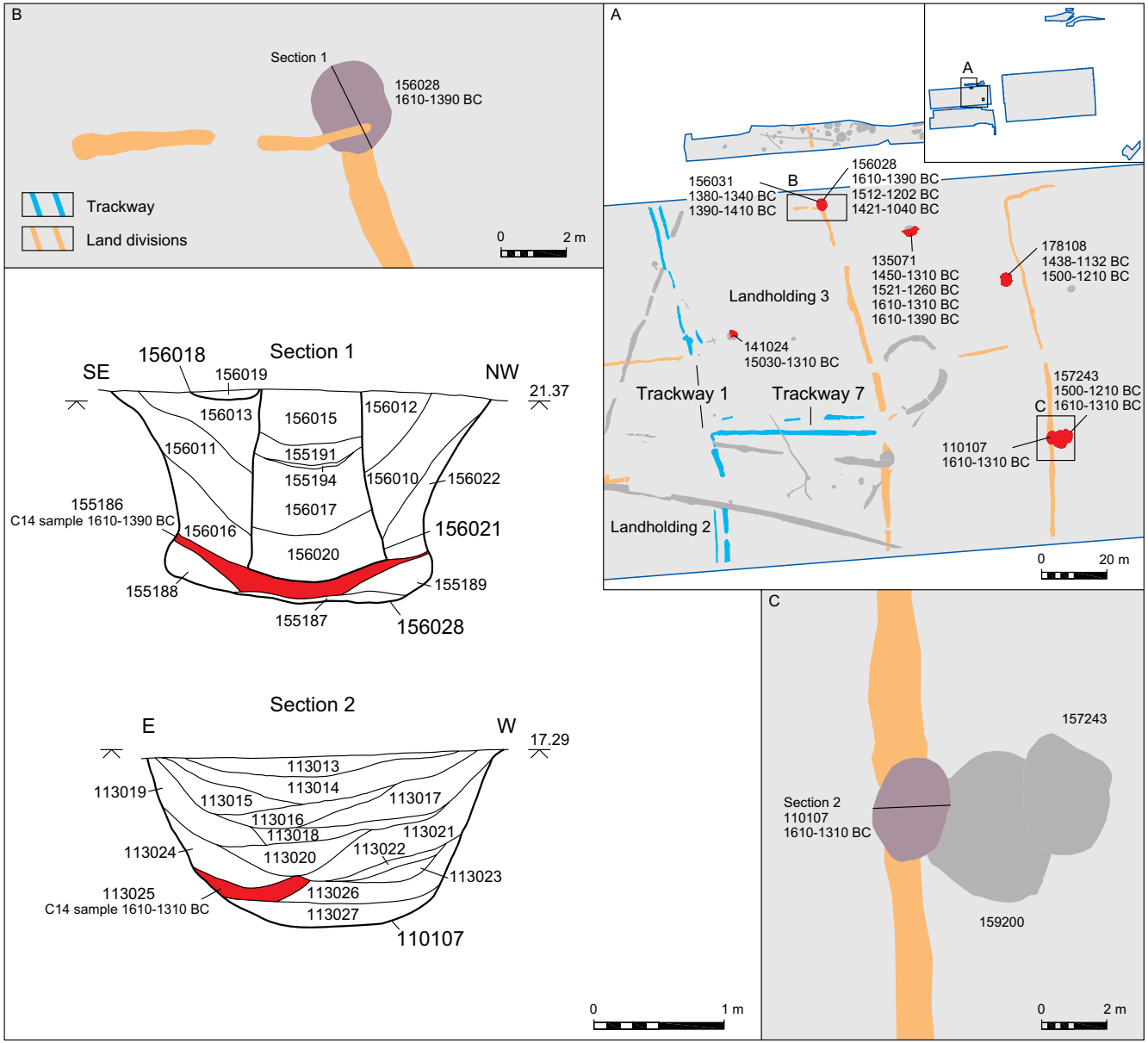


Figure 3.4: Radiocarbon dates from Landholding 3

Stratigraphy: Bronze Age land enclosures with the Neolithic monuments of the 3rd and 4th millennium BC

At some point between *c* 2000 BC and 1600 BC a major transformation of the landscape took place. Previously open areas were enclosed and the construction of boundaries would have restricted movement. This process began with the integration of the monuments of the 4th and 3rd millennia BC into the enclosed landscape of the 2nd millennium BC. The stratigraphic relationships that attest to this transformation within Landholdings 2 and 3 are examined in detail here (Fig. 3.5).

Two important stratigraphic relationships are apparent.

- None of the major 2nd millennium BC north-south aligned enclosure ditches cut across Neolithic monuments.

- The east-west enclosure ditches clearly did cut across Neolithic monuments.

The first observation is illustrated by the C1 Stanwell Cursus and the adjacent 2nd millennium north-south aligned boundaries, which all respect the cursus. Other north-south boundaries also avoid the early monuments or navigate through existing gaps in ditches and banks. For instance, ditch 110009, a recut of 110014, curves around the western side of the horseshoe enclosure and through a gap in the southern bank and ditch of the second cursus. Similarly, field boundary

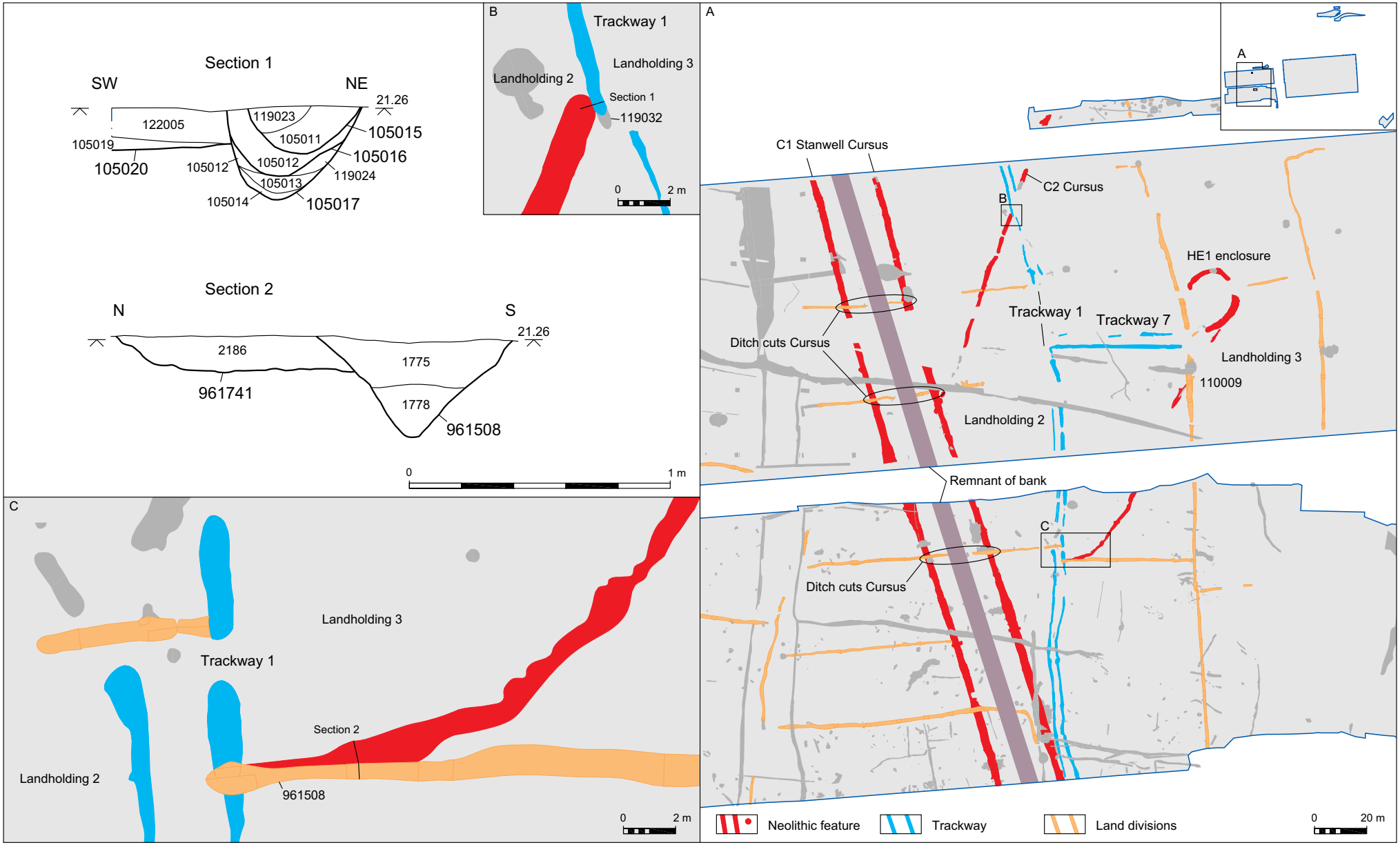


Figure 3.5: Stratigraphic relationships in Landholdings 2 and 3

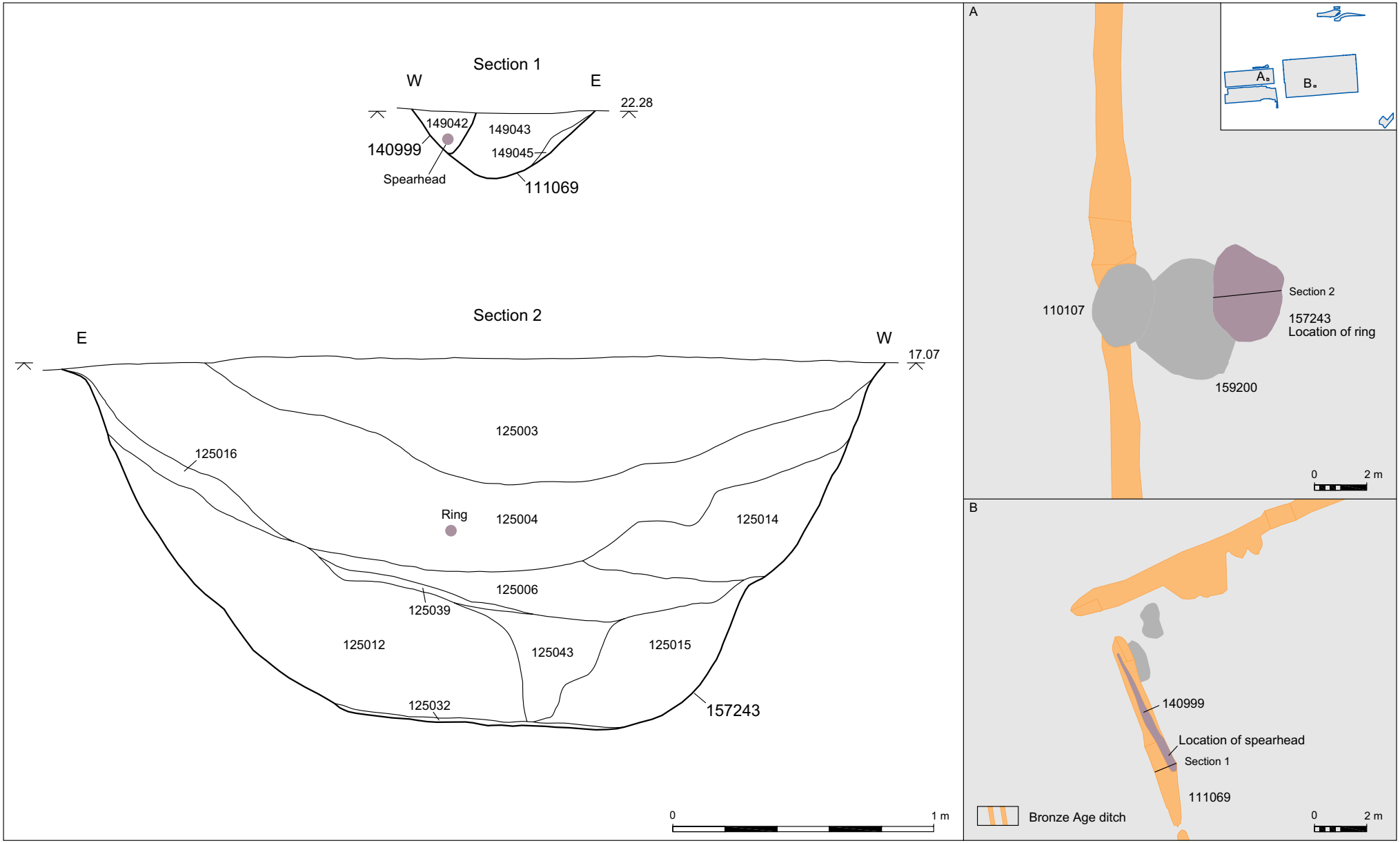


Figure 3.6: Plan of site with copper alloy objects located

119032 carefully negotiates the existing gaps in the northern ditch and bank of the second cursus.

In contrast, a series of east-west aligned ditches cut across the Stanwell Cursus, demonstrating that these boundaries do not respect the monument. The gaps in the east-west ditches at the centre of the cursus indicate the points at which the ditches cut into the decayed and eroded remnant of the central cursus bank (see Fig. 3.5). Furthermore, the east-west field boundary ditch 961508 cuts the southern terminal of the southern ditch of the C2 Cursus.

These stratigraphic relationships are important, since elsewhere in this chapter we will show that, in general, the first elements of the 2nd millennium BC land enclosures were the north-south ditches, followed by east-west subdivisions. Clearly then, the earliest elements of this enclosure system respected the Neolithic monuments, although by the time the later sub-divisions were constructed, the Neolithic landscape was being overwritten by the imperatives of living in a changed world.

Bronze Age Metalwork

Two copper alloy objects dating to the 2nd millennium BC were recovered, a spiral finger ring and a spearhead (Fig. 3.6). Both provide some evidence that contributes to our understanding of the chronology of land enclosure during this period. The objects are typologically assigned to the Taunton phase of the middle Bronze Age and are paralleled elsewhere.

The Ring (Fig. 3.7)

The ring is formed from a stout, coiled rod of oval section with smoothly rounded ends. Objects of this type are normally regarded as personal ornaments on the basis of continental parallels, but they may have served other functions. The diameter of the ring is more consistent with an interpretation as a thumb rather than a finger ring, although a toe ring is also a possibility. The ring was recovered from the central part of an upper fill (125004) within a well (157243) (see Fig. 3.6). The significance of this location is twofold:

- The well was situated close to a north-south aligned ditch, which was possibly associated with an old hedgerow.

- The well cut waterhole 159200, which was also cut by waterhole 110107. This suggests that this particular location was a focus of regular use.

Two interpretations for the deposition of the ring can be suggested. It may have been redeposited from the earlier waterhole, or else it could have been deposited as a curated, significant votive object. The presence of possible Post-Deverel Rimbury pottery in the waterhole suggests that the former explanation is most likely.

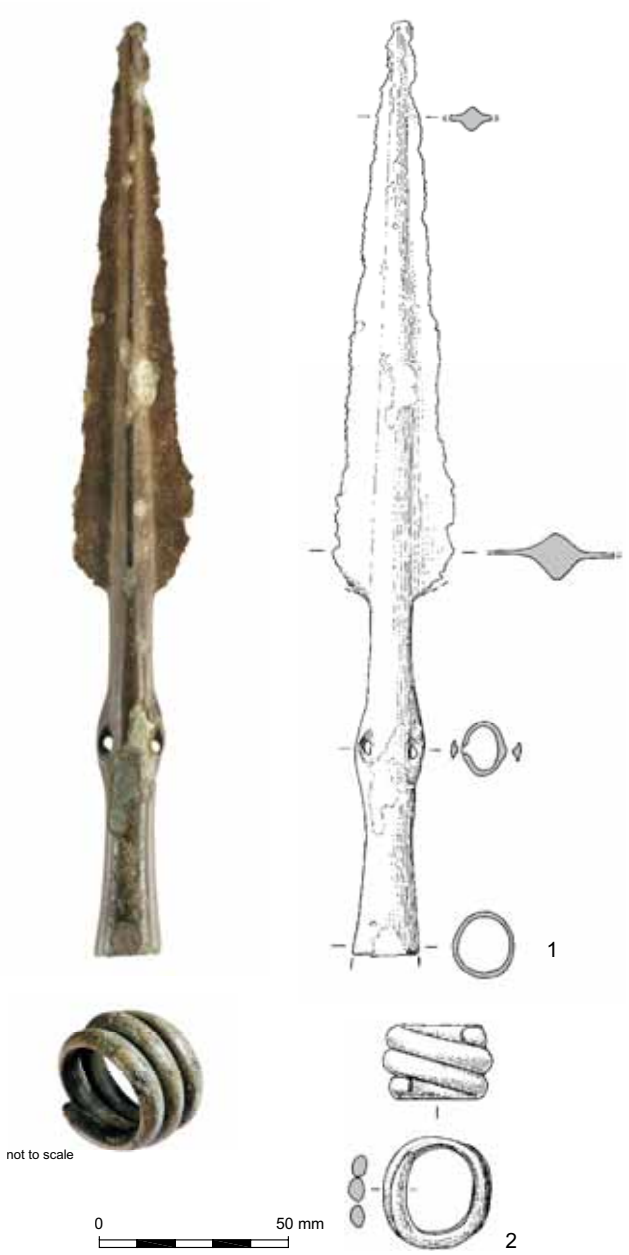


Figure 3.7: Copper alloy ring and spear head

The Spearhead (Fig. 3.7)

The spearhead is a Taunton phase middle Bronze Age type, cast with a hollow socket and side loops. It was recovered from recut ditch 149099 (Fig. 3.6), the western boundary of a Bronze Age field system in Landholding 5.

The chronology of this type has been discussed at length (eg Ehrenburg 1977, 7–9; Rowlands 1976, Ch. II 3), while associated radiocarbon dates have been assessed by Needham *et al.* (1997). Although Needham *et al.* (ibid., 85) admit to some imprecision in the dating of metalwork of the Taunton phase, as a result of the re-use and long functional life of spearheads, a date between 1450 and 1250 cal BC would seem appropriate.

A radiocarbon date from wood (ash) preserved in the haft of the spearhead confirmed the middle Bronze Age date (NZA14907; 2932±55 BP) of 1308–940 cal BC (2 sigma), which could appear slightly later than the suggested typological date. Repeated re-hafting of the spearhead over several hundred years may explain this anomaly. Re-hafting would also emphasise the potential for reuse of functional bronze and acts of deliberate deposition of curated or 'heirloom' objects, where the antiquity of the object is recognised and valued.

The context of the spearhead is even more significant than that of the ring. It was located within a shallow recut (feature 149099) of a Bronze Age field ditch (111069) in Landholding 5. If the spearhead had been deposited in the recut sometime between *c* 1308 and 940 BC, the construction of the original ditch and associated field bank could have preceded this event by several centuries.

Palaeoenvironmental evidence for hedgerow origins prior to 1600 BC

Figure 3.8 shows the position of waterholes which provided palaeoenvironmental evidence from the period *c* 1600 to 750 BC. The detailed reports on this data (pollen, Wiltshire; insects, Robinson; waterlogged plant remains, Carruthers) are contained on the accompanying CD-Rom. In this section we will summarise the pollen evidence from the middle Bronze Age waterholes 124100, 135071, 178108 and 156031 (discussed in more detail below), and show how this information has contributed to our belief that the initial construction of the land boundaries pre-dated *c* 1600 BC. All of these waterholes were located adjacent to ditches and banks which would have supported hedgerows, with the exception of 135071 which was equidistant between two hedgerows.

Wiltshire has summarised the pollen evidence to address two main questions:

How did the hedges form?

There are several possibilities for hedgerow formation. They can be formed from (a) selective clearance of primaeval woodland (assarting), (b) by default (natural colonisation after erection of semi-temporary artificial boundaries), and (c) by active planting of appropriate and available shrub species. The existence of obvious banks and ditches at Perry Oaks precludes the development by assarting so this leaves natural colonisation or planting. Either was possible.

When did the hedges form?

The hedges themselves were very diverse. There is little doubt that trees such as alder, birch, pine, and elm were growing away from the immediate settlement but some trees (such as lime and possibly ash) and a wide range of shrubs were growing very locally and could have been components of the managed hedgerow systems. Shrubs included field maple, hazel, dogwood, purging buckthorn, alder buckthorn, hawthorn, sloe, elder, and guelder rose. It is also possible that the hedgerow supported standard oaks, which could have provided important resources, while honeysuckle, ivy, and bramble were also significant components of the hedge community. The presence of ivy and honeysuckle gives additional credibility to the contention that the shrubs had been allowed to grow fairly tall. Herbaceous plants are always important components of any hedgerow and bank. They provide soft and palatable food for many animals, and the hedge itself provides a protective haven for this complex community. Many of the herbs and ferns recorded in both the palynological and macrofossil record for the site could have been well established in the hedgebank.

Based on the species composition deduced from the palynological and other environmental evidence, and relying on suggestions made by

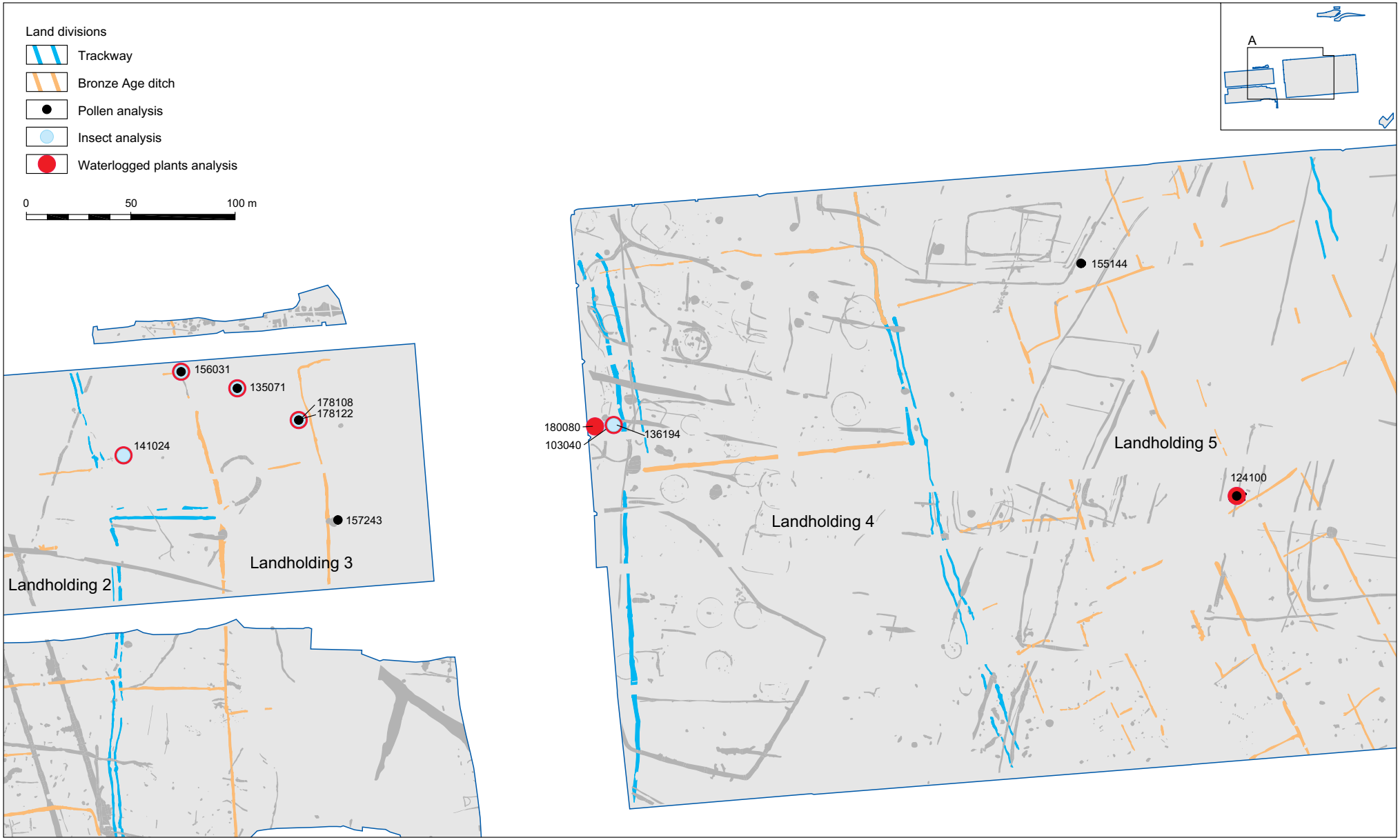


Figure 3.8: Waterholes dating from 1600 to 750 BC containing palaeoenvironmental evidence

Rackham (1986), it is likely that the hedges were at least 500 years old by the time that the waterholes were dug. It has been suggested that both hazel and field maple take a long time to colonise natural hedgerows and, further, that any hedgerow containing field maple is likely to be at least 400 to 500 years old (ibid.). This confirms that the hedgerows at Perry Oaks were well established and, indeed, very old before the waterholes were dug. Even some herbaceous plants are indicators of old hedges. *Mercurialis* (dog's mercury) was found in waterhole 124100 and it was probably growing at the base of the hedge adjacent to this feature. Even today, this plant is an indicator of ancient woodland, and is a frequent member of herbaceous communities associated with ancient hedges.

Given the reliability of radiocarbon estimates (at 2 sigma) from the four waterholes (see above), this would mean that the hedges originated some time between 2020 and 1610 BC (cal). This implies that the landscape was extensively cleared by the early Bronze Age to allow the setting out of the major land boundaries.

Building the system—Development of the trackways and landholdings

In the previous section we discussed the chronology of the inception of the enclosed landscape of the 2nd millennium BC. In this section we will explore how the enclosure of the landscape developed through the 2nd and into the early 1st millennia BC. But let us start by continuing the palaeoenvironmental summary of the palynological, entomological and other botanical evidence to paint a picture of what the landscape would have looked like during the formation of the waterholes and development of the trackways and landholdings between *c* 1600 and 1100 BC. The following section is derived from Pat Wiltshire's pollen report, which can be found in full on the CD-Rom, Section 11.

What did the landscape look like during the latter half of the 2nd millennium BC?

The landscape of the latter half of the 2nd millennium BC had already been established for many centuries, with the terrain largely cleared of woodland. However, there were certainly some trees in the landscape, with alder probably growing further towards the river and small stands or isolated trees, including birch, pine, lime and elm, dotted around Landholding 3 and beyond. The pattern of land use and management had long been in existence and had resulted in a patchwork of fields, lanes, and hedgerows that provided for the needs of the local communities.

There is little doubt that people were engaged in mixed farming, and the environmental evidence tells the story of everyday domestic and small-scale agricultural activity and management. The ditches (and associated banks) of the field boundaries, as well as functioning as land divisions, could also provide drainage for the brickearth-derived soils overlying the Thames gravels. Gradually, through natural succession, these banks became colonised by vegetation and eventually by shrubs and even trees. Thus, productive hedgerows could have developed by default and, once established, were probably nurtured and maintained through careful management. Essentially, hedgerows represent 'woodland edge', the most productive part of any woodland in terms of food and other resources.

The palynological evidence suggests that the shrubs in the hedgerows were allowed to grow tall enough to produce flowers. They were not maintained by regular severe cutting as is characteristic of the modern British landscape. The base of the hedgebank would have provided a haven for many herbs—grasses and flowering plants—and been home to small mammals, birds, invertebrates, and even reptiles. In short, the hedgerow provides a rich, diverse habitat for plants and animals and these can be exploited by people. The palynological evidence also suggests that by the second half of the 2nd millennium BC, these hedgerows were already established and certainly very old.

The hedges and banks separated the fields, which were seemingly used for stock animals and crop growing (see below). Successful pastoral farming implies good pasture and there is evidence for established grassland. The only evidence for crop plants was of barley, wheat (emmer and spelt), and flax but it is possible that other foods and utility plants were also being grown. Animal husbandry was important and there is tentative evidence that sheep were kept as well as cattle and pigs. It is probable that the farming community

also exploited the wider landscape for food, wood, and other resources such as fibre, fodder, medicines, and dye plants. The hedges and woodland edges were certainly rich in berries and nuts and there is ample evidence for bramble, hazel, purging buckthorn, sloe, and elder.

Settlements were built within each of the landholdings (see below), and around these areas was evidence for broken trampled soils and waste ground. There was certainly some degree of soil impoverishment during the life of the settlement; bracken and heather were recorded at low level and these imply poor, acidic soils. These plants may have been infesting poor pasture outside the settlement.

There is little doubt that the picture presented by the environmental evidence from the waterholes at Perry Oaks is of the modern concept of a rural idyll. It must have been exceedingly colourful with hedges full of spring flowering shrubs, full of honeysuckle in summer, and providing rich autumn colour from berries and foliage. Verdant fields offered herb-rich grassland—buttercups, daisies, flowering grasses, and milkwort. Even the trampled areas under herds and flocks, and around the settlements, supported diverse herb-rich ground and pretty grassy edges. Some of the waterholes themselves must have been very attractive with meadowsweet, loosestrife, watermint, crowfoot, pondweed and iris.

Social context of landscape division

If, as discussed above, social pressures led to creation of the first land boundaries in the first half of the 2nd millennium BC, we may pose the following question: does the division of the landscape mark the fragmentation of the community into smaller constituent groups, or did the community evolve to accommodate the increased importance of group identity?

We have chosen to explore this question by studying the way the landscape developed and became increasingly sub-divided during the 2nd millennium BC. By seeking to understand these physical developments, we can attempt to interpret the social dynamics that drove them. A relatively coarse level of analysis has been adopted at this stage, since a much greater area of landscape will be available for study once excavation at T5 is complete, and will be presented in Volume 2.

Figure 3.1 at the beginning of this chapter shows that the field system is divided into seven landholdings and seven double-ditched trackways. The trackways have been numbered from 1 to 7 (all but Trackway 7 north-south), and the blocks of field systems defined by these trackways have been referred to as Landholdings (LH) 1 to 7.

The trackways and landholdings have undergone varying degrees of recent truncation. In general, the eastern landholdings (6 and 7) and trackways (4 to 6) have been subject to most destruction but others (eg Landholding 3) have also undergone severe truncation. This variability in survival has affected analysis, with, for example, very few of the field or trackway ditches retaining their stratigraphic relationships. This has proved a major obstacle in understanding the developmental history of the field system. Even from an incomplete plan, however, it is clear that the fields within each landholding maintained a general coherence in size, shape and orientation, although these properties differ markedly between each landholding. With the exception of short east-west Trackway 7, the trackways are all on a north-south or NW-SE orientation.

We can see from Figure 3.1 that the double-ditched trackways defined distinct blocks of land that were laid out and developed in different ways. To understand that development, we must look first at the history of the trackways.

Development of the trackways

As already discussed above, circumstantial and indirect evidence may lead us to believe that the first major land boundaries were laid out sometime between 2000 and 1600 BC, and that these boundaries were aligned north-south. We believe that those boundaries which developed into double-ditched trackways were the first to be dug, and served as the major boundaries for individual landholdings. A number of strands of evidence lead us to this conclusion.

