BURNT MOUNDS AND THE BRONZE AGE EXPLOITATION OF THE SUFFOLK CLAYLANDS

Excavations at Fornham All Saints (Marham Park) Laxfield and Hepworth

by Abby Antrobus and Richard Mortimer



Cotswold Archaeology

Cotswold Archaeology Monograph 24

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by Abby Antrobus and Richard Mortimer
with Michael Green, Chris Fern and Rebecca Smart

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Front cover: The Beaker period burnt mound site at Marham Park during excavation, facing north-east (photograph by Flypod Aerial Imagery Ltd)

Back cover: Early stages of excavation of the Beaker period burnt mound at Marham Park (top); Flint scrapers from Marham Park (middle); Beaker period well at Marham Park (bottom)

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Abbreviations

BH01	Borehole 1
BH02	Borehole 2
BM 1	Burnt mound complex 1
BM 2	Burnt mound complex 2
EBA	Early Bronze Age
FAS	Fornham All Saints (three letter code used by Suffolk HER)
HEP	Hepworth (three letter code used by Suffolk HER)
HER	Historic Environment Record
LBA	Late Bronze Age
LBA–EIA	Late Bronze Age to Early Iron Age
LPAZ	Local pollen assemblage zones
LXD	Laxfield (three letter code used by Suffolk HER)
MBA	Middle Bronze Age
MIA	Middle Iron Age
PG	Pit Group
PHG	Posthole Group
Ra	Registered artefact
S1	Structure 1 (Beaker period)
S2	Structure 2 (Beaker period)
SNT	Stanton (three letter code used by Suffolk HER)

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During the work at Marham Park, over 1000 visitors attended four open days that were held in April, July and September 2016 and November 2017, and a volunteer excavation project ran for four weeks in May and June 2016, with volunteers also undertaking aspects of post-excavation work. Public outreach was led by Alex Fisher, who also gave public talks to schools and amateur groups. Throughout the excavations at Marham Park aerial photographic services were provided by Commission Air, and drone photographs were provided by Flypod Aerial Imagery Ltd.

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Summary

This volume focuses on remains of the Beaker period to Late Bronze Age/Early Iron Age (*c.* 2400–350 BC) from three multi-period developer-funded excavations on the clay uplands of Suffolk, within which four 'burnt mounds' were investigated. The sites were excavated by Cotswold Archaeology (CA) and Suffolk Archaeology Community Interest Company (CIC) (now Cotswold Archaeology). At Marham Park (Fornham All Saints), overlooking the valley of the River Lark, features included a Beaker period burnt mound complex, a Beaker roundhouse, Beaker pits, an Early Bronze Age burnt mound complex, Middle Bronze Age field systems/enclosures and probable Late Bronze Age/Early Iron Age land division boundaries. At Laxfield, above a tributary of the River Blyth, a burnt mound site of earlier Bronze Age date was located in the vicinity of subsequent Middle Bronze Age enclosures. At Hepworth, a fragmentary Beaker period/Early Bronze Age burnt mound site was recorded on higher land above tributaries of the River Dove.

Burnt mounds are one of the more common types of prehistoric site known from across the British Isles, with the majority dating to the Beaker Period and Early Bronze Age. They are understood to be sites where 'hot stone' technology was employed, predominantly for the heating of water. Waste burnt flints or stones are often associated with wells, pits and trough-like features. Their purpose, however, has long been debated, with suggested uses that range from the cooking of meat to the generation of steam, perhaps for bathing. From some Irish sites the parts of animals represented in bone assemblages have hinted at activities relating to the tanning of animal skins, and this volume presents the considerable evidence from Marham Park that animal products, particularly skins/hides, were processed at the burnt mound sites there. Over six thousand pieces of worked flint were recovered, including knapping waste, tools, partial tools, utilised flakes and blades. In all there were over three hundred tools, including some piercers and burins but mainly scrapers, of which a sample showed microwear traces consistent with their use in the scraping of dry hides. Lipid analysis was carried out on burnt and worked flints and on deposits from some of the features associated with the burnt mound sites, and this indicated the presence of fats from ruminants (cattle/sheep/goat) and the occasional pig. In a contribution to burnt mound studies, and drawing on research into prehistoric leather, it is suggested that these may have been sites where animals were processed and hides were preserved, probably using fats and smoke. A hypothetical model is presented which links the pits, wells and troughs of the burnt mound sites to the processes of brain (or fat) and smoke tanning, suggesting that hot or warm water could have been used for cleaning skins and/or for the preparation and application of preserving agents.

These four burnt mounds represent an increase in the number of the site type on the clay uplands of East Anglia, compared to the wider known corpus from lower lying topographic settings such as the fen edges. They, and environmental evidence from them, particularly the good pollen sequence from the well at Laxfield, contribute to an emerging perception of the character and chronology of earlier Bronze Age incursion into the woodlands of not only the edges of the major river valleys, such as at Marham Park, but also the higher plateaus of Suffolk, as highlighted by the recent publication by others of a burnt mound site excavated at Yaxley in the county, which was identified in a similar topographic context. Perched water tables in the upland clay made it ideal for summer/autumn pastureland. The burnt mound sites here are presented as specialised locales in the pastoral use of at least parts of their wider landscape, potentially as ubiquitous as burnt mounds in lower lying contexts. It is suggested that they were related to seasonal grazing patterns, the locations of herds at the end of summer pasture, the culling of animals and a full exploitation of the resources offered by carcasses immediately upon slaughter.

Related to the *longue durée* of landscape use, this volume also highlights the evidence for Middle Bronze Age field systems and enclosures and, at Marham Park, the possible long boundaries of a later Bronze Age/Early Iron Age sheep walk or ranch landscape, such as those previously seen in Wessex.

Chapter 1
Introduction

Abby Antrobus and Richard Mortimer

Overview

In recognition of their combined potential to contribute to two linked research themes this volume presents the detail of Beaker period to Late Bronze Age/Early Iron Age archaeological remains from *c*. 2400–350 BC from three developer-funded multi-period sites in Suffolk (Fig. 1.1), excavated by Suffolk Archaeology Community Interest Company (CIC) and Cotswold Archaeology (CA). The first theme is the function of prehistoric burnt mounds while the second is the prehistory of the Suffolk clay plateau. The background to both of these is set out in this chapter, along with a review of the gaps in knowledge towards which evidence from the sites can contribute.

Introduction to the sites

Chapter 2 of this volume is dedicated to excavations at Marham Park, in the parish of Fornham All Saints on the north-western edge of Bury St Edmunds in West Suffolk. The site was located on the edge of the valley of the River Lark, encompassing a slope of land which ran up to a clay plateau at approximately 800m from the river (Fig. 2.2). Two areas were excavated under the site codes FAS 055 and FAS 056, which were allocated by the Suffolk Historic Environment Record or HER (Green and Mortimer 2023). Features included a Beaker period burnt mound complex (2400–1950 BC), a Beaker structure, Beaker pits, an Early Bronze Age burnt mound complex (1950–1600 BC), Middle Bronze Age field systems (1600–1150 BC) and a probable Late Bronze Age/Early Iron Age land division boundary (1100–350 BC). Evidence for earlier activity consisted of a spread of Early Neolithic pits (4000–3000 BC), while later periods were represented by Middle Iron Age pit sites (350–50 BC), Roman enclosures (AD 50–410) and remains from a Second World War firing range. The two burnt mound sites were both located within natural hollows on higher ground on the edge of the clay upland, at 50m AOD above the valley. Figure 1.2 shows the work in progress on one of these remnant burnt mounds.

At Laxfield in Mid Suffolk, the subject of Chapter 3, a burnt mound site of probable earlier Bronze Age date was excavated, along with Middle Bronze Age field systems that were located in the vicinity. A good pollen sequence was recovered from the deep well that was associated with the burnt mound, and this offers insights into the changing prehistoric environment (HER LXD 135, Fern 2024). Three roundhouses lay within the enclosures, one of which was of confirmed Middle Iron Age date, and medieval ditches were also recorded. The site was located at 55m AOD on the edge of the clay upland above a tributary of the River Blyth.

At Hepworth in West Suffolk, presented in Chapter 4, there was a fragmentary Beaker period burnt mound site (HER SNT 090 and HEP 011, Smart and Mortimer 2022). Across the site, probable charcoal-burning pits were also investigated, with at least one dated to the Roman period. The burnt mound site was situated on the edge of the clay upland, on a plateau at 55m AOD above a north–south aligned watercourse that was part of the hydrological system of land that overall fell gradually towards the Little Ouse River, approximately 6.6km to the north of the site (Fig. 1.1).

Set into the *longue durée* of wider Bronze Age activity, this monograph particularly focuses on the four Beaker period and Early Bronze Age burnt mounds. Detailed specialist reports on finds and environmental remains from these periods are therefore included in the site-specific chapters. Within each chapter, summaries and highlights of all periods are given as pointers to detail in the archive reports and in the archives. The digital, documentary and physical archives will be curated by the Archaeology Data Service and Suffolk County Council Archaeological Service. Cotswold Archaeology reports are available online (https://reports.cotswoldarchaeology.co.uk/) and also through the Archaeology Data Service (https://archaeologydataservice.ac.uk/).

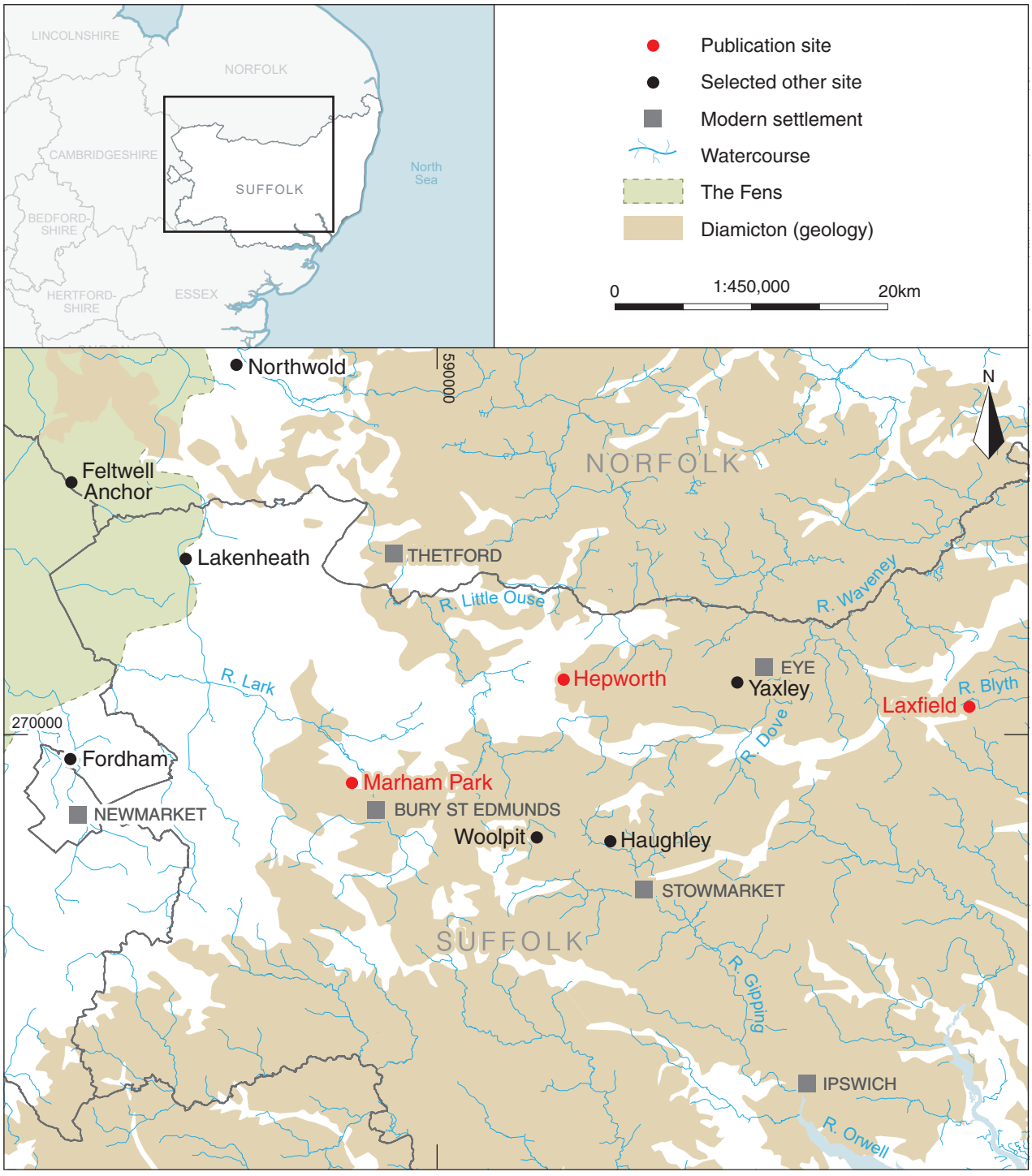


Figure 1.1 Site location plan

Burnt mounds

Burnt mounds are one of the most common prehistoric archaeological features across the British Isles and parts of Europe, and in Britain and Ireland they represent one of the most frequently recorded prehistoric monument types (Ó Néill 2009). They are particularly common in Ireland, where over seven thousand are known (Hawkes 2018), and also in Scotland and Wales (Bradley 2019, 249). Geographically closer to the four sites included in this volume, a number of burnt mound sites along the eastern fen edge have been published (Bates and Wiltshire 2000; Crowson 2004; Silvester 1991) and therefore form part of a wider corpus of sites with similar attributes. These are, chiefly, the presence of large quantities of heat-altered flint or stone and charcoal in locations adjacent to water sources, usually a well, and often associated with troughs designed to hold liquid. There has been much published research and discussion on their possible function or functions, without a particular consensus, and, as will be seen in

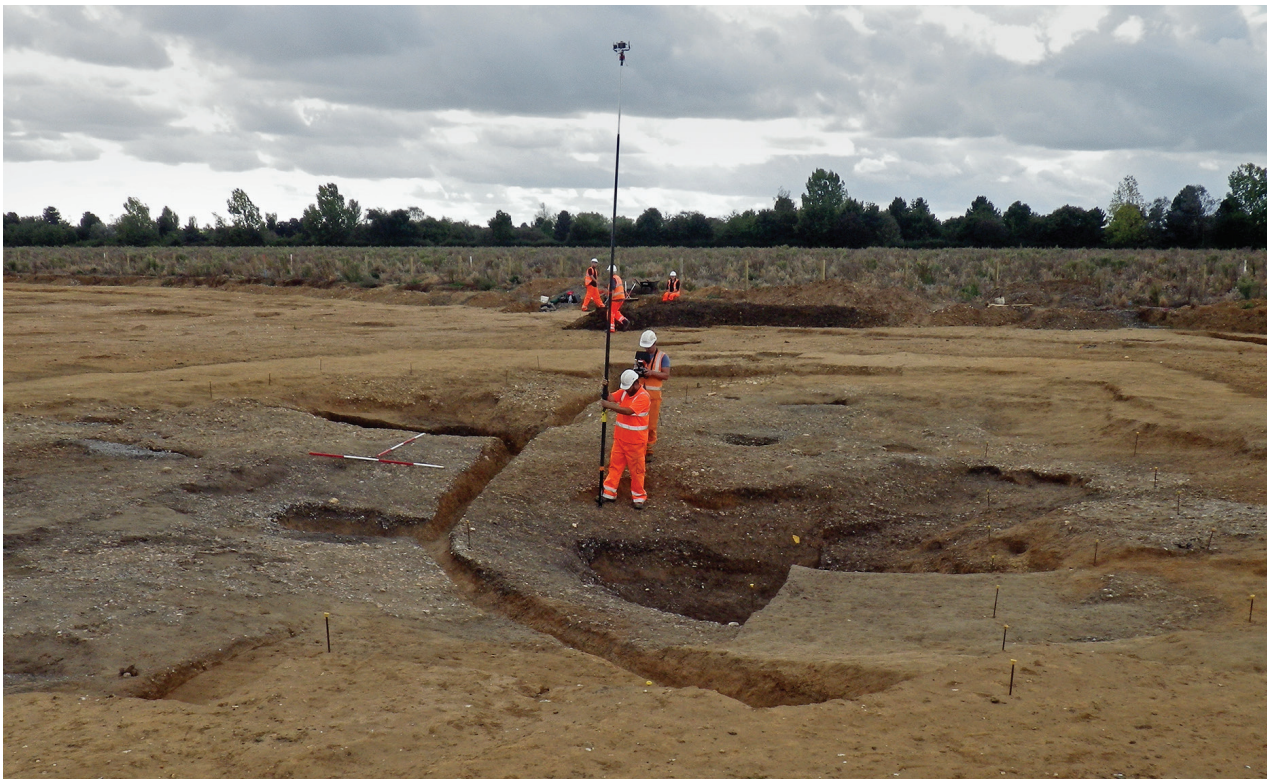


Figure 1.2 Marham Park, Fornham All Saints: setting up a pole for timelapse photography

Chapters 2 and 5, the remains from Marham Park offer a significant contribution to this debate. By way of background the characteristics of burnt mound sites are briefly reviewed below.

Characteristics of burnt mound sites

Chronology

While there are some burnt mound sites of putative Neolithic date, radiocarbon dating has shown that they tend to span the period from *c.* 2500 BC to *c.* 500 BC, with most being of Beaker and Early to Middle Bronze Age date. In Ireland there was a major phase of construction between 2500 and 1900 BC, with the majority of the remaining dates falling into the second millennium BC (Bradley 2019, 249; Johnston 2021, 145; Ó Néill 2009, 40).

The term burnt mound

The best surviving burnt mounds, usually in low-lying topographic locations and/or landscapes that have been spared the plough, comprise heaps of heat-altered material such as flint, stone and charcoal which may be 10 to 35m across and 0.5 to 3m high – hence the term burnt mounds (Bliss 2015, 1; Brown *et al.* 2016). Elsewhere, where sites have been subject to millennia of farming and ploughing, the mounds themselves do not survive, but other features characteristic of burnt mounds are usually found in association with spreads of burnt material, which is also often incorporated into the fills of contemporary features. This was the case at Marham Park, Laxfield and Hepworth.

Hot water

It is generally accepted that burnt mounds comprise the accumulated fire-cracked stone and other burnt material that was a waste product of prehistoric hot stone, pyrolithic or thermolithic technology, in which stones were used to boil large quantities of water. The stones in burnt mounds show evidence of significant heating and often thermal shock. Flints, for example, are often calcined as a result of the direct heat of a fire, and also crazed or shattered, characteristically caused by subsequent quenching. These features are consistent with the use of hot stones to transfer heat from a fire to water in order to raise the temperature, potentially to boiling point (Chapter 2, Green; see also Seager Thomas 2010). The location of burnt mounds is, therefore, intrinsically linked to the presence of water, and they are often located on marginal land near rivers or other natural water sources, such as adjacent to bogs, fens, marshy ground or springs – where a site is located away from these, excavations have shown that pit-wells were usually present, for example to access groundwater percolating through glacial tills (Ripper and Beamish 2011, 196; Ó Néill 2009, 55).

Burnt mounds are frequently associated with pits and rectangular trough-like features which may be enclosed by the 'arms' of the often crescent-shaped mounds. In waterlogged conditions wooden linings to these features often survive, such as the preserved timber trough of Early Bronze Age date excavated at Feltwell Anchor on the eastern fen edge in Norfolk (Bates and Wiltshire 2000, see Fig 1.1), the alder planks that lined a pit at Northwold, Norfolk, at

a complex of 2265–2065 BC date (Crowson 2004), or the withy-lined pit excavated at Swale's Fen, Mildenhall, Suffolk (Martin 1998). Evidence from Irish sites also shows the use of roundwood, planks, wattle and hollowed-out tree trunks alongside stone and clay (Hawkes 2018, 64–80), such as the lining of wicker and moss that was observed in a trough dating to the early second millennium BC at Errarooey More, Co. Donegal (Hawkes and Malainey 2018). The troughs were probably used to hold the water that was heated by the stones, with waste burnt flint being discarded close to them, perhaps after multiple uses. At a burnt mound site in Birstall in Leicestershire, in the wetlands of the Soar valley, a layer of whole stones and others that had shattered *in situ* was recorded within a plank-lined trough, above layers of sand and charcoal; this was interpreted as evidence of the final episode of heating within it (Ripper, Beamish *et al.* 2011, 177). Chips of flint were also recorded at the base of the wood-lined trough of probable Early Bronze Age date at Swale's Fen (Martin 1998, 359). Hearths have been excavated at some sites (Hodder 2018) and at a very few there have been structural remains (Ó Néill 2009), including, for example, stakeholes or postholes relating to timber, stake-built or tented structures (Hawkes 2018, 102–8), stone structures such as the small cells observed on Shetland (Moore and Wilson 1999) or timber structures such as a platform at Ballybar Lowe, Co. Carlow, Ireland (Tourunen 2008, 39).

Landscape

In some locations, such as along the Cambridgeshire and Norfolk Fen edge, the remains of burnt mounds are clustered in proximity to each other, and scientific dating and analysis has shown that some were built up over long periods of episodic activity, ranging from decades to hundreds of years. Soil micromorphological assessment of *in situ* deposits has highlighted that mounds can comprise complex sequences that accumulated due to repetitive activities, with material such as fuel residues, wood, grasses, discrete deposits of bone, unburnt plant tissues and rubified sediments also incorporated (Gardner 2019). This suggests that such deposits were related to enduring practices or traditions within long-standing communities (Crowson and Bayliss 1999; Gardner 2019, 73–4; Chittock *et al.* 2021). Generally they were isolated from settlement sites and other features and the remains are not significantly associated with artefactual assemblages indicative of domestic activity. However, burnt mounds do appear to have been common in the landscape and, as is discussed in Chapter 5, where there have been systematic landscape scale surveys, they are often shown to occur at regular intervals. At Bradley Fen near Peterborough (Knight and Brudenell 2020), four burnt mound complexes were recovered at *c.* 60m intervals along the 'Beaker Fen Edge', and the 'pot-boiler' pattern recorded along the edge of the Wissey Embayment in Norfolk (Silvester 1991) identified 23 discrete burnt flint scatters over a distance of *c.* 1300m – roughly one every 55m. In the Midlands in some areas that have seen more intensive investigation, excavations have recorded examples of two or three burnt mound sites at distances of between 80 and 150m from each other (Ripper and Beamish 2011, 197) and burnt mounds were noted to have been the most numerous type of prehistoric site in Birmingham and the Black Country (Hodder 2017). Other distributions have been observed in parts of Ireland, Shetland and Wales (e.g. Ó Drisceoil 1998; Moore and Wilson 1999; Grogan 2005; Kenney 2008; Doughton 2013). It has been suggested that activity at them correlated with agricultural or pastoral cycles, bringing people to a particular area on a seasonal basis for craft and industrial activities (Chittock *et al.* 2021, 254).

The debate: what were burnt mounds for?

Despite the ubiquitousness of burnt mound sites there is not a consensus view as to their function and the underlying rationale for the heating of water. It has been unusual to see a definitive or non-caveated suggestion as to their use(s), perhaps because it is rare to find evidence of their products. The mystery of their function(s) inspired conferences in 1988 and 1990 (summarised in Crowson 2004, 35; see also Bliss 2015, Chapter 2 for a literature review). A general view is that they were multifunctional sites, meeting a mix of community needs (Bradley 2019, 249; and noted in Hawkes 2015, 52–3). Further, it is acknowledged that, across their chronological and spatial distributions, there may have been sites for different purposes under the umbrella of the term burnt mound, with a range of possible functions that may have predominated at different times and places (Armit and Braby 2002, 254). Working from the basis that the evidence at a burnt mound site 'represents the physical remains of a technological process, with its attendant apparatus, products and by-products' (Ó Néill 2009, 9), numerous possible interpretations for activities which might have used fire and water have been suggested.

Some of these have been tested through experimental reconstruction or compared to parallels observed in traditional craft practices, and they include: copper production, albeit with little evidence (Thelin 2007); extraction of bone grease (Monk 2007); steam bending of wood (Ó Néill 2009, 76); brewing (Quinn and Moore 2008); softening of material for baskets (noted in Ripper and Beamish 2011, 196); the retting of flax for linen (noted in Chittock *et al.* 2021, 254–5); felting (noted in Ripper and Beamish 2011, 200); the washing of cloth, perhaps with tallow, ash and lye used as cleaning agents (summarised by Ó Néill 2009, 76; Ripper and Beamish 2011, 196–200); fulling; textile manufacture and dyeing (Bliss 2015, 11–12; Reilly *et al.* 2012); hide and leather working (Brown *et al.* 2016; Waddell 2000, 177); the boiling and salting of joints of meat to preserve them (Roycroft 2006); cooking or feasting (O'Kelly 1954; Ó Drisceoil 1988; Hawkes 2018), and steam bathing (Barfield and Hodder 1987). Cosmological or more ritualised practices have also been

considered (see Ó Néill 2009). There has, in discourse, been a particular polarisation between the 'cooking or bathing' debate, with argument and counter argument (Hawkes 2015 and 2018; Barfield and Hodder 1987; Ó Drisceoil 1988).

Steam

The theory that the generation of steam was the primary purpose of burnt mounds challenged a longer standing suggestion that they represented cooking and feasting sites, particularly in the light of a general lack of faunal remains or other evidence for the preparation, cooking and consumption of food in excavated examples; it was intended to open up consideration of other possible purposes (Hodder 1998). The 'bathing' hypothesis was particularly inspired by cultural practices elsewhere, for example indigenous American sweat lodges (Barfield and Hodder 1987). This model fitted well with sites where structures were recorded that could have enclosed the hearths and troughs. However, in Ó Néill's pan-European survey of over a thousand excavated sites, timber or stone structures were recorded in only five per cent of cases (2009, 48), highlighting that they may have been rarer, although structures may have been more tent-like and ephemeral.

Cooking… or other animal products?

Irish burnt mounds have long been thought about as sites related to animal butchery, cooking and feasting, perhaps for boiling, steaming, roasting and baking, with Alan Hawkes in particular proposing a model of open-air feasting/foodsharing possibly hosted by small family groups at these socially separate spaces (Hawkes 2015, 2018). The framing of burnt mounds as cooking places also draws on experimental work, particularly that carried out by O'Kelly (1954), which demonstrated the efficacy of using hot stones in troughs to cook meat, and the creation, through doing this, of an archaeological signature similar to that at burnt mounds. There is analogy with the *fulacht fiadh* or *fian* described in tradition and folklore, meaning 'recess or cavity (cooking place) of the deer or wild', with *fian* meaning 'band of hunters or warriors (Ó Drisceoil 1988, 673). Medieval and early modern literary accounts describe the roasting of meat at hunt sites, and also the boiling of joints in pits using hot stones to heat the water, and the manuscript of the *Romance of Mis and Dubh Ruis* dating to 1764 describes an episode of curative washing and bathing in a pit after cooking had occurred, using deer fat and a piece of skin (Ó Drisceoil 1988, 673–4). It has been noted that these accounts are anachronistic to Bronze Age sites, although they may capture folk traditions for which there are parallels, such as an 18th-century reference to the Hebridean practice of boiling beef in a hide or a dug-out trough heated with hot stones (Hawkes 2015, 51–2; Ó Drisceoil 1988, 675).

The acceptance of burnt mounds as sites for feasting and cooking is, however, hampered by the general paucity of faunal and plant remains that might be anticipated as evidence of such activity (e.g. Bates and Wiltshire 2000, 391). It has been noted that the survival of prehistoric animal bone may have been generally low if, for example, waste was simply discarded to the margins of sites where it would probably have been gradually broken down (Tourunen 2008, 37–42) and more recently the bulk sampling and sieving of deposits on sites excavated during work on road schemes in Ireland has increased the recovery of animal bone, including a number of recognisable butchered elements and meat-bearing bones from a small number of sites (Hawkes 2018, 157–8). A synthesis of over a thousand sites (Hawkes 2015, 2018) shows a range of faunal remains, often burnt, with a notably higher percentage of domesticates compared to wild animals, and a pilot study of lipid analysis on burnt stone from Errarooey More, Co. Donegal has identified fats from large herbivores such as deer or cow, with some plant sterols (Hawkes and Malainey 2018; Hawkes 2018, 162). Geographically closer to the sites presented in this volume, a small assemblage of animal bone was recovered from within the trough excavated at Swale's Fen, Mildenhall, Suffolk (Martin 1988). On the face of it the growing evidence suggests work with animal products, even if sites were not related to the hunting of wild animals and associated feasting (Hawkes 2015, 52; Bradley 2019, 249–50). Niall Roycroft, for example, in linking the high numbers of burnt mounds to the significance of cattle in the Irish Bronze Age economy and practical aspects of herd management, has argued that meat could perhaps have been boiled, salted and then smoked or dried at such sites, for consumption later and elsewhere, which would have left a smaller assemblage of faunal remains (Roycroft 2006).

However, there are other products resulting from the slaughter of animals that would also have required processing but which also might not have left a significant assemblage of faunal remains if the animals were ultimately consumed elsewhere. These include fats, organs and, particularly, the valuable raw material of animal skins. The interpretation of the artefactual and scientific evidence from Marham Park, as set out in Chapter 2, justifies an approach which places these animal products centre stage, and the discussion in Chapter 5 draws on other cases where similar ideas have been explored (e.g. Bliss 2015; Ripper, Beamish *et al.* 2011; Tourunen 2008).

Overall, the thinking articulated in this volume represents a coalescence of ideas generated through analysis of the three sites presented (Fern 2024; Green and Mortimer 2023; Smart and Mortimer 2022) and another burnt mound site at Fordham in Cambridgeshire, where excavations led by one of the authors yielded a flint tool assemblage that was smaller to that at Marham Park, along with an assemblage of faunal remains that included a notable collection of cattle heads from the upper fills of the well (Mortimer 2005 and Mortimer *et al.* in prep).

Burnt mound sites and the Suffolk claylands

Significantly, the four burnt mound sites of Beaker and probable Early Bronze Age date form a small group of such sites that have been relatively newly investigated on the clayland areas of Suffolk (Fig. 1.1), alongside two further examples. These are a recently published example of Early to Middle Bronze Age date at Yaxley near the town of Eye, located at 45m AOD on the edge of the clay upland above a tributary of the River Dove (Brudenell and Kwiatkowska 2022) and an example at Haughley which was located at 55m AOD on the upper slope of a valley leading down to a tributary stream of the River Gipping and which, similarly to that at Laxfield, was infilled by or in the Middle Bronze Age (Woolhouse and Pullen 2020).

One of the rationales for publishing them together is that they stand out from the published corpus of burnt mound sites in the East Anglian region, where examples have been mostly located on the fen edge (e.g. Bates and Wiltshire 2000; Crowson 2004; Martin 1988; Mortimer 2005 and Mortimer *et al.* in prep). The fenland survey work in Norfolk observed burnt flint sites near to water sources such as springs, fens and streams, generally distributed on gravel and sandy ridges that overlooked and protruded into wetlands (Crowson 2004, 3, 36–7). Similarly, burnt mound sites in the Midlands, many of which were found through development-led projects, were, in earlier decades at least, observed to cluster around rivers and their tributaries (Ripper and Beamish 2011, 197). These clayland examples, however, which exploit the alternative accessible sources of water in the perched water table, suggest that this lowland distribution of burnt mound sites could be more a factor of the chances of discovery, and therefore that activities which were undertaken at them could have been spread across more diverse landscapes.

Such a perception contributes to an evolving appreciation of the character and earliest dates for the exploitation and deforestation of parts of the ancient woodland cover of the upland clay plateaus of Suffolk, situating it in the Bronze Age, as argued by Brudenell and Kwiatkowska (2022) in their publication of the burnt mound site at Yaxley. This theme is explored further in Chapter 5. Appreciation of the use of the landscape is informed by the potential it offered for good grazing land, particularly evident in later periods. The chapter also highlights the contribution that the sites can make to understanding the development of landscapes later into the Bronze Age in Suffolk, where, unlike other parts of the eastern region such as Cambridgeshire, the patterns of development have not, until recently, offered opportunities for excavations that have allowed systems of Bronze Age land division to be significantly disclosed. Examples of Middle Bronze Age enclosures were recorded at Laxfield and Marham Park and these are increasingly being recognised across the county (Green and Mortimer 2023, 126–8; Woolhouse 2024). At Marham Park there were also two long, probably Late Bronze Age or Early Iron Age, ditched and banked boundaries that negated and replaced the Middle Bronze Age field systems; these may be the first evidence from the county of sheep walk or ranch-style landscape features such as are more commonly recorded in Wessex and the south, as detailed in *Prehistoric Land Divisions on Salisbury Plain* (Bradley *et al.* 1994) and more recently in Barry Cunliffe's article 'Wessex cowboys?' (2004).

Chapter 2
Marham Park, Fornham All Saints

Abby Antrobus, Richard Mortimer and Michael Green

Introduction

Overview

This chapter provides an overall summary of the site sequence from the excavations at Marham Park, followed by details of the Bronze Age archaeological remains. Selected summary finds reports are then presented, where they relate to the burnt mound sites. These include heat-altered stone (Michael Green), worked flint (Sarah Bates), lithic microwear analysis (Randolph E. Donahue) and pottery (Anna Doherty and Alistair J. Barclay). The environmental evidence relating to the burnt mound sites follows, including animal bone (Julie Curl), plant macrofossils (Anna West), pollen and diatoms (Michael J. Allen, Catherine Langdon and Nigel Cameron) and, finally, geoarchaeological work and lipid analysis (Michael J. Allen, Julie Dunne, Richard P. Evershed and Charles French). Full details of evidence from the site can be found in the archive report (Green and Mortimer 2023) and in the site archive, which includes full catalogues of the material.

Project background

Archaeological excavation took place between March 2016 and October 2017 in advance of the residential development of Marham Park within the parish of Fornham All Saints on the north-western edge of Bury St Edmunds (NGR 583806 266405, Fig. 2.1). The work was undertaken to fulfil conditions on planning consent DC/13/0932/HYB, granted by St Edmundsbury Borough Council. It was carried out by Suffolk Archaeology CIC, now Cotswold Archaeology, funded by Countryside (now part of the Vistry Group) and facilitated and overseen by John Trehy of Terence O'Rourke. The project was specified and monitored by Suffolk County Council Archaeological Service.

The excavations covered 16.9ha of the 68ha development site and were focused on discoveries made during a suite of evaluation works. These included desk-based assessment (Trehy 2012), geophysical survey (Smalley 2012), fieldwalking and metal detecting survey (Stump 2012) and trial-trenched evaluation (Beverton 2013a and 2013b). The works fell into two main site areas, which were allocated separate site codes by the Suffolk Historic Environment Record (HER). Site area FAS 055 was located on low ground towards the river, and FAS 056 covered the southern part of the development land, on the higher ground at the top of the river valley (Fig. 2.2). Further details of the excavation methodologies and approaches to features are presented in the site archive report (Green and Mortimer 2023). Metal detecting was undertaken throughout the excavation, with scanning of topsoil, subsoil, exposed features and excavated material.

An outreach programme was conducted throughout the fieldwork and immediate post-fieldwork stages of the project; it included two site and two off-site open days which attracted over one thousand visitors, a number of talks to schools and local interest groups, blogs a display in Bury St Edmunds Library, and a home-owners welcome pack. A community excavation ran for four weeks in May and June 2016, in which volunteers fully excavated the previously half-excavated Iron Age storage pits in FAS 055.

Location, topography and geology

The site was located on former arable fields on a north-facing slope which overlooks the Lark Valley. The northern site boundary (the A1101, Fig.2.1) lay at a height of 30.2m above Ordnance datum (AOD) (Fig. 2.2). The ground level rose gently to approximately 52.0m AOD towards the central-southern portion of the development area, then declined southwards in a very gentle slope to a height of 50.7m AOD (Fig. 2.2).

The underlying bedrock geology of the excavations was Lewes Nodular Chalk Formation, overlain by silts, alluvial and gravel deposits towards the valley to the north, and by Lowestoft Formation diamicton, a heavy chalky boulder clay deposit, on the hilltop at the south (Fig. 2.2). A prominent band of chalk ran east–west across the slope in

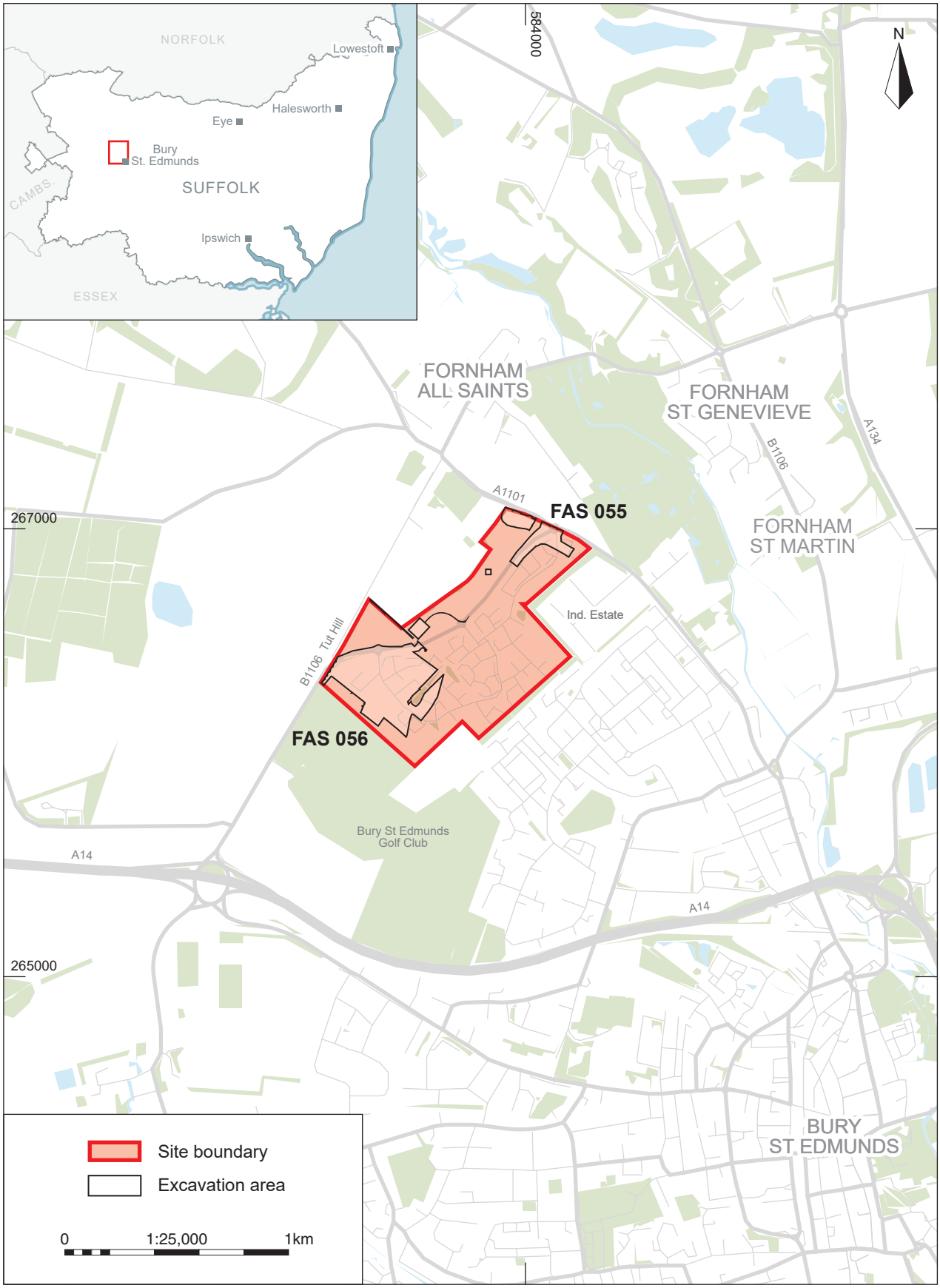


Figure 2.1 Marham Park, Fornham All Saints: location of sites FAS 055 and 056

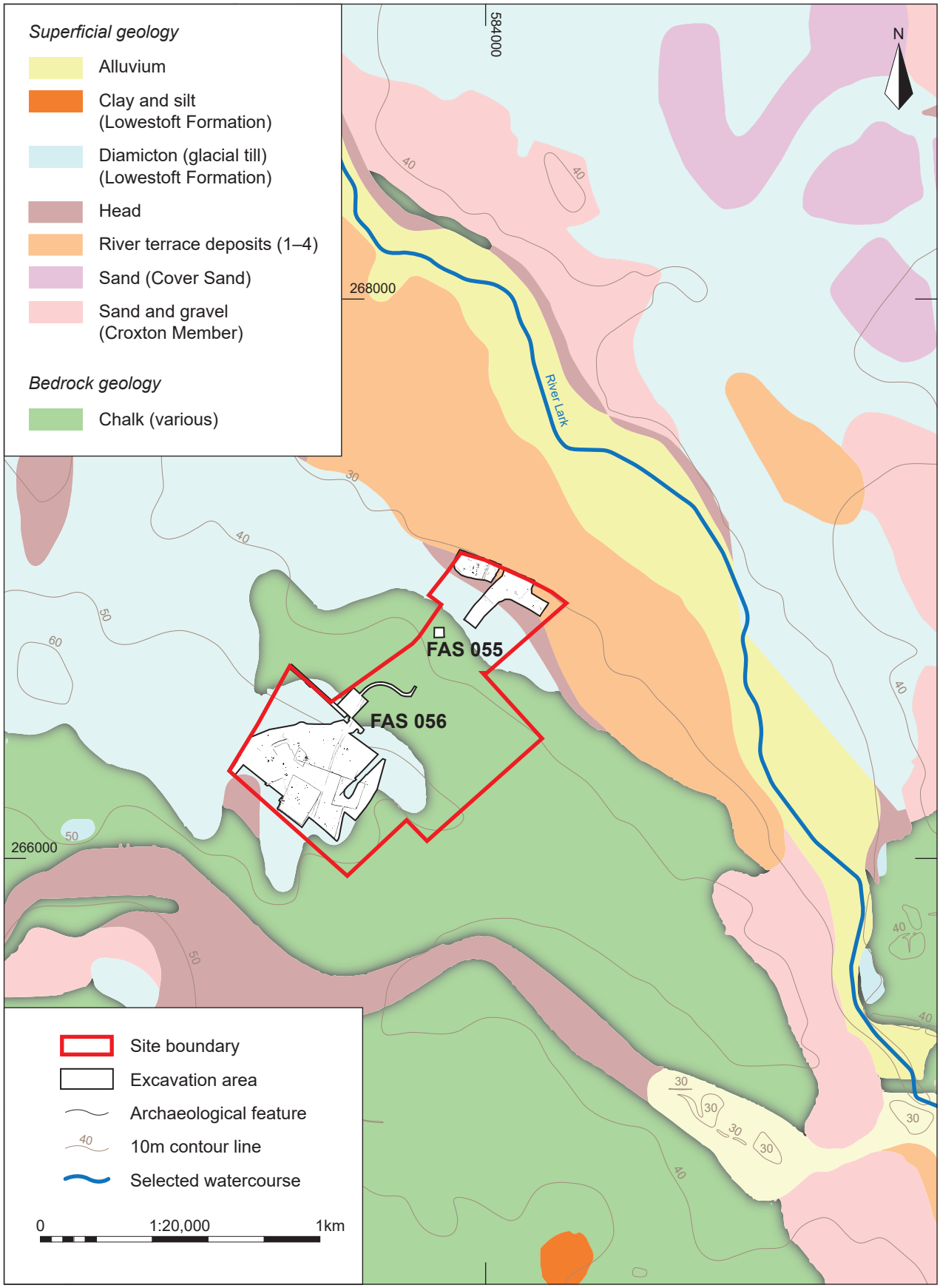


Figure 2.2 Marham Park, Fornham All Saints (FAS 055 and 056): geology, river and topography

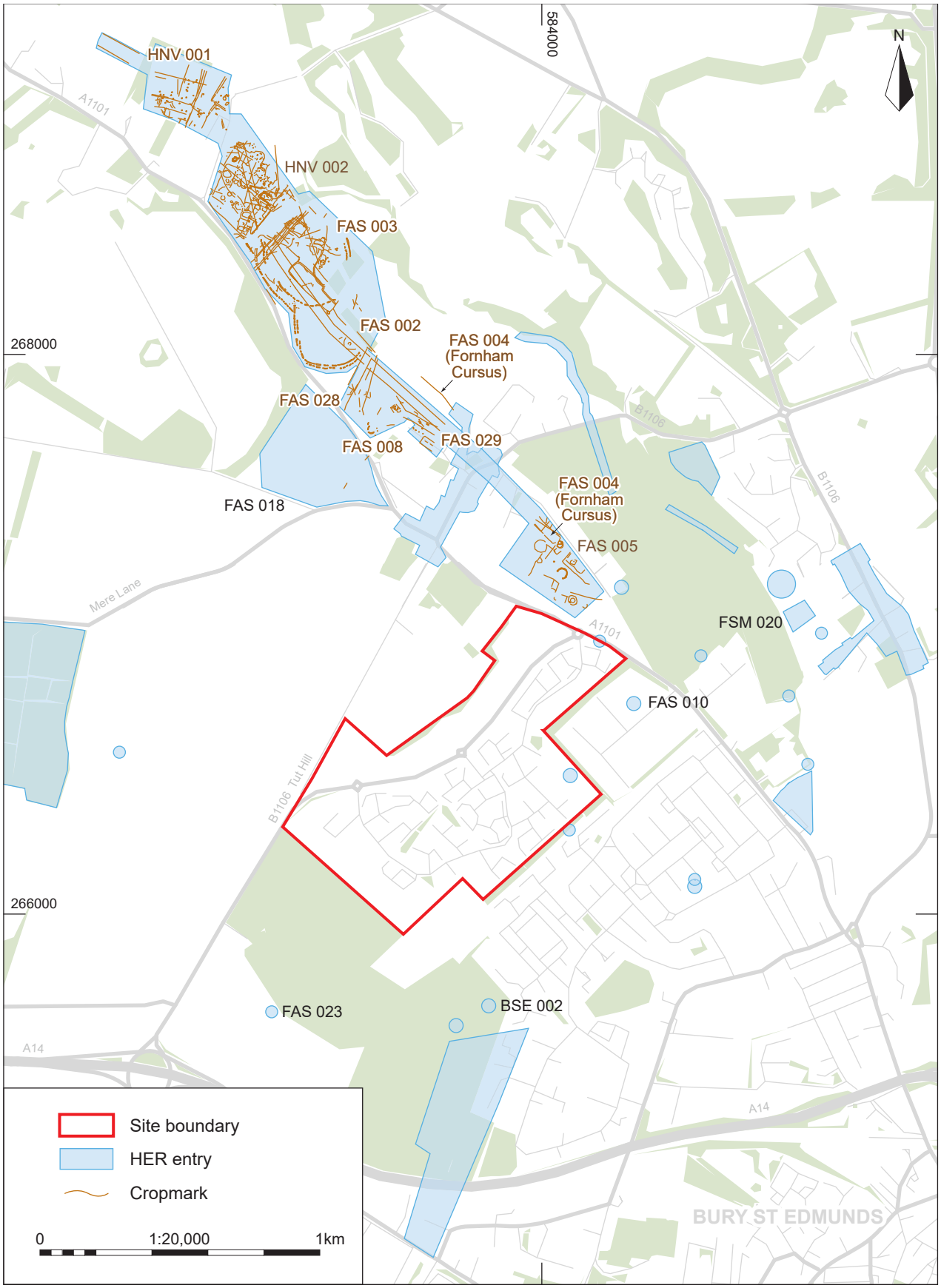


Figure 2.3 Marham Park, Fornham All Saints: archaeological context

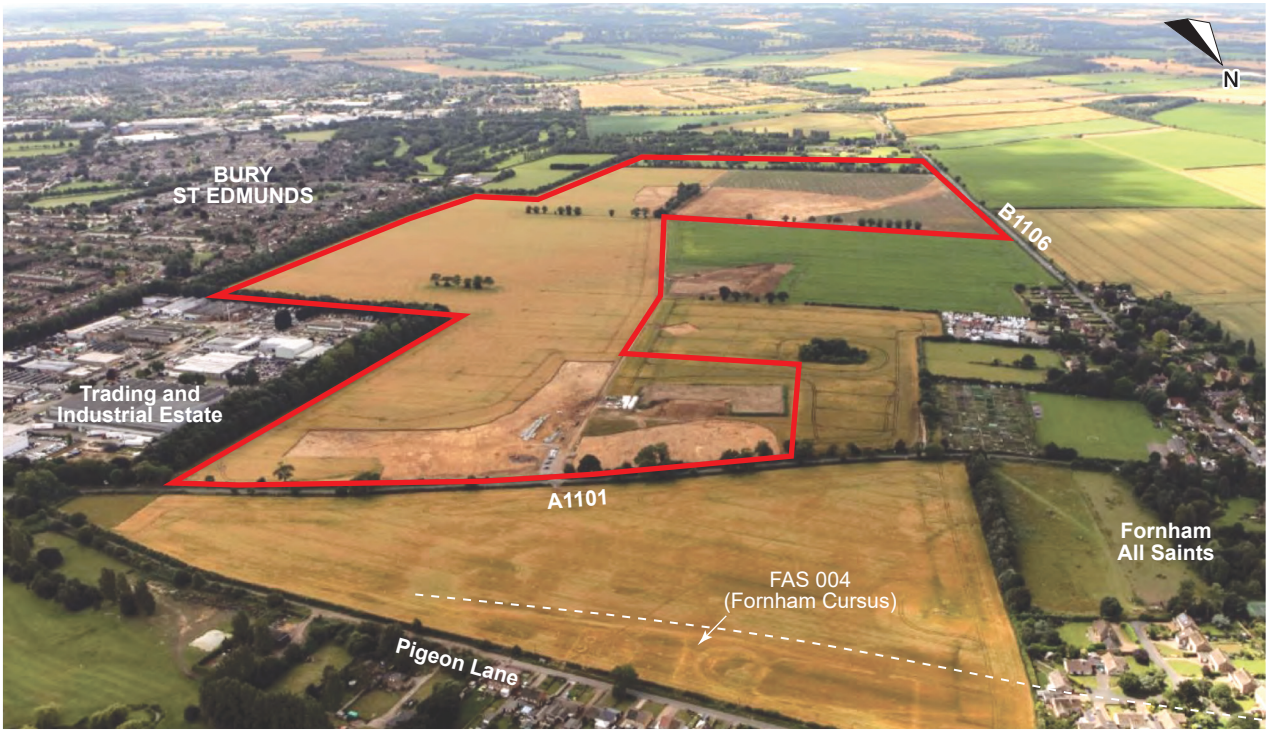


Figure 2.4 Marham Park, Fornham All Saints: aerial view facing SW, showing cursus monument and cropmarks (Commission Air)

the central portions of the development area just below the crest of the hill (BGS 2025), possibly providing a source of flint exploited for the burnt mound sites.

Modern activity relating to arable land use had removed any major micro-topographic features, although during excavation frequent natural dips, hollows and occasionally deeper infilled depressions of various sizes were observed in the underlying geological layers. These represented solution hollows, where the overlying diamicton at the south, or silts and sands at the north, had collapsed into voids that had formed in the underlying chalk strata. Many of these held incidental finds assemblages of varying and multiple dates, which had either entered the hollows as they gradually filled up or been present on the ground surface when they formed. Both burnt mound complexes had been constructed within pre-existing hollows in the diamicton, and it is likely that these areas had become reservoirs for the perched water table sitting within the layer as the boulder clay dropped into the underlying chalk.

Archaeological context

Sites in the vicinity of the development area captured in the Suffolk Historic Environment Record (HER, see SCC 2025a) are shown in Figure 2.3 and are labelled where mentioned in the text. An extensive prehistoric monument complex, based on the Fornham Neolithic Cursus (National Heritage List 1006018, see Historic England (HE) 2025, HER FAS 004), is present along the south side of the Lark Valley floodplain between Fornham All Saints and Hengrave, the eastern end of which lies within 250m of the northern edge of the development area.

The cursus is the dominant feature of a larger overall complex of cropmarks, the extent of which has been largely established through aerial photography. Other notable aspects include: a Neolithic causewayed enclosure (FAS 002); areas of smaller earthworks emanating from the cursus (FAS 028 and 029, HNV 001 and 002); a group of earthworks including four features interpreted as a possible Late Neolithic henges or hengiform monuments (FAS 005); at least eight ring ditches, probably Bronze Age (HNV 002, FAS 008) and two possible Iron Age or Roman rectangular enclosures (HNV 001 and FAS 003). Further earthworks, likely to be related to the complex, have been identified at HER FSM 020 and towards the south side of the central cursus area (FAS 010). To the south, on the south-facing valley side over the crest of the plateau, lie two more potential Bronze Age burial mounds (FAS 023 and BSE 002). Aerial photography of the excavations has produced one of the best recent views of the eastern end of the cursus complex (Fig. 2.4).

Site sequence

Overall, the archaeological remains across the site ranged in date from the Early Neolithic to Modern periods (Figs 2.5 and 2.6).

Early Neolithic (4000–3000 BC)

Early Neolithic activity was concentrated on the top of the rise in site area FAS 056, with a group of six and a group of ten pits, three pit pairs and four single examples (see general spread shown on Fig. 2.6). One pit pair was recorded in area FAS 055 to the north (Fig. 2.5). Over 1000 sherds/5kg

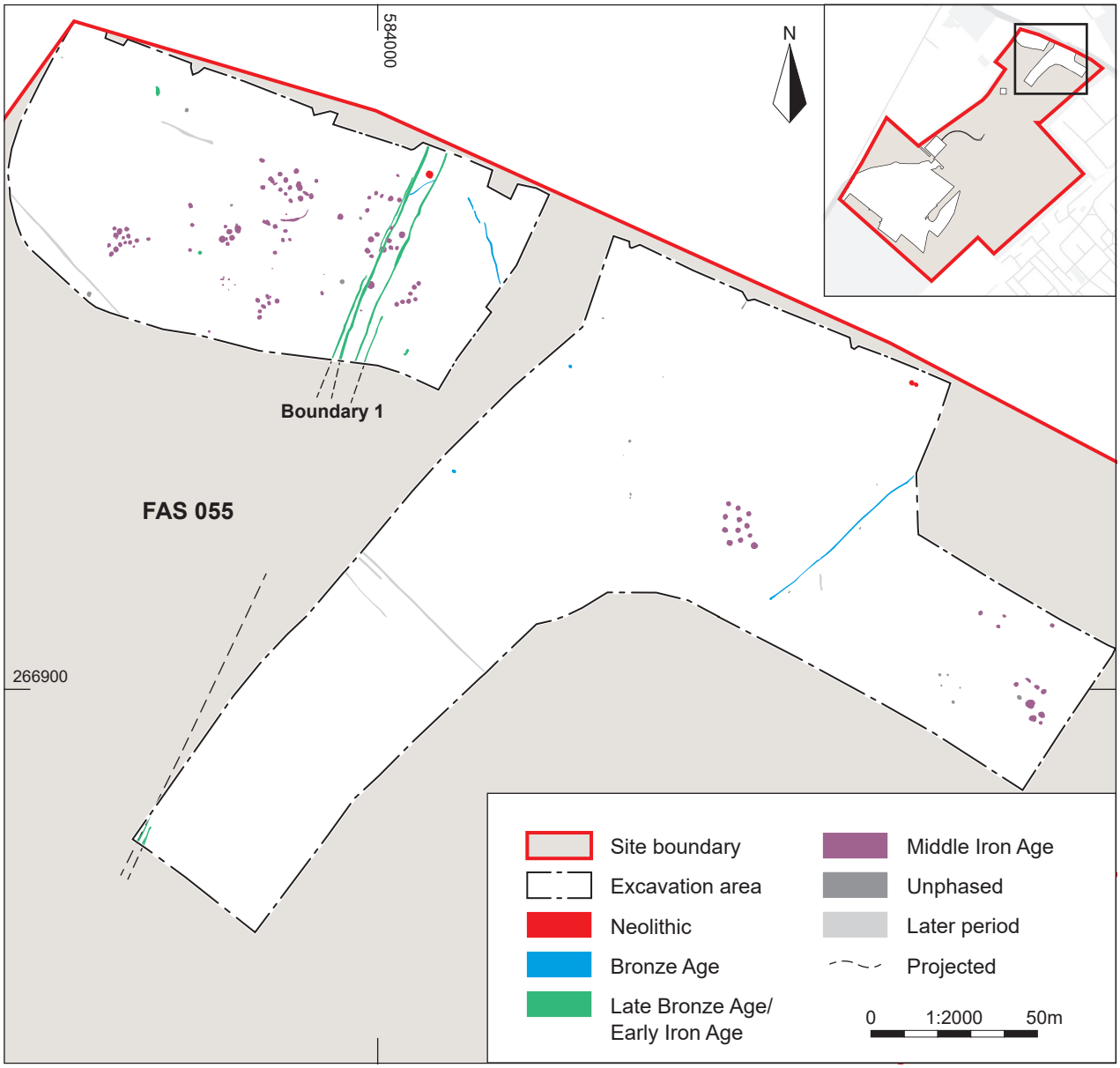


Figure 2.5 Marham Park, Fornham All Saints: all phases plan (FAS 055)

of Early Neolithic pottery and 550 struck flints were recovered from the pits and natural features, or residually in later deposits. There were no notable concentrations of artefacts, although there is a trend of increasing numbers of finds spatially across pit groups, potentially indicating that individual pits within them had been dug successively in areas of activity where waste was increasingly present (Green and Mortimer 2023, 27–8 and 115–18). Only a negligible amount of faunal material was recovered (34g).