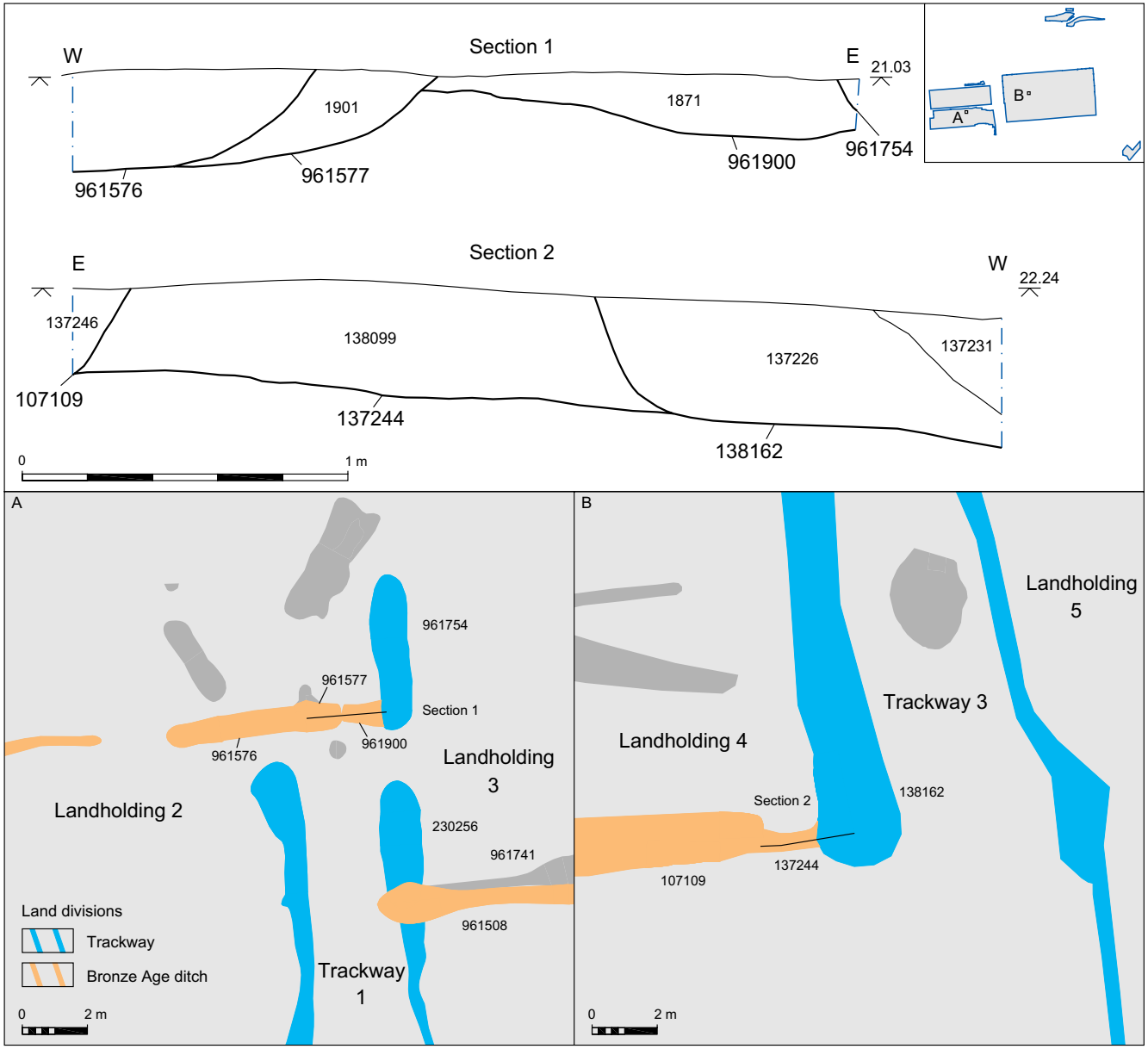


Figure 3.9: Relationships between trackway ditches and landholding ditches

Stratigraphy

Only three unambiguous stratigraphic relationships between trackway ditches and landholding ditches were recorded (Figs 3.9–10). The first lay within the area of Trackway 1, where ditches from Landholdings 2 and 3 converge with the southern ditch of the Neolithic C2 Cursus (Fig. 3.9). Here, C2 Cursus ditch 961741 is cut by north-south ditch segment 230256, which is part of Trackway 1. This is in turn, cut by east-west ditch 961508, which is part of Landholding 3. However, immediately to the north the primacy of the north-south trackway ditch is less clear. Here, the first feature appears to be an elongated pit, 961900. This is cut by both trackway segment 961754 and ditch segment 961577 in Landholding 2.

Small pits of this type are present in other areas of the landscape, such as where Trackway 3 ditch 138162 and Landholding 4 ditch 107109 meet (Fig. 3.9). In plan it looks as though a short length of ditch 137244 was dug to link the two, but the reverse is true. Ditch / pit 137244 is stratigraphically the earliest feature, and is cut by the trackway and landholding ditches. These small pits and their associated spoil may represent a temporary marking out of the main landholding boundaries, but their small size and subsequent digging of the field and trackway ditches have obscured their original function.

The second example concerns the relationship between Trackway 2 and Landholding 4 (Fig. 3.10). Eastern trackway ditch 119303 cuts

Landholding 4 ditch 108043. However ditch 119303 is shallower (0.6 m deep) than western trackway ditch 160233 (1.0 m deep), suggesting that the western ditch was the original boundary. The recent T5 excavations have confirmed that 119303 is a later addition which forms the double ditched trackway. In this case there is no stratigraphic relationship between Landholding 4 ditch and the primary element of the land boundary (ditch 160233) that became Trackway 2.

The relationship between Trackway 5 and Landholding 7 is the final example (Fig. 3.10). Here, trackway ditch 121104 is cut by landholding ditch 121106. However, on the opposite side of the trackway, it appears as though ditch 149131 is superseded by ditch 149141, presumably in order to reduce the width of Trackway 5.

To summarise, there are two examples of east-west field boundaries cutting trackway ditches, and one example of the reverse. Additional stratigraphic relationships have been recorded between field boundaries within the landholdings. In six of eight examples, east-west ditches are cut by north-south ditches and in one case the reverse is true. The final example resembles that shown in Fig. 3.9, with a small gully cut by two later ditches.

The stratigraphic evidence indicates that the original ditches and banks which were modified as trackways were the earliest division of the open landscape. Had they been inserted into a pre-existing field system, many more stratigraphic relationships would have been apparent. It seems

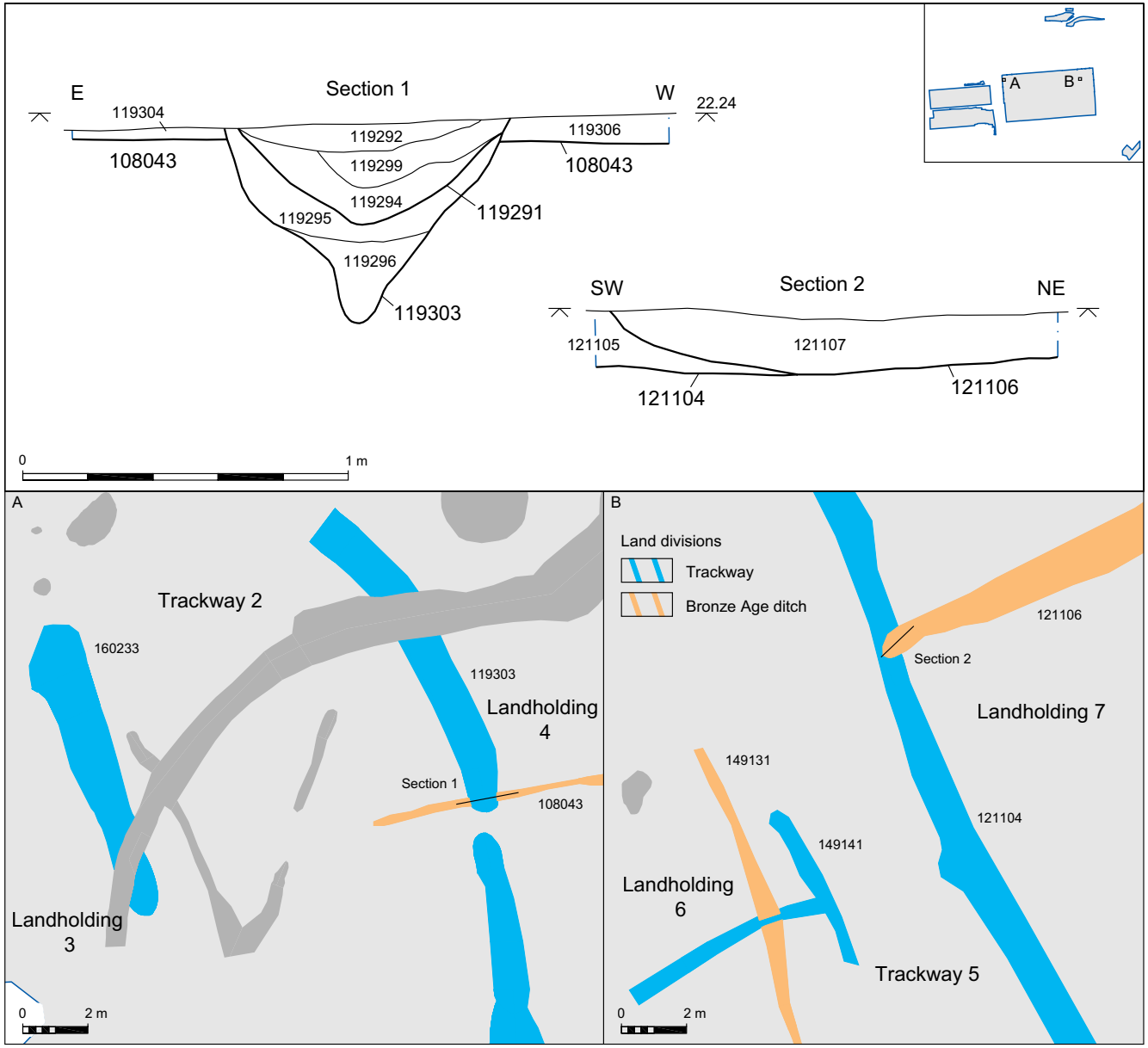


Figure 3.10: Relationships between trackway ditches and landholding ditches

also that the first land boundaries superseded pits and associated spoil heaps that acted as markers for early landholdings.

This apportionment of land may have reflected the break-up of the community of the 3rd millennium BC into constituent kin-groups, each with their own landholding. This division of the landscape was apparently undertaken in an orderly way, as blocks of land may have differed in width, but they lay on the same orientation. This apportionment of land was probably not imposed by a single authority, since, as we have noted previously, high status artefactual and burial paraphernalia of the early Bronze Age is conspicuously lacking in West London. Instead, the constituent groups within the community appear to have agreed on a system of land division that resolved the increasing conflict over access and resources.

As previously discussed, the first major boundaries respected the monuments of the 4th and 3rd millennia, but also took clear account of small variations in the relatively flat topography of the area (Fig. 3.11). Once the major land boundaries had been dug and the banks constructed, the field system evolved differently within each landholding. Each possible kin-group divided their landholding to best suit their own requirements and those of the topography and local resources. Figure 3.11 shows how the ditches of Landholdings 1 and 2 cut across the contours and ran towards the floodplain of the River Colne. In contrast, the landholding ditches and trackways to the east of Trackway 2 ran roughly parallel with the 23 m contour.

There appears to have been a general trend for the long rectangular north-south aligned landholdings to have been initially divided into smaller fields by east-west ditches and banks, before further sub-division by additional north-south ditches. This is, however, a generalisation, and the long north-south orientated fields of Landholding 3, for example, seem to be an exception. Of course, in order to lay out major linear land boundaries and finer field divisions the landscape must, to some degree, have been cleared of trees, and we will consider the palaeoenvironmental evidence for this later in this chapter.

It appears that the development of the landholdings and trackways reflected the ascendancy of individual kin-groups over the larger community, but as we shall see when we examine the chronological development of the system, this may have been a short lived phenomenon.

Chronology of the development of the trackways and landholdings

The first major land boundaries were dug between 2000 and 1600 BC, probably in the centuries around 1800 and 1700 BC. We have demonstrated above, on the basis of relatively few stratigraphic relationships, how these major landholdings were sub-divided into fields and how the land boundaries developed into double-ditched trackways. The chronology of these developments is, however, far from clear for several reasons. Firstly, there are no radiocarbon dates from the field boundaries and trackways, as organic materials were preserved only at the base of large pits and waterholes. Secondly, the relative ceramic sequence is based on Deverel Rimbury and Post-Deverel Rimbury wares. On the basis of Needham's (1996) chronological framework, Deverel Rimbury pottery could have been in use through Periods 4 and 5 (1700 BC to 1150 BC) and Post-Deverel Rimbury pottery through Periods 6 and 7 (1150 BC to 750 BC). The context of these ceramics within the trackways and field systems should, therefore, provide a relative chronology of Period 4/5 or 6/7, although recutting of the upper fills of ditches has resulted in the mixing of Deverel Rimbury and Post-Deverel Rimbury ceramics. Furthermore, the truncation of much of the field system by the construction and operation of the sludge works has removed the upper part of many of the ditches, thus depriving us of the full silting sequence. However, if we chart the amount of Deverel Rimbury and Post-Deverel Rimbury pottery from each trackway and landholding, we can at least gain an idea of the relative development of these entities in the periods 1700–1150 BC and 1150–750 BC.

The chart (a) in Figure 3.12 is presented by trackway and landholding from west to east across the landscape. The chart reflects the relative area of landholding available for excavation and the varying degrees of truncation.

There is a trace residue across the landscape of pottery from Needham's (1996) Periods 3 and 4 (The early Bronze Age, 2050–1700 and 1700–1500 BC) in the small sherds of Beaker and Collared

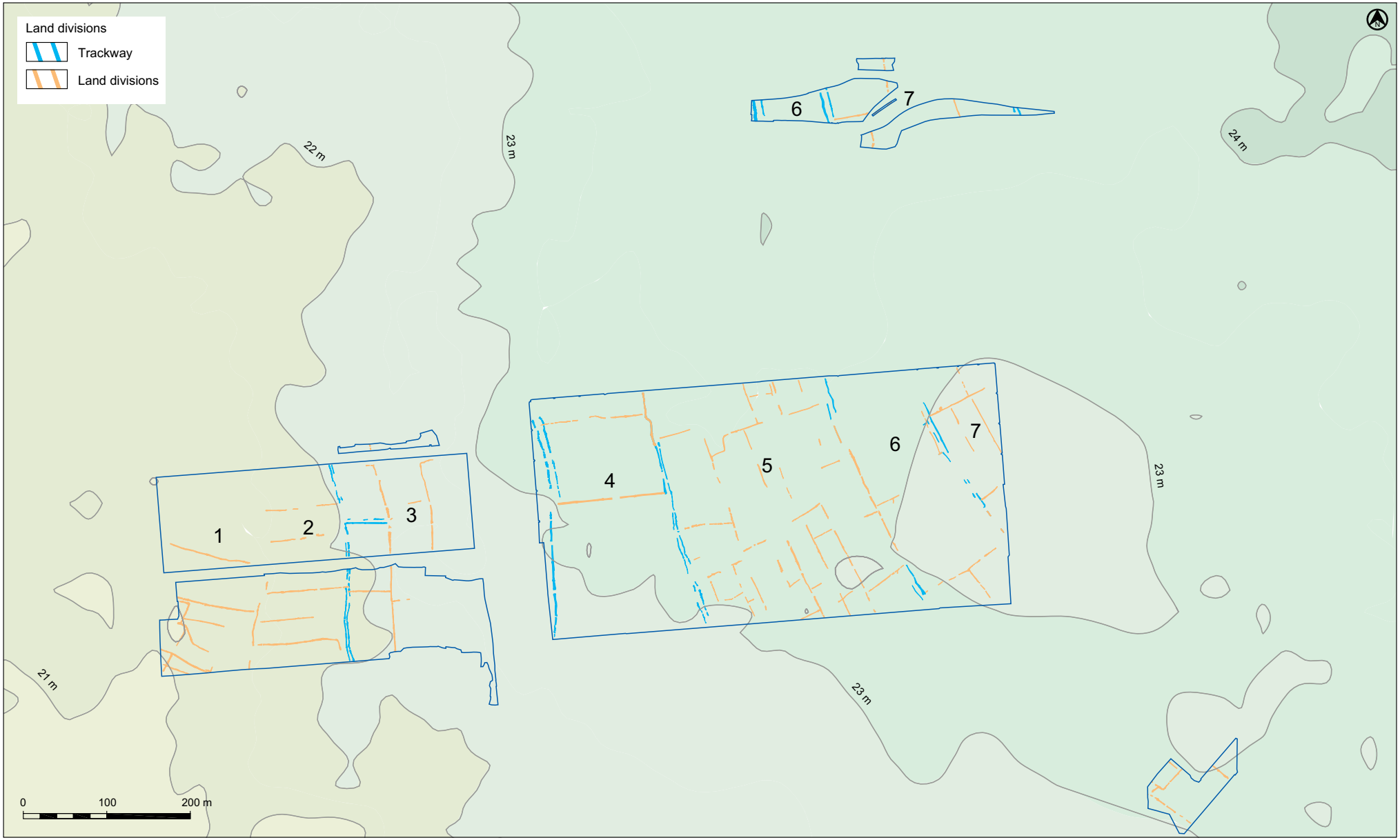


Figure 3.11: Landholdings, trackways and topography (contours at 0.5 m intervals)

Urn. The occurrences of Deverel Rimbury Bucket / Barrel and Globular Urns show that at least some elements of all the trackways and landholdings (except perhaps Landholding 4) had been laid out and were functioning between Needham's Periods 4 and 5 (1700 BC to 1150 BC). That Landholding 4 is represented by only two east-west ditches explains the small quantity of pottery and suggests that both ditches were either dug or recut and collecting material during Periods 6 and 7.

It is clear from the presence of Post-Deverel Rimbury pottery in all areas apart from Landholding 1, that almost all landholdings and trackways continued to be used, maintained and sub-divided through Periods 6 and 7 (1150 BC to 750 BC). This evidence indicates that within the restrictions of our chronological understanding, the landholdings developed independently across the landscape through the 2nd millennium BC, once the major boundaries had been set out. The field system did not originate in any specific area and then expand across the landscape.

Before turning to more detailed analysis of the pottery residues of the field system, it is worth noting the peaks in the quantities of pottery in the areas of Trackway 1, Landholding 3, Trackway 2 and Landholding 6. In subsequent sections we will discuss how and where settlements emerged within the field system and how they developed through the 2nd millennium BC. The peaks in the pottery chart above are in part a reflection of the location of those settlements.

The chart (b) in Figure 3.12 has been produced using the same data as chart (a), but displays the weight of pottery as a percentage of the combined trackway and landholding assemblages. This chart indicates a higher percentage of Post-Deverel Rimbury pottery in the trackways than in the field boundaries, the result of continued maintenance and recutting of the initial landholding boundaries through the latter half of the 2nd millennium BC. The addition of a parallel ditch and further recutting of the original ditch completed the transformation of landholding boundary into trackway. This process can be demonstrated stratigraphically. Although many field ditches were recut, there was proportionately more recutting of trackway ditches.

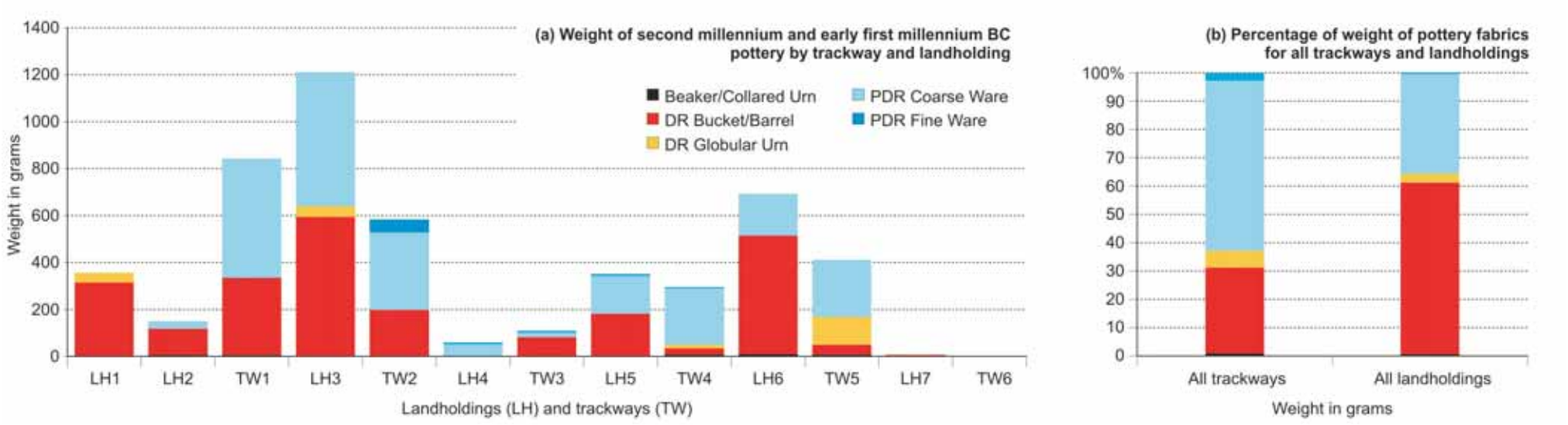


Figure 3.12: Graphs showing (a) weight of 2nd millennium and early 1st millennium BC pottery by Landholding and Trackway and (b) percentage of weight of pottery fabrics for all trackways and land holdings

Figure 3.13: Sections across Trackway 1 (north)

Trackway 1 provides a good example of the process (Figures 3.13 and 3.14 present sections across this trackway). At the northern end of the site (Fig. 3.13), the western ditch (section 1) was maintained by recutting, whilst the eastern ditch (section 2) had a single phase of digging and silting. However, south of the east-west aligned double-ditched trackway (Trackway 7) that led towards the Neolithic HE1 enclosure, the pattern was reversed, the eastern ditch (Fig. 3.13 sections 4–5; Fig. 3.14 sections 2 and 4) being repeatedly recut and maintained. In some areas the western ditch became very shallow (Fig. 3.13 section 3; Fig. 3.14 section 1) with the same dimensions as the final recut of the eastern ditch. At one point the eastern ditch bifurcated, indicating that this boundary was recut on a slightly different alignment.

The small pottery assemblage from Trackway 1 was dominated by Deverel Rimbury Bucket Urn (Table 3.2). Only one sherd (2 g) of Post-Deverel Rimbury ware fabric was recovered, from deposit 107014. Although this was the fill of a secondary recut of the eastern boundary ditch, a single sherd remains a reliable indicator of the date of the silting.

At present the stratigraphic and artefactual evidence is insufficient to indicate at what point in the 2nd millennium BC the landholding boundaries became double-ditched trackways. However, we may suggest a reason as to why these boundaries underwent this change.

We have suggested that the entities that became fully developed trackways started as the first major land divisions—the initial boundaries of blocks of land that were held by individual kin-based groups. Once the process of division and land apportionment was set in motion, the only way to move around the landscape without crossing neighbouring landholdings was to travel along the boundaries of these landholdings. These boundaries became practical and acknowledged routes for people and animals to move through the landscape without causing disputes. Over time, routes became formalised into trackways and additional parallel ditches were dug as control of movement of livestock became ever more important.

In the next section we will turn to examine the development of settlements within the individual landholdings.

Settlement

Settlement genesis

In the previous chapter, we demonstrated the presence of Neolithic occupation localities from the occurrences of flintwork residing in later features. Here we will show how middle Bronze Age settlements also developed at such locations. First we will explore the nature of human occupation of the landscape prior to the division of the landscape in Periods 2 and 3 (2300–1700 BC), traditionally referred to as the early Bronze Age.

Evidence for occupation during the late 3rd / early 2nd millennium BC is sparse, restricted to a handful of grog-tempered sherds and a few diagnostic flint artefacts, including barbed-and-tanged arrowheads. This may represent a very low level of landscape occupation, or may reflect a lack of archaeological visibility of the type seen elsewhere at the time (mainly burial evidence).

Pottery ware	Fabric	No. sherds	Wt g.
Beaker/Collared Urn	GR1	2	5
DR Bucket/Barrel	FL2	33	330
DR Globular Urn	FL3	0	0
PDR Coarse Ware	FL1	1	2
PDR Fine Ware	FL5, FL12	0	0

Table 3.2: Pottery assemblage from Trackway 1

It is reasonable to assume that early Bronze Age settlement dynamics resembled those of the late Neolithic in that settlements were relatively transient, with perhaps the major focus of occupation lying on the Thames floodplain rather than on the higher terraces (eg Brown and Cotton 2000, 90). However, diffuse lithic scatters of late Neolithic / early Bronze Age date do appear to have been associated with the Perry Oaks Neolithic monuments, and probably represent semi-permanent settlements dating to the early 2nd millennium BC. Their location adjacent to such monuments is perhaps to be expected, as these structures had served as arenas for the negotiation of land utilisation and access to resources during the 3rd millennium BC (see Chapter 2).

The construction of the first major land boundaries between 2000 and 1600 BC led to the emergence of the middle Bronze Age settlements,

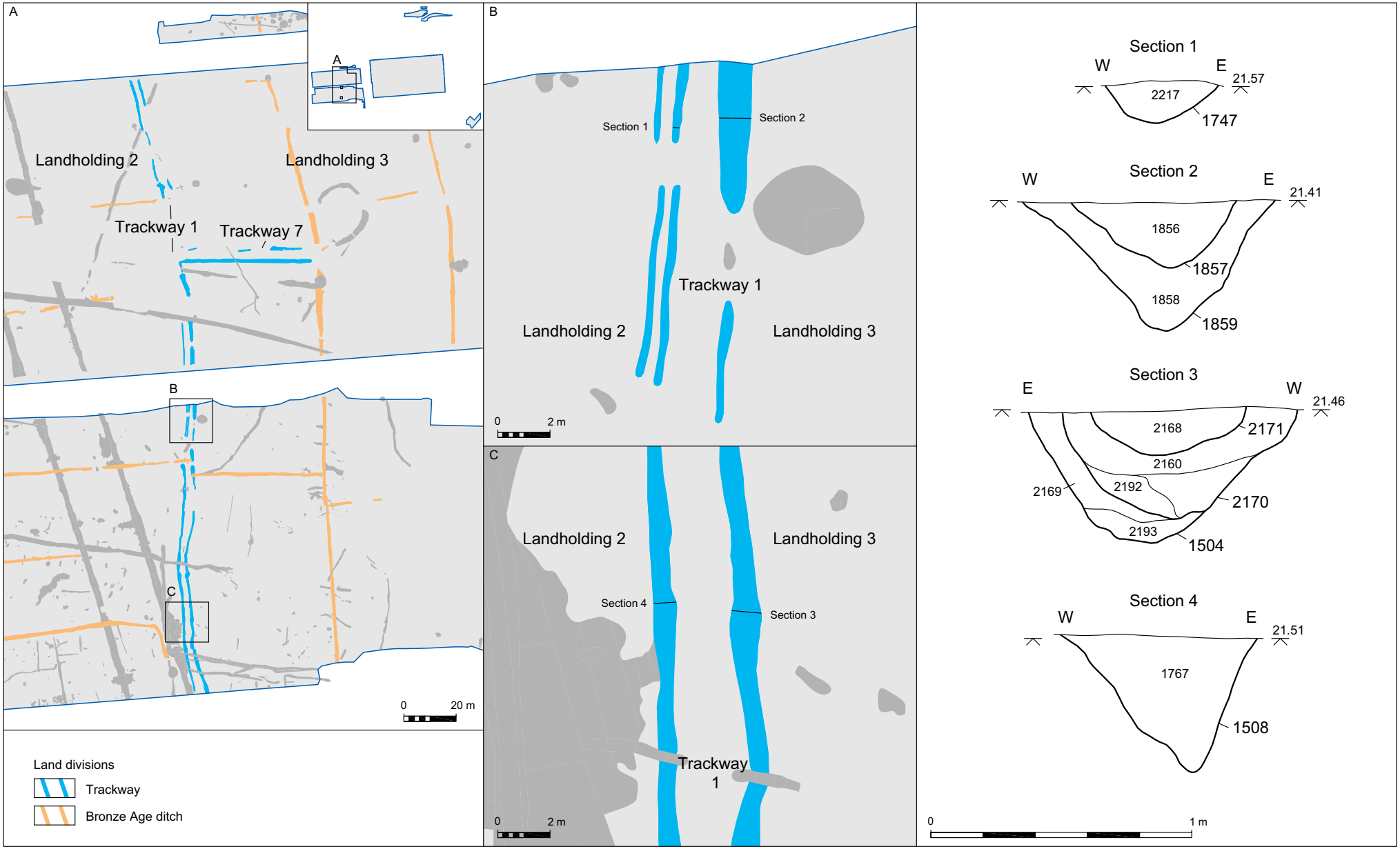


Figure 3.14: Sections across Trackway 1 (south)

albeit still in similar locations linked to the earlier Neolithic monuments. With the breakdown of traditional practices and the first division of the land, the primary resource for a residential group would be the produce of their land block. The 2nd millennium BC thus saw the emergence of a new concept of land tenure, the holdings defined by physical boundaries and reinforced by the physical linkage of settlement with ancient locations.

Settlement and Landholding

Division of the landscape into landholdings had a number of consequences. We have shown how large landholdings were subdivided into smaller fields of varying patterns and orientation, and how the boundaries evolved into double-ditched trackways. With the sub-division of the landscape came the need for the supply of water to fields, animals and settlements and so large waterholes and wells were excavated in the fields and adjacent to settlements. These features will be examined below. This section explores another major consequence of landscape division—the development of archaeologically visible domestic structures and settlements in Periods 4 and 5 (1700 to 1150 BC). It also presents the possibility of a change in settlement nature and location during Periods 6 and 7 (1150–750 BC).

The structure of individual settlements is not discussed in detail here, nor is there detailed discussion of the palaeobotanical evidence for the economy of the settlements. The settlements exposed during this excavation were either very heavily truncated, partially exposed, or lacking good organic preservation. These problems have been redressed during the recent excavations at T5, where complete plans of the settlements mentioned in this volume have been revealed, providing a better sample of palaeobotanical remains upon which to base a study of landscape/settlement interrelationships and economics. A fuller discussion of settlements will therefore be presented in Volume 2.

Middle Bronze Age settlement location

Six possible middle Bronze Age settlements have been identified (Fig. 3.15). In order of decreasing certainty they are:

Settlement 1: This consisted of four or five subrectangular structures, enclosed to the west and east by north-south aligned field boundaries which developed into double-ditched trackways. Although the northern part of the site remained inaccessible beneath the airport operational area, the southern boundary was defined by postholes representing a fence line. Immediately to the south of this line, the edge of a large pit or quarry contemporary with the settlement was exposed.

Settlement 2: This settlement consisted of a number of palisade trenches and gullies sub-dividing a large square enclosure adjacent to the Stanwell Cursus. First identified from the higher density of burnt flint and pottery in the area, subsequent excavations produced the full settlement plan. Despite the presence of large pits containing domestic refuse and loom weight fragments within one of the palisade trenches, no accompanying post-built structures survived. Since most of this settlement was excavated as part of the T5 programme, it will be described fully in Volume 2.