The 11 environmental samples taken from pit pairs and groups produced common hazelnut shell and charcoal fragments, indicating material gathered from woodland and woodland-edge resources (West 2023). Hazelnut shells from two of the pits, 2746 and 5345 (Fig. 2.7), produced radiocarbon dates of 3634–3381 cal BC and 3646–3526 cal BC respectively at 95.4% probability (SUERC-93340 and 93346, see *Radiocarbon and chronological monitoring*, Hamilton below, and Table 2.19). The environmental samples also included rare fragments of cereal grains, although these were fragmented and abraded and may have been intrusive in these early features. Pit 2746 also produced 104 sherds of pottery (737g) and 27 pieces of struck flint, with 19 sherds of pottery weighing 35g and eight struck flints from pit 5345.

Late Neolithic (3000–2400 BC)

A single Late Neolithic pit was recorded in each of the two areas. Neither contained a statistically significant assemblage of finds; that in FAS 056 to the south (Fig. 2.7), 5184, contained 21 sherds of Grooved Ware, 27 struck flints and 620g of heat-affected flint, and that in FAS 055 to the north, 0183, contained one sherd of pottery and 16

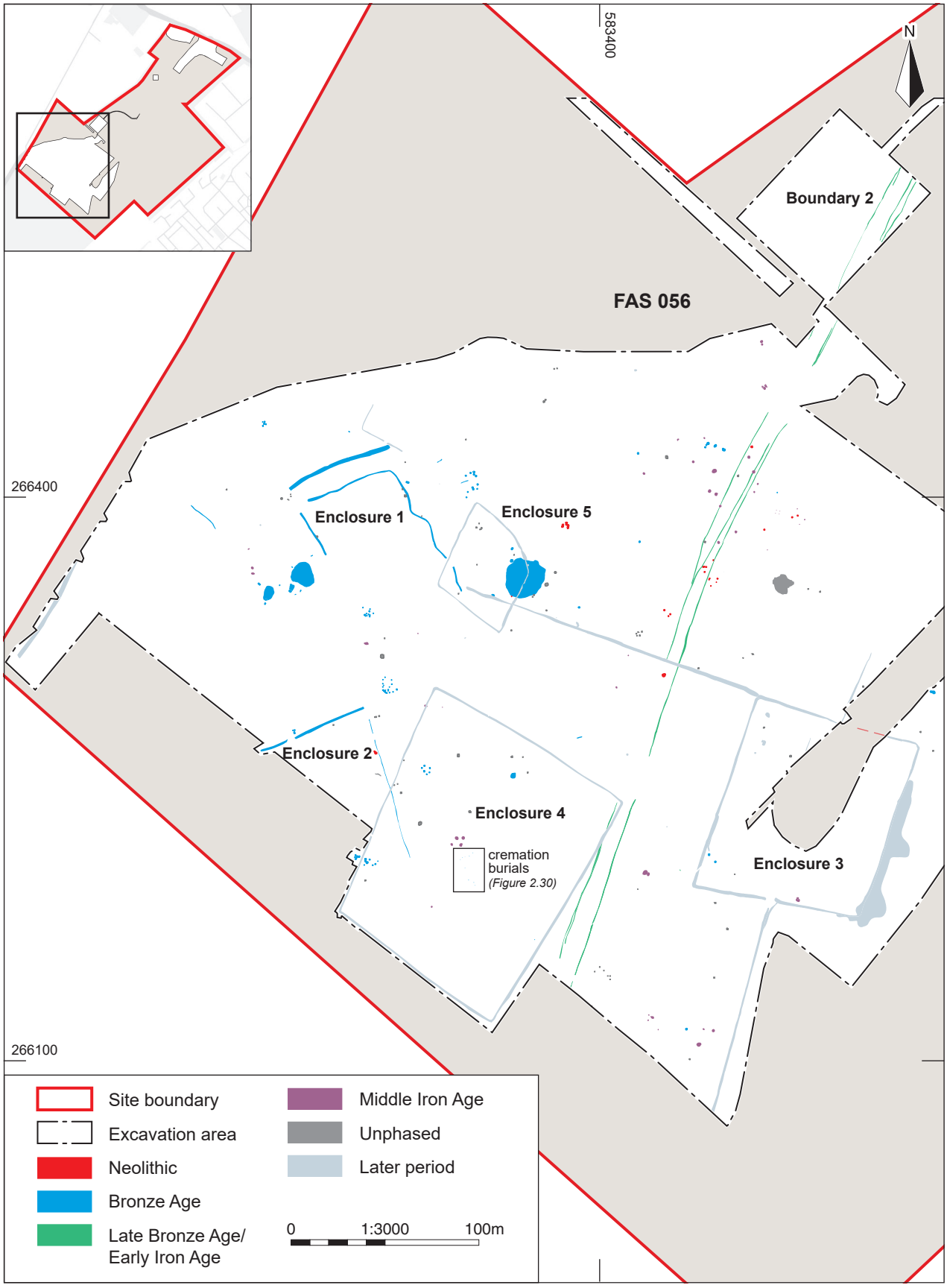


Figure 2.6 Marham Park, Fornham All Saints: all phases plan (FAS 056)

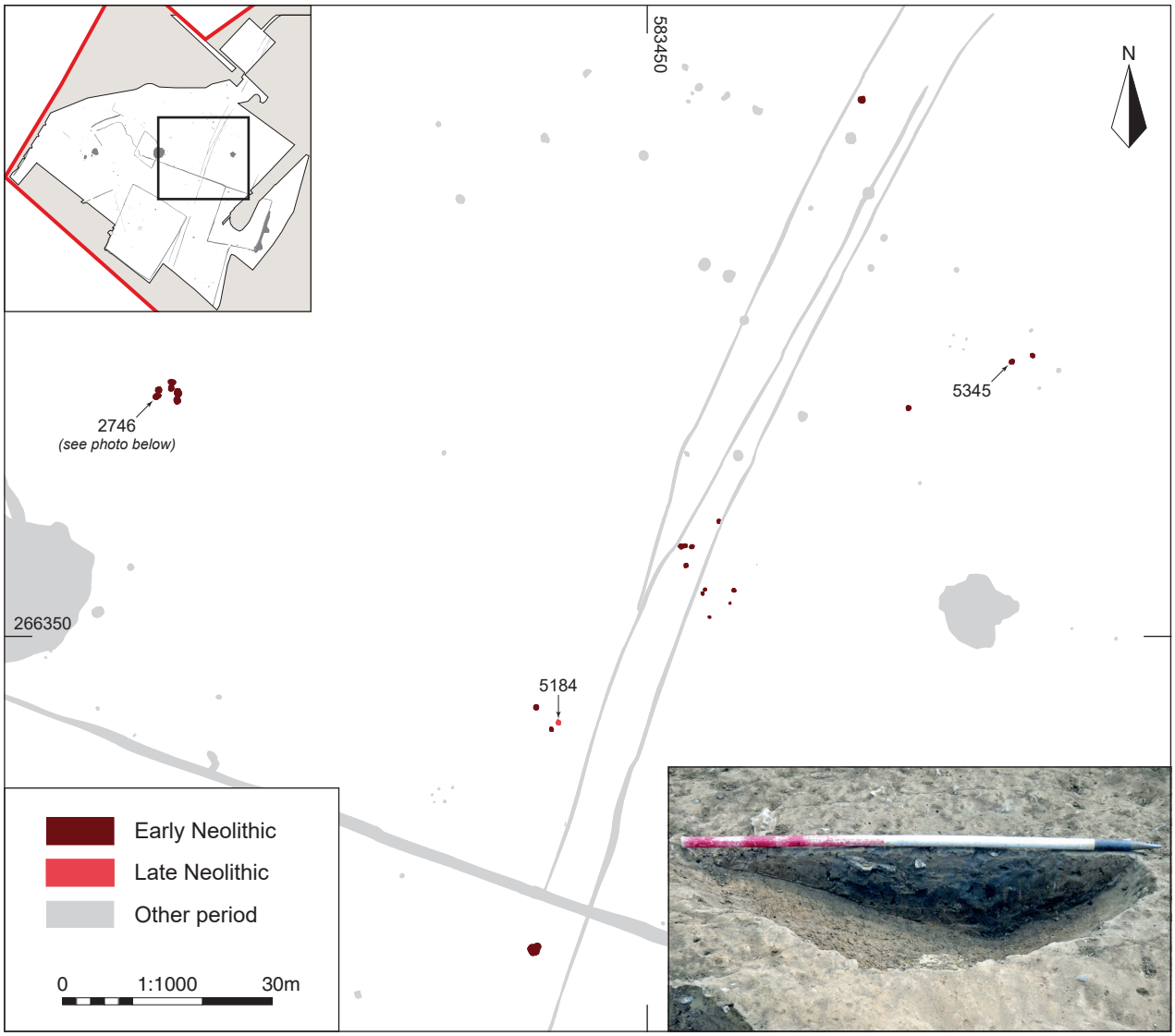


Figure 2.7 Marham Park, Fornham All Saints: selected Neolithic features (FAS 055) Inset: pit 2746, facing SE, 1m scale

fragments weighing just 20g (Fig. 2.8). Overall, including residual material and finds from natural hollows or buried soil, the pottery assemblage for the period comprised 39 sherds (106g), with no animal bone surviving.

Beaker and Early, Middle and Late Bronze Age/ Early Iron Age (2400–350 BC)

The Beaker and Bronze Age to Early Iron Age evidence forms the substance of this chapter and is set out in detail below. Beaker occupation (2400–1950 BC) was recorded principally on the higher, southern part of the site (Fig. 2.10). Features included a large burnt mound complex, Burnt Mound 1 (BM 1, including Structure 1, a line of postholes), a roundhouse (Structure 2) and numerous pits which were arranged singly, in pairs or in groups (Pit Groups or PG 1–8). A single pit was recorded at the base of the slope in FAS 055 to the north (Fig. 2.5).

Early Bronze Age activity (1950–1600 BC), as distinct from the Beaker period, was limited to a second, smaller burnt mound complex, Burnt Mound 2 (BM 2) and occasional pits, also on the high ground. Both burnt mound sites were placed on the clay ridge running from east to west on the valley top above the river.

There was some evidence for subsequent Middle Bronze Age activity (1600–1150 BC) at one of the wells within BM 2, related to the wider landscape of ditched fields and enclosures, with the truncated remains of two enclosures recorded at the south of the site (Enclosures 1 and 2, Fig. 2.6) and the poorly preserved elements of a wider field system recorded down the slope to the north. A small cemetery of heavily truncated cremation burials was positioned on the watershed at the top of the slope (see Fig. 2.30), and a single contemporary pit was recorded. The Middle Bronze Age finds assemblage was relatively small, mainly found within the deeper ditched enclosure.

Two long, multi-ditched boundaries, Boundary 1 and Boundary 2 (Figs 2.5 and 2.6) appear, stratigraphically, to have been of Late Bronze Age or Early Iron Age date

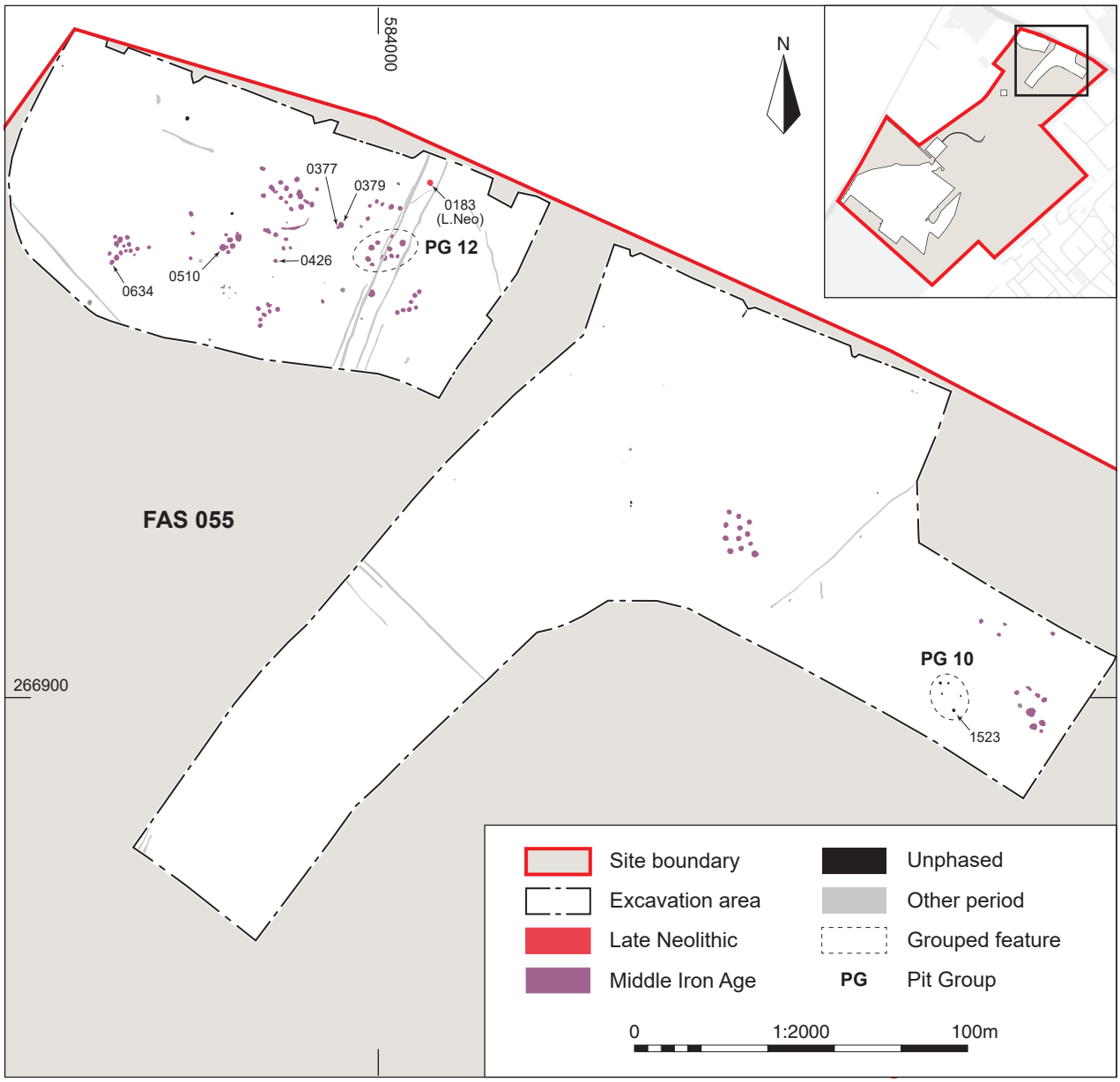


Figure 2.8 Marham Park, Fornham All Saints: selected Neolithic and Middle Iron Age features (FAS 055)

(1150–350 BC) and may have been part of a wider system that negated the Middle Bronze Age field systems and divided the land into north-north-east to south-south-west aligned strips that extended from the Lark valley onto the higher ground.

Middle Iron Age (350–50 BC)

Middle Iron Age occupation was evident on both the higher clay and the lower lying alluvial soils (Figs 2.8 and 2.9); overall 158 pits were recorded. Within FAS 055 to the north there were many individual pits along with nine groups of large, broadly circular, flat-based 'storage' pits of a type common on well drained Early and Middle Iron Age sites, including those further down the River Lark (e.g. Craven 2012; Fern 2022; Newton and Mustchin 2015). Two of the pit groups were present to the east, and the other seven were tightly grouped in the west of the area. A single four-post structure that measured 3.2 by 2.8m and the remains of a possible ring gully, an 8m length of curvilinear ditch, were also recorded (not labelled on Fig. 2.8). The finds – 26 hammer, bashing or grinding stones, and pottery, animal bone, loom weight fragments, hones, pieces of saddle quern, worked flints and heat-affected flint and stone – are all indicative of domestic, craft and agri-industrial activities taking place in the vicinity, if not within the excavation area itself. In FAS 056 to the south, there was a single large, extensive group of 13 pits and a scatter of smaller groups of between two and five in number, and a four-post structure (not labelled on Fig. 2.9). There were fewer 'storage' type pits, and activity in this area appears to have been slightly earlier, with a higher percentage of flint-tempered pottery fabrics within the assemblage.

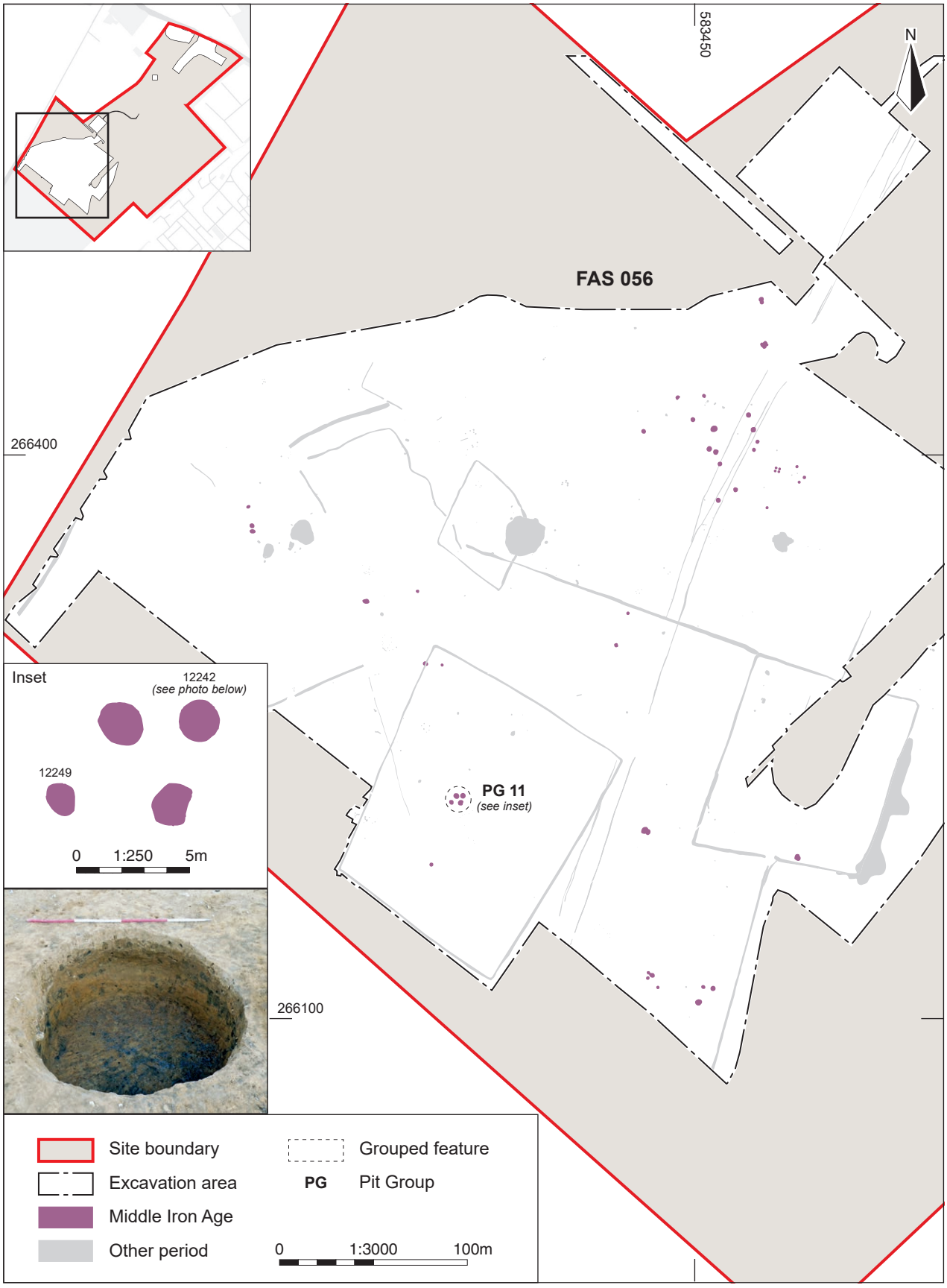


Figure 2.9 Marham Park, Fornham All Saints: selected Middle Iron Age features (FAS 056) Inset: pit 12242, facing E, 2m scale

The struck flint assemblage from the Middle Iron Age features, approximately 950 pieces, was partly residual, though with a number of contemporary pieces, and the pottery assemblage comprised 5700 sherds (nearly 34kg). This was spread between the features and between the fills of pits, with a small overall average sherd weight of just under six grams. Generally the character of the assemblage appears to represent secondary or tertiary deposition of sherds, presumably from surface spreads or middens; ceramic sherds were generally small and variously abraded, there were few cross-fits, and the larger assemblages contained parts of numerous vessels. There was nothing within the animal bone assemblage (almost 25kg) to suggest structured deposition, with no placing of specific bone groups on the bases of the pits.

The assemblage was dominated by cattle bone (78% by weight or 63% by number of fragments) along with horse (15% by weight/ 8% by number of fragments), with far lower numbers of sheep/goat and occasional pig/boar, dog and red and roe deer. Most cattle were adults, with some juvenile and neonate bones, suggesting local breeding and perhaps the keeping of working/breeding animals and meat stock. Metrical data for cattle were in the range of Celtic Shorthorn with one probably a Dexter type (Curl 2023). The cattle bone included lower limb, foot bones, one pelvic fragment and cranial elements indicative of waste from primary butchery and processing, lesser cuts of meat, and some suggestion of skinning. The general lack of damage from invertebrates may suggest that waste was relatively rapidly buried, although there was some evidence of gnawing (see Curl 2023). The environmental remains were sparse but included a concentration of chaff and occasional cereal grain fragments of emmer/spelt from samples from the north-west of the site, with a few barley grains, indicative of the final stages of cereal processing, with pieces of hazelnut shell indicating exploitation of hedgerow resources, as was the case in earlier periods. Sedges (*Carex* sp.) and grasses (Poaceae) may have been used for thatching/fodder, litter or bedding, or may indicate the arable cultivation of damp ground (West 2023).

The majority of the heat-altered flint and stone from FAS 055 came from Middle Iron Age pits and comprised material that had been subject to both high and low temperature heat. It was generally found in association with charcoal, bone and pottery, and was probably deposited into the pits as general waste alongside other artefacts (Green 2023). Notably, a large quantity of heat-altered stone was recovered from pit 0426 (Fig. 2.8), 11.9kg, mostly quartzite cobble stone and sandstone lumps, probably used for pot-boiling (Green 2023, 313). Large quantities of the same material were also recovered from pit 0379 and tree throw-hole 0377, and from pits in the surrounding area. It is likely that hot works were occurring outside of the site limits in this period or on the now-truncated surface, leaving little trace within the archaeological record, and it is possible that multiple heat-related activities were occurring, including surface fires, hearths and water heating using pot-boilers. A group of undated pits (PG10) located at the eastern limit of FAS 055 consisted of a small cluster of four 'fire pits' with a possible hearth of scorched red fired clay 1m in diameter, 1523 (Fig. 2.8). To the south in FAS 056, pit fills 12244 of 12242 and 12251 of 12249 (PG 11, Fig. 2.9) contained 6–7kg of heat-altered stone, probably part of a dump of stones used as pot-boilers (Green 2023, 315).

Undated prehistoric

Across the site there were five undated pit groups of three to five pits, six undated pairs and 43 single pits (see the general spread illustrated in Figs 2.5 and 2.6). They frequently contained non-diagnostic struck flints or heat-affected flint with occasional small, undatable scraps of prehistoric pottery. While these could date to any period in which the excavation of small pits was common – the Neolithic, Beaker and Early Bronze Ages in particular – many were notably in the same central swathe of the site as the Early Neolithic features, in a band 50–60m wide, following the contour along the top of the ridge (a sample is illustrated in Fig. 2.7), and were of a size and in locations that suggest that they may have been Early Neolithic or Beaker period features. They may represent contemporary features that did not attract an assemblage of waste material, perhaps through a difference or shortness of duration of activity. There was also some clustering around the Beaker period BM 1 site, and south and south-east of the Beaker period structure, Structure 2, and along the lines of the ditches of Enclosure 1 (Middle Bronze Age). Two undated posthole groups (PHG) were also recorded, PHG 1 and PHG 2 (Fig. 2.10). They did not form discernible structures, although the second may have been associated with Middle Bronze Age Enclosure 1.

Additionally, an assemblage of two hundred struck flints and six sherds of pottery (7g) was recovered from the upper light grey silt fill of a large broadly circular natural hollow, 5413, which was 0.16m deep (Fig. 2.10); this had a lower fill of poorly sorted gravel and flint and was probably a solution hollow within which a remnant of land surface had been preserved.

An assemblage of over 12kg of heat-altered stone was recovered from pit 12214 (Fig. 2.10), mostly cobblestones, but no evidence of *in situ* burning or lining was observed.

Romano-British (AD 50–410)

Two large rectangular and one small D-shaped enclosures were constructed on the top of the slope in FAS 056 in the Romano-British period, occupying the same contour and the same locations as the Middle Bronze Age enclosures (Enclosures 3, 4 and 5, Fig. 2.6). Enclosure 3 measured 95m north–south and 88m east–west, and an entrance of approximately 4.5m wide was observed in the centre of the southern side. Ditches on the same alignment as the side extended from Enclosure 3. Enclosure 4, also on the same alignment, measured 130m north–south and 118m

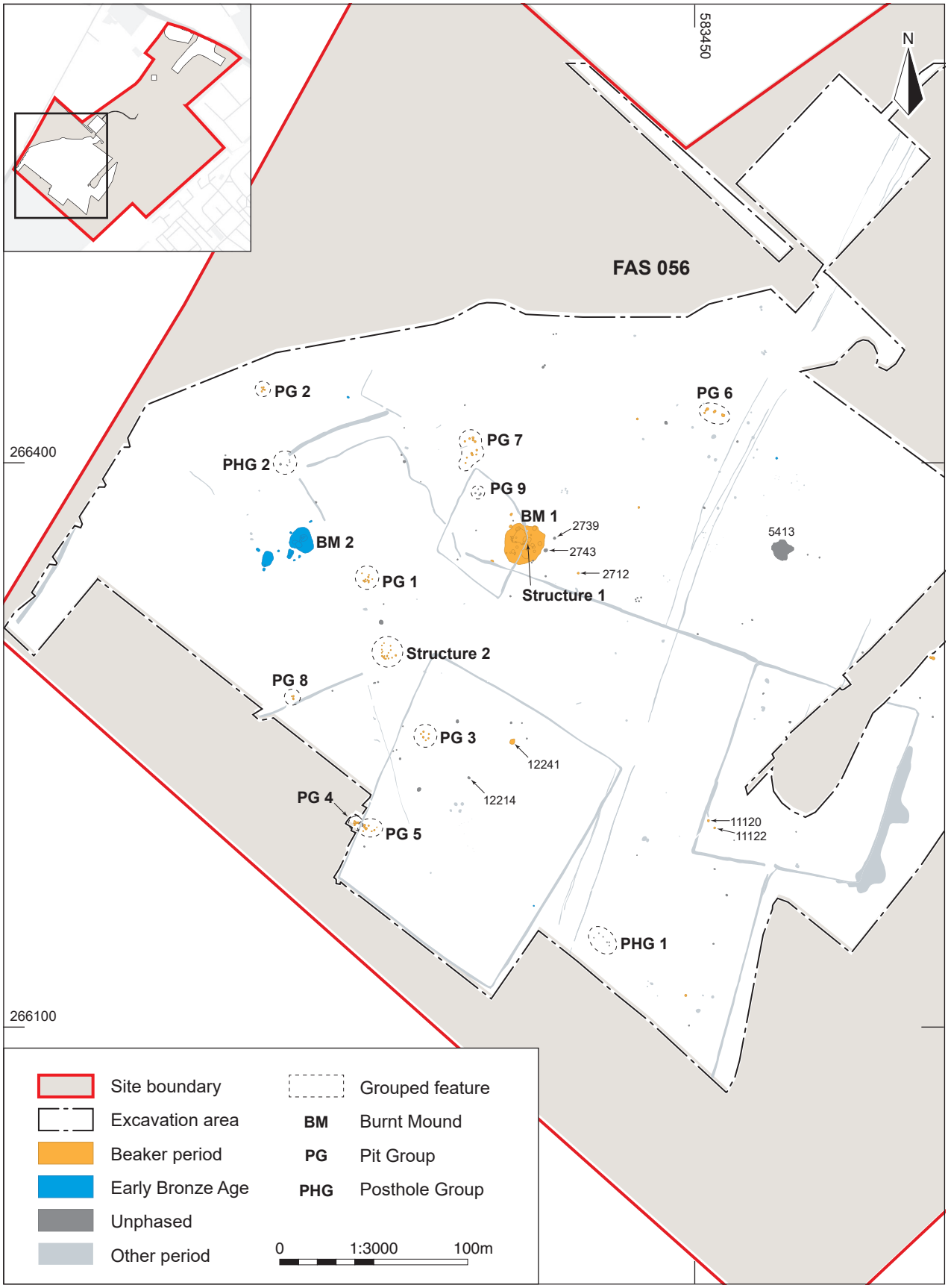


Figure 2.10 Marham Park, Fornham All Saints: Beaker, Early Bronze Age and unphased plan (FAS 056)

east–west and showed evidence of recutting. The finds assemblage, chiefly pottery with just over two thousand sherds weighing 17kg, was derived from two main locations: the north-west corner of Enclosure 3, where there had evidently been a midden deposit, and the backfilling of the extensive later Roman quarries along one edge of the same enclosure. Other finds from this enclosure included small quantities of oyster shells, 37 pieces of ceramic building material, a possible copper-alloy belt mount, 19 pieces of iron – mostly strip fragments, nails and hobnails, with one awl/stylus – and eight pieces of lead including three fittings, one structural piece and four waste pieces. Across the site 20 small finds of 1st to 4th-century date were found in the topsoil and subsoil, and most came from the area of Enclosure 3, including a near complete enamelled lobed disc brooch of 1st to 3rd-century date. The pottery assemblage (19kg) comprises mainly locally sourced coarseware jars of mid 2nd to mid 3rd-century date, with some sherds of 4th-century date. The 246 identifiable pieces of animal bone from this period (11.3kg) came almost entirely from cattle and horse, with smaller numbers of sheep/goat and one pig/boar and a large dog skull (Curl 2023); there was evidence for primary and secondary butchering waste, with bones from the quarries showing evidence of skinning and primary waste (Curl 2023). The enclosures may have been for the corralling or pasturing of livestock. Plant remains were sparse, although a number of spelt grains and possible free-threshing bread wheat grains (*Triticum* sp.) were recorded from ditch fill 5520 (not illustrated). Barley (*Hordeum* sp.) grains were recorded only in low numbers (West 2023).

The D-shaped enclosure, Enclosure 5, measured 72m north–south and 42m east–west. The curved side enclosed the site of the well associated with the Beaker BM 1 site, and it may be that the hollow was exploited for water in this period. Four of the eighteen small and abraded sherds of pottery recovered from the enclosure ditch were of Roman date; the rest were residual Early Neolithic, Beaker and Middle Iron Age items.

At the base of the slope in FAS 055 a pair of parallel north-west to south-east ditches approximately 7m apart (Fig. 2.5) may have flanked a Roman routeway along the south side of the Lark valley, from Lackford to Bury. This aligned with the road exiting the crossroads in Fornham All Saints at the west (Fig. 2.1) and a historic field boundary at the east (not illustrated), and could also have been of medieval date, although there were no later period finds; 12 sherds (180g) of Middle Iron Age pottery, 12 struck flints and some pieces of heat-affected stone were recovered from the ditches.

Post-medieval and modern (AD 1550–2000)

Two post-medieval field ditches were recorded, along with, across FAS 056, a number of small pits, postholes and concrete pads across that related to the use of the site as a firing range during the Second World War.

Beaker (2400–1950 BC)

Overview

At the top of the hill, within FAS 056, a large burnt mound complex, Burnt Mound 1 (BM 1), and a single roundhouse 75m to the south-west of it, Structure 2, were the foci of Beaker period activity (Fig. 2.10). Five pit groups were arrayed around the roundhouse, all within approximately 80m and mostly to the south. Three more pit groups and three single pits were spread out to the north of the burnt mound.

Small fragments of mammal bone were recovered from several of the features, with some larger pieces – mainly cattle (Curl below). Overall, a moderately large assemblage of approximately 3000 sherds of principally domestic Beaker (*c.* 2400–1950 BC) with some Early Bronze Age (*c.* 1950–1600 BC) pottery, including some significant groups of rusticated Beaker, was recovered from features of this date. Typologically early Beaker material is absent from the assemblage. Broadly, radiocarbon modelling (see Hamilton below and Table 2.19) indicates that activity at BM 1 started *2415–2130 BC (at 95% probability)* and probably in *2245–2140 BC (at 68% probability)* and that it ended between *2145–1855 BC (at 95% probability)* and probably *2140–2055 BC (at 68% probability)*. This gives a potential span of activity of between *1 and 515 years (at 95% probability)* and probably *10 and 190 years (at 68% probability)*. The Beaker pits and roundhouse appear to have been slightly later in date than BM 1 but they may have been present within the timeframe of the latter stages of its use, with calibrated radiocarbon date ranges of 2196–1959 cal BC at 95.4% probability or 2136–1980 cal BC at 68.2% (see Table 2.19, SUERC-93354, 93355 and 93357).

Burnt mound complex (BM 1)

The Beaker burnt mound complex (BM 1) covered an area spanning 18.3m by 21.3m. The complex, which showed stratified evidence for a long period of use associated with some spatial shifts in focus, included a main well which showed evidence of having been recut, a later, secondary well and two possible smaller secondary wells. These were associated with trough-like features, 20 pits, 17 postholes and a cobbled/metalled surface which sealed some of the earlier features. In addition to the wells, several of the pits probably also held water (see *Geoarchaeology*, Allen below). The complex was sited within a large natural depression of periglacial origin, probably a large solution hollow within the underlying chalk, and the community who created the complex would have observed that water collected within it.

The associated mound of burnt stone which would have accompanied activity at the site had been ploughed away, but its former presence is attested by the quantities of burnt flint that was recovered from within features, and

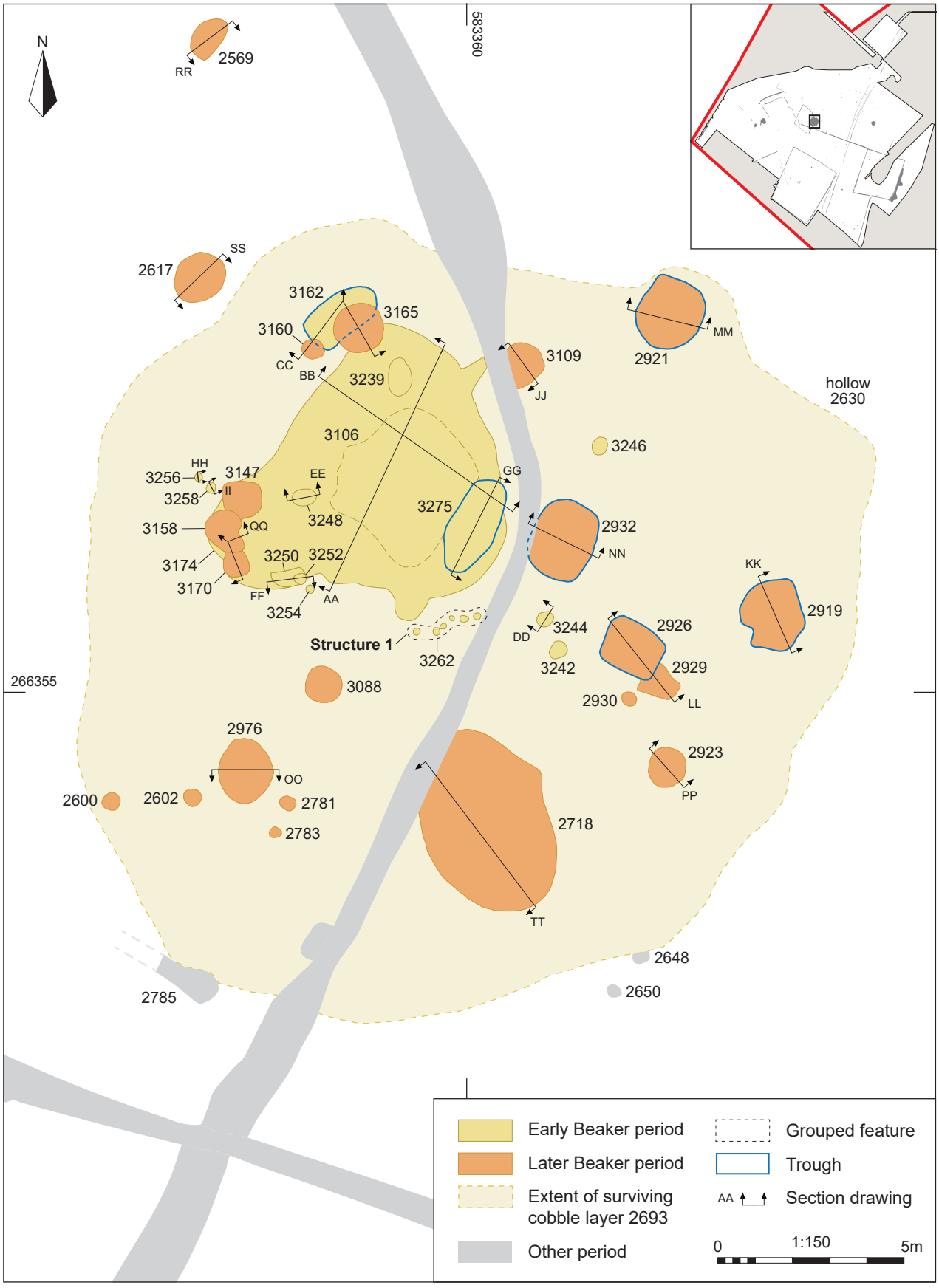


Figure 2.11 Marham Park, Fornham All Saints: Beaker burnt mound complex (B M1)



Figure 2.12 Marham Park, Fornham All Saints: photographs of BM 1 during excavation (A, facing W; B, facing SW; C, facing N showing cobbled surface 2693) and afterwards (D, facing SE), 1m and 2m scales

in extensive spreads of material (Figs 2.11 and 2.12). The presence of the two burnt mound sites was not identified until the excavation stage of site investigation works, although a low-density distribution of burnt flints across a wide area that was found in fieldwalking can, with hindsight, be associated with them (see Stump 2012).

With up to ten troughs, the evidence suggests an unusual scale or longevity of operation within the possible 190-year span indicated by radiocarbon dating (at 68% probability). Some of the earlier features lay beneath the cobbled/metalled surface, which also extended over some of the initial fills of the main well, while others cut through or were respected by it. The burnt mound was therefore developed over time, in several phases of activity. This impression is supported by some of the discard patterns in flint cores and knapping waste, which could have been dumped in successive areas as features were backfilled (Bates below).

The overall finds assemblage from the complex included over 1000 sherds of contemporary, stratified pottery (3.78kg), a much larger flint assemblage of over 6000 struck flints including knapping waste, partial tools, utilised flakes and blades and over 300 flint tools, mainly scrapers and burins; many showed evidence of retouch (see *Worked flint*, Bates below).

Methodology

Initially two 1m wide trenches on north-north-west to south-south-east and west-south-west to east-north-east alignments respectively were excavated by hand across the hollow, to either 1m in depth or to the cobbled/metalled surface (trenches not illustrated). Within these, small finds were located by GPS. The trenches showed that layers within the hollow were consistent across the feature, and so the area was divided into quadrants for full excavation by hand (Fig. 2.12). Discrete features were initially half-sectioned and then fully excavated. The two larger pit-wells, 2718 and 3106, were excavated in quadrants with continuous sections recorded through their centres. Environmental samples were taken from each layer within each quadrant and from each discrete feature. Monolith and Kubiena samples were taken at various points for geoarchaeological and soil micromorphological analysis and analysis of lipids, pollen and diatoms.

Hollow

The solution hollow within which the complex was situated, 2630, had a sandy silt fill, 2668, recorded beneath the cobbled/metalled surface. Micromorphological analysis of this layer (see French below) indicated that it had been de-turfed prior to use, exposing the clean compact B horizon, either as a working surface or as a foundation for the metalling.

Main well

The main well, 3106, lay towards the north-western quadrant of the hollow (Fig. 2.11). There appeared to be ledges around the western edge of the cut, and channels or gullies running into the feature – for example 3174,

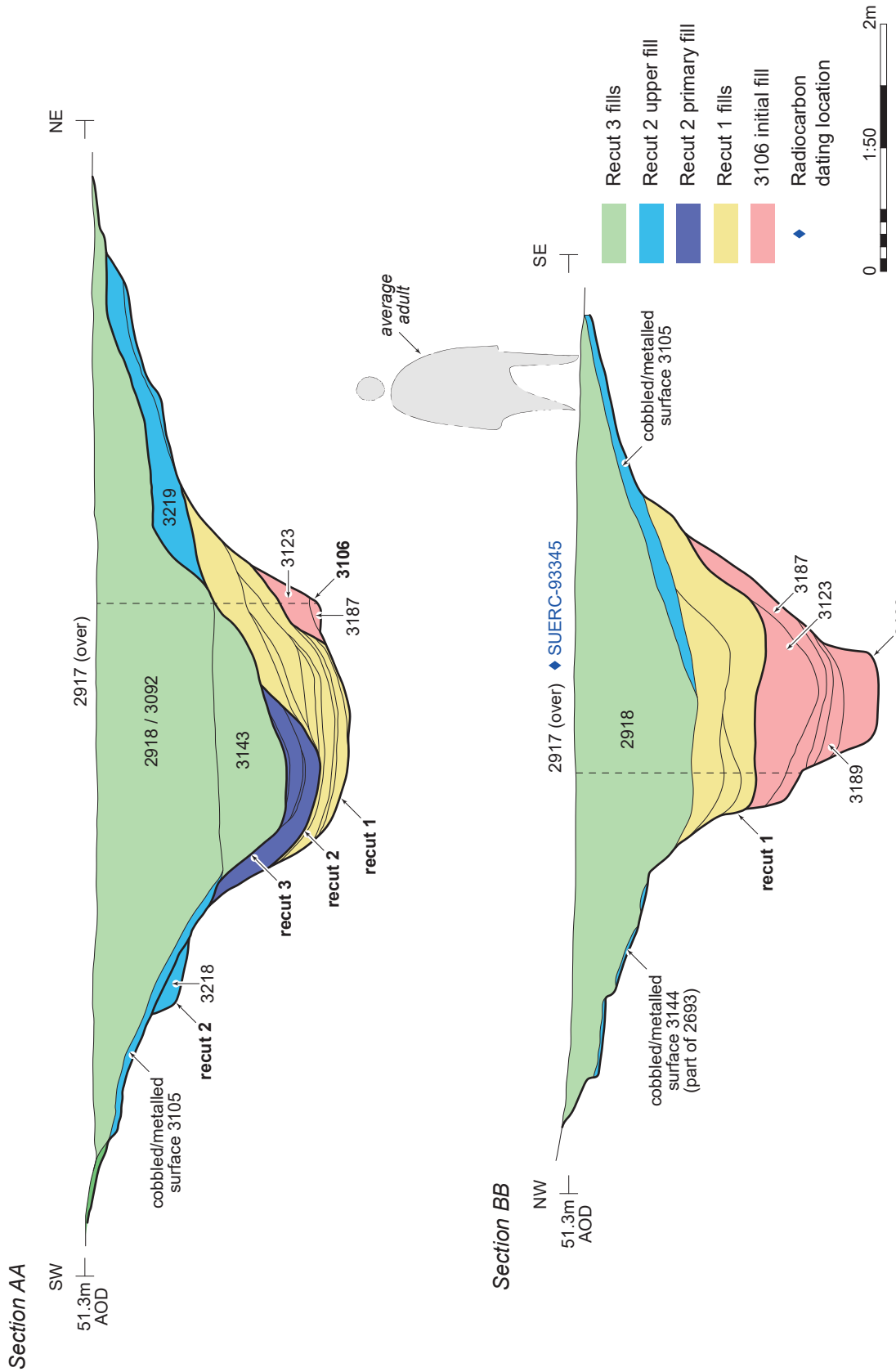


Figure 2.13 Marham Park, Fornham All Saints: BM 1, sections of well 3106

filled by 3272, from which 77 worked flints were recovered and which was equivalent to one of the fills of the well, 3218. However, with wells cut into solution hollows it can be difficult to distinguish deliberate cuts from natural slumping, and some of the observed complexity – the ledges and 'channels' – is thought to be of natural origin; hollows have a core area of deepest collapse and will often, over time, collapse in successive concentric rings, forming ledges such as were seen along the western slope of the well.

At the surface the deeper depression within the solution hollow measured approximately 8m long and 6.5m across and within it, off-centre to the east, the well shaft, 3106, was 3m across, sub-square in shape, and a maximum of 2.4m deep (Fig. 2.13, Sections AA and BB, Fig. 2.45D). Originally the well shaft would have been lined to prevent the collapse of the edges, either with wicker, timbers or a hollowed-out tree (see Chapter 5).

There were seven groups of fills within the well, indicative of episodes of recutting and infilling. The initial five fills of cut 3106 (including 3187, 3189 and 3123 labelled on Fig. 2.13), were a mix of sandy silts and clay representing initial silting or slumping from the edges. The first recut was filled by a series of up to nine sandy silts overlain by silts with occasional slumps of clay. The lower part of the second recut was filled by four pale to dark grey silty sand fills with occasional fine gravel lenses. These three initial fill groups were a markedly clean mix of waterlain silts and washed-in sands, and no finds were recovered from them. Geoarchaeological analysis suggests that they were possibly seasonally wet/dry, with a water table that rose and fell over the seasons (Allen below) and therefore attendant pollen and diatom preservation was poor (Langdon and Cameron below).

The surviving upper fills of the second recut, where not removed by the third recut, comprised light grey soft sands with occasional charcoal fragments and heat-affected flints, particularly on the southern side of the well (including 3218 and 3219 labelled on Fig. 2.13).

The fills of the second recut were partially overlain by a deposit of cobbles, 3105, which incorporated moderate amounts of heat-affected flint (Fig. 2.13). Deposit 3105 surrounded the final recut of the well and appeared to represent an extension of the main cobbled/metalled surface 2693, which was thicker towards the centre of the hollow (see *Cobbled/metalled surface* below). A reasonable interpretation is that deposit 3105 related to the third recut of the well, and that cut features which were sealed by it related to the earliest phase of use of the well and its earlier recuts (see *Early features* below).

The final recut of the well, with the cobbled surface at its edges, was filled by 3143, a mottled silty sand; it contained a moderate amount of gravel and occasional cobbles, and a single piece of bone. The well was capped by fill 2918/3092, a sandy silt which contained a moderate density of heat-affected and struck flint inclusions; this extended across the north-west quadrant of hollow 3061.

With the exception of the cobbles, the upper three fill groups were also characteristic of seasonally wet or dry conditions (Allen *et al.* 2023a). They contained considerable quantities of struck flint, with 96, 101 and 588 pieces respectively. The capping fill, 2918, included a clay component which may have derived from the excavation of secondary wells (see below), along with a large quantity of heat-affected flint, 11 small sherds of Beaker pottery (44g) that may have come from another pit and 15 small pieces of cattle bone. Sarah Bates noted that the flint assemblage from the upper fills of the principal well, 3106, contained more cores and larger dumped flints than from the cobbled layer, associated pits and probably a later well in the sequence, 2718 (see below), suggesting that flints in those may have been produced more from task-related activity whilst the assemblage in the well may have been deliberately dumped from the breaking and prepping of flint for use elsewhere and, by implication, slightly later – perhaps at later features in the complex or to the south (Bates below).

Overall the pattern of the deposits within the well indicate that non-silting infilling primarily occurred from the north-east, where it is assumed that a significant part of the burnt mound itself was located, along with many of the activities that created it.

Early features

The early features, which were overlain by a cobbled/metalled surface across the base of the hollow, 2693, comprised two larger features interpreted as troughs, six smaller pits and a number of postholes (Fig. 2.11). These features were fully excavated. They generally had at least one fill that included dark charcoal-rich material and quantities of heat-affected flint, attesting to burnt mound activities prior to the laying of the full extent of the cobbled surface; they may therefore have related to the earliest use of the main well and become repositories for flint, ash and charcoal waste.

The two probable troughs, 3162 and 3275 (Fig. 2.14, Section CC and photograph, and Section GG), elongated ovals in shape, were close to the main well. The former was 1.1m long by 0.8m wide and 0.26m deep with a shallow, bowl-shaped profile and four fills. The latter was 2.5m long, 1.7m wide and 0.36m deep, again with a bowl-shaped profile and single fill. Both were filled with deposits of grey-black charcoal-rich silt, with frequent heat-affected flint inclusions. Two of the smaller pits, 3239 (section not illustrated) and 3248 (Fig. 2.14, Section EE), were halfway down the sloping western side of the dip of the well, towards cut 3106, and one, 3250 (Fig. 2.14, Section FF) was just beyond the edge. These were also oval in shape with flat bases, with lower fills of yellow clay or silt and dark upper fills containing fire-cracked flint (for example, fill 3240 in 3239). They were between 0.7m and 1m long, 0.7m and 0.5m wide, and 0.18 to 0.4m deep (see Table 5.1). The similarities in shape, size, orientation and infilling between these pits would suggest a unity of purpose, based around the heating of flint. The larger troughs were in part

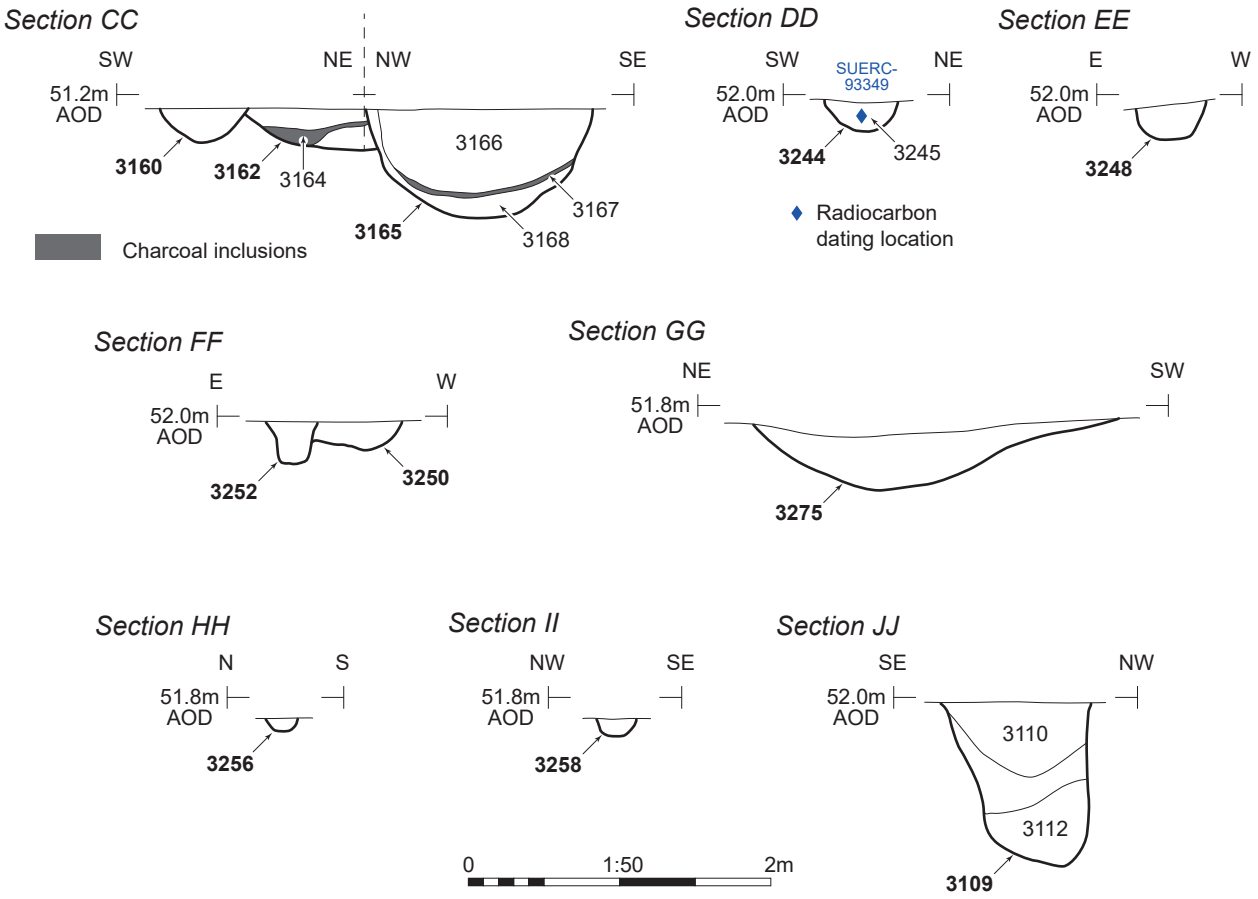




Figure 2.14 Marham Park, Fornham All Saints: BM 1, selected sections and photograph of 3160, 3162 and 3165, 1m scale

truncated, damaged and less well formed than the later examples of such features at the site (see below) but, based on evidence from sites elsewhere (e.g. Ó Néill 2009) they may have been lined or may have held wooden troughs. Eleven struck flints were recovered from 3239, 3250, 3275 and 3242, including a retouched flake and two probable piercers, again perhaps an indicator of early activity that was similar to that from later phases.

Three other pits were located to the east of the well, 3242 (section not illustrated), 3244 (Fig. 2.14, Section DD) and 3246 (section not illustrated). They were smaller and subcircular, 0.5m in diameter and 0.2–0.25m deep, with single fills from which fragments of charcoal were recovered, with hazel, elm, oak and Maloideae identified (Challinor 2023). A radiocarbon date of 2291–2143 cal BC at 95.4% (SUERC-93349, Table 2.19) was obtained from a piece of hazel wood charcoal from the fill 3245 of pit 3244. The date is comparable to that obtained from a piece of unidentified wood charcoal from pit/trough 2921 that cut or was abutted by the cobbled/metalled surface (see below and SUERC-93347, Table 2.19), although as the species was unidentified there is potential for an unknown age offset in this later sample as a result of the old wood effect.

Immediately to the south of well 3106, six subcircular postholes formed a broadly linear array aligned east-north-east to west-south-west (Fig. 2.11, Structure 1). Two further postholes, 3252 (Fig. 2.14, Section FF) and 3254, were recorded south of the well, and two more to the west, 3256 and 3258 (Fig. 2.14, Sections HH and II). They were 0.2–0.3m in diameter and 0.1–0.3m deep. A fragment of heat-affected flint was recovered from 3254. Stratigraphically the majority of these were sealed by the cobbled/metalled surface and they may have related to structures that were used in early activity at the burnt mound (see Chapter 5), although some of them – excepting 3252 which cut pit 3250, see above – may also have related to even earlier activity, given that two Early Neolithic features were recorded at the southern edge of the hollow (Fig. 2.11, 2648 and 2650).

Cobbled/metalled surface

The cobbled/metalled surface, overall number 2693, was preserved within the hollow and was probably created as a firm and slip-resistant working surface (photograph Fig. 2.12C and Fig. 2.13 Section BB). It may originally have extended beyond the depression but been destroyed by ploughing. The surface comprised a deposit of small to medium-sized flint gravel and rounded flint cobbles 50mm–200mm in size with occasional chalk and sandstone pieces and fire-cracked flint, pressed into the underlying clay. It appeared consistent across the area and it was therefore not possible to discern phases in the creation of the surface, although towards the centre of the hollow it appeared to have been built up and added to over time either deliberately or incidentally, with layers of cobbles and fire-cracked flint observed. As noted above, context 3105, recorded within the fills of well 3106 (Fig. 2.13, Sections AA and BB), could have resulted from an expansion of the surface over earlier well fills and pit and trough features, up to the edge of the final recut of the principal well.

The entire metalled surface was removed by hand excavation; one piece of residual Early Neolithic pottery was recovered, along with 342 struck flints. Lipids relating to non-ruminant carcasses or hides were identified on a scraper from the cobbled surface which formed part of the sample selected for analysis (Dunne and Evershed below).

Pits and troughs of varying form and size were cut through the surface, while others were perhaps surrounded by it and may have been either retained or created when the metalling was laid down. The majority of these features, the wells, pits and troughs, would have been lined with either wood or wattle to at least the level of the metalled surface and possibly well above it (see Chapter 1 *Characteristics of burnt mounds*).

Troughs

Five trough-like features were cut through or were abutted by the metalled surface, four to the east of the wells, 2919, 2921, 2926, 2932, and one in the south-west quadrant of the hollow, 2976. These were all similar, oval, square-cut or rectangular to a greater or lesser degree, near-vertical sided and flat bottomed, and approximately the same size, 1.6m–2.0m long, 1.2m–1.7m wide and 0.5–0.7m deep (see Table 5.1). They would almost certainly have been lined and sealed so that they held water, perhaps with planks as has been recorded elsewhere. Some of the fills potentially related to the use-life of the features, with timbers or lining rotting *in situ* beneath deposits relating to their last use.

The lower fills of features 2926 (Fig. 2.15, Section LL; Fig. 2.17A) and 2932 (Fig. 2.15, Section NN, Fig. 2.45A) were brown-black silts or clay silts with few inclusions. Geoarchaeological analysis of feature 2932 (Allen below) showed the lowest fill, 3145, to be a weakly gleyed, weathered fill, characteristic of a feature left open for some time. The uppermost part of the secondary fill, 2935, was humic and silty, possibly representing an A-horizon or period of stabilisation, with a sharp boundary to the overlying fill which contained burnt stone, 2934, which was probably dumped within the feature or spread from the collapsing mound. Analysis of lipids on a sample of burnt flint from context 2935 identified traces of stearic and palmitic acids, typical of degraded animal fat, from ruminant and non-ruminant sources (Dunne and Evershed below).

The lower fill of trough 2976 (2979) comprised a similar weathered fill of black silt and yellow clay with frequent heat-affected flints and charcoal (Fig. 2.15, Section OO; Fig. 2.17B); nine sherds (16g) of Beaker pottery and two struck flints were recovered from it (Fig. 2.42); a sample of burnt flints from 2976 was one of the five from various features that did not reveal evidence of lipids, although this may not necessarily mean that they were originally absent (Dunne and Evershed below).

The deposit sequence within feature 2921 differed (*Geoarchaeology*, Allen below). The lowest fill, 3151, was

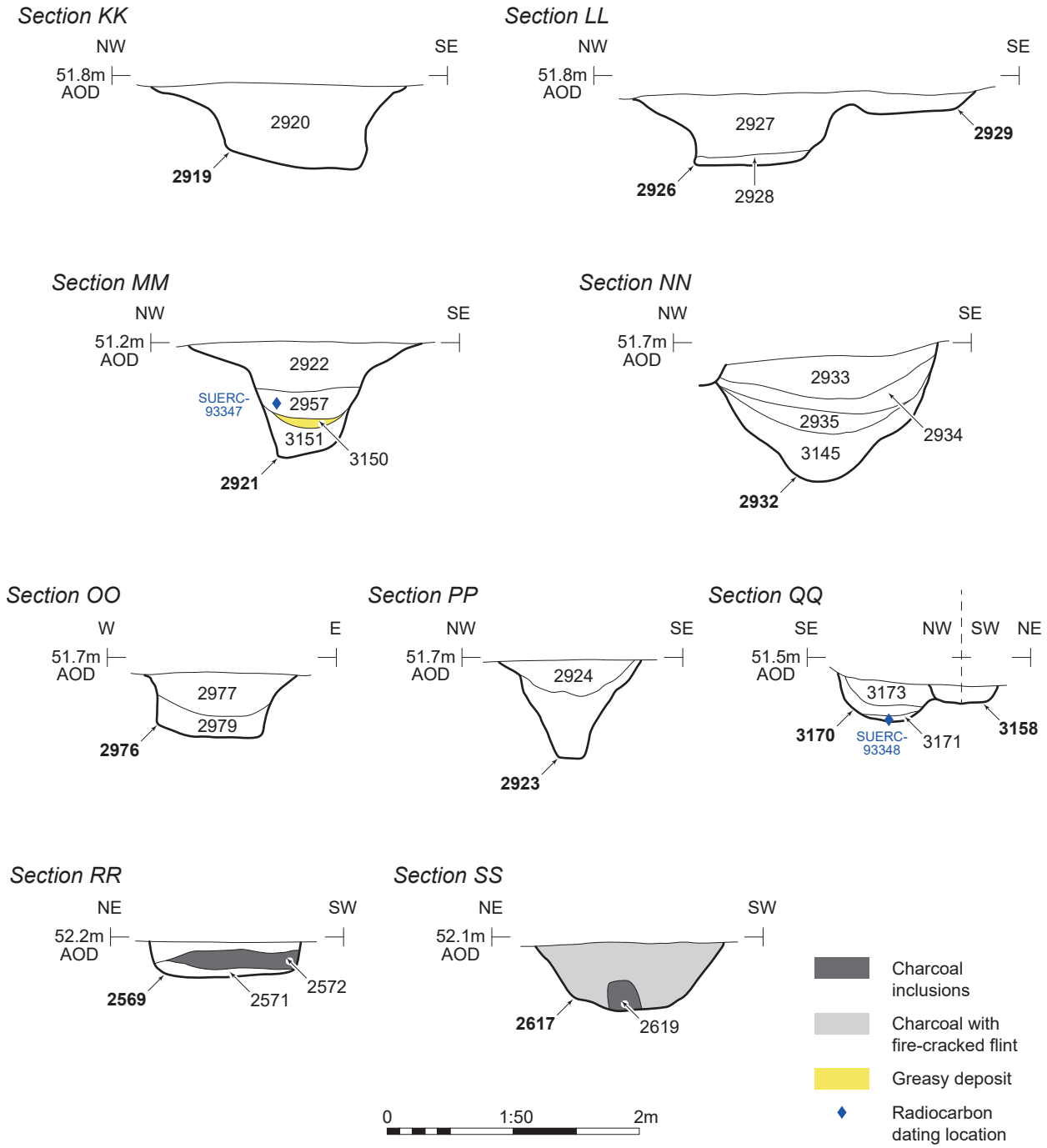


Figure 2.15 Marham Park, Fornham All Saints: BM 1, sections of selected troughs and pits

a sandy clay slump (Fig. 2.15, Section MM; Figs 2.17C, 2.45B and 2.45C). Above it there was a thin deposit of grey-black sandy silt, 3150, with moderate amounts of burnt flint and charcoal and a distinct greasiness to it. Over this was fill 2957, a mid-grey silt with large fire-cracked flints and charcoal from which four struck flints were recovered; this may have been a deposit of burnt flint dumped into the pit during or shortly after the use of the pit, before there had been time for the development of a deposit such as the more weathered lower fills seen in 2926 and 2932. Lipid residues from a sample of the 'greasy soil' 3150, and a sample of burnt flint from it, both included palmitic and stearic acids, from ruminant sources (Allen, Dunne and Evershed below). The greasy fill therefore contained a fatty residue that may have arisen from the use of the feature, which was also present on the burnt stones within it. A radiocarbon date of 2287–2140 cal BC at 95.4% (SUERC-93347) was obtained from a piece of wood charcoal from trough 2921, similar in date to that from pit 3244 (SUERC-93349, above) which was sealed by the cobbled/metalled surface. As the tree species was unidentified, there is potential for there to be an unknown age offset due to the old wood effect in the sample that was submitted for dating, although it represented a best attempt to date the feature.

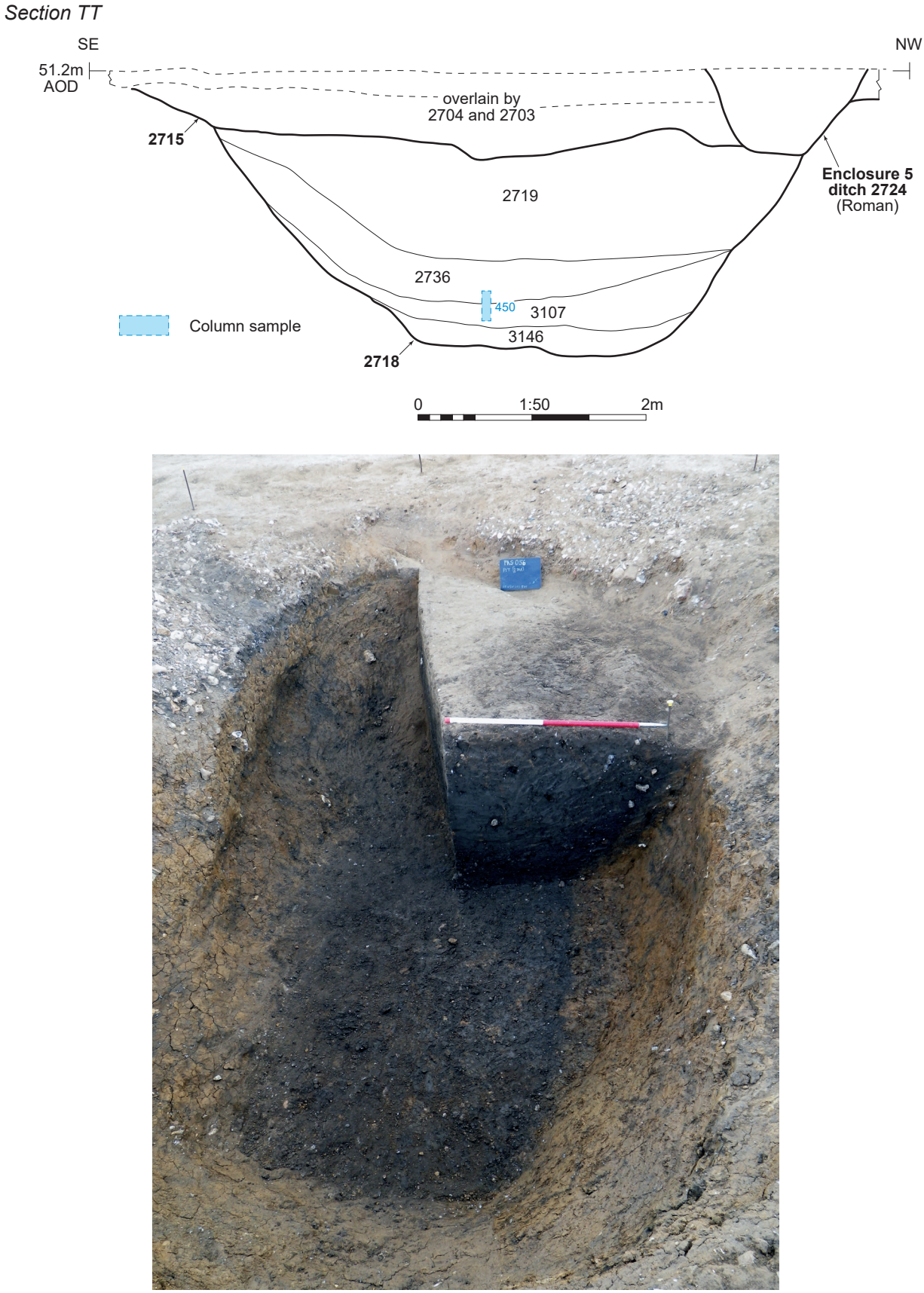


Figure 2.16 Marham Park, Fornham All Saints: BM 1, section and photograph of well 2718

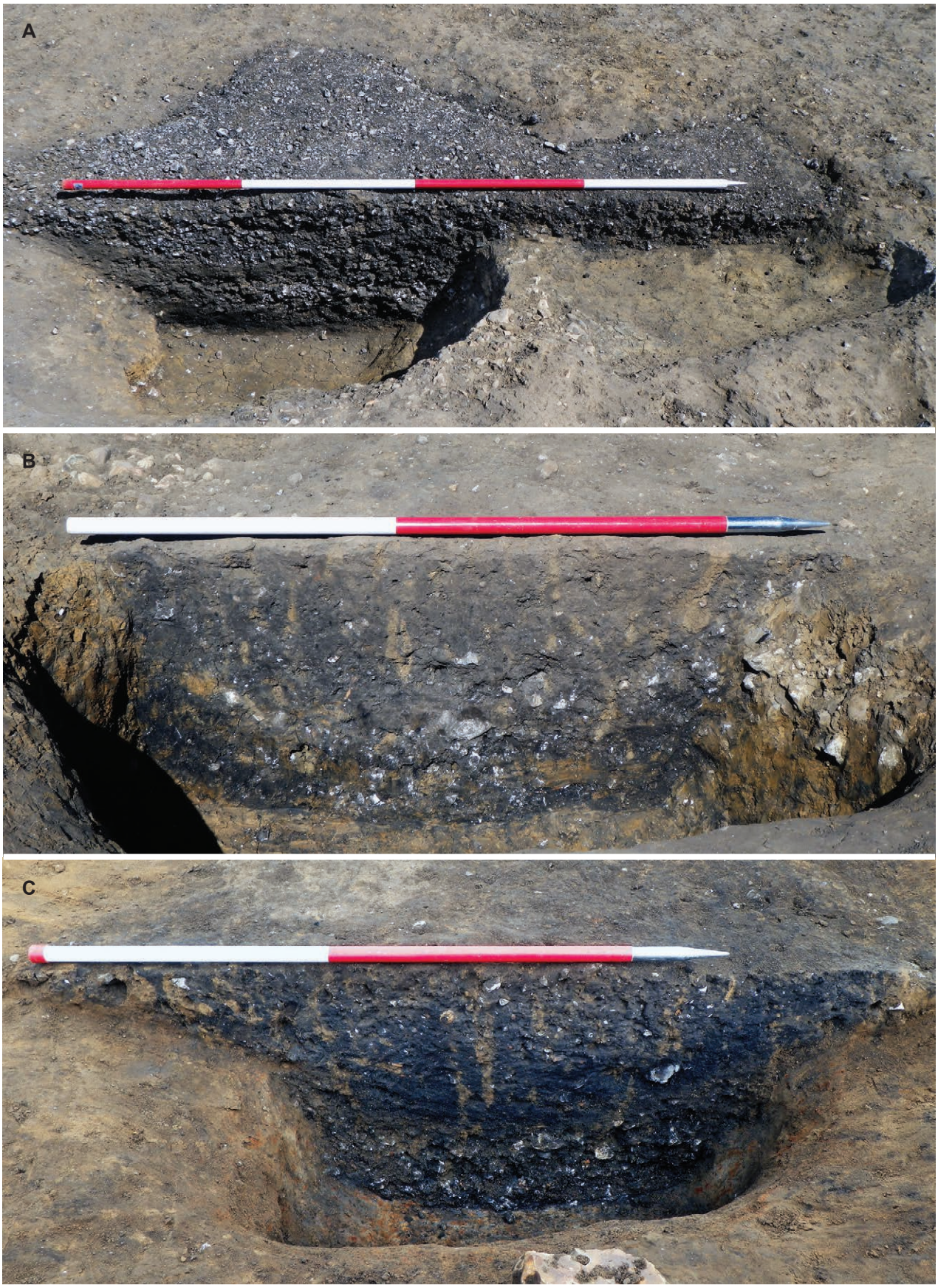


Figure 2.17 Marham Park, Fornham All Saints: BM 1, photographs of troughs 2926 (A, Section LL), 2976 (B, Section OO) and 2921, (C, Section MM)

The upper fills of the probable troughs (2927, 2922, 2933/4, 2977, see Fig. 2.15) were similar to or the same as an ash, charcoal and heat-affected flint layer that covered them and the cobbled surface 2917 (see below); this may have been incidental or spent burnt flint may have been deliberately dumped into features that had previously been used to hold water. Geoarchaeological analysis suggests differences in the backfilling of the pits. In pit 2932 an A-horizon or deposit representing stabilisation had developed beneath the dump of stones, 2934, indicating that waste material was probably dumped into or incorporated into an earlier feature which had held water and which had been open for a period of time; there was little evidence of *in situ* heating of soils, which indicates that flint was probably finally deposited in the pit when it was cold (see Allen below). In trough 2921 the backfilling appears to have been more immediate.

Feature 2919 was the only one of the five troughs which did not contain an earlier basal fill (Fig. 2.15, Section KK); it was filled by 2920, similar to layer 2917 (see below) but with a greater concentration of heat-affected flint. It is possible that this pit or trough was later in the sequence than the others, perhaps even cutting layer 2917, and functioning with a secondary well to the south, 2718 (see below). Residues of palmitic and stearic acid typical of degraded animal fats were identified on a sample of burnt flint from this feature, from non-ruminant (pig?) sources (Dunne and Evershed below).

Overall finds from the upper fills of 2919, 2926 and 2932 included 45 struck flints and 18 small sherds of Beaker pottery (62g), perhaps representing general waste in the area. The assemblage of finds recovered from fill 2922 (pit 2921) was much larger, comprising 305 struck flints, 76 pieces of mammal bone and 370 sherds of Beaker pottery weighing over 1.8kg, with large parts of a single vessel (see Fig. 2.42); it seems likely that this pit was more deliberately, rather than incidentally, backfilled.

Pits

Three smaller circular pits were recorded around the edge of the principal well (3147, 3160, 3170), with two slightly larger ones to the south and east, 3088 and 2923 (Fig. 2.11). They ranged from 0.6m to 1.2m in diameter and from 0.25m to 0.8m in depth (Table 5.1) and were cut through the metalling or were abutted by it. These too had vertical or near-vertical sides and flat bases, and they had similar fill sequences to the troughs, with between one and three fills of waterlain deposits overlain by charcoal and burnt flint-rich material that was equivalent to fill 2917, which covered the hollow. It is possible that these were used in the same way as the larger rectangular pits, perhaps lined with wicker or leather, or potentially wooden barrels, buckets or hollowed tree trunks.

The lower fill of 3147, 3148, was of clay with some inclusions and eight struck flints. Two lower fills were recorded within pit 3170, which cut the cobbled/metalled surface at the west of the well; a sandy silt basal fill, 3171, and an orange clay fill (Fig. 2.15, Section QQ). A charred hazelnut shell from 3171 gave a radiocarbon date of 2267–2038 cal BC at 95.4% (SUERC-93348, Table 2.19); this suggests that the feature was slightly later in the sequence than some other features for which radiocarbon dates were obtained. Pit 3160 held a single fill of clay silt with heat-affected flint and charcoal flecks from which seven struck flints were recovered (Fig. 2.14, Section CC and photograph). The lower fill of pit 2923 (Fig 2.15, Section PP) comprised waterlain sandy silt 0.55–0.6m deep with occasional large flint inclusions, from which deposit one smaller sherd of pottery (2g) and six worked flints were recovered; the upper fill, 2924, was similar to deposit 2917 (see below).

Finds from the upper deposits within pits 3088, 2923 and 3170 included between ten and twenty struck flints each, with 3g of Beaker pottery from 3170.

A number of smaller shallower pits were also recorded in the vicinity: 2600, 2602, 2781, 2783, 2929, 2930, 3158 (Fig. 2.11). Feature 2929 was rectangular, 1.0m long and 0.18m deep, but most were circular, between 0.3m–1.0m in diameter and 0.1m–0.22m deep. Most had single fills of sandy silt with inclusions of occasional charcoal and small fragments of heat-affected flint. The exceptions were 2929 and 2930, which were filled with a deposit similar to layer 2917 which filled the hollow (see below), with the fill of 2929 noted as similar to the fill of adjacent feature 2926 (Fig. 2.15, Section LL). Pit 2602 was filled with a similar deposit, from which three pieces of hazelnut shell were recovered, but also had a basal fill of clay silt with occasional charcoal and small fragments of heat-affected flint. Other finds from these pits included a single struck flint from 2783, with one small fragment of Beaker pottery (2g) and ten struck flints from fill 3159 of 3158 (Fig. 2.15, Section QQ).

Secondary wells

Two smaller oval-shaped features were probably wells as they were relatively deep for their size. They appeared to have been cut through or surrounded by the cobbled/metalled surface and could have been secondary to the main well (Fig. 2.11). Feature 3109 was 1.3m long, 1.1m wide and 1.08m deep (Fig. 2.14, Section JJ). The basal fill 3112, beneath two clay deposits, was a waterlain sandy clay. The lack of heat-affected flint from the feature may indicate that it had been kept clean, or that it belonged to an earlier phase of use; occasional flints in the upper fill, 3110, may have been remnants of a poorly surviving part of the cobbled surface overlying the feature. Four struck flints were recovered from this upper fill.

Feature 3165 was 1.7m long, 1.5m wide and 0.75m deep with steep sides (Fig. 2.14, Section CC and photograph). The basal fill, 3168, was a waterlain silty clay sand, with rare heat affected flint inclusions. The middle fill, 3167, included more heat-affected flint, and the upper fill, 3166, equivalent to 2917 across the hollow (see below), was a sandy silt with frequent charcoal and heat-affected flint from which 11 struck flints were recovered. Both were

immediately adjacent to the principal well, to the north. They may perhaps represent wells that were cut when the principal one had decayed but had not yet been replaced by the large secondary well to the south, 2718.

Well 2718 was oval-shaped, 6.20m long and 4.10m wide, and was cut through the cobbled/metalled surface. At 2.40m deep it was of a similar depth to the principal well but was simpler in form – a large, open bowl shape with no obvious evidence of recutting or clearing out (Fig. 2.16, Section TT and photograph). This may be because it was not cut into a natural sinkhole, with the attendant geological complexity, additionally it may not have been in use for as long. There was also no evidence to suggest that this well was lined, it may have been a simple pit-well. The basal fill, 3146, was of mottled clay silt with frequent large flint inclusions that probably fell from the cobbled surface (see *Geoarchaeology*, Allen below). Ten struck flints were recovered from it. The secondary fills, 3107 and 2736, were charcoal-stained clay silts with occasional flint and heat-affected flint inclusions; waterlain but with residues of charcoal, ash and heated stone waste from surrounding activities. Eighty fragments of cattle bone including a molar (113g), fragments of dog/wolf bone and other mammal bone were recovered from them, particularly 3107, along with 28 struck flints.

The upper and greater portion of the well was filled by a compact grey silt clay with occasional charcoal flecks and flint inclusions, 2719, from which 148 struck flints, 13 fragments of cattle bone, other fragments of mammal bone and 10 small sherds of pottery (32g) were recovered. Although small and fragmentary, these appear to represent parts of the base of an Early Bronze Age Collared or Biconical Urn. This fill may have been dumped as deliberate backfill (*Geoarchaeology*, Allen below). Unlike the main well, this feature was not covered by the earliest infill layer of the hollow, 2917 (see below). It therefore appears to have been open as that layer formed and may have cut through at least some of it. This well and one of the associated 'trough-like' pits, 2919, appear to have represented the final period of use within the hollow, and may be better placed in the Early Bronze Age.

Pits outside the hollow

Two large oval-shaped pits, 2569 and 2617 (Fig. 2.11 and Fig. 2.15, Sections RR and SS) were recorded outside the hollow, with a third, 2591, to the south-west (section not illustrated). They were 1.2–1.4m long, 0.76–1.24m wide and 0.16–0.54m deep, with generally steep sides to flat bases. They may have been troughs, although 2569 and 2591 were 12m and 20m distant from the main well. The lowest fill of 2569, north-west of the hollow, was a charcoal-rich sandy silt with occasional heat-affected flints, 2572. Above this, fill 2571 contained abundant charcoal and heat-affected flint (13kg), probably dumped, given that there was no visible indication of *in situ* burning. The basal fill of 2591, which had a more gradual eastern edge, was of charcoal-rich clay silt with abundant heat affected flint; a 3.25kg sample of this was taken. The lower fill of pit 2617 comprised mainly mounded charcoal, 2619. A few worked flints were recovered from 2569 and 2617. The upper fill of all three was a dark charcoal-rich sandy silt with abundant charcoal and heat-affected flint (97kg from 2617).

An undated pit, 2743, was located approximately 2m east of the burnt mound complex (Fig. 2.10). It measured 1.8 by 0.7 by 0.18m, with steep sides and a flat base. It may have been associated with the burnt mound, although the volume of burnt flint recovered, 2.7kg, was relatively low for the size of the feature, and it may have been a later pit containing some residual heated flint. Pit 2739 was 6m north-east of pit 2743 (Fig. 2.10). It was circular, just over 1m in diameter and 0.26m deep, with a charcoal-rich fill. Six struck flints and 1.4kg of heat-affected flint were recovered from it, again an insufficient basis to certainly associate the feature with the burnt mound. They may have been contemporaneous and linked to the burnt mound activity.

Infilling of the hollow

An extensive layer of black charcoal-rich silt up to 0.12m thick, 2917, covered features in the hollow (see, e.g. Fig. 2.13). It is estimated to have contained approximately 3.5 tonnes of heat-affected flint, based on the dimensions of the hollow and depth of the fill, giving an approximate volume of 8.25m³ and a mean average of 16.86kg per 40-litres from three bulk samples (equating to 425.1kg per m³). This may have represented dispersal of material generated during the use of the burnt mound, deliberate backfill or *in situ* waste or trample generated during the latest processes at the site. These, however, would be indistinguishable stratigraphically. The infill layer may in part also have originated in out of season consolidation and turf growth accumulating during the use-life of the cobbled surface and features. An assemblage of 420 sherds of pottery (1.4kg) was recovered from layer 2917, comprising mainly Beaker pottery with a small element of residual Early Neolithic Plain Bowl. The average sherd weight of just 3.3g suggests that the pottery was present in general surface deposits. The assemblage of struck flint was larger, at 1384 pieces, including 115 tools. A radiocarbon date of 2113–1916 cal BC at 95.4% (SUERC-93345) was obtained from a hazelnut shell (context 3085, see Table 2.19). This range is, broadly, a century or two later than the three dates obtained for stratigraphically earlier features relating to the main activity in the hollow and may give a broad end date to the main activity within the area; limited activity, however, may have taken place into the Early Bronze Age.

Above this layer, fill 2704 (not illustrated) was a paler silt up to 0.4m deep in the centre of the hollow; this lay directly over the latest well in the sequence, 2718, which, as noted above, was not sealed by layer 2917. Layer 2704 contained only occasional fragments of heat-altered flint. Pottery again comprised Beaker and occasional Neolithic sherds with a low average sherd weight (65 fragments weighing 164g). Over 1000 worked flints were recovered

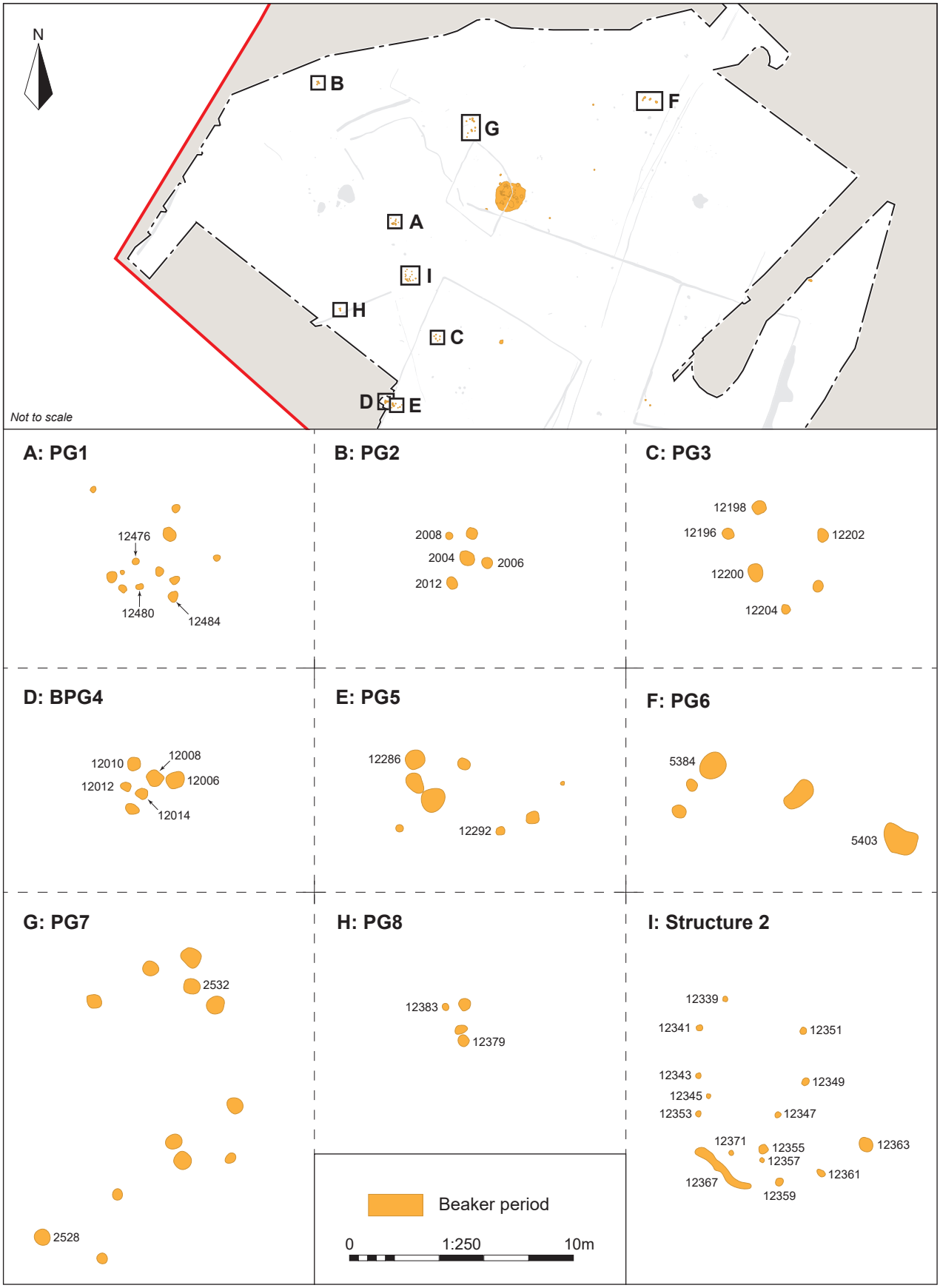


Figure 2.18 Marham Park, Fornham All Saints: Beaker pit groups (PG1–8) and structure (S2)

Table 2.1 Average pit sizes per Beaker Pit Group at Marham Park (in cm)

Group	No. of pits	Length	Width	Depth
PG 1	12	0.36	0.22	0.16
PG 2	5	0.50	0.50	0.25
PG 3	6	0.54	0.42	0.22
PG 4	6	0.53	0.53	0.21
PG 5	8	0.61	0.61	0.19
PG 6	5	1.05	0.80	0.22
PG 7	12	0.70	0.70	0.18
PG 8	4	0.50	0.39	0.15

from this layer, including 60 tools. A final silt layer, 2703, filled the remainder of the hollow; this contained 1152 worked flints including 27 tools, a small assemblage of Neolithic, Beaker, later Prehistoric and Roman pottery, and two pieces of mammal bone. Within the flint assemblages from these three layers the proportion of tools present decreased dramatically the further up in the sequence from the archaeological features, from 8% to 5.5% to 2% of the assemblages.

Beaker structure

A roundhouse, Structure 2, was recorded 80m to the south-west of BM 1, comprising seven postholes which formed a slight oval 6m long by 5m wide; one or more further postholes may have been missing (Figs 2.10 and 2.18I). Six further postholes lay within 2.5m of the south side. The dimensions of the postholes ranged from 0.17m–0.50m long, 0.16m–0.4m wide and 0.08m–0.27m deep. They were filled with silty clay with occasional charcoal flecks. One sherd of pottery (9g in total) was recovered from each of four of the postholes, 12341, 12353, 12359 and 123261, two of which were datable as Beaker sherds. Ten struck flints were also recovered, with 175g of heat-affected flint, and a few fragments of mammal bone from 12341 and 12345. A short stretch of a possible ring or drainage ditch, 12367, possibly marked the south-western limit of the building, and finds from this included six struck flints, a single fragment of mammal bone, a small quantity of heat-altered flint and five sherds of pottery (44g) which, where recognisable, were Beaker.

The structure was oriented north-north-west to south-south-east, with the entrance at the latter. Feature 12363, somewhat larger than the rest of the postholes in the circle and located to the south, was probably a pit; three sherds (16g) of Beaker pottery and ten struck flints were recovered from it. However, with a second, smaller posthole to the south, 12361, it could have held the posts for a façade to an entrance porch for the roundhouse, thus making the building 10m in diameter overall, with a 5–6m internal ring of roof-supporting postholes. This long 'extended porch' might be a feature of Beaker roundhouses: one of the only well-dated examples excavated and published in recent years, at Bradley Fen (Knight and Brudenell 2020), is of almost identical size and design, though unusually for a prehistoric roundhouse its porch and entrance was oriented east-north-east rather than south-south-east as would be the norm, and as is the case at Marham Park.

A hazelnut shell recovered from pit/posthole 12363 gave a radiocarbon date of 2135–1959 cal BC at 95.4% (SUERC-93357, Table 2.19). This is distinctly separate from the earliest dates from BM 1. However, it may indicate that activity at Structure 2 potentially occurred within the use-life of the complex, given that the date is broadly similar to that of 2113–1916 cal BC (at 95.4% probability, SUERC-93345) which came from a hazelnut shell incorporated into fill 2917 covering features in the hollow associated with BM 1 but not the secondary well 2718. The date is broadly similar to those obtained from pit groups, including PG 4, where a piece of hazelnut shell gave a date of 2140–1977 cal BC at 95.4% probability (SUERC-93354). PG 3 may have been a satellite group to the structure and a date of *c.* 2196–2027 cal BC at 95.4% probability (SUERC-93355, Table 2.19) was obtained from a piece of hazelnut shell from one of the pits (12198, Fig. 2.18C).

Beaker period roundhouses are relatively rare. When Gibson published *Beaker Domestic Architecture in Britain and Ireland* (2019) very few actual roundhouses were included, at least from lowland England, with just two structures appearing convincing, from Sutton Hoo in Suffolk and Hunstanton in Norfolk (ibid.). The Bradley Fen roundhouse, with its circle of support posts, central hearth, façade and porch (Knight and Brudenell 2020) was something of a gamechanger, and the Marham Park building is another good example that has features in common with the small corpus from the eastern region. A further example was identified at Fordham Road, Newmarket, comprising postholes arranged in a perfect circle that was associated with five pits to the south-east that contained Beaker period pottery and lithics, and a broad linear feature, possibly a midden (Rees 2014, 15 and fig. 5). The main conclusion that can be drawn is that the structure at Marham Park may suggest a more permanent occupation but if it was for human habitation at all it may have been seasonally occupied (see Chapter 5).

Beaker pits

Beyond those within BM 1, 68 Beaker period pits were recorded across the site and it is probable that a number of the undated pits, those without finds, were also of this date. Eight Beaker period pit groups were identified within site area FAS 056, with a further two pairs of pits and five discrete features. One pit was recorded in area FAS 055 (see Fig. 2.5, 'Bronze Age'). The number of pits recorded, at a minimum of 68, makes Marham Park one of the larger Beaker period pit sites in the region in recent decades, When Garrow published *Pits, Settlement and Deposition during the Neolithic and Early Bronze Age in East Anglia* in

Table 2.2 Finds assemblages per Beaker Pit Group at Marham Park

Group	No. of pits	Pot (no.)	Pot (g)	Pot per pit (approx. no.)	Flint (no.)	Flint per pit (approx. no.)
PG 1	12	59	342	5	40	3
PG 2	5	154	1160	31	45	9
PG 3	6	21	129	3.5	47	8
PG 4	6	126	718	21	98	16
PG 5	8	73	260	9	56	7
PG 6	5	64	420	13	54	11
PG 7	12	2	10	<1	22	2
PG 8	4	10	33	8	69	17

2006, for example, the ten already published study sites between them contained just 41 pits, with ten being the greatest number from an individual site.

Tables 2.1 and 2.2 give the dimensions of the pits, and an indication of the density of finds material recovered from them; the features are considered more fully in the archive report (Green and Mortimer 2023), with further comment in Chapter 5, which assesses the character of artefactual assemblages from them and highlights their significance to studies of Beaker domestic sites in the region (below). The pits were generally circular or subcircular, 0.40–0.70m in diameter and 0.20m deep, with steep edges and bowl-shaped to flat bases (Table 2.1). The form and sizes of the individual pits at Marham Park are comparable to those recorded elsewhere in the region. Apart from some of the very largest, the pits contained single homogeneous fills. In general the discrete and paired pits were of similar form and fill to those within groups, with similar assemblages. The finds assemblages were generally limited (Table 2.2) and were recovered from throughout the pit fill matrices, with no particular concentrations at the sides or bases.

Just over 900 sherds of pottery (6.7kg) and 570 pieces of flint were recovered from within the 68 pits across the site. The pottery sherds were on average larger than those from deposits and fills of features within the burnt mound complex, undoubtedly a result of the deposition of waste material within the sealed pits contexts rather than on the ground surface, as was likely the case at the burnt mound. The flint assemblage was considerably smaller than that from the burnt mound site, undoubtedly reflecting the specialist activity that was being undertaken there.

The Beaker pits at Marham Park were similar to others in the region. On average there were seven pits in a group, with one group of four, two of five, two of six, one of eight and two of twelve. Recently excavated examples in Suffolk include three pit groups of five, six and nine at Felixstowe (Meredith and Mortimer 2023), two clusters of six and seven pits at Ingham Quarry in Fornham St Genevieve, near Marham Park (Newton and Mustchin 2015) and larger groups of seventeen features at Worlingham in the east of the county (Bales 2003) and a loose cluster of twenty-five pits at Saxmundham with one associated with a radiocarbon of 2200–2030 cal BC at 95% probability (Billington *et al.* 2018). A group of four pits was excavated to the north at Kilverstone in Norfolk (Garrow *et al.* 2005 and 2006). This grouping of pits into small clusters, while not universal, is therefore very common, as it is in the earlier Neolithic, although the Beaker groupings are perhaps less formal.

Beaker Pit Groups

(Fig. 2.10 and Fig. 2.18)

Pit Group 1

PG1 was located approximately 35m to the north of Structure 2 and comprised a relatively tight group of 12 features. The four pits with the largest finds assemblages, together containing 70% of the total assemblage from the group, including 38 struck flints, were those that formed the southern limit of the group; the five pits which contained no material were at the north-west of the group. Environmental samples from pits 12484, 12480 and 12476 produced cereal grain fragments (see West below).

Pit Group 2

PG 2 was located 120m north-west of Structure 2 and comprised a tight group of five features. Four of the pits in PG2 between them held a small, combined assemblage of pottery and flint; and pit 2012 held 146 fragments of Beaker pottery weighing 1.16kg. A combined assemblage of 63 struck flints was recovered.

Pit Group 3 (Fig. 2.19A)

PG3 was located approximately 50m south of Structure 2. The pits were arranged in a D-shape, and the open area within it measured *c.* 4m by 3m. A radiocarbon date of 2196–2027 cal BC at 95.4% probability (SUERC-93355, Table 2.19) was obtained from a piece of hazelnut shell from pit 12198. At 68.2% probability, the date was between 2136 and 2040 BC, broadly similar to the date associated with Structure 2 (see above). The three westernmost pits of the six contained 75% of the finds. Finds included 44 struck flints. Three small pieces of mammal bone (2g) came from pit 12196. Selected pottery sherds from pit 12198 are shown in Figure 2.43S.

Pit Group 4 (Fig. 2.19B)

PG4 was a tight group of six features *c.* 100m south of Structure 2. A total of 152 worked flints and 143 pottery sherds were recovered from the group (a selection is illustrated, Fig. 2.43O, Q and R). Sherds from the same



Figure 2.19 Marham Park, Fornham All Saints: photographs of PG3 (A, facing SE), PG 4 (B, facing SW), PG 6, pit 5384 (C, facing SE), PG 8 (D, facing W), 1m and 2m scales

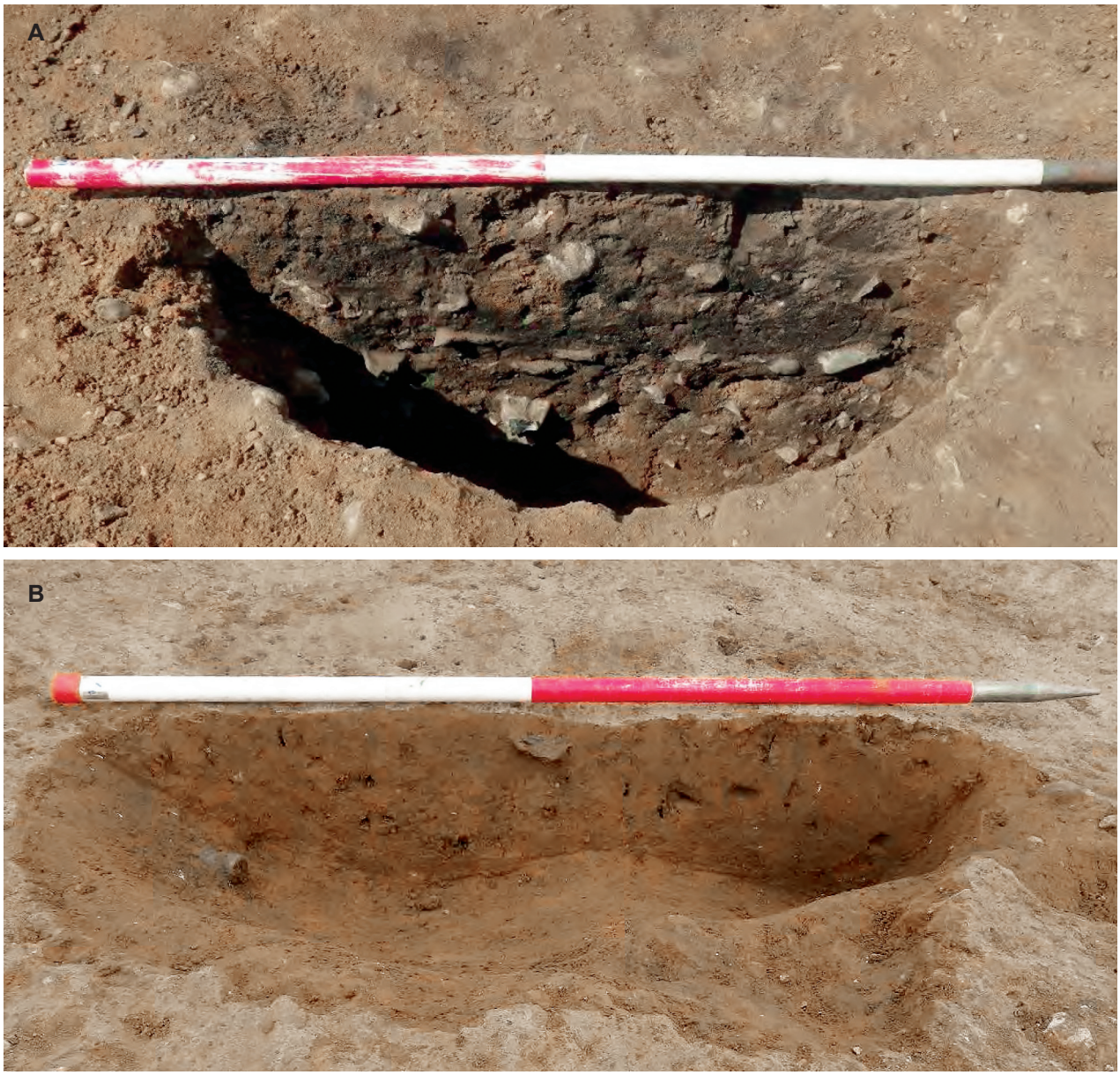


Figure 2.20 Marham Park, Fornham All Saints: photographs of Beaker pits 2712 (A) and 11120 (B), facing north, 1m scale

vessel were noted between pit 12006 and pit 12286, which was three metres away in the adjacent PG5 (Fig. 2.43O and P). Charred acorn fragments and 328 pieces of hazelnut shell were recovered from pit 12010; one of the latter returned a radiocarbon date of 2140–1977 cal BC at 95.4% (SUERC-93354, Table 2.19). At 68.2% probability this is 2132–2026 cal BC, in the same broad range as those associated with Structure 2 and PG3. A fragment of charred sheep/goat bone was recovered from Pit 12008, with 5g (42 frags) of other mammal bone. In PG4 the three northernmost of the six pits contained 86% of the material.

Pit Group 5

PG5 was a tight group of five pits with three satellite features, adjacent to PG 4. The size of the finds assemblages increased towards the north, with the northernmost pit containing 70% of the finds. Pit 12286 contained more finds than the others combined and included a sherd that cross-fit with one from pit 12006 (see above, PG 4, and Fig. 2.43P).

Pit Group 6

PG6 was a relatively tight group of five features, three of which were much larger than the others, including pit 5384 (Fig. 2.19C). Ninety-one pieces of flint were recovered, including a small part of a flint dagger (not illustrated). Selected pottery sherds from pits 5403 and 5384 are illustrated in Fig. 2.42K and L. Twenty-seven pieces of mammal bone (31g) were recovered from pit 5384 and nine pieces (1g) from 5403.

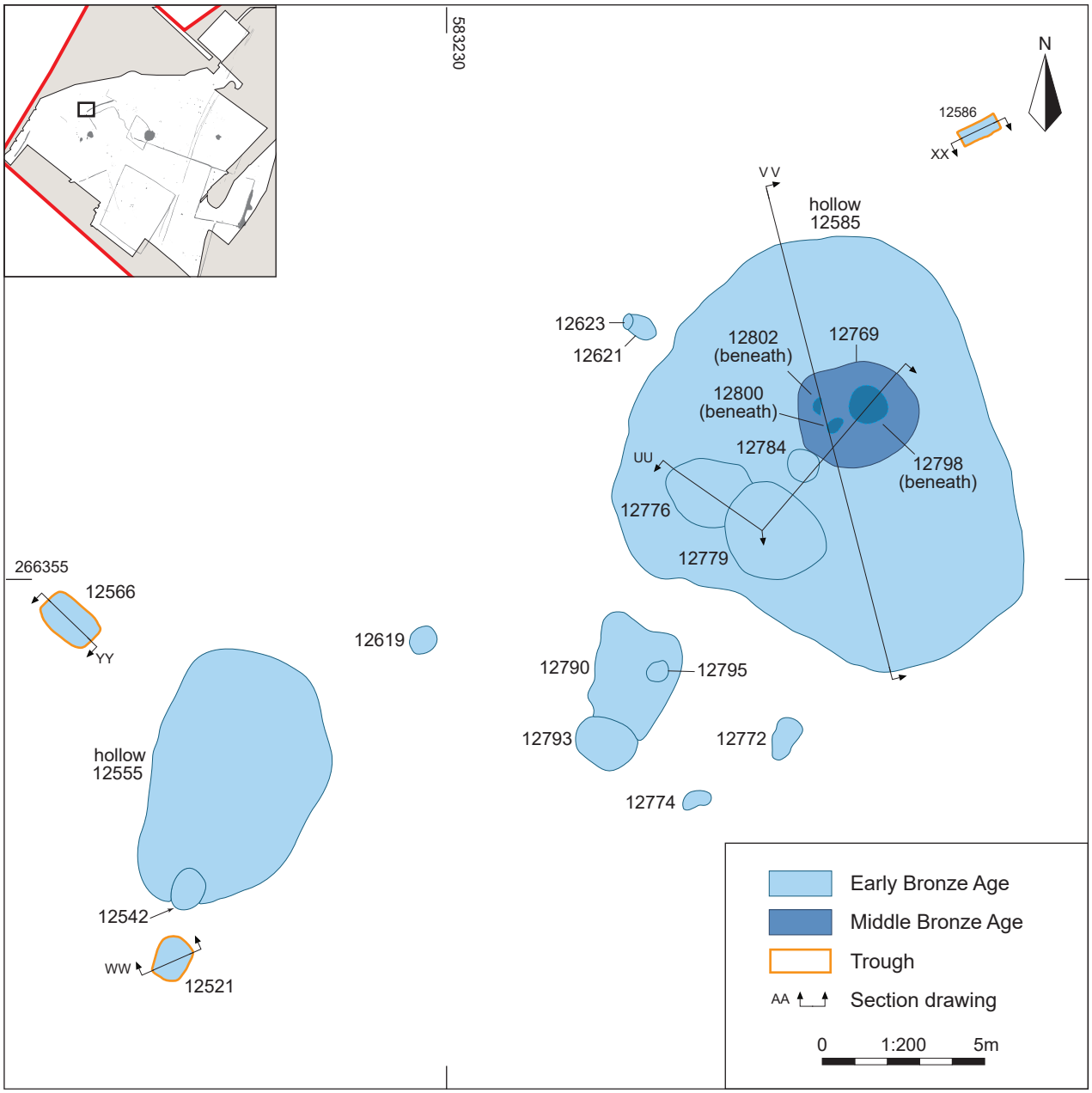


Figure 2.21 Marham Park, Fornham All Saints: Early Bronze Age burnt mound complex (BM 2)

Pit Group 7

PG7 was located equidistantly between groups PG1, PG2 and PG6. The twelve pits were fairly homogeneous but fell into a northern and southern group. Compared to other groups, the density of finds in all the pits was remarkably low (see Table 2.2).

Pit Group 8 (Fig. 2.19D)

PG8 was a small, tight group of four pits located approximately 50m west-south-west of Structure 2. The only instance of pits intercutting occurred in this group, although many others in close proximity would probably have done so prior to truncation. A total assemblage of 11 pottery sherds, 69 struck flints and 29 fragments (17g) of mammal bone were recovered.

Paired and single Beaker pits

Two pairs of Beaker pits and six single pits were recorded across the site (not illustrated in detail). Notable finds assemblages came from two of the single pits. Pit 2712 (Figs 2.10 and 2.20A) contained 148 sherds of pottery weighing 1.66kg (Fig. 2.41A and B), 63 struck flints and 450g of heat-affected flint. Pit 12241 (Fig. 2.10), which was large at *c.* 2m diameter, contained 32 flints and 255 sherds of pottery (1.42kg), including large parts of a single crushed Beaker vessel at its base (selected sherds illustrated Fig. 2.43U). The feature had a rough, undulating base and might best be seen as a natural feature, perhaps a tree throw-hole – its assemblage profile differs markedly from all other pits on the site. Pottery from pit 11120 (Figs 2.10 and 2.20B) is illustrated in Figure 2.42M.

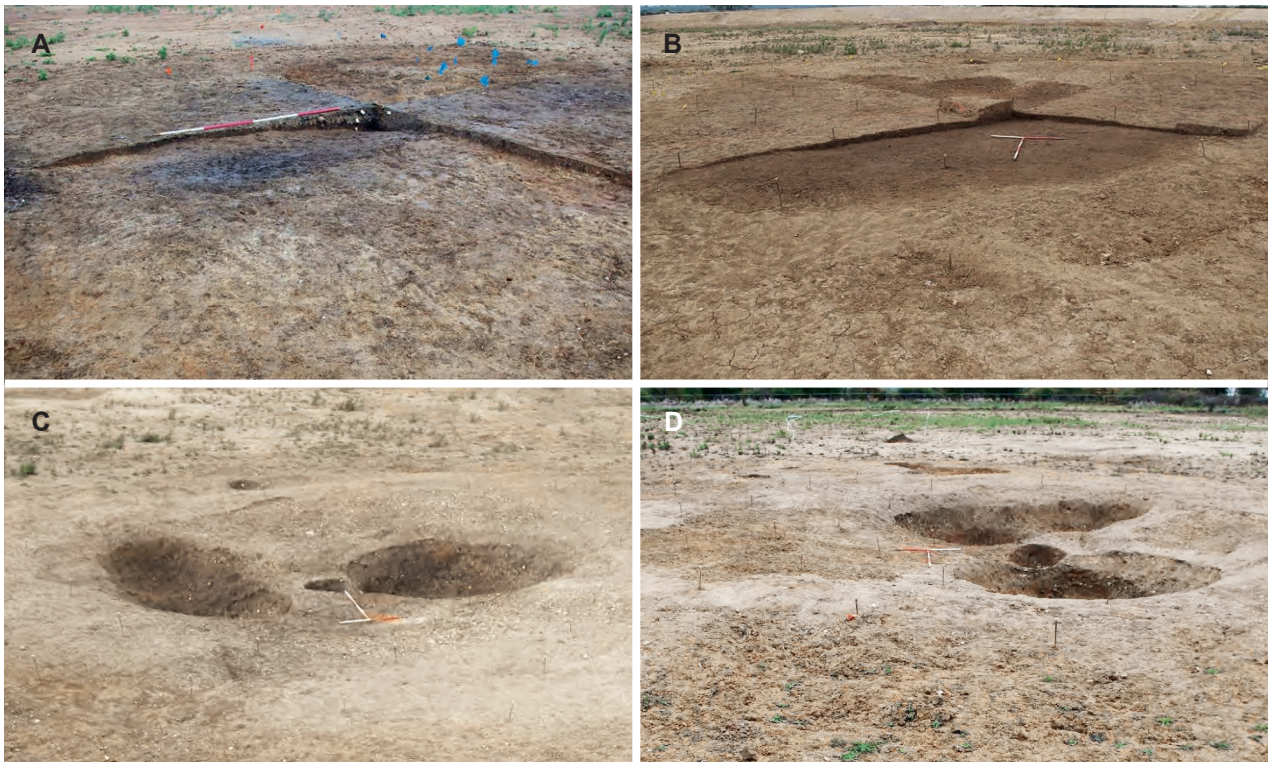


Figure 2.22 Marham Park, Fornham All Saints: BM 2, photographs of hollows 12555 (A, facing N) and 12585 (B, during excavation, facing W; C, showing wells and cobbles, facing W; D, after excavation, facing SW), 1m and 2m scales

Early Bronze Age (1950–1600 BC)

Burnt mound complex (BM 2)

A second, smaller, later burnt mound complex, Burnt Mound 2 (BM 2), was located 100m to the west of the Beaker period burnt mound site (Fig 2.21). This was centred on a group of wells that had been dug within a natural hollow, 12585, with 'troughs' outside of the hollow to the north-east and south-west. Between the troughs and the wells there was a second large and shallow hollow, 12555, and a number of cut and natural features, some of which contained quantities of heat-affected flint. Over a thousand struck flints were recovered, including 20 tools; these were fewer in number than those from BM 1 and generally larger and more irregular (see *Worked flints*, Bates below).The pottery assemblage from features within the complex was incidental (fewer than a hundred sherds), comprising largely undiagnostic sherds probably belonging to an Early to Middle Bronze Age Biconical Urn tradition (*c.* 1900–1600 BC); an absence of earlier ceramic traditions such as Collared Urn and Food Vessel within this range may suggest a hiatus in activity between the use of Beaker vessels and the uptake of wares in the later Biconical Urn tradition (Doherty and Barclay below). Radiocarbon dates of 1870–1658 cal BC from 12776, one of the earlier wells, and of 1879–1694 cal BC from one of the covering layers (SUERC-93365 SUERC-93359, see Table 2.19), both at 95.4% probability, indicate that activity probably commenced at BM 2 in the mid-19th to early 17th century BC (see Hamilton below and Fig. 2.48). At 68.2% probability the dates were 1746–1691 cal BC and 1870–1700 BC, suggesting an approximate period of use for the principal mound features within a timeframe of 1800–1700 BC. Broadly this correlates with the date of the small assemblage of pottery from surrounding features.