Settlement 3: This small post-built structure could be part of a settlement, but it is small and apparently isolated.

Settlement 4: No structures were identified in this area but the presence of Coleoptera in samples from pit 178108 and recut 178122 suggests that timber buildings may have been located in the vicinity of this feature.

Settlement 5: Only circumstantial evidence suggests the presence of a settlement here as no structural evidence was identified.

Settlement 6: Only field system patterning and finds distributions suggest the presence of a middle Bronze Age settlement in this location.

Some general observations can be made with reference to middle Bronze Age settlement. Settlements, fields, and waterholes had developed in the landscape between 1600 and 1300 BC. The settlements post-date the initial major north-south land boundaries, and some (eg Settlement 2) appear to post-date the sub-division of the large blocks. Most settlements are located adjacent to major land boundaries that evolved into double-ditched trackways. This is not surprising, since trackways developed in order

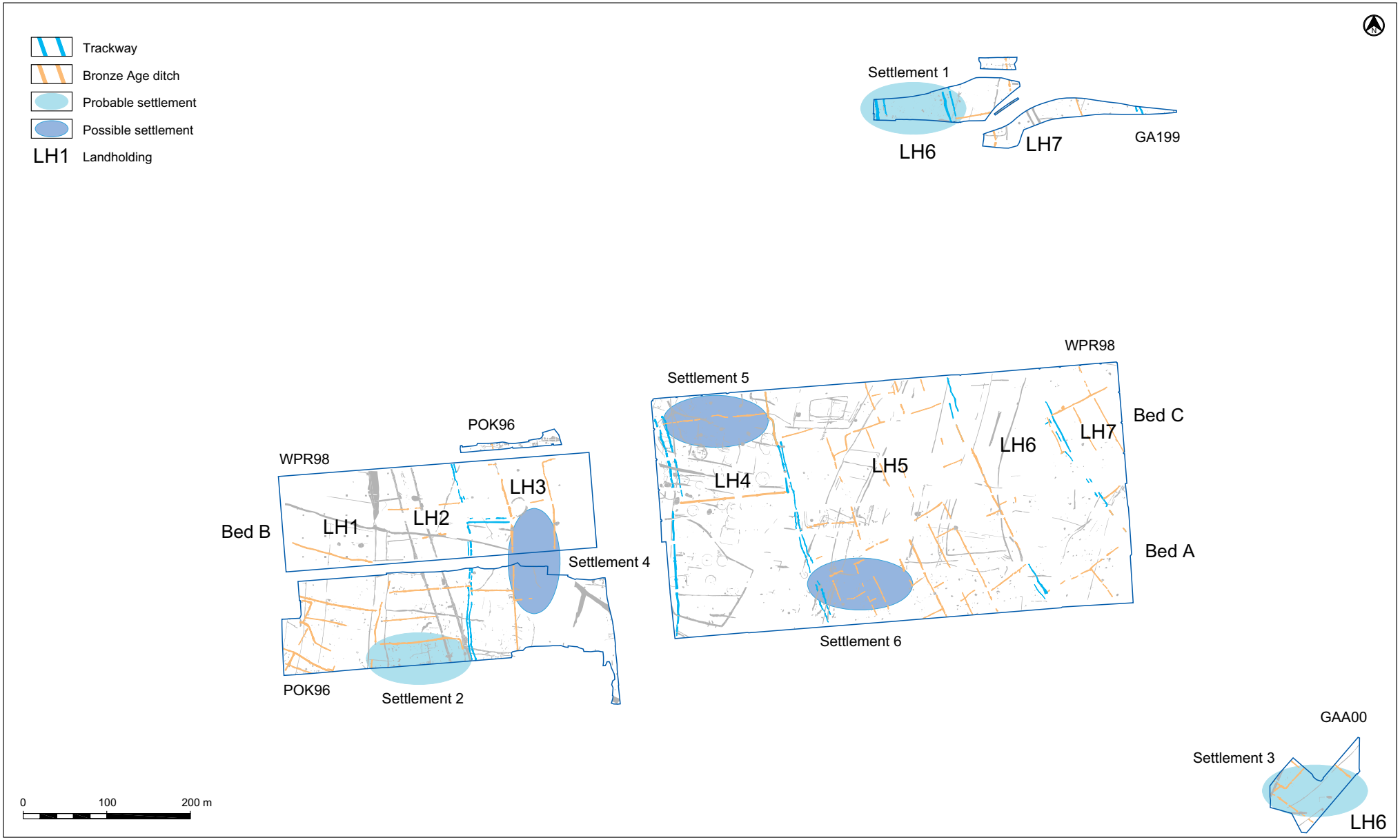


Figure 3.15: Location of middle Bronze Age settlement

to facilitate movement between settlements and fields. Figure 3.15 shows the location of the settlements and highlights the double-ditched trackways. Even if some of the more improbable 'settlements' (eg Settlement 5) are discounted, a clear pattern of settlements located within landholdings remains.

The description above presents all the middle Bronze Age settlements as contemporary, although there is little direct evidence to corroborate this and current theories suggest that middle Bronze Age settlements may have been relatively short lived and have 'migrated' across the landscape (eg Pryor 1996, 323). Unfortunately, we have no radiocarbon dates directly associated with structural features and the pottery chronology allows us to distinguish only between Deverel Rimbury and Post-Deverel Rimbury ware (see above).

The six possible settlements are discussed in more detail below.

Settlement 1 (Fig. 3.16)

The settlement was located in Landholding 6, within the excavated area known as Northern Taxiway (GA199), 300 m north of the main excavations.

Pre- and early settlement activity (Fig. 3.16)

The history of this part of the landscape has been discussed in Chapter 2, specifically concerning the way the distribution of Grooved Ware in shallow pits relates to the Neolithic landscape as a whole. The 2nd millennium BC settlement at Northern Taxiway was located c 50 m south of an undated, interrupted ring ditch partially excavated in 1969 (Canham 1978). The ditches of Trackway 5 appeared to lead directly towards this monument, which probably dates to the 4th or 3rd millennium BC (see Fig. 3.17). Pit 216009, which contained 3rd millennium BC Grooved Ware pottery, lay between the ditches of Trackway 5, suggesting that the 2nd millennium BC settlement had close spatial ties with the past landscape that were not fortuitous.

In the previous chapter we proposed that the small circular monuments of the late 3rd millennium BC were the original sites of ceremonies held to negotiate control of land and resources. The ceremonies apparently culminated in rituals performed within the area of land under negotiation and involved the deposition of artefacts including Grooved Ware pottery. We can argue that the kin-group that constructed the 2nd millennium BC settlement at Northern Taxiway and held Landholding 6 merely formalised the tenure established during the late 3rd millennium BC and previously maintained through ceremony and ritual.

There is some evidence of the activity that preceded the construction of north-south Trackway 4 ditch 218035 on the western boundary of the settlement (Fig. 3.16). Two short east-west gullies (218042 to the north and 217061 further south) were cut by this ditch, and 218042 contained 3 sherds (13 g) of grog-tempered pottery. The sherds were in fabric GR1, and possibly belonged to a Beaker or Collared Urn. Another small sherd was recovered from the upper fills of ditch 218035, and presumably derived from gully 218042. Gully 218042 was the western extension of another gully, 218038. Another short length of ditch (218058) probably functioned in association with this gully complex, until it was superseded by the construction of the Trackway 4 ditches.

The gullies and their intersection with Trackway 4 ditch 218035 were excavated as part of a programme of field evaluation by trenching in 1996 (site code WXE96, trench 5B5: BAA /905, 1996). The finds remain at the Museum of London and were unavailable for examination during this analysis, although the fieldwork report (BAA/905) described a small green glass or faience bead and part of a Deverel Rimbury Globular Urn, recovered from gully 218038. The presence of the grog-tempered Beaker / Collared Urn sherds would imply activity on the site prior to 1700 BC.

Another feature which probably pre-dated the main settlement was shallow ditch 212055, which lay just to the west of the large Trackway 5 ditch 212086. Although undated, ditch 212055 could be an early trackway ditch which was replaced by 212086, as we have previously shown that Trackway 5 may have been narrowed further to the south in the WPR98 area (see above).

Figure 3.16: Settlement 1: Northern Taxiway

The 2nd millennium BC settlement (Fig. 3.17)

An east-west transect was excavated through the Northern taxiway settlement, which was defined to the west and east by the double ditches of Trackways 4 and 5. The southern extent of the settlement appears to have been defined by a post-built fenceline, while the northern part of the site remained unexcavated, preserved below the airport operational area. Within this area a number of post-built buildings were recognised.

The plan of the settlement is at best partial and interpretation is further hampered by the scarcity of stratigraphic relationships between the features. The contexts of the Deverel Rimbury and Post-Deverel Rimbury pottery recovered are, therefore, the most reliable chronological indicators for the development of the settlement, and this provides only a very broad sequence for the settlement history.

The main phase of activity seems to date to between 1700–1150 BC and to be associated with Deverel Rimbury pottery. The parallel ditches of the trackways bounding the settlement are unusual in being spaced *c* 7.4 m apart, wider than the spacing of most other trackway ditches across the landscape. This suggests that the land boundaries / trackways at this point may have been specifically modified to accommodate the settlement.

The dimensions of the trackway ditches adjacent to the settlement indicate that ditch 212086 in Trackway 5 and 218035 in Trackway 4 were substantially wider and deeper than other trackway ditches. They were also more substantial than their respective parallel ditches, but 212086 very rapidly became shallower and narrower at its southern point, past the fenceline demarcating the southern settlement boundary. If we look at the above ground architecture, the excavators have suggested that both ditches of Trackway 5 were banked to the west, and the Trackway 4 ditches were banked to the east. It is normally expected that double-ditched trackways had banks external to the ditches in order to confine animal movement along their length. It is, therefore, likely that the larger, deeper trackway ditches were later enlargements or embellishments of the settlement boundary, although the evidence for this is circumstantial.

The Trackway 5 ditches contained Deverel Rimbury pottery and burnt flint in the middle and upper fills, whilst ditch 218021 of Trackway 4 produced Deverel Rimbury pottery, fired clay and struck flint from the basal fills and burnt flint from the upper fill. No artefacts were recovered from the lower fills of ditch 218035, although 'Bronze Age' pottery was recorded from an equivalent lower fill of the same ditch in an evaluation trench to the north (BAA/905, figure E3 and Appendix 1). The quantities of pottery (159 g) were, in relation to the total landscape assemblage, relatively insignificant. Globular Urn fabrics amounted to 125 g, as opposed to the generally more numerous Bucket / Barrel fabrics. It is likely, therefore, that the middle and upper fills of the ditches at least were contemporary with the settlement activity.

Turning to the area enclosed by the trackway ditches, direct evidence for the presence of a settlement comprised a number of postholes, some of which formed reasonably convincing building plans.

For example, Posthole Group 1 (Fig. 3.17) covered an area *c* 10 m long and 5–6 m wide. The postholes appear to have made up a substantial structure (although the exact form remains uncertain), with two intercutting postholes indicating a phase of repair. Perhaps the most interesting aspect of this structure was the extraordinary number of Deverel Rimbury Bucket Urn sherds deliberately placed in two postholes or pits, 210026 and 221005. Table 3.3 shows the quantity of pottery from these two features, which is particularly striking in contrast to the total of 2612 g of Deverel Rimbury pottery from all of the seven landholding field ditches. Table 3.3 also shows that both FL2 and FL10 fabrics were present in both postholes, suggesting the presence of at least two vessel elements in each.

Feature	Deposit	Fabric	No. sherds	Wt g.
210026	21005 21003	FL2 FL10	92 113	124 5167
total			**205**	**5291**
221005	21004 221003 221003	FL10 FL10 FL2	4 21 44	3 1305 1442
total			**69**	**2750**

Table 3.3: Quantity of pottery from postholes or pits 210026 and 221005

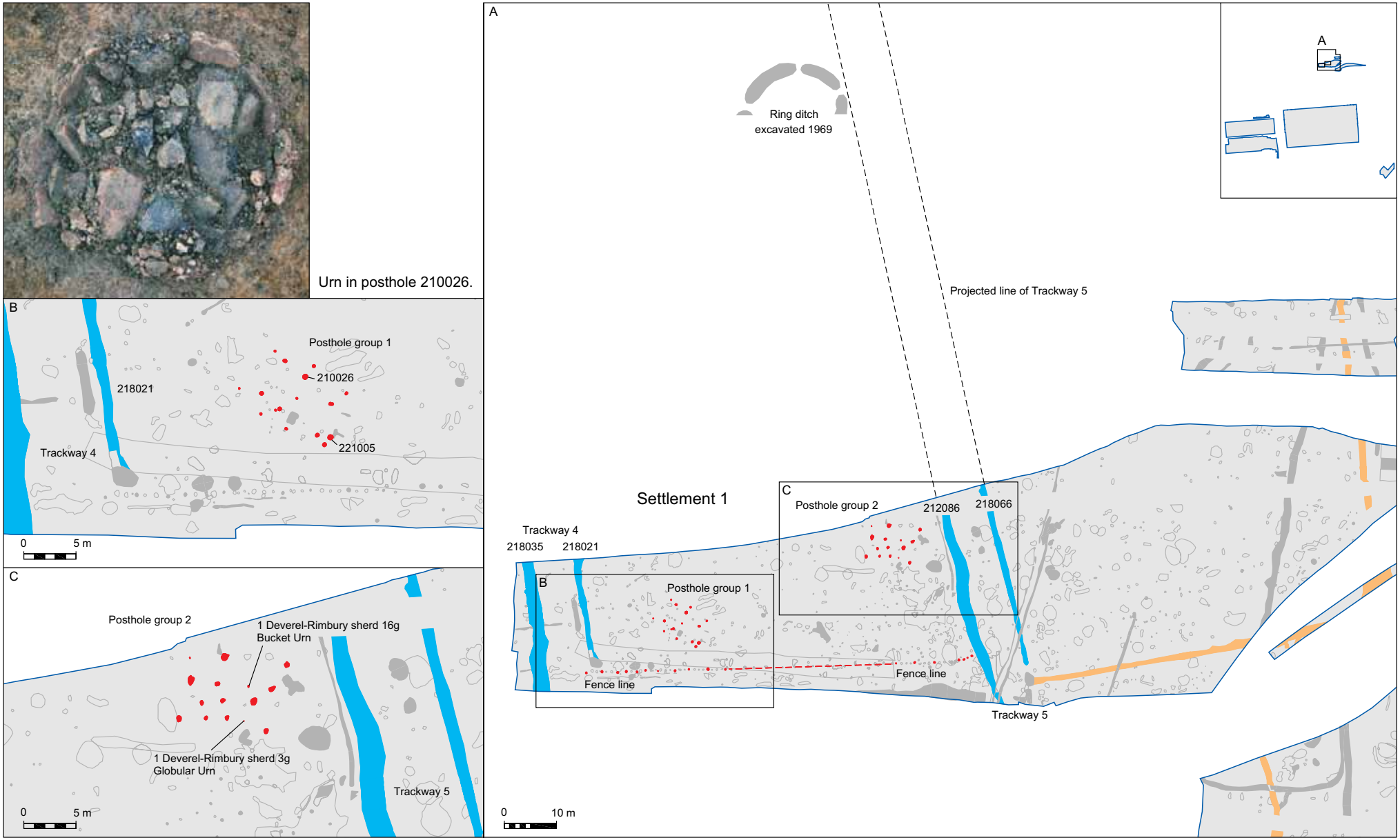


Figure 3.17: Settlement 1: The 2nd millennium BC settlement showing posthole groups 1-2

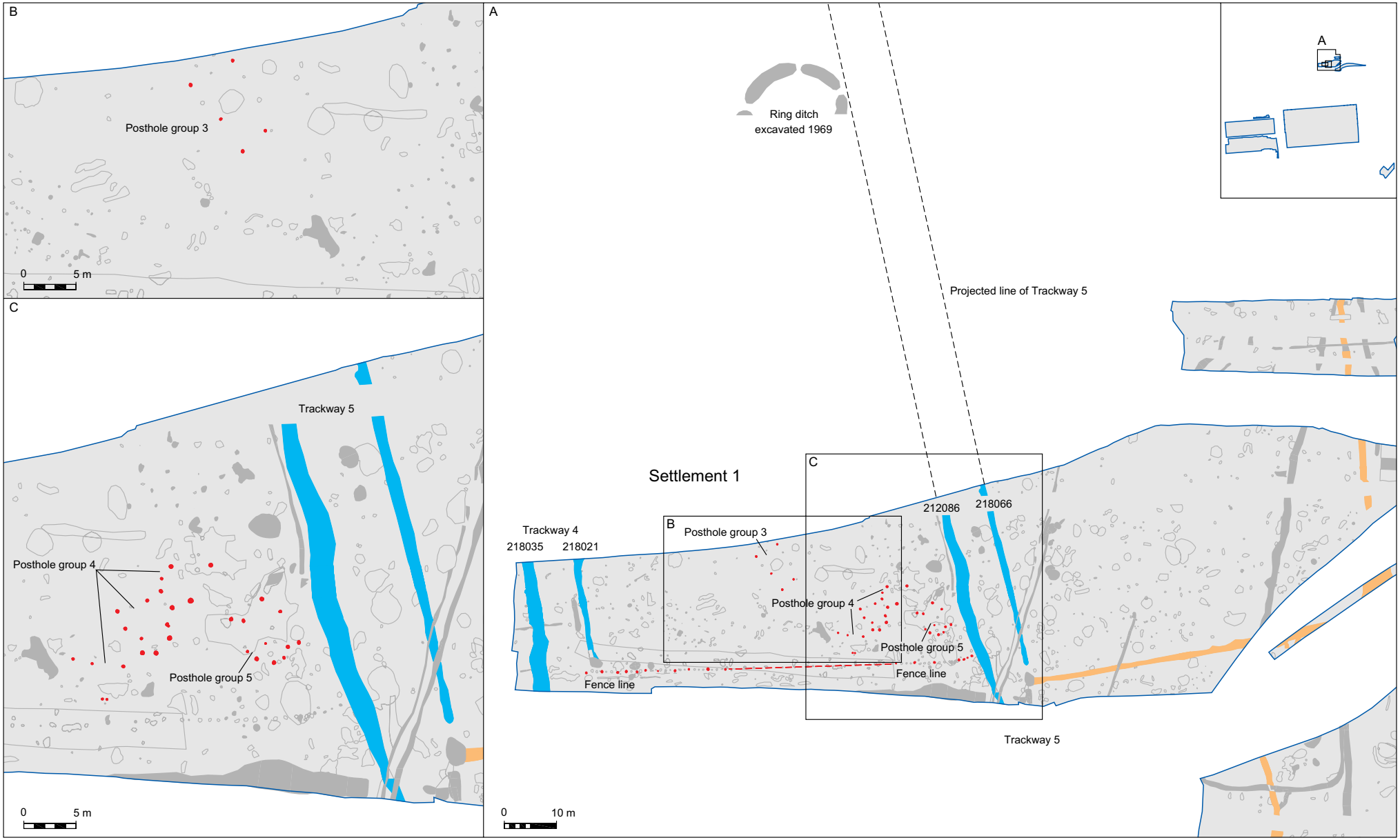


Figure 3.18: Settlement 1: The 2nd millennium BC settlement showing posthole groups 3-5

The photograph in Figure 3.17 shows a complete pot placed on the base of 210026 and a similar deposit was found in 221005. The absence of burnt bone indicates these were not cremation burials. If they were indeed postholes, the complete or near complete vessels may have been 'foundation' deposits.

A group of postholes designated Group 2 (Fig. 3.17) in the north-eastern part of the enclosed area probably also represented a series of buildings, but the plan is even less clear. Group 2 contained two small postholes / stakeholes, each of which produced a sherd of Deverel Rimbury pottery.

Three other posthole groups (Groups 3–5) were recognised within the enclosed area, all of which probably made up at least one building (Fig. 3.18). Posthole Group 5 must have either pre-dated the bank associated with Trackway 5 ditch 212086, or have been partially constructed on the decaying mound, but there is insufficient evidence to clarify this. None of the features produced any datable finds.

Post-Deverel Rimbury activity 1150–750 BC

Whilst there are no structures that can be definitely ascribed to the period 1150–750 BC, there are sufficient Post-Deverel Rimbury ceramics and features to suggest that some level of activity continued at the settlement during this period (Fig. 3.19).

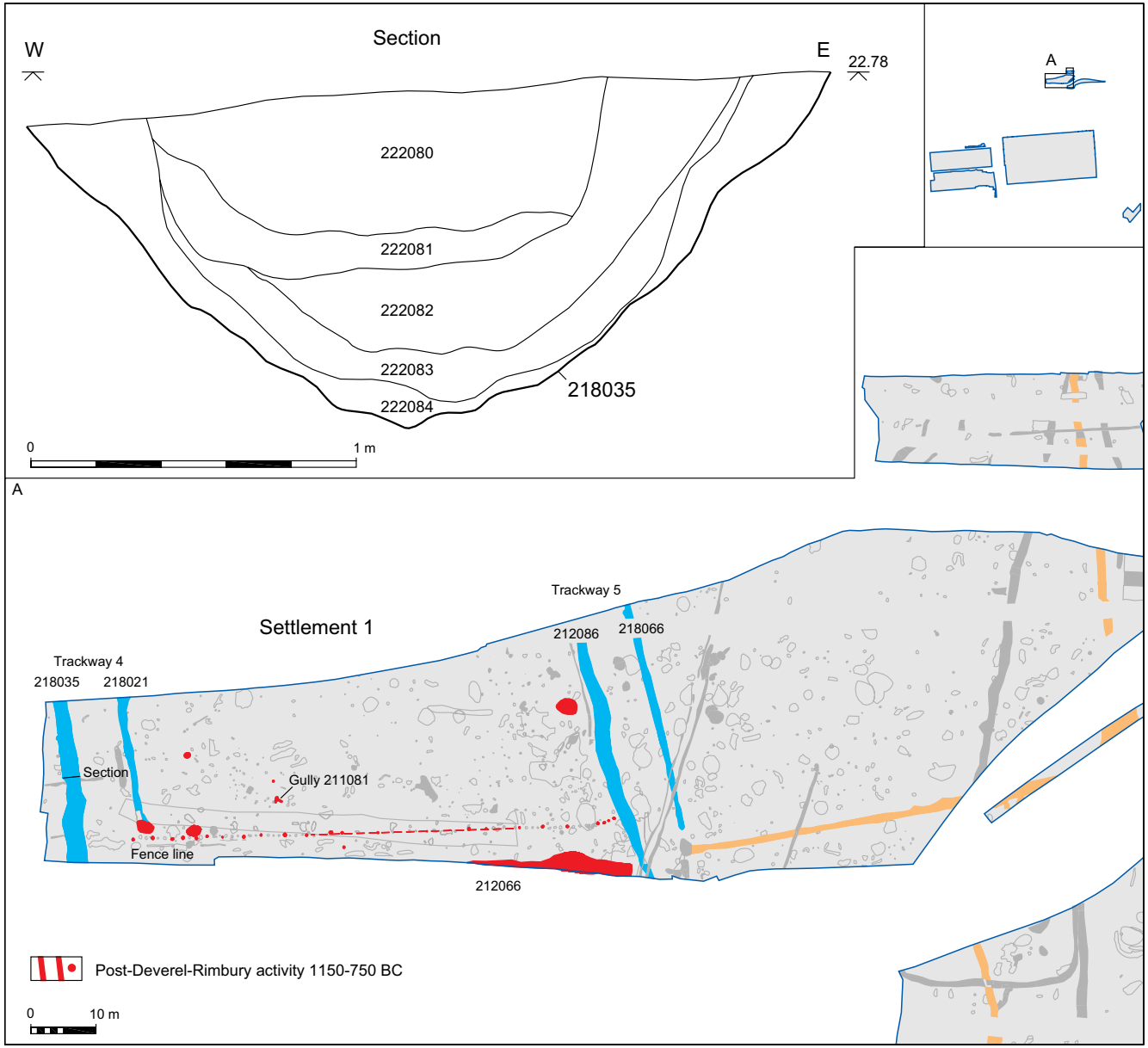


Figure 3.19: Post-Deverel Rimbury activity 1150-750 BC

Plate 3.1: Trackway 4: recut boundary ditch 218035 looking north

The major features include the recutting of the westernmost boundary ditch of Trackway 4 (218035; Plate 3.1) and the excavation of a very large feature, 212066, immediately to the south of the fenceline. The fills of the recut ditch were stained dark with comminuted charcoal and contained pottery, burnt and struck flint, fired clay and burnt stone, the sort of material that would be produced by domestic activity. Very little Post-Deverel Rimbury pottery was recovered from the silts of the other trackway ditches defining the settlement, suggesting that they had silted up by this time.

Feature 212066 was only partly exposed within the excavated area. It may have been either a large ditch or a series of pits or quarries. The fills produced 94 g of Deverel Rimbury pottery and 168 g of Post-Deverel Rimbury pottery, along with struck flint and a small quantity of fired clay and burnt flint.

Within the settlement area, a few postholes produced small sherds of possible Post-Deverel Rimbury pottery, as did a small 'T' shaped gully (211081) near Posthole Group 1. These features are sufficient to suggest the presence of structures of some sort during the period 1150–750 BC, although alternatively gully 211081 at least may be related to Posthole Group 1. Additionally, there are a number of shallow pits on the periphery of the enclosure that can be dated to this period. Pits are conspicuous by their absence from the Deverel Rimbury phase of the settlement, and their appearance in this later phase suggests a change in the nature of activity within the enclosure. Finally, we have dated the southern fence line boundary to this later phase of activity on the basis of a few sherds of Post-Deverel Rimbury pottery in two of the postholes, and on the relationship of the fenceline with the western and eastern trackway ditches. At the western end of the fence, the posts ran slightly beyond the line of ditch 218021, whilst at the eastern end, the fenceline clearly curves northwards to meet ditch 212086. The last three eastern postholes of the fence line were 50 mm to 80 mm shallower than the average depth of those to the west, suggesting that they perhaps cut remnant bank material adjacent to the ditch.

Conclusion

The phasing of the Northern Taxiway settlement is somewhat tenuous but a number of important points have emerged.

- The location of the settlement close to a 4th or 3rd millennium BC ring ditch and the 3rd millennium BC Grooved Ware pit, together with residual pottery of the early Bronze Age, demonstrates a link with previous mechanisms of securing access to land and resources.

- The settlement seems to have developed after 1700 BC within an area initially defined by major landholding boundaries which became trackways. The trackways were subsequently modified and emphasised to provide more impressive boundaries to the settlement.

- There is evidence to suggest continued activity at the settlement after 1150 BC, with the recutting of one of the boundary ditches and the addition of a fenceline along the southern boundary.

Settlement 2 (Fig. 3.20)

The settlement at Burrows Hill Close was located adjacent to the major monument of the Neolithic, the C1 Stanwell Cursus. The main part of this site was excavated as part of the T5 programme, and will be described in detail in Volume 2. However, it is worth summarising the major features of this settlement here.

Origins

There is some evidence for the presence of late Neolithic settlement activity in the area where the Burrows Hill Close middle Bronze Age settlement developed, comprising a few small fragments of Beaker or Collared Urn (2400 to 1700 BC) from the northern enclosure ditch and some of the internal settlement features. This was a similar pattern to that at the Northern Taxiway site.

Structure

The settlement was enclosed to the north and south by east-west field boundary ditches, both of which were modified following the construction of the settlement. The northern boundary ditch was extended eastwards over the western ditch and central bank of the C1 Stanwell Cursus, and the latter feature formed the eastern boundary of the settlement. Double-ditched Trackway 1 ran immediately to the east of the Stanwell Cursus.

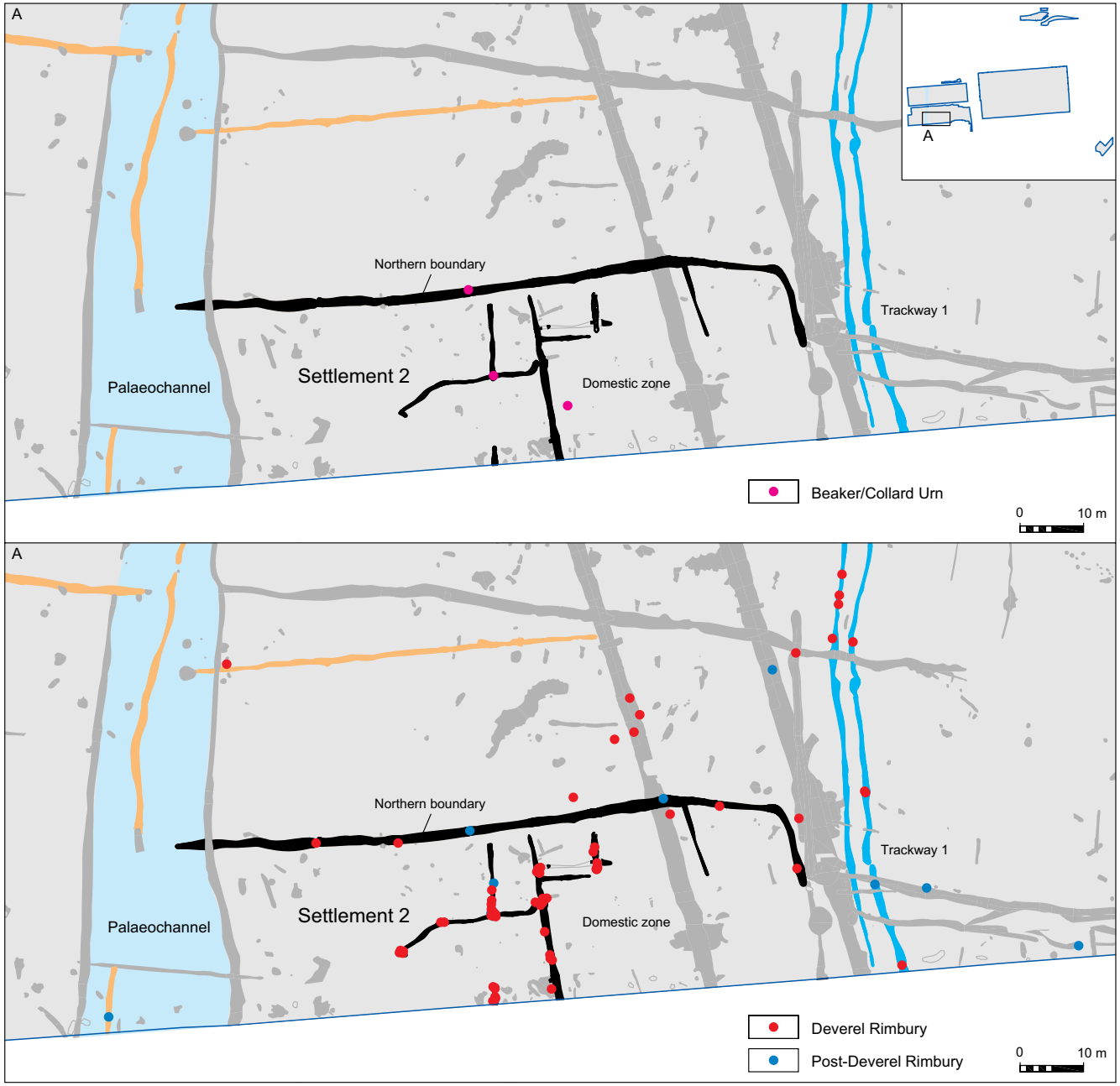


Figure 3.20: Settlement 2: Burrows Hill Close

A recut of the southern boundary ditch contained significantly more middle Bronze Age pottery than the original fills, suggesting that the recut was contemporary with the settlement. To the west, the boundary of the settlement was formed by a series of shallow north-south aligned ditches and the palaeochannel, which would have been a low-lying boggy area.