Overall BM 2 was less complex than BM 1 to the east, and appears to have been in use, possibly intermittently, for a shorter period; the quantities of heat-affected flint were comparatively small, the wells themselves were relatively clean and worked flint was noted to be sharp and therefore perhaps had not been around so long before deposition (Bates below). Some of the deeper features which contained quantities of heat-affected flint – trough 12586 and features 12619 and 12621 – also had a clean silty upper fill, perhaps suggesting that the 'mound' of heat-affected flint around the wells may not have been particularly large.

Methodology

The two hollows, 12585 and 12555, were divided into quadrants (Fig. 2.22). Opposing quadrants were excavated by hand in stratigraphic sequence. Feature 12585 was further divided into 2m by 2m squares so that the distribution of finds could be investigated. Smaller features were half-sectioned and then fully excavated.

Two environmental samples of 40 litres were taken from each layer within the quadrants of 12585 and 12555, and a single sample taken from each of the pits. Additionally,

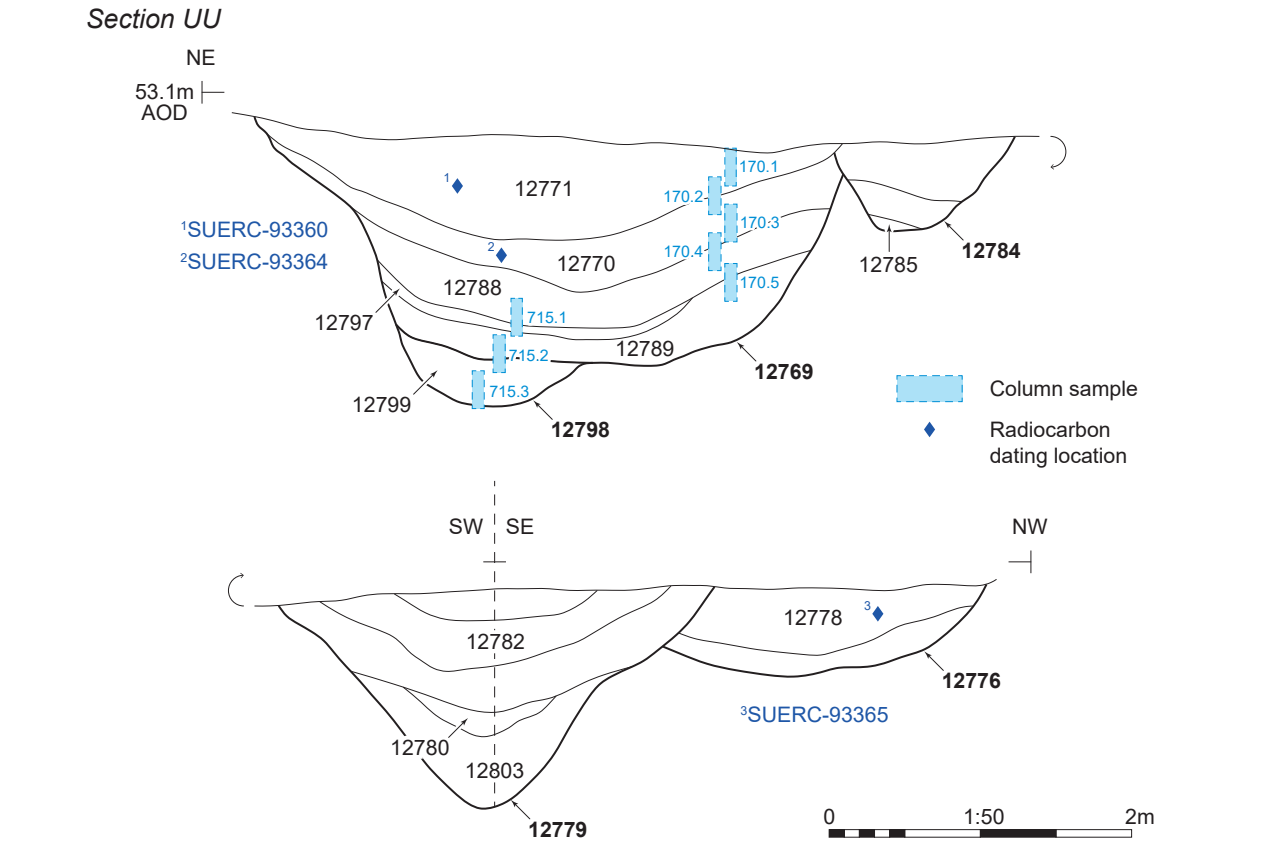


Figure 2.23 Marham Park, Fornham All Saints: BM 2, sections and photographs of Section UU showing EBA wells 12779 (A), 12798 (B), and MBA well 12679 (B), showing possible postholes for ladder

the volume of heat-altered flints in half of each fill was quantified for a selected group of the smaller features. Monolith samples were taken from hollow 12585, a well, 12769, and a natural feature, 12772.

Hollows

Hollow 12555 (Figs 2.21 and 2.22A) measured 8.5m by 5.50m and had a maximum depth 0.28m at the centre. It probably represents a fragment of surviving land surface preserved in a depression. It was filled by a red-brown clay silt (including 12570, not illustrated), a probable buried soil, overlain by a dark silt deposit (including 12563, not illustrated) that contained frequent heat-altered flints and charcoal which probably accumulated and became trodden into the ground surface as a result of surrounding activities. The hollow was then naturally infilled by silting (including context 12562, not illustrated).

A larger, deeper and more complex natural hollow, 12585 (Fig. 2.24, Section VV), lay 12m to the north-east of hollow 12555, probably the top of a geological solution hollow that had been modified for use, with the wells associated with BM 2 cut into it. It was broadly oval in shape, 13.50m by 11.75m, and up to 0.60m deep at the centre. A metalled surface (see below) was preserved within it; micromorphological analysis of the layer beneath, 12765 (not illustrated), indicated that the hollow had been

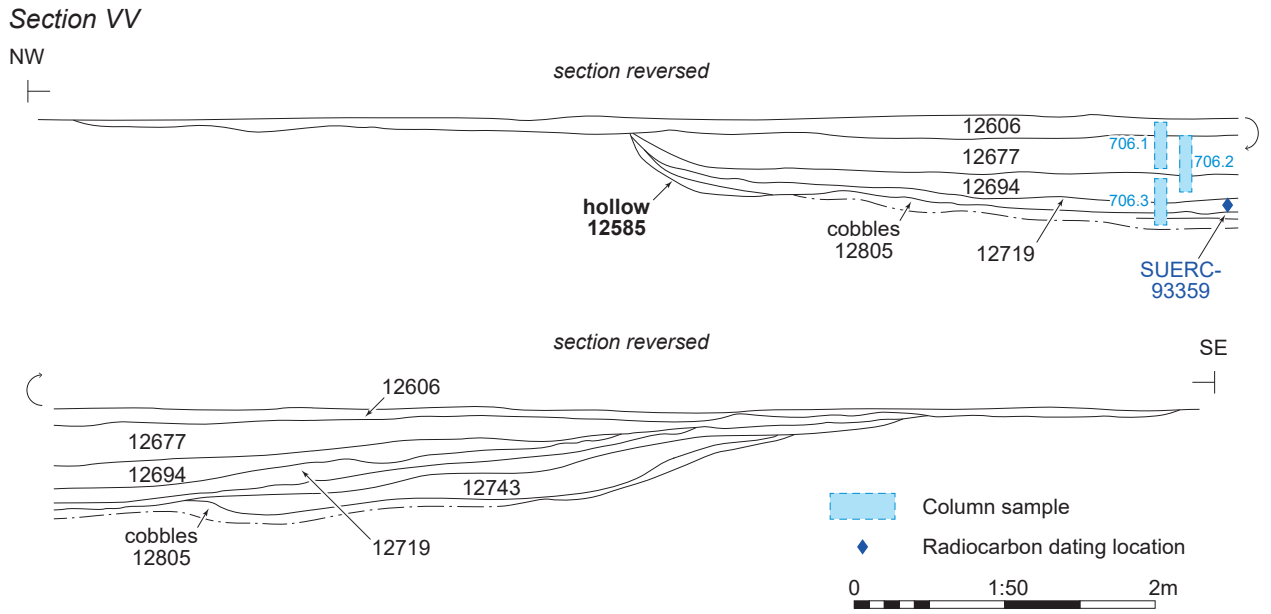


Figure 2.24 Marham Park, Fornham All Saints: BM 2, section of infilling layers

de-turfed prior to use, with the clean, compact B-soil horizon exposed either as a working surface or as a foundation for the metalling.

At the western limit of the hollow, pit 12776, 2m in diameter, had a gentle bowl shape and was 0.55m deep (Fig. 2.23, Section UU). It was filled by reposited natural clay fills, with two struck flints recovered from the uppermost fill. The feature may have been a natural dip within the hollow that was infilled/levelled when the main well, 12779, was excavated and its presence may have inspired the location of the well. Small fragments of oak and hazel charcoal were identified in samples from the fill (Challinor 2023) and a piece of hazel wood charcoal from the upper fill returned a radiocarbon date of 1870–1658 cal BC at 95.4% (SUERC-93365, Table 2.19).

Cobbled/metalled surface

The base of much of hollow 12585 had been surfaced with a layer of flint cobbles 0.1–0.2m in size, which had been pressed into the clay (overall number 12805, Fig 2.24, Section VV), presumably to provide traction and a firm working surface. The surface was patchy, and inconsistent in depth and extent; a few worked flints were recovered from it. The features within the hollow were either abutted by the surface, cut through it or had no relationship to it; none were sealed by it.

Wells

A cut feature, 12798, was recorded beneath the base of a probably Middle Bronze Age well within the hollow, 12769 (see below), representing a remnant of a smaller but slightly deeper early well within the complex. It was 1m long and 0.6m wide, with a surviving depth of 0.3m (see Fig. 2.23, Section UU, photograph B). A small amount (29g) of animal bone was recovered from the clay silt fill, including an eel bone, a few pieces of mammal bone including two pieces of sheep/goat bone, and a few traces of pollen indicative of an open, pastoral environment (Allen *et al.* below).

Well 12779 was cut into a possible natural dip, 12776, in the southern part of the hollow 12585 (Fig. 2.23, Section UU, photograph A). It was broadly circular, 3m in diameter, with a soft V-shaped profile and a narrow base 1.5m deep. It was filled by a series of five silty clay fills with occasional charcoal flecks. The pottery assemblage comprised six small, abraded sherds, probably fragments of a Biconical Urn, weighing 25g. Fired clay (57g), 19 struck flints and a few scraps of animal bone were also recovered; three pieces were recognisable as cattle (Curl below).

The date of the large northern well, 12769, is uncertain (Fig. 2.23, Section UU, photograph B). A sherd of Middle Bronze Age Deverel-Rimbury pottery and radiocarbon dates of 1406–1265 and 1388–1134 cal BC at 95.4% on charcoal from relatively short-lived species (Maloideae (hawthorn/apple/rowan etc.) and *Prunus* sp. (blackthorn/cherry)) from the upper fills, 12770 and 12771, indicate a date of approximately 1400–1200 BC and show that the well was infilling into the Middle Bronze Age (SUERC-93364 and SUERC-93360, Table 2.19). There is, however, little dating evidence from the lower fills save for small fragments of Biconical Urn from fill 12788, which could have been residual (see Fig. 2.44). Given the apparent 400-year gap between the two Early Bronze Age dates from the complex and the date from fill 12770, a potentially early disuse fill, it is likely that the well is of Middle Bronze Age date, serving a wider field system and exploiting the same natural features as the earlier well-diggers. However, the possibility remains that the well was of Early Bronze Age date and associated with activity at the burnt mound site and took a long time to completely infill.

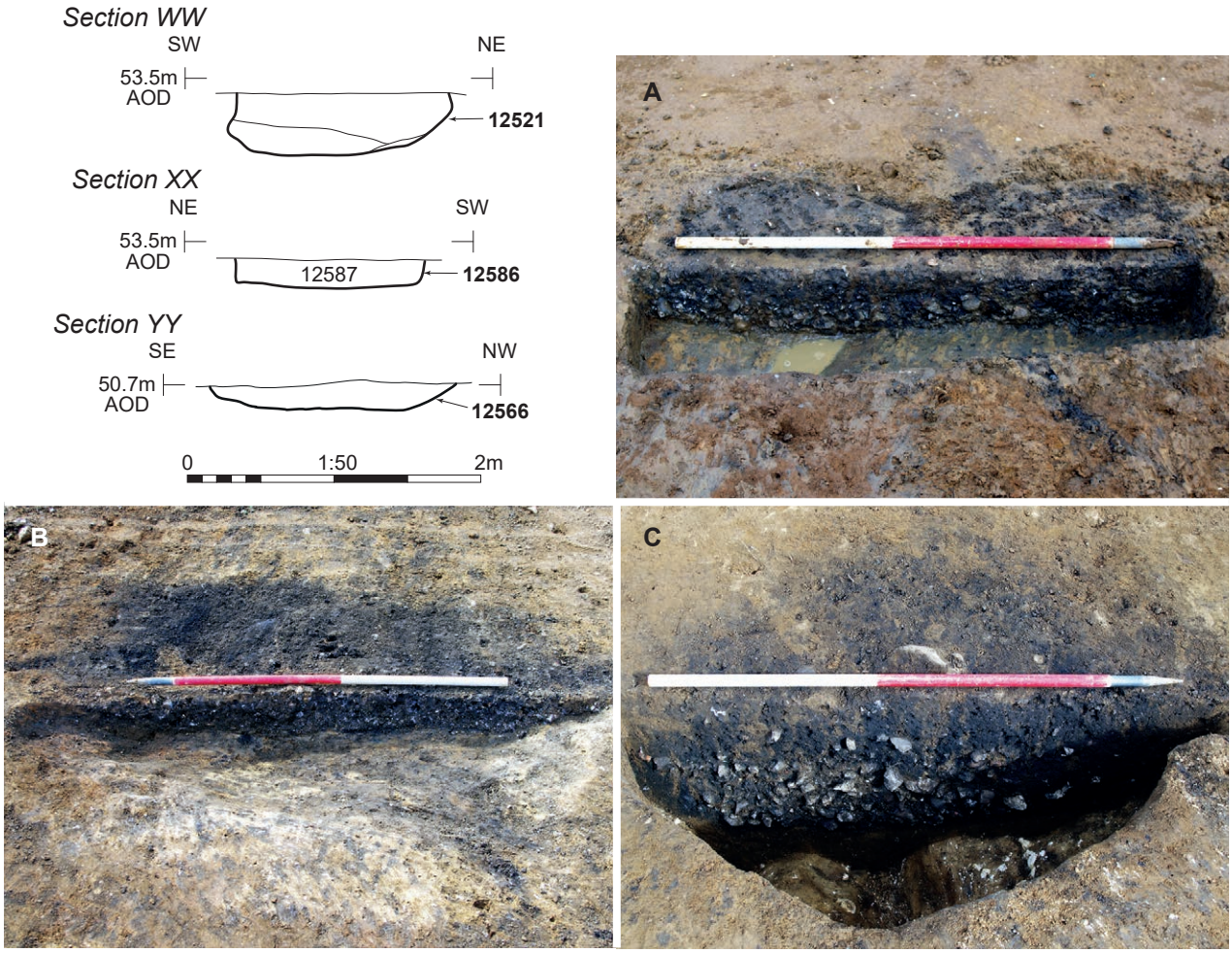


Figure 2.25 Marham Park, Fornham All Saints: BM 2, sections and photographs of troughs 12586 (A), 12566 (B) and 12521 (C)

Troughs

Two troughs, 12521 and 12566, were located close to hollow 12555. Trough 12566 was 1.7m long, 1.2m wide and 0.2m deep, with steep sides and a flat base and again may have been lined (Fig. 2.25, Section YY and photograph B). The fill, 12567, was a dark clay silt with abundant heat-affected flints and charcoal fragments, from which two struck flints were recovered. To the immediate south of the hollow, feature 12521 measured 1.40m long by 1.1m wide and 0.5m deep (Fig. 2.25, Section WW and photograph C), although it had slumped and been affected by bioturbation, with seemingly undercut sides and an undulating base. The lowest fill of the feature comprised 0.1m of clean silt (context 12547 on the north side, not illustrated) but the majority of the upper fills again consisted of heat-affected flint within a silty charcoal matrix. Eight pieces (6g) of mammal bone were recovered.

A third possible trough, 12586, lay 4m to the north-east of the main hollow. It was 1.25m long, 0.50m wide and 0.18m deep with square cut corners and vertical sides (Fig. 2.25, Section XX and photograph A). The lower fill was a dark clay silt with abundant heat-affected flint inclusions, and there was an upper, central fill of clean sandy silt. Like 12566 this feature probably held a wood-lined trough for heating water. A sample of burnt flints from fill 12587 which was subject to analysis for lipids produced traces of palmitic and stearic acid, typical of degraded animal fat, identified as from ruminant and non-ruminant sources (Dunne and Evershed below).

Pit

A shallow, bowl-shaped pit, 12542, cut the southern tip of hollow 12555. It was 1.10m long by 1.0m wide and 0.32m deep. The upper fill was of dark silt with occasional heat-affected flints, over a primary clay fill.

Natural features

Between the hollows, a number of features – 12790, 12793, 12795, 12772, 12774, 12621, 12623 and 12619, although the latter may have been a small pit – were probably tree throw-holes or shallow depressions in the land surface (Fig. 2.21). They varied in size from 0.8m to 1.8m in diameter and 0.1m to 0.3m deep. They contained varying quantities of heat-affected flint and charcoal, with almost 10kg of material recovered from 12619, 12621 and 12623. One struck flint was also recovered from these features.

Infill of well and hollow 12585

Six largely waterlain silted deposits formed the upper fills of hollow 12585 above well 12769, and covered the cobbled surface and fills of the later pits and features, indicating that the hollow had infilled gradually (Fig. 2.24, Section VV). These deposits comprised: 1) a yellow clay containing flecks of charcoal, including context 12743, which lay over the cobbles but did not extend into the northern or western parts of the area and which was equivalent to fill 12771, within the top of well 12769; 2) a mid yellow-red sandy clay, including 12752 (not illustrated), in the north-western quadrant and across the southern half of the area; 3) a spread of grey silt with flint and charcoal fleck inclusions which filled the hollow at the centre of the area, including contexts 12719 and 12730; 4) an overlying silt layer, including contexts 12593–4, 12690, 12694, 12708 and 12710; 5) another overlying silt layer including contexts 12657, 12666, 1267 and 6) an uppermost silt layer including contexts 12596, 12606, 12625 and 12636, with inclusions of occasional flint, charcoal flecks and fragments of heat-altered flint.

These layers produced 51 sherds of pottery ranging in date from Early Bronze Age to the Late Bronze Age/Early Iron Age, with an average weight of 2 grams per sherd. A piece of charred hazel wood in layer 12719 (context 12721) – identified along with small fragments of oak (Challinor 2023) – returned a radiocarbon date of 1879–1694 cal BC at 95.4% (SUERC-93359); this is consistent with a date from hollow 12276 and was probably residual as it was from a layer above deposits from which Middle Bronze Age dates were obtained. Fragments of mammal bones were also recovered from these fills (68 pieces, weighing just 24g). The quantities of finds increased higher up the sequence, with fewer in the lower levels that may have formed closer to the time that activity was taking place; this may suggest that there was material in the vicinity which was gradually washed into the feature. The percentages of the total of 695 struck flints recovered from the fill sequence were, from the lowest fill upwards, 1%, 3%, 13%, 20%, 31% and 32% respectively. The pottery followed a similar pattern.

Early Bronze Age pits

Away from BM 2, three further discrete pits within FAS 056 were recognised as being of Early Bronze Age date: 5363, 2035 and 12161 (not illustrated). Thirty-three sherds (<150g) of Biconical/Collared Urn were recovered from these with residual sherds of Beaker pottery, and 14 struck flints. Two contained charcoal and fired clay flecks. Nine small pieces (2g) of mammal bone were recovered from 12161 and 16 fragments of hazelnut shell were recovered from fill 2036, the lower of the two fills of 2035.

The contrast with the number of Beaker period pits indicates either a much reduced level of activity across the Early Bronze Age or a change in the footprint of activity.

Middle Bronze Age (1600–1150 BC)

Archaeological evidence for Middle Bronze Age activity consists of a possible recut of the northernmost well within hollow 12585, two enclosures, one with a relatively substantial ditch, remnants of a wider field system and a small group of cremation burials. An assemblage of 724 sherds (1,115g) of Middle Bronze Age date, mainly grog-tempered wares, was recovered from Enclosure 1 and predominantly from the cremation cemetery. Radiocarbon dates, detailed below, indicate activity in the earlier Middle Bronze Age, in the 15th to 14th centuries BC, with infilling of the wells in the mid 14th to mid 13th centuries BC (modelled as activity spanning probably 1 to 280 years, at 95% probability, or 1 to 115 years at 68% probability, see Hamilton below and Table 2.19). However, while undated, construction of the enclosure and field system probably predate the filling of the well.

Well

Well 12769 in the northern part of hollow 12585 (Figs 2.21 and 2.23, Section UU) lay stratigraphically over the probable remnant of an earlier well, 12798 (see above, *Early Bronze Age*). It was 4m in diameter and 1.6m deep with steep sides. The two earliest fills of waterlain silty clay with chalky and charcoal fragments, 12789 and 12788, were separated by a thin band of sandy silt, 12797. Five struck flints and a small assemblage of cattle and mammal bone was recovered from the lower fill (116g), and pollen was indicative of an open, pastoral environment (Allen *et al.* below). The presence of common frog and toad bones probably reflects the open nature of the feature (Curl below).

Nineteen struck flints, four pottery sherds (34g) and ten pieces of mammal bone came from fill 12788; the pottery sherds were small, but they probably represent fragments of Early Bronze Age Biconical Urns – possibly residual. The sandy lens may have represented a change in use or function of the well, perhaps the point it fell into disuse; two fragments of bone came from it. Above these fills deposit 12770 was an accumulation of firm clay with flint, chalk and charcoal fragments, representing the silting of the feature with collapse from the edges; flint hammerstones, flakes, three scrapers and a small amount of animal bone were recovered from it, including 233 fragments of cattle bone (1975g) and approximately 200 fragments of less diagnostic mammal bone. Feature 12784 was cut into the edge of the well into the top of this deposit (see below) and both were sealed by a brown-grey clay silt 12771, equivalent to the wider fill within the hollow (12743/65, see below); a further few pieces of cattle and mammal bone were recovered.

Fragments of wood charcoal were identified from both 12770 and 12771 including oak, blackthorn/cherry (*Prunus* sp.) and Maloideae (hawthorn/apple/rowan etc.)

(Challinor 2023). A sample from the lower fill, 12770, of Maloideae wood charcoal, dated to 1406–1265 cal BC at 95.4%, and one from a fragment of *Prunus* sp. from the upper fill, 12771, gave a date of 1388–1134 cal BC at 95% (SUERC-93364 and SUERC-93360, Table 2.19). These dates fall comfortably within the Middle Bronze Age, consistent with the date of a fragment of Deverel-Rimbury vessel in a sandy grog-tempered fabric that was recovered from 12771.

As noted above, while well 12769 could feasibly have been a feature that was in use as part of earlier activity at BM 2 that simply took a long time to fill it is more probable that it was contemporary with the Middle Bronze Age enclosures, located to target the same natural source of water as the earlier activity. In possible further corroboration, worked flints from the feature were observed to be generally thicker than from other features (Bates below).

One smaller circular pit, 12784, was cut into the partially infilled northern well and therefore belonged to the later phase of the complex (Fig. 2.23, Section UU). The pit contained three clay-silt fills, from which were recovered three flints and 23 sherds of pottery weighing just 46 grams. There was one recognisable sherd of Early Bronze Age urn which may have been residual.

Two postholes, 12800 and 12802, were cut into the western edge to one side of the base of the earlier well (Fig. 2.23, photograph B). They measured 0.5m long, and 0.4m wide and 0.16m deep, and 0.25m wide and 0.3m deep respectively. Postholes in this location may perhaps have been the footings of log ladders used for access, as have been recorded elsewhere, such as in a Middle Bronze Age well at Crowthorne, Berkshire (Chittock *et al.* 2021, 235–7, fig. 4).

Field systems and enclosures

Parts of two Middle Bronze Age enclosures were excavated, Enclosures 1 and 2 (Fig. 2.26). They were broadly the same size, approximately 80m by 50–60m, and both were on a north-north-west to south-south-east alignment.

On the western side of the site, a partially surviving rectangular enclosure, Enclosure 1, was formed from an L-shaped ditch (11024, Fig. 2.27, Section ZZ; Fig. 2.28B) and a shorter stretch of ditch on the western side (12459, Fig. 2.27, Section dd; Fig. 2.28A). These were on average 1.0–1.1m wide and 0.45–0.55m deep. The northern side was flanked by a larger, outer ditch, 11149, on average 2.5m wide and 0.9m deep (Fig. 2.27, Sections aa, bb and cc). The gap between this double-ditch at the northern end was a minimum of 8m wide. A piece of hazelnut shell from the middle fill of the north-eastern end, 11042 (Fig. 2.27, Section bb), gave a radiocarbon date of 1412–1278 cal BC at 95.4% (SUERC-93350, Table 2.19). Where the pattern of infilling in the ditches indicated that there had been a bank, these appear to have been internal for all. The 'wandering' nature of the eastern ditch may imply that the feature was cutting a boundary that already existed and was marked by extant trees.

An undated posthole group, PHG 2, lay within the area created by the abutment of three ditches; the group did not form a discernible structure, although it could have formed a structure located at a north-western entrance to the enclosure. Undated PG9 also lay close to the enclosures.

To the south lay a second partial enclosure, Enclosure 2, of which only the northern and eastern arms were seen (the western lay beyond the limit of excavation), with the eastern ditch being more ephemeral and interrupted. As with Enclosure 1, the northern arm was deeper and wider. The only place where the location of an associated bank could be clearly seen was along the northern, exterior side of the northern ditch (Fig. 2.29, Sections ee and ff). A charred cereal grain from a dump of fired clay in fill 12439 (cut 12438, location show on Fig. 2.26) returned a date of 1492–1306 cal BC at 95.4% (SUERC-93358, Table 2.19). The fired clay was too loose and fine to be recovered but it may have once formed part of an oven or hearth.

The two radiocarbon dates suggest that the enclosures were constructed between 1500 BC and 1300 BC. Finds from the ditches included struck flints, heat-altered flint and from Enclosure 1, particularly ditch 11149, a small assemblage of pottery. The average sherd weight is just 2g, and much of the material is worn and abraded residual Beaker and Earlier Bronze Age material, with a few sherds of Middle Bronze Age Deverel-Rimbury ceramics consistent with the radiocarbon dates. Only six pottery sherds (47g) were recovered from Enclosure 2, although 369 worked flints were recovered from excavated sections of the ditches. These were mainly irregular, with a few cores, struck or tested pieces and slightly retouched or utilised pieces; this is inconsistent with the Middle Bronze Age date, although it should be noted that closely datable types are rare and residual material falling into open ditches would heavily outnumber contemporary pieces, including, for example, part of a leaf-shaped arrowhead and a well-used core (Bates 2023, 274–5).

Part of a saddle quern and a hammerstone were recovered from Enclosure 1 and fragments of a probable cylindrical loom weight of broadly Bronze Age date (132g) were recovered from a small pit, 12288, at the south end of Enclosure 1, just within the enclosure. A residual flint arrowhead came from Enclosure 2. However, there was no structural evidence or strong indicator of domestic activity within the enclosures. A large rectangular pit, 11068 (Fig. 2.26), possibly a tank, was located immediately to the east of Enclosure 1. It was 2.3m long and 1.3m wide, with vertical sides 0.27m deep and a flat base, with a lower fill of chalky clay silt and a darker upper fill. Three sherds (4g) of Deverel-Rimbury pottery and 27 struck flints were recovered from it.

An assemblage of over 1.5kg of burnt flint was recovered from the upper fill of the terminus of one the ditches of Enclosure 2, cut 12387, and the end of the ditch may have been used to dump fire waste at some point (Green 2023, 314). An assemblage of 91 pieces of worked flint came

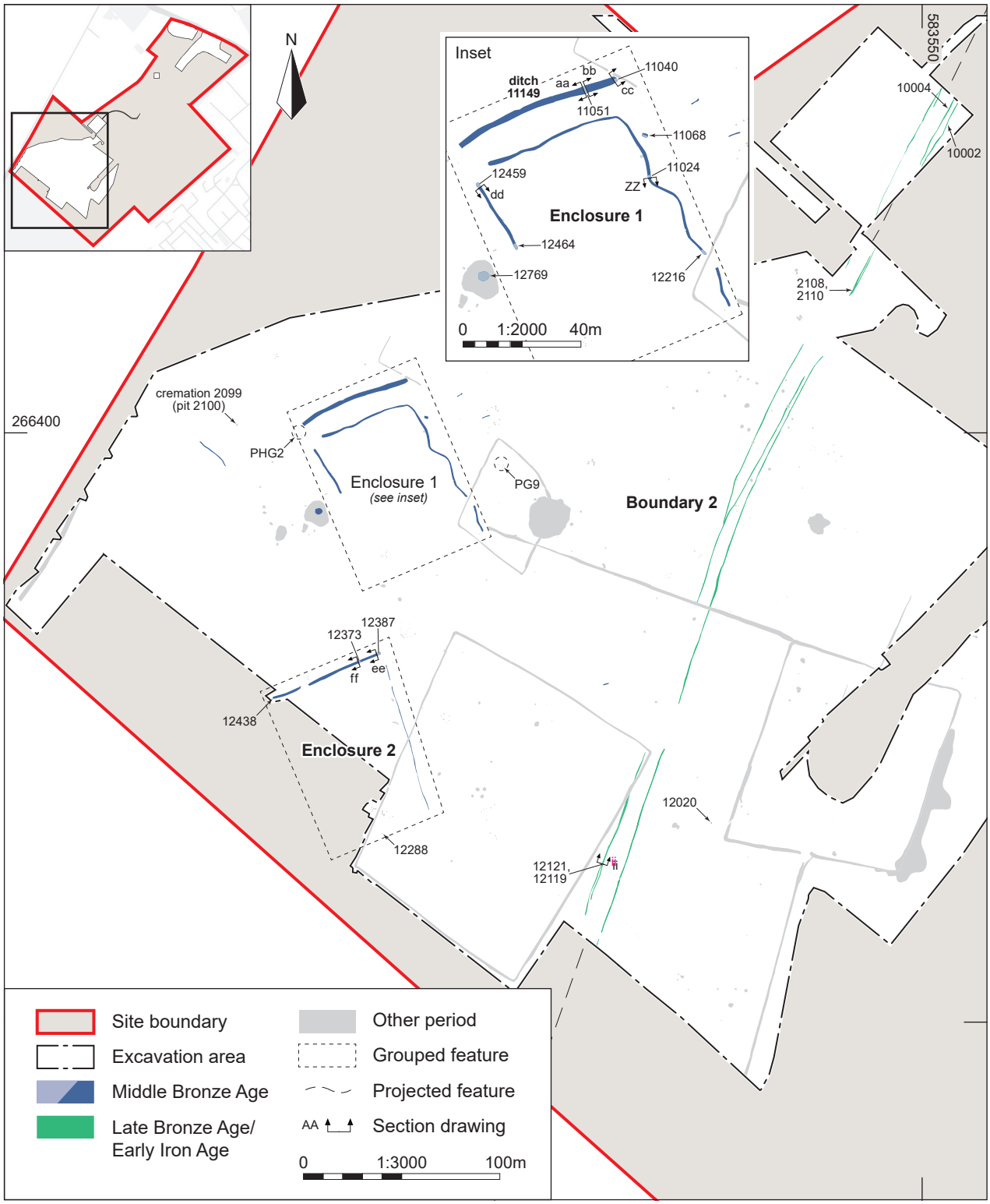


Figure 2.26 Marham Park, Fornham All Saints: Middle and Late Bronze Age/Early Iron Age, FAS 056

from the same eastern terminus of Enclosure 2 as the burnt flint (Bates 2023, 274–5) and a large part of a flint quern (Ra 5084, not illustrated) was found in the terminus of a possible entranceway on the eastern side of Enclosure 1, 12216. The deposition of querns or quern fragments in features, sometimes with other artefacts, has been discussed with reference to symbolic associations with disuse and their transformative nature, particularly in relation to boundaries and entrances (Bates 2023, 274–5; Watts 2012, 87 and 164).

Highly fragmented wood charcoal was present in the environmental samples from this period (West 2023). A few fragmentary and abraded cereal grain fragments were recovered from the enclosures, with some identifiable

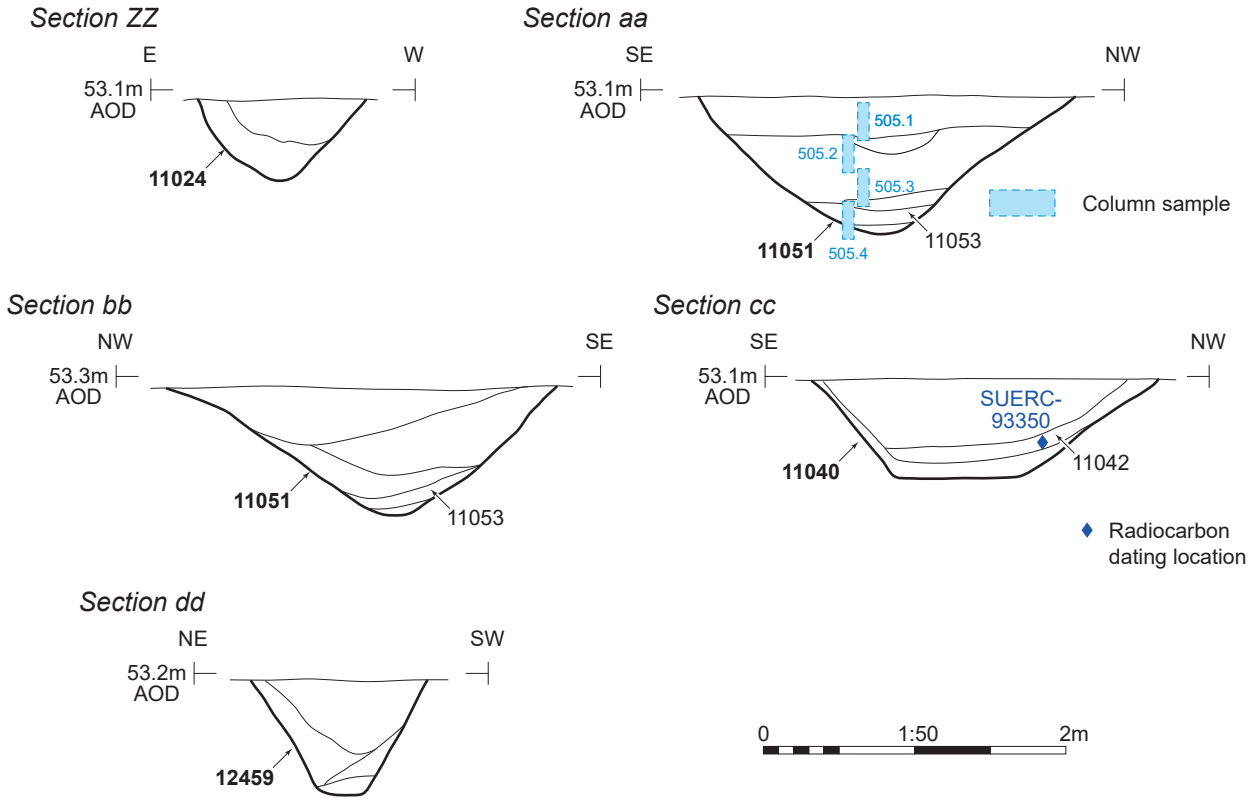


Figure 2.27 Marham Park, Fornham All Saints: Middle Bronze Age Enclosure 1 sections

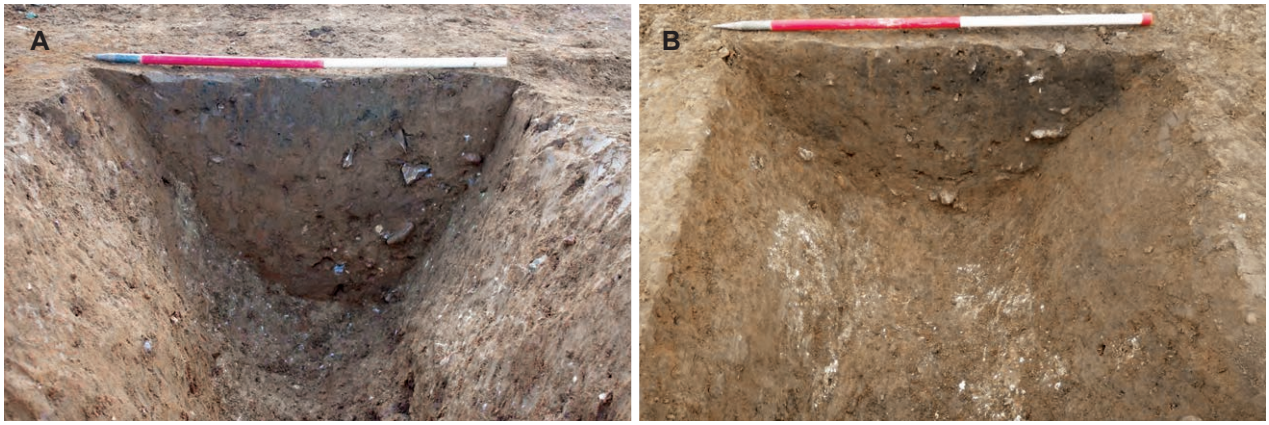


Figure 2.28 Marham Park, Fornham All Saints: Enclosure 1 photographs of cuts 12464 (A, facing NE) and 11024 (B, facing N, Section ZZ), 1m scales

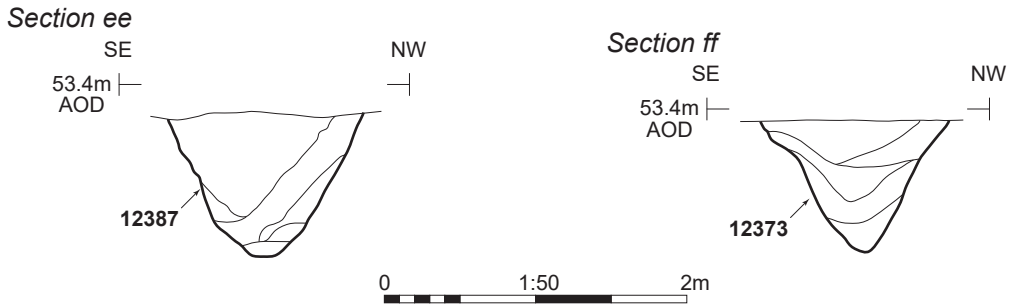


Figure 2.29 Marham Park, Fornham All Saints: Middle Bronze Age Enclosure 2, sections

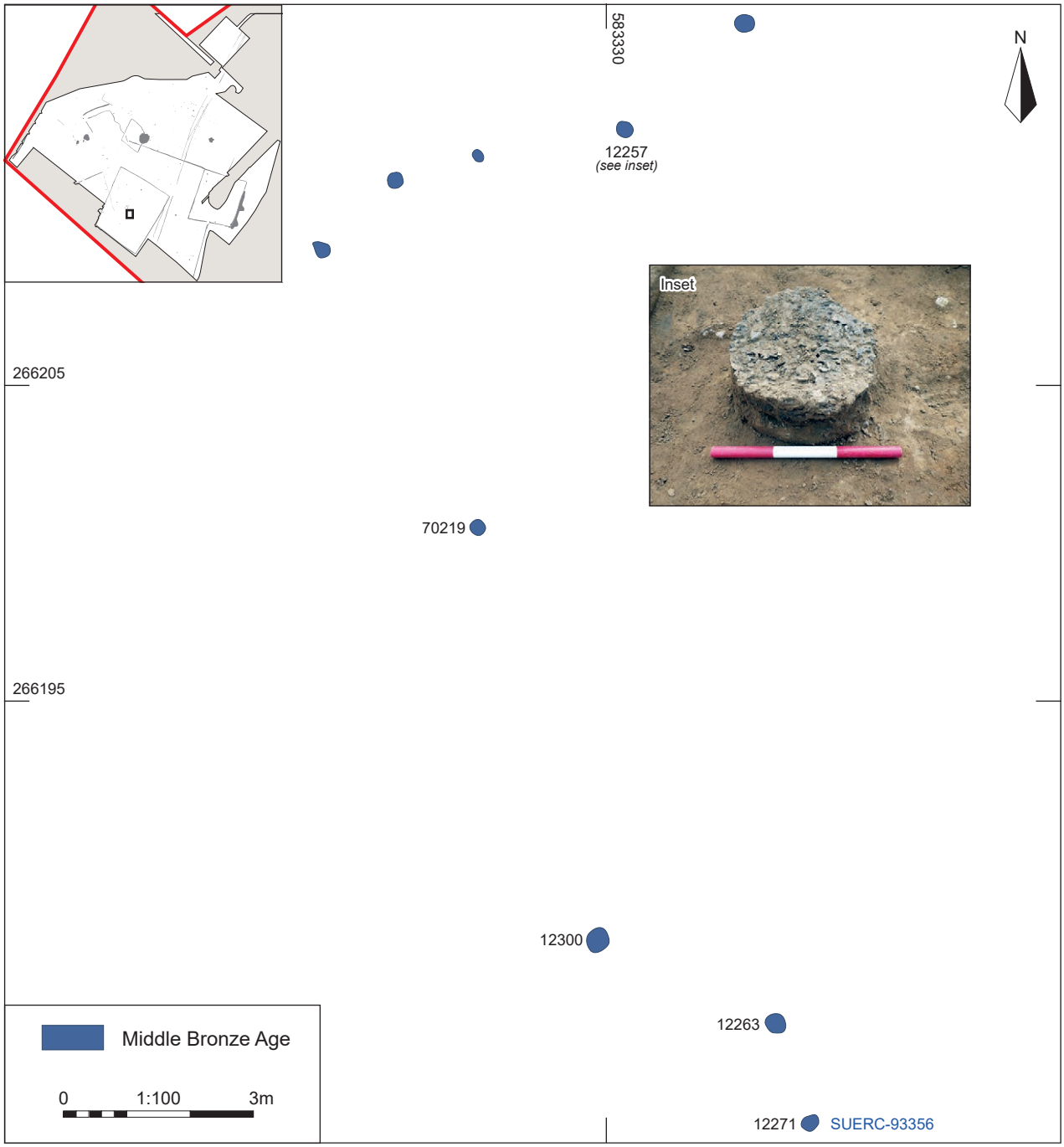


Figure 2.30 Marham Park, Fornham All Saints: Middle Bronze Age cremation burials. Inset: cremation burial 12257, facing S, 0.3m scale

wheat and a small number of possible barley grains. From fill 12439 (of cut 12438) charred fragments of false oat-grass (*Arrhenatherum elatius* var. *bulbosum*) and onion couch grass were recovered in small quantities; this grass is intolerant of cutting or trample such as may occur in pasture but may be present in ungrazed grasslands or arable land that has fallen fallow, and it can become an invasive weed in arable crop; the presence of the basal nodes may suggest the grass was uprooted by hand, perhaps while a crop was being harvested in this way (Roehrs *et al.* 2013; West 2023).

The open sides of the enclosures may have originally been closed off with turf banks, hedges or fences, none of which would have let sufficient trace after centuries of plough truncation. With the evidence for possible crops and weeding practices noted above, the enclosures may have been small, cropped areas with hedges and ditches to keep animals out, or they may have been for similarly protected areas of coppice (Matt Brudenell pers. comm.). Equally they may have been for holding animals in. Overall the small assemblage of animal bone (329g), as for the Beaker and Early Bronze Age periods, was almost entirely

composed of cattle teeth and mandible fragments, with two sheep/goat and one pig/boar bone (Curl 2023), although there may have been some residuality from earlier activity. The enclosures were approximately an acre in size, 4000 sqm and 4400 sqm, approximately equating perhaps to the area required to keep a cow fed; herd sizes are unknown but it may be that herds needed to be regularly moved between enclosures or enclosures may have been for temporary accommodation such as at night or for calving, milking or stock management. Well 02769 could have provided water for arable or pastoral activities taking place within the fields and enclosures.

The remains probably represented the deeper surviving elements of a much wider field system, traces of which were recorded around Enclosure 1, east of Enclosure 2 and in site area FAS 055 (Figs 2.26 and 2.31). The ditches survived only to depths of between 0.12m and 0.14m, but they shared an alignment with the enclosures.

Cremation graves

A small group of heavily truncated urned and unurned cremation burials was clustered within FAS 056 at the crest of the hill, broadly within the truncated and fragmentary field system. Although cremated bone was not found within all of these features, the similarity of the nine circular pits, all surviving to between 0.07m and 0.3m deep and approximately 0.3m in diameter, suggests a uniformity of purpose, and the presence of bone in some of them means they have all been interpreted as graves. Five graves formed a linear group on a west-south-west/east-north-east alignment, and the other four formed a perpendicular linear group to the south-east (Fig. 2.30). It should be noted that these two alignments follow the axial alignment of the enclosures and wider field system, even with no obvious ditches in the immediate vicinity. They are likely to have been following elements of the field system which can no longer be seen.

There were a number of heavily truncated urns, with a combined weight of just 0.75kg. One of the features, 70219, contained the crushed base of a Middle Bronze Age urn and two others, 12257 (Fig. 2.30) and 12300, contained fragments of pottery that probably represented the same. The large diameters, thick-walled profiles and grog-tempered fabrics indicate that they belong to an Early or Middle Bronze Age urn tradition, but none could be ascribed to a specific style as only a maximum of 20mm of the height of any of the vessels survived, and there were no diagnostic features (Doherty and Barclay 2023). However, while the burial within 12271 (12273) was not obviously contained within a vessel, 55 extremely fragmentary grog-tempered body sherds in a comparable fabric were recovered from it and were associated with a radiocarbon date of 1415–1288 cal BC at 95.4% from the cremated bone (SUERC-93356, Table 2.19). The possibility of an age offset through the exchange of carbon from the pyre atmosphere to bone apatite during cremation means this result should be treated as a *terminus post quem*, but the result would thus indicate a date within the later centuries of the Middle Bronze Age period when Deverel-Rimbury style ceramics were in use (ibid.).

Human bone was recovered from 12257 (52.6g), 12263 (5.2g), 12271 (7.4g) and 70219 (4.4g) through the flotation of bulk samples, with the exception of 12257, which was excavated in spits. Feature 12271 was half-sectioned prior to full recovery. Within 12257 a few fragments of bone could be identified as human but not to age or sex. The small fragments recovered from 70219 appear to be from an infant/juvenile (Anderson 2018). Associated soil samples contained no plant remains other than highly comminuted wood charcoal fragments and a possible single barley grain (West 2023).

A further isolated undated and unurned cremation burial was found towards the north-western site edge (2099, Fig. 2.26). It contained the largest collection of bone (403.5g including unsorted <2mm fractions) but the quantity was still less than a quarter of the average expected weight for an adult female. It was excavated on site in two spits. The bone was in fair condition and included identifiable pieces of cranial vault and long bone, the size and gracility of which, with lack of fusion of the lambdoid suture, suggests a young adult female or possibly an older sub-adult.

Late Bronze Age/Early Iron Age (1150–350 BC)

Boundaries

Boundary 1 in site area FAS 055 and Boundary 2 in FAS 056 were stretches of long, multi-ditched and probably banked boundaries or trackways (Figs 2.26 and 2.31). The ditches were generally shallow and truncated by ploughing, with those of Boundary 1 measuring 0.20–1.20m wide and 0.1–0.75m deep (Fig. 2.32, Sections gg and hh) and those of Boundary 2 measuring 0.20–0.7m wide and 0.05–0.3m deep (Fig. 2.32, Section ii).

Boundary 1 comprised two continuous ditches approximately 4–5m apart, with further parallel ditches recorded approximately 1.3m to the west and 2.5m to the east (Fig. 2.33A). Two and occasionally three ditches formed Boundary 2 (Fig. 2.33B), with the width between the two sides of the boundary ranging from 6m to 10m. A third ditch was present sometimes as a flanking ditch or recut on the eastern side, with up to 2.5m between the pair, or as an apparent recut on the western side. In the centre part of the site a third ditch crossed the gap between the sides of the boundary. It is therefore possible that there were two phases of boundary, with one comprising a single ditch – and bank – and the other of double-ditch form. A pair of ditches 1.5m apart that formed part of one side of this system were recorded in a small excavation area in the centre of the site. Although shallow, they both showed evidence for

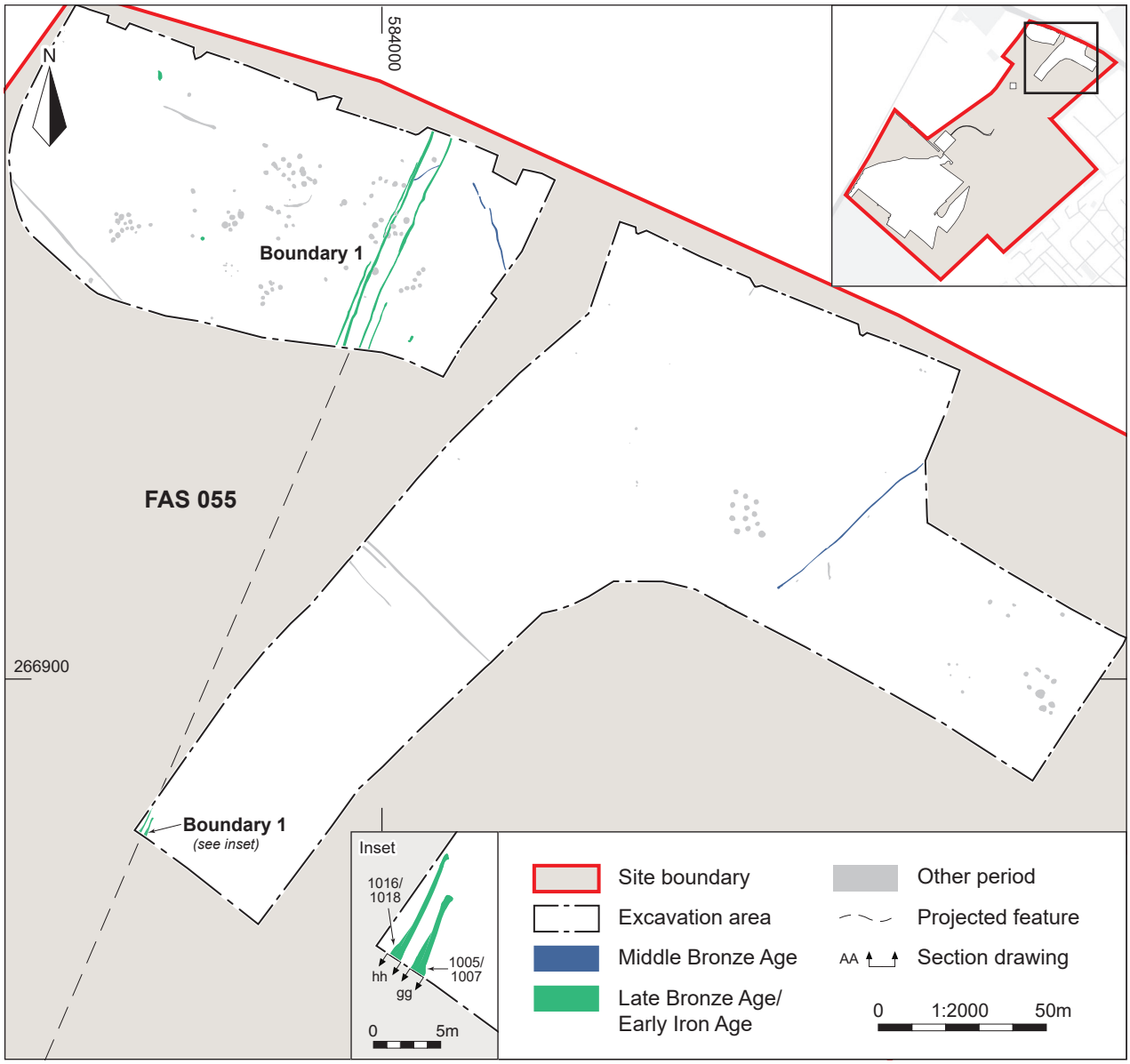


Figure 2.31 Marham Park, Fornham All Saints: Middle and Late Bronze Age/Early Iron Age, FAS 055

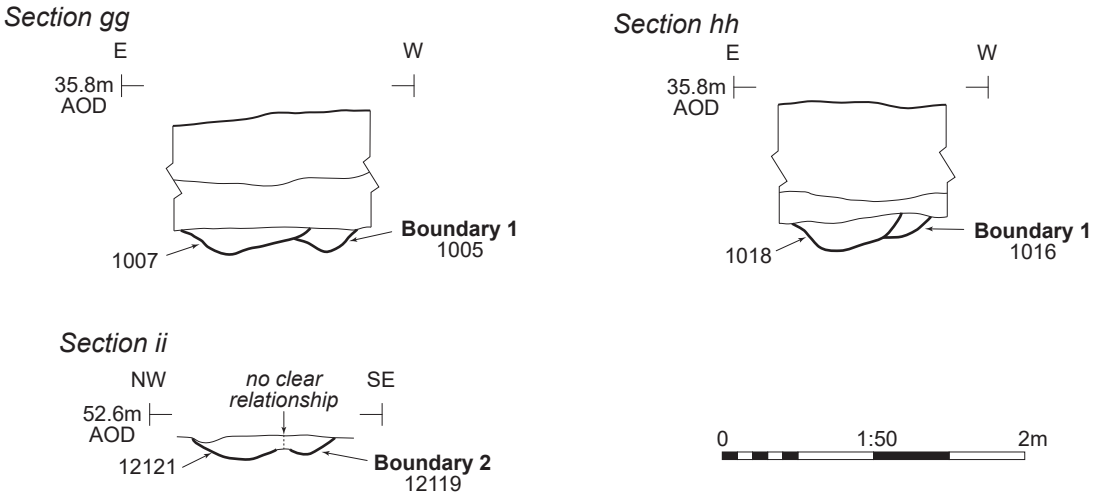


Figure 2.32 Marham Park, Fornham All Saints: sections of Late Bronze Age/Early Iron Age Boundaries 1 and 2

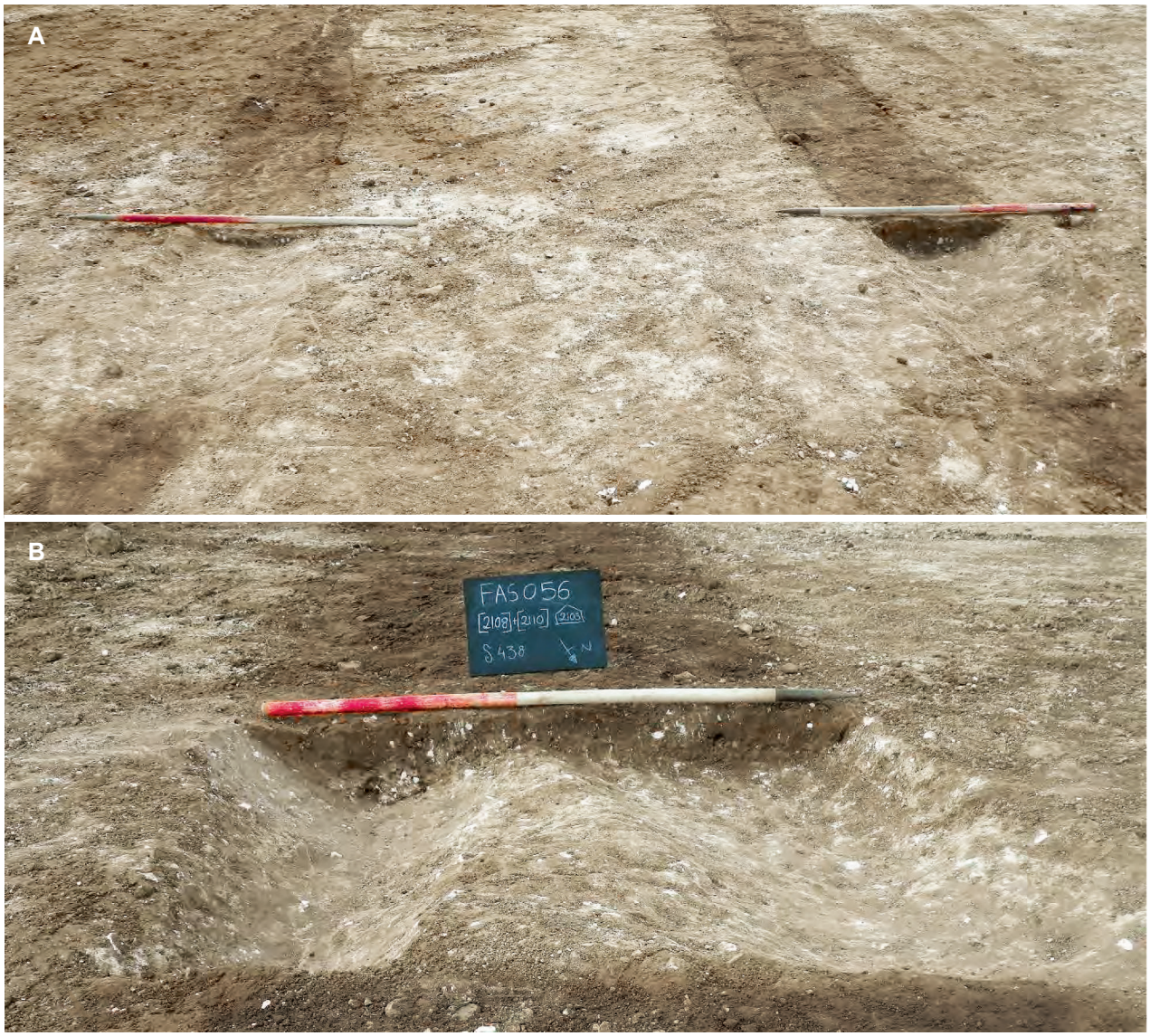


Figure 2.33 Marham Park, Fornham All Saints: photographs of Late Bronze Age/Early Iron Age Boundary 1 (A, cuts 10002 and 10004; B, cuts 2108 and 2110), facing SW, 1m scales

recuts to their east (Figs 2.31 and 2.32, Sections gg and hh) and banks to the west of both may therefore be inferred, perhaps suggesting a more complex form for the boundary.