No internal building plans survived but a relatively substantial double palisade trench probably represented the demarcation of an area that divided a domestic zone from the larger enclosed area (not all shown on plan). This domestic zone was sub-divided by a series of gullies.

Development

This settlement emerged as a highly visible entity from a more transient late Neolithic/early Bronze Age settlement. The middle Bronze Age settlement was constructed in the corner of an existing field, the boundaries of which were modified accordingly. The presence of large proportions of Deverel Rimbury pottery within the assemblages from the settlement features indicates that these developments took place between 1700 and 1150 BC. Table 3.4 shows the proportion of Deverel Rimbury to Post-Deverel Rimbury pottery from this settlement. As with the Northern Taxiway settlement, Post-Deverel Rimbury pottery is present in features at Burrows Hill Close, but with a much lower frequency and concentrated at the periphery of the settlement. This may be the result either of deposition of material through agricultural practices such as ploughing and manuring or of more specialised intermittent activity. This pattern may be modified as a result of analysis of the T5 excavations, but the current evidence indicates that settlement activity had declined at Burrows Hill Close during the late Bronze Age.

Pottery type	Weight (g)
Beaker/Collared Urn	9
DR Bucket/Barrel	1188
DR Globular Urn	108
PDR Coarse Ware	104
PDR Fine Ware	0
Total	**1409**

Table 3.4: Proportion of Deverel Rimbury to Post-Deverel Rimbury pottery in the Burrows Hill settlement

Settlement 3 (Fig. 3.21)

A relatively small area of the Heathrow landscape was investigated at Grass Area 21 (GAA00) to the south-east of the main excavation area, and despite the identification of a post-built structure, evidence for settlement here is tenuous.

Origins

A single Mesolithic and a handful of Neolithic flint artefacts were recovered from a middle Bronze Age field boundary. Unlike other settlement locations, however, no Neolithic monuments lay within the excavated area.

Structure and development

Five or six postholes belonging to a rectangular structure measuring 2.73 m x 2.27 m were the only settlement features identified. The only dating evidence was a single small sherd of Deverel Rimbury Bucket Urn from posthole 404032. The building was situated immediately adjacent to the ditches that formed part of Bronze Age Landholding 6. The ditches had been recut several times and contained both Deverel Rimbury and Post-Deverel Rimbury pottery. They also contained large quantities of burnt flint, which had apparently derived from the rectangular building. Analysis of the charcoal from the postholes suggested that it was came from the remains of domestic fires associated with the building (Challinor, CD Section 10).

Precise interpretation of the function of the Grass Area 21 structure is difficult. It somewhat resembles the four or five structures identified at Settlement 1, but is distinct in that it is solitary.

Post-Deverel Rimbury pottery was found in the fills of the field ditches around the building, but it is unclear whether this was derived from activity associated with the building or with agricultural activity in the adjacent fields.

Rectangular structure.

Figure 3.21: Settlement 3: Grass Area 21

Settlement 4 (Fig. 3.22)

Settlement 4 lay to the east of Settlement 2 within Landholding 3. No structural evidence was identified, and the only evidence for settlement activity is provided by insect assemblages from pit 178108 and its recut, 178122. The layout of the trackways in this area, the presence of Neolithic horseshoe enclosure HE1, and a scatter of pits and waterholes provide additional circumstantial evidence to support this evidence.

Origins

As we have seen at settlements 1 and 2, middle Bronze Age settlements tend to be located adjacent to Neolithic monuments. The proposed Landholding 3 settlement lay close to two monuments, the HE1 Horseshoe Enclosure and the C2 Cursus.

Structure and Development 1700–1150 BC

Despite the absence of structural elements, the layout of the middle Bronze Age field system and trackway in this area hint at the presence of a settlement. The site contained the only east-west aligned trackway in the entire excavated area (Trackway 7), which led from north-south Trackway 1 and terminated at the Neolithic horseshoe enclosure HE1. Elsewhere on the site, trackways generally connected settlements, with Trackway 1 for example probably originating at Settlement 2, and it would be reasonable to assume that the east-west trackway led to a settlement in Landholding 3.

Middle Bronze Age pits in Landholding 3 were distributed in a rough elipse with a radius of 52 m to 72 m from a central point at the eastern end of the east-west trackway. This could represent an arrangement of pits and waterholes surrounding a settlement.

The best settlement evidence comes from one of these pits, 178108, its recut, 178122, and well 156031. Sample 857 from 178121, one of the lowest fills of pit 178108, and sample 856 from 178120, the lowest fill of 178122, both produced evidence of Coleopterae, which suggests the presence of buildings in the vicinity. A radiocarbon date of 1450–1210 BC (WK10029 cal BC 2 sigma) was obtained from 178123, which sealed fill 178121 and was sealed by fill 178120. On the basis of this result, the following data can be firmly assigned to the middle Bronze Age.

Woodworm beetles of Species Group 10, mostly Anobium punctatum but also Lyctus linearis, ranged from 2.2 to 3.6% of the terrestrial Coleoptera in these samples. They are rare members of the British woodland insect fauna under natural conditions because their habitat of dry dead wood is uncommon, but they thrive in timber structures. The cerambycid beetle Phymatodes testaceus, which was present in both samples 856 and 857, could have attacked old oak timbers on the outside of a building or have emerged from firewood, rather than being from naturally occurring dead wood. The general synanthropic beetles of Species Group 9a, represented by Ptinus fur, ranged from 1.2 to 3.0% of the terrestrial Coleoptera. Ptinus fur naturally feeds on debris in bird and rodent nests but flourishes in much larger numbers inside buildings amongst stable debris, in old hay, in thatch and amongst relatively dry waste in neglected corners from food preparation. The values for these two groups of beetles from the two samples strongly suggests that there was a building adjacent to the pits or that debris from a building was dumped into them. Feature 178122 cut Feature 178108 after it had silted up, so the results imply that there was some continuity to the presence of a building or buildings on this part of the site. Members of the Lathridiidae (Species Group 8) comprised around 5% of the terrestrial Coleoptera in the two samples. They tend to occur in old hay, thatch, sweet compost etc. The two most numerous, Lathridius minutus gp. and Corticaria punctulata, tend to flourish in settlements.

The insects from samples 856 and 857 gave no other evidence for high concentrations of organic refuse associated with any settlement. They did, however, give some indication of nettle-covered disturbed ground as occurs around settlements. The beetles Brachypterus urticae, Apion urticarium, Cidnorhinus quadrimaculatus and Ceutorhynchus pollinarius, all of which feed on Urtica dioica (stinging nettle), comprised 3.1% of the terrestrial Coleoptera in these samples. They only made up 0.5% of the terrestrial Coleoptera in Samples 229 and 277, from the other two waterholes. Samples 856 and 857 were the only Bronze Age samples to contain the nettle-feeding bug Heterogaster urticae. Many of the beetles that occur in arable fields (see above) also occur on disturbed and weedy ground. For example, the ground beetle Agonum dorsale and the Polygonaceae-feeding leaf beetle Chaetocnema concinna already mentioned could as readily have been occurring on waste ground in a settlement as in cultivated fields. However, several of

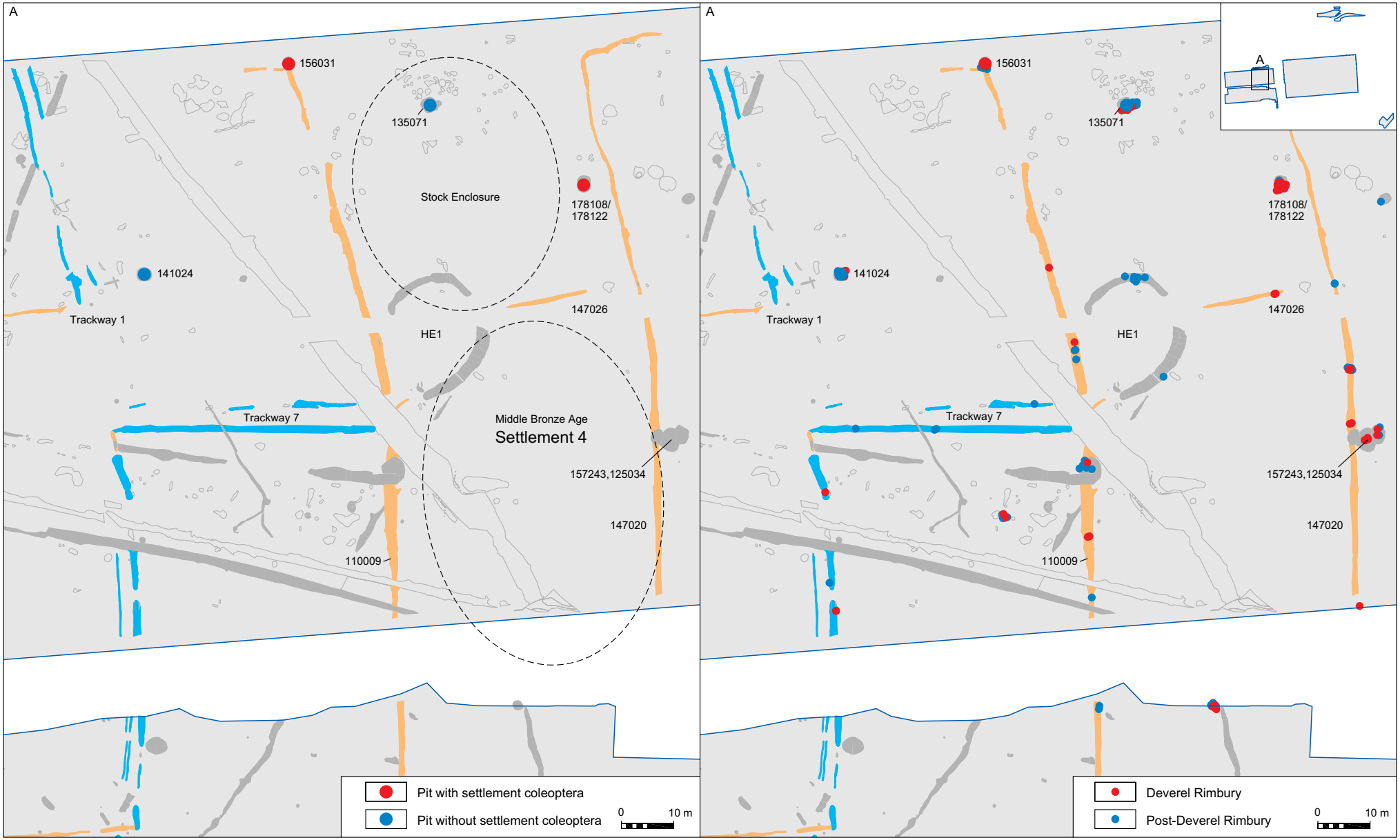


Figure 3.22: Settlement 4 in Landholding 3

the samples contained beetles which feed on members of the Malvaceae, particularly Malva sylvestris (common mallow), such as Podagrica fuscicornis and Apion aeneum. The Malvaceae are very vulnerable to grazing and are most likely to have grown in areas from which stock were excluded, such as waste ground in settlements

(Robinson, CD Section 12).

Sample 227 came from deposit 156034 at the bottom of well shaft 156031, which re-cut waterhole 156078. This sample also produced some synanthropic beetles, providing further evidence of settlement nearby.

Three individuals of Anobium punctatum (wood-worm) and an example of the synanthropic beetle Ptinus fur, which tends to occur inside buildings, raised the possibility that there was a settlement, or at least a timber building, close to Feature 156031. However, members of the Lathridiidae (Species Group 8) and insects of foul organic refuse were not particularly high. There was no strong evidence of any waste-ground type habitat.

(Robinson, CD Section 12)

Deposit 156034 yielded three consistent radiocarbon dates (Table 3.5), again placing any settlement firmly within the mature middle Bronze Age, probably between 1410 and 1340 BC.

In contrast, pits 135071 and 141024 provided no indication of the presence of settlement or buildings. It may be that the settlement was fairly small and probably contained within ditches 147020 and 110009. Robinson observed that the high levels of scarabaeoid dung beetles from pit 178108 indicated that,

SG Deposit	Context	Lab No.	Material	Results BP	Cal Date - 2 sigma
156034	156020	WK9376	Seeds	3015 +/- 56 BP	1410-1110 BC
156034	156020	WK10031	Wooden chips	3260 +/- 57 BP	1410-1390 BC
156034	156020	WK10028	Wooden chips	2492 +/- 59 BP	1380-1340 BC

Table 3.5: Radiocarbon dates from 156034

'domestic animals were concentrated in the vicinity of the middle Bronze Age pit. It is possible that the enclosure in which this pit was situated was used for management of stock which grazed over a much wider area.'

(Robinson, CD Section 12).

If so, then east-west ditch 147026 probably served to divide the stock enclosure from the settlement area to the south. The northern stock enclosure would then contain the waterholes and wells for watering the animals, whilst the southern settlement enclosure contained none. The nearest water sources are separated from the settlement by boundary ditches and banks.

The plan on the right in Figure 3.22 shows the distribution of pottery within Settlement 4. It indicates that pottery is confined to the waterholes in the northern stock enclosure, which may be the result of deliberate dumping of settlement rubbish from the southern settlement enclosure, hence the presence of building timbers, and crop processing waste in the waterholes. In the southern settlement area the pattern may reflect the accidental incorporation of rubbish from the settlement into the boundary ditches. It follows that the absence of settlement in the northern enclosures produces a corresponding lack of pottery in the ditches.

Movement into the settlement would have been along east-west Trackway 7, which was designed to funnel animals through the old Neolithic horseshoe monument into the stock enclosure. People, on the other hand, could turn southwards into the settlement.

The late Bronze Age, 1150–750BC

With only indirect evidence of a settlement in Landholding 3, it is difficult to establish whether such a settlement would have continued to be occupied into the late Bronze Age. The only evidence for this is that the upper levels of the middle Bronze Age waterholes described above were either filled or re-worked / recut in the late Bronze Age. For example:

- The uppermost fills of 141024 contained Post-Deverel Rimbury pottery.

- The upper levels of the central shaft and surrounding fills of 156031 were cleaned and re-lined between 1150 and 750 BC.

- The top of waterhole 135071 was recut as 135055 and infilled with a range of material, including Post-Deverel Rimbury pottery.

- Two pits, 157243 and 125034, to the east of the possible settlement cut through two earlier middle Bronze Age pits. Both of the later pits contained Post-Deverel Rimbury pottery as well as abraded Deverel Rimbury sherds.

It is unclear whether the later re-working of existing middle Bronze Age pits signifies continuing settlement activity, or a continuing concern with supplying water to animals. However, the shallow depth of the later pits suggests they were associated with settlement rather than an attempt to reach the water table, as was the case with the earlier pits.

Settlement 5 (Fig. 3.23)

No definite structures dating to between 1150 and 750 BC were identified during the Perry Oaks excavations, but there was a concentration of Post-Deverel Rimbury pottery in the area of Landholding 4, leading to an assumption that a Bronze Age settlement may have occupied the site. Truncation of the excavated area would have removed the majority of postholes, leaving only the deeper pits and waterholes identified during excavation. The hypothesis was augmented by the recovery of loom weights from ditch 103046 and pit 125233 that dated from the middle of the 2nd millennium to the first quarter of the 1st millennium BC. Figure 3.23 shows the distribution of Deverel Rimbury and Post-Deverel Rimbury pottery in the area, and demonstrates that the majority of this material resides in Iron Age and Romano-British features.

The evidence from Settlement 2 shows that double-ditched trackways served to channel movement to and from settlements. Trackways 2 and 3 terminated at the northern enclosure in Landholding 4, the possible location of a 2nd millennium /early 1st millennium BC settlement. At settlements 1, 2 and 4, large waterholes were separated from the domestic areas of the settlement. In settlement 5, the large waterholes and pits lay to the west of Trackway 2 (see above).

However, unlike the other possible settlements described so far, little in the way of artefactual or monumental evidence from the period pre-1700 BC was recovered in the vicinity, and, even taking into account the effects of truncation, the absence of structures in this area is clear. The recent excavation of the Twin Rivers area (described in Volume 2) to the west of Landholding 4 has emphasised the extensive spread of Post-Deverel Rimbury pottery in this area, again mostly residual in Iron Age and Romano-British features or in situ in large early first millennium BC waterholes.

Table 3.6 shows the quantity of Deverel Rimbury and Post-Deverel Rimbury pottery from later features in and around Landholding 4. The small total of 2.66 kg is significant in view of the fact that the total weight of Deverel Rimbury and Post-Deverel Rimbury pottery from all the 2nd and early 1st millennium BC Trackways and Landholding ditches amounted to only 5.06 kg.

Although analysis of the recent T5 excavation is not sufficiently advanced to allow final identification of structures, there appears to be no significant concentration of structural features that would account for the comparatively large concentration of Post-Deverel Rimbury pottery in the area of Landholding 4, although a range of possible explanations could account for this phenomenon. A number of other sites dating to the late 2nd/early 1st millennium BC, including East Chisenbury (McOmish 1996) and Potterne (Lawson 2000), are characterised by the accumulation of large concentrations of pottery, flint and animal bones. During analysis of the Potterne site, Lawson (2000, 264–272) conducted a wide-ranging review of formation processes and the structure of similar sites in southern Britain. This discussion will not be repeated here, but the northern parts of Landholding 4 and the Twin Rivers area resembled these sites in some respects, particularly in terms of the presence of large accumulations of domestic rubbish at a single location. Occupation of Settlement 1 and possibly 2, appeared to continue into the period 1150–750 BC. If this were the case, then the contrast in the sparse concentration of Post-Deverel Rimbury pottery and other settlement debris in and around these sites, along with the relatively high concentration in Landholding 4,

Figure 3.23: Settlement 5: Landholding 3 and 4

Pottery type	No. sherds	Weight (g)
Deverel Rimbury Post-Deverel Rimbury	47 246	342 2322
Total	**293**	**2664**

Table 3.6: Quantity of pottery from later features in and around Landholding 4

could indicate the presence of a 'midden' in this area. But the terminology must be qualified. Needham and Spence (1997) have argued that the term 'midden' should only be used for deposits generated by deliberate dumping of material in a particular place. Lawson favours the interpretation that the Potterne deposit accumulated *in situ* within the settlement in a wider context of periodic meetings of groups of people to engage in feasting, sacrifices and slaughter of animals (Lawson 2000, 271).

The effects of construction and working of the 20th century sludge works would have removed most evidence of deposits of the type preserved at East Chisenbury and Potterne. Nonetheless, the possibility of the existence of a late Bronze Age settlement or midden (or both) in Landholding 4 and the Twin Rivers area will be explored in Volume 2.

Settlement 6 (Fig. 3.24)

There is relatively little evidence for a middle Bronze Age settlement in this location (Landholding 5) but its existence was suggested by a number of factors.

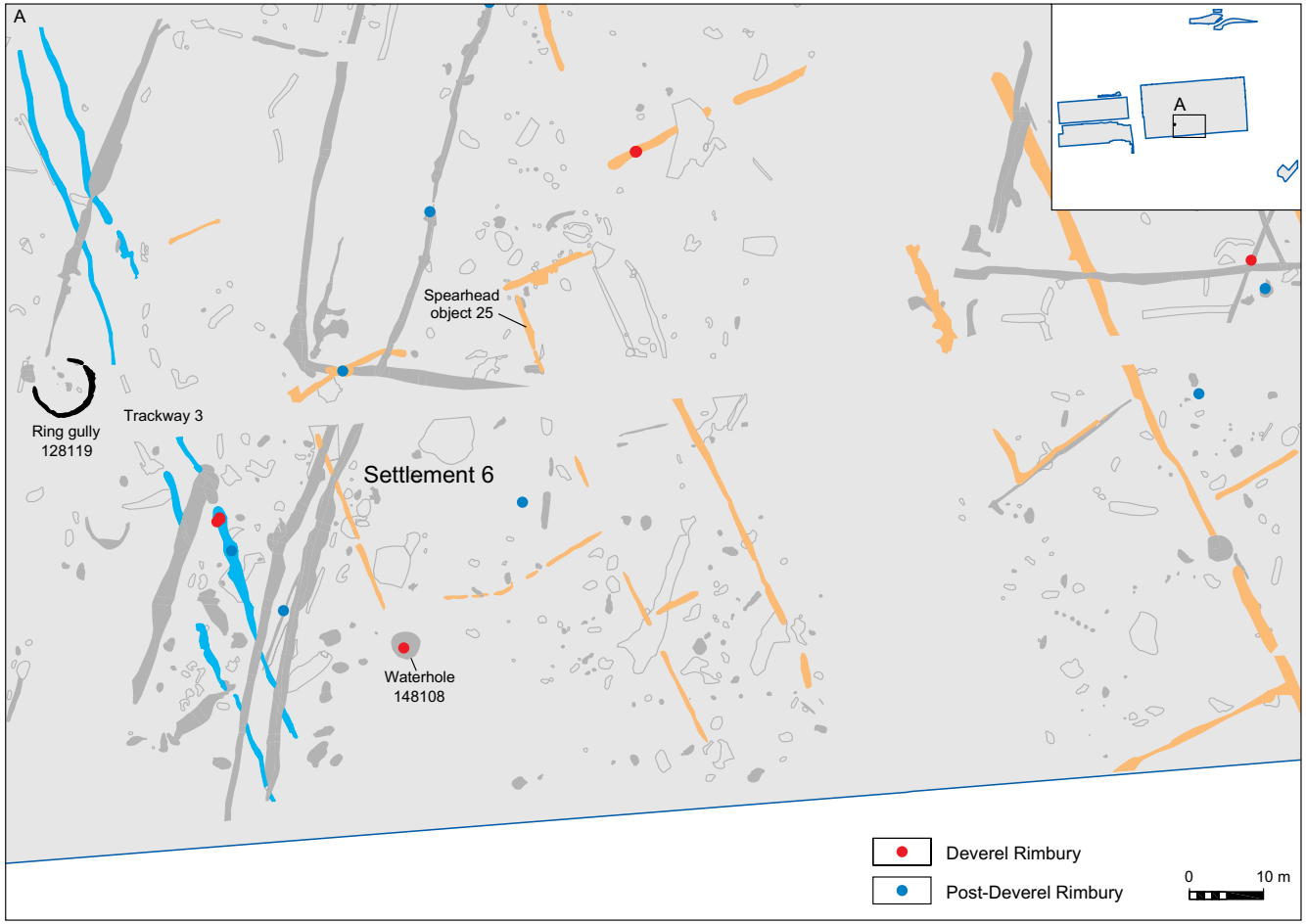


Figure 3.24: Settlement 6: Landholding 5

A small, heavily truncated ring gully, 128119, which contained undateable struck and burnt flint, lay within this area (Plate 3.2). This feature has been interpreted either as a 4th / 3rd millennium BC ring gully or an eaves-drip gully for a 2nd or 1st millennium BC house. As a house, it would be smaller than most of the middle Iron Age structures exposed to the north-west, and clearly isolated from the core of the Iron Age settlement. It was located close to Trackway 3 and the balance of evidence indicates that it is more likely to be a small late 2nd-early 1st millennium BC house than an earlier monument. The lack of dating evidence, however, allows for either possibility.

Another factor that suggests the presence of a settlement in this area is that the field system pattern in Landholding 5 to the east of Trackway 3 is more closely sub-divided than other parts of Landholdings 4 and 5. The sub-divisions could represent a series of small paddocks around a settlement. Finally, the side-looped Taunton

Plate 3.2: Ring gully 128119 within Settlement 6, looking north-west

phase spearhead (object no. 25) was recovered from a recut in the upper fill of ditch 149099 (see above), possibly close to the boundary of a settlement. The general patterning of other finds such as pottery, however, is not dissimilar to that of the surrounding field system. The lack of clear evidence for settlement in this area precludes further profitable discussion.

Structural elements of settlements

The structural evidence for Bronze Age settlement is relatively limited, but the possible settlement sites described above share a number of traits:

- The original major land boundaries and field sub-divisions were sometimes further modified to accommodate a settlement and provide more substantial boundaries, particularly to the east and west (eg Settlements 1 and 2).

- Some settlements were sub-divided to form an outer animal compound and an inner or separate domestic area (Settlements 2 and 4).

- The southern boundaries of settlements or internal domestic areas were demarcated with fence lines or palisade trenches (Settlements 1 and 2).

- Waterholes, wells and pits were separated from the domestic area and tended to be located outside the settlement or within the animal compound area. Where buildings survived, they were rectangular or subrectangular in plan and exclusively post-built with no eaves drip gullies. At Settlement 1 complete pots were deposited as foundation offerings in the postholes of some of the buildings.

- The economic basis of the settlements can only be inferred from the general environmental evidence (see below).

- At a general level, we have a good understanding of how permanent settlements originated, why and where they were located, how they were structured and how they became central to the tenure of large land blocks. We are less clear about the contemporaneity and duration of occupation of the settlements. Were they all occupied from 1700 to 1150 BC, and if so, what happened to the settlements following 1150 BC in the late Bronze Age?

Settlement post-1150 BC

Almost all the middle Bronze Age settlements showed evidence of some survival into the late Bronze Age. This took the form of late Bronze Age pottery incorporated in ditch fills of the field system bordering the settlements, recutting of the middle Bronze Age pits and waterholes fringing the settlements and occasionally the digging of new features of this type. However, there is no good chronological control over the ceramic assemblage assigned to the Post-Deverel Rimbury tradition and the material does not include distinctive late Bronze Age forms. The settlements may therefore not have survived long into the late Bronze Age.

Analysis of pottery distributions suggests that whatever the nature of settlement activity, there was a substantial concentration of late Bronze Age pottery in the area of Settlement 5. This could represent the transition from a pattern of dispersed smaller settlements to nucleated settlement. Alternatively, this material may represent the creation of a large rubbish 'midden' similar to the one at East Chisenbury (McOmish 1996). Alternatively, as at Potterne (Lawson 2000), this material may have been the product of a range of ritual, ceremonial and domestic activities which gave rise to a 'tell-like' deposit. It is unlikely that the Perry Oaks deposit would have been on a scale equivalent to those at Potterne and East Chisenbury, but until analysis of the more recently excavated Terminal 5 sites is complete, all possibilities must be considered.

It is clear that, in terms of settlement, the next archaeologically visible settlement developed sometime during the early Iron Age and continued through the middle Iron Age in Landholding 4. We will discuss the changes that occurred in the landholdings, settlements and trackways between 1150 and 400 BC later in this chapter. Here we will describe additional components of the agricultural landscape of the 2nd millennium BC—pits, wells and waterholes. These features produced a wealth of artefactual and environmental material, and we will seek to understand their role in the enclosed landscape of this period.

Waterholes and water management in the 2nd and early 1st millennium BC

As discussed above, at around 1700 BC the landscape was divided into landholdings which were subsequently subdivided into fields or paddocks within which settlements developed. In this section we will look at another consequence of this modification of the landscape—the excavation of large pits originally constructed to supply water (Table 3.7, Fig. 3.25). The waterholes were generally wider and/or deeper than the pits, certainly deep enough to have reached the present day water table, although there is a continuum gradiation in size between pits and waterholes, so the division between the two is somewhat arbitrary. Various attempts have been made elsewhere to differentiate 'wells' from 'waterholes' (eg Brossler 2001, 133), but for ease of analysis, 'waterhole' has been used here to describe all large features we believe were originally intended to provide water.

Waterhole shape	Feature	Feature date (widest range)
Ramped access	108101	Pre-1700 BC?
Steep sided	963267	1700-1150 BC
Steep sided	963114	1700-1150 BC
Steep sided	960514	1700-1150 BC
Steep sided	178122	1700-1150 BC
Steep sided	178108	1450-1210 BC
Steep sided	159200	1610-1210 BC
Steep sided	156031	1410-1110 BC
Steep sided	156028	1610-1040 BC
Ramped access	148108	1700-1150 BC
Steep sided	141024	1380-940 BC
Steep sided	135071	1500-1100 BC
Ramped access	124100	*c.* 1500-1100 BC
Steep sided	110107	*c.* 1600-1300 BC
Ramped access	103040	1700-1150 BC
Steep sided	961744	1150-750 BC
Steep sided	960529	1150-750 BC
Ramped access	180080	1150-750 BC
Steep sided	157243	1150-750 BC
Steep sided	157065	1700-750 BC
Originally steep sided became ramped	155144	1150-750 BC
Ramped access	148042	1150-750 BC
Steep sided	146048	1150-750 BC
Steep sided	146043	1150-750 BC
Steep sided	146039	1150-750 BC
Steep sided	136194	1150-750 BC
Ramped access	135055	1150-750 BC
Ramped access	126025	1150-750 BC
Steep sided	125244	1150-750 BC
Steep sided	125233	1150-750 BC
Steep sided may have been ramped	103038	1150-750 BC

Table 3.7: Bronze Age waterholes at Perry Oaks

Figure 3.25: Location of Bronze Age waterholes

The waterholes at Perry Oaks have produced several important types of evidence:

- Waterlogging of basal deposits preserved a range of rare wooden objects.
- The wooden objects produced a series of radiocarbon dates ranging from 1600 to 940 BC. These helped define the chronological sequence of landscape development.
- The waterlogged deposits also preserved microscopic and macroscopic palaeobotanical remains which provided a clear picture of the landscape, its flora and some indication of farming practices.

When were the waterholes excavated, what did they look like and what were they used for?