Stratigraphically, Boundary 2 cut a Middle Bronze Age enclosure or field ditch in site area FAS 056, negating that earlier system, and in both site areas the boundaries were cut by Middle Iron Age pits. There was little direct dating evidence, with residual or intrusive material evident. A small, mainly undiagnostic, pottery assemblage was recovered, mainly only tiny fragments. However, the larger sherds were in flint-tempered fabrics, in some cases associated with well-finished/burnished surface treatments suggestive of earlier Iron Age dating. The prevalence of flint-tempered wares and absence of the sandier fabrics more common in the Middle Iron Age assemblage from the site might imply a slightly earlier date, although the assemblage is too small to provide conclusive evidence of dating (see Doherty and Barclay 2023, 172–9). The environmental samples from the features produced only small quantities of highly fragmented wood charcoal (West 2023).

From Boundary 1, 126g of burnt flint, 18 struck flints and 14 sherds of Early to Middle Iron Age pottery were recovered, with the pottery all from an area where the banks and ditches were truncated by Middle Iron Age pits. From Boundary 2, 161g of heat-affected flint and 74 struck flints were recovered, along with 15 sherds (37g) of mostly undatable pottery, with some residual earlier prehistoric sherds, some potentially contemporary and some intrusive later Middle Iron Age and Roman material. Very little animal bone was recovered (61 fragments, 271g), representing a single cattle tooth and fragments of a sheep mandible (Curl 2023).

The paired ditches could have been the flanking ditches of a track or droveway, although the distances between

them are narrower than may be anticipated for this. For Boundary 1, the minimum distance between the sides of the boundary was 4m–5m, with a possible width of 7m if either the easternmost or westernmost of each side formed a pair. When the truncation of the upper levels of the ditches is taken into account the central 'pathway' between the ditches would have been narrower, perhaps 2m–3m to 5m wide. Similarly, the gap between the ditches of Boundary 2 would have varied from 4m to 8m at the maximum.

The features rather resemble the remains of banked, ditched and hedged boundaries, a suggestion lent credence by the point in Boundary 2 where a ditch from one side of the feature crossed over to the other; this would not be logical in a trackway or route, although the ditch may have been earlier than the paired ditches. Further circumstantial evidence that there may have been a bank between the features is provided by the depth of the pits in a Middle Iron Age pit group, PG12, which spans the boundary (Fig. 2.8). The five pits to the west of the boundary were on average 0.59m deep, ranging from 0.41m to 0.90m, while the six between the ditches were 0.38m deep on average, ranging from 0.26m to 0.45m deep; this may suggest that the latter had been cut from higher up, through a raised bank (Green and Mortimer 2023, 135). These may have formed parts of boundary systems akin to 'sheepwalk' landscapes identified in Wessex, further discussed in Chapter 5.

Within the site there were no other features of Late Bronze Age/Early Iron Age date, although a small assemblage of pottery, with flints and burnt flints, was recovered from a number of tree throw-holes and natural features across FAS 055 and from a single pit located to the east of Boundary 2 in FAS 056 (12020, Fig. 2.26). In this pit seven sherds (25g) of pottery were found with nine struck flints and 150g of heat-affected flint and cattle and sheep/goat mandible and molar fragments (Curl 2023).

Beaker and Early Bronze Age finds

Overview

This section presents finds reports into the Beaker and Early Bronze Age material, towards understanding activity at the burnt mound sites. Full versions of the reports can be found in the site archive report (Green and Mortimer 2023).

Heat-altered flint and stone

Michael Green

Large quantities of heat-altered flint were present throughout the site. The retained assemblage from excavation area FAS 056 – a small proportion of the material present overall – comprised 381.6kg of heat-altered flint and 56.8kg of heat-altered stone, recovered during the excavation of features and from bulk soil samples. Of this assemblage, 55% of the heat-altered flint derived from pit fills and 37% from other burnt mound contexts. Pit fills produced 80% of the heat-altered stone. Most was associated with prehistoric features, mainly of the Beaker period, with lesser amounts from Early Bronze Age, Middle Bronze Age and Middle Iron Age features.

The heat-altered flint assemblage was dominated by the vast quantities of highly fragmented material associated with Beaker period BM 1 and to a lesser extent Early Bronze Age BM 2. As noted above, in excess of 3500kg, or 3.5 tonnes of material, is estimated to have been present in the main fills of BM 1 which contained heat-altered flint, with a mean average of 16.86kg per 40-litres from three bulk samples (equating to 425.1kg per cubic metre). Up to 50% of the fills of pits located within BM 1 comprised heat-altered flint, much of which was probably incorporated into the pits after their use-life (see Chapter 5). BM 2 contained a separate dump of heat-altered material to the south-west of the main working hollow; this was heavily truncated and contained far less heat-altered material than deposits associated with BM 1.

The large quantities of heat-altered flint and stone recovered from the site in association with the wells and other features associated with the burnt mound sites clearly show that hot works were occurring on the site in the Beaker to Early Bronze Age periods. The heat-altered flint from both burnt mound sites was highly fragmented and discoloured, which indicates that the material had been quenched and that, as is commonly accepted, the majority of the heat-altered flint was used to heat water within the pits associated with both of the burnt mounds.

Small quantities of heat-altered flint and stone were also recovered from the pits, postholes and ditches dating to the Beaker to Bronze Age periods in areas other than the burnt mound sites. Given that a large amount of heat-altered material was created by the activities at the burnt mounds, it is likely that some was incorporated into surface soil horizons and contemporary features in the wider area, resulting in the higher than average heat-altered flint assemblage for the site as a whole. Some material was also probably residual in later features.

There were a few pieces of heat-altered struck flint from BM 1 and from pit fills. Three heat-altered struck flints were recovered from contexts 2706, part of the first infill 2917 at the northern edge of BM 1, and 3075 in the north-west quadrant of the same. These suggest either that flint knapping was occurring close to the heat source and activity and that knapping and hot works were effectively being undertaken in the same location, or that residual flint knapping waste was being unintentionally or intentionally heated and that flint collection included that from knapping areas. The highly fragmented state of the heat-altered flint made identification of heat-altered struck flint difficult, and it is likely that more was present but unrecognised.

As noted above, heat-altered stone from Middle Iron Age features also indicates that hot works were being undertaken, probably also related to the heating of water.

Worked flint

Sarah Bates

Full details of flint from the site and a catalogue are presented in the archive report and project archive (Bates 2023). Overall a total of 11,958 pieces of struck flint was recovered from the two excavation areas (Bates 2023), the majority from good quality local black flint from the chalk bedrock. Half of the assemblage was recovered from features and deposits dated to the Beaker period, with 1500 from Bronze Age features and 900 from Middle Iron Age features. Close to 1000 pieces were recovered from natural features such as sinkholes, hollows and tree throw-holes. There were over 7000 flakes and blades, with another 1300 utilised and retouched pieces, 300 scrapers and just 14 arrowheads. Piecers, awls and notched pieces were more common.

Some of the tools were subject to both microwear and lipid analysis, with illuminating results in relation to the processing of hides and animal products (see below). Photographs of a selection of struck flints and locations of associated microwear are shown in Figures 2.34–2.40.

Beaker Burnt Mound 1 (BM 1)

Well 3106

In total 183 flints were recovered from the fills of well 3106 in the north-western quadrant of BM 1. These came mostly from fill 3143 of the final recut, although 27 pieces were from the upper fill of an earlier cut, 3219 (Fig. 2.13, Section AA). A neatly used multi-platform flake core and three single platform flake cores were found, along with two core fragments and five struck fragments. Debitage mostly comprises flakes which were mainly small, quite irregular and edge damaged. There are small numbers of blade-like flakes and shatter pieces. A large proportion of the worked flint from the feature, 33%, comprises retouched or utilised pieces. Seven scrapers, all but one from 3143, include a slightly retouched end scraper with a small spur formed at the left side of its proximal edge (Ra 2399, fill 3143, Figs 2.38B and 2.39N), a neatly retouched thin ovate cortex-backed side scraper (Ra 2374, fill 3219, Fig. 2.39M), and other miscellaneous types, mostly slightly retouched very irregular pieces. An irregular combination scraper/spurred piece was made on a primary thermal flake. Another small scraper made on the convex side of a thick broad cortical flake has slight retouch at the opposite 'end' which may have formed a point (tip missing, possibly broken during use) or been for prehension (Ra 2330, fill 3143, Figs 2.36W and 2.39G). A few pieces may have been used as 'piercers'. A quite long, slender oblique arrowhead has retouch/damage at its edge and tip, the former of which, at least, seems inconsistent with use as an arrowhead – it is more akin to that seen on 'denticulate' from pit/gully 3174, fill 3272 (see below) but does not appear to be post-depositional and the object may have been re-used as a point or for another purpose (Ra 2359, fill 3143, Fig. 2.36Y, similar to Clark 1934, 55, fig. 2, Type H). Miscellaneous edge-retouched flakes (39), fragments (3) and a blade include a few scraper type pieces. Edge-utilised pieces comprise 13 flakes and a blade.

Seventy-seven flints came from feature 3174, a gully which was related to pit 3106 or to the solution hollow into which it was cut (Fig. 2.15). The flint comprises debitage – mostly sharp and with at least some cortex – and a relatively large proportion, 30%, of retouched or utilised pieces, with two single platform flake cores. Two scrapers have additional 'spurs' at an edge (e.g. Ra 2384, fill 3272, Fig. 2.36Z). An irregular long flake with a sloping and slightly denticulated edge (fill 3272, Fig. 2.36X) is unusual in the mound assemblage although there is a similarly shaped, slightly more squat, thicker 'piercer' from the same context with its dorsal surfaces entirely cortical and/or patinated.

Early pits and postholes: 3239, 3250, 3275, 3242

Eleven flints were recovered from four of the pits in the base of hollow that contained BM 1, 2630, which appear to represent the earliest activity associated with the complex (Fig. 2.11). The assemblage comprises a possibly retouched flake, two probable piercers – one on a thermal fragment – and a few irregular flakes.

Cobbled/metalled surface 2693

The cobbled surface was excavated in spits and then 2m by 2m-square boxes within four quadrants, to better understand spatial distribution. A total of 342 flints was recovered.

Most flint from the cobbled layer came from the two northern quadrants, with a concentration from a stepped or terraced area immediately surrounding well 3106 in the north-west quadrant. The range of material includes cores and other struck pieces, debitage and modified pieces. Similar debitage occurred together in a few areas, which suggests that knapping occurred in the immediate vicinity; three refitting flakes found in one context in the north-east quadrant confirm this. Formal scrapers were relatively few – one is an irregular 'thumbnail-type' – but miscellaneous retouched or utilised pieces are quite frequent and include scraper-type tools and various cutting flakes. Other tools include piercers of different types, including two or three irregular points with small, flattish slightly worn or damaged 'burin-like' tips, such as from context 3198 in the north-east quadrant, although these are not burins in the technological sense (Fig. 2.36T). These were all found in the north-eastern quadrant along with an unusual small piece that was retouched either side of a protruding distal 'point' (Ra 2490, 3207 in the north-east quadrant, Fig. 2.36U). It is uncertain whether this was intended for use, or for prehension or hafting; the convex proximal edge is slightly retouched and may have been used as a scraper. There are also some notched or possibly notched pieces (for example, from deposit 3191 in the north-east quadrant, Fig. 2.36S) and several 'combination' tools, often involving scraper or piercer type edges. Some of the retouched pieces were quite crudely or simply made. A small number of patinated flints

may be residual earlier pieces. Additionally, a small blade, probably residual, and an irregular retouched flake came from a possible later extension to cobble layer 2693 in the north-west quadrant, 3105 (Fig. 2.13, Section AA).

Troughs: 2976, 2921, 2932, 2926 and 2919

From the five trough features that cut or were abutted by the cobbled surface (Fig. 2.11) 407 flints were recovered. The largest number of pieces, 341 (the greatest number from any single feature on the site), came from pit 2921 at the north edge of the mound (Fig. 2.15, Section MM). Six flints were from a lower but not the primary fill of the pit, 2957. They include a small fragment of blade, possibly residual, and only one scraper, a 'nosed' piece on an anomalous flake of patchy slightly brownish light-grey flint with multi-directional dorsal scars, which is larger than the other tools from the pit (Ra 2149, Fig. 2.39C). It too may be an earlier piece or unrelated to the mound activity. The rest of the flint was from the upper infill of the pit, 2922. There is a single fragment from a core, a small number of tested fragments and some irregular struck fragments. Unmodified flakes formed by far the largest component of the assemblage and, although there are some slightly larger pieces and some tertiary flakes, there was, overall, a clear consistency to both flint and cortex type – very dark grey/black, and medium to quite thick dirty cream-coloured respectively – and to the predominantly small, quite irregular, squat flakes. Cortical pieces included several primary flakes. It is possible that some refits may be present. The 25 scrapers include 3 thumbnail types (Ra 2143, Fig. 2.39B; Ra 2343 and Ra 2347) and a range of others, with some very small pieces; a few of these were on tertiary flakes, giving a relatively neater appearance. There are also several end scrapers (e.g. Ra 2148) and other miscellaneous and/or more irregular pieces including three 'thumbnail-like' (e.g. Ra 2348, Fig. 2.39J; Ra 2368 and Ra 2349), on quite a few of which the predominance of cortex is notable; in a few cases a cortical edge was retouched for use. There seems to have been no apparent preference for flake type. Flakes were likely to have been rapidly produced, with suitable pieces used as required. The irregular struck fragments are consistent with this, although the presence of the majority of the flint in the upper fills of the pit, with similarity of the fill to the overlying mound material, shows that the material was deposited into the pit after it went out of use. A few other tools also came from the uppermost fill. They are mostly miscellaneous slightly retouched pieces but two combination scraper/knives are present – one a near-primary flake, the other a more regular thin flake (Ra 2352). A small, thin serrated blade is a residual piece. It is notable that some of the tools were of a generally much more regular, neatly made nature than others from many of the mound contexts.

Three small scrapers came from pit 2976 (Fig. 2.15, Section OO), including a short 'end' scraper (Ra 2176, fill 2977, Fig. 2.39D), a primary slightly retouched thumbnail type and a squat subcircular one. A combination scraper/knife (Ra 2179, fill 2977, Fig. 2.39E) and four miscellaneous retouched flakes also came from the pit. A few other retouched pieces came from these pits. They include a blade from the upper fill of pit 2926, 2927, which was retouched along both sides, with a protruding spur formed by retouch at its distal end (Fig. 2.36AA). This piece is orangey grey and slightly abraded. The nature of the spur, which is rather like some seen on a few scraper edges, suggests this may be a re-used piece but it may equally be of earlier date.

Occasional pieces are anomalous and likely to be of earlier date. For example, a patinated neat conical blade core came from pit 2932. Much of the flint from these pits is of a similar nature to that from pit 2921 and almost all of it was from the upper or only fills of features and thus related to the infilling of the area once disused. In at least two pits – 2932 and 2976, which each had 33 flints in total, the largest assemblages after that from pit 2921 – the cortical nature of much of the debitage is notable and there are several primary or near primary flakes.

Smaller, circular pits 3088, 3160, 3170, 2923 and 3147

A total of 122 flints came from five smaller, circular pits, which were cut around well 3106 as it silted up (Fig. 2.11). Pit 3147 (section not illustrated) included 49 pieces, pit 2923 (Fig. 2.15, Section PP) 33 pieces and the other pits 18 or fewer. The flint comprises debitage – mostly sharp – and retouched or utilised pieces, with a chunky, rotated, flake core from pit 3147. The tools were often only slightly retouched and often include a scraper-type edge. The assemblage includes one thumbnail-scraper (Ra 2340, fill 3161, Fig. 2.39I) and two other small, squat slightly retouched pieces which are 'thumbnail-like', including Ra 2363 from fill 3149 of pit 3147 (Fig. 2.39K).

Again, the occasional piece is anomalous and likely to be of earlier date, such as a small, thin blade from pit 2923. A quite carefully used single platform core from this pit, struck from both sides of a largely cortical surface, has blade type scars and is slightly abraded and glossy. A small thick flake from the same pit has a similar appearance and these differ from most of the sharp flakes and fragments from the pits; they may be of earlier date. Much of the flint from these pits is similar in nature to that in trough 2921 (see above) and almost all of it was from the upper or only fills of features and thus related to the infilling of the area after use. The cortical nature of much of the debitage in pit 2923 is notable and there are several primary or near primary flakes. An irregular thick flake and a small thin one from pit 3088 have, respectively, a notched and possible notched edge.

Large well 2718

In total 196 flints were recovered from 2718 (Fig. 2.16), the well in the south-eastern quadrant of BM 1 which appears to have replaced well 3106. A few flints came from its basal fill, 3146, some came from some possibly redeposited clay on the southern edge, 3108 (not illustrated) and others from a charcoal-stained fill, 2736. Moderate numbers

were recovered from secondary fill 3107 and many came from an initial slot excavated through several fills (2719, not illustrated). Three small irregular multi-platform flakes cores were probably exhausted, and three cores have blade type scars, one from two opposite ends. Flakes are predominantly irregular, cortical pieces and most often slightly edge damaged, although some flint is sharp, and quite a few are relatively thick. There were a few blade-like flakes, shatter pieces and spalls. Twenty per cent of pieces from this pit were retouched or utilised. The six scrapers include a squat subcircular example from fill 2719 (Ra 2090, Fig. 2.39A) and relatively small, thick pieces, one on a primary flake (for example, Ra 2322, Fig. 2.39F, from fill 2736, and Ra 2333 from fill 3146 of pit 3147, Fig. 2.39H).

A blade-like piece has cortex at its distal end with slight probably use-related damage around this cortical edge. Its proximal end was retouched at each side to form a thick narrow protruding point (Ra 2318, fill 2719, Fig. 2.36CC); this is similar to the smaller piece from the cobbled layer, Ra 2490, noted above. Combination tools are a piercer/notched flake and scraper/spurred piece on a small thick primary flake. A near primary flake has possible small notches in one edge. A long narrow piece, possibly a small fabricator, was made on a patinated thickish blade subsequently slightly retouched at its edges and retouched or worn at its ends (Ra 2338, fill 2719, Fig. 2.36BB). A small bifacially (irregularly) flaked piece has some fractured surfaces, perhaps representing a 'roughout' or a tested piece (fill 2719). Various miscellaneous retouched flakes (x18), a utilised blade and six utilised flakes are present. A retouched small flake is slightly similar to Ras 2318 and 2490 mentioned above, with protruding retouched proximal part, albeit in this case more irregular.

Well infilling and covering layers

A total of 646 flints came from deposit 2918 which infilled the top of well 3106 (Fig. 2.13, Sections AA and BB). They include a significant number of cores, often chunky, with several used with some care and/or rotated. A few other cores, although slightly irregular, had produced some blade type pieces. Some other struck pieces include one that was possibly used as hammer. Flakes are varied, but similar pieces from some areas may indicate contemporary knapping, and an unusually large number of spalls were recovered (relative to the burnt mound site contexts generally, although not the very large amounts of micro debitage which might be expected in an area of *in situ* knapping debris). Scrapers are by far the most common tool type and include various types, several notably cortical, and three thumbnail-like, although two are slightly irregular and the other incomplete. Other tools are knife types, including a variety of cortex-backed knives (e.g. from context 3094 in the north-west quadrant, Fig. 2.35R), piercers and slightly spurred pieces, combination tools (e.g. spurred scraper from context 3093 in the same quadrant, Ra 2297), a serrated 'blade' which is a curving, quite thick, piece with cortex backing its opposite side, and a possible fabricator (context 3094). Many miscellaneous retouched and utilised pieces are present and most appeared to have been used as cutting edges; a few have slight/possible notches, for example a retouched notched thermal flake from context 3094. It was notable that some of the flints – ranging from cores and struck fragments to modified pieces – were quite large relative to those from many other contexts. It was also notable, overall, that creamy white cortex of various thickness is prevalent on many of these larger flints.

In total 1437 flints were recovered from mound infill layer 2917 (not illustrated), concentrated in the north-west quadrant (810 pieces). A selection is illustrated in Figure 2.34. Twenty pieces have been classified as cores, with other tested and struck pieces and some 'core fragments' (e.g. from contexts 3075 and 3076 in the north-west quadrant). Two cores had produced blade type pieces but mostly the cores are quite irregular, some exhausted. Most cores were from the northern part of BM 1 and summary comparison suggests that smaller slightly 'neater' pieces were concentrated there. Two refitting flakes were identified from the same area, while the similar nature of pieces from some grid squares suggest others may exist. Various flake types are present but they tend to be irregular in nature and are predominantly cortical. From the northern quadrant, for example, 76% have cortex, 8% are primary flakes, 7% have cortical platforms and 4% have hinged terminations. Many scrapers were found, including sometimes quite short or squat end scrapers (for example, Ra 2280 from context 3077, and Ras 2242 and 2269 from 3076, both in the north-west quadrant), end-and-side scrapers (for example Ras 2281, Fig. 2.39U, and Ra 2282 from 3075), thumbnail types (Ras 2244 and 2296 from 3076) and many other more irregular types, many of which were quite small pieces, minimally retouched and often with cortex and/or their shape providing a 'blank' suitable for use without much modification and often with retouch extending around an 'end' and part of a 'side' (e.g. Ras 2278 and 2277 from 3075, the latter a small thick flake with reverse retouch that made use of a suitable edge). Eleven were on primary flakes and others had large areas of cortex. A few pieces were used as knives (for example Ra 2171 from context 2972, Fig. 2.39R in the south-west quadrant and Ra 2135 from 2886 in the north-east quadrant, Fig. 2.39Q), spurred pieces (e.g. Ra 2261 from 3075, Fig. 2.39T), and multipurpose combination tools usually involving a scraper and either knife or spurred edges. Many miscellaneous retouched or utilised pieces are also present (104 and 40 pieces respectively), mostly flakes but with a few thermal fragments and blades. An earlier Neolithic leaf-shaped arrowhead was also found.

An additional 174 pieces came from slot 2715 (not illustrated) but other than part of a thin subcircular scraper which was likely to pre-date the mound activity, the flint includes very similar material to that from deposit 2917.

A total of 1110 flints was recovered from layer 2704, again particularly from the north-western quadrant. Cores (almost all flake cores but a few that had produced small,

short blade-like pieces), other struck pieces, debitage and tools are present with, in most areas, debitage which is predominantly cortical. There were smaller amounts of cortex on individual flakes in the assemblage from the south-western quadrant, and the debitage from the north-western is notably sharper in nature, while the condition elsewhere was more varied and edge damage is present on some material from most contexts in the south-east quadrant. Two refitting flakes were identified in the north-eastern quadrant but, otherwise, occurrences of similar flint were not noted. There were 30 scrapers including end scrapers, a few slightly retouched thumbnail-like pieces and various other types. Various other tools were present. These include a sturdy 'piercer', which was slightly retouched along one side and at the tip of its distal point and at a proximal protrusion, which might have enabled hafting or eased holding (context 3037 in the south-east quadrant, Fig. 2.35N). Also present were a small number of other slightly retouched piercers, a spurred piece, cortex-backed 'knives' and various other retouched or utilised pieces (94 and 68 pieces respectively), including two serrated blade-like pieces, one smaller and incomplete, which may be a residual earlier piece, and one thickish and cortex-backed. An unusual relatively small, thick cortical fragment had been slightly flaked at its wider end to an edge which could be described as 'adze-like' and is slightly edge damaged, probably through use; its body had been narrowed or 'waisted' by crude working at each side, perhaps for hafting or holding more easily (3043 in the north-west quadrant, Fig. 2.35P). Also in this deposit were an oblique arrowhead (Ra 2321, context 3042, Fig. 2.35O, also in the north-west quadrant) and a possible unfinished arrowhead or other tool; the latter was a thick triangular piece with all sides bifacially retouched but with cortex surviving over its central dorsal (Ra 2110, context 2873 in the north-east quadrant).

A total of 1173 flints were recovered from layer 2703, the uppermost layer infilling BM 1. Flake cores and other struck pieces and debitage were recovered, most often irregular and cortical squat flakes with occasional blade type pieces. Part of a quern or pounder of some sort had been subsequently utilised as a core (from context 2835 in the north-east quadrant). The condition of the flint varied, with some sharp and some damaged material. A large number of hinge fractured flakes came from the south-east quadrant. A few flakes and fragments of similar flint were found in the north-west quadrant, while the occasional neat patinated blade was probably residual. Part of a hammerstone was found, and a flaked thermal fragment may have been a core or tool. Seventeen scrapers include end scrapers (one double ended, Ra 2102 from context 2841 in the north-east quadrant), a very small thumbnail example and a neat thick scraper on glossy black flint which is quite unlike most of those from the mound (Ra 2103, Figs 2.35M, 2.38A and 2.39S, context 2841). In many cases cortex was not an impediment to use. A thickish ovate flake had a 'burin-like' small blade removal from its right distal side, although there is slight retouch of the original scraper-like distal edge immediately left of this; possibly the 'removal' occurred during use. Also, there is some extremely slight potentially use-related damage to the left side of the bladelet scar which could represent use or continuation of use in its present form (2774 from the initial slot, Fig. 2.35L). Other tools include a knife made on a long thermal fragment with cortex backing one side and bifacial retouch of the opposite edge (context 2999 in the north-west quadrant, Fig. 2.35K), a few piercers and a possible spurred piece. Miscellaneous retouched or utilised pieces also occur (55 and 56 pieces respectively) and one small fragment appears to be from a quern, re-used as a core.

Beaker Structure 2

Twenty-three flints came from features comprising Beaker Structure 2. They include two irregular stuck fragments and debitage that varies in nature but is generally quite irregular, most recovered in small numbers (1–3 pieces) from postholes. Ten flints were recovered from fill 12364 of pit 12363, a probable pit to the west of the structure (see Fig. 2.18I).

Beaker pits

Pit Group 1

Thirty-eight flints were distributed within about half of the features in the group, mostly present in small numbers (2–7 pieces), but with 15 pieces from Pit 12480 (Fig. 2.18A). These are mostly flakes and include two refitting pieces. Flake cores, other struck pieces and flakes, a thickish end-and-side scraper and a scraper-like retouched flake are consistent with a Beaker date; there are some irregular terminations and no blades were present. The only possible anomaly is part of a possible arrowhead although it is incomplete and may be unfinished. Closely datable tools were not present.

Pit Group 2

Sixty-three flints came from PG2, all of which contained burnt debris and worked flint. Between 6 and 22 flints were recovered from the features, with the assemblage mainly comprising flakes – mostly irregular, and sharp or quite sharp, and often thickish and jagged – with some shatter pieces, spalls and chips. The six scrapers include part of a probable thumbnail type from one pit and in another, 2012 (Fig. 2.18B), a small irregular scraper, four end scrapers and a retouched flake were found along with various pieces of debitage. A few retouched pieces from the other features include a small, squat combination tool (spurred scraper) and a few miscellaneous retouched flakes. The largest pottery assemblage from the feature group, including some large Beaker sherds, also came from pit 2102 and the retouched pieces formed a high proportion of the flint from the feature; 27% of the pieces from the pit were retouched and 22% were scrapers. The end scrapers range from a slightly retouched long cortical flake to a squat neatly retouched semicircular piece with previous removals

of cortex forming a thumb hold; they were, however, generally lightly retouched and comparable to some from similarly dated pits elsewhere (e.g. Bates 2012, 35–7, figs 3.10 and 3.11).

Pit Group 3
Forty-four flints were recovered from PG3. Pits 12198 and 12200 (Fig. 2.18C) contained 17 and 16 flints respectively, with the other flints found in features in smaller numbers (1–7 pieces). The tested fragments and flakes, quite sharp, were also mostly irregular and cortical. Fragments of a core and some blade-like flakes give slight evidence for the neater nature of flint from 12198 – although all fragments are burnt, as are two scrapers, one of which is an incomplete, thin piece.

Pit Groups 4 and 5
A total of 152 flints came from the 14 small pits in PG4 and PG5, with flint present in all but one pit (1–36 pieces in individual pits). Debitage is mostly sharp. The largest assemblage, from pit 12006 (PG4, Fig. 2.18D), mostly comprises flakes which vary but are relatively regular in nature, with a few shatter pieces, two small thin blades and a small piece with battered dorsal ridge that is possibly a crested blade but probably a more informal core trimming piece. Thirty-five flints were recovered from pit 12286 (PG5, Fig. 2.18E). They include three struck/tested pieces, an irregular piercer the shape and working of which may suggest it was hafted (Ra 5092 from fill 12287, Fig. 2.40BB), a neat scraper on a thin, broad ovate cortical flake and debitage mostly comprising small quite irregular flakes.

Found in other pits were a small, chunky multi-platform flake core probably also used as a hammer (12292, PG5), three tested pieces and an irregular utilised blade (12010, PG4), a small, neat D-shaped scraper with cortex 'backing' its straight-sided right part (Ra 5069, 12012, PG4, Fig. 2.40Z), a 'backed' flake or knife (12014, PG4) and various debitage, with a few other miscellaneous retouched or utilised pieces.

Pit Group 6
Ninety-one flints came from the five features within PG6. Forty-seven pieces, the largest number from a pit in the group, were found with exclusively Beaker pottery in pit 5403 (Fig. 2.18F). Part of a possible scraper and six pieces of debitage – mostly small, irregular flakes and shatter – were from a basal fill, with the rest from the upper fill; these include an irregular possible core or tool, two tested pieces and mostly cortical flakes and shatter. There are two blades: one small with a cortical platform and the other patinated with an abraded platform edge, probably residual. Of most note, and very unusual, is a finely made bifacially flaked dagger (Ra 2181, fill 5404, not illustrated) from pit 5403. Its full length is unknown as one end and the other tip are missing but it measured 53mm and 10mm respectively at its widest point and thickness. It was flaked across the entirety of both faces and had a patchy light grey to white patina. Although incomplete, it meets definitive criteria listed in a recent study of British later Neolithic and Bronze Age flint daggers (Frieman 2014, 34–7). Some small indentations in its edges, although not pronounced or evenly spaced, might relate to hafting and suggest that the piece is a long-tanged type, Type D (ibid., 37, fig. 2, Type D, and 43–6). Two scrapers were also present in the upper fill, one irregular and the other on a short wide flake.

Thirty-one flints came from pit 5384, including an irregular struck fragment and debitage with quite a few blades and blade-like but irregular pieces and two utilised blades. The other three pits in the group contained much smaller numbers of flints, mostly irregular flakes. Much of the flint from PG3 was patinated (68% by number).

Pit Group 7
A low density of finds was recorded from this group; only 16 flints were recovered, mainly flakes and shatter fragments.

Pit Group 8
Sixty-nine flints were recovered from the four closely grouped small pits in PG8 (Fig. 2.18H). The largest assemblage comprised 36 flints from pit 12381 and included a core fragment and a utilised flake. Three other pits held 10 or 11 flints each, with three slightly retouched scrapers in total, two of them from pit 12383. These comprise a thin subcircular example, an irregular cortical end scraper and a thick scraper from pit 12379 (Ra 5093, Fig. 2.40CC). Otherwise, the flint mostly comprised unmodified sharp debitage, predominantly small and irregular in nature, with four struck or tested pieces present in two of the smaller assemblages.

Pit or tree throw-hole 12241
Thirty-three pieces of flint, including a burnt fragment, were found with pottery in feature 12241, possibly a tree throw-hole. They are mostly sharp, quite similar thick cortical flakes and other debitage, but a small neat utilised blade and a small quite thick cortical end scraper with a 'spur' or corner formed at one side of its retouched distal end was recovered from fill 12211 (Ra 5087, Fig. 2.39Y), from which Beaker pottery was also recovered.

Early Bronze Age Burnt Mound 2 and Middle Bronze Age well 12769

Other than part of an axe or adze of probable Mesolithic date in well 12769 – a probable Middle Bronze Age well cut into the area of BM 2 – there were no closely datable pieces within these features but the nature of most of the flint, predominantly irregular sharp cortical flakes with short thickish pieces, and the use of some irregular flakes for tools, is consistent with a Bronze Age date. By far the largest number of flints, 147, came from the central well/pit 12769, where two probable hammerstones, some struck pieces (cores/fragment), debitage and a few retouched or utilised pieces were found. These include a combination scraper/spurred piece, Ra 5130 (12771, Fig. 2.39W),

two thick scrapers – one small and one a relatively large, neatly retouched subcircular example, Ra 5129 (12771, Fig. 2.39V) – a notched flake, and a few utilised pieces. Other features had smaller amounts of flint, mostly comprising debitage.

Totals of 20 and 19 flints respectively came from the cobbled layer 12805 which had been pressed into the base of hollow 12585 and from well/pit 12779 in the southern part of BM 2 (Fig. 2.23). They include struck and tested pieces and irregular and/or cortical debitage. A retouched flake with a possible notch was found in the cobble layer. From the pit, a combination knife/'spurred piece' made on a thinnish flake with multi-directional dorsal scars (Ra 5132,12779,) and an awl made on a thickish blade from a prepared core both have a slightly patinated nature compared to other 'fresher' and largely cortical pieces from the same feature. Along with two other blade type pieces from prepared cores, these may be residual. A tested piece and two other flints, one perhaps slightly retouched, came from an adjacent much smaller pit, 12784.

Silting/infilling of the hollow

Six more or less distinct layers of infill were recorded and the numbers of flints increased consistently upwards through the mound layers, with six pieces in the lowest deposit and 228 in the uppermost infill.

Flint from the lower fills of the mound hollow comprise irregular debitage, mostly quite sharp cortical flakes although rarely primary pieces, with a few irregular cores or tested or struck fragments. There are two small neat patinated blades which are likely to be residual. Tools mostly comprise miscellaneous retouched or utilised pieces, including a utilised thermal fragment. A large utilised flake is cortex-backed. There is also a piercer made on the distal point of a blade-like flake, a few irregular or slightly modified scrapers including one on a relatively large thick primary fragment (Ra 5126, 12690, part of the fourth layer of infill), a possible arrowhead and an irregular ovate pebble of dark red probable quartzite used, quite minimally, as a hammer or grinder (Ra 5124, 12710, also part of the fourth layer of infill).

From the upper fills of the hollow there were larger numbers of flints, although the general nature of the material was similar, with cores, struck pieces and debitage all present and correspondingly slightly larger numbers of retouched or utilised pieces including some scrapers with thick wide platforms (for example, Ra 5119 from 12636, part of the fourth overlying fill, Fig. 2.39X), a 'nosed' example (Ra 5123, from 12660, part of the fifth fill, Fig. 2.39O), some pieces backed by cortex, a possible arrowhead, a long thick cortical fragment, possibly used as a crude point (12654, fifth fill), a long thin flake used as a knife and a few retouched or irregular utilised pieces including thermal fragments and 'flakes' struck in an ad hoc manner from cortical lumps or nodules (for example 12681, fifth fill, and two from 12617, the sixth fill). Another minimally used hammer or grinding stone, on an irregular lump of dark yellowish-brown quartzite, was also found (Ra 5121, 12648, fifth fill).

Most of the tools were not closely datable but the presence of irregular pieces, utilised cortical flakes and a few thermal fragments is clearly consistent with the Bronze Age date of the mound. The slightly larger size and more irregular nature of the tools, compared to BM 1, was apparent.

Discussion

Beaker pits

Outside the areas of BM 1 (see below) flint was found in 65 Beaker pits. Flint from the pit groups included several cores or other struck fragments and a range of predominantly quite irregular debitage, as well as three scrapers (one of which is incomplete and two are burnt) and part of a possible arrowhead of uncertain type.

There were particularly notable proportions of retouched flints; 27% of the flint from PG2, including five scrapers and a retouched flake, and in discrete pit 11120, all six flints, including four scrapers, were retouched or utilised. In both cases the scrapers were consistent in nature with pieces found in Late Neolithic or Beaker pits elsewhere (Bates 2012, 35–7, figs 3.10 and 3.11; Robins 2000, 198, fig.159). The proportion of retouched to other flint in Beaker pits, and the occurrence of scrapers in particular, has been discussed elsewhere (Cleal 1984; Garrow 2007). No evidence, however, was recorded for any unusual arrangement or deposition of flints within the features, as has possibly been seen in Grooved Ware pits at some sites.

Part of a flint dagger was found with Beaker pottery in PG6. Flint daggers are often associated with Beaker type pottery, most often found and traditionally associated with Beaker burials but also known from settlement contexts (Frieman 2014, 106), and their distribution is particularly concentrated in the eastern parts of Britain (ibid., 35, fig. 1; Grimes 1931; Rogerson and Ashley 2011, 249, figs 1 and 2). They are thought to have emulated early metal types and their continued presence in more elaborate forms in East Anglia might have related to a rarity of metal daggers there, and perhaps also to the abundance of flint (Frieman 2014; Grimes 1931, 349). Both utilised daggers and examples – including some of those from burial contexts – which appear not to have been used are known, and their use and possible meaning to those who produced and used them has been discussed elsewhere (Edmonds 1995, 146; Frieman 2014, 53–5). The present example was clearly not in its original context as it is broken and patinated; other flints from the feature are less closely datable.

Other Beaker period finds

A relatively large number of flints were recovered from a natural sinkhole (1543, not illustrated). Most of the material is not closely datable but the fact that pieces are predominantly irregular, with the inclusion of some flakes of a very similar flint type, suggests that the assemblage could be contemporary with the Beaker activity at the site, and a chisel arrowhead is datable to that period. Part

of a backed knife found in an Iron Age pit is likely to be a residual Late Neolithic or Early Bronze Age piece, and scrapers likely to date to the Neolithic or earlier Bronze Age were found in Iron Age and medieval contexts.

Burnt Mound 1

A very large proportion of the flint recovered from FAS 056 was associated with BM 1.

No flint was found in the lower sediments of the large well, 3106, which built up during its initial use. Above these, debitage and some retouched or utilised flint (including scrapers) were recovered, mostly from the deeper central area of the pit where a few cores were also present, with a smaller amount of material found in a thinner layer which was subsequently sealed by a surface of cobbles. A large number of retouched or utilised pieces came from the pit (33% of the flints from the pit had been used in some way), mostly slightly edge-retouched flakes but also several scrapers and a small number of slightly retouched/probable piercers; all but four of the utilised pieces were from the central fill. It is possible that flints (including, perhaps, some heavier pieces such as cores) fell into and accumulated more readily in the deeper area but it may also be the case that deliberate discard of pieces occurred here during or following activity relating to the cobbled surface and an associated later well and pits. A relatively high number of retouched or utilised pieces (30% of the flints) also came from an upper part of the main well cut, 3174. They include some slightly unusual types, with two 'spurred' scrapers and two longish pointed pieces, one of them with a denticulated edge.

In total 344 flints were found within the cobbled layer, parts of which post-dated the initial use of the mound complex. Waste material and cores were present, but retouched or utilised pieces formed a very large proportion of the flint (40% by number of pieces) with by far the majority of the flint coming from the northern and eastern part of the mound complex in the vicinity of pit 3106. Similar debitage, with one identified occurrence of refitting pieces, strongly suggests that knapping took place on this surface. A particularly high concentration of flint was recorded in a 'stepped' edge of the pit (3174, see above). Miscellaneous retouched flakes were the most common tool type from the cobbled layer, with slightly utilised pieces second most common, but fourteen scrapers were found along with seven piercers, two each of knives and combination spurred scrapers, and single examples of an awl, a notched flake and a denticulate.

A smaller proportion of retouched and utilised flint, albeit still quite high, 19% overall, came from the fills of five pits which were in the northern part of the mound area and were probably associated with the cobbled layer as the main pit silted up. Tools included two or three 'thumbnail-like' scrapers but were predominantly miscellaneous slightly retouched or utilised pieces.

The final infilling of the main pit 3106 included a large number of flints, but the proportion of retouched or utilised pieces, 26%, was less than that seen in the cobbled layer or from the infill of the pit. The range of tools was typical of the mound overall, although a possible fabricator was also found. It was also the case that notably more cores were found in the upper infill of pit 3106 than in the cobbled layer and associated pits, and that some larger flints (including cores and modified pieces) were present. This may reflect the change in use of the area from that of task-related activity (with flake production, use and discard) and the shift of focus of activity to the south. The hollow in the top of the partly silted up pit was infilled, partly deliberately backfilled, and larger flints may have been more likely to have been included in this process – either by the transportation of material previously dumped outside the mound or perhaps during the initial breaking and 'preparation' of flint for subsequent use.

A range of flints similar to that seen in the earlier pits came from the 'replacement' well 2718 in the southern part of the mound (20% were retouched or utilised) and the condition of the debitage varied although it was predominantly slightly edge damaged. Many more flints came from pits that were probably associated with the cobbled surface and recut or replacement wells, most of them from the upper fill of one of the 'troughs', 2921, which had the largest single feature assemblage from the entire site (Fig. 2.15, Section MM). No cores were present in this pit, but by far the majority of pieces were unmodified flakes. Only 12% of the pieces were retouched or utilised, probably reflecting the subsequent ceasing of activity at BM 1, but unlike in most other features where miscellaneous retouched flakes were the main tool type, in this pit there were more than twice as many scrapers (26 examples and two combination scraper type tools) as miscellaneous retouched flakes, and only two slightly utilised pieces. Perhaps this represents the deliberate selection and deposition of these pieces. Notably, while flint from most of the earlier contexts mentioned above included a range of slightly edge damaged and some sharper debitage, the material from this later pit (and, also, from the other pits associated with the replacement well) was almost all sharp, in accordance with the idea that the replacement well was not in use for long and that activity in the immediate area ceased quite soon after its formation and relatively short-lived use (see above).

Flint from the initial 'post-use' deposit infilling the mound hollow, 2917, was concentrated in the northern area and includes a range of cores, debitage and tools, with just over 70 scrapers and more than 100 miscellaneous retouched pieces found, and other tools including small numbers of knives, combination tools and spurred pieces. Although some quite neat scrapers were present, both the occurrence of thick cortical sides utilised as 'backing' and pronounced or irregular dorsal scars which would have provided a good hold suggest that functionality was more important than a precise form, and that flakes or fragments suitable for use without much modification had often been used. The deposit, and the flint included within it, undoubtedly derived from waste material associated with the activity

at the mound. Much of it had probably been dumped outside the working area, to be subsequently spread across and into the remnant hollow on abandonment of the area. The condition of the flint varied, with both sharp and edge damaged debitage present. It is notable, perhaps, that almost all that from the north-western quadrant (and a fair proportion of that from the south-western) was recorded as sharp or quite sharp while there was a mix of sharp and edge damaged material from the north-eastern quadrant – much less flint came from the south-eastern quadrant but that also included a mix of conditions. This might again suggest that material was dumped directly into the disused northern area from the 'replacement' activity area to the south-east, and that material may have been moved from earlier dumps (perhaps dumps of material relating to the original large pit) and spread over the south-eastern area following the final abandonment of the mound; such a secondary deposition process would have provided more opportunity for damage to occur.

Slightly fewer but still quite large numbers of flints came from two further deposits that infilled the hollow remaining at the complex. However, the number of scrapers present decreased quite dramatically, with approximately 30 in the lower deposit, 2704, and 17 in the uppermost layer, 2703, being concentrated in the north-western and north-eastern quadrants respectively. The range of other tools was similar to that from underlying deposits, with numbers of particular tool types varying but overall numbers decreasing higher in the sequence. Miscellaneous retouched and utilised pieces were still present in the lower final infill in comparable numbers to those from the mainly backfilled material 2917, but the quantity decreased somewhat in the uppermost layer. As in the underlying deposit, debitage from 2704 in the north-western quadrant is notably sharper in nature (see above) while its condition elsewhere is more varied, and edge damage is present on some material from most contexts in the south quadrant. Above, in deposit 2703, there was no discernible difference in the condition of flint across the mound; both sharp and edge damaged material was present in all areas.

Early Bronze Age Burnt Mound 2

A total of 916 flints was found in contexts associated with the use and silting up of BM 2. Material found in contexts assigned to the phases of activity relating to the use of the mound (219 flints) did not include closely datable pieces but flakes were mostly irregular and often thick and cortical. Most of the material was, however, from infill layers in the upper part of the large well 12769. It may therefore relate to later activity, rather than contemporary material associated with the earlier phases of use of BM 2, given that two of the upper fills produced radiocarbon dates firmly within the Middle Bronze Age. It may equally well – as suggested for BM 1 – have been redeposited material from intermediate dumps which did relate to use of the well, with the sharpness of most of the debitage suggesting it had not been moved around that much. The only 'formal' tools, all relatively thick, were two scrapers and a combination spurred tool/scraper. Some other pits associated with the earliest use of the area contained very small numbers of flints and only two pieces were retouched or utilised. Some of the flints from a cobbled layer lining the main hollow and from two pits, one of them the earlier well 12798 surviving beneath well 12769, seem more likely to have been *in situ* pieces relating to early activity than the material from higher up in the fills of the main well, but they are relatively few. An irregular core and tested pieces from the cobbled layer suggest that flint may have been worked here. Flakes were irregular and almost all had cortex. The only utilised piece was a notched flake. In the pit within the well a knife/spurred piece and two or three blade type pieces may be of earlier dates as they differed in nature and patina from the irregular cortical flakes also found there.

In total 690 flints were from the layers which accumulated as the mound hollow silted up. Occasional cores or other struck pieces were present throughout, with retouched or utilised pieces, but unmodified debitage is most common, with irregular and mostly cortical flakes predominating. Numbers of flints were not as large as in the deposits associated with BM 1, but increased consistently upwards through the infill material, all of which was thought to comprise naturally accumulating material rather than deliberate backfill; material may therefore have been incorporated from surrounding waste.

Several scrapers were made on thick flakes, often irregular and occasionally with notably thick platforms with obtuse angles. The presence of other irregular retouched and utilised pieces, including some thermal fragments, is also consistent with the judicious use of available flint to serve activities occurring at the mound. The ready availability of raw material provided suitable 'blanks' which, with a small degree of fashioning, could be used for tasks at hand and also cores from which flakes could be rapidly produced, simply retouched and utilised, often incorporating existing cortex as a backing or hold (or an irrelevance – in that it was not considered necessary to remove it).

Although the condition of the flint varied and was mixed in some areas/layers, in general it was mostly quite sharp and this may reflect the relatively shorter life of BM 2. Of some note, perhaps, was its more mixed condition in the uppermost infill with debitage from the southern quadrant of that infill being mostly edge damaged. This could be seen as corresponding with the position of the later replacement pit 12779 and, as at BM 1, reflect the redeposition of material at a late stage in the life of the mound.

Comparison of the flint from Beaker Burnt Mound 1 and EBA Burnt Mound 2

Flint from both burnt mound sites was similar, in that debitage was largely irregular in nature and that cortex was often present. Cores or other struck pieces were found, although not in large numbers and with little in the way of core preparation evident. Spalls were rarely present in more than small numbers which could support an interpretation

of the assemblages as mainly use-related rather than related to knapping and production. However, first most of the material was in effect redeposited in pits and mound deposits, and the relative lack of micro-debitage could be explained by the lesser likelihood of tiny pieces being picked up from an original knapping position and redeposited. Second, if cores and tools were worked, respectively, with little preparation and minimally, relatively fewer spalls would occur. Flint was probably worked on site, or immediately adjacent, and used as and when tasks were undertaken and tools required. While the flint was not closely examined for refits, there were at least three lots of two or three refitting flakes from BM 1, and some other groups of very similar flakes. At BM 2 only a few similar flakes were seen in a few contexts and no refits were identified.

Retouched or utilised flint comprised a greater proportion of the material than is generally seen in assemblages of comparable date. This was particularly true at BM 1 where it formed 19% to 40% of the flint collected from a few key contexts (see above). At BM 2 this was between 8% and 20%. The nature of many of the tools supports the idea that raw material was readily available and utilised opportunistically as required. Cortex was often retained, either as backing or to otherwise enhance prehension, or sometimes probably simply because it did not impair function. Cortical edges were sometimes themselves retouched or utilised as the working edge of the tool. Large numbers of scrapers were found from BM 1 with fewer from BM 2. In general scrapers from BM 1 are slightly smaller and neater with those from BM 2, which tend to be larger, more irregular and, in many cases, with more cortex; these characteristics are consistent with the relative dates of the mounds. It was also notable that, from BM 2, the flakes on which the tools were made were often thicker, some with an obtuse angle between the platform and ventral face – an attribute also consistent with their later date compared to those seen at BM 1 where thinner flakes were more prevalent (see Ballin 2002, 13–14).

Donahue (below) describes the end scrapers from the burnt mound sites as quite unique, being mostly without the lateral edge use which often represents the use of end scrapers for cutting as well as scraping purposes. He also mentions, however, that the selection analysed for microwear was not a random sample of tools from the site and, from the mound assemblages overall, there are pieces with dual use – although whether edge use for cutting pre-dated use as a scraper (as described by Donahue) is uncertain. At least eight combination scraper/knives (or knife/scrapers) were recorded from BM 1 contexts and miscellaneous more minimally retouched pieces include other examples.

As presented by Donahue (below), edge-wear analysis showed that, where use could be ascertained, tools were used for working dry hide; by far the majority for scraping hides – unsurprisingly, given the nature of the sample – but with one cutting edge and three piercing tools identified, the latter possibly for making holes in a hide to enable it to be held or stretched flat during the scraping process or, perhaps, for subsequent working (see Chapter 5). The analysis also identified some pieces with post-depositional damage and some possibly resharpened but 'unused' edges. Many of the Bronze Age pieces were from deposits associated with the mounds and many were possibly redeposited into pits and depressions from related dumps following abandonment of the areas, which could account for the wear/damage.

The most notable aspects of the lithic assemblage from the burnt mound sites at Marham Park were their large size and the very high numbers of retouched and utilised flints, particularly scrapers. Despite work at many burnt mound sites in England and Ireland there has often been a lack and sometimes an absence of any significant artefactual evidence associated with them (Brown *et al.* 2016, 2–3). Relatively small assemblages of flint and other finds have, however, been found at many sites, with slightly larger numbers of flints from a few.

A total of 805 flints was found sealed by and within Bronze Age burnt mound deposits at Sandy Lane, Charlton Kings, Gloucestershire, with 300 more flints from other contexts at the site. The assemblage from the burnt mound site included some 'well-worked down' cores but also a high proportion of cortical and generally irregular flakes (Bradley 2001, 73–4). Raw material appeared to have been worked 'without much expertise and with numerous flaking errors'. The only formal tools were a number of scrapers and although a few blades/narrow flakes were found, the flint was consistent in nature with later prehistoric working and contemporary with the excavated deposits – although the condition of much of the flint suggested it may have been redeposited in the mound deposits. The flint was comparable to that from Marham Park, but the purpose of the burnt mound was uncertain; the presence of animal bone included, however, domesticated species and a relatively high proportion of red deer, which led to a suggestion that meat and antler working might have occurred there (Leah and Young 2001, 80).

A lesser amount of flint was recovered from burnt mound deposits at Hatch, Basingstoke where, although a few flints were likely to be residual, most of the material was thought to relate to use-activity at the mound, with procurement and manufacture under-represented (Ford 2006). Several serrated pieces were found, and the variable shape of these suggested they may have been contemporary with the 'probably' Middle Bronze Age mound activity. At Marham Park there are several serrated pieces from BM 1 and, while at least one is likely to be a residual earlier tool, two or three thicker 'blade-like' flakes have cortex backing and a more irregular nature, consistent with the rest of the mound-related material. A report of experimental 'prehistoric' hide working describes a fresh flint 'blade' being used to cut the skin, and flint scrapers with 'serrated edges' used to scrape the dried skin. However, that report also describes how the scraping edges became blunt, requiring retouching several times during the process, and it seems that these were retouched scraper edges rather than serrated (Harris 2012).

Smaller numbers of flints from or associated with burnt mounds include examples from Northwold, Feltwell Anchor and Brundall (Norfolk), Harbridge (Hampshire) and from burnt flint deposits and pits at Crabble Mill, Dover (Kent), but although retouched pieces were included at all these sites, and considered contemporary with the burnt deposits, tools were few and there was little to suggest specific activities – although at Northwold and Feltwell, environmental evidence provided information about the nature and sequences of site use (Bates 1994; Butler 2006; Crowson 2004, 18; Edmonds 2000; Shennan 1999, 177–8). The traditional interpretation of burnt mounds as cooking places or 'saunas' is often repeated in site reports (as noted in Chapter 1) and an explanation for the absence of significant diagnostic tools or numbers of such tools which could inform on the nature of activities is usually lacking. Although craft or 'industrial' associations have been suggested, clear evidence for these has, until now, been frustratingly sparse (Crowson 2004, 35; Parfitt 2006, 233–4).

Few comparable assemblages to those from the mounds at Marham Park have been found elsewhere. Microwear analysis of a sample selection of the tools indicates, where use is identifiable, that the pieces were used for working dry hide. The range of tool types, with scrapers by far predominating and piercer-type pieces and informal knives also present, as well as numerous 'miscellaneous' modified flakes and fragments, mostly scraping and cutting types, is consistent with such activity and the likely multitude of associated tasks (see Chapter 5). The somewhat irregular nature of many pieces, especially those from BM 2, reflects their date but is probably emphasised by the nature of the work which was taking place, with flakes and fragments being modified, used and discarded as tools were needed, and during many work sessions and seasons.

That flint was worked at or close to the mounds is evidenced by the presence of cores and debitage, a small number of hammerstones and, in two or three instances, refitting flakes. The absence of large quantities of micro-debitage as well as the redeposited nature of many of the deposits (in pits and 'mound' infill) makes it difficult to identify actual knapping areas with clarity.

Numbers of 'combination' tools were found. These have been noted as most common during the Neolithic period (Butler 2005, 168) but they may have been particularly useful during various stages of scraping, cutting and piercing hides; a multipurpose tool might have been useful for different tasks undertaken by one. A worker may have held onto one tool during an episode of work (perhaps modifying it as required). A few distinctive 'spurred' scrapers were found with a small point protruding from an edge or 'corner' of a scraper, which may have been used for piercing. The range of sizes, shapes and lengths of scraper edges may have been useful in working different areas and perhaps various textures and conditions of animal hide.