Thirty waterholes of two basic forms were identified and are listed in Table 3.7 by feature number. One type was steep or vertical sided, the second had a shallow ramped access on one side. The steep-sided waterholes would have required people to draw water either by buckets or by climbing into them on log ladders, some of which were partially preserved (see reconstruction, Fig. 3.32 below). In several of the steep sided waterholes wicker or wooden revetments were also preserved, which would have stabilised the sides of the holes and acted as a filter to maintain a clear pool of water at the base. These waterholes would have been suitable for supplying

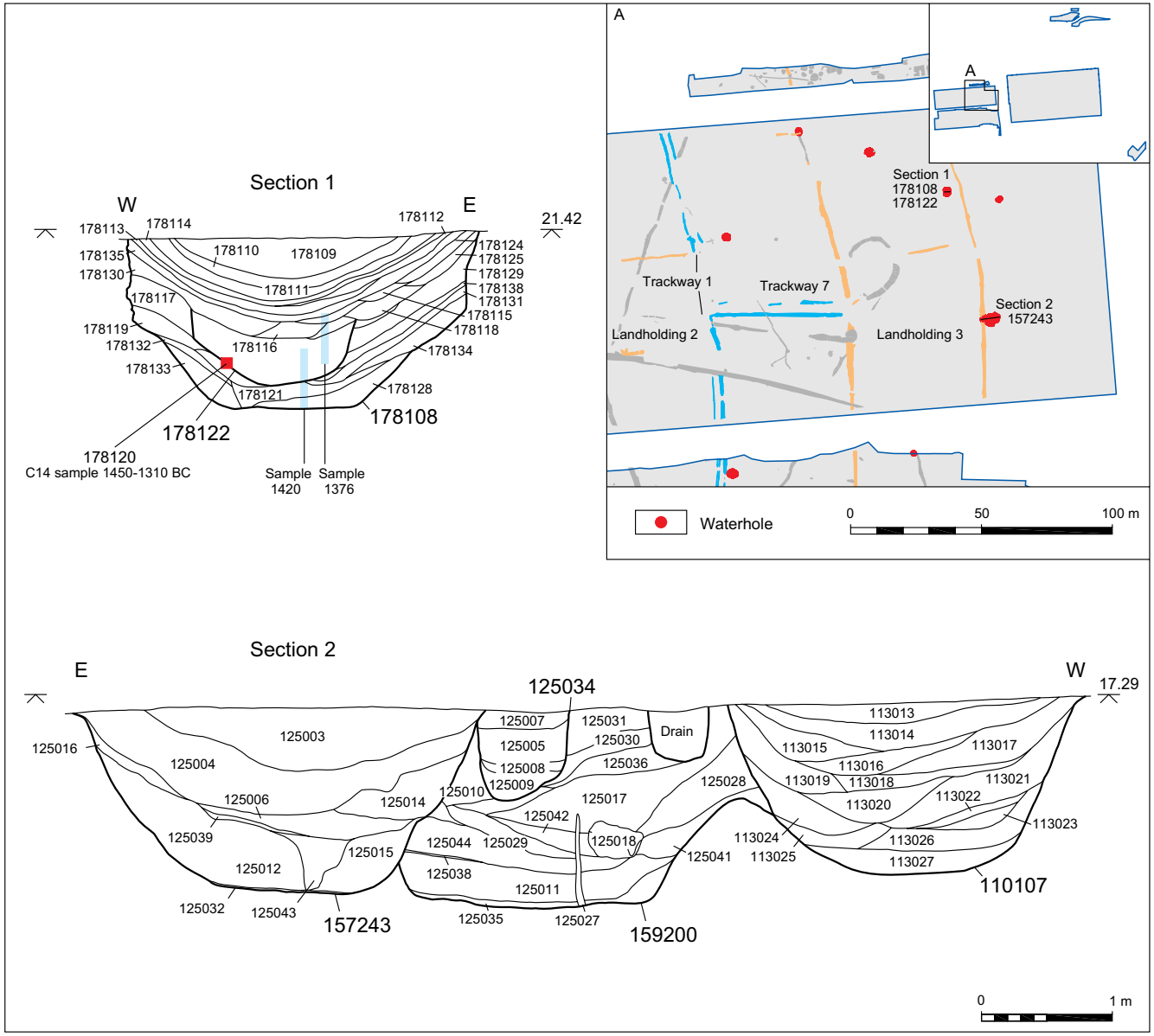


Figure 3.26: Waterholes 178108, 157234, 159200 and 110107

settlements with water, and contrast with the ramped waterholes that may have been designed principally to allow access to water for animals without the assistance of people. The artefacts contained in some of the waterholes, however, suggest that they may also have served other, less clear cut functions. Before looking at the distribution of the waterholes, we will consider when they were constructed.

A number of large waterholes cut some of the silted north-south field ditches. Wooden artefacts or palaeobotanical material in the lower waterlogged fills of some waterholes produced radiocarbon dates of the 2nd and the first quarter of the 1st millennium BC (see Table 3.7).

Several waterholes dug and used during the period 1700–1150 BC subsequently became receptacles for domestic settlement rubbish and crop processing waste before being recut between 1150 and 750 BC (eg 178108; Fig. 3.26). In some cases there is evidence of multiple phases of recutting and reuse within the general footprint of the original waterhole (eg 112062, 103038, 136194) or in the form of intercutting waterholes (eg 157243, 159200, 110107; Fig. 3.26 and Plate 3.3). In other cases (eg 156031) the waterholes silted up with rubbish dumped in them before 750 BC. The repeated re-use and recutting has led to deposition of residual material. For example, the radiocarbon date of 1620–1320 BC (WK9375 cal BC 2 sigma) on seeds from the central shaft of 136194 does not correspond with the 8th century BC dates for complete pottery vessels recovered from the base of the feature. Similarly, many waterholes demonstrate some mixing of Deverel Rimbury and Post-Deverel Rimbury ceramics.

Figure 3.27: Distribution of waterholes in the two main phases of use

Plate 3.3: Wattle structure excavated in waterhole 159200

The evidence demonstrates that the practice of constructing large steep-sided and ramped waterholes occurred once the landscape had been divided into landholdings, presumably in response to the restriction of access to natural sources of water in rivers, streams and pools. Once constructed, it would appear that after a period of use a waterhole would typically fill by a combination of natural silting / slumping and deliberate backfilling with domestic or agricultural waste. Frequently, the partially or wholly filled waterhole would be recut to a shallower depth and reused, and in most cases this final phase occurred between 1150 and 750 BC. Figure 3.27 shows the distribution of waterholes across the two phases.

Distribution: where were waterholes dug and why?

The earliest excavated waterhole was probably 180101 in Landholding 5 (Fig. 3.28). It was a large ramped-access waterhole which produced no datable artefacts. The lower fill, however, contained bones of an aurochs and red deer, as well as cattle and other undifferentiated large mammals. The presence of the wild animal element is interesting, particularly the aurochs, which appears to have become extinct in the early 2nd millennium BC (eg Tinsley 1981, 219).
The latest British aurochsen date is that from Charterhouse Warren Farm in Mendip (dated to 3245+/-37BP (1620–1430cal BC) BM-731; Burleigh and Clutton-Brock 1977; Yalden 1999, 109).
Cotton *et al.* (in press) have recently reviewed the British evidence for aurochs in the archaeological record and have observed that many dates cluster either side of 2000 BC. A large, fierce, wild beast such as the aurochs would have had an uncomfortable existence in the divided landscape of the second half of the 2nd millennium BC.

In considering the distribution of waterholes in the landscape between 1700 and 750 BC (see Fig. 3.27), it must be remembered that the area excavated at Perry Oaks was a comparatively narrow transect across the seven landholdings, subsequent excavation has shown such landholdings to extend much further in all directions. Despite this partial view, Table 3.8 shows that different types of waterholes were dug in different parts of the landholdings.

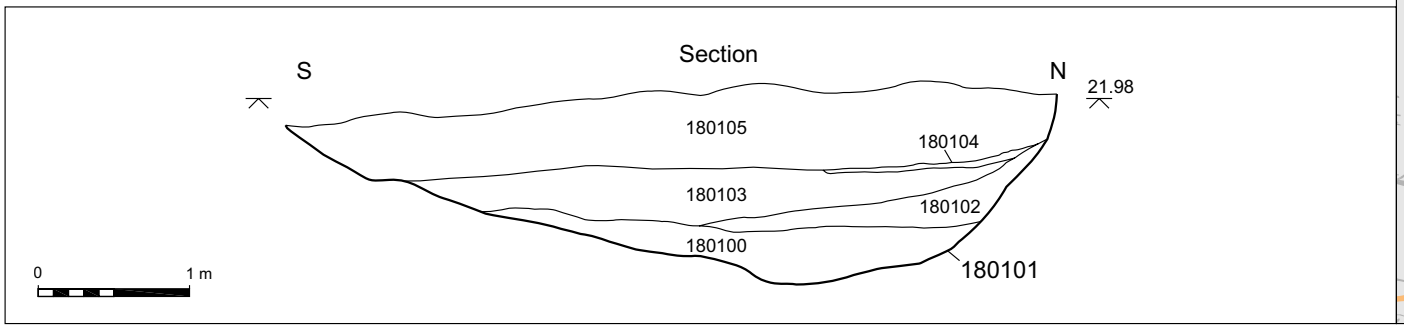
During the period 1700–1150 BC two ramped access waterholes were dug in Landholding 5, and another adjacent to Trackway 2 in Landholding 3. Although we do not know how extensively Landholding 5 was divided at this time, it appears that the network of paddocks in this area was principally concerned with stock management, for which ramped access waterholes would be appropriate. It is notable that ramped access waterholes were comparatively rare, and were not dug in landholdings (or parts of landholdings) that incorporated larger, less finely sub-divided fields. In contrast, ten of the twelve steep-sided waterholes were dug in Landholding 3. These waterholes may have been sited to provide water for a settlement in Landholding 3 and to water stock that had been moved close to the settlement. Some of the waterholes may also have served nearby Settlement 2 in Landholding 2.

Whether fortuitously or by design, the waterholes in Landholding 3 appear to have encircled the Neolithic HE1 enclosure (see Fig. 3.29). This arrangement, together with the nature of the artefacts recovered from two of the waterholes in Landholding 3, suggests these features served functions beyond the purely practical need to supply water. The two waterholes (135071 and 156028) around the HE1 enclosure containing the artefacts will now be described in some detail, before other waterholes across the site are considered.

		Landholding							
Date	**Waterhole type**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
1700-1150 BC	Steep sided	2		10					12
	Ramped			1		2			3
1150-750 BC	Steep sided			6	2	1	1		10
	Ramped			2		1	2		5
	Total	**2**	**0**	**19**	**2**	**4**	**3**	**0**	**30**

Table 3.8: Waterholes: Type, location and date

Context no.	Object No.	Species	Object count	Weight	Description
180100		Cow	3	146	
180100		Large mammal	1	2	
180100	214	Aurochs	23	537	Distal humerus fused. Htc= 561.2mm.Bd (minimum as worn around this area=98.2)
180100	215	Red deer	26	27	



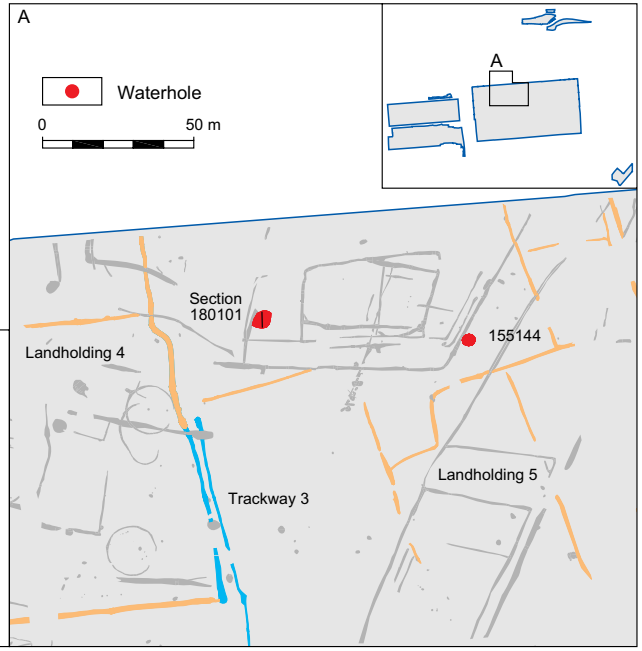


Figure 3.28: Waterhole 180101

Wooden "beater". Radiocarbon date 1502-1116 BC.

Wooden axe haft. Radiocarbon date 1438-1132 BC.

Neolithic stone axe.

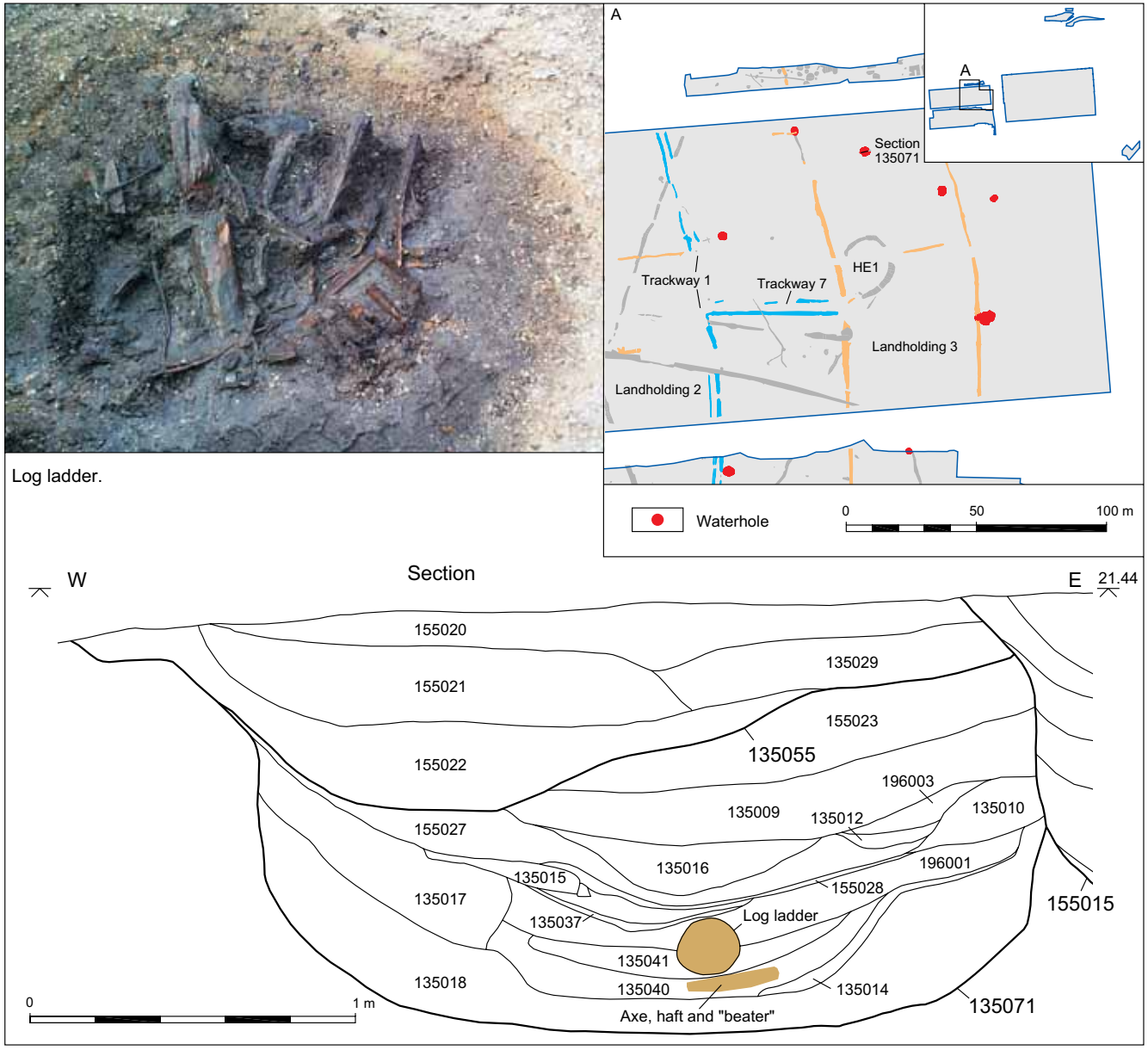


Figure 3.29: 'Ring' of waterholes around Neolithic HE1 enclosure with detail of waterhole 135071 and ramped re-cut 135055

Figure 3.30: Wood ladder 135042

Waterhole 135071 (Fig. 3.29)

The sequence of deposition is as follows:

Episode 1

The lowest fills (eg 135018) were deliberate deposits to provide a more solid platform for drawing water. There was no conclusive evidence of wattle revetment but the lack of primary erosion from the sides of the waterhole suggests some level of maintenance during the initial use of the feature.

Episode 2

The next phase appears to represent a time when the waterhole was going out of use. Waterlogged organic-rich deposits 135040 and 135041 produced wooden artefacts, including:

A deposit of bark (135045- Alnus sp.), a log ladder (135042; Fig. 3.30) and artefacts (basketry SF 543–544, axe haft SF 88 (Fig. 3.29) and a 'beater' SF 323; Fig. 3.29). 106 other loose pieces of wood were recovered from the same feature including wood chippings (1 of Prunus, 2 not identified, 3 each of Populus and Fraxinus, 6 Quercus, 11 Salix and 14 Alnus spp.), bark chippings (1 Salix, 1 Fraxinus and 11 unidentified), sections of round-wood (1 each of Frangula, and Fraxinus, 2 unidentified, 5 Alnus, 6 Quercus, 11 Prunus and 22 Salix spp.) and stake points (1 Salix and 4 Quercus spp.). It is possible that among this assemblage are the remains of a disartic-ulated wattle lining. However the diverse composition and the fact that much of the roundwood consists of twig-type material suggests rather that this is a more casually derived assemblage. (Allen, CD Section 6)

The log ladder (Fig. 3.30) had probably been partially sunk into the basal deposits to provide a firmer seating. During excavation it was suggested that a deposit of bark was the remains of a bark container but specialist examination cast doubt on this interpretation. What seems likely is that a wooden haft (object 88) for a socketed tool and a Neolithic polished stone axe (object 500) were deliberately placed on the surface of deposit 135067. This was then covered by a deposit of wooden material (135091) which contained a wooden 'beater' (object 323).

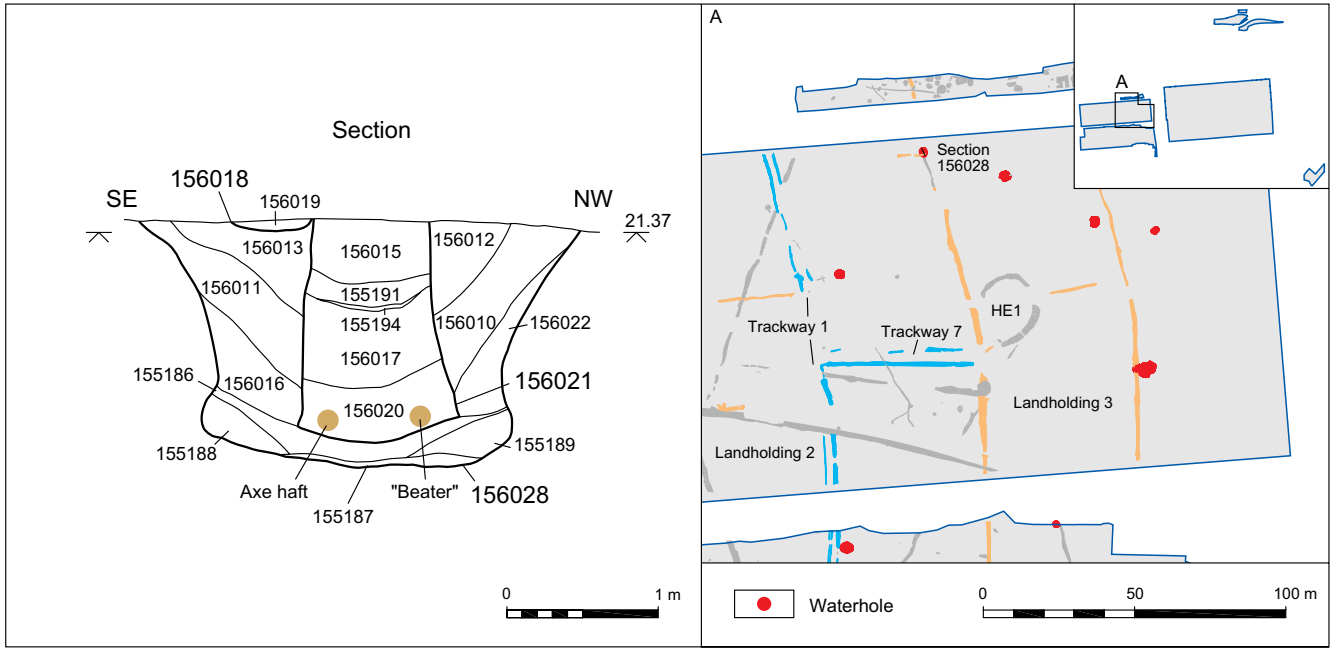
Episode 3

The depositing of these artefacts seemed to signal a change in the history of the waterhole, which was allowed to silt slowly with material derived mainly from the erosion of the surrounding ground surface. Deposit 135062 (not on section), an organic fill, formed between these episodes of natural silting, perhaps at a hiatus in the erosion sequence, before reverting to natural silting again.

Episode 4

The waterhole was finally deliberately backfilled, possibly to level the ground.

Sometime between 1150 and 750 BC, the waterhole became a focus of activity again when a ramped-access waterhole, 135055, was dug into the top of the original feature (Fig. 3.29). A small pottery vessel was placed in the uppermost fill of the new waterhole, echoing the deposits of artefacts in the base of the original feature.



Wooden "beater", radiocarbon date 1421-1040 BC and wooden axe haft, radiocarbon date 1512-1202 BC.

Figure 3.31: Waterhole 156028

Waterhole 156028 (Fig. 3.31)

The deposition history of waterhole 156028 varied somewhat from that of 135071. The primary fills were caused by rapid slumping of the sides of the feature. Above this material was placed a wooden haft (object 207) for a socketed tool and a wooden 'beater' (object 208) (see below). This was followed by an episode of more gradual silting. It appears that the waterhole was then radically redesigned, with a wattle panel inserted to form a cylindrical revetment (156021; Fig. 3.31). This produced a vertical shaft into which spoil was deposited. Nine chippings (1 Pomoidiae, 8 *Quercus* spp.) and 12 sections of roundwood, 6 to 20 mm diameter (1 each of *Acer*, *Alnus*, Pomoidiae, *Salix*, *Ulmus* and 7 *Quercus* spp.) were recovered from a panel (156020) of the wattle revetment. A second assemblage, which produced 15 sections of roundwood 5–12 mm diameter (7 unidentified, 6 *Quercus* and 2 *Salix* spp.), may be derived from brushwood trimmings or sweepings.

Radiocarbon dates of 1410–1110 (WK9376 cal BC 2 sigma), 1410–1390 (WK10031 cal BC 2 sigma) and 1380–1340 (WK10028 cal BC 2 sigma), obtained from wooden chips and seeds from the first organic silting of the shaft (deposit 156034; not shown in section), placed this event firmly in the middle Bronze Age. Post-Deverel Rimbury pottery from the upper fills of the shaft indicated that it continued to fill during the period 1150–750 BC.

The occurrence of similar pairs of wooden artefacts in two waterholes *c* 26 m apart is unlikely to be coincidental or to be considered as casual losses, especially taking into consideration the presence of the Neolithic polished stone axe. How are we to interpret this evidence, and what were the historical processes that led to these deposits?

Deposits within waterholes 135071 and 156028

In Chapter 2, we suggested that deposition of material in pits in the 3rd millennium BC formed the final act in a sequence of actions that served to establish control and access to land and resources. We discussed how this system finally ended and was transformed in the centuries prior to 1700 BC, culminating in the division of the landscape into landholdings that physically defined land tenure. This led to the emergence of archaeologically visible settlements and waterholes. However, in addition to providing the essential requirements for water, the spatial distribution of the waterholes and the artefacts in the two examples described above suggest an historical and probably spiritual link with the past and its ceremonies and rituals. The waterholes served the settlements, but they were arranged around an ancient horseshoe enclosure where, generations before, representatives of the wider community met at certain times of the year. It is even possible versions of such gatherings still took place at this monument during the latter part of the 2nd millennium BC, and the waterholes were in some way linked to this. It has been widely argued (eg Bradley 1984, 100; 1998; Bradley and Gordon 1988) that during the 2nd and 1st millennia BC, and probably during the earlier prehistoric periods as well, water and 'watery contexts' fulfilled a special and mystical place in people's lives (see artist's reconstruction of a middle Bronze Age 'waterhole ceremony' in Fig. 3.32). The artefacts in the two waterholes may have been part of a symbolic repertoire, and it is worth considering them in some detail.

Axe/adze handles (Fig. 3.33)

The two axe/adze handles were clearly intended for, and used with, socketed axes. Both were worked from long shafts, forming the handles, with one principal side branch worked to create a tine to fit into the socket. The angle of the tine to the handle (62.5 and 66 degrees) was deliberate; the tines were worked slightly off the centre of the side branch and there was sufficient wood available for the angle to have been made somewhat closer to a right angle had this been required. There is no evidence to suggest whether the blade on SF207 (Fig. 3.33, no. 1) was an axe or an adze but the cross section of the tine on SF88 (Fig. 3.33, no. 2) is more likely to have been associated with an axe. A shaving tool appears to have been utilised to trim the handle shaft but a sharp axe blade appears to have been all that was necessary to shape the butt and the head.

A number of socketed axe/adze handles of Bronze Age date are known. The remains of an oak tine were found in a socketed axe from Horsford, Norfolk (McK. Clough 1970–73, 491).

Figure 3.32: Artist's reconstruction of a middle Bronze Age 'waterhole ceremony'

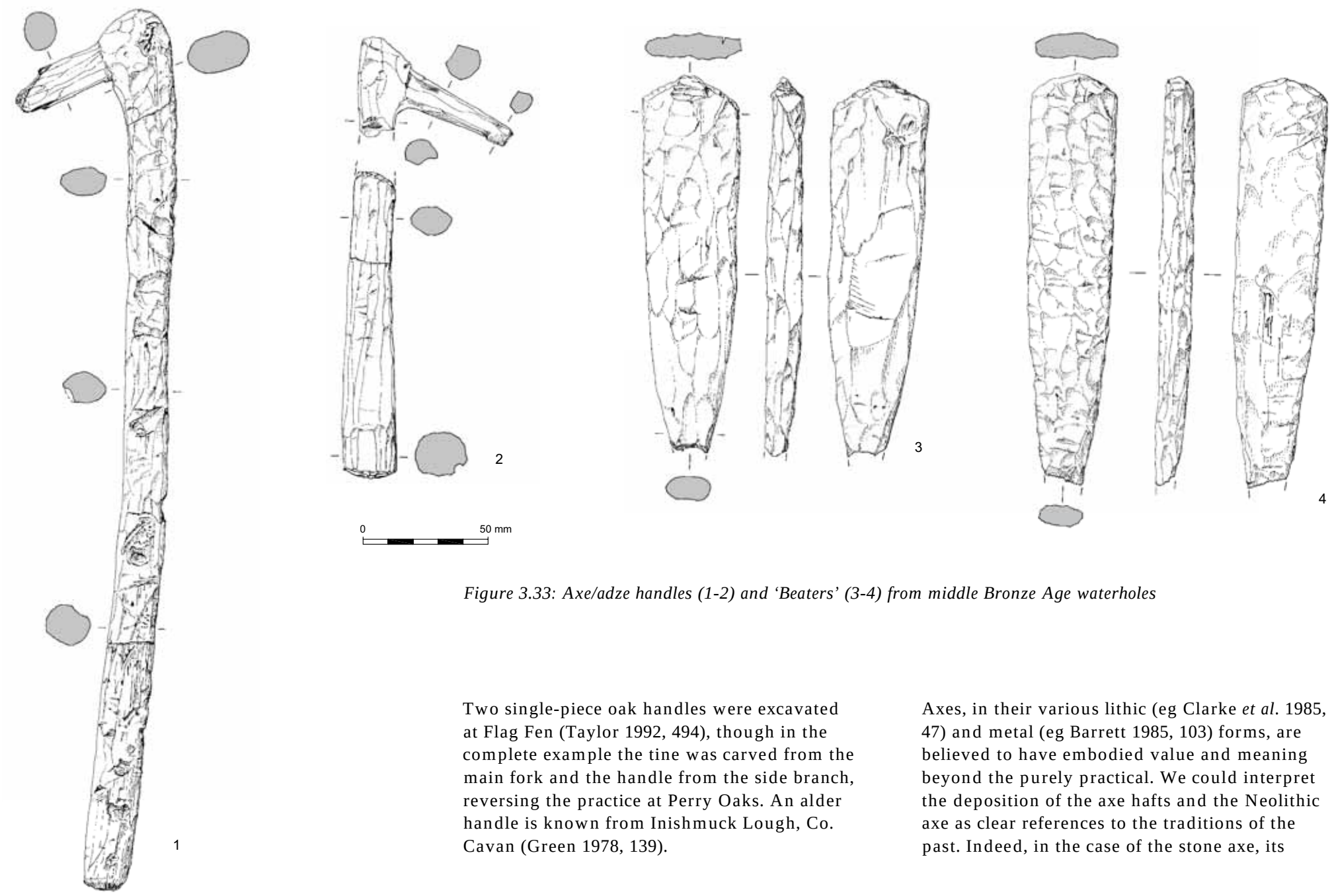


Figure 3.33: Axe/adze handles (1-2) and 'Beaters' (3-4) from middle Bronze Age waterholes

Two single-piece oak handles were excavated at Flag Fen (Taylor 1992, 494), though in the complete example the tine was carved from the main fork and the handle from the side branch, reversing the practice at Perry Oaks. An alder handle is known from Inishmuck Lough, Co. Cavan (Green 1978, 139).

Axes, in their various lithic (eg Clarke *et al.* 1985, 47) and metal (eg Barrett 1985, 103) forms, are believed to have embodied value and meaning beyond the purely practical. We could interpret the deposition of the axe hafts and the Neolithic axe as clear references to the traditions of the past. Indeed, in the case of the stone axe, its

excellent condition suggests that it was an heirloom passed down by generations before final removal from the world of the living and deposition in a waterhole.

'Beaters' (Fig. 3.33)

The enigmatic 'beaters' may be somehow linked to the axes.

The two 'beaters', SF 323 (Fig. 3.33, no. 3) and SF 208 (Fig. 3.33, no. 4), found in association with the axe/adze handles are of uncertain function. The wood they are cut from might be any of a number of fruit woods, such as apple, pear or hawthorn. They are fine grained and hard wearing. It would not be out of place to expect these artefacts to have been intended for some form of pounding or crushing activity, such as food preparation or, if hafted, as mattocks.

The wear on these objects though is quite uniform and as such probably occurred during burial rather than through use. It is questionable whether these are in fact finished artefacts. The axe marks are not smoothed off, the damage appears to have taken place during burial and there is no trace of any hafting or mounting for these tools. In appearance, these 'beaters' are very similar to unpolished stone axe/adzes. If ritual explanations for the depositions in these waterholes are invoked, then it may be worth considering whether these 'beaters' are wooden substitutes for the bronze axe/adze heads removed from the handles with which they are associated.

(Allen, CD Section 6)

The 'beaters' may, therefore, be mid-2nd millennium BC representations of 3rd millennium BC stone axes. The axe hafts, stone axe and wooden axe representations all directly refer to the past and the traditions of the past and these references were made at a time when the old world had been transformed into landholdings and when the community of the 3rd millennium BC had become less cohesive at the expense of the kin-group. Perhaps the excavation and use of the ring of waterholes around the Neolithic HE1 monument and the deposition of the artefacts described above was an attempt by the community to maintain a level of cohesion by drawing on the artefacts and traditions of the past but reworking them in the milieu of new depositional contexts, features and landscapes.

Waterhole 124100 (Fig. 3.34)

Waterhole 124100 was teardrop shape in plan with a sloping ramp on the western side (124105) leading to a shallow pool, created by the construction of a timber and wattle revetment (13048; Plates 3.4–5). It was excavated to a depth of 1.30 m. The revetment produced three radiocarbon dates (WK10023, WK10033 and WK10034) of between *c* 1500 and 1100 (cal BC 2 sigma; see Fig. 3.3). Following an uncertain period of time, the pool was deliberately filled with dumped material (124101) that was rich in burnt flint. Subsequent fills of the waterholes contained varying quantities of burnt flint until mid-way down the sequence, where an episode of stabilisation with a sterile deposit (123047 and 124109) was evident.

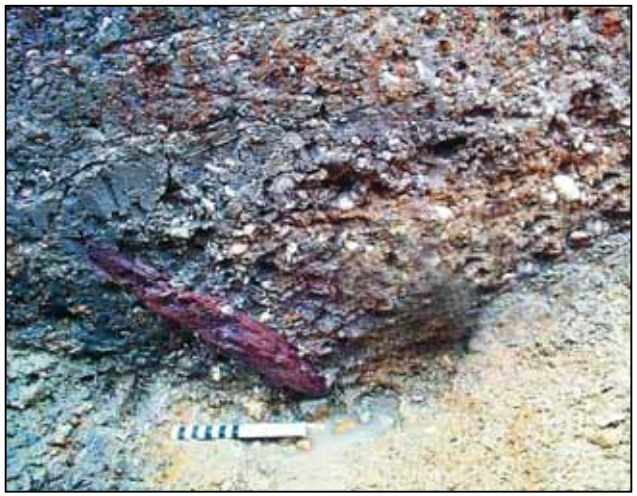


Plate 3.4: Wooden revetment within waterhole 124100

More burnt flint was deposited above this level, peaking in the upper fill (124092). A shallow rectangular feature (124085) lying 1.6 m to the north-west of waterhole 124100 also contained a very large quantity of burnt flint, particularly in the upper fills, and may have been a water trough (Fig. 3.35; see below).

Burnt flint was also recovered from interventions through the 2nd millennium BC field ditches adjacent to the waterhole and shallow pit. These deposits indicate that the function of the waterhole may have changed quite suddenly from watering animals to providing water for boiling by adding heated flint. The burnt flint debris was probably strewn over a wide area following successive episodes of heating and boiling, and a 'burnt mound' probably formed adjacent to the waterhole. A steep sided waterhole, 157065, 80 m to the west also produced relatively large

quantities of burnt flint and small quantities of Post-Deverel Rimbury pottery (Fig. 3.35). This waterhole may have replaced 124100 as a water source associated with the burnt mound during the period 1150–750 BC.

Burnt mounds have been the subject of much research (eg Buckley 1990), which has tended to polarise interpretation. On the one hand, the mounds, together with water sources and boiling troughs (12485?), are interpreted as sites of communal cooking of meat, possibly associated with feasting (Hedges 1975; James, 1986). The alternative view is that they represent sites of saunas, sweat lodges for ritual cleansing (Barfield and Hodder 1987). However, Ray (1990) has developed yet another line of interpretation whereby the mounds became '…one locus of mediation of interests and strategies among several others' (Ray 1990, 10).

The Perry Oaks burnt mound complex was located amidst the sub-divided fields of Landholding 5, some distance away from any of the postulated settlements discussed above. The exact function of the burnt mound complex will probably remain uncertain but the depositional sequences in waterhole 124100 and possible trough 124085

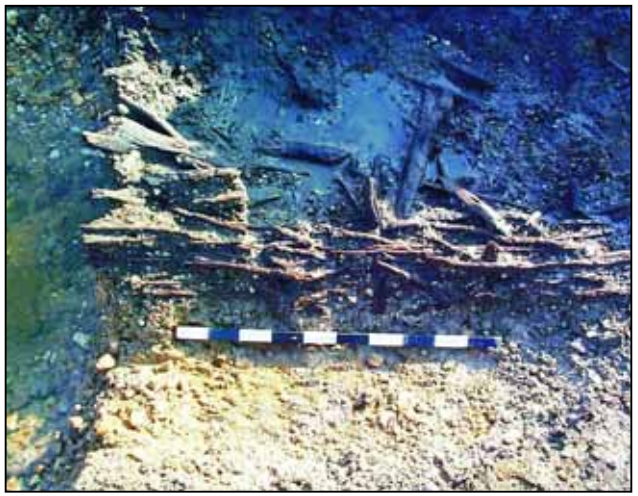


Plate 3.5: Part of wood and wattle revetment on the base of waterhole 124100

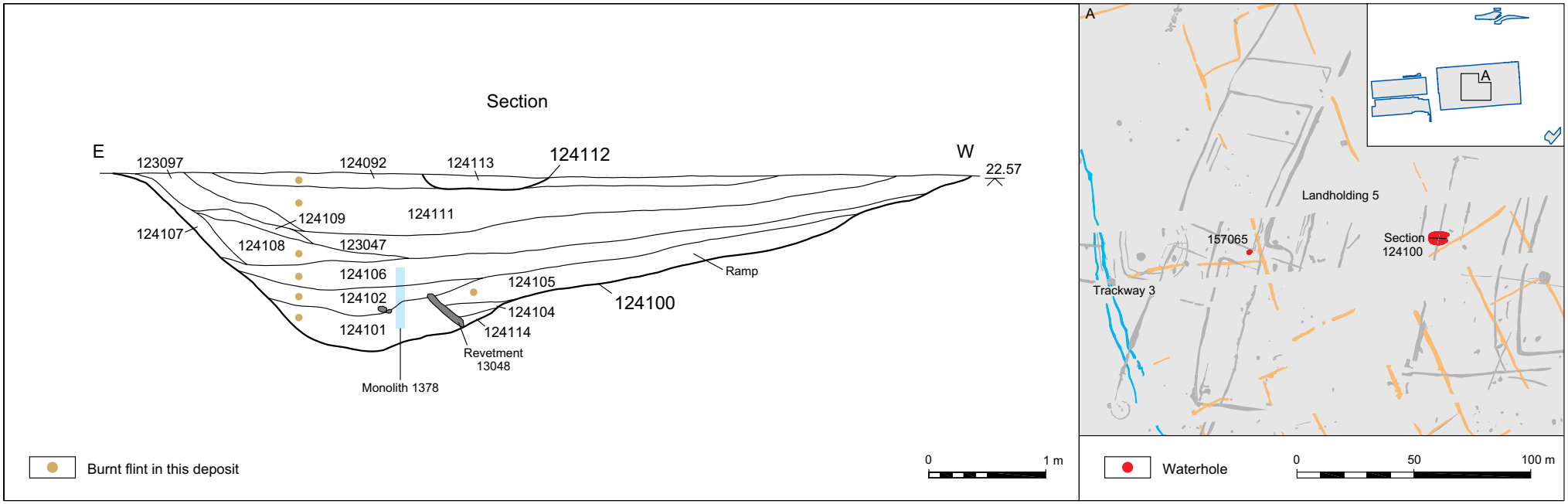


Figure 3.34: Ramped waterhole 124100

suggest that people periodically gathered at this location to take part in activities that produced the residues recovered during excavation. It has already been suggested that the ring of waterholes and unusual artefacts around the HE1 horse-shoe enclosure served to reinforce the ties that bound together the kin-groups in order to retain a form of community. The burnt flint complex may testify to a need to satisfy a similar requirement, acted out in a different physical and social setting, but retaining the element of water. In other words, members of the kin-groups might have come together in a relatively isolated part of the landscape in order to reaffirm community ties, undertaking unknown ceremonies and rituals that may have included cooking, feasting or bathing.

The developing role of the waterholes into the late Bronze Age

The waterholes and artefacts in Landholding 3 and the burnt flint complex in Landholding 5 seem to have fulfilled similar functions to the monuments of the 4th and 3rd millennia BC, but within a different structure, architecture and pattern in the landscape. All served to display, accommodate and negotiate the tensions between individuals, kin-groups and the wider community.

These examples demonstrate the role played by waterholes in the routine of social connections during the period 1700–1150 BC. Between 1150 and 750 BC many waterholes were re-cut and reinstated and new ones were excavated. Figure 3.27 and Table 3.8 above have shown that, whilst steep-sided waterholes continued to concentrate in Landholding 3 around the HE1 enclosure, they had a more even distribution across the landscape in the later period. Perhaps importantly, one steep-sided waterhole (125233) was excavated through ditch 113124, which formed part of Trackway 2. This suggests the abandonment of this trackway as an active routeway.

The numbers and distribution of ramped waterholes also increased slightly between 1150 and 750 BC. The current sample is too small to suggest a change in stock management and the stock / arable balance before and after 1150, although this theme will be explored further in Volume 2.

Turning to the role of waterholes in maintaining late Bronze Age communities, one or two examples of unusual artefact deposits in the bases of these features appear to continue the pre- 1150 BC traditions.

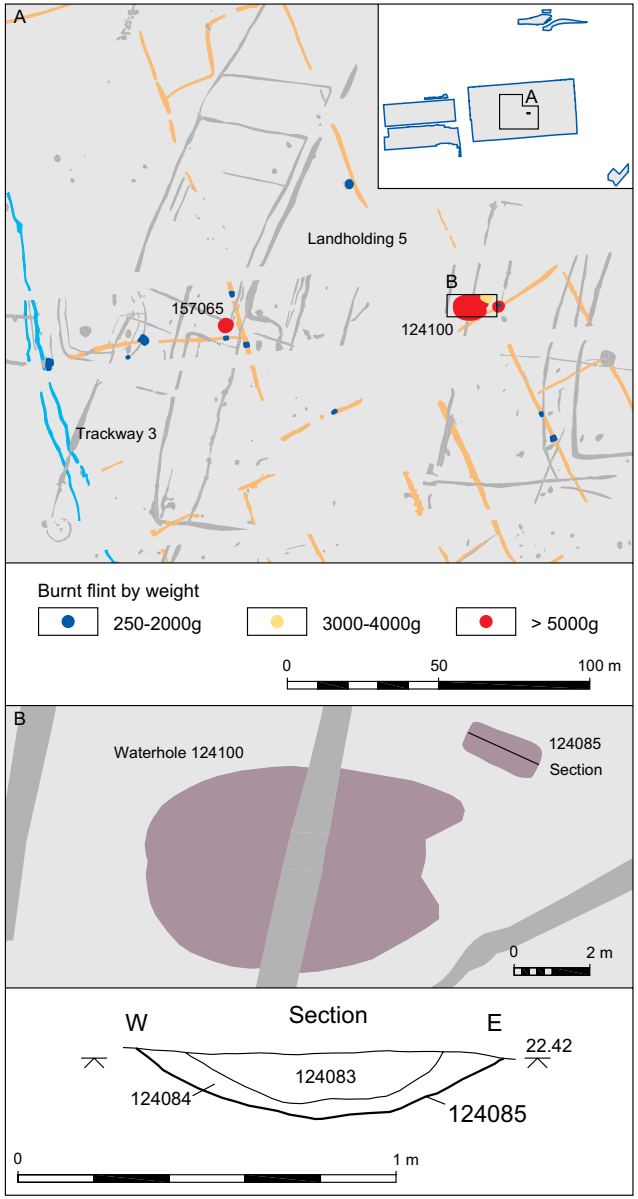


Figure 3.35: Burnt flint features around waterhole 124100

Waterhole complex 103040, 103038, 136194

Waterhole 103038 was a steep-sided recut of ramped waterhole, 103040 (Fig. 3.36). The excavator believed that 103038 was cut by shaft 136194 to form a well, but, due to extremely difficult excavation conditions, precise interpretation of this complex sequence is not possible. Nevertheless, the original interpretation is described here, with the shaft shown on the section in Figure 3.36 as cut 136194. The base of waterhole 103038 was revetted to retain the soft, unconsolidated fills of the earlier ramped waterhole, 103040. A significant artefact assemblage was recovered from the basal fills of shaft 136194 and waterhole 103038, comprising an almost complete Post-Deverel Rimbury bipartite jar (from 112062), and a carinated bowl with two carinated drinking vessels (from 136193) (Figs 3.36-7).

A radiocarbon determination on waterlogged seeds from basal fill 136193 produced a date of 1620–1320 (WK9375 cal BC 2 sigma). The seeds, however, may have derived from the earlier waterhole, 103040, since the pottery from 136193 clearly belonged to the Post-Deverel Rimbury ceramic tradition. Every and Mepham (CD Section 1) describe the vessels from this waterhole complex:

One carinated bowl formed part of a deliberate deposit at the base of a waterhole (136194; Fig. 3.37, no. 4) together with two carinated drinking vessels (Barrett's Class V; Fig. 3.37, nos 2–3). The latter have no known direct parallels in Thames Valley assemblages, although the profile of the form echoes exactly that of the accompanying bowl form—both forms have convex neck profiles and omphalos bases, and these three vessels were almost certainly made at the same time as a 'matching set'. The two drinking vessels both have simple linear decoration around the neck and carination. All three of the vessels within this deposit had been partially burnt, with localised 'blistering' and refiring of exterior surfaces in each case, and the bowl has what appears to be a large post-firing perforation in the base (perhaps a deliberate 'killing' of the vessel?). While nearly all the fineware bowls have the short necks typical of the late Bronze Age, there is at least one example (from deposit 136188) of a long-necked form, which potentially has a slightly later (early Iron Age) date; this example is decorated with incised motif (Fig. 3.37, no. 5).

The deposition of a complete coarseware bipartite jar at the base of waterhole (103038; Fig. 3.37, no. 1) and the careful placing of a 'matching set' of carinated bowl and two carinated cups, all finewares, at the base of waterhole (see above) is clearly an act of deliberate deposition. In these instances, pots can be seen as similar to the to the 'sealing deposits' comprising wooden and other artefacts in other waterholes of the middle Bronze Age; the latter do not include whole vessels although occasional sherds are included, perhaps incidentally. All three fineware vessels, prior to their final deposition, had been subjected to high temperatures to produce slight localised burning, such as might result from being placed close to a bonfire, and the bowl had apparently been deliberately pierced through the base. The coarseware jar appears to show evidence of use prior to deposition, in the form of an external burnt residue over the rim and upper part of the vessel.

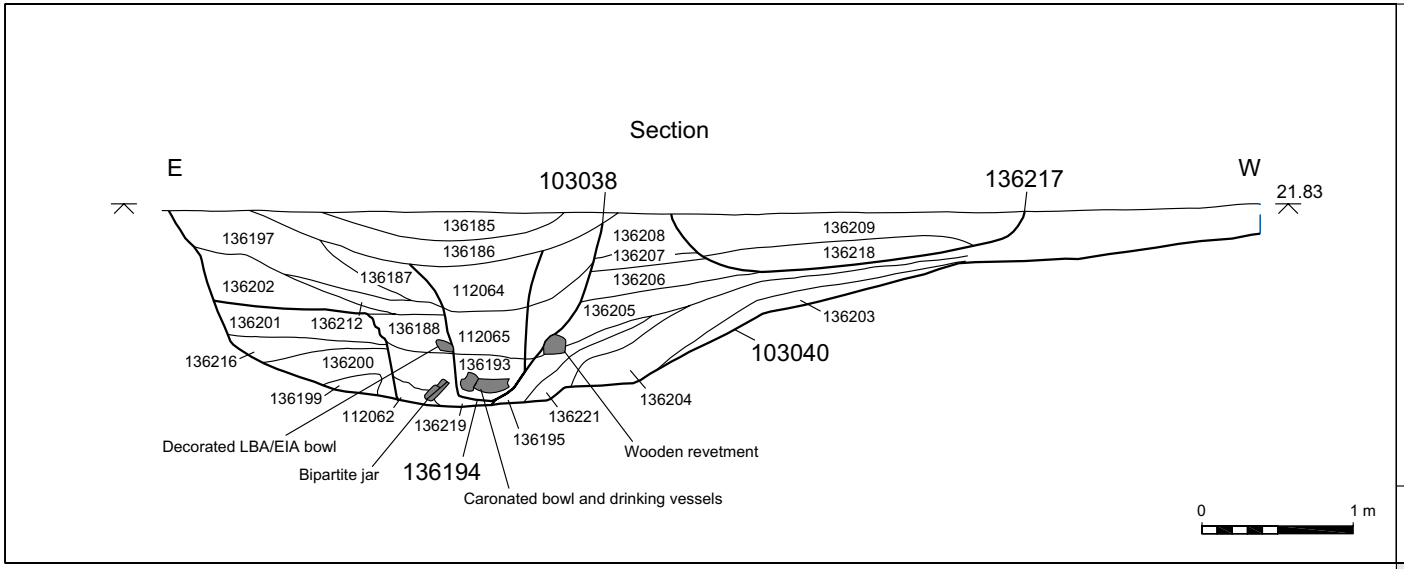
There may in fact be a further link between these vessels. Woodward (1998–9) has highlighted the deposition of communal 'feasting sets' from the Neolithic onwards. For the late Bronze Age (1150–750 BC), she defines these 'sets' as consisting of a single large, often thin-walled, vessel, one or more medium-sized jars, and one or more drinking vessels. If the two intercutting waterhole deposits are combined, the four vessels could conceivably be seen as one such 'set'.

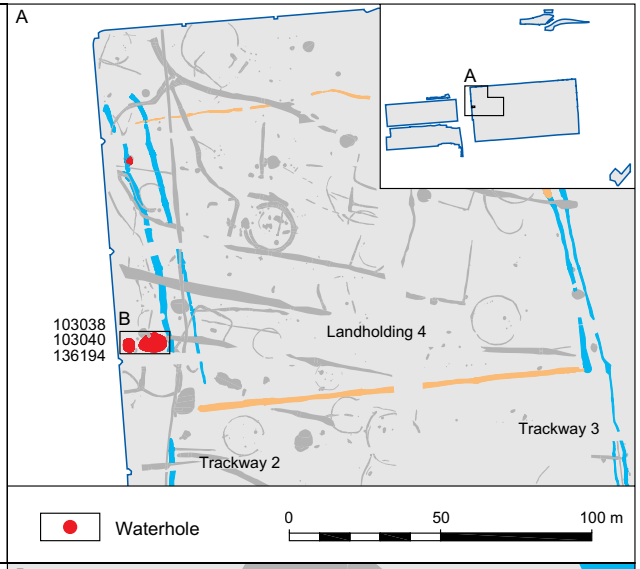
(Every and Mepham, CD Section 1)

This pattern of deposition of complete pots has been observed elsewhere, most recently at Swalecliffe, Kent, where a complete vessel ('pot 3', resembling the bi-partite carinated jar from waterhole 103038) was placed at the base of a waterhole in a dense complex of other such features (Masefield *et al.* 2003, fig. 28, plate 11). Radiocarbon and dendrochronology date this deposit to the 'turn [ie early] of the eighth century BC' (Masefield *et al.* 2004, 338) and we can postulate a similar date for the deposition of the Perry Oaks vessel.

Hill (1989) has explored the representation of symbolic systems through the placing of deposits in pits. We would simply suggest that, sometime in the 8th century BC, the social gatherings and interactions which were necessary to hold communities together were as important as ever, and that these activities involved the deposition of artefacts at the base of waterholes 103040 / 136194.

Right
Figure 3.36: Waterhole complex 103040, 103038, 136194

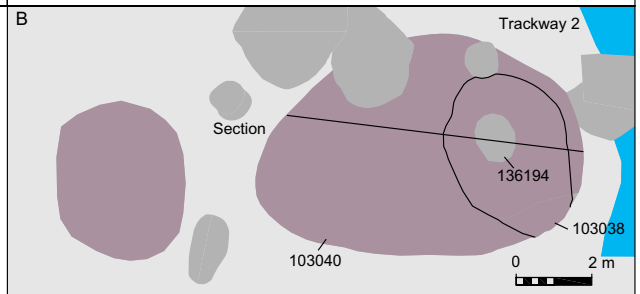




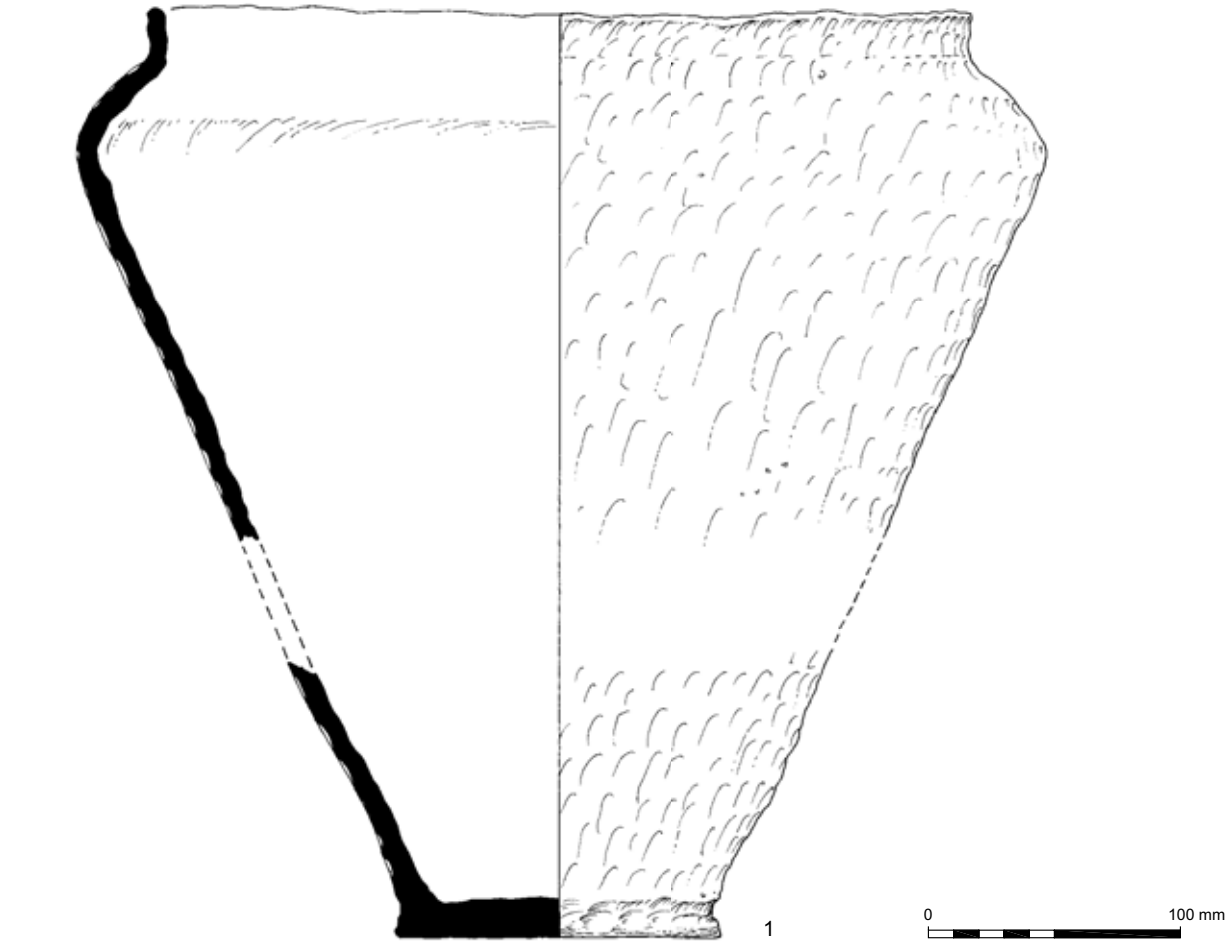
Bipartite jar.

Wooden revetment.

Carinated bowl and drinking vessels.



Drinking vessels.



Continuity of tradition

A comparison of the waterholes and associated artefacts indicates a strong element of continuity between the periods 1700–1150 BC and 1150–750 BC, but also changes, which reflected how people shaped their society and community. The waterholes and associated artefacts of the middle Bronze Age period appeared to refer back to the Neolithic in their spatial arrangement (around the HE1 monument), act of deposition in pits and symbolism of the objects themselves. These elements were, however, affected by new constraints—the requirement to obtain water in a landscape where access to streams and rivers was now restricted by ditches, banks and hedges. Within this new landscape, the landholding kin-groups still had to work and live side-by-side, and will have come together as a community to share labour, resources and participate in social events such as births, marriages and deaths. We have argued that the construction and use of waterholes in Landholding 3 and the burnt

Figure 3.37: Late Bronze Age pottery assemblage and decorated late Bronze Age/early Iron Age bowl from Waterhole complex 103040, 103038, 136194

mound complex in Landholding 5 were shaped by practices that reflected these concerns. Moving forward to the period 1150–750 BC, we see a strong sense of continuity with the reuse of waterholes or the excavation of new examples adjacent to the originals. However, the water-holes of this later period derived their meaning from the more immediate past, the period 1700–1150 BC, not the ancient past of the 4th and 3rd millennia BC. The echoes and traditions of that ancient community which persisted into the latter half of the 2nd millennium BC had been swept aside in the making of the new world of the agricultural and pastoral landscape. In its place we see in the complete pottery vessels the agency of new mechanisms involving feasting and drinking that modulated the age-old dynamic tension between individuals, the kin-groups and the community.

Life and death during the 2nd and early 1st millennium BC at Perry Oaks

We have now explored how and perhaps why the landscape was divided sometime around 1700 BC into a series of landholdings, and how a system of fields, trackways, settlements and waterholes followed. We have suggested that the broader community may have become more loosely bound than previously, but we have shown how mechanisms resulting in the deposition of unusual artefacts and burnt flint in waterholes may have served to maintain the intra-community bonds.

In this section we will start by discussing the elements of life in the 2nd millennium BC that are surprisingly under-represented in our excavations, namely the use and deposition of metalwork and the disposal of the dead. We will then move on to discuss how the landholdings may have sustained the kin-groups through arable and pastoral agriculture. We will briefly discuss changes in settlement distribution in the early 1st millennium BC, and how this may represent the strengthening of the community as the individual kin-groups coalesced.

Burials and Metal artefacts: where are they?

In a period where we have demonstrated a thriving rural agricultural landscape, the scarcity of cremations or inhumations at Perry Oaks, either in cemeteries or singly is striking. Similarly, the only metalwork of note was the side-looped spearhead and the spiral finger ring described above. No metalwork was recovered from any of the possible settlement sites we have identified. In order to understand this, we must firstly remember the effects of truncation on the archaeological deposits at Perry Oaks and then we should consider the Heathrow landscape in a wider geographical context.

The varying degrees of truncation caused by the construction of the sludge works would have removed most shallow features which were confined to topsoil or upper subsoil. During the recent T5 excavations, a small un-urned

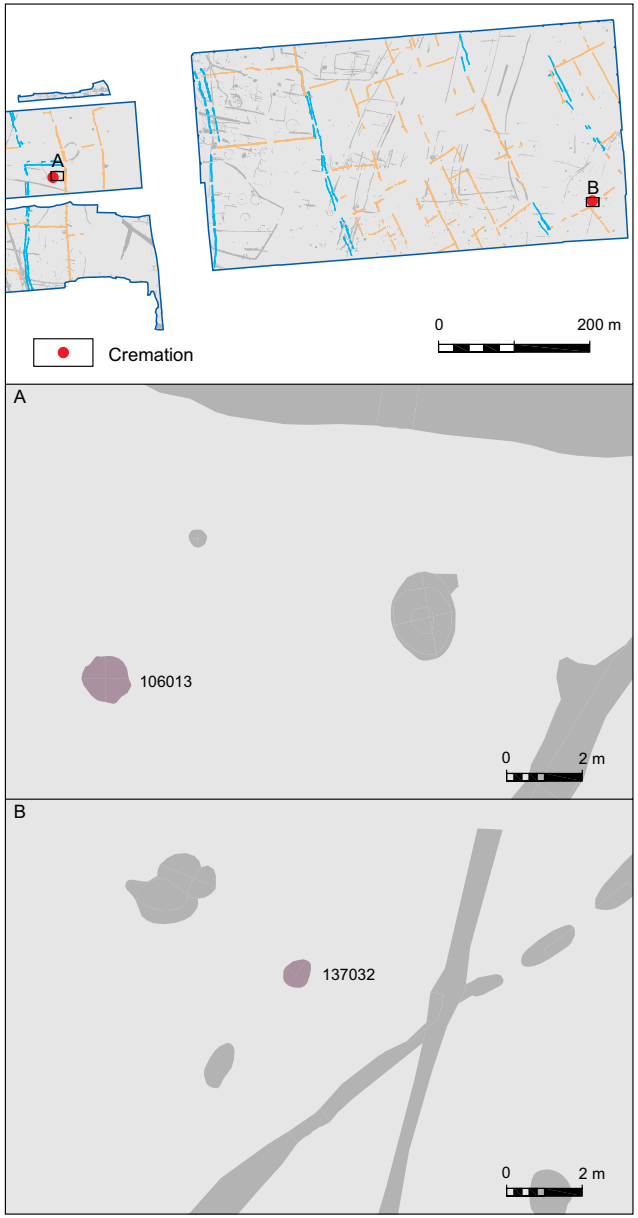


Figure 3.38: Location of Bronze Age cremation burials at Perry Oaks

cremation cemetery, probably dating to the 2nd millennium BC, was excavated on the edge of the Colne floodplain near the village of Longford (discussed in Volume 2). Truncation on the scale encountered at Perry Oaks would have removed all trace of these burials, while cremations contained within Deverel Rimbury urns and grouped into cemeteries such as that at Ashford Common (Barrett 1973) would also have been destroyed. Similarly, cremations inserted into the flanks of low mounds or barrows would have been removed, and so we must acknowledge that what remains at Perry Oaks is a very partial sample of what *could* have once existed.

Only two definite cremations were present at Perry Oaks: 106013 and 137032 (Fig. 3.38). Both contained an adult (probably female), and 137032 also contained fragments of copper alloy from probable grave goods and ten *Arrhenatherum elatius* (onion couch) tubers. The presence of edible tubers, such as *Arrhenatherum elatius*, in cremation deposits are particularly characteristic of Bronze Age cremations (eg Jones 1978, 108; Carruthers 1992, 63; Moffett 1999, 245), although their purpose in these assemblages is unclear. Unfortunately, a sample of this material produced a radiocarbon date of 3030–2870 (WK11473 cal BC 2 sigma). However, in view of the presence of copper alloy, and the known occurrence of these tubers in 2nd millennium BC cremations, we conclude that this date is probably from a contaminated sample. Cremation pit 106013 contained fragments of Deverel Rimbury pottery but Post-Deverel Rimbury pottery predominated, suggesting a date after 1150 BC.

The location of pit 137032 in Landholding 6 is relatively isolated, but pit 106013 was located between Settlements 2 and 4, south-west of the Neolithic HE1 monument. It could thus be seen to fit the model proposed by Barrett for the Thames Valley 'buffer zone', where, 'The correlation is between the inheritance of land and those rights of inheritance which find further expression through the burial of ancestors in close proximity to the settlement' (Barrett 1980, 84).