Catalogue of illustrated worked flint

Fig. 2.34

A End scraper. BM 1, first infilling deposit, 2917 (see Fig. 2.13, Sections AA and BB), contexts 3075 and 3076 (not illustrated)
B Side scraper. Context details as for A
C End scraper. Context details as for A
D End and side scraper with a slight spur at left side. Context details as for A
E, F End and side scrapers. Context details as for A
G Thumbnail scraper. Context details as for A
H, I Cores. Context details as for A
J Core tool. Context details as for A

Fig. 2.35

K Knife. BM 1, layer 2703 (Fig. 2.16, Section TT), context 2774
L Burin, with possible slight use as a scraper. BM 1, layer 2703 (Fig. 2.16, Section TT), context 2999
M Scraper (Ra 2103). BM 1, layer 2703 (Fig. 2.16, Section TT), context 2841
N Piercer (Ra 2321). BM 1 layer 2704 (Fig. 2.16, Section TT), context 3037
O Oblique arrowhead (Ra 2321). BM 1 layer 2704 (Fig. 2.16, Section TT), context 3042
P Retouched adze-like tool. BM 1 layer 2704 (Fig. 2.16, Section TT), context 3043
Q Scraper/spurred piece. BM 1 layer 3092/2918 (Fig. 2.13, Section AA), context 3094 (not illustrated)
R Knife. Context details as for Q

Fig. 2.36

S Notched flake. BM 1, cobbled surface 2693 (Fig. 2.13, Section BB), context 3191
T Burin. BM 1, cobbled surface 2693 (Fig. 2.13, Section BB), context 3198
U Tanged scraper (Ra 2490). BM 1, cobbled surface 2693 (Fig. 2.13, Section BB), context 3207
V Serrated blade. Later gully near BM 1, 2785, fill 2786 (not illustrated)
W Scraper (Ra 2330). BM 1, well 3106 (Fig. 2.13, Sections AA and BB), context 3143
X Denticulated blade. BM 1, gully 3174 near well 3106, fill 3272 (not illustrated)
Y Oblique arrowhead (Ra 2359). BM 1, well 3106 (Fig. 2.13, Sections AA and BB), context 3143
Z Scraper (Ra 2384). BM 1, gully 3174 near well 3106, fill 3272 (not illustrated)
AA Piercer/spurred point. BM 1 Trough 2926 (Fig. 2.15, Section LL), fill 2927
BB Fabricator (Ra 2318). BM 1, well 2718 (Fig. 2.16, Section TT), layer 2719
CC Piercer (Ra 2338). BM 1, well 2718 (Fig. 2.16, Section TT), layer 2719

Fig. 2.37

DD, EE, FF, GG, HH, II, JJ and KK
Scrapers. BM 1, well 2718 (Fig. 2.16, Section TT), context 2721 (not illustrated)

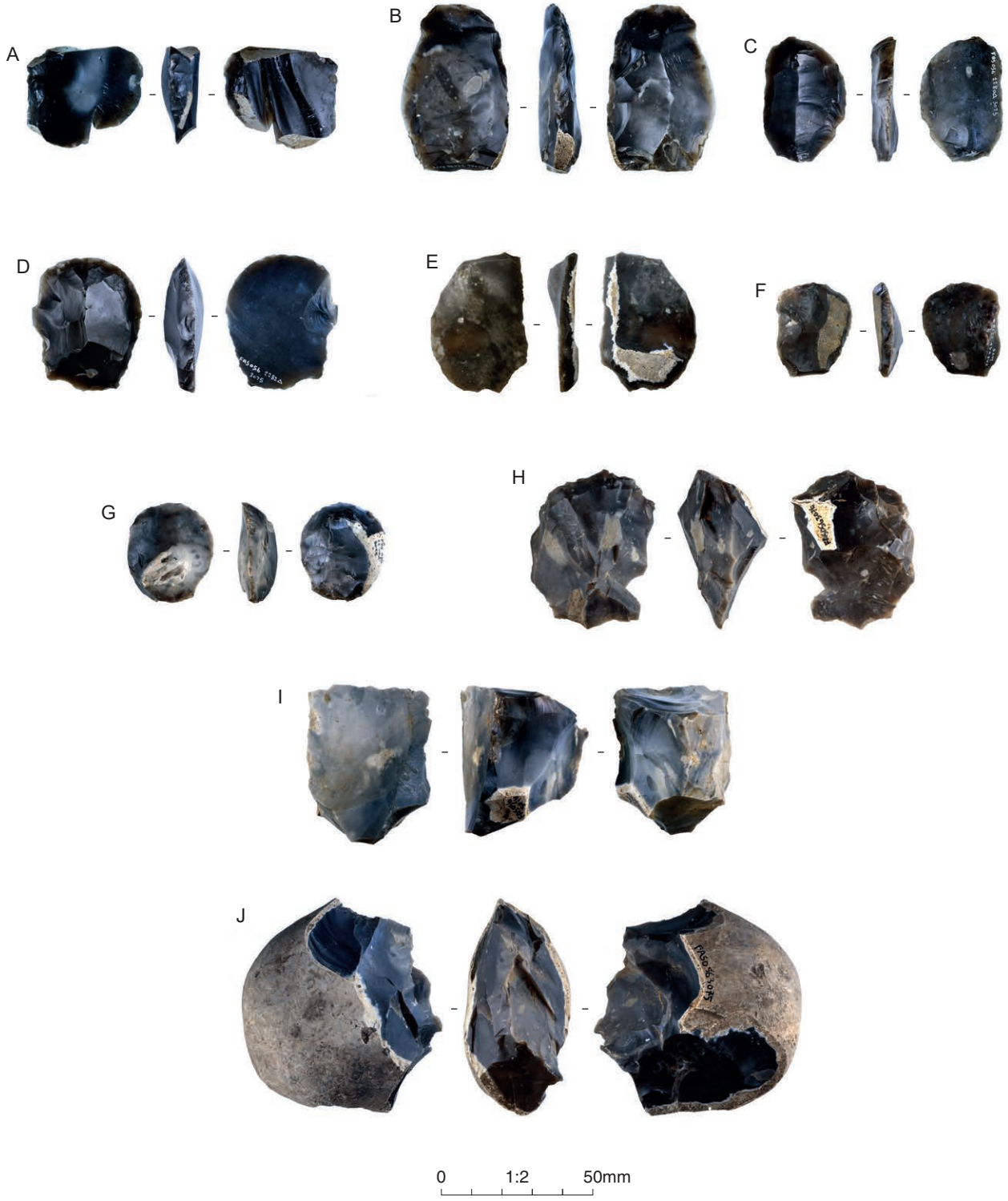


Figure 2.34 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 (1:2 scale)

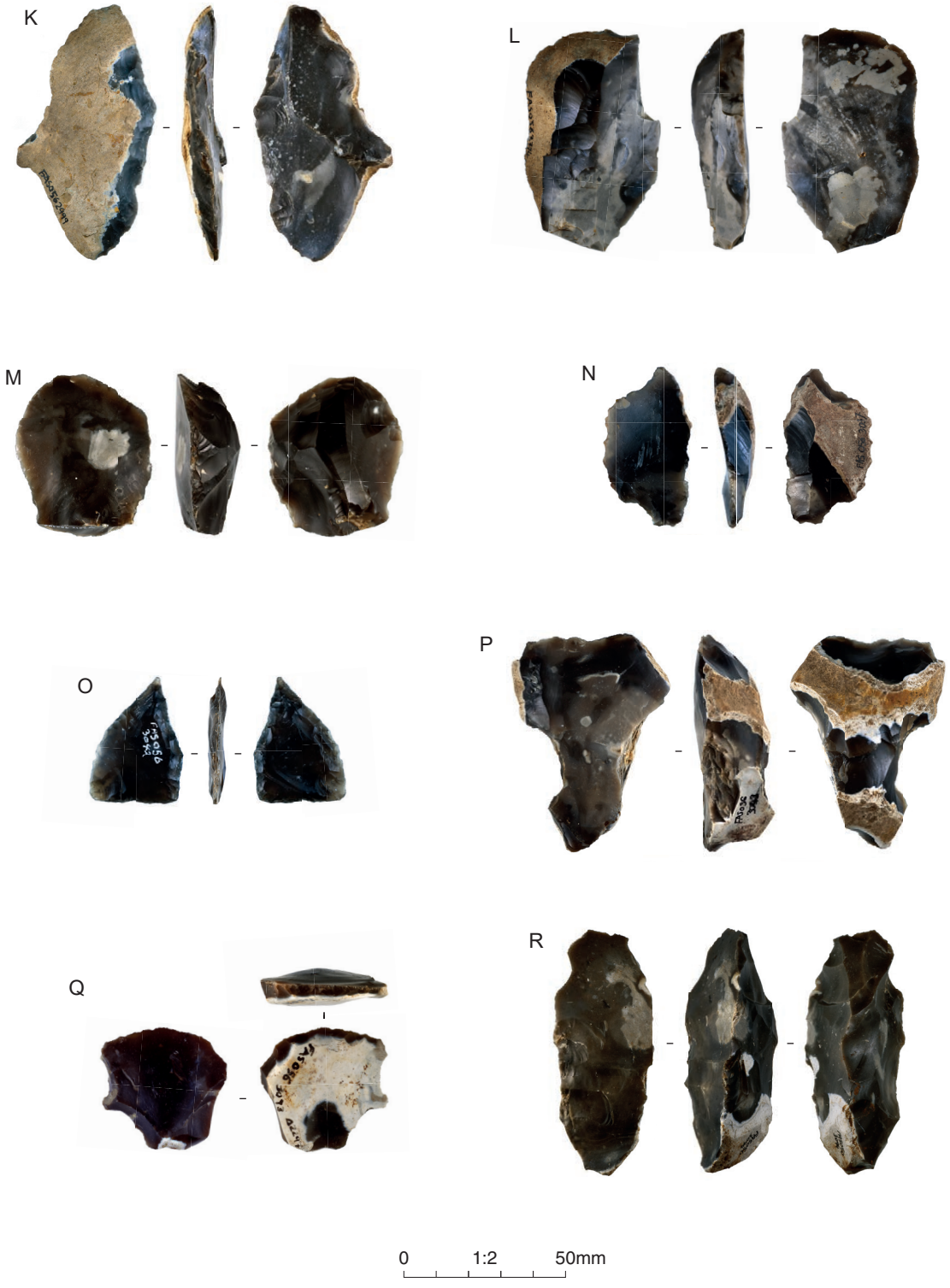


Figure 2.35 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 (1:2 scale)

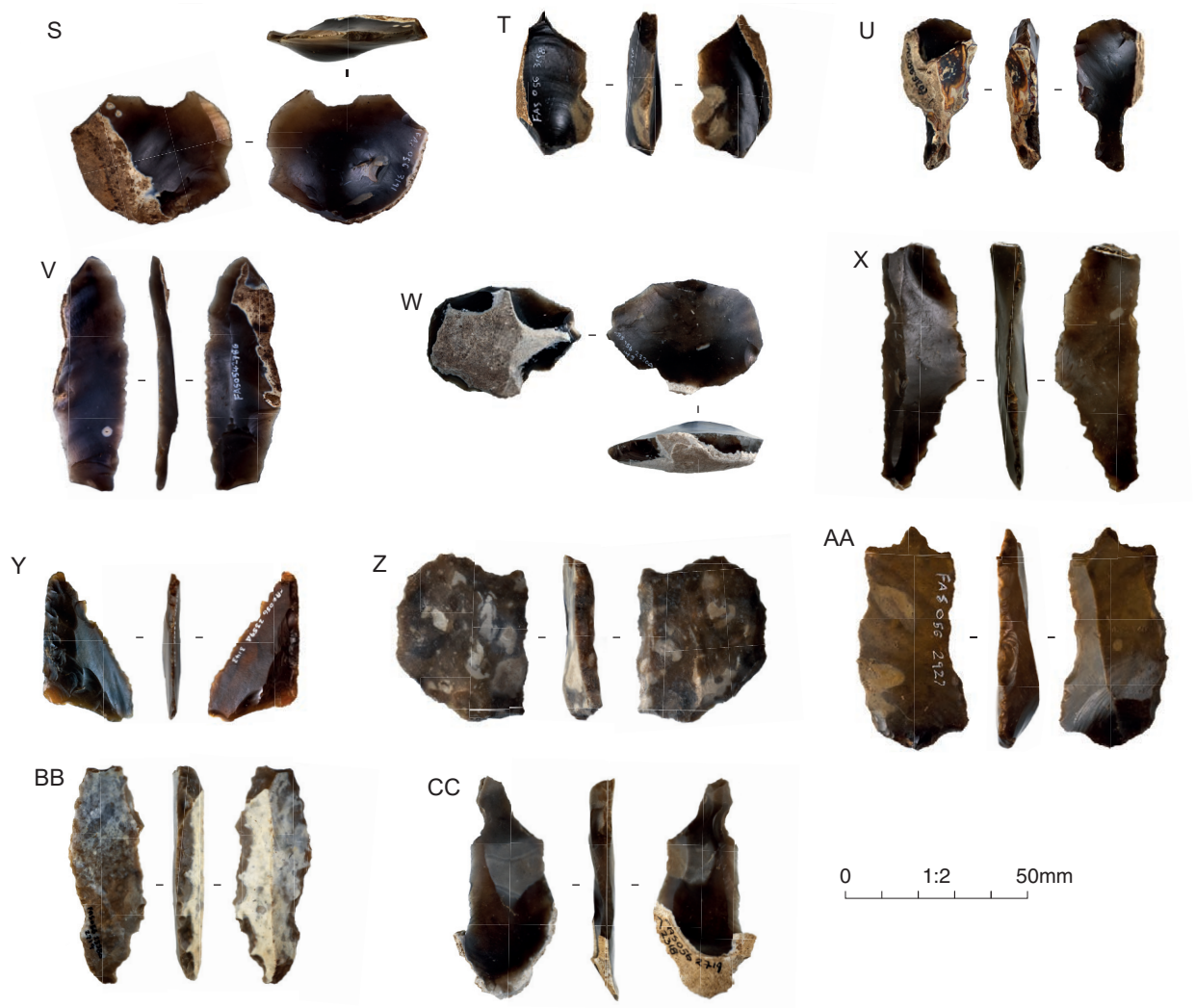


Figure 2.36 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 (1:2 scale)

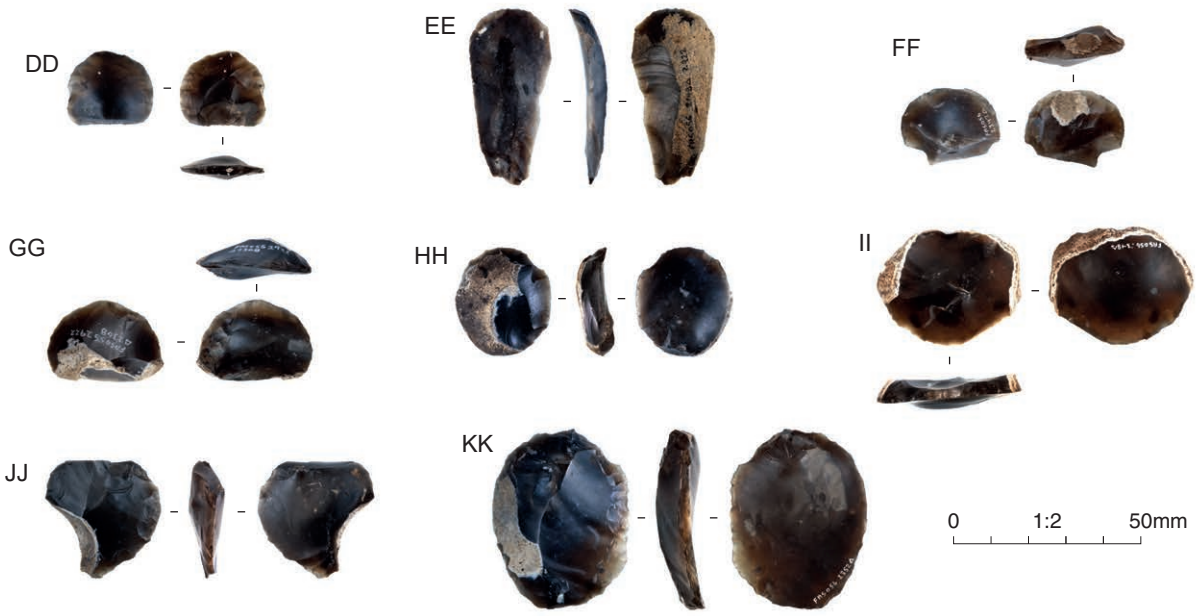


Figure 2.37 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 (1:2 scale)

Lithic microwear analysis

Randolph E. Donahue

Introduction

A sample of 77 artefacts from the Beaker and Early Bronze ages was submitted to the Lithic Microwear Research Laboratory to assess how the tools were used. Most of these were scrapers of various forms. This text is an edited version of the report prepared for the site archive report (Donahue 2023). Questions framing microwear analysis included: 1) Were there different uses for tools in each period and/or for Burnt Mounds 1 and 2, and did tools from these compare to contemporary features?; 2) Does the sample of tools suggest single or multiple uses for the burnt mound complexes (for example, cooking of the processing of animal skins)?; 3) Is there evidence of different manufacturing techniques/pressure flaking techniques within or across periods, which may reflect on the intended use of the tools?; 4) Is it possible to identify evidence of re-use/residuality which may suggest tools were used for other tasks after or as well as for their primary intended use?

Lithic microwear analysis

Lithic microwear analysis is the microscopic examination of wear and fractures that form along the edges and surfaces of fine-grained siliceous stone artefacts, often to improve understanding of how stone tools were used. Experimental studies demonstrate that microscopic wear and fracture scar characteristics resulting from tool use vary systematically according to the worked material (e.g. hide, wood, meat, bone) and according to the applied forces and motions such as cutting, scraping and wedging. Understanding these principles and relationships permits microwear analysts to infer past uses of lithic artefacts with a greater degree of precision and accuracy than can be achieved through reliance on either macroscopic attribute analysis or ethnographic analogues of tool form. Importantly wear patterns of different materials do not tend to merge to a common pattern with increased use. Instead what is observed is that the wear pattern for a given material becomes increasingly unique (Donahue 1998; Keeley 1980; Moss 1983). Wear can be produced by other causes. Rots (2003; 2004; 2010) has demonstrated how hafting and handling of tools produce wear and Keeley (1982) has shown how hafting impacts on the archaeological record.

Natural processes also produce wear features that can confound the interpretation of use-wear (Keeley 1980; Levi Sala 1986a, 1986b; Stapert 1976). However, it has been shown that these natural wear features can aid in understanding site formation processes (e.g. Burroni *et al.* 2002; Donahue 1994, 1998; Donahue and Burroni 2004; Donahue *et al.* 2019). Applications in the study of site formation processes alongside study of tool use have increased over the past two decades (e.g. Donahue and Evans 2012). The more site formation and post-depositional processes have affected stone artefacts, however, the less information that can be recovered about their use. Movement of artefacts and or the sediments is often the major cause of wear from post-depositional processes. Measuring such effects is done following a modified version described by Keeley (1980), derived from a method developed by Shackley (1974) for measuring downstream movement of handaxes in river deposits. The technique averages the width of the dorsal ridge using ten measurements of the width of the light beam reflected along the ridge; the sharper the ridge, the narrower the beam.

The ubiquitous scraper

The term 'scraper' is used here to describe stone tools that have been retouched to form a convex working edge with, normally, a fairly steep profile. The distal end of blades and flakes are often conducive to producing this form and as such the tools are often referred to as end scrapers to differentiate them from other tools, such as straight edge side scrapers. Referred to as 'grattoirs' in France and distinguished from '*racloirs*' (side scrapers), this group of tools includes circular scrapers, horseshoe scrapers, thumbnail scrapers etc., all with the characteristic convex working edge or edges with relatively steep profiles (Laplace 1964). Scrapers are one of very few artefact types that are almost exclusively used for one purpose and the association of these convex-shaped working edge tools and their use for scraping hides has been most emphatically demonstrated in the Upper Palaeolithic, where study after study has shown that their principal use (nearly 100%) is for scraping hides. In the Mesolithic this pattern continues, although one study indicated that they were also used to scrape bone (Dumont 1983). In the Neolithic it is observed that their principal use is for hide scraping and, while lithic microwear studies of Bronze Age and Iron Age sites are rare, again studies show that this tool form is strongly associated with hide scraping (Donahue unpub.). The pattern outside Europe is the same. Native Americans used convex-shaped, steep profile, edged tools for scraping hides. In Africa archaeological and ethnoarchaeological studies incorporating microwear and residue analyses demonstrate that these tools are used for scraping hides (e.g. Beyries and Rots 2008; Rots and Williamson 2004).

The association between scrapers and hide scraping is so strong that a microwear specialist now puts efforts into disproving the hypothesis of hide scraping rather than attempting to demonstrate how the tool was used. In the current study, which includes a large number of scrapers, alternative explanations of how the scrapers were used are demonstrably rejected.

Why are scrapers the preferred tool form for scraping hides? After removal from the carcass a hide needs to be flensed or fleshed (removal of flesh tissue attached sporadically to the hide). This flensing activity may involve use of a scraper-form tool or a straighter edged tool, like a knife or side scraper, because the flesh often needs to be cut away. Once the fresh hide is flensed it needs to be preserved or tanned (see Chapter 5). Modern techniques often use a chromium-based chemical solution but traditional practice

often show that the brain of the animal was rubbed into the hide and reports of traditional Native American practice also include the use of bark and oak leaves, rubbed into and wrapped in the hide.

Following these processes hides are stiff and require softening. This often involves the piercing of holes around the edge of the hide and the stretching of it on a frame or on the ground. The hide is then ready for scraping. The scraper can be held in the hand but because the hide can be softened faster by using much force, it is usually best to use the tool hafted in a long handle so that more leverage can be applied. The curved front of the scraper allows application of much force without snagging the hide.

Wear from the scraping of dry (post-tanned) hide is quite distinctive. The edge is often extremely rounded. The scraping of hides does not require a sharp edge, so a tool can be used well after the edge would be useless for other tasks. The texture of the surface of the edge is best described as matt and the reflectivity is dull; relative to any other tool use, the wear from hide scraping is the least reflective. The surface wear is also very extensive; it extends from the edge up the ventral and dorsal faces and into depressions of the surface and not just the peaks. This characteristic is typical of the working of soft material, which tends to wrap around the edge and come in contact with the faces and into surface depressions. Also observed on edges that worked dry hide are large hemispherical pits (Keeley 1980) measuring about 50µm in diameter and appearing as tiny thermal spalls, often seen along the immediate edge. These may be caused by the heat created by the high friction ratio when working dry hide. In addition to unique pitting of the edge, two kinds of striations associated with hide working are also observed. Common are wide striations that run in the direction of movement of the tool. These striations are formed by third-body wear (Arnell *et al.* 1991), where particles that get trapped between the hide and the tool scratch the tool as it scrapes the hide. In hide scraping the source of the particles is most likely the flint itself. Wide striations are found on the tool edges used for other tasks, but they are frequently observed on hide scraping edges. The other kind of striation is unique to dry hide scraping tools, best referred to as linear depressions. They are wide linear depressions, sometimes shallow, sometimes deep, that initiate at the face/edge boundary and extend across the edge. Linear depressions are probably caused by a cluster of silica platelets breaking off the flint surface and then gouging out a path across the edge. They may also be caused by a fracture scar that has been worn down substantially by the dry hide scraping, but there seem no examples of obvious scars in transition to being a linear depression. However they initiate, the high friction ratio of dry hide seems very important in their formation; to this author the linear depressions appear like glacially formed valleys with their rounded bottoms.

Wear from dry hide differs from all other worked materials, even fresh hide. Adding much grease or oil to a dry hide reduces the friction substantially. As a result a tool used on fresh hide does not display the hemispherical pits or linear depressions observed with dry hide. The amount of edge rounding is also less, most probably because the aim is often to remove flesh from the hide, which requires the edge to have the ability to cut and not just scrape and rub. Other soft material, meat, is even greasier than fresh hide and is cut and never scraped. The successful cutting of meat requires a sharp edge; once even mildly dull a meat-cutting knife becomes nearly useless. The only other soft material likely to have been worked in prehistoric times is soft siliceous plant fibre, which will leave a highly polished edge caused by the phytoliths in the plant tissue. Phytoliths are what produce the highly reflective surface referred to as 'sickle gloss'. Finally, the working of hard materials produces wear on the topographic higher points along an edge; it does not affect the ventral and dorsal faces or topographic low points along the edge. Hard materials also produce a variety of wear characteristics that distinguish them from each other, which is not relevant here.

Wear can also be produced by natural processes. Movement in sediments produces wear on all parts of a tool but particularly on projecting parts. Wear from sediments produces a rough surface texture and tends to give a glossy or non-contrasting character to the surface. Striations may or may not occur; they are often narrow and vary in depth and in direction. The wear can be similar to that from working fresh hide but can be checked by looking at wear on dorsal ridges.

Donahue (unpub.) analysed an assemblage of scrapers and other tools at the Royal Docks School Bronze Age site in London. The scrapers were consistently used for scraping dry hides but the consistent pattern of a bright polish on the working edges indicated some other material was also involved. Given that this section of the site was located in peaty sediments and was associated with a large number of pits it was hypothesised that the hides were tanned by wrapping them in peat, which has high concentrations of tannic acid, and then burying them in the waterlogged peaty sediments.

Because most scrapers have the working edge on the distal end of the flake or blade it is usually simple to resharpen the edge multiple times by retouch without modifying the form of the edge only the length of the flake. This extends substantially the use-life of a tool that would otherwise be useful for less than an hour and probably less than half an hour. The extended use-life of the tool means that substantial wear from handling or from the haft can be produced in unexpected locations on the tool. It is possible for lateral edges and dorsal ridges to show more wear and rounding than the working front of the tool. Differentiating tool use from hafting or handling wear in these situations can be extremely difficult.

Methodology

The sample of 77 artefacts included a variety of tools but various forms of scrapers predominated. The artefacts were selected based on visible condition, context and type. They

were recorded and photographed, then cleaned in 10% solution hydrochloric acid (muric acid), washed and bathed for 10 minutes in cold running water, patted dry and kept in covered trays.

For microscopic observation artefacts were set temporarily in plasticine and viewed at 200× magnification. Retouched and modified edges were viewed first, followed by unmodified edges. Other microscopic and macroscopic characteristics associated with post-depositional modification were also recorded (following Burroni *et al.* 2002; Donahue 1994; Donahue and Burroni 2004), particularly thermal alteration, patina and post-depositional residues.

If needed, ethyl alcohol was used to clean edges to remove finger grease or oil (which make surface observations more difficult) from the plasticine. Occasional dust particles and other contamination were ignored during observation unless they obstructed the viewing of important wear features. Microscopic characteristics were recorded and important or diagnostic surface features that contributed to understanding of use or post-depositional processes were photomicrographed using DinoCapture 2.0 software and camera. Multiple images were taken using different foci, later merged into a confocal image using Picolay software (www.picolay.de). The location of different kinds of wear characteristics were drawn and the inferred use or uses recorded.

Study of ridge rounding was performed on 15 artefacts. Ridge width was measured 10 times along the length of at least one dorsal ridge at random intervals. The amount of ridge rounding was measured using the width of bright light reflected back from the surface of the ridge at 200× magnification. Means and standard deviations were recorded of ridge width for each artefact as documented by Donahue *et al.* (2019).

Results

Forty-five of the tools showed evidence of having been used to work dry hide. Of the other 22, 6 show no evidence of having been used – at least since the last episode of resharpening – and 16 had post-depositional modification to such a degree that it hampered inference of tool use or even identification as to whether a tool had been used at all. There is no evidence on the tools for the working of any other material. Table 2.3 shows a list of the tools with inferred use. A selection of images is presented, indicating the position of observed microwear on the tools (Figs 2.39 and 2.40).

Post-depositional wear includes roughening of the surface; modification of surface reflectivity to a non-contrasting reflectivity; rounding of all edges, ridges and other protruding surfaces and production of many narrow and some wide striations going in multiple directions across the roughened surfaces. This pattern of wear is produced by movement of sediment rubbing against the artefact. It is also evident that there is much scarring produced by post-depositional processes. The fracture scarring usually preceded surface roughening, but sometimes the scars appear after surface roughening. It is not known if the artefacts were moving around (e.g. by being kicked around on the surface) or sediments flowed across the surface, or if there was movement through both processes. The early scarring would indicate that quite severe and extensive post-depositional processes affected many of the tools soon after their discard. Twenty-four of the artefacts in Table 2.3 were recovered from subsequent infill layers above the primary features and while the others were from 'sealed' contexts – pits and wells etc. – the material within them was not of primary deposition (see also *Worked flint*, Bates above, for comment on deposition of material).

Measurement of ridge rounding (e.g. Donahue *et al.* 2019) of a sample of artefacts from a variety of contexts shows that post-depositional processes, although common, are variable. As can be observed from Table 2.4, ridges are often rounded to a degree that tool-use inference should be impossible. However, first, at least some of the ridge rounding is likely caused during use from handling rather than from post-depositional processes alone and, second, dry hide wear is extensive and will persist in areas not affected by post-depositional processes. As a result use-wear features were identifiable, which allowed for inference of the tool-use of many artefacts.

Many scrapers display debris at the top of step termination scars on their retouched fronts, including silica crystals or crystal clusters. Among the debris there may be organic tissue, which may be the source for the lipids identified (see *Organic residue analysis of flints and sediments*, Dunne and Evershed below). In addition a red residue was observed, most probably red haematite. Ground haematite is often reported as being rubbed into hides for two different reasons: 1) haematite is a proven bactericide and thus would act as a preservative; 2) it produces a sienna colour, which is often preferable to the natural colour of hide. However, here the deposit may have been produced by burning of the geological soils.

The scrapers, particularly the end scrapers, are quite unique. Often an end scraper is made on a blade or blade-flake and can have one or both lateral edges used for a variety of uses before being reworked into an end scraper and being used repeatedly to scrape hides. At other times a lateral edge of an end scraper may be used for cutting (usually hide) during the time it is also used as a hide scraper. There are very few tools in the sample that show either pattern (although see *Worked flint*, Bates above, for comment on the assemblage as a whole). Most of the scrapers are made on cortical flakes which show very little evidence of previous use. When wear is observed on edges other than the front, post-depositional wear, handling and haft wear all confound identification of any previous use.

Artefact Ra 2103 (upper fill of BM 1, 2703) is an impressively large and thick end scraper on a flake (Fig. 2.35M). The edge of the front is heavily scarred from ancient post-depositional processes; the working edge is heavily rounded except where there are post-depositional scars and the surface texture varies greatly. It is generally

Table 2.3 Inferred use of tools from microwear analysis

Artefact	Feature/Deposit	Context	Details	Tool type	Material	Action	Figure
Ra 2090	2718	2719	BM1 well	Subcircular scraper	Dry hide	Scraping	2.39A
Ra 2149	2921	2957	BM1 trough	Scraper	Dry hide	Scraping	2.39C
Ra 2176	2976	2977	BM1 trough	End scraper	Hide	Scraping	2.39D
Ra 2179	2976	2977	BM1 trough	End/side scraper	Dry hide	Scraping	2.39E
Ra 2322	2718	2736	BM1 well	Scraper	Dry hide	Scraping	2.39F
Ra 2333	3147	3146	BM1 pit	Scraper	Dry hide	Scraping	2.39H
Ra 2363	3170	3149	BM1 pit	Thumbnail scraper	Dry hide	Scraping	2.39K
Ra 2367	3170	3173	BM1 pit	Scraper	Dry hide	Scraping	2.39L
Ra 2374	3106	3219	BM1 well	Side scraper	Dry hide	Scraping	2.39M
Ra 2399	3106	3143	BM1 well	End scraper	Dry hide	Scraping	2.38B, 2.39N
Ra 2101	2703	2840	BM1 upper fill (NE quadrant)	Scraper	Dry hide	Scraping	–
Ra 2103	2703	2841	BM1 upper fill (NE quadrant)	Scraper	Dry hide	Scraping	2.38A, Fig 2.39S (see also 2.35m)
Ra 2104	2703	2853	BM1 upper fill (NE quadrant)	Scraper	Dry hide	Scraping	–
Ra 2117	2704	2949	BM1 upper fill (SW quadrant)	Knife	Dry hide	Cutting	–
Ra 2157	2704	2950	BM1 upper fill (SW quadrant)	Utilised flake	Dry hide	Scraping	–
Ra 2169	2917	2972	BM1 first infill (SW quadrant)	Thumbnail scraper	Dry hide	Scraping	–
Ra 2171	2917	2972	BM1 first infill (SW quadrant)	Backed knife	Dry hide	Working	2.39R
Ra 2194	2917	2973	BM1 first infill (SW quadrant)	End scraper	Dry hide	Scraping	–
Ra 2208	2704	3044	BM1 upper fill (NW quadrant)	End scraper	Dry hide	Scraping	–
Ra 2214	2704	3054	BM1 upper fill (NW quadrant)	Scraper	Dry hide	Scraping	–
Ra 2218	2704	3051	BM1 upper fill (NW quadrant)	Thumbnail scraper	Dry hide	Scraping	–
Ra 2227	2917	3070	BM1 first infill (NW quadrant)	Rod	Dry hide	Scraping	–
Ra 2229	2917	3070	BM1 first infill (NW quadrant)	Scraper	Dry hide	Scraping	–
Ra 2281	2917	3075	BM1 first infill (NW quadrant)	End/side scraper	Dry hide	Scraping	2.39U
Ra 2295	2917	3076	BM1 first infill (NW quadrant)	Scraper	Dry hide	Scraping	–
Ra 2340	3160	3161	BM1 pit	Thumbnail scraper	Dry hide?	Scraping?	2.39I
Ra 2364	NA	3105	BM1 cobble layer extension, NW quadrant	Retouched flake	Dry hide	Scraping	–
Ra 2365	2693	3238	BM1 cobble layer (NW quadrant)	Scraper	Dry hide	Scraping	–
Ra 2376	2693	3211	BM1 cobble layer (NE quadrant)	Retouched flake	Dry hide	Scraping	–
Ra 2386	3174	3272	BM1 gully	Scraper	Dry hide	Scraping	–
Ra 2416	2704	3044	BM1 upper fill (NW quadrant)	Spurred piece	Dry hide	Piercing	–
Ra 2441	2630	2668	Hollow	Scraper	Dry hide	Scraping	–
Ra 2443	2630	2668	Hollow	Scraper	Dry hide	Scraping	–
Ra 2459	2917	2717	BM1 first infill (NW quadrant)	Scraper	Dry hide	Scraping	–
Ra 2436	2704	2686	BM1 upper fill (slot)	Scraper	Dry hide	Scraping	–
Ra 2455	2704	2686	BM1 upper fill (slot)	Thumbnail scraper	Dry hide	Scraping	–
Ra 5129	12769	12771	BM2 Well (MBA?)	Subcircular scraper	Dry hide	Scraping	2.39V
Ra 5116	12625	12627	BM2 sixth infill (N quadrant)	Scraper	Dry hide	Scraping	–
Ra 5119	12636	12638	BM2 sixth infill (S quadrant)	Scraper	Dry hide	Scraping	2.39X
Ra 5128	12594	12695	BM2 fourth infill (N quadrant)	Piercer	Dry hide	Piercing	2.38 C, 2.39P
Ra 5087	12241	12211	Beaker Pit	End scraper	Dry hide	Scraping	2.39Y
Ra 2150	5209*	5208	Nat Feat	Scraper	Dry hide	Scraping	–
Ra 5090	12286	12287	Beaker PG5	Scraper	Dry hide	Scraping	2.38C, 2.40AA
Ra 5092	12286	12287	Beaker PG5	Piercer	Dry hide	Piercing	2.40BB
Ra 5093	12379	12380	Beaker PG8	Scraper	Dry hide	Scraping	2.40CC
Ra 1058	0634*	0642	MIA Pit FAS 055	End scraper	Dry hide	Scraping	–

Notes:
*= not illustrated
Some context details relate to spits/squares that formed sub-samples of deposits or layers and not all are illustrated, although details can be found in the site archive

Table 2.4 Estimated effect of post-depositional processes on microwear

Artefact	Ridge mean (µm)	Ridge standard deviation (µm)	Rank
2103	45.71	13.83	Extremely rounded
2135	29.19	13.06	Heavily rounded
2214	10.86	4.41	Heavily rounded
2252	2.96	1.04	Minimally rounded
2365	16.22	9.77	Heavily rounded
2386	32.01	7.70	Extremely rounded
2416	30.74	10.05	Extremely rounded
2090	16.36	5.16	Heavily rounded
2147	4.65	4.36	Mildly rounded
2333	35.25	13.61	Extremely rounded
2367	14.95	11.44	Heavily rounded
5129	8.74	7.43	Moderately rounded
5117	14.52	3.52	Heavily rounded
2150	8.74	2.80	Moderately rounded
5092	4.09	2.70	Mildly rounded
2182	2.96	6.32	Minimally rounded

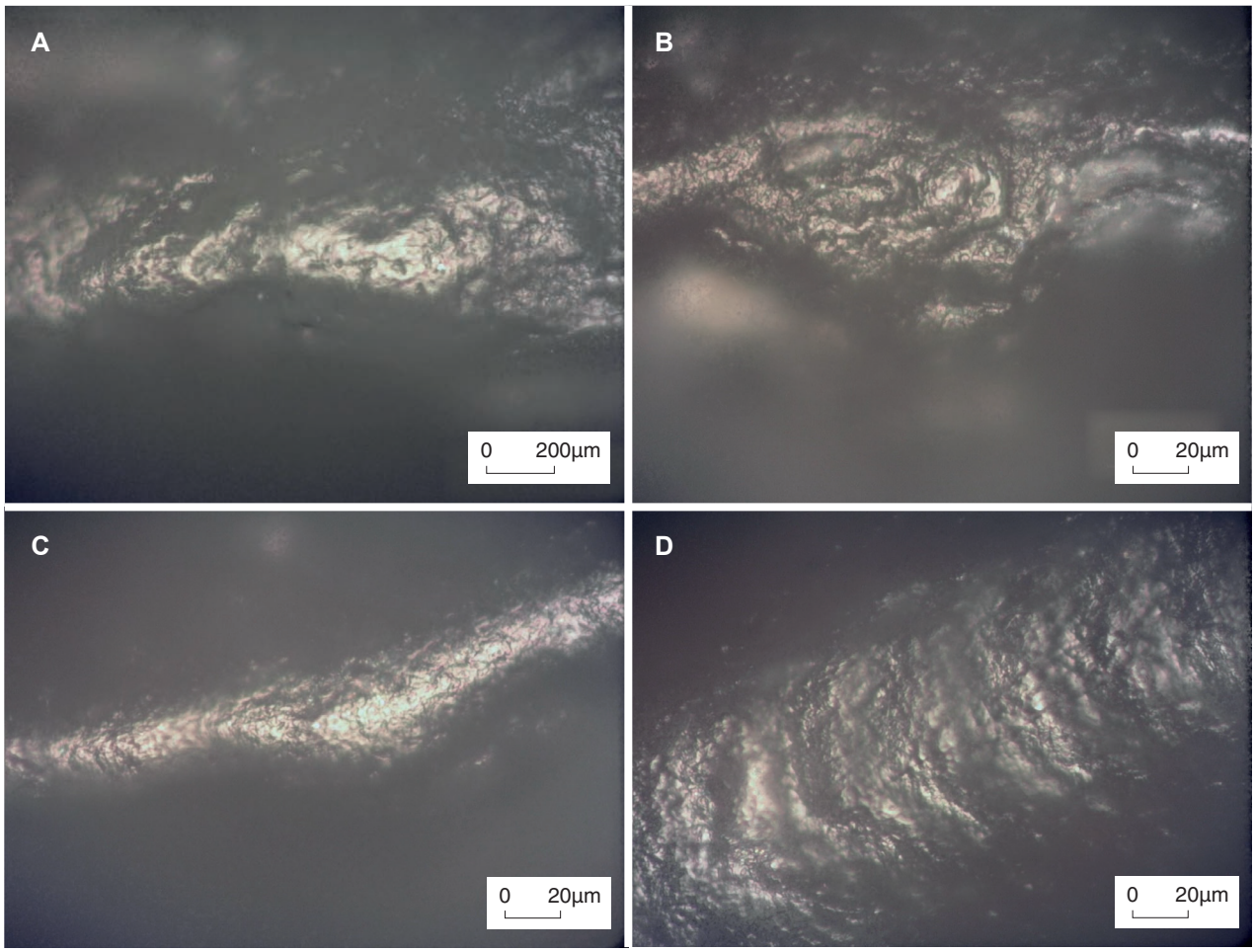


Figure 2.38 Marham Park, Fornham All Saints: working edges of Ra 2103 (A), Ra 2399 (B) and 5090 (C), and a lateral edge of the piercing section of Ra 5128 (D)



Figure 2.39 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 with use-wear locations (1:2 scale)

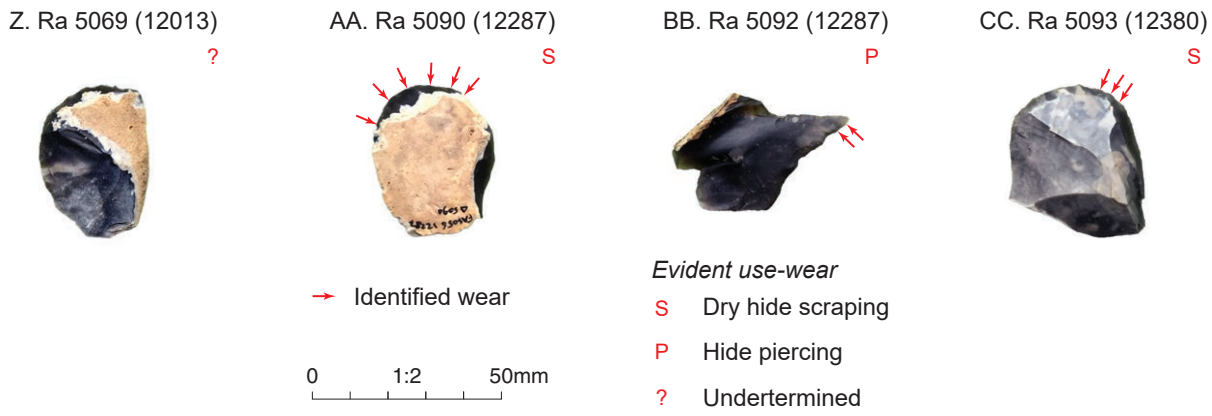


Figure 2.40 Marham Park, Fornham All Saints: photographs of selected worked flints from BM 1 with use-wear locations (1:2 scale)

matt but also rough and non-contrasting on surfaces associated with the post-depositional scars and elsewhere. On the most protruding section the surface is polished as one might see from working plant or wood fibres. This wear could be natural or could indicate that vegetal matter was used in a tanning or preserving process. In support of the dry hide hypothesis there are large hemispherical pits, wide striations and linear depressions perpendicular to the edge. The narrow striations are mostly associated with post-depositional processes. The wear characteristics that formed before discard are good evidence of dry hide scraping. Post-depositional modification has severely affected the edge and protrusive dorsal ridge. Figure 2.38A shows a section of the working edge with much rounding, a slight protrusion with two small post-depositional pits either side of a wide striation and a large hemispherical pit lying above it. There are numerous narrow striations on edge and faces that postdate discard. It is likely that the tool was used substantially on the entire front, but evidence of use of dry hide scraping could be found only on the left side of this (Fig. 2.39S).

An end scraper, Ra 2399 (well 3106 associated with BM 1, context 3143, Fig. 2.39N) has a fairly large front. It is a very good example of a well-used edge that scraped dry hide. Figure 2.38B shows on the far left a well-rounded edge with a matte texture. Towards the centre of the figure there is a widening of the ridge with multiple rounded surfaces. Such features are fairly common on scrapers used for scraping hide. They seem to initiate at the intersection of a retouch scar ridge or arris and the edge. There is a hemispherical pit near the bottom centre and above it, slightly to the right, a modified linear depression. Fine striations are indications of post-depositional modifications.

Another end scraper, Ra 5090 (pit 12286 in PG5, context 12287), is made on a relatively small cortical flake. It has a fairly large scraper front (Fig. 2.40AA). The working edge is extremely rounded except where post-depositional scarring has occurred. The surface of the edge has a matte texture and is quite dull. Figure 2.38C shows a large hemispherical pit above the rounded edge in the centre of the picture. On the left side there a couple of wide striations going vertically across the edge. Between the striations and the pit is a linear depression, which is slightly out of focus. There are numerous fine striations running in all directions, indicating that this artefact also underwent post-depositional modification.

A piercer, Ra 5128 (fourth infill over BM 2, 12695) is made on a small flake (Fig. 2.39P). This seemingly diminutive and insignificant piece provides an important key to understanding the site. The lateral edges of the piercer display evidence of intensive scraping motion on dry hide. Together they indicate the rotational pattern of use to pierce or drill dry hide. There are numerous wide striations running perpendicular to each edge (Figure 2.38D). In some cases they are so wide as to appear almost as linear depressions. There are also long narrow striations running parallel with the edge. These post-date the other features and probably result from post-depositional processes rather than from use.

Discussion

The microwear sample, while not a random sample of artefacts from the site, is nonetheless representative of the activities that were performed. The sample is highly biased towards scrapers because the flint tool assemblage on the site was equally biased with perhaps 90% of recorded tools being scrapers of one form or another. The bulk of the scrapers fall into the group known as *grattoirs* (end scrapers, thumbnail scrapers, horseshoe scrapers etc.), which by definition have a convex retouched edge with a relatively steep profile.

Typologically the sample includes 47 scrapers of various types excluding side scrapers. Of these, 36 were identified as having been used for scraping dry hide. The others were either undetermined or categorised as unused (e.g. Ra 2330, Fig. 2.39G and Fig. 2.36W) but, as indicated above, none of these tools showed evidence of working an alternative material. 'Undetermined' tools are labelled as such primarily because post-depositional processes have eradicated or modified the working edge so much as to make inference of use from wear characteristics impossible. Unused tools were

Table 2.5 Association of tool type and use from sample submitted for microwear analysis

Tool form	Dry hide working	Dry hide cutting	Dry hide scraping	Dry hide piercing (drilling)	Undet.	Unused	Grand total	Total dry hide working
Scraper group	–	–	34	–	16	3	53	36
End scraper	–	–	5	–	2	1	8	5
End/side scraper	–	–	2	–	1	–	3	2
Scraper	–	–	21	–	9	2	32	20
Subcircular scraper	–	–	2	–	–	–	2	2
Thumbnail scraper	–	–	4	–	4	–	8	4
Other tools	1	1	5	3	11	3	24	10
Rod	–	–	1	–	–	–	1	1
Backed knife	1	–	–	–	1	–	2	1
Knife	–	1	–	–	2	–	3	1
Piercer	–	–	–	2	–	–	2	2
Side scraper	–	–	1*	–	1	–	2	1
Spurred piece	–	–	–	1	1	1	3	1
Retouched flake	–	–	2	–	6	–	8	2
Retouched fragment	–	–	–	–	–	1	1	0
Core/tool	–	–	–	–	–	1	1	0
Utilised flake	–	–	1	–	–	–	1	0
Grand total	**1**	**1**	**39**	**3**	**27**	**6**	**77**	**43**

Note: *This is a classic scraper with the convex front manufactured on the lateral edge of a flake

Table 2.6 Tool uses across cultural periods

Use	Neolithic	Bronze Age	Iron Age	Total
Dry hide working	–	1	0	1
Dry hide cutting	–	1	0	1
Dry hide scraping	1	34	4	39
Dry hide piercing	–	2	1	3
Undetermined	–	25	2	27
Unused	–	4	2	6
Total	**1**	**67**	**9**	**77**

not necessarily unused; by definition their working edge shows no use-wear and post-depositional processes have not modified the edge such as to obliterate any evidence of use. Often an end scraper may be resharpened (retouched) just prior to loss or discard. Such tools may have been used quite a lot but the edges do not reflect use and as such would be labelled 'unused'.

Given that any tool showing evidence of use was used for the working of hide, it is possible to argue quite strongly that the assemblage consists of tools used primarily for this purpose. It is of particular importance that drilling shaped tools, which could be used on a variety of materials, were used for piercing dry hide, indicative of either preparing hides for scraping or for the preparation of finished items made with hide.

Like the association with tool types (Table 2.5), there is no variation in tool use across chronological periods (see Table 2.6), although the numbers of Neolithic tools studied (from later contexts) was small, commensurate with their numbers in the site assemblage as a whole.

There are other tool forms in the sample. Although their numbers are not high, the ones that display tool use all show that they were used for the working of hide. Thus this appears to have been the predominant activity undertaken at both burnt mound complexes. Differences in assemblage sizes may relate to length of use of the different complexes. Likewise there seems to be no differences in tool use from other contemporary features. The amount of post-depositional modification to the tools varies but samples from most contexts are too small to demonstrate differences statistically.

The large number of flints predominantly used for working dry hide from the burnt mound sites and their pits is not typical of a domestic household assemblage, which would include a variety of other activities. The features were clearly specialist constructs and are not contemporary. Further consideration of their use is presented in Chapter 5.

Such a specialised locality indicates that craft specialists may be involved; something not usually discussed with regard to hides. Nonetheless, with increasing craft specialisms emerging during the Bronze Age, the processing of hides, with the increased exploitation of domesticated animals, could certainly fit this.

Conclusion

Lithic microwear analysis at the Marham Park site demonstrates that the assemblage was used primarily for processing dry hides. There is much evidence for the scraping of them but also for piercing and cutting. While other activities may have taken place at the site there was no evidence of this in the lithic microwear sample. The predominance of dry hide working at the site indicates that this is a specific activity area in the processing of hides during the Beaker period and Early Bronze Age.

Beaker and Early Bronze Age Pottery

Anna Doherty and Alistair J. Barclay

Full details of the pottery from the site and methodology for examination and reporting are presented in the archive report (Doherty and Barclay 2023). Here the Beaker and Early Bronze Age (2600–1600 BC) pottery is presented in more detail. A moderately large assemblage of 2955 sherds (12,527g) of domestic Beaker and Early Bronze

Age pottery was recovered, with a notable component of rusticated vessels including a small number of pot-beakers. Typologically early Beaker is absent from the assemblage. The Beaker assemblage was widely dispersed across FAS 056 but was mainly recovered from pits – including substantial groups of material from PG2 and PG4 and moderate sized groups from PG1 and PG3 – and over half of the assemblage came from features and deposits associated with BM 1. This is of note, since most burnt mounds both regionally and nationally have produced fairly small pottery assemblages.

The later burnt mound, BM 2, produced a very small assemblage of largely undiagnostic pottery probably belonging to an Early to Middle Bronze Age Biconical Urn tradition. Other ceramic traditions including Collared Urn and Food Vessel are notably absent and could suggest a hiatus between the use of Beaker and the update of Biconical Urn.

A selection of sherds is illustrated in Figures 2.41–2.44. Fabric groups were defined according to a site-specific fabric type-series, formulated in accordance with the guidelines of the Prehistoric Ceramics Research Group (PCRG 2010).

Beaker

Context

Assemblages of Beaker domestic pottery are well known from Britain and, in particular, from East Anglia (e.g. Bamford 1982; Clarke 1970; Gibson 1982). Much is recorded from funerary and, to a lesser extent, ceremonial contexts, but there are also significant assemblages from pit and occupation sites with notable assemblages recovered from East Anglia (see Bamford 1982, figs 9 and 10). Domestic assemblages occur throughout the currency of Beaker pottery but there are notable regional differences and a number of those from East Anglia are associated with Clarke's Southern British style (Bamford 1982: Hockwold Site 93 figs 1 to 11; Hockwold 'the Oaks' figs 13 to 26) and provide comparanda for FAS 056.

Stylistically these assemblages are generally seen as late within the currency of Beaker pottery, appearing alongside what Clarke (1970) termed 'Southern' styles and after what Needham (2005) has defined as a 'Fission horizon', a chronology which would equate broadly to the 22nd and 21st centuries and possibly the 20th century BC. As Clarke (1970) and subsequent authors have noted, rusticated vessels in particular are rarely found in funerary contexts but do appear on non-funerary sites and within a more domestic sphere. The assemblages are generally characterised by a combination of rusticated (fingernail/tip, bone and heavy tool impressed, cordoned: see Bamford 1982) and non-rusticated vessels (typically incised and/or comb-stamped), although vessels with combinations of decorative elements can also occur. The rusticated vessels include a range of much heavier and often large vessels alongside small and medium-sized vessels with lighter rustication. These broadly share the same range of forms as the non-rusticated vessels: generally long necked but also slightly rounded/weakly shouldered and/or mid-carinated/bipartite. While the rusticated element can be loosely described as the coarseware, against the generally finer vessels with either comb and/or incised decoration, there are exceptions as some rusticated vessels can also be thin-walled and of good quality. One notable feature of the rusticated vessels (coarser wares) at FAS 056 is the use of calcined flint grit within the fabric, although this distinction is probably not found at every site.

Fabric

As shown in Table 2.7, a broad range of fabrics was encountered. Although many have mixed inclusions and appear to exist on a continuum, they can be divided into three major fabric groupings: grog-tempered (G and GF), flint-tempered (F1 to F3 and variants) and sandy (Q1 and Q2 plus variants). Grog is the major inclusion type for most sherds (73% by count), 60% of which were purely grog-tempered (fabric G) with a smaller proportion that also included rare to moderate flint (GF). Where sherds can be defined as rusticated or non-rusticated Beaker, the latter are consistently more likely to be exclusively grog-tempered. In total 44% of Beaker sherds were assigned to fabric G but only a small number of these were rusticated fragments. Conversely fabric GF is strongly associated with rusticated vessels.

Predominantly sandy fabrics are the next most common – 18% by count of the non-rusticated Beaker assemblage. A few sherds of purely sandy fabric, Q, were noted. More commonly sandy fabrics occur with a range of other rare or sparse inclusions, mostly flint (Q1F, Q2F) and grog (QGV). A rare fabric included some chalk inclusions (QCV), while a number of the quartz-rich fabric variants also contained some rare organic matter (QCV, QGV, V and VF). Sandy fabrics appear to be more strongly associated with the diagnostic non-rusticated Beaker assemblage, accounting for most of the identifiable Beaker versus a very minor proportion of the rusticated sherds.

Interestingly, fabrics in which flint temper is the major inclusion type are less clearly differentiated between the rusticated/non-rusticated traditions. Together, fabrics F1, F1G, F2, F2V and F3V account for 12% of sherds; however they make up only a slightly larger proportion of diagnostic rusticated sherds. These flint-tempered fabrics tend to be coarse and rather ill sorted. The assemblage might include some residual fragments of Early Neolithic Bowl fabrics.

The Beaker/Early Bronze Age assemblage contains examples of flint-tempered wares with some organic inclusions (F2V, F3V) and a small number of the more heavily flint-tempered wares also contain some grog (fabric F1G); these can probably be viewed as on a continuum with the more commonly grog-tempered GF fabrics.

The small groups of pottery associated with BM 2, and with the Middle Bronze Age cremation vessels, have a slightly different fabric profile, given their association with later urn traditions. About 6% of sherds are uncertainly spot-dated body sherds, some of which may belong to other periods.

Table 2.7 Quantification of Beaker and Early Bronze Age pottery fabrics

Fabric Group	Fabric	Fabric descriptions	Sherds	Weight (g)
Flint	F1	Abundant to common coarse large to medium-sized angular flint in a dense silty matrix with moderate to sparse sand and rare organic impurities	281	2407
	F1G	Common coarse large to medium-sized flint and moderate to sparse fine grog in a dense sandy matrix, often with rare large, rounded sand grains	122	514
	F1QCV	Abundant to common coarse to medium angular flint in a dense silty matrix with sparse coarse sand grains, chalk and organic impurities	2	26
	F2	Abundant to common mixed large to medium-sized angular flint in a dense fine to medium sandy matrix	73	317
	F2V	Common mixed large to medium-sized angular flint and organic temper in a medium sandy matrix	32	103
	F3	Moderate to rare medium to small-sized coarse and angular flint in a dense fine or medium sandy matrix (main inclusion is quartz)	1	6
	F3V	Common medium to small-sized coarse and angular flint and moderate organic temper in a medium sandy matrix	11	10
Grog	G	Abundant to moderate grog in a soft silty matrix with frequent voids from leached chalk and/or burnt organic temper, often with rare flint or large sand grains	1291	3499
	GF	Abundant grog and moderate to rare medium-sized flint in a fine and dense silty matrix, often with rare larger sand grains	864	4797
Quartz	Q	Fine and dense sandy fabric with rare inclusions other than large-sized quartz, very often micaceous	51	76
	Q1F	Moderate to rare fine small-sized flint in a dense silty matrix with larger sand grains of various colours (opaque, red, yellow); often 'flint dusted' exterior but not flint-rich fabric	61	261
	Q2F	Abundant sand of various sizes mixed with moderate to rare fine small-sized sub-rounded flint, often silt-sized grains	88	336
	QCV	Moderate chalk and organic temper in a loose sandy matrix with holes from leached chalk, occasionally with larger sand grains and flint impurities	31	32
	QGV	Moderate grog and sparse organic temper in a dense sandy matrix, occasionally with flint impurities	21	101
	QVF	Moderate to sparse flint and sparse fine organic tempers in a dense sandy fabric, often micaceous	5	14
	QVM	Abundant to common medium coarse organic tempers in a fine sandy micaceous matrix with rare flint impurities	2	5
Other	V	Abundant to common medium coarse organic tempers in a medium sandy matrix with rare flint impurities, often micaceous	17	22
	VF	Abundant coarse organic tempers and sparse coarse to medium flint, is a medium sandy matrix with larger sand grains	2	1
	Total		**2955**	**12527**

In deposits associated with BM 1 the quartz-rich fabrics are often associated with typical Beaker decorative styles such as comb-stamped or horizontal incised lines. In other contexts nearly all of these fabrics are associated with tiny undiagnostic fragments of uncertain typology and it is suspected that they may include some intrusive Iron Age sherds.

Form, completeness and decoration

Rusticated and non-rusticated Beaker shared some fabric characteristics but of the unique diagnostic featured sherds quantified by estimated vessel number around 20% were recorded as rusticated and 28% as non-rusticated Beaker. It can also be noted that similar forms are shared by both the rusticated/non-rusticated vessels, although the rusticated vessels have a greater vessel size range and can have thicker walls (e.g. Figs 2.42J, 2.43P and 2.43U). While it is certainly true that some of the coarser vessels are heavy in appearance, there are also much finer rusticated vessels that would have required more skilful potting (e.g. Fig. 2.41A).

What is commonly referred to as the 'death' assemblage probably represents only a proportion of what was used in 'life'. There are nearly twice as many rims as bases but there are also two fragments of handle (not illustrated) indicating that handled Beakers were also part of this assemblage (also a feature at Hockwold 'The Oaks': Bamford 1982, fig. 13: P69.133 and P63.134 and Cottage Field, Wattisfield fig. 40a–b). Where groups of sherds are present, either refitting or non-joining, these tend to be from the rim or upper portions of vessels. Sherd size can also be observed as relatively medium to large in certain cases, indicating that some vessels were in all probability freshly broken prior to burial or discard. The more complete vessels include a number of the rusticated pots (e.g. Figs 2.41A, 2.42H, 2.43U). Groups of refitting sherds and relatively large sherds from all sections of vessel A are present. Its fresh condition indicates that much of the vessel was collected prior to deposition. Nearly the whole circumference of the rim of vessel U is present (only selected sherds illustrated).

A number of vessels were heat damaged and at least one rim was distorted (not illustrated). This could have been the result of overfiring at the time of manufacture or through use, if the vessel was used near or on a fire, if it fell apart over a fire or was discarded into a fire. At FAS 056 the association with at least one of two burnt mound sites may account for some of the heat damage observed, either through associated use or incidental incorporation. The possible destruction of some sherds by fire could also explain some missing vessel elements from the overall assemblage.

Given the fairly fragmentary nature of the Beaker assemblage, it is difficult to assign specific form types with

Table 2.8 Summary quantification of Beaker period decorative styles by sherd count and estimated number of vessels (ENV), broken down by ceramic style

Tradition	Decorative style	Sherds	%Sherds	ENV	%ENV
Rusticated	Cordons	1	0.3%	1	2.0%
	Mixed: cordons and fingernail	164	49.6%	27	51.9%
	Mixed: cordons and fingertip	93	28.2%	4	7.6%
	Fingernail	289	5.4%	44	13.5%
	Fingertip	13	3.6%	6	9.6%
	Grooved	2	0.6%	2	3.8%
	Mixed: grooved and fingernail	4	1.2%	1	2.0%
	Mixed: impressed and fingernail	2	0.3%	2	2.0%
	Mixed: grooved and impressed	14	4.2%	1	2.0%
	Mixed: impressed and incised	3	0.8%	1	2.0%
	Incised	54	5.5%	20	5.8%
	Impressed	48	1.0%	10	2.0%
Total rusticated		**687**	**100.0%**	**119**	**100.0%**
Non-rusticated Beaker	Comb-stamped	289	63.4%	83	70.9%
	Mixed: comb-stamped impressed	3	0.7%	1	0.9%
	Mixed: comb-stamped incised	2	0.4%	1	0.9%
	Mixed: comb-stamped and fingernail	5	1.1%	3	2.6%
	Fingernail	61	13.4%	8	6.8%
	Simple tool impressed	13	2.9%	7	6.0%
	Incised	39	8.6%	11	9.4%
	Mixed: incised and impressed	44	9.6%	3	2.6%
Total non-rusticated Beaker		**456**	**100.0%**	**117**	**100.0%**

much certainty. A few of the rusticated vessels are of long necked form, including vessels A, H, O and S (Figs 2.41–2.43). Vessel A, a rather finer and well-made rusticated vessel, appears to have a typical long necked profile, and the relatively large sherds or refitting portions were sufficient to approximate its form. Other notable refitting groups include those from vessels H and U (Figs 2.42–2.43). There were refitting rim and upper body sherds and a base fragment (not illustrated) from Vessel H, which appears to have a near cylindrical or slightly globular neck with a broad rim zone marked by an impressed cordon. Vessel U is similar but with a much thicker wall and heavier rustication and with the rim, rim zone and neck marked by raised rusticated cordons. Other similar vessels are represented by I, J, N, O and P, the latter with a comb-decorated base. However, there are other much smaller, thin-walled vessels with lighter and sometimes non-plastic rustication, including vessels F, K, L and S. Again the forms are potentially long necked Beakers. Here the decoration mostly consists of paired fingernail or lightly impressed paired fingertip impressions either applied to produce 'crow's feet' motifs or pinched, mostly used to form vertical rows or more rarely, as in the case of vessel F, horizontal rows. Occasionally vessels had both impressed comb and fingernail (e.g. K). Vessel S, which had also been overfired or refired, had all-over rustication including on the rim top. Alongside these rusticated vessels were a group of mostly comb impressed Beakers.

Pit 12241 (Fig. 2.10) produced a fragmented but partial pot beaker, with an applied cordon on the upper mid body, extensive rows of fingertip impressions/pinches on the body and fingernail impressions on the rim top (U). This vessel was associated with two fairly unabraded sherds, one Beaker rim and a body sherd with multiple pinched out cordons that are typical of rusticated Beakers.

The non-rusticated Beaker assemblage was predominantly decorated with impressed comb, accounting for over 40% of the estimated vessels by sherd count and approximately half by estimated number of vessels. The comb impressed Beakers are equally fragmentary, although the forms appear to be mostly long necked (e.g. B, E and M) and are decorated with complex geometric motifs (ladders, floating and nested lozenges, pendant infilled triangles, reserved bands of zig-zag motifs, chevrons, lattice and opposed infilled triangles paired with reserved triangles, e.g. vessel G). Decoration was mostly arranged in horizontal zones but occasionally involved more complex patterning of alternating vertical and horizontal blocks. Vessel B represents one of the finest Beakers within the overall assemblage and is one of the more elaborately decorated. The quality of this vessel can be compared with vessels M and E, which are more poorly executed. Other sherds, represented by vessels C, D and P, are likely to come from similar shaped vessels. Absent from the assemblage are the globular forms that are a common feature of the East Anglian Beaker group (see Clarke 1970, 146–52; Case 1993, 263–5).

Both the forms and the range of decoration from FAS 056 can be closely compared with the assemblages found at Hockwold (Bamford 1982, see above).

As shown in Table 2.8 the Beaker assemblage has a broad range of decorative styles or techniques, although there is some similarity in the zonal patterning. Not surprisingly the rusticated techniques allow for only limited patterns and motifs, while those carried out using a comb or point could result in either simple linear or more complex geometric motifs.

Among the decorated sherds uncertainly assigned as rusticated Beaker, the greatest proportion were fingernail impressed, including examples with paired 'crow's feet'

decoration as well as more randomly spaced fingernail decoration over a wide body area. Incised decoration is also fairly well represented, including examples of ladder-like motifs with vertical and short horizontal or diagonal lines, as well as simple horizontal incised lines and incised rhomboids. A single vessel features a similar ladder-like design with the short horizontal section impressed with a double-toothed tool, with separate impressions with a simple crescent shaped tool made on another part of the body (not illustrated).

Catalogue of illustrated Beaker sherds

Fig. 2.41

A Beaker rusticated vessel; internally expanded rim with a smoothed bevel and impressed fingertip decorated internal lip. Vessel has vertical rows of all-over fingertip pinched decoration that are closely spaced on the rim and more loosely spaced on the belly where they are arranged in horizontal rows. The rim has a diameter of approx. 340mm and a height that probably exceeded this. Fabric F1. Pit 2712, fill 2713.

B Long necked Beaker; complex comb-stabbed decoration including horizontal bands of impressed combed lines and a chevron motif above vertical panels with cross-hatch or chevron motifs between opposed pendant triangles infilled with repeated bands of a short chevron motif. Fabric GF. Context details as for A.

Fig. 2.42

C Beaker, long necked; horizontal combed impressions; single and double comb bounded zones containing either short horizontal or oblique comb marks possibly made with two different combs. Fabric GF. BM 1, trough 2921, fill 2922 (Fig. 2.15, Section MM).

D Beaker with slightly flaring or cylindrical neck, possibly long necked; comb-stabbed horizontal lines and cross-hatching. Fabric F1. Context details as for C.

E Beaker rim, belly and neck sherds, possibly from a long necked vessel. Complex comb-stabbed decoration comprising infilled geometric shapes – pendant triangles and alternating vertical bands infilled with simple horizontal lines. Fabric QGV. Context details as for C.

F Beaker possibly long necked; horizontal rows of aplastic paired fingernail impressions. Fabric G. Context details as for C.

G Beaker body sherd with complex comb-stabbed decoration comprising infilled geometric shapes. Fabric QGV. Context details as for C.

H Beaker, rusticated pot-beaker (rim dia. 310 mm); single horizontal finger impressed/pinched row below rim and to form a cordon between the rim zone and neck; slightly rounded belly (dia. 320mm) of the pot is covered with columns of mostly aplastic paired 'crow's feet' fingernail impressions. A base fragment (not illustrated) suggests this motif could have been all-over. Fabric F1. Context details as for C.

I Beaker, rusticated, horizontal row of overlapping fingertip impressions/pinches below a plain, slightly flaring rim (dia. 240mm), horizontal cordons and fingernail impressions on the top of the body. Here the cordons run oblique and horizontal suggest a more complex motif. Fabric F1. Context details as for C.

J Beaker, rusticated, vessel; row of finger impressions/pinches below rim; horizontal cordons interspersed with fingernail pinches. Context details as for C.

K Beaker with upright neck profile; spaced out (plain/reserved band in between), almost aplastic, vertical paired 'crows' feet' fingernail impressions. Fabric Q1F. Pit Group (PG) 6, pit 5384, fill 5386.

L Beaker with flaring neck profile; horizontal comb-stabbing and paired 'crow's feet' fingernail impressions. Fabric G. PG6, pit 5403, fill 5404.

M Beaker with a simple rim (dia. 100mm), long neck and rounded belly (dia. 120 mm); complex comb-stabbed decoration featuring infilled opposed pendant triangles with a reserved band zig-zag motif, chevron motif and horizontal lines. Fabric G. Pit 11120, fill 11121.

N Beaker, rusticated with rows of finger impressed/pinched decoration. Fabric F2. Context details as for M.

Fig. 2.43

O Beaker, rusticated, with horizontal cordons interspersed with rows of horizontal fingernail pinching and some ?bone impressions, Fabric F2. PG4, pit 12006, fill 12007.

P Beaker base with slightly concave profile; complex comb-stabbed decoration comprising infilled pendant triangles. Fabric GF. Context details as for O.

Q Beaker, rusticated, collared profile with a slightly concave neck, horizontal rows of single impressed fingertip decoration. Fabric F1. Context details as for O.

R Beaker, rusticated, with horizontal cordons interspersed with rows of fingernail impressions and indeterminate impressions (?bone), Fabric G, heat damaged. PG5, pit 12286, fill 12287. A piece of grog containing a calcined flint inclusion may indicate grog within grog.

S Beaker, rusticated, with slightly rounded profile; all-over paired aplastic 'crow's feet' fingernail impressions. Fabric F1. PG3 pit 12198, fill 12199. Light grey exterior and pinkish interior coloration indicates possible heat damage either over or refired.

T Beaker with upright slightly necked profile; comb-stabbed chevron/cross-hatch. Fabric G. Pit 12241, fill 12211.

U Pot Beaker with rusticated decoration. Rim is slightly collared with a moulded cordon. Heavily rusticated with fingertip pinching on the rim, which becomes less frequent and gives way to non-rusticated impressions (?bone) on the lower neck. Fabric GF. Context details as for T.



Figure 2.41 Marham Park, Fornham All Saints: Beaker pottery from pit 2712

Early Bronze Age

BM 2 contained a much smaller assemblage of pottery (just under 100 sherds). This material (vessels V–Y, Fig. 2.44), while fragmentary, was more in keeping with the Biconical Urn tradition of the Early/Middle Bronze Age. In general the rest of the assemblage was fragmentary and dispersed widely in different areas of the site.

It seems likely that some of the thick-walled body sherds in a wide variety of fabrics recorded in features and deposits associated with BM 2 are also likely to derive from vessels in the Biconical Urn tradition, given the lack of diagnostic featured sherds associated with Collared Urns in the assemblage. This is supported by the two statistically consistent radiocarbon dates from this feature (SUERC-93365; 1870–1658 cal BC and SUERC-93359, 1879–1694 cal BC, both at 95.4% probability, Table 2.19), which when calibrated fall within the latter centuries of the Early Bronze Age period and at a time when the Biconical Urn, in particular, was in use.

Diagnostic Biconical Urn vessels were noted in well 12769, associated with BM 2, and as a potentially residual find within ditch 12832 in Middle Bronze Age Enclosure 1. The former contained a small T-shaped rim (X) and a partial rim from a vessel with a barrel-shaped profile (Y),



Figure 2.42 Marham Park, Fornham All Saints: selected Beaker sherds

while the latter also produced the upper profile of a small barrel-shaped vessel (V).

The assemblage from Middle Bronze Age Enclosure 1 included two examples of barrel-shaped urns: one thick walled with a flattened rim (not illustrated), the other slightly thinner walled with a slightly beaded rim and a rounded lug on the mid body (Fig. 2.44W). This may have come from a possible late style Biconical Urn or Deverel-Rimbury vessel – although the latter is considered to have developed out of the former (Doherty and Barclay 2023).

Catalogue of illustrated Early Bronze Age Biconical Urns

Fig. 2.44

V Small slightly globular vessel with a beaded rim; undecorated. Possibly Beaker or Biconical Urn. Fabric G. Middle Bronze Age Enclosure 1, ditch 12832, cut 12464, fill 12465.

W Everted out-turned rim and plain boss from a Biconical Urn or Deverel-Rimbury vessel. Fabric G. Middle Bronze Age Enclosure 1, ditch 11149, cut 11040, fill 11043 (Fig. 2.27, Section cc).

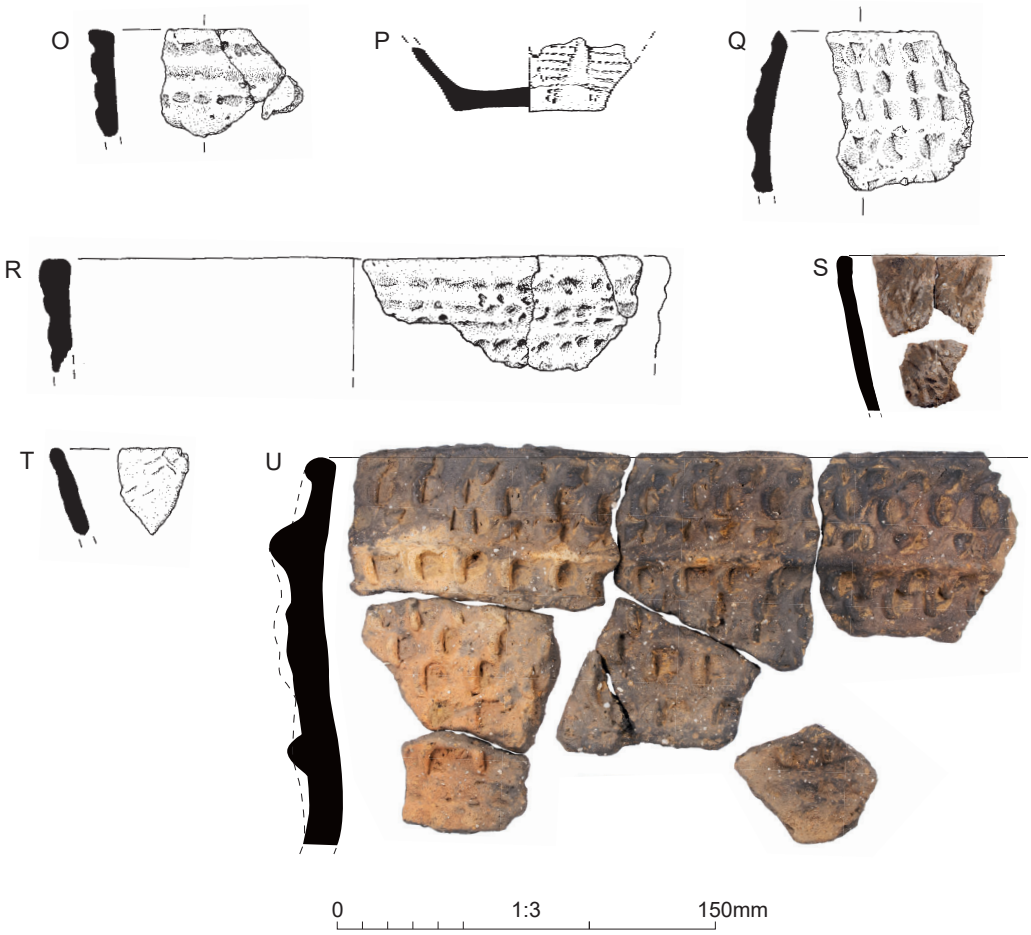


Figure 2.43 Marham Park, Fornham All Saints: selected Beaker sherds

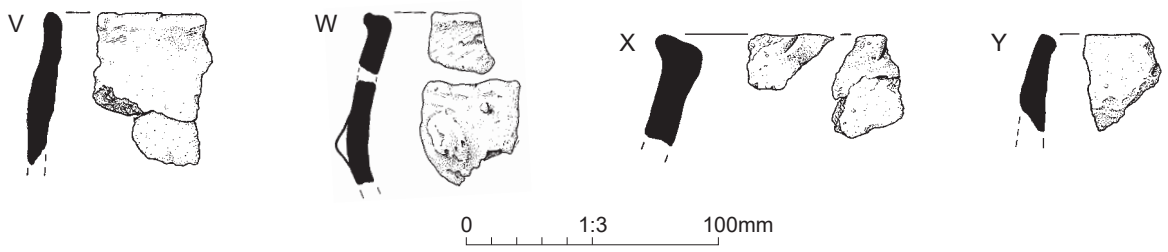


Figure 2.44 Marham Park, Fornham All Saints: selected Biconical Urns

X Out-turned rim from a Biconical Urn; oblique fingernail impressions on the outer rim tip. Fabric QGV. BM 2 well 12769, fill 12770 (Fig. 2.23, Section UU).

Y Slightly beaded rim from a probable Biconical Urn. Fabric G. BM 2 well 12769, fill 12770, fill 12788 (Fig. 2.23, Section UU).

Discussion

More than half of the pottery was associated with BM 1, found within burnt mound deposits, in pits considered to be directly associated with the feature and in the covering and infilling layers above these. The direct association of Beaker pottery with the use of a burnt mound, as touched upon in Chapter 5, is not completely unexpected and neither is the use of calcined flint as a temper or opening material within the pottery fabric. It has also been noted that a small number of sherds had been heat damaged either at the production stage, through use or after breakage.

Burnt mound BM 2 contained a much smaller assemblage of pottery, more in keeping with the Biconical Urn tradition of the Early/Middle Bronze Age (1900–1600 BC). Other ceramic traditions including Collared Urn and Food Vessel are notably absent and could suggest a hiatus between the use of Beaker and the uptake of Biconical Urn.

In general the rest of the assemblage was fragmentary and dispersed widely in different areas of the site.

Environmental remains and scientific analysis

Overview

Selected environmental evidence and the results of scientific analysis are presented here, where they inform on the nature of activity at the burnt mound sites and their evolving landscape context. Full versions of the reports can be found in the site archive report (Green and Mortimer 2023).

Animal bone

Julie Curl

Introduction

Bone was both hand-collected and recovered from sieved samples; across the site as a whole the condition varied (Curl 2023). Elements were identified to species wherever possible using comparative reference material, and where possible fragments were refitted. Sheep/goat elements were identified – with attempts to distinguish sheep from goat – using published criteria (Albarella and Salvagno 2017; Payne 1969, 1985) and distinguishing horncores. Mammal bones were recorded and estimated following modified versions of guidelines (Davis 1992; Baker and Worley 2014). Record of butchering where possible noted the type, such as cut, chopped or sawn and location of butchering. Burnt bone was noted. Pathologies were noted with element, location and description. Other modifications were recorded, such as any possible working, working waste or animal gnawing. Weights and total number of pieces from contexts are presented in the archive report and digital archive, with a full report on the site (Curl 2023). Bones were recorded that were measurable (following Driesch 1976) and countable (following Davis 1992).

Beaker and Early Bronze Age remains are presented here (Table 2.9)

Table 2.9 Animal bone catalogue

Context	Cut/ deposit	Details	Qty	Wt (g)	Species	NISP	Ad	Juv	MNI	Element range	Count	Butchering	Burnt	Gnaw	Comments
Beaker period															
Burnt Mound 1															
2681	2659	Slot	1	3	mammal	1	–	–	–	single fragment	–	–	–	–	–
2719	2718	Well	13	181	cattle	1	–	–	–	radius fragment	–	–	–	–	–
2719	2718	Well			mammal	12	–	–	–	fragments	–	–	–	–	–
2736	2718	Well	12	12	mammal	12	–	–	–	fragments	–	–	–	–	–
3107	2718	Well	80	113	cattle	1	–	–	–	upper molar 2	–	–	–	–	–
3107	2718	Well			dog	10	1	–	–	thor vert, scapula, pcalcaneus, tibia, carpal	–	–	–	–	–
3107	2718	Well			mammal	69	–	–	–	fragments	–	–	–	–	–
3143	3106	Well	1	8	mammal	1	–	–	–	single fragment	–	–	–	–	–
2985	2703	Infill	2	1	mammal	2	–	–	–	fragments	–	–	–	–	–
3098	2918	Infill	15	6	cattle	15	–	–	–	tooth fragments	–	–	–	–	–
2922	2921	Trough	4	2	mammal	4	–	–	–	fragments	–	–	–	–	–
2922	2921	Trough	4	2	mammal	4	–	–	–	fragments	–	–	1	–	1 burnt grey
2922	2921	Trough	68	10	mammal	68	–	–	–	small fragments	–	–	–	–	–
Paired pits															
11123	11122	–	2	1	mammal	2	–	–	–	fragments	–	–	–	–	–
Pit Group 3															
12197	12196	–	3	2	mammal	3	–	–	–	fragments	–	–	–	–	–
Pit Group 4															
12009	12008	–	42	5	mammal	41	–	–	–	burnt fragments	–	–	–	–	burnt grey
12009	12008	–			sheep/goat	1	1	–	–	charred mt	–	–	–	–	black to grey
Pit Group 5															
12287	12286	–	12	10	mammal	12	–	–	–	fragments	–	–	–	–	–
Pit Group 6															
5386	5384	–	20	8	mammal	20	–	–	–	fragments	–	–	–	–	–
5386	5384	–	7	23	mammal	7	–	–	–	fragments	–	–	–	–	–
5404	5403	–	9	1	mammal	9	–	–	–	fragments	–	–	–	–	–
Pit Group 8															
12380	12379	–	29	17	mammal	29	–	–	–	small fragments	–	–	8	–	8 burnt white
Structure 2															
12342	12341	–	1	1	mammal	1	–	–	–	single fragment	–	–	–	–	–
12346	12345	–	2	1	mammal	2	–	–	–	fragments	–	–	–	–	–
12368	12367	–	1	1	mammal	1	–	–	–	single fragment	–	–	–	–	–
Early Bronze Age															
Burnt Mound 2															
12780	12779	Well	3	77	cattle	3	1	–	–	mc, radius fragments	–	chopped	–	1	mc with canid gnawing
12803	12779	Well	19	18	mammal	15	–	–	–	fragments	–	–	–	–	–
12799	12798	Well	1	8	fish – eel	1	–	–	–	vertebra	–	–	–	–	–
12799	12798	Well	2	1	mammal	2	–	–	–	fragments	–	–	1	–	burnt white/grey

Beaker

The Beaker period fills produced 411g of faunal material, amounting to 328 pieces. Of this, 338g came from BM 1, 70g came from pits and 3g came from Structure 2.

Only 28 fragments were identifiable to species, including cattle (NISP 17), sheep/goat (NISP 1), dog/wolf (NISP 10) and unidentified mammal (NISP 300). The main identifiable species was cattle, chiefly tooth fragments with one radius fragment.

Fill 3107 of pit 2718 (a probable later well within BM 1) included a cattle molar and several elements from a dog/wolf, consisting of a thoracic vertebra, scapula, calcaneus, tibia and a carpal, none showing any butchery marks. However, this does not rule out skinning, which might only leave minimal evidence that might be lost with the erosion of bone surfaces. The cattle molar might suggest primary waste and possibly a skull that had been left with a skin that was processed here, but meat waste (tongue, cheek meat and brain) is possible, or a cleaned skull used for decoration.

Some of the bone was burnt, varying in the intensity of burning from charred to fully oxidised and white in colour. Most of the burnt bone was small fragments lacking in diagnostic features and identified only as 'mammal'. A single fragment of charred sheep/goat bone was recovered from Pit 12008 from PG4; the metapodial had been burnt to a black to grey colour.

Early Bronze Age

The assemblage from Early Bronze Age features is larger by weight and fragment size than that from the Beaker period. It comprises 385 pieces (2425g); 8g from pits and 2416g from BM 2. Again the bulk of the identifiable mammalian remains were of cattle. Only 50 fragments were identifiable to species, including cattle from BM 2 (NISP 23, comprising tooth, pelvic, femur and radius fragments), sheep/goat from BM 2 (NISP 6, comprising teeth fragments and part of a femur), unidentified mammal (NISP 335), fish – eel (NISP 1) and frog/toad (NISP 20).

Table 2.9 Continued

Context	Cut/ deposit	Details	Qty	Wt (g)	Species	NISP	Ad	Juv	MNI	Element range	Count	Butchering	Burnt	Gnaw	Comments
12799	12798	Well	2	1	mammal	2	–	–	–	fragments	–	–	1	–	burnt white/grey
12799	12798	Well	2	29	sheep/goat	2	–	1	–	femur	–	–	–	–	unfused
12746	12743	1st infill E quadrant	21	4	mammal	21	–	–	–	fragments	–	–	–	–	–
12721	12719	3rd infill S quadrant	12	5	mammal	12	–	–	–	fragments	–	–	–	–	–
12711	12708	4th infill E quadrant	1	1	mammal	1	–	–	–	single fragment	–	–	–	–	–
12703	12701	4th infill S quadrant	8	1	mammal	8	–	–	–	fragments	–	–	–	–	–
12693	12689	4th infill W quadrant	1	1	mammal	1	–	–	–	single fragment	–	–	2	–	burnt white/grey
12678	12677	5th infill E quadrant	6	4	mammal	6	–	–	–	fragments	–	–	–	–	–
12709	12677	5th infill E quadrant	1	1	mammal	1	–	–	–	single fragment	–	–	1	–	burnt white
12630	12625	6th infill N quadrant	10	4	mammal	10	–	–	–	fragments	–	–	–	–	–
12643	12636	6th infill S quadrant	8	3	mammal	8	–	–	–	fragments	–	–	–	–	–
12530 *Pit*	12521	Trough	8	6	mammal	8	–	–	–	fragments	–	–	8	–	burnt black
12162	12161	Pit	9	2	mammal	9	–	–	–	fragments	–	–	–	–	–
Middle Bronze Age(?)															
12770	12769	Well at BM2	13	23	cattle	1	–	–	–	lower P3	–	–	–	–	–
12770	12769	Well at BM2			mammal	12	–	–	–	fragments	–	–	–	–	–
12770	12769	Well at BM2	220	1952	cattle	13	1	–	–	humerus, tibias, radius, ulna, upper molars, lower molars, pelvic fragments	–	–	–	–	–
12770	12769	Well at BM2			mammal	207	–	–	–	small fragments	–	–	–	–	–
12771	12769	Well at BM2	1	1	mammal	1	–	–	–	single fragment	–	–	–	–	–
12771	12769	Well at BM2	4	125	cattle	4	–	–	–	femur fragments	–	–	–	–	–
12788	12769	Well at BM2	2	1	herpetofauna – toad	2	1	–	–	pelvis, metapodial	2	–	–	–	–
12788	12769	Well at BM2	10	40	mammal	10	–	–	–	fragments	–	–	–	–	–
12789	12769	Well at BM2	6	3	herpetofauna – frog	5	1	–	–	limbs	2	–	–	–	–
12789	12769	Well at BM2			mammal	1	–	–	–	single fragment	–	–	–	–	–
12789	12769	Well at BM2	2	113	cattle	2	–	–	–	scap fragments	–	–	–	–	–
12797	12769	Well at BM2	15	2	herpetofauna – frog	13	1	–	–	limb, scap, pel	3	–	–	–	–
12797	12769	Well at BM2			mammal	2	–	–	–	fragments	–	–	–	–	–

Key: NISP = Number of Individual species elements present. Measurable following von den Driesch 1967 (NB none recorded). Countable following Davis 1992
Note: Beaker period and Early Bronze Age hand-collected and material from samples, from FAS 056

Fill 12780, the second of the five fills of feature 12779 within BM 2, produced a bovine metacarpal and radius; both had been chopped, the radius also showed canid gnawing. A single eel bone was also recovered from a soil sample of this fill. Two fragments of sheep/goat (29g) were recovered from well 12799.

Post-cranial elements from cattle were also seen in well deposits 12770, 12771 and 12789, from feature 12769 associated with BM 2; 12789 was the primary fill but the upper fills, 12770 and 12771, are both associated with Middle Bronze Age radiocarbon dates. Herpetofauna were represented by bones of the common frog (*Rana temporania*) and common toad (*Bufo bufo*) from this feature. Both species will naturally fall into wells (possibly inescapable) on their travels for food, reproduction and seeking out damp environments.

Discussion

Bovids from Bronze Age periods are dominated by the remains of teeth, which survive better than most elements, with some post-cranial elements. Cattle were the main identifiable species in the deposits associated with the burnt mound site, probably due to their more robust nature. None of the early remains were sufficiently robust to suggest any surviving aurochs.

The scarcity of bone in the deposits associated with the burnt mound sites appears typical, despite the possibility that these mounds were used for either cooking or processing skins, with a dearth of animal bone noted in other mounds (Lovett 2016; Barfield and Hodder 2011).

Plant macrofossils

Anna West

Introduction

A total of 91 bulk samples were taken from samples allocated to the Beaker period, across FAS 056 (Tables 2.10 and 2.11), with 45 samples from Early Bronze Age features (Table 2.12). Many of these samples contained no charred plant remains other than wood charcoal. Generally the plant remains recovered from the site from all periods were sparse, fragmented and abraded and most probably represented mixed occupation waste; there were hints of gathered resources (hazelnuts, acorns) and, in small quantities, cereal grain fragments and arable weeds. Remains from other periods have been mentioned above.

The samples were processed using manual water flotation/washover and the flots were collected in 300μm mesh sieve. The dried flots were scanned using a binocular microscope at x10 magnification. Identification of plant remains is with reference to Stace (1997) for wild plants and Zohary *et al.* (2012) for cereals. The non-floating residues were collected in a 1mm mesh and sorted when dry.

For the purposes of this report items such as cereal grains and seeds have been counted as 1 if whole or an identifiable fragment. However, if identification was uncertain due to poor preservation, or numerous fragments were present which could not be recorded in full within the limits of the analysis, charred plant remains have been recorded qualitatively according to the following categories # = 1–10, ## = 11–50, ### = 51+ specimens. Items that cannot be easily quantified such as charcoal have been scored for abundance x = rare xx = moderate, xxx = abundant. Some context details relate to spits/squares that formed sub-samples of deposits or layers and not all are illustrated, although details can be found in the site archive.

Preservation of the plant macrofossils present was through charring and was generally fair to poor; the nature of the geology across the site has meant that the plant macrofossils recovered were generally fragmented and abraded making positive identifications difficult or impossible. Wood charcoal fragments were present in all the samples, in many making up the majority of the material present, in others, however, charcoal fragments were rare. Commonly the charcoal was highly comminuted. Charred cereal grains were mostly present as fragments, in very low numbers or as individual grains. The counts recorded within Tables 2.10 to 2.12 include large fragments as well as whole caryopses. The majority of caryopses were very fragmented and/or abraded making identification to species difficult or impossible. Many of the grains present were puffed, with a honeycomb structure, and were very friable as though they had been exposed to combustion at high temperatures.

Beaker

Burnt Mound 1

Fifty-four bulk samples were taken from pits, postholes, layers and well fills which form part of BM 1 (Table 2.10). Charred plant remains were sparse within these samples, with only minimal fragments of largely indeterminate cereal grains being recovered. Hazelnut (*Corylus avellana*) shell fragments were more common than cereal remains within these deposits but were still relatively rare. A small number of plum family (*Prunus* sp.) endocarp fragments were also present amongst the charcoal fragments.

Beaker pits and structure

Charred hazelnut shells dominate the remains, being common in a number of the postholes and pits but were only present in low numbers in many features (Table 2.11). Gathered foods were an important resource during the prehistoric period and hazelnuts, in particular, were easy to store or transport and could be eaten raw without any need for cooking. Eighteen charred acorn (*Quercus* sp.) fragments were recovered from pit 12010 in PG4 (sample 602) along with 328 hazelnut shell fragments. Although charred acorns have been recovered from Neolithic and Bronze Age sites in the Middle East and Southern, Central and Northern Europe, they were most probably exploited as a food resource during times of poor harvest, when the acorns could be roasted and ground prior to consumption. It is likely that the high tannin content of British oaks made acorns unpalatable other than as a famine food. They could however be used as fodder for animals, particularly swine (Zohary *et al.* 2012).

Cereal remains were generally sparse within the Beaker period samples. Generally only low numbers of indeterminate cereal grain fragments were recovered. However, low numbers of barley (*Hordeum vulgare*) were present in a handful of samples.

A small concentration of cereal remains was recovered from three features within PG1. Pit fills 12485 (sample 661, pit 12484), 12481 (sample 662, pit 12480) and 12477 (sample 663, pit 12476) all produced cereal grain fragments. A single glume base fragment of emmer/spelt (*Triticum dicoccum/spelta*) was also recovered from fill 12481 (sample 662), although the poor preservation means diagnostic features were missing. Hulled wheats emmer and spelt both remain tight within their glumes after harvesting and these crops were stored in their spikelets and processed piecemeal on a domestic level as and when required. The spikelets would be heated or parched and then pounded in order to release the grains prior to milling. The chaff waste may then be disposed of within the domestic fire or utilised as fuel or fodder for animals (Hillman 1981).

The presence of cereal grains, the small quantity of chaff and hazelnut shell fragments recovered from the fills of PG1 and also PG4 suggest that domestic activities such as food preparation may have been taking place in the vicinity during this period.

The range of charred weed seeds present was limited. Grass (Poaceae) seeds were most common, although frequently small and/or fragmented. As with the cereal grains, the majority of the weed seeds present were so fragmented that identification was impossible and they are generally recorded by type. Cleavers (*Galium aparine*) was present in very low numbers. Cleavers is often regarded as indicative of autumn sowing, most likely on heavier soils (Hillman 1981) and their long, clinging stems mean that the seeds can often be collected along with a crop.

Early Bronze Age

The charred plant material recovered from the Early Bronze Age features is extremely poor, particularly from the pits, layers, surfaces and the well associated with BM 2 (Table 2.12). Cereal grain fragments were very rare, only being present in low numbers or as single specimens within a handful of samples; none of the abraded grain fragments recovered were identifiable. Wood charcoal is present in moderate quantities within most of the samples but is highly comminuted and can add no detailed information regarding resource management or fuel selection.

Discussion

On the whole the charred plant remains within Beaker period features were sparse. They do, however, appear to show the exploitation of hedgerows or woodlands in the vicinity for gathered foods and fuel and also some use of cereals, in particular the hulled wheat emmer, and perhaps the farming of heavier or damp soils. The presence of deciduous woodland, hedges or scrubland was indicated by hazel nuts, acorns and plum family remains, and these were clearly exploited for gathered food resources as well as wood for fuel. Gathered food remains dominate the prehistoric assemblages across the site and indicate how wild resources played an important role within the diet during this period across mainland Britain. Hazelnut shell fragments were common, with plum family and acorns also being recorded. The absence of other remains may be due to the lack of preservation opportunities rather than an absence from the diet.

Arable weeds were rare, although cleavers was present in small numbers throughout all the phases (see above). The weed seed assemblage was dominated by grass (Poaceae) seeds. These remains suggest that grassland was in the vicinity of the site during the earlier phases, possibly providing grazing for livestock during this period.

Charred plant remains were sparse within the samples taken from features associated with areas of burnt mound related activity. The absence of plant macrofossils from these contexts, other than low numbers of indeterminate cereal grain fragments, is consistent with the results from excavations of burnt mounds at Feltwell and Northwold in Norfolk, where charred plant remains were generally absent from contexts associated with the burnt mound (Crowson 2004), suggesting that the processing of plant remains was not the focus of the activity carried out in association with burnt mounds.

Pollen and diatoms

Michael J. Allen, Catherine Langdon and Nigel Cameron

This report is an edited version of the full report available in the archive report (Allen *et al.* 2023b).

Introduction

Michael J. Allen

The environmental setting and land use history associated with the site was addressed by selected pollen and diatom analysis. Following selection and sampling of 12 profiles, a suite of 95 pollen and 17 diatom subsamples were taken (Table 2.13). Of those, six profiles were selected for pollen assessment and 14 subsamples assessed, and three of those profiles were also selected for diatom assessment and six samples assessed. The selection of samples covered the principal feature and deposit types: buried soils, covering layers and wells from the burnt mound complexes. A Middle Bronze Age enclosure ditch and a Middle Iron Age pit were also included. The fills in general were fine-grained with sands and silts being the main components but some layers were also quite stony.

Pollen

Catherine Langdon

Fourteen pollen sub-samples of 2ml volume were processed by Rob Scaife using standard techniques for the extraction of the sub-fossil pollen and spores (Moore and Webb 1978; Moore *et al.* 1991). Pollen taxonomy, in general, follows that of Moore and Webb (1978), modified according to

Table 2.10 Plant macrofossils from BM 1, FAS 056

Sample no.	Context	Cut/ deposit	Details	Cereals and other food plants					Tree/shrub charred			Other plant macrofossils			Material from non-floating residues		Sample volume (litres)	Volume of flot (ml)	% flot sorted
				cf Triticum spelta (grains)	*cf Triticum* sp. (grains)	Cereal indent. (grains)	culm node (indet)	Large legumes	*Corylus avellana* (nutshell)	*Prunus* sp. (endocarp frag)	Endocarp (indet frag)	Charcoal <2mm	Charcoal <4mm	Charcoal >4mm	*Corylus avellana* (nutshell)	Endocarp (indet frag)			
458	3107	2718	Well	–	–	–	–	–	#	–	–	xx	x	–	–	–	10	10	100
458	3107	2718	Well	–	–	–	–	–	#	–	–	xx	x	–	–	–	10	10	100
459	3146	2718	Well	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<5	100
461	2927	2926	Trough	–	–	–	–	–	–	–	–	x	x	–	–	–	10	15	100
462	2928	2926	Trough	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<5	100
145	3094	2918	Capping fill well 3106	–	–	–	–	–	–	–	–	x	–	–	–	–	40	<5	100
104	2685	2704	Upper fill (slot)	–	–	1	–	1	–	1	–	x	–	–	–	–	40	<5	100
107	2735	2917	1st infill (slot)	–	–	–	–	–	–	–	–	xx	xx	–	–	–	20	20	100
111	2864	2704	Upper fill SW quadrant	–	–	1	–	–	3	–	–	xxx	x	–	–	–	40	20	100
114	2887	2917	1st infill SW quadrant	–	–	1	–	–	2	–	–	xxx	xx	–	–	–	40	20	100
112	2891	2917	1st infill SW quadrant	–	–	–	–	–	1	–	1	xxx	x	x	–	–	40	30	100
113	2912	2917	1st infill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	95	100
122	2949	2704	Upper fill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	15	100
124	2951	2704	Upper fill SW quadrant	–	–	–	–	–	–	–	–	xx	–	x	–	–	40	<10	100
123	2954	2704	Upper fill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	300	100
126	2971	2917	1st infill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	7	–	40	40	100
127	2972	2917	1st infill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	40	100
125	2975	2917	1st infill SW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	110	100
134	3049	2704	Upper fill NW quadrant	–	–	#	–	–	–	–	–	xx	–	–	–	–	40	10	100
135	3060	2704	Upper fill NW quadrant	–	1	–	–	–	–	–	–	xx	x	x	9	1	40	15	100
136	3052	2704	Upper fill NW quadrant	–	–	–	–	–	–	–	–	x	–	–	–	–	40	10	100
138	3068	2917	1st infill NW quadrant	–	–	–	–	–	–	–	–	xxx	xx	x	–	–	40	50	100
139	3076	2917	1st infill NW quadrant	–	–	–	–	–	–	–	–	xxx	x	x	22	–	40	50	100

457	3099	2918	Capping fill well 3106	–	–	1	–	–	–	–	–	x	x	–	–	–	40	10	100
137	3028	2704	Upper fill SE quadrant	1	–	4	–	–	–	–	–	xxx	x	–	–	–	40	5	100
132	3033	2704	Upper fill SE quadrant	–	–	–	–	–	–	–	–	xxx	x	–	–	–	40	30	100
144	3085	2917	1st infill SE quadrant	–	–	–	–	–	–	–	–	xx	x	–	1	–	40	15	100
102	2619	2617	Pit	–	–	–	–	–	–	–	–	x	–	–	–	–	51	<5	100
106	2719	2718	Well	–	–	–	–	–	–	–	–	xxx	x	–	–	–	40	20	100
100	2571	2569	Pit	–	–	–	–	–	–	–	–	xxx	xx	x	–	–	20	50	100
116	2920	2919	Trough	–	–	#	–	–	–	–	–	xxx	xxx	x	–	–	40	300	100
451	2920	2919	Trough	–	–	#	–	–	–	–	–	xxx	x	x	–	–	10	20	100
465	2922	2921	Trough	–	–	–	–	–	–	–	–	xxx	x	x	–	–	10	50	100
117	2922	2921	Trough	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	100	100
467	2957	2921	Trough	–	–	–	–	–	–	–	–	xxx	x	x	–	–	10	40	100
121	2957	2921	Trough	–	–	1	–	–	–	–	–	xxx	xx	xx	–	–	30	100	100
119	2924	2923	Pit	–	–	–	–	–	1	–	–	xxx	x	–	–	–	40	40	100
118	2927	2926	Trough	–	–	#	–	–	–	–	–	xxx	xx	x	–	–	40	60	100
120	2933	2932	Trough	–	–	–	–	–	–	–	–	xx	x	–	–	–	40	15	100
128	2977	2976	Trough	–	–	–	–	–	–	–	–	xxx	x	x	–	–	40	40	100
452	3110	3109	Secondary well	–	–	4	–	–	–	–	–	x	x	–	–	–	40	40	100
464	3149	3147	Pit	–	–	–	–	–	1	–	–	x	x	–	–	–	40	10	100
470	3159	3158	Pit	–	–	–	–	–	–	–	–	x	–	–	4	–	20	<5	100
476	3164	3162	Pit	–	–	–	–	–	–	–	–	xxx	xxx	x	–	–	40	300	100
471	3166	3165	Pit	–	–	–	1	–	–	–	–	–	x	x	–	–	40	<5	100
472	3171	3170	Pit	–	–	–	–	–	2	–	–	x	–	–	–	–	2	5	100
473	3171	3170	Pit	–	–	–	–	–	2	–	–	x	–	#	13	–	10	15	100
482	3240	3239	Pit	–	–	–	–	–	–	–	–	x	–	–	–	–	20	<5	100
480	3249	3248	Pit	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
463	2931	2930	Small pit	–	–	–	–	–	3	–	–	xxx	x	–	–	–	10	20	100
477	3243	3242	Early pit	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
478	3245	3244	Early pit	–	–	–	–	–	–	–	–	xx	x	#	–	–	10	10	100
479	3247	3246	Early pit	–	–	–	–	–	–	–	–	xxx	x	–	–	–	10	30	100
481	3255	3254	Posthole	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<5	100
483	3263	3262	Posthole, S1	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<5	100

Key: # = 1–10, ## = 11–50, ### = 51+ specimens. x = rare, xx = moderate, xxx = abundant

Table 2.11 Plant macrofossils from Beaker Structure 2 and pits, FAS 056

Sample no.	Context	Cut	Details	Cereals and other food plants				Tree/shrub charred			Weeds/other charred		Other plant macrofossils			Material from non-floating residues		Sample volume (litres)	Volume of flot (ml)	% flot sorted
				cf Triticum sp. (grains)	*Hordeum vulgare*	Cereal indent. (grains)	Glume base *T. dicoccum* /*spelta*	*Quercus* sp. (fruit frags)	*Corylus avellana* (nutshell)	*Sambucus nigra*	Poaceae	*Gallium aparine*	Charcoal <2mm	Charcoal <4mm	Charcoal >4mm	*Corylus avellana* (nutshell)	*Quercus* sp. (fruit frags)			
Single pits																				
105	2713	2712	Pit	–	–	#	–	–	–	–	–	–	xxx	xx	x	–	–	40	100	100
507	11121	11120	Pit	–	–	–	–	–	–	–	–	–	#	–	–	–	–	10	10	100
508	11124	11122	Pit	–	–	1	–	–	1	–	–	–	xx	–	–	8	–	10	<5	100
Pit Group 1																				
663	12477	12476	Pit	cf54	–	xxx	–	–	4	–	–	–	xxx	–	–	–	–	10	30	50
662	12481	12480	Pit	cf3	9	xx	1	–	4	–	–	–	xxx	x	–	–	–	10	20	75
661	12485	12484	Pit	1 cf4	5	X	–	–	16	–	–	–	xxx	x	–	–	–	10	20	75
Pit Group 2																				
53	2007	2006	Pit	–	–	–	–	–	30	–	2	–	xxx	xx	x	41	–	30	30	100
52	2005	2004	Pit	–	–	1	–	–	9	–	–	–	xxx	x	x	2	–	20	30	100
54	2009	2008	Pit	–	–	–	–	–	2	–	–	–	xxx	x	–	–	–	10	15	100
55	2013	2012	Pit	–	–	–	–	–	–	–	–	–	xx	x	x	–	–	40	40	100
Pit Group 3																				
609	12197	12196	Pit	–	–	–	–	–	10	–	2	–	x	x	–	2	–	10	<5	100
610	12199	12198	Pit	–	2	3	–	–	28	–	#	–	xx	–	–	–	–	10	10	100
611	12201	12200	Pit	–	–	–	–	–	4	–	–	–	x	–	–	8	–	10	<5	100
612	12203	12202	Pit	–	–	–	–	–	1	–	–	–	x	–	–	–	–	10	<5	100
613	12205	12204	Pit	1	–	1	–	–	57	–	–	–	xx	x	–	–	–	10	30	100
Pit Group 4																				
602	12011	12010	Pit	–	12 cf3	1	–	7	103	–	–	3	xxx	x	xx	225	9	10	440	8

Pit Group 6																			
310	5404	5403	Pit	–	–	7	–	–	137	–	1	2	xxx	xx	x	–	–	80	50	100
311	5405	5403	Pit	–	–	–	–	–	4	–	–	–	x	x	x	5	–	20	15	100
312	5406	5403	Pit	–	–	1	–	–	–	–	–	–	x	–	–	–	–	20	10	100
318	5404	5403	Pit	–	–	–	–	–	106	–	–	1	xxx	x	x	–	–	40	40	100
307	5386	5384	Pit	–	–	3	–	–	25	–	–	–	xxx	x	x	–	–	20	50	100
Pit Group 7																			
110	2529	2528	Pit	–	–	–	–	–	–	1	–	1	xxx	xxx	xxx	–	–	20	600	100
Pit Group 8																			
639	12380	12379	Pit	–	–	2	–	–	57	–	–	–	xxx	xx	x	13	–	10	80	18
Structure 2																			
635	12340	12339	Posthole	–	–	–	–	–	–	–	–	–	x	–	x	–	–	10	<5	100
636	12342	12341	Posthole	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10	<5	100
637	12344	12343	Posthole	–	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<5	100
638	12346	12345	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
641	12348	12347	Posthole	–	–	3	–	–	1	–	–	–	x	–	–	–	–	10	<5	100
642	12350	12349	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
643	12352	12351	Posthole	1	–	2	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
640	12354	12353	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
646	12356	12355	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
647	12358	12357	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
648	12360	12359	Posthole	–	1 cf	5	–	–	2	–	1	1	x	x	–	–	–	10	<5	100
650	12364	12363	Posthole	–	–	5	–	–	4	–	–	–	xx	x	–	–	–	10	<5	100
644	12368	12367	Ditch	–	–	–	–	–	–	–	–	–	x	–	–	–	–	10	<5	100
645	12372	12371	Posthole	–	–	–	–	–	–	–	–	–	#	–	–	–	–	10	<1	100

Key: # = 1–10, ## = 11–50, ### = 51+ specimens. x = rare, xx = moderate, xxx = abundant

Table 2.12 Plant macrofossils from BM 2 and Early Bronze Age pits, FAS 056

Sample no.	Context	Cut/ deposit	Details	Cereals and other food plants				Tree/shrub charred			Weeds/other charred		Other plant macrofossils			Charred organic material	Material from non-floating residues		Sample volume (litres)	Volume of flot (ml)	% flot sorted
				cf Triticum sp. (grains)	*Hordeum vulgare*	Cereal indent. (grains)	Glume base *T. dicoccum/ spelta*	*Quercus* sp. (fruit frags)	*Corylus avellana* (nutshell)	*Sambucus nigra*	Poaceae	*Gallium aparine*	Charcoal <2mm	Charcoal <4mm	Charcoal >4mm		*Corylus avellana* (nutshell)	*Quercus* sp. (fruit frags)			
Single pits																					
51	2036	2035		–	–	–	–	–	59	–	–	–	xxx	xxx	xx	–	16	–	40	100	100
606	12162	12161		–	–	–	–	–	–	–	–	–	xx	x	x	–	–	–	10	20	100
Burnt Mound 2																					
725	12822	12805	Cobbles	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	20	<5	100
665	12534	12521	Trough	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	20	<5	100
667	12536	12521	Trough	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	20	100
668	12532	12521	Trough	–	–	–	–	–	–	–	–	–	–	x	x	–	–	–	10	15	100
669	12531	12521	Trough	–	–	–	–	–	–	–	–	–	xxx	x	–	–	–	–	40	50	100
670	12530	12521	Trough	–	–	–	–	–	–	–	–	–	xxx	x	–	–	–	–	40	50	100
677	12547	12521	Trough	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	10	<5	100
687	12553	12542	Pit	–	–	–	–	–	–	–	–	–	x	xxx	–	–	–	–	30	20	100
681	12567	12566	Trough	–	–	–	–	–	1	–	–	–	xxx	x	–	–	–	–	40	40	100
685	12581	12555	Possible pit in hollow	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	20	<5	100
686	12583	12555	Possible pit in hollow	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	30	<20	100
689	12587	12586	Trough	–	–	1	–	–	–	–	–	–	xx	xx	–	–	–	–	10	30	100
724	12773	12772	Pit	–	–	–	–	–	–	–	–	–	xxx	xx	x	–	–	–	50	100	100
720	12775	12774	Tree throw	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	10	100
718	12782	12779	Well	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	15	100
719	12785	12784	Pit	–	–	2	–	–	–	–	–	–	xx	x	–	–	–	–	40	20	100
722	12794	12793	Tree throw	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	10	100
723	12796	12795	Tree throw	–	–	1	–	–	–	–	–	–	xxx	xx	–	–	–	–	50	100	100
713	12799	12798	Pit	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	15	100
714	12801	12800	Posthole	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	10	<5	100
679	12562	12555	Hollow	–	–	–	–	–	–	–	–	–	x	–	x	x	–	–	10	15	100
680	12563	12555	Hollow	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	<5	100
682	12570	12555	Hollow	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	15	100
709	12771	12769	Well MBA?	–	–	1	–	–	–	–	–	–	xx	x	–	–	–	–	40	30	100

710	12770	12769	Well MBA?	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	15	100
711	12788	12769	Well MBA?	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	<10	100
712	12789	12769	Well MBA?	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	5	100
716	12797	12769	Well MBA?	–	–	–	–	–	–	–	–	–	#	–	–	–	–	–	10	15	100
692	12630	12625	6th infill N quadrant	–	–	–	–	–	–	–	–	–	xx	xx	–	–	–	–	40	25	100
696	12662	12657	5th infill N quadrant	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	10	100
701	12697	12694	4th infill N quadrant	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	20	100
702	12731	12730	3rd infill N quadrant	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	<10	100
691	12614	12606	6th infill E quadrant	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	<10	100
694	12678	12677	5th infill E quadrant	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	15	100
699	12709	12708	4th infill E quadrant	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	<5	100
705	12746	12743	1st infill E quadrant	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	20	<10	100
704	12753	12752	2nd infill E quadrant	–	–	–	–	–	–	–	–	–	xx	x	–	–	–	–	40	15	100
693	12643	12636	6th infill S quadrant	–	–	2	–	–	–	–	–	–	xx	–	–	–	–	–	40	15	100
697	12672	12666	5th infill S quadrant	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	<10	100
700	12703	12593	4th infill S quadrant	–	–	3	–	–	–	–	–	–	xxx	–	–	–	–	–	40	20	100
690	12605	12595	6th infill W quadrant	–	–	–	–	–	–	–	–	–	x	–	–	–	–	–	40	<10	100
695	12654	12594	5th infill W quadrant	–	–	–	–	–	–	–	–	–	xx	–	–	–	–	–	40	10	100
698	12693	12594	4th infill W quadrant	–	–	–	–	–	–	–	–	–	x	x	–	–	–	–	40	10	100

Key: # = 1–10, ## = 11–50, ### = 51+ specimens. x = rare, xx = moderate, xxx = abundant

Table 2.13 Features sampled for pollen and diatom assessment

Feature	Contexts	Details	Sample	Pollen	Diatoms
2693	3090	BM1 cobbled surface (NE quadrant)	K474	2	–
2917/2704/2703	–	BM1 layers	129	3	–
3106	3123/3189	BM1 well	148–9	2	3
12585	–	BM2 well	708	–	1
12769	–	BM2 well (MBA?)	715	2	2
11051	–	MBA Enclosure 1	505	2	–
0510	–	MIA pit	42	3	–

Table 2.14 Pollen assessment data from the six features examined

Features/ monolith	Buried soil sample K474			BM1 Slot 2659 sample 129		Well 3106 sample 148		BM2 Well 12769 sample 715			MBA Ditch 11051 sample 505		IA Pit 0510 sample 42	
Context	A	3090	2703	2704	2917	3123	3189	12789	12799	–	11055	11053	–	513
Depth	2cm	4cm	82cm	106cm	130cm	78cm	128cm	32cm	48cm	18cm	48cm	72cm	36cm	52cm
Pollen/spore type														
Pinus	–	–	1	–	–	–	–	2	1	–	–	1	–	–
Quercus	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Corylus avellana	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Poaceae	–	–	1	–	13	5	2	3	–	–	1	2	–	1
Poaceae >40μm	–	–	–	–	1	–	–	–	–	–	–	–	–	–
Ranunculus type	–	–	–	–	3	–	–	–	–	–	–	–	–	–
Caltha type	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Brassicaceae	–	–	–	–	–	–	–	1	–	–	–	1	–	–
Caryophyllaceae	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Polygonum aviculare	–	–	–	1	–	1	–	–	–	–	–	–	–	–
Plantago lanceolata	–	–	–	–	3	1	1	1	–	–	–	–	–	–
Plantago undiff.	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Succisa	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Lactucoideae	–	–	10	1	2	1	1	1	–	–	1	3	–	4
Cryperaceaea	–	–	–	–	–	1	–	2	1	–	–	–	–	–
Pteridium aquilinum	–	–	2	6	10	–	1	30	8	–	4	7	2	–
Dryopteris type	–	2	–	3	3	–	1	4	–	–	2	1	–	–
Polypodium	–	–	–	–	1	–	–	1	–	–	1	–	–	–
Liverwort	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Unidentified	–	–	–	1	1	1	1	4	1	–	1	1	–	–
Total pollen + spores	**0**	**2**	**14**	**12**	**37**	**10**	**10**	**52**	**11**	**–**	**10**	**16**	**2**	**6**
Exotic	5	50	50	66	41	58	46	132	74	29	57	51	22	91
Concentration pollen + spores/ml	–	193	1353	879	4361	833	1051	1904	718	–	847	1516	439	319
Dinoflagellate	–	–	–	–	–	–	–	1	–	–	–	–	–	–
Pre-Quaternary pollen + spores	–	1	3	8	25	–	–	–	–	–	4	1	–	–

Bennett *et al.* (1994) and Stace (1992). These procedures were carried out in the Palaeoecology Laboratory of the School of Geography, University of Southampton (PLUS). Unfortunately, all of the 14 samples assessed had poor preservation and concentrations. Pollen counts made range from 0 to only 52 grains per sample. Fern spores and miscellaneous elements were counted outside the basic pollen sum. Pollen data is presented in Table 2.14.