The marked absence of metalwork is particularly striking in view of the well-known concentrations of finds from the River Thames, and several terrestrial hoards in West London. There have been numerous attempts to reconcile the apparent dichotomy between rich metalwork evidence suggesting social differentiation, versus the settlement evidence that suggests little such differentiation (eg Bradley 1984). This paradox is particularly evident at Perry Oaks, and apart from the two bronze artefacts already described above; one cannot help but feel that almost all bronze artefacts were carefully removed and either recycled, or recast and reused, but ultimately deposited with particular care in certain contexts. For example, both wooden axe hafts were buried without their associated bronze axe heads. The context of deposition of the spearhead and spiral finger ring may also have been symbolic. The spearhead, an artefact with male associations, was placed in a field boundary, whilst the thumb ring, an artefact with possible female associations, was deposited in a waterhole. These symbols could suggest the different roles the genders played in matters of land inheritance and claim, provision of water as a fundamental of life and the social mechanisms used to bind the community together.

How people lived: arable and pastoral agriculture at Perry Oaks 1700–750 BC

We have described above a complex landscape of fields, trackways, settlements and waterholes, which evolved from 1700 to 750 BC. We will turn now to how people may have used this landscape to produce the food they needed to exist.

Firstly it is worth reiterating that the landscape and agricultural regime of the latter half of the 2nd millennium represented a complete trans formation from that of the 3rd millennium BC. It has been argued that once the concept of tenure and inheritance of formal blocks of land had been formalised by the first land boundaries, the trajectory of landscape development and agricultural transformation was altered. People had no choice but to shape their own, narrower world defined by the land boundaries so that they obtained the best return from their resources and labours. This is reflected in the different sizes and orientations of the fields and paddocks within each landholding.

Similar conclusions were reached for the Newark Road sub-site at Fengate, Cambridgeshire (Pryor 1980). However, in the light of his practical experience as a sheepfarmer, Pryor reviewed the situation that led to the creation of the 'planned' later prehistoric landscapes, and came to different conclusions (Pryor 1996, 316). Fundamental to the pattern of stock management proposed by

Pryor was the suggestion that livestock were grazed in the rich pastures of Flag Fen during the dryer summer months, but were moved and spent the late autumn, winter and early spring on the well-drained, higher ground of Fengate where they were kept and managed using the ditched fields and trackways. These trackways were spaced 50–100 m apart and ran down to the wetland edge (ibid., 314). Within this complex of droveways, Pryor suggested the existence of 'community stockyards' where major gatherings of people and animals occurred at the beginning / end of the dryland phase of grazing. The Newark Road complex was interpreted this way, and would have served to manage the confinement, sorting, inspection and exchange of hundreds if not thousands of animals, predominantly sheep.

In tandem with the 'community' stockyards, Pryor suggested 'farm' stockyards, serving single farms, and cited the Storey's Bar Road sub-site at Fengate as an example (ibid., 317–8). Pryor's model proposed very large flock sizes, running into thousands, which required increasingly elaborate stock control mechanisms. This redressed what he saw as a bias towards arable agriculture in the archaeological literature. He suggested that the long droveways, for instance, passed through paddocks not arable fields and were to keep animals apart from other animals and overgrazed pasture rather than from crops.

The strength of Pryor's analysis is that it is based on large excavated areas and his own personal experience of raising and managing sheep, and as such it deserves close comparison with the Perry Oaks landscape.

Firstly we can see many similarities between Fengate and Perry Oaks: the long trackways, instances of stock management features, sub-divided fields and waterholes. There is a clear example of a gateway in Trackway 1, for example, which was probably used for stock management (Fig. 3.39). Many of the trackways varied in width at different points along their length to allow sheep to be singled out and inspected. Many of the fields had entrances at their corners to take advantage of the funnelling effect of two hedgerows. Trackway 2, at almost 7 m wide, may have served as a 'main drove' for moving animals longer distances across the landscape. Even Settlement 1 could be interpreted as one of Pryor's 'community stockyards', with the buildings being sheds for animals. However, the flanking trackways narrowed to the south of the settlement, in contrast to the Newark Road stockyard where they widened as they moved away from the enclosure.

It is indisputable that much of the Perry Oaks landscape developed during the 2nd millennium BC to facilitate animal husbandry. However, there are differences between the Fengate model and Perry Oaks, some subtle, some more sharply drawn. Firstly, we maintain that the main trackways represented major landholdings, and the differences in field layout cannot be explained purely in functional terms. Secondly, the fundamental basis of the Fengate model is the movement of animals from the wetter summer

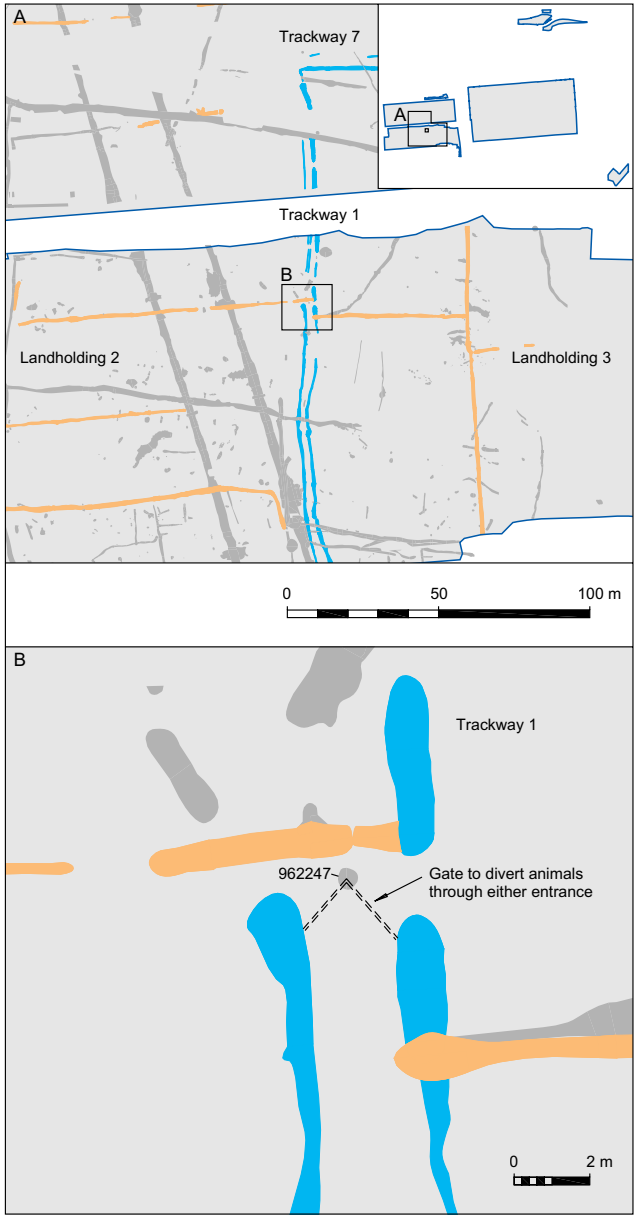


Figure 3.39: Gateway in Trackway 1, used for stock management

pastures to higher, dryer pastures during winter, hence the orientation of droveways to this effect. At Perry Oaks, all the major droveways were orientated parallel to the River Colne, roughly north-south. They could have been aligned to provide access to a loop in the Colne, 1.1 km to the north-west, but this seems unlikely. If access to and from the Colne Floodplain and the higher, dryer terrace was of crucial importance, then the major landholdings and certainly the trackways would have been aligned east-west. That way, all landholdings would have had access to the river, and could have moved and herded their animals easily between the two areas.

Palaeoenvironmental evidence from middle Bronze Age waterholes

The palaeoenvironmental evidence from Perry Oaks features dated to the middle Bronze Age shows quite clearly that the landscape maintained a mixed agricultural regime of cereal crops and animal husbandry, while insect remains clearly stress the importance of stock raising and animal husbandry, as detailed by Robinson:

All the Bronze Age insect assemblages gave strong evidence for grassland. The chafer and elaterid beetles of Species Group 11, such as Phyllopertha horticola and Athous haemorrhoidalis, comprised around 5% of the terrestrial Coleoptera. Another member of this group, Agrypnus murinus, which is characteristic of well-drained soils, was well-represented in Sample 856 from Feature 178108 and Sample 857 from Feature 178122, the intercutting pits. Many of the Carabidae (ground beetles) commonly occur in grassland including Pterostichus cupreus, Calathus fuscipes and some species of Amara. A warm sunny aspect to the site, with sheltered areas of permanent grass which was relatively short, was suggested by the occurrence of Brachinus crepitans (bombardier beetle) in several of the samples. Another beetle of warm dry habitat is the tenebrionid Opatrum sabulosum, which was represented by six individuals in Sample 857. It occurs in sandy areas where there are breaks in the vegetation cover and now has a distribution in Britain which is principally coastal, although it is known from parts of Berkshire and Surrey (Brendell 1975, 10). The lygaeid bug Aphanus rolandri, also found in this sample, only occurs in sheltered sunny habitats. Further evidence of broken sandy grassland was given by Calathus cf. ambiguus but there was no other evidence of the heathland vegetation with which this beetle is often associated, although heathland subsequently developed in the region.

Grass-feeding insects included cicadellid bugs from the genus Aphrodes. The phytophagous beetles gave some indication of the grassland vegetation. They included Ceuthorhynchidius troglodytes which feeds on Plantago lanceolata (ribwort plantain), Mecinus pyraster which feeds on P. media (hoary plantain) as well as P. lanceolata, Hydrothassa glabra which feeds on Ranunculus spp. (buttercups) and Galeruca tanaceti which is mostly associated with Achillea millefolium (yarrow). A more general association with Compositae is shown by Olibrus sp. Weevils from the genera Apion and Sitona which feed on clovers and vetches (Species Group 3) ranged from 2.3 to 3.7% of the terrestrial Coleoptera. Such values are not high enough to suggest hay meadow but are characteristic of grassland that has not been so heavily grazed as to prevent the flowering of clovers. Two of the more host-specific members of this group that were identified, Sitona hispidulus and S. lepidus mostly feed on Trifolium spp. (clovers) although they can also occur on Medicago spp. (medicks) (Morris 1997, 51, 57).

Evidence that the grassland was grazed by domestic animals was given by the scarabaeoid dung beetles of Species Group 2. These beetles feed on the droppings of larger herbivores on pasture. They ranged from 9.3% of the terrestrial Coleoptera in Sample 229 from Feature 135071 to 19.2% of the terrestrial Coleoptera in Sample 856 from Feature 178108. The lower value is what might be expected from a largely pastoral landscape but the higher value suggested that domestic animals were concentrated in the vicinity of the middle Bronze Age pit. It is possible that the enclosure in which this pit was situated was used for management of stock which grazed over a much wider area.

The most numerous of the scarabaeoid dung beetles were species of Aphodius: A. cf. sphacelatus in Samples 229 and 277, A. granarius in Samples 856 and 857. However, species of Onthophagus were also well-represented in samples 229 and 277, comprising 33.3% individuals in these two samples. Two species of Onthophagus in Samples 229 and 277, O. nutans and O. taurus, are now extinct in Britain. Individuals of Aphodius greatly outnumber Onthophagus in present-day dung faunas in Britain. The proportion of Onthophagus, however, rises further south in Europe. It is possible that mean summer temperatures were somewhat warmer when some of the middle Bronze Age deposits accumulated (see below).

The insects from the Bronze Age samples also included members of several other families of Coleoptera which commonly occur in the droppings of domestic animals. They included the hydrophilids Sphaeridium bipustulatum and Megasternum obscurum, the histerid Hister quadrimaculatus and the staphylinids Anotylus sculpturatus gp. and Philonthus spp. Some of these species are members of Species Group 7 and also occur in other categories of foul organic material including dung heaps and middens.

Coleoptera are very good at demonstrating the importance, species composition and use of grassland within the vicinity of a waterlogged deposit, but are less effective at indicating the presence of arable (Robinson 1983). This is because cereal crops in Britain do not commonly suffer from beetle pests. Sample 277 from Context 141024 did, however, contain a single example of Aphthona cf. euphorbiae, a beetle that as well as occurring on species of Euphorbia (spurges) also feeds on Linum usitatissimum (flax). Otherwise, possible evidence of arable was given by the carabid (ground) beetles of Species Groups 6a and 6b which are favoured by areas of bare or weedy disturbed ground. The two members of Species Group 6a, Agonum dorsale and Harpalus rufipes, beetles of general disturbed ground or arable, ranged from 0 to 3.5% of the terrestrial Coleoptera. The species of Amara such as A. apricaria and A. bifrons that belong to Species Group 6b, beetles of sandy or dry disturbed ground and arable, ranged from 0 to 0.7% of the terrestrial Coleoptera. Their abundance was certainly sufficient to show the occurrence of their habitat in the vicinity of the waterholes. However, it is much harder to establish whether they were from cultivated ground or disturbed, weedy and bare ground as occurs around settlements. In the case of Sample 229 from Feature 135071, there was no evidence from the insects for the proximity of settlement whereas Sample 856 from Feature 178108 and Sample 857 from Feature 178122 contained synanthropic beetles and it is very likely that there would have been areas of bare and weedy ground between buildings (see below).

The phytophagous beetles included some that are dependent on potential arable weeds. For example Pseudostyphlus pillumus feeds on Tripleurospermum, Anthemis and Matricaria spp. (mayweeds) and many of the Ceuthorhynchinae feed on Cruciferae that are arable weeds. However, many of the phytophagous beetles feed on herbaceous plants that occur in several habitats. Chaetocnema concinna, which feeds on Polygonaceae, was present in all the Bronze Age samples but it is uncertain whether it was feeding on Rumex spp. (dock) at the base of the hedges, in waste ground, in grassland or growing in cultivated ground. It could also have been feeding on other plants such as Polygonum aviculare (knotgrass) growing on disturbed ground.

(Robinson, CD Section 12)

The pollen and waterlogged plant remains indicate direct and indirect evidence of cereal growing as well as animal husbandry. The best direct evidence for cereal growing was provided by the dump of crop processing waste in waterhole 135071 (see Fig 3.29 above).

Waterhole 135071

Six samples were examined for waterlogged plant macrofossils, four of which produced a wide range of well preserved remains. Sample 1141 (context 135040), taken from below the log ladder, was the lowest of the samples stratigraphically, but sample 1140 (context 135034), a thin layer higher up the profile, produced by far the greatest concentration of plant remains. 1140 also produced the largest amounts of emmer (Triticum dicoccum) and spelt (T. spelta) glume bases and spikelets, including some that were radiocarbon dated to 1260–910 BC (WK9374 cal BC 2 sigma). The presence of compacted layers of straw and chaff, interleaved with numerous wild parsnip (Pastinaca sativa) and common mallow (Malva sylvestris) fruits and stems in both samples from this thin layer (samples 1140 and 1135) suggest that crop processing waste mixed with ruderal weeds had been deposited in the waterhole. Crop processing waste was recovered from all four of the lower, better preserved samples, accounting for 2 to 10% of the identifiable remains. A few barley (Hordeum vulgare) rachis fragments provided evidence for the cultivation of barley, in addition to emmer and spelt. The absence of synanthropic insects from the deposit of crop processing waste, context 155028 (Robinson, CD Section 12), demonstrated that the straw had not been used for thatching, flooring or bedding before being deposited in the waterhole.

A few flax (Linum usitatissimum) capsule fragments were recovered from two of the samples. Waterlogged features often produce evidence of flax processing waste, since leaving the plants to rot in water (retting) is one of the stages in processing flax for its fibre. Because only a few capsule fragments and

no seeds were present in otherwise very well-preserved samples there is no clear evidence for retting having taken place in this particular waterhole. Retting is a smelly process that would have fouled the water if it was being used for human or livestock consumption, and caused eutrophication. It is likely that flax processing waste had been fed to livestock and small amounts had been introduced into the feature in animal dung.

(Carruthers, CD Section 9)

The common mallow and wild parsnip found in waterhole 135071 are tall perennials (parsnip is a biennial) that grow primarily on dryer soils. Mallow shows a preference for calcareous soils, whilst parsnip is often found on nutrient-enriched soils. Being perennials, they would not have been growing as arable weeds, but may have survived around field margins. Alternatively, they may have become mixed with the straw in the early stages of threshing. Both plants are readily grazed by animals, but a threshing area is likely to have been situated on dryer ground which was fenced off from livestock. The plants would have been fruiting some time between July to September, which would correspond with harvesting arable crops. A beetle which feeds on mallow, Podagrica fuscicornis, was recovered from the same context as the seeds (Robinson, CD Section 12).

All the pollen samples from middle Bronze Age waterholes 178108, 124100, 156031 and 135071 provided evidence for cereal production and grazed grassland. We can take waterholes 178108 and 124100 as good examples, since they are spatially well separated (see Fig. 3.8 above). The following is derived from Wiltshire (CD Section 11):

Waterhole 171808 (Fig. 3.40)

If Feature 178108 is taken as an example, elements of mixed farming and landscape management can be seen. From the base of the waterhole, Zones 178108/1&2 relate to the earliest phase of the feature.

Zone 1 *shows relatively low levels of grass pollen, ruderal weeds, and pasture herbs, and this might indicate a fairly high grazing pressure in the environs of the feature. But cereals were well represented and these indicate the importance of arable farming in this area of*

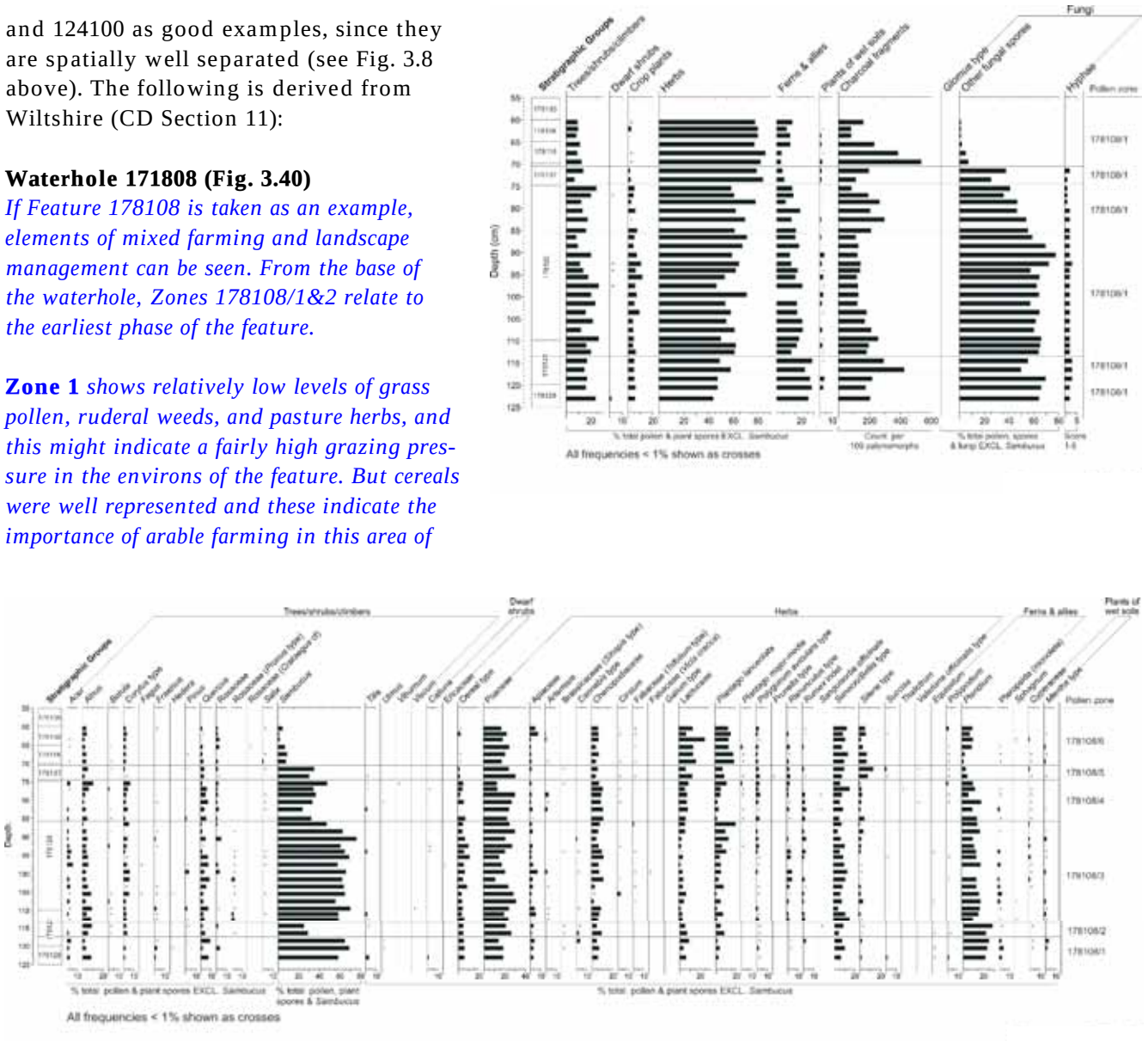


Figure 3.40: Pollen samples from waterhole 178108

the site. The soils around the waterhole were obviously wet, but the absence of obligate water plants might suggest that the feature was so intensively used that floating plants could not colonise. The ferns and many of the herbs recorded in the diagram could have been growing at the base of the adjacent hedge. The observed assemblage is often seen along boundaries of field systems today although, of course, they could also have been growing in grassland or on open, disturbed soils associated with ploughed fields.

Zone 2 *shows some intensive activity in the vicinity of the feature. The local hedge was affected (particularly elder) and the changes might have been related to local burning. It is possible that hedge cuttings were burned very close to the feature. There was certainly no impact on local cereal growing but the rise in grasses and other herbs might indicate that animals could have been kept away from the area for a period.*

Zone 3 *coincides approximately with the re-cutting of the waterhole 178108 by Feature 178122. This was presumably an attempt to rejuvenate the original silted-up waterhole. Throughout this zone, the very local landscape seems to have been stable, and there were only small variations in the herb pollen spectra throughout. The hedgerow recovered and, indeed, more woody taxa were recorded. Bracken declined while some ruderal weeds and pasture plants increased. This implies that there was a greater availability of disturbed and broken soils. The wetness around the feature also increased.*

In **Zone 4**, *there appears to have been another management event and the hedge was adversely affected. Cereal growing also seems to have declined slightly and there seems to have been trampling, grazing, or cutting of local herbaceous vegetation. However, there was better representation of smaller herbs such as plantains, buttercups, polypody fern, and cleavers. Common valerian and meadow rue (plants characteristic of meadow/pasture) were also recorded. The removal of taller grasses might have allowed better pollen dispersal of these plants. The effects in the herb flora might suggest that the impact on grasses (whether due to active management or grazing) occurred before the main grass flowering period in June; the later flowering plants are thus better represented.*

In **Zone 5**, *there seem to have been an even greater impact on the hedgerow and other trees and shrubs in the catchment. Values for cereal pollen and bracken also dropped while grasses and some other herbs were enhanced by events. It must be remembered that the timing of plant management can affect the palynological record very dramatically. The cutting of spring and summer flowering woody plants at any time will result in a diminishing of flowering in the following year or even longer. Cutting grasses and many herbs in late spring, and cutting bracken at any time between April and late July, will result in poor pollen and spore representation. The pollen spectra in this zone are probably reflecting the effects of small scale management although there is little doubt that cereal production had either moved away slightly, or had declined in areal extent in the immediate locality.*

In **Zone 6**, *the local elder bushes seem to have been severely cut and/or burned, but attention seems to have been directed mainly to this one shrub. Cereal production also declined near the feature. The increase in pollen of herbaceous plants, particularly that of plantain, campion, dandelion-like plants and, eventually, bracken and hogweed/fool's parsley, suggest that the sward at the base of the hedge remained lush. It is possible that the herbs were actually growing in the ditch and out of reach of stock animals. There is little doubt that there were small-scale changes in the area but it is doubtful that there were meaningful alterations in the landscape further afield.*

(Wiltshire, CD Section 11)

Waterhole 124100 (Fig. 3.41)

Zone 1 *in the pollen diagram for this features shows that, as with the waterholes in Landholding 3 to the west of the site, this one was set in a cleared, agricultural landscape with both arable and pastoral farming being important in the immediate area. It was also close to diverse hedgerows. The vegetation dominating the open ground was also very similar to that recorded on the west of Perry Oaks for the same period.*

Zone 2 *shows changes in local management. Cereals appear to be grown or processed further away and flax was recorded. Flax is well known to produce tiny amounts of poorly dispersed pollen (values of less than 2% TLPS have been recorded within the crop fields) so a single pollen grain could, actually, represent a considerable area put to this crop. It is tempting to suggest that crops were being rotated, albeit at a small scale in an attempt to conserve soil fertility. At about 112 cm, Poaceae declined and continued to do so until the end of the zone. There was also a decline in some of the herbs that might have been abundant in the local grassland such as Fabaceae (clover family), Potentilla type (eg silver*

weed), and Ranunculus type (buttercups). It is possible that grazing intensity increased locally but it might also mean that the grassland was being managed for hay production. The lack of response of some of the herbs that were probably growing in the pasture community might simply reflect the relative flowering times at hay cutting. This interpretation is conjectural but quite feasible.

In **Zone 3**, *the area around the waterhole seems to have been the focus of renewed agricultural pressure, and microscopic charcoal increased very greatly. There was little change in the larger woody taxa other than a slight but consistent lower representation of Alnus. However, Acer and Viburnum (guelder rose) were recorded and Salix increased while Rosaceae indet (probably bramble) declined. Nevertheless, the hedgerow remained diverse and was probably being managed carefully. Cereal pollen was more frequent along with ruderals which could have been growing at the field boundaries, on paths, or even in the crops themselves. Grasses recovered slightly but not to the levels of the earlier part of the previous zone. There was a marked decline in plantain and a reciprocal (quite large) rise in bracken.*

The varying fates of these taxa must relate to relatively small-scale changes in local land use practices. It is feasible that brambles were being cleared from the hedgerow, freeing bracken from competition. It is also possible that more intense grazing allowed the unpalatable bracken to flourish. Stock animals often seek out the longer and more succulent herbage along field boundaries and hedgerows but grazing is selective. It is, of course, possible that a different stock animal was being grazed in the pasture, possibly sheep rather than cattle. They have a very different effect on the sward from cattle by virtue of close nibbling rather than tongue pulling. Generally, they cannot cope with long vegetation and, today, are usually pastured when the grassland sward has been reduced in height (Bacon 1990). They can cope with a very short sward, and even crop stubble after harvest, whereas cattle need fairly lush, long grass (Owen 1980). Sheep will nibble young bramble and flowering heads of rosette plants (personal observation), but will usually avoid bracken; and they are not as effective as cattle at trampling down this invasive pastoral weed. Sheep are also less dependent upon waterholes and get much of their water from vegetation. It is feasible that drier conditions and repeated drying out of the waterhole favoured sheep over cattle in this particular field system.

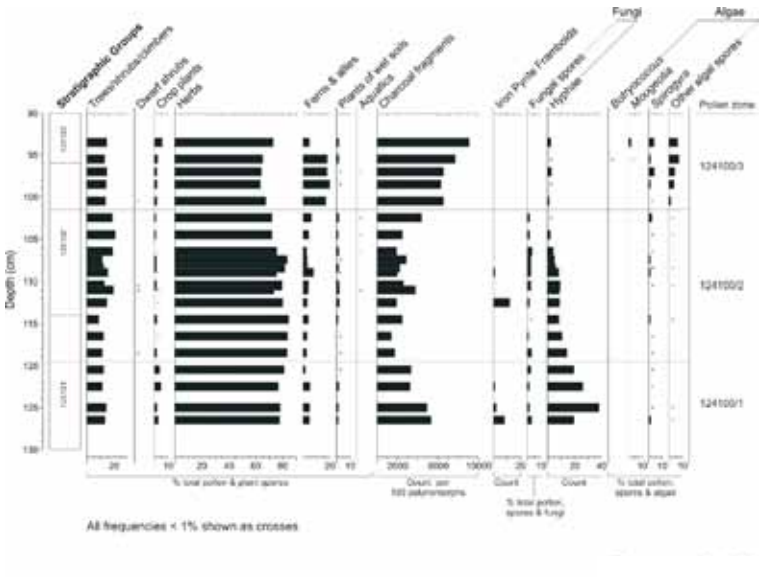


Figure 3.41: Pollen samples from waterhole 124100

Stocking densities and duration of grazing in any one area is known to affect the species composition of pasture very markedly. However, certainly in calcareous grassland, high species richness is maintained when sheep are kept at one animal/ha/yr on swards of low productivity, but at seven sheep/ha/yr where there is high productivity (Bacon 1990). The species richness in herbs in Zone 124100/3 certainly changed, and taxa such as Fabaceae (eg bird's foot trefoil, hop trefoil, clover), Galium type (eg bedstraws), Plantago lanceolata, and Potentilla type declined. It is possible that sheep grazing was responsible for this effect. Some of the shrub taxa growing locally certainly indicate that the soil was moderately calcareous (at least in patches) and, considering the rich assemblage of plants growing in the sward, it is possible that the grassland was at least moderately productive. Although it is highly conjectural, perhaps a stocking density of about seven sheep/ha/yr was being maintained.

It is very difficult to define precisely the nature of the stimulus to vegetation change, but any of the above suggestions is possible. In any event, none of the shifts in the relative performance of the plant communities created dramatic transformation of the local landscape. The effects were probably caused by relatively small scale changes in husbandry and land management such as selective cutting of different plants in the hedges, attempts at removing troublesome 'weeds', crop rotation, rotation of the use of areas for arable and pastoral husbandry, and moving sheep and cattle around to cope with varying states of herbage in the pastures.

(Wiltshire, CD Section 11)

Palaeoenvironmental evidence from late Bronze Age waterholes

Our evidence for arable and pastoral agriculture from 1150 to 750 BC is much less extensive. However, although the pollen diagram from late Bronze Age waterhole 155144 shows subtle differences when compared to the landscape of the period 1700–1150 BC, farming remained a mix of cereal production and animal husbandry:

Waterhole 155144 (Fig. 3.42)

Zone 1: *Arboreal pollen was highest in the basal sample and values ranged between 20–25% TLPS. The best represented taxon was Alnus, and the Corylus and Quercus which characterised the landscape of earlier times were much diminished by the time these sediments had accumulated.*

Both had either been exploited so extensively that their flowering was massively depressed, or they had been largely removed from the site for some considerable distance. Pinus and Betula were still growing in the catchment and Salix was growing not too far away. Ulmus (elm) had been exploited to extinction but the relatively high levels of Tilia throughout the zone are

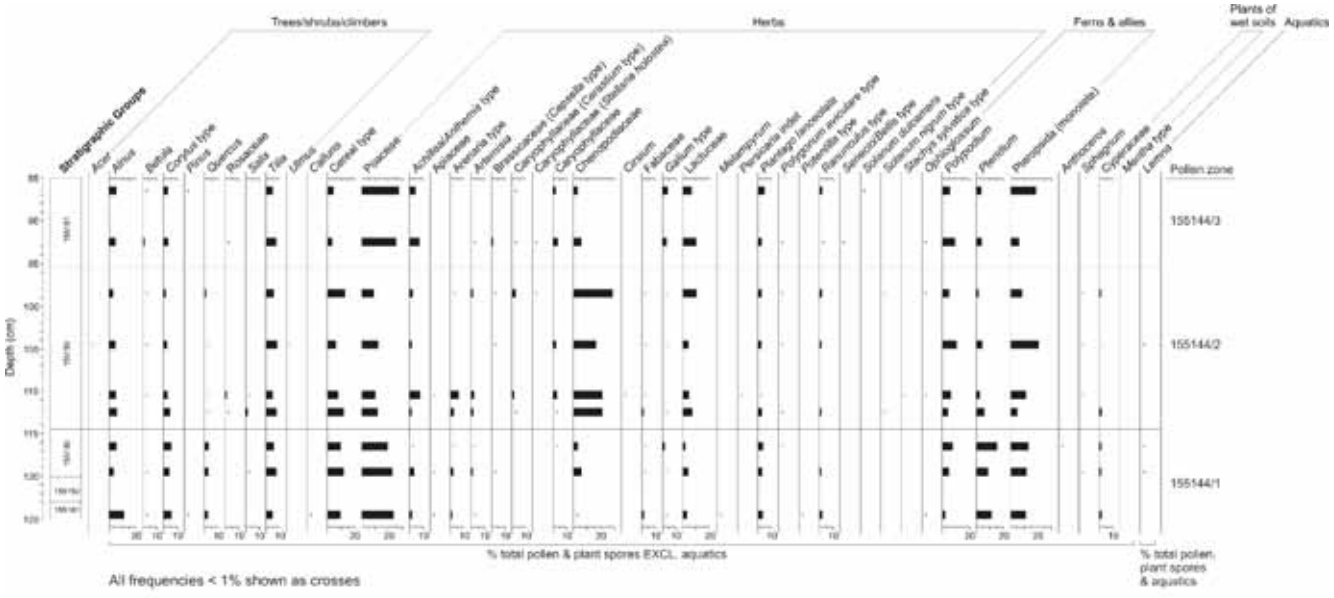


Figure 3.42: Pollen diagram from late Bronze Age waterhole 155144

quite surprising. In view of its poor pollen production and dispersal, its pollen percentages suggest that it must have been growing locally. However, it is also possible that faeces from stock animals fed on lime leaf fodder were finding their way into the feature. Ferns (undifferentiated) were growing locally and may have been species such as Dryopteris carthusiana (narrow buckler fern) that are, today, often found on the wet soils at the margins of ponds. Polypodium was also well represented and its spores may have been derived from ferns growing on field banks.

There is little doubt that the site was quite open and most trees were probably some distance away. The local area supported herb-rich grassland (probably pasture) and it is possible that the relatively abundant Pteridium (bracken) spores were derived from plants infesting drier areas of grazing; the presence of Calluna (heather) also suggests that heathland plants were starting to invade the acidic soils. Today, many of the herbs in the assemblage are certainly characteristic of lightly grazed pasture. These include Plantago lanceolata (ribwort plantain), Ranunculus type (buttercups), and Lactuceae (dandelion-like plants). However, the presence of ruderals such as Chenopodiaceae (goosefoot family), Artemisia (mugwort), Senecio/Bellis type (ragwort/daisy and others), and Polygonum aviculare (knotweed) indicate that there were open, broken, and possibly trampled soils around the site. Indeed, the high value for cereal type pollen suggests that ploughed arable fields were either very close to the feature or that the waterhole was situated close to the boundary between arable and pastoral land. It is interesting that a spore of Anthoceros (hornwort) was found since this is often an indicator of fallow ground.

Zone 2: *The most dramatic change in the record is due to the massive representation of Chenopodiaceae and enhanced representation of ruderals and weeds often associated with crop fields. These include Achillea/Anthemis type (eg yarrow/mayweeds), Arenaria type (sandwort), Artemisia (mugwort), Lactuceae (dandelion-like plants), Solanum nigrum type (black nightshade), and others. However, Poaceae declined quite markedly while cereal type pollen reached values similar to the earlier period in the life of the feature. These results suggest that this area of the site was being used more intensively. The lowered grass and eventual higher fern values might suggest higher grazing intensities since flowering heads of grasses would be removed by animals. By the same token, bracken might have been purposefully removed because of its toxic effect on stock animals while other ferns could have thrived because of their lack of palatability. The values for Tilia remained high and whether the pollen was derived from dung or from local trees must remain an enigma.*

The high levels of Chenopodiaceae and other ruderals might have been a response to the neglect of an area close to the feature. Weeds would be quick to capitalise on the open, fallow ground. On the other hand, the enhancement of weeds might simply be due to poor crop husbandry.

Zone 3: *Apart from Tilia, which continued to be represented as before, the local landscape was clear of trees other than those that were probably growing some distance away such as Alnus, Betula, and Corylus. Quercus seems either to have been removed altogether from the immediate area, or it was so intensively managed that it never flowered. There appears to have been some relaxation of land use in this zone and this continued for some time. The pollen spectra are reflected in the lower sediments of Sample 1181 above 1171. The area certainly seems to have become drier and no evidence of aquatics or plants of wet soils was found. The rise in Poaceae and the decline of many ruderal weeds also indicates that grazing was somewhat relaxed. Cereal pollen also declined but crops were still being grown in the area. Again, these conditions continued into the sediments above this zone.*

This diagram would appear to indicate a very arable landscape in Zone 1, succeeded by more intensive grazing, and possible a period of fallow fields in Zone 2. The sequence culminates in a more relaxed grazing regime, but still with an arable component.

However it must be emphasised that these findings may reflect the activity in the handful of small fields surrounding waterhole 155144 and not the landscape at large.

(Wiltshire, CD Section 11)

Waterhole 180080 (Fig. 3.43)

Waterhole 180080 produced waterlogged plant macrofossil remains from its base:

The dominant group was weeds of disturbed / cultivated land, as usual (average = 49% of total remains). Nutrient-loving weeds such as fat hen, small nettle and common chickweed were fairly frequent, as were more specific arable weeds, such as parsley piert and scentless mayweed. Cereal grains and a few emmer/ spelt, spelt and barley chaff

fragments were recovered from these samples, suggesting that domestic waste, fodder or dung had found its way into the well. No doubt many of the arable weed seeds had been introduced with these remains.

The second most important group was plants of wet grassland/marsh/banksides. This was mainly due to relatively high counts of blinks (Montia fontana ssp. minor) seeds. Meadowsweet (Filipendula ulmaria), wood-rush (Luzula sp.) and sweet-grass (Glyceria sp.) were also present in low frequencies, and drier grassland taxa were fairly well represented. This suggests that the surrounding vegetation consisted of grassland that was probably seasonally waterlogged and permanently damp in places.

This was the earliest sample to produce macroscopic evidence of heathland, with several heather (Calluna vulgaris) shoot tips and some cross-leaved heath (Erica tetralix) leaves. Pollen evidence for heathland vegetation was recorded in the earliest pollen zone in M/LBA pit F178108. Heather grows on sandy and peaty soils, but cross-leaved heath is typically found on wetter, boggy areas of heath. These remains could represent locally growing vegetation, in which case they indicate that the local soils had deteriorated following the clearance of scrub and/or woodlands. However, the presence of cereal waste also suggests that it could have been deposited in domestic waste, fodder or dung. The only woodland/scrub/hedgerow seed found in this feature was a single bramble seed, so some changes in the landscape appear to be taking place between the middle and late Bronze Ages.

(Carruthers, CD Section 9)

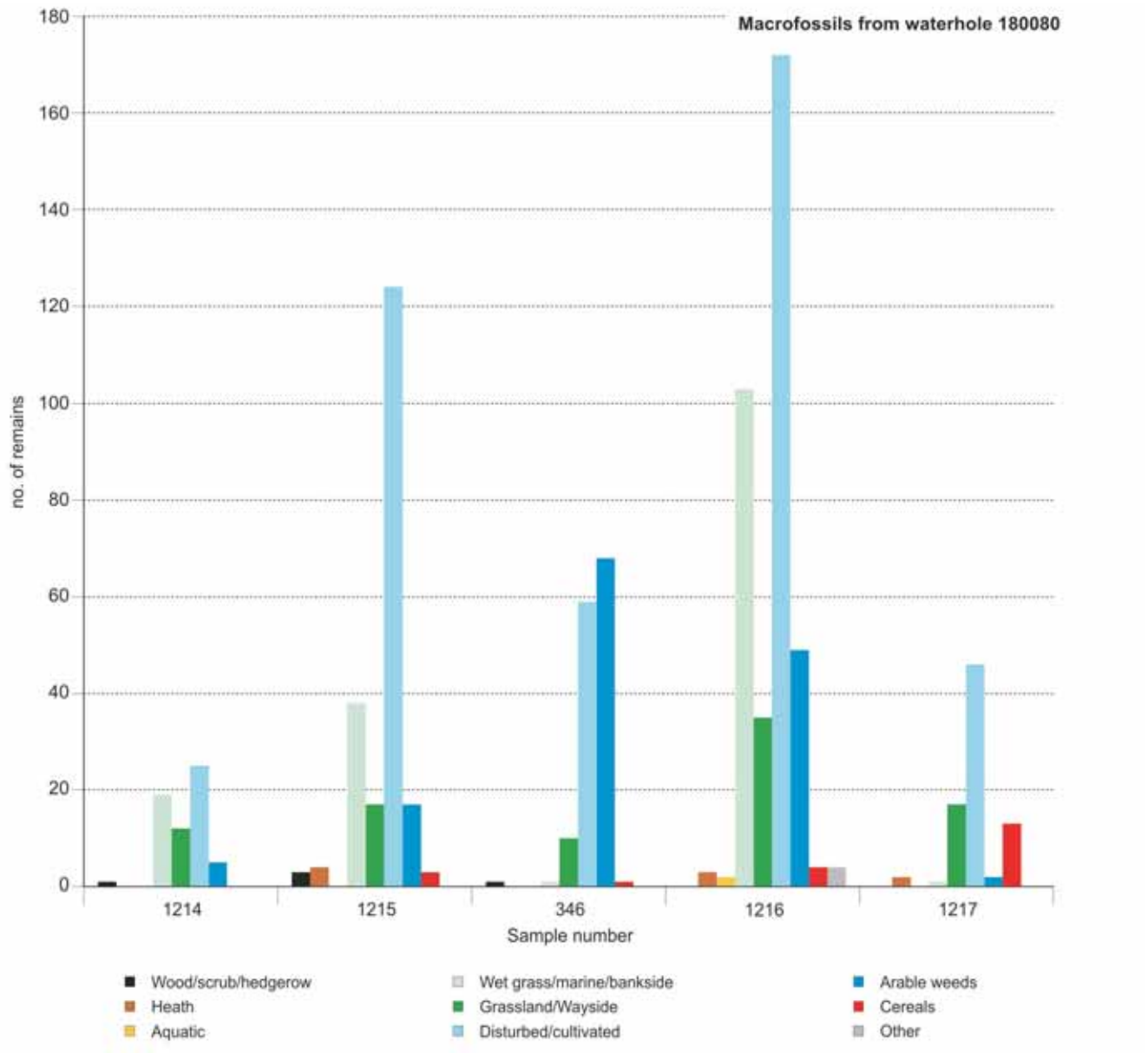


Figure 3.43: Plant macrofossils from late Bronze Age waterhole 180080

Figure 3.44: Burnt flint wt by intervention from Bronze Age fields and trackways

The presence of possible domestic waste, fodder and dung is especially interesting, since waterhole 180080 was located in the area which we believe to have been occupied by the larger, nucleated settlement form 1100 to 750 BC (see above).

Summary: farming practices in the middle to late Bronze Age

The assumption that the farming economy of the Thames Valley in the later 2nd and early 1st millennia BC was dominated by pastoralism has been fundamental to recent reviews of field systems in the region and West London (in particular Yates 2001, 67). However, the Langley Silt ('brickearth') capped Kempton Park, Taplow and Lynch Hill gravel terraces have long been known for their high agricultural productivity (eg Rackham and Sidell 2000, 17), so it should come as no surprise that the evidence from Perry Oaks demonstrates that arable agriculture formed an important part of a mixed agricultural regime. There is ample evidence from Southwark on the banks of the Thames downstream from Heathrow of ard cultivation in the 2nd millennium BC, probably associated with manuring of the soil (Drummond-Murray *et al*. 1994, 253–4). This cultivation occurred for a relatively short period around 1520–1220 BC (Sidell *et. al*. 2002, 36). It is likely that similar techniques were used at Perry Oaks, which would explain the small quantity and sherd weight of the pottery assemblage from the fields, together with the ubiquitous burnt flint (Fig. 3.44). The average sherd weight shown in Figure 3.45 demonstrates that similar depositional processes affected the ramped waterholes and field boundaries of the landholdings. In other words, they formed part of the same agricultural complex, with artefacts (in this case pottery) being deposited in their fills following distribution in the fields through spreading midden material. The slightly higher average sherd weight from the trackway ditches reflects their dual roles as corridors of transport (for animals but also presumably of midden material) and field boundaries. We have already described how steep-sided waterholes performed a range of functions, and the high average sherd weight clearly reflects not only deliberate deposition of complete vessels in the late Bronze Age, but also significantly larger fragments of Deverel Rimbury pottery associated with settlements. These features can clearly be separated from the agricultural complex of ditches and ramped waterholes.

Most of our evidence for a mixed arable / pastoral economy comes from the period 1700–1150 BC, but at the moment there is nothing to suggest a radical change during the period 1150–750 BC. The development of double ditched trackways occured late in our sequence, but as we have shown it is difficult to know precisely when this happened. There was a slight increase in the number of ramped waterholes, between 1150 and 750 BC, but it is small. Taken together, these could demonstrate an increase in the importance of stock rearing, but the pollen evidence demonstrates the continued cultivation of cereals.

Mixed arable / pastoral agriculture, crop rotation and land management would explain the alteration of some steep-sided waterholes to ramped

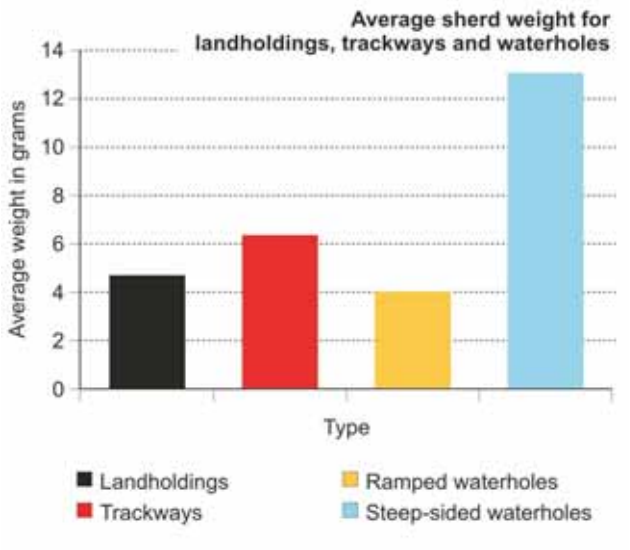


Figure 3.45: Average pottery sherd weight for Landholdings, trackways and waterholes

access examples. It would also explain why the ramped access waterholes tended to be associated with more finely sub-divided fields, since these probably served as stock holding areas. In contrast, very few of the larger fields had any waterholes, and these could have been where arable crops were grown. If stock rearing was not the overriding economic concern then the Perry Oaks trackways could have developed along landholding boundaries to facilitate access across the landscape without disturbing neighbouring kin group's crops and pasture, as opposed to an overriding prerequisite to secure summer grazing on the floodplain of the Colne. As we have suggested earlier in this chapter, the original

landholding boundaries formalised land tenure and control which had been facilitated through negotiation and ceremony in the 3rd millennium BC, and again these would have been driven by imperatives other than large scale sheep herding. For the trackways and boundaries to have been laid out with sheep management in mind, an economy already based on huge flocks would have to have already existed in the late 3rd millennium BC, and there is no evidence for this. Indeed, such thinking produces a 'chicken and egg' situation. For trackways to exist, large flocks of sheep must have been in existence, but without trackways and fields, how were these flocks managed? As Barrett has pointed out, It is [in] the social mode of production…… that explanations must be sought. The productive technology, and the ecosystem itself, can only represent a changing pattern of constraints acting upon the mode of production. They do not determine its actual path of development' (1980, 77).

Changes in settlement patterns in the early 1st millennium BC

We have shown how the mixed farming economy of the 2nd and early 1st millennium BC operated in conjunction with the development and adaptation of the landholdings in terms of hedges, trackways and waterholes. We have also shown how small possibly kin-based settlements may have existed in each landholding during the period 1700–1150 BC, and how ceremonies enacted around waterholes throughout our period served to tie the community together.

Unfortunately as discussed above, the evidence from the Perry Oaks excavations for where people lived during the period 1150–750 BC is less clear. It is possible that some of the earlier settlements such as Settlement 1 continued to be occupied, although it appears that the main focus of activity in this period lay within Landholding 3 (Settlement 4) and an adjacent zone (Twin Rivers) excavated during the later T5 excavations. Whether this represented a trend towards nucleation of settlement into fewer, larger locations, or whether it was an accumulation of debris and rubbish (by whatever mechanism and for whatever purpose) will be explored in Volume 2. For now, we will pursue the former theory, that during the period 1150–750, many of the settlements of the last half of the 2nd millennium BC were abandoned in favour of fewer, more nucleated settlements.

The plan in Figure 3.46 shows how this model might look. The trackway boundaries of the original kin-based land holdings would now simply be used for movement and stock management. In effect, the landholdings would coalesce and become one large pastoral / arable system, farmed by a community living in a single larger settlement. The usual causes for this change in society include deterioration in climatic conditions and soil quality which leads to increased 'pressure' on resources. 'Pressure' is a frequently encountered term in the archaeological literature, and is often used in a variety of contexts to explain change or impetus for development. Unfortunately, exactly what is meant by 'pressure' is rarely specified or discussed in detail. If we take the insect evidence from Perry Oaks, Robinson (CD Section 12) makes a case for

'…possibly a brief episode towards the end of the middle Bronze Age when southern England had significantly warmer summers than at present.'

This was followed by a decline in temperature. Lambrick proposed a rise in the water table in the Upper Thames Valley from the late Bronze Age (Lambrick 1992, 217), and the recutting to a shallower depth of waterholes during this period at Perry Oaks suggests a similar occurrence in the Middle Thames. Our pollen, insect and waterlogged plant evidence show the presence of heathland at Perry Oaks from the latter half of the 2nd millennium BC. Such evidence for deteriorating climate and worsening soils could well explain the 'pressure' on land and productivity, which forced people to abandon individual landholdings and pool their resources.

But what of changes in the 'social mode of production'? If we are to avoid rounding up the usual archaeological suspects as causes of settlement pattern changes in the early 1st millennium BC, then we must look at our model of the dynamics between the kin-groups and the individuals. Yes, climate and soils must have had some effect on how people lived, but firstly, these changes were far from catastrophic, and secondly we would argue that the way people dealt with these conditions led to changes both in their own relationships and in the landscape.

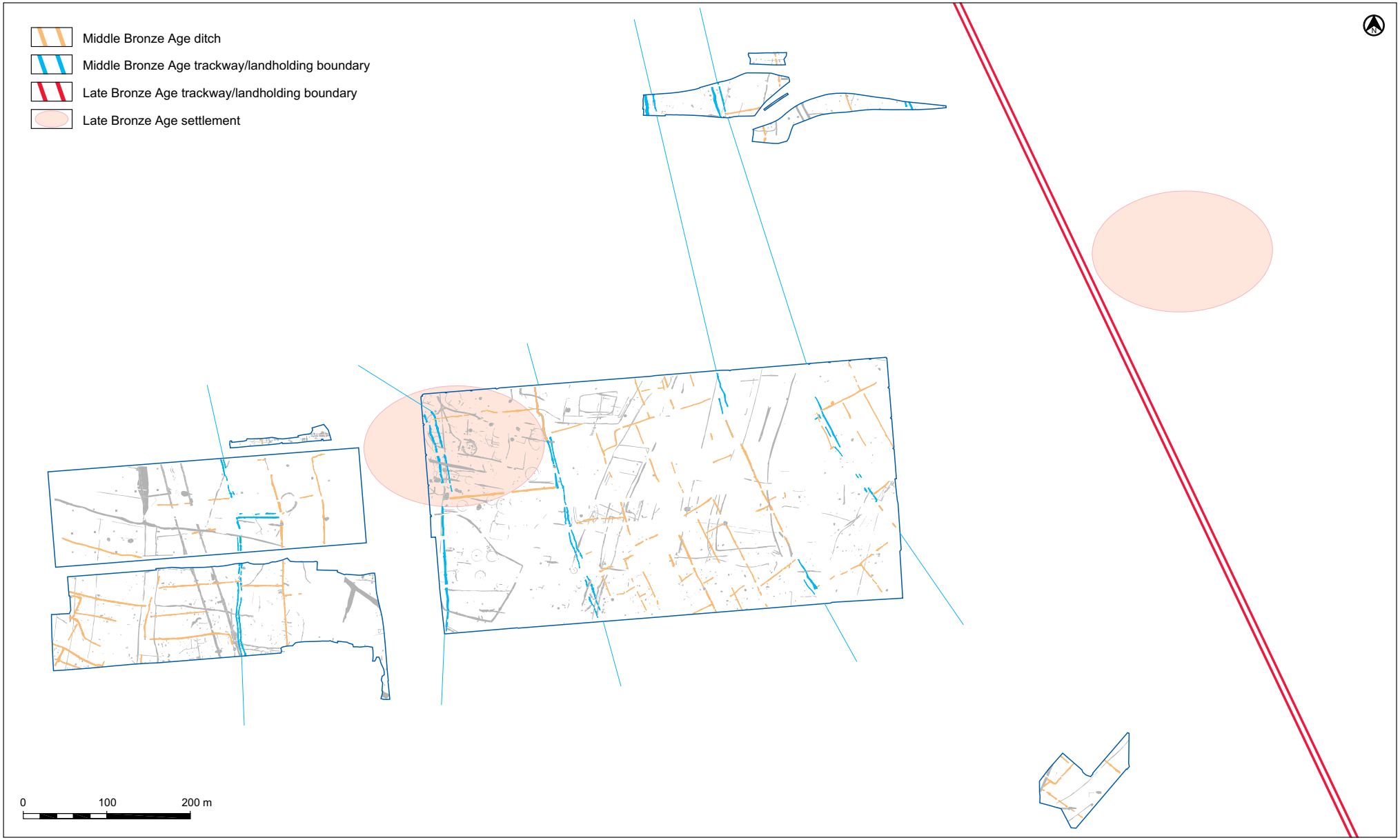


Figure 3.46: Late Bronze Age / early Iron Age Settlement and Landholding

We have shown that the Perry Oaks landscape was very fertile and facilitated the successful development by the individual kin-groups of their landholdings through the 2nd millennium BC. The mixed economy of arable and pastoralism would have allowed greater flexibility in the way landholdings were used, and we can see this in crop and pasture rotation. The key here is to emphasis just how successful this way of life must have been, both economically and socially. However, we do not have the metalwork and burial evidence with which we can explore the kinship and exchange networks which some have taken to underpin 2nd and early 1st millennium BC society. For instance, Rowlands (1980, 46) stated that dominance and hierarchy depend on the relations of circulation and exchange rather than control of production, but that these cannot be separated, since the former depends on the latter. Therefore the success of the kin-groups through the latter half of the 2nd millennium BC in terms of production of crops and animals needed to be translated into increased prestige through gift exchange with other kin-groups outside the area. In order to make these exchanges and form these networks, kin-groups would have been too small, and instead the importance of the community would have again come to the fore. The external imperatives of exchange networks would have increased the need for the kin-groups to develop closer ties within their community.

Turning to the landscape, the successful development of the individual landholdings may paradoxically have required even more co-operation between the kin-groups. The increasing sub-division and 'enclosure' of the landscape led to more elaborate routeways, but must also have required increasing co-operation between the different landholdings. In other words, successful development would have reached a point where it could only continue by landholdings working in co-operation, rather than isolation.

We believe that it is these social factors which, allied with agricultural success, led to the trend towards settlement nucleation in the early 1st millennium BC. However, as has been discussed many times before, such a dependence on complex networks of gift exchange made the community vulnerable to the changes of the 8th century BC, and it is to the early Iron Age that we now turn.

The early Iron Age landscape at Perry Oaks

Little evidence was recovered for early Iron Age activity during the Perry Oaks excavation, but results from the recent excavations at T5 have provided information that will enhance the narrative for landscape use in the Heathrow area during this period. Details of the recent findings will form part of Volume 2. Major elements of the Bronze Age agricultural landscape appear to have persisted well into the Iron Age, and the position of late Bronze Age and early Iron Age waterholes indicates that many field boundaries remained in use, mainly in the form of hedgerows, as the ditches had largely silted up by the early Iron Age. Some degree of expansion of land division eastwards occurred during this period, new waterholes were cut and earlier ones kept open, mostly in the eastern part of the site. Waterholes appeared to have retained their status as places of offering for generations of farmers during the late Bronze Age/early Iron Age whilst hedgerows were maintained and ancient trackways respected.

Precise dating of these developments in landscape use and settlement activity is not clear. Pottery belonging to the Post-Deverel Rimbury tradition was recovered from field ditches across the site, particularly in the central and eastern sector. Late Bronze Age and early Iron Age pottery fabrics are, however, generally indistinguishable in the region and the most undiagnostic body sherds can be dated only broadly to the late Bronze Age/early Iron Age. At the end of the Bronze Age the frequency of sandy fabrics escalated and distinctive decorative motifs emerged, and a few deposits and archaeological events can be assigned with some confidence to the early Iron Age. The recovery of distinctive early Iron Age pottery from waterholes and other features exposed in the recent T5 excavations indicates continuity of activity following the late Bronze Age at a higher level than the Perry Oaks evidence suggested (see Vol. 2).

The small dispersed settlements of the middle Bronze Age were abandoned during the late Bronze Age (see above) and there is no conclusive evidence for the re-emergence of nucleated settlement until the middle Iron Age, when a substantial settlement was established between

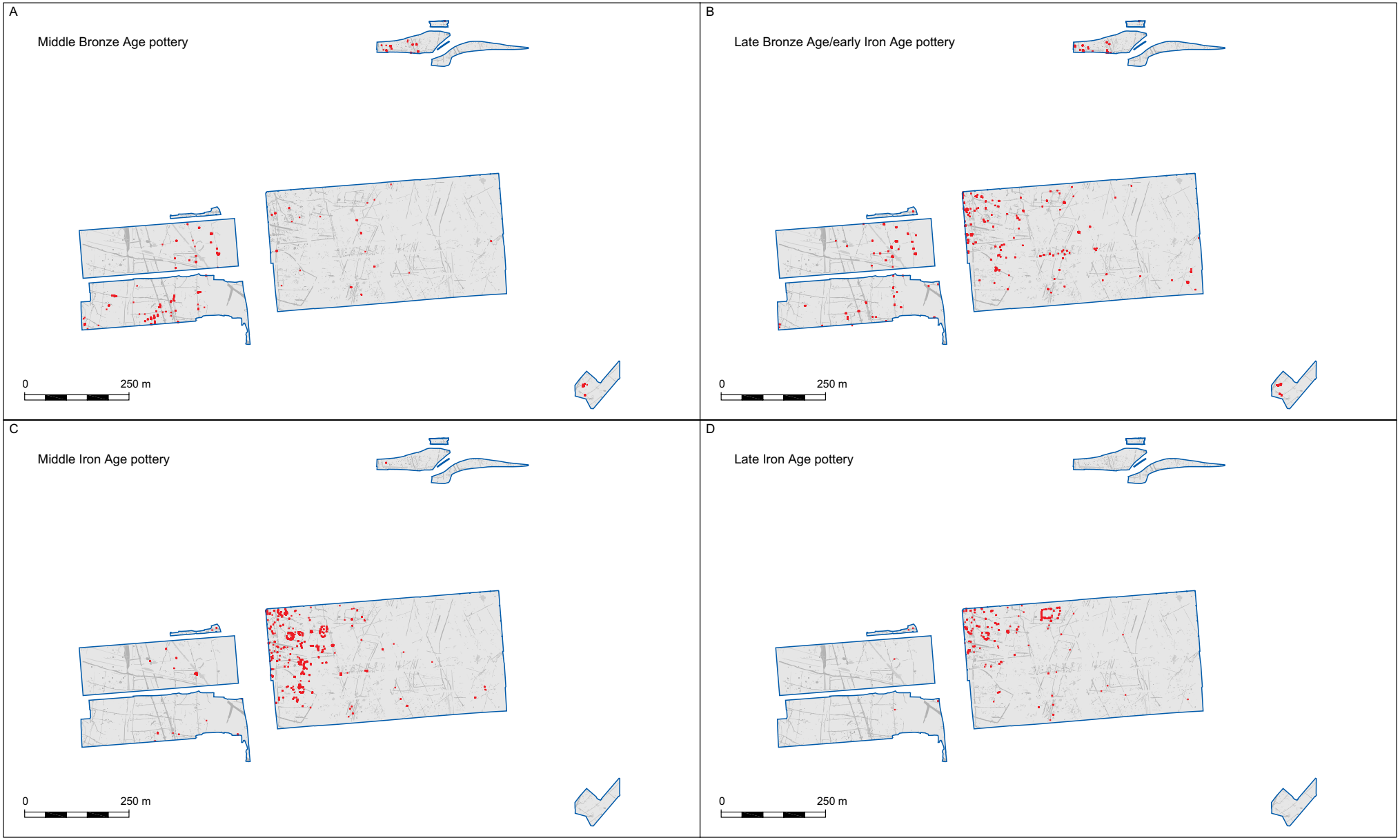


Figure 3.47: Pottery distribution showing the process of settlement nucleation from the middle Bronze Age to the middle and late Iron Age at Perry Oaks

field blocks in what may have been an area of common land (see Chapter 4). The process of settlement nucleation may, however, have begun as early as the late Bronze Age or early Iron Age, based on the concentrations of Post-Deverel Rimbury pottery found in the central part of the site (Fig. 3.47). The maps in Figure 3.47 demonstrate the process of settlement nucleation from the middle Bronze Age to the middle and late Iron Age, but also indicate that the use of the field system changed over time. Manuring of fields and the construction of middens seem to have been elements of the agricultural regime during the later part of the Bronze Age and the early Iron Age, and this may explain how pottery came to be scattered across the fields at this time.

The sparse and disparate strands of evidence for late Bronze Age/early Iron Age settlement suggest a slight concentration of features set amongst the pre-existing field systems, including waterholes and a small number of structural features. Evidence for early Iron Age occupation activity was also exposed during excavations in advance of the Northern Runway extensions in 1969 (Canham 1978). Nonetheless, the relatively limited evidence from the Perry Oaks excavations, along with past and recent fieldwork at Heathrow, is insufficient to allow us to fully characterise the scale and nature of early Iron Age activity or to determine the role of the settlement within a larger economic and social scheme of the Thames Valley at this point in the history of the landscape. Nor is it possible to clearly depict the early Iron Age settlement as an architectural expression of any wider unit of economic or political control in the region. Nonetheless, as agricultural activity continued, habitation persisted in some form at Perry Oaks until, at some point in the period preceding about 400 BC, the central part of the site was transformed by the establishment of a substantial nucleated settlement.