Despite universally low concentrations and poor pollen preservation in all samples, it is possible to make some broad and rather tentative statements about the nature of the vegetation and environment in some cases.

From BM 1 layers 2917/2704/2703 (Table 2.13) there is some evidence for an open environment with pastoral activity as evidenced by the presence of Poaceae (grass), Lactucoideae (dandelions) and *Ranunculus* type (buttercups). There is also some evidence of this type of environment in the lower fills of well 3106 beneath (fills 3123/3189), in the lower fills of well 12769 (12789 and 12799: BM 2) and Middle Bronze Age ditch 11051 (Table 2.14), although this is very limited and inferred often by the single incidence of pollen grains such as *Plantago lanceolata* (ribwort plantain) and *Polygonum aviculare* (knotweed).

The increase in Lactucoideae (dandelions), particularly from context 2703, may be the result of preferential preservation. Lactucoideae is particularly robust and tends to differentially preserve in soil samples as it has a longer residence time than other, less robust, pollen types (Dimbleby 1957). Additionally, a single large grass recorded at 130cm in this site may be of a cereal type and could attest to some arable activity nearby. In general there is a paucity of pollen associated with tree and shrub taxa, with only the occasional pine pollen grain recorded. The only sample that contained other tree and shrub taxa was context 12789 from well 12769 in which single oak and hazel pollen grains were noted. The pollen of these taxa is anemophilous (wind pollinated) and may have been transported from more regional or extra regional sources.

Despite poor preservation and low concentration of pollen there is a small amount of evidence for pastoral activity in some of the Beaker and Early and Middle Bronze Age features. A single large grass pollen grain may be of cereal type which would also indicate some arable farming (slot 2659). There is little tree and shrub pollen, suggesting a predominantly open habitat. The arboreal taxa which have been recovered are mostly anemophilous and are likely to derive from regional or long-distance sources.

Diatoms

Nigel Cameron

Three sequences were sampled for diatoms and a total of 17 pollen samples taken. Six samples were selected (Table 2.13), prepared and assessed for diatoms.

The assessment (Cameron 2023) showed that diatoms were absent from all six samples, and no remains of any kind were present, an absence that can be attributed to taphonomic processes.

Conclusions

Michael J. Allen

Despite intensive field sampling of features across the site and periods, the preservation of pollen and the total lack of diatom survival provides little information about the land use and landscape history. Nevertheless, there is evidence for a pastoral Bronze Age open landscape with only a few trees and shrubs locally; a landscape predominantly of pasture but with some arable farming nearby.

Geoarchaeology and lipid analysis

Michael J. Allen, Julie Dunne, Richard P. Evershed and Charles French

Introduction and analysis

Michael J Allen

This report is an edited version of that in the archive report (Allen *et al.* 2023a). The site lay on Head (i.e. Quaternary clay, silt, sand and gravel deposits), which is mixed glacial sand, gravel chalk and clay over Lewes Nodular chalk formation and Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk Formation, which support generally typical calcareous pelosols of the of the Hanslope Association (Jarvis *et al.* 1984).

To summarise, the burnt mound complexes comprised spreads of heat-altered flints and charcoal and a series of pits, some containing dumps of heat-altered flint and charcoal, within hollows with cobbled surfaces, associated with two very large pits, one of which at least holds or held water. These were surrounded by smaller pits containing burnt flint. Occasional distinct and 'greasy' deposits were present in some of the pits.

The association of a large number of flint tools, in particular scrapers, and the possible greasy deposits support the hypothesis that one of the activities associated with the burnt mound sites may have been hide processing and/or the working or processing of animal or plant materials. It seems likely the large pits were used for water collection and storage, with the smaller pits around the feature being associated with heated water (see Chapter 5).

The formation of, and activities associated with, the burnt mound complexes were tackled via three lines of enquiry: 1) geoarchaeological record of the deposits; 2) soil micromorphological analysis of selected deposits and 3) lipid analysis of a selection of burnt flints and tools and soil deposits associated with the two burnt mound sites. The aims were to identify any distinct practices associated with the burnt mounds and to attempt to see if there were any functional or task differences between the two complexes. This report, therefore, comprises four parts: 1) the deposit geoarchaeology (Allen), 2) soil micromorphology (French), 3) lipid analysis (Dunne and Evershed) and 4) summary discussion and conclusions (Allen). The analysis programme is summarised in Table 2.15.

Table 2.15 Features and contexts discussed in geoarchaeological analysis

Mound complex	Scraper SF no.	Feature/ deposit	Details	Context	Geoarch	Soil micro-morphology	Lipids
BM1	–	2630	Old land surface within hollow	2668	–	–	–
BM1	–	2693	Cobbled surface (NE quadrant)	3090	–	–	–
BM1	–	2919	Trough	2920	–	–	–
BM1	–	2926	Trough	–	–	–	–
BM1	–	2932	Trough	–	–	–	–
BM1	–	2718	Well	–	–	–	–
BM1	–	3106	Well	–	–	–	–
BM1	–	2921	Trough	3150	–	–	–
BM1	2187	2917	First fill over mound complex (SW quadrant)	2973	–	–	–
BM1	2383	3174	Gully fill	3272	–	–	–
BM1	2393	2693	Cobbled surface (NE quadrant)	3209	–	–	–
BM2	–	12585	Old land surface in hollow (S quadrant)	12765	–	–	–
BM2	–	12566	Pit/trough	12567	–	–	–
BM2	–	12586	Pit	12587	–	–	–
BM2	–	12769	Well	12771	–	–	–
BM2	5127	12694	Fourth infill of BM2 (N quadrant)	12700	–	–	–

Geoarchaeology

Michael J. Allen

Field descriptions and records from undisturbed samples (monoliths) were made (Hodgson 1997) to attempt to provide a geoarchaeological record and form the basis of both interpretation of the fills/layers and activities associated with them, and to isolate deposits to progress for further analysis.

The thin spreads of heat-altered flints and charcoal-rich deposits associated with the Burnt Mound complexes are dealt with via soil micromorphology (French below). A number of pits associated with the burnt mound complexes, however, contained specific deposits or infill histories that were examined; some of which progressed to soil micromorphological and lipid analysis, or pollen and diatom assessment.

Three rectangular, vertical-sided and heat-altered flint-filled pits interpreted as 'troughs', 2921, 2926 and 2932, and two waterholes or wells, 2718 and 3106, were examined in the field or in undisturbed samples (monoliths).

Heat-altered flint-filled pits – Burnt Mound 1

The primary fill of pit 2932 had weathered and derived from the sandy sides of the feature (Fig. 2.45A); the darker colours suggest anthropogenic activity, possibly with high localised water (standing water or groundwater) resulting in some weak gleying. The pit had stood open allowing a 14cm thick primary fill to develop. The upper part of the secondary fill was humic and silty, possibly an A horizon (soil)/stabilisation, and the upper horizon had a sharp/abrupt boundary with the dumped material indicating stasis and stabilisation prior to the dumping of the overlying burnt flint layer. The upper layer is dumped burnt stone – there were no signs of heat alteration or reddening of any of the soils, indicating they were cool. Therefore these fills represent disposal in the pit after it had been left open, rather than during or immediately after the use of the pit. This contrasts with pit 2921 (see below).

The fill sequence in pit 2926 was similar to that of pit 2932, with a primary weathered fill, and a similar infill history can be ascribed to this pit.

Pit 2921 showed a sharp contact between the base and the infills, with no primary fill apart from a sandy-clay slumped deposit. In places the heat-altered flint rich layer lies directly on the base of this pit (Fig. 2.45B), or over a very thin greasy (residue) layer 3150 (Fig. 2.45C), indicating the flints were dumped into the pit almost immediately after it was excavated or recut. Vestiges of a thin intermittent very dark brown 'greasy' silty clay, 3150 (Fig. 2.45C) lay at the very base in places and may be, or contain, residue of the processing and use of the pit. This may be a fatty residue from 'industrial' use such as boiling, skin/hide preparation retting etc. and may relate to activities in the vicinity (see *Organic residue analysis of flints and sediments*, Dunne and Evershed below) and the function of the pits specifically.

Wells/waterholes associated with Burnt Mound 1

Two 'waterholes' were examined, pits 2718 and 3106, to define their infill history and attempt to recognise any differences between them.

The large pit 3106 was examined and the lower *c.* 1.5m fills were exposed. Three monoliths were taken from the deposits: M1, sample 148, two overlapping monoliths, M2, sample 149, and M3, sample 150 (not illustrated). The basal *c.* 1.5m of this pit contained clearly banded deposits of sands, and silts (standstill phase) with clear evidence of inclusions from the weathered sides (Fig. 2.45D). These seem to have formed, in part, under water – possibly even seasonally with drier episodes (sand) and water-filled (silts). The basal deposit was grey silty sands and fine silt with a sharp boundary on the natural geology, indicating initial settling of waterlain sands, superseded by silts and sandy



Figure 2.45 Marham Park, Fornham All Saints: photographs by M. Allen. Sandy primary fill (3145) of pit 2932 showing silting prior to the dumping of burnt flint rich layer (A); lack of primary fill and direct contact of dumped fill in pit 2921 (B); greasy layer 3150 at the base of 2921 (C) well 3106 with the monolith tins in place (D)

silts. The fine silt was deposited and settled out under water, and a number of succeeding sandy lenses suggest the collapse of unstable sides, perhaps created by accessing the pit, and this was covered by further fine greys sands and silts again settled out under water. The upper part of the exposed stratigraphy was typical terrestrial pit fill.

A 25cm monolith sample, 450, was taken from silt immediately over the basal gravelly deposits in well 2718 (Fig. 2.16, Section TT). This silty sand may have settled in water. The basal deposits were gravel cobbles that had collapsed into the pit, perhaps suggesting the cobbled area was in place and this pit had been cut through them, *contra* pit 3106 (see above). This occurred very soon after the pit was dug, and succeeding deposits were silts and sandy silts. The upper fills included a massive homogeneous silty clay loam deposit 30–40cm thick and probably dumped as a 'clay' plug, indicating deliberate backfilling of this pit at least.

Discussion

The concentration of heat-altered flints in the fills suggest that they were being deposited in the pits either as a functional and active part in their use, or as discarded material.

The heat-altered flint-filled pits vary in their nature: some indicate a period of being left open (primary fill accumulation), while others have dumps of burnt flint on recently dug or recut pits. The burnt flint fills between the pits vary significantly: some are of packed burnt flint with little matrix, others are matrix dominated fills with many burnt flints, often smaller pieces. There are hints of residue or deposits which may relate to the use of the pit (e.g. 2921) – this may be a fatty residue from 'industrial' use such as boiling, skin/hide preparation, retting etc. (see *Organic residue analysis of flints and sediments*, Dunne and Evershed below).

Both water-filled pits 2718 and 3106 have evidence for holding water and of deposits formed in water. Deposits seem to be a mixture of those deposited underwater and collapse of sides. There is a hint that the water table may have fluctuated and the alternating silts and sand could be taken as seasonal drier and wetter conditions. The lower infills associated with standing water seem overall to have occurred relatively rapidly. The upper fills of both pits are

1) more normal terrestrial pit fills and 2) possibly included deliberate backfilling (clay 'plug' in pit 2718). Investigation of the presence and nature of the water, its depth and temporality was attempted via diatom analysis, but unfortunately all samples examined were devoid of diatoms (Cameron above).

Micromorphological analysis of the buried soil beneath the burnt mounds

Charles French

Three sample blocks were taken for soil micromorphological analysis through the surviving Holocene soil observed beneath two later prehistoric burnt mound complexes (after Courty *et al.* 1989; Goldberg and Macphail 2006; Murphy 1986). For BM 1, the samples were of buried soils 2668 in the main hollow and the metalled surface, 2693 (context 3090, from the north-east quadrant), samples 474 and 475 respectively. For BM 2, buried soil 12765 was sampled; this was part of the lowest soil layer within the hollow in the southern quadrant where no metalled surface existed (sample 726). As noted above the site is situated on glacial head deposits.

The thin sections were described using the accepted terminology of Bullock *et al.* (1985), Stoops (2003) and Stoops *et al.* (2010). The micromorphological investigation aimed to establish the nature of prehistoric soil development at the site, as well as truncation of the soils, whether evidence of burning or heating could be differentiated, and potentially of water (possibly slaking?) as a part of activities associated with the construction and use of these two burnt mound complexes.

Thin section analysis

Sample 474 from buried soil 2668 was predominantly a fine sandy/silty clay loam with a well-developed small sub-angular blocky ped structure. Significantly, there were a few striae of pure (or limpid) clays in the dusty (or silty) dominated groundmass. Most of the groundmass exhibits moderate staining with amorphous sesquioxides, with about 25–30% being strongly stained. There were also a few irregular aggregates of a dark brown, humic, very fine sandy silty clay loam intermixed with the main fabric. Sample 475 from soil 3090 from the cobbled surface of the same burnt mound complex was similar to sample 474 but the whole groundmass was dominated by striated and weakly reticulate striated pure (10%) and dusty clay (60%) with moderate to strong birefringence.

Sample 726 from buried soil 12865 (BM 2) exhibited a similar fabric to both other samples, with strongly amorphous sesquioxide stained, striated and reticulate pure and dusty clays throughout.

Together these samples suggest that the surviving buried soil beneath both burnt mounds was a well-developed argillic B (or Bt) horizon. There was good and stable soil ped structure, good organisation of the clays and characteristic oriented pure coatings in the groundmass and of the grains, all of which indicate the former presence of a weakly acidic argillic brown earth at this site (Bullock and Murphy 1979; Fedoroff 1968; Kuhn *et al.* 2010). The presence of pure clay coatings integral with the groundmass is suggestive of the former presence of woodland (Macphail 1992), with the predominant fine dusty clays suggesting considerable disturbance of the soil profile. The remainder of the soil profile above is missing (i.e. eluvial Eb and Ah horizons), although there are a few aggregates of a humic A horizon present as aggregates within the argillic Bt horizon of sample of buried soil 2668, which also indicate physical disturbance of the soil profile. The ostensible absence of soil material indicative of the expected overlying soil horizons is most probably related to the construction of the mounds themselves, and the associated truncation and removal of this upper soil material, probably as a consequence of de-turfing.

There was moderate to strong impregnation with amorphous sesquioxides in all of the groundmass component of this buried soil. This could reflect the considerable influence of the groundwater in the past (Lindbo *et al.* 2010) but it may have been caused and/or enhanced by heating effects (Ropke and Dietl 2017). Although there was no direct evidence of burnt soil fragments observed in thin section, and the upper half of the soil profile has been undoubtedly removed through truncation. The strong reddening or rubification caused by heat – anywhere from *c.* 250–800°C – leading to the formation of hematite is possible. There would need to be some other form of direct evidence of burning and burning temperatures to take this suggestion further.

Organic residue analysis of flints and sediments

Julie Dunne and Richard P. Evershed

Lipids, the organic solvent soluble components of living organisms, i.e. the fats, waxes and resins of the natural world, are the most frequently recovered compounds from archaeological contexts (Evershed 1993). They are associated with the major classes of organic remains, namely absorbed residues found in archaeological pottery, soils and sediments, and human, animal and plant remains (Evershed 2008).

Lipid analyses have great potential as a diagnostic tool to investigate subtle differences in soil organic matter caused either by natural changes to soil, such as overlying vegetation changes, or anthropogenic additions caused by human activities (Bergen *et al.* 1997; Bull *et al.* 1999). Several classes of compounds provide evidence for the input of specific organic materials into ancient soils and sediments, including middens, disused watercourses, latrines and cesspits (Bethell *et al.* 1994; Bull and Evershed 2012 and references therein; Bull *et al.* 2002; Bull *et al.* 2003; Evershed and Bethell 1996; Evershed *et al.* 1997a; Lin *et al.* 1978; Shillito *et al.* 2013). Furthermore, the identification of agricultural deposits at archaeological sites, such as manure used to fertilise soils, has also proved valuable in determining land management practices by early farmers. Overall this wide range of biomarkers provides evidence

Table 2.16 Sample information and results: lipid concentrations (μg g^{-1}), total lipid concentration in extract (μg) and $\delta^{13}C$ and $\Delta^{13}C$ values

Sample/ SF no.	Material	Feature	Details	Context	Lipid conc'n (μg g^{-1})	Total lipid (μg)	$\delta^{13}C_{16:0}$	$\delta^{13}C_{18:0}$	$\Delta^{13}C$	Attribution
455	Burnt flints	2932	BM1 pit	2935	–	–	-30.8	-30.3	0.4	Non-ruminant/ ruminant adipose
469	Burnt flints	2921	BM1 pit	3150	–	–	-29.6	-30.6	-1.0	Ruminant adipose
689	Burnt flints	12586	BM2 pit	12587	–	–	-30.2	-29.8	0.4	Non-ruminant/ ruminant adipose
469	'Greasy' soil	2921	BM1 pit	3150	194	500	–	–	–	–
116	Burnt flints	2919	BM1 pit	2920	–	–	-27.6	-27.0	0.6	Non-ruminant adipose
681	Soil	12566	BM2 pit	12567	12.0	63.4	–	–	–	–
709	Soil	12796	BM2 well	12771	30.8	139.6	–	–	–	–
5127	Flint scraper	12694	BM2	12700	–	–	-27.6	-29.0	-1.4	Ruminant adipose
2393	Flint scraper	2693	DBM1 cobbles	3209	–	–	-27.3	-26.9	0.4	Non-ruminant/ ruminant adipose
2383	Flint scraper	3174	BM1	3272	–	–	-27.8	-32.0	-4.2	Dairy fat
2187	Flint scraper	2917	BM1	2973	–	–	-27.8	-33.8	-6.0	Dairy fat

for the input of specific organic materials into ancient soils and sediments, providing understanding of site formation processes and the broader environment.

The analysis comprises material from the two Bronze Age burnt mounds which are both composed of limited buried soils with small cobbles above. However, the majority of the activity is represented by a number of pits with discrete or clear dumps or concentrations of burnt flints within them, including a dense and 'greasy' layer at the base of pit 2921 (see *Geoarchaeology* above). The analysis was undertaken at the Organic Chemistry Unit, School of Chemistry, University of Bristol.

Aims and objectives

The objective of this investigation was to determine whether organic residues were preserved on nine samples of heat-altered flint, nine flint scrapers and a 'greasy' soil deposit found in the two burnt mound complexes. The fills sampled were the more central fills containing the most heat-altered flint and charcoal. Burnt mounds have been suggested to have been associated with cooking activity (O'Kelly 1954), thus here we set out to test the hypothesis that lipids originating from animal carcasses cooked in the pits may be preserved on the burnt flints (in addition to evidence for the processing of hides, see above and Chapter 5). Three control (soil sediment) samples were also analysed, one of which was the 'greasy' layer at the bottom of pit 2921.

Analytical methodology

Lipid analysis and interpretations were performed using established protocols described in detail in earlier publications (Correa-Ascencio and Evershed 2014), adapted to use with burnt flints and flint scrapers. The sediment samples were weighed directly into a furnaced culture tube and the burnt flints/flint scraper samples were placed in a methanolic acid solution and heated for 12 hours to release any lipids present on their surfaces. Following chemical extraction the samples underwent high temperature gas chromatography using a gas chromatograph (GC) fitted with a high temperature nonpolar column (DB1-HT; 100% dimethylpolysiloxane, 15m x 0·32mm i.d., 0.1μm film thickness). The carrier gas was helium and the temperature programme comprised a 50°C isothermal followed by an increase to 350°C at a rate of 10°C min^{-1} followed by a 10 min isothermal. A procedural blank (no sample) was prepared and analysed alongside every batch of samples. Further compound identification was accomplished using gas chromatography-mass spectrometry (GC-MS). Fatty acid methyl esters (FAMEs) were then introduced by autosampler onto a GC-MS fitted with a non-polar column (100% dimethyl polysiloxane stationary phase; 60m x 0.25mm i.d., 0·1μm film thickness). The instrument was a ThermoFinnigan single quadrupole TraceMS run in EI mode (electron energy 70eV, scan time of 0·6s). Samples were run in full scan mode (*m/z* 50–650) and the temperature programme comprised an isothermal hold at 50°C for 2 min, ramping to 300°C at 10°C min^{-1}, followed by an isothermal hold at 300°C (15 min).

Carbon isotope analyses by GC-C-IRMS were also carried out using a GC Agilent Technologies 7890A coupled to an Isoprime 100 (EI, 70eV, three faraday cup collectors *m/z* 44, 45 and 46) via an IsoprimeGC5 combustion interface with a CuO and silver wool reactor maintained at 850°C.

Results

Lipid analysis and interpretations were performed on 21 samples (9 burnt flints, 9 flint scrapers and 3 soil samples), not all of which yielded useable lipid profiles (Table 2.16). The mean lipid concentration from the 'greasy' soil (sample

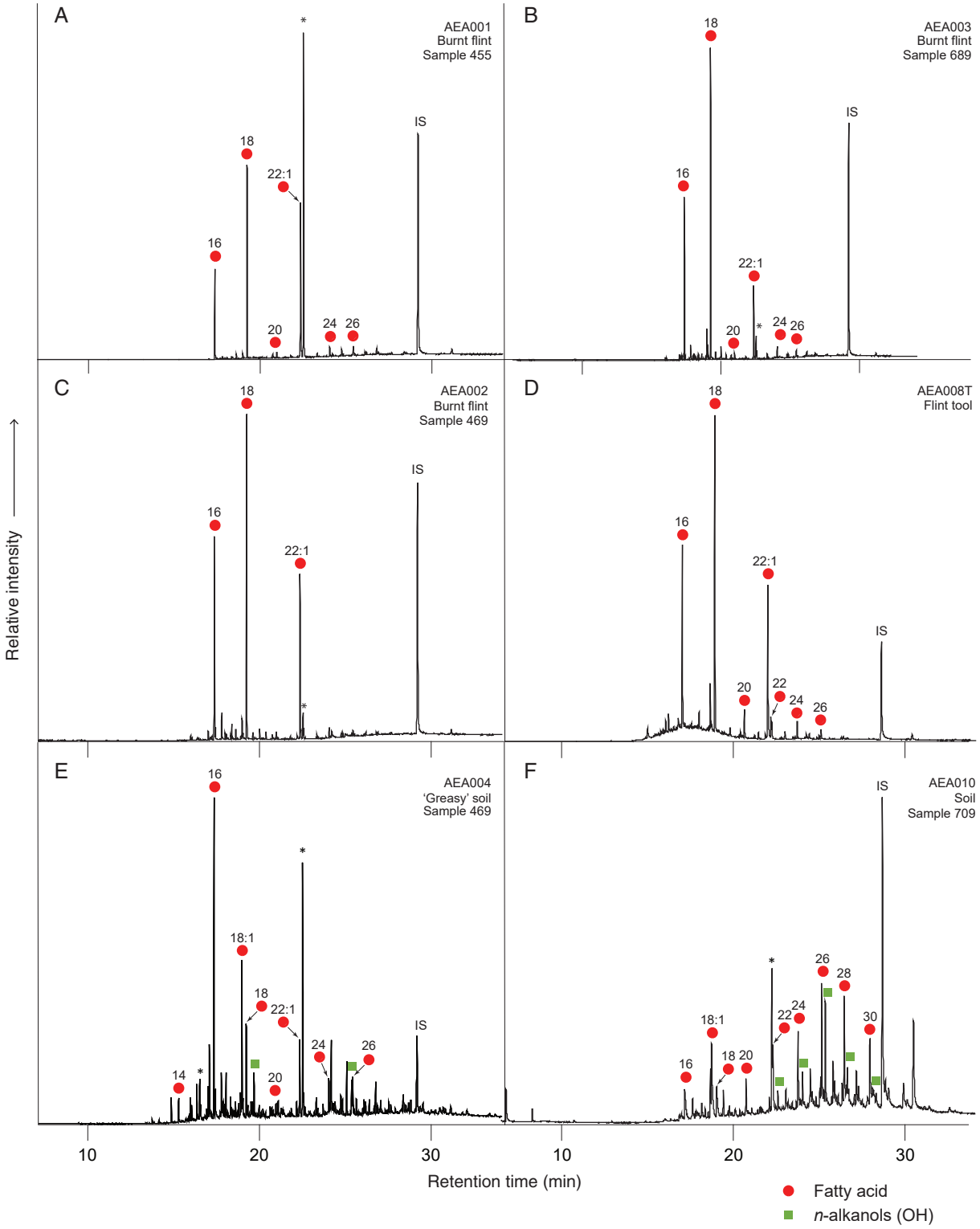


Figure 2.46 Marham Park, Fornham All Saints: partial gas chromatograms of acid-extracted FAMEs from burnt flint, samples 455 (A), 689 (B), 469 (C), a flint scraper 2383 (D), greasy soil sample 469 (E) and soil, sample 709 (F)

469, context 3150 in pit 2921) was 0.194 mg g^{-1}, and for the control soil samples (681 and 709 from pits 12566 and 2769 respectively) 0.012 and 0.030 mg g^{-1} respectively. Lipid concentrations could not be determined for the burnt flint or flint scrapers as these could not be weighed. The burnt flints (samples 455, 469, 689 and 116; Table 2.16; Fig. 2.46) yielded interpretable lipid profiles comprising the free fatty acids, palmitic ($C_{16:0}$) and stearic ($C_{18:0}$), typical of a degraded animal fat (e.g. Evershed *et al.* 1997b). Also present were a series of long-chain fatty acids (LCFAs), in low abundance, containing C_{20} to C_{26} carbon atoms (Fig. 2.46). It is thought these LCFAs probably originated directly from animal fats, incorporated via routing from the plant diet of a ruminant animal (Halmemies-Beauchet-Filleau *et al.* 2013, 2014). Analysis of burnt flints from the remaining pits (2976, 3147, 3165 from BM 1; 12779 and 12795, BM 2) did not yield usable lipid profiles, due either to low abundances of lipids or to the presence of plasticisers.

The presence of an unsaturated fatty acid $C_{22:1}$ in each of these samples is somewhat unusual. It was often present in high abundance in the lipid profile, eluting next to a plasticiser.

Interestingly, radish oil (and other oil of the Brassicaceae) contains high abundances of $C_{22:1\Delta13}$, and to a lesser extent $C_{20:1\Delta11}$ and $C_{24:1\Delta15}$. These other compounds were not, however, present in the extracts, and the farmer has confirmed that rape (a common Brassicaceae crop) was not cultivated in this area. Plasticiser was also present in all samples, in varying abundances, probably due to their storage in plastic bags.

The 'greasy' soil sample lipid profile from sample 469 from pit 2921 (Fig. 2.46E) was complex, comprising a mixture of saturated and unsaturated fatty acids, dominated by the $C_{16:0}$ and $C_{18:0}$ fatty acids, together with plasticisers. It should be noted that the dominance of these fatty acids in the 'greasy' soil sample may be indicative of an animal product origin. This lipid profile appears to be an amalgamation of both typical animal product and soil profiles.

Lipids were present in low abundance in both soil samples from a probable trough, pit 12566 (sample 681) and well 12769 (sample 709, Fig. 2.46F) with the lipid profile of the sample from pit 12566 comprising a series of long-chain fatty acids and *n*-alkanols. These fatty acid compounds are not diagnostic and cannot be attributed to any particular source but probably arose from plant or animal matter present in the local environment. In short, these are typical soil lipid distributions. Similar classes of compounds have been widely detected in soils and reflect contributions from terrestrial vegetation (Bergen *et al.* 1997; Bull *et al.* 2000).

GC-C-IRMS analysis was carried out on four burnt flint samples, 455, 469, 689 (Fig. 2.47) and 116, and four flint scraper samples, 5127, 2392, 2382 (Fig. 2.47) and 2187, to determine the $\delta^{13}C$ values of the major fatty acids, $C_{16:0}$ and $C_{18:0}$, and ascertain the source of the lipids extracted, through the use of the $\Delta^{13}C$ proxy (Table 2.16; Fig. 2.47).

The $\delta^{13}C$ values of the $C_{16:0}$ and $C_{18:0}$ fatty acids from the eight burnt flint and flint scraper samples are plotted onto a scatter plot along with the reference animal fat ellipses (Fig. 2.47A). It has been established that when an extract from a ceramic vessel plots directly within an ellipse, for example, ruminant dairy, ruminant adipose or non-ruminant adipose, then it can be attributed to that specific source. If it plots just outside, then it can be described as predominantly of that particular origin. However, it should be noted that extracts commonly plot between reference animal fat ellipses and along the theoretical mixing curves, suggesting either the mixing of animal fats contemporaneously or during the lifetime of use of the vessel (Mukherjee *et al.* 2005).

Here, three of the burnt flint samples plot just outside the ruminant adipose ellipse (455, 469 and 689, Fig. 2.47A), suggesting the processing of ruminant animal products with possible minor mixing of non-ruminant carcass products. This indicates that the lipids originated from animal products produced by the cooking/processing of mainly ruminants such as cattle, sheep or goat in the pits, with possibly the occasional pig. The remaining burnt flint sample (116, Fig. 2.47A) again plots between the ruminant and non-ruminant adipose ellipse, but much more closely to the non-ruminant adipose ellipse, suggesting that primarily non-ruminants were cooked/processed in that area. The $\Delta^{13}C$ values of -0.4 ‰, -0.4 ‰ and 0.6 ‰ for burnt flint samples 455, 689 and 116, respectively, suggest the mixing of non-ruminant and ruminant products in these pits with a predominance of pig processing (Fig. 2.47B) whereas, in contrast, burnt flint sample 469 ($\Delta^{13}C$ value of -1.0 ‰) plots within the ruminant adipose field, but on the border, suggesting some mixing with non-ruminant products. In summary, stable carbon isotope values from the burnt flint samples suggest that these pits were used for animal product processing, probably animal carcasses.

Four flint scraper samples yielded interpretable lipid profiles, similar to the burnt flint profiles, and were therefore taken forward for isotopic analyses. It should be noted that, after excavation, these were minimally handled to reduce contamination as far as possible. One of the flint scraper samples plots on the border of the dairy ellipse (Ra 2187) and another (Ra 2383) plots close to the border. Two further flint scraper samples (Ra 5127 and Ra 2393) plot between the non-ruminant and ruminant ellipses. These data all suggest some mixing of animal products.

The $\Delta^{13}C$ values of -4.2 ‰ and -6.0 ‰ for flint scraper samples 2383 and 2187 plot firmly within the dairy region, suggesting these tools probably came into contact with dairy products.

The $\Delta^{13}C$ values of 5127 and 2393 respectively are -1.4 ‰ and 0.4 ‰, suggesting 5127 was used to process ruminant meat or hide products and 2393 was similarly used to process non-ruminant carcass or hide products. It seems likely that the flint tools which plot in the carcass product range may have been used as scrapers to deflesh

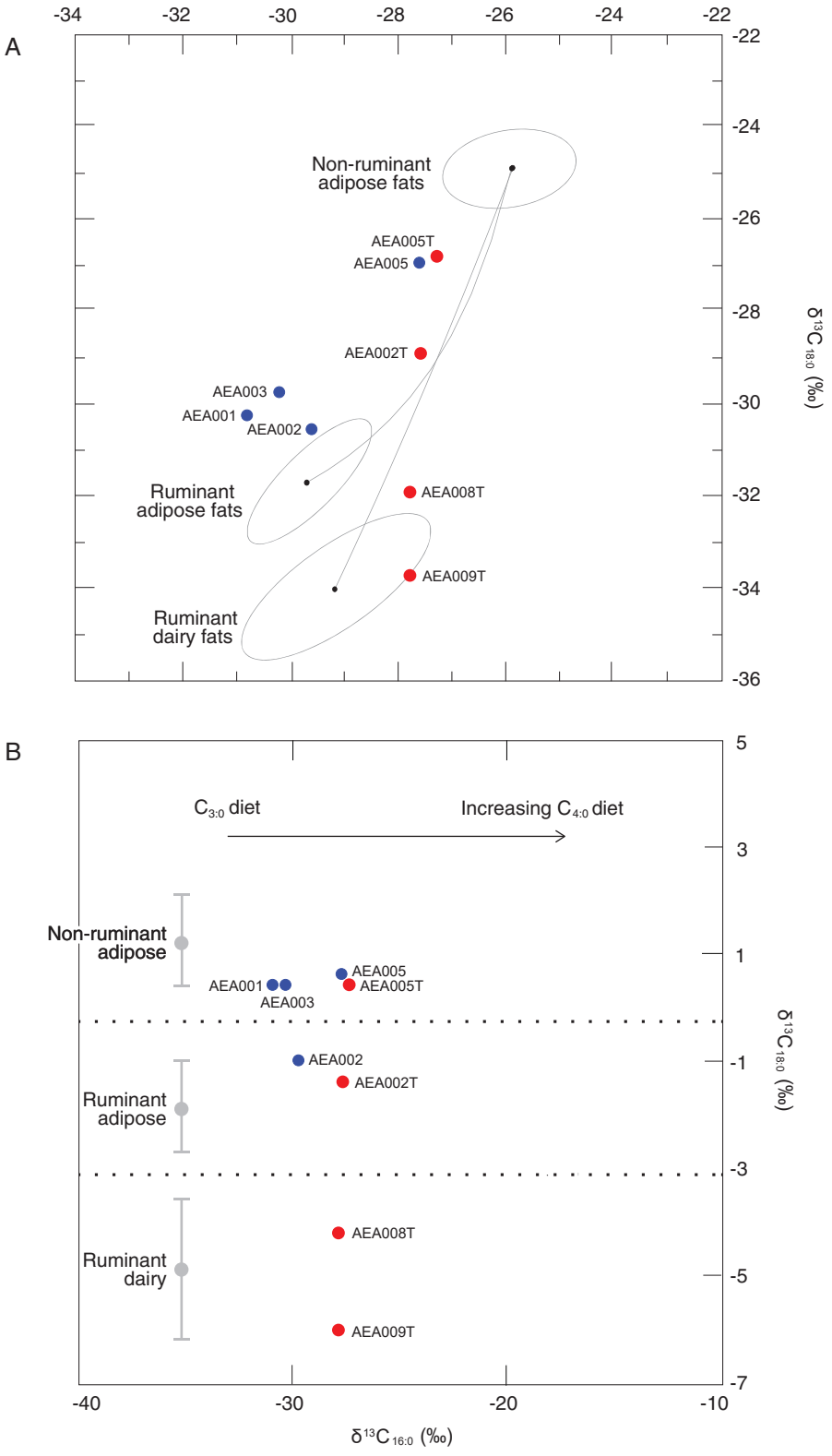


Figure 2.47 Marham Park, Fornham All Saints: $\delta^{13}C$ values for the $C_{16:0}$ and $C_{18:0}$ fatty acids for archaeological fats from four burnt flint and flint scrapers from pits (A). (The three fields correspond to the P = 0.684 confidence ellipses for animals raised on a strict C_3 diet in Britain (Copley et al. *2003). Each data point represents an individual sample of burnt flints). $\Delta^{13}C$ ($\delta^{13}C_{18:0} - \delta^{13}C_{16:0}$) values from the same samples (B). (The ranges shown here represent the mean ± 1 s.d. of the $\Delta^{13}C$ values for a global database comprising modern reference animal fats from Africa (Dunne* et al. *2012), UK (animals raised on a pure C_3 diet) (Dudd and Evershed 1998), Kazakhstan (Outram* et al. *2009), Switzerland (Spangenberg* et al. *2006) and the Near East (Gregg* et al. *2009))*

and soften animal hides. Those with dairy product profiles, however, seem anomalous, unless the scrapers were used in conjunction with some form of butter, used as a grease to help soften hides.

However, the data from the lipid residue results from the flint scrapers should be interpreted with a large caveat. The $\Delta^{13}C$ proxy is used to determine ruminant and non-ruminant product processing from absorbed lipid residues extracted from ceramic vessels. This is obviously a different sample matrix and, to our knowledge, isotopic analyses of lipid residues adhering to stone tools has not been undertaken before. Experimental analysis on defleshing and softening hides using flint tools would be required to confirm these results. It should also be noted that while handling was kept to a minimum, the flint tools may well have been exposed to contaminants within the burial environment.

Discussion

The objective of the investigation was to determine whether organic residues were preserved on the surface of burnt flints and a selection of flint scrapers associated with the two Bronze Age burnt mound sites. A sample of 'greasy' soil from the base of one of the pits and two control (soil) samples were also analysed. The principal objectives were to see if the flint scrapers were associated with hide working and what type of animals (ruminant vs non-ruminants) these might be. Likewise did the heat-altered flint in the burnt mound complexes have similar evidence or was there evidence of processing of different materials, and did the two burnt mounds differ?

Interestingly all four burnt flint samples from the pits provided clear lipid profiles, dominated by the $C_{16:0}$ and $C_{18:0}$ fatty acids, typically indicative of degraded animal product processing. These lipid profiles closely resemble those typically extracted from archaeological pottery used to process animal products. It should also be emphasised that these lipid profiles (Fig. 2.46A, B, C) differ significantly from 'typical' soil lipid profiles (as seen in Figure 2.46F, sample 709) which display much broader distributions of characteristic lipids. The lipid profile from the dark brown greasy layer at the base of pit 2921 also differs from that of a typical soil profile, in that the $C_{16:0}$ and $C_{18:0}$ fatty acids are also present in high abundance in addition to typical soil lipids. This suggests the addition of animal products (possibly originating from 'industrial' use), which have migrated downwards over the burnt flints and become absorbed into the soil at the base of the pit, producing a 'greasy' or fat-rich soil. Furthermore the low lipid concentration of the other control soil samples does not suggest any contribution from animal products processing.

Stable carbon isotope results from these burnt flint profiles, determined from GC, GC-MS and GC-C-IRMS analyses, provide evidence of semi-industrial or craft activity in these pits, probably through the processing of animal carcasses, likely meat products, ruminant and/or non-ruminant (see Chapter 5). Of these, three burnt flint samples came from pits associated with BM 1 (2932, 2921 and 2919) and one from mound complex 2 (pit 12586). Of the three burnt flint samples from mound complex 1, the $\delta^{13}C$ values from extract sample 469 (pit 2921) suggests this pit was used to process solely ruminant products (cattle, sheep or goat), whereas the $\delta^{13}C$ values of sample 455 (pit 2932) and sample 116 (pit 2919) suggest that both ruminant and non-ruminant (pigs) were processed in these two pits. The $\delta^{13}C$ values of lipid extract from mound complex BM 2, pit 12586, suggest this pit was similarly used to process both ruminant and non-ruminant animals.

Interpretable lipid profiles were recovered from the 'middle of fill' for three burnt flint samples (455, 469 and 116). The remaining sample, 689, which yielded an interpretable lipid profile, originated from the bulk of the fill (exact location not known). It is expected that lipid abundance would be highest at the top of the fill, where they first adhere to the burnt flints, decreasing at distance from the lipid source. The presence of lipids, however, in the 'greasy' soil at the base of pit 2921 suggests considerable migration of animal products through the pit profile. This may suggest 'industrial' and/or sustained use over a period of time.

Analysis of burnt flints from the remaining pits (2976, 3147, 3165; BM 1) and (12779 and 12795; BM 2) did not yield usable lipid profiles, either due to low abundances of lipids or the presence of plasticisers, although they were generally similar to those that could be taken forward for stable carbon isotope analysis. Together these lines of evidence suggest that pits from both mound complexes were used for semi-industrial processing of animal products. However, as only one sample (and thus one pit) from BM 2 yielded an interpretable lipid profile, it is difficult to make meaningful comparisons between the two mounds.

Stable carbon isotope analyses of possible lipid residues adhering to stone scrapers suggested four tools may have been used to process, or come into contact, with animal products, possibly in the form of scrapers (see *Lithic microwear analysis* Donahue above).

The presence of the unsaturated fatty acid, $C_{22:1}$, in the samples, often in quite high abundance, is not understood as it does not appear to originate from Brassicaceae products (where it is commonly found). It may be that this compound is a modern contaminant. Future work could include radiocarbon dating of this unsaturated fatty acid (using a compound specific approach), which would establish its provenance (Casanova *et al.* 2018). In summary, these data confirm the hypothesis that these pits were probably used for a semi-industrial function, that of processing/cooking animal products, both ruminants (cattle, sheep or goat) and non-ruminants (pig) on various occasions.

Discussion and conclusions

Michael J. Allen

The analyses aimed to shed light on the processes associated with the two burnt mound complexes, and upon the greasy deposits seen in a number of pits, e.g. pit 2921 (context 3150) and pit 2924 (see above, BM 1 pits).

Table 2.17 Samples examined for lipids from the two burnt mound complexes

Burnt mound complex	BM1	BM2
Burnt flints	3	1
Flint tools	3	1
'Greasy' soil	1	–
Soil/control	–	2

Table 2.18 Contributing fatty acids from the two burnt mound complexes

Burnt mound complex	BM1	BM2
Ruminant	1	1
Non-ruminant/ruminant	3	1
Dairy fat	2	–
Terrestrial vegetation	–	2
No attribution	1	2

Key questions involved the function of the burnt mound complexes and the heat-altered flints, the origin of the greasy deposits and the potential for hide working on the flint tools, especially the scrapers (Table 2.17).

The burnt mound complexes themselves contained heat-altered flints and charcoal but the soil micromorphology from the soil beneath them (French) has no evidence of burning *in situ* or of great heat at the locations sampled. The heat-altered flints (and charcoal) may have been deposited as cooled flints, rather than being burnt/heated *in situ*. There has, however, been disturbance and truncation, but the sample points are under the burnt flints. Truncation may have removed the thin skin of soil that is heat affected (cf. Canti and Linford 2000) but the fact there is no presence of burnt soil relicts is suggestive of the lack of *in situ* fire and burning beneath the 'burnt mound' complexes.

The greasy soil (3150) in pit 2921 clearly contained animal products, while the samples generally showed the presence of four specific fatty acids: ruminant, non-ruminant/ruminant, dairy fat and the possibility of plant fatty acids (Table 2.18).

We can, therefore, be sure of the presence of processing of animal fats (ruminant and possibly non-ruminant) and possibly animal hides but the evidence may include other animal elements and plant matter (Table 2.18, see also *Lithic microwear analysis* Donahue above) associated with the flint scrapers, the heat-altered flints and deposits associated with the burnt mounds and pits, a point returned to in Chapter 5. Further, the associated pits may have been more than just receptacles for the discard of material (heat-altered flints, tools and soiled soil) but may have been integrally related to this activity. The fact they clearly held water – whether permanent or seasonal is not clearly defined – may also be an important factor in the process.

Radiocarbon and chronological modelling

Derek Hamilton

Introduction

Seventeen samples were processed for radiocarbon dating by accelerator mass spectrometry (AMS), eleven of which were from features of the Beaker and Early Bronze Age periods (see Hamilton 2023). The samples consisted of single entities (Ashmore 1999) of charcoal, charred grains and nutshells, and a sample of cremated bone. They were submitted to the Scottish Universities Environmental Research Centre (SUERC), East Kilbride, where they were pretreated and measured as described by Dunbar *et al.* (2016).

The SUERC lab maintains rigorous internal quality assurance procedures and participation in international intercomparisons (Scott 2003; Scott *et al.* 2010) indicates no laboratory offsets, thus validating the measurement precision quoted for the radiocarbon ages.

The results are presented (Table 2.19) as conventional radiocarbon ages (Stuiver and Polach 1977). They have been calibrated using the internationally agreed terrestrial calibration curve (IntCal20) of Reimer *et al.* (2020) and the OxCal v4.4 computer program (Bronk Ramsey 2009). Simple calibrated results are presented at 95% probability intervals (unless otherwise noted) in plain text and rounded outward to ten years. The *italicised* dates presented in the text below are posterior density estimates derived from mathematical modelling of archaeological problems and have been rounded outward to five years. These dates can change with the addition of new data or when the modelling choices are varied.

Methodological approach

A Bayesian approach (Buck *et al.* 1996) has been applied to the interpretation of the chronology of some of the archaeological activity at Marham Park. Although simple calibrated dates are accurate estimates of the radiocarbon age of samples, it is the dates of the archaeological events represented by those samples that are usually of interest – for example, the start and end of activity at the burnt mound sites. The chronology of this activity can be estimated not only by using the absolute dating derived from the radiocarbon measurements but also by using stratigraphic relationships between samples and the relative dating information provided by the archaeological phasing.

The methodology used here allows the combination of these different types of information explicitly to produce realistic estimates of the dates of archaeological interest. The posterior density estimates produced by this modelling are not absolute, rather they are interpretative estimates, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives. The technique used is a form of Markov Chain Monte Carlo sampling and has been applied

Table 2.19 Radiocarbon results from Marham Park, FAS 056

Lab ID	Sample ID	Context	Period	Cut/ deposit	Context description	Feature	Charred material dated	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Rounded calibrated date BC (95% probability)	Calibrated date BC (95.4% probability)	Calibrated date BC (68.2% probability)
SUERC-93340	<109>	2747	Early Neolithic	2746	Fill of pit	–	Hazel nutshell (*Corylus avellana*)	-20.9	4737 ±21	3630–3380	3634–3556 (58.0%) 3540–3507 (19.3%) 3426–3381 (18.1%)	3631–3579 (47.4%) 3535–3517 (14.8%) 3396–3386 (6.0%)
SUERC-93346	<303>	5346	Early Neolithic	5345	Fill of pit	–	Hazel nutshell (*Corylus avellana*)	-23.3	4801 ±25	3650–3520	3646–3626 (19.5%) 3598–3526 (75.9%)	3640–3631 (13.4%) 3578–3574 (4.8%) 3566–3536 (50.0%)
SUERC-93345	<144>	3085	Beaker	2917	First infill layer of mound, SE quadrant	BM1	Hazel nutshell (*Corylus avellana*)	-24.9	3624 ±23	2120–1890	2113–2101 (1.8%) 2036–1916 (93.6%)	2022–1952 (68.2%)
SUERC-93347	<467>	2957	Beaker	2921	Fill of pit/trough	BM1	Wood: unident	-25.1	3781 ±24	2290–2130	2287–2140 (95.4%)	2278–2251 (21.4%) 2299–2222 (4.6%) 2211–2194 (14.6%) 2176–2144 (27.6%)
SUERC-93348	<472>	3171	Beaker	3170	Fill of pit	BM1	Hazel nutshell (*Corylus avellana*)	-25.0	3739 ±24	2280–2030	2267–2261 (0.7%) 2206–2116 (65.4%) 2109–2038 (29.3%)	2199–2161 (36.6%) 2153–2133 (17.4%) 2081–2061 (14.2%)
SUERC-93349	<478>	3245	Beaker	3244	Fill of pit (early)	BM1	Wood: hazel (*Corylus avellana*)	-25.8	3794 ±21	2300–2140	2291–2193 (78.6%) 2177–2143 (16.8%)	2283–2248 (33.2%) 2233–2199 (29.0%) 2161–2153 (6.0%)
SUERC-93354	<602>	12011	Beaker	12010	Fill of pit	Pit Group 4	Hazel nutshell (*Corylus avellana*)	-24.0	3677 ±23	2140–1970	2140–2011 (87.7%) 2001–1977 (7.7%)	2132–2085 (43.6%) 2056–2026 (24.6%)
SUERC-93355	<610>	12199	Beaker	12198	Fill of pit	Pit Group 3	Hazel nutshell (*Corylus avellana*)	-21.2	3703 ±23	2200–1980	2196–2171 (6.1%) 2146–2027 (89.3%)	2136–2119 (15.5%) 2096–2040 (52.7%)
SUERC-93357	<650>	12364	Beaker	12363	Fill of pit/posthole	Structure 2	Hazel nutshell (*Corylus avellana*)	-25.2	3664 ±23	2140–1950	2135–2078 (38.0%) 2072–2070 (0.5%) 2065–1959 (57.0%)	2126–2091 (30.7%) 2044–2016 (25.4%) 1996–1980 (12.1%)
SUERC-93359	<703>	12721	Early Bronze Age	12719	Third infill of BM2, southern quadrant	BM2	Wood: hazel (*Corylus avellana*)	-26.3	3459 ±19	1880–1690	1879–1838 (26.0%) 1830–1792 (14.2%) 1786–1733 (42.2%) 1719–1694 (13.0%)	1870–1846 (20.2%) 1810–1804 (3.6%) 1776–1741 (36.3%) 1711–1700 (8.1%)
SUERC-93365	<717>	12778	Early Bronze Age	12776	Hollow	BM2	Wood: hazel (*Corylus avellana*)	-26.9	3424 ±23	1870–1630	1870–1846 (4.3%) 1775–1658 (91.1%)	1746–1691 (68.2%)
SUERC-93360	<709>	12771	Early Bronze Age	12769	Upper fill/infill of well	BM2	Wood: *prunus* sp.	-24.3	3020 ±25	1390–1200	1388–1339 (16.7%) 1316–1194 (77.9%) 1141–1134 (0.9%)	1368–1363 (2.7%) 1292–1220 (65.5%)
SUERC-93364	<710>	12770	Early Bronze Age	12769	Upper fill of well	BM2	Wood: Maloideae	-24.8	3066 ±23	1420–1260	1406–1265 (95.4%)	1389–1338 (40.6%) 1321–1286 (27.6%)
SUERC-93358	<653>	12439	Middle Bronze Age	12577	Fill of ditch	Enclosure 2	Cereal grain	-27.2	3134 ±23	1450–1310	1492–1482 (1.6%) 1454–1378 (78.3%) 1343–1306 (15.5%)	1436–1394 (65.0%) 1332–1328 (3.2%)
SUERC-93356	<628>	12273	Middle Bronze Age	12271	Burial in cremation group		Cremated human bone	-18.9	3088 ±21	1430–1280	1415–1288 (95.4%)	1407–1377 (26.7%) 1346–1304 (41.5%)
SUERC-93350	<504>	11042	Middle Bronze Age	11049	Secondary fill of ditch	Enclosure 1	Hazel nutshell (*Corylus avellana*)	-29.3	3078 ±23	1420–1260	1412–1278 (95.4%)	1396–1373 (19.2%) 1358–1300 (49.0%)
SUERC-93344	<132>	3033	Unphased	2704	Residual material in infill layer (SE quadrant)	BM1	Wood: unident	-24.8	6383 ±23	5740–5310	5466–5404 (24.0%) 5386–5314 (71.4%)	5459–3453 (4.0%) 5376–5319 (64.2%)

using the program OxCal v4.4 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available in Bronk Ramsey (1995; 1998; 2001; 2009) or from the online manual. The algorithm used in the models can be derived from the OxCal keywords and bracket structure shown in Figure 2.48A.

Samples and models

The submitted samples come from contexts associated with two burnt mound sites, a cremation, and various pits, ditches and postholes containing prehistoric pottery sherds.

Burnt Mound 1

Five samples were dated from pit and layer contexts associated with the Beaker period BM 1, four of which produced relevant dates. There is a dated sample (SUERC-93349) of hazel charcoal from fill (3245) of posthole 3244. This was overlaid by cobbles on the burnt mound proper, above which there are dated samples (SUERC-93347–8) on unidentified wood charcoal and a charred hazel nutshell from the fills of pits 2921 and 3170 respectively. These pits were sealed by a black charcoal-rich layer, 2917, from which there is a date (SUERC-93345) on a charred hazel nutshell from context 3085. Above this a second date (SUERC-93344) was obtained from another charred hazel nutshell in layer 2704 (context 3033); this, however, dates to the Mesolithic period and as it is residual in this context it has been excluded from all further modelling.

Burnt Mound 2

Four samples were dated from contexts associated with Early Bronze Age BM 2. Three of the samples dated are from cut features. SUERC-93365 is from a fragment of hazel charcoal in the fill (12778) of pit 12776, while well 12769 produced two results (SUERC-93364 and -93360) on fragments of Prunoideae and *Prunus* sp. charcoal from fills 12770 and 12771, respectively. Fill 12771 is stratigraphically later in the sequence. Overlying these features was layer 12719, the third fill of the six layers infilling the hollow within which the mound lay, from which a fragment of hazel charcoal was dated from context 12721 (SUERC-93359). The dates from the material sealed in well 12769 are approximately 400 radiocarbon years more recent than the other two results, suggesting pit 12776 and potentially the material in the burnt mound deposits are related to a different period of activity.

There are a number of possible scenarios but broadly these can be viewed as placing the BM 2 activity either temporally with well 12769 or pit 12776. Either 1) pit 12776 and BM 2 activity occurred and nearly a half millennium later well 12769 was dug near the edge of the burnt mound, which subsequently slumped to cover the well; or 2) pit 12776 activity took place and nearly a half millennium later well 12769 and BM 2 activity occurred, with the single result from the burnt mound being residual material from the earlier activity in the area.

The current level of dating makes it impossible to use that information to disentangle the relationships and so it is necessary to rely on the excavation record to tease the relationships apart. Overall, as discussed above, the first scenario is favoured, based on the small assemblage of Biconical Urn from 12779, another well associated with BM 2.

Other dates

The remaining eight radiocarbon results are derived from material in the fills of pits, postholes, ditches and a cremation burial, including two dates from Early Neolithic features. Except for the cremation burial, these results all have associated prehistoric pottery. Additionally some of the features within the two burnt mound sites contained pottery and so the relevant dates have been cross-referenced into the modelling for the pottery typologies.

There are three further dates associated with Beaker pottery: single charred hazel nutshells (SUERC-93354–5 and -93357) were dated from pit 12010 and two pit/postholes (12198 and 12363), respectively.

In addition to the Middle Bronze Age dates from well 12769 in BM 2, three further features were dated to the period: cremation burial 12273 in grave 12271 (SUERC-93356) and two others associated with pottery that is typical of the Middle Bronze Age. Fill 11042 in ditch 11049 (Enclosure 1) was dated (SUERC-93350) with a charred hazel nutshell, and a charred cereal grain from the fill (12439) in ditch 12577 (Enclosure 2) was dated (SUERC-93358).

Results

The chronological model has good agreement (Amodel=61) between the radiocarbon dates, stratigraphic observations and ceramic typological phasing. Only one result has an individual agreement below the usually accepted threshold of 60 (SUERC-93345). The dated hazel nutshell was recovered from an upper layer in the burnt mound deposits, and it is slightly later than the remainder of the underlying material. As a result of its position and the often loose nature of the stones that form much of the burnt mound layers, it is possible this sample is intrusive in the context, although the fill is one of the infilling layers and may be expected to have post-dated the main period of activity at BM 1. The model had converged on an answer with an overall agreement above 60, and so this result has been maintained and is simply highlighted here as providing potentially further information about the taphonomy of the mound and human activity in the area.

Burnt Mound 1

The model estimates BM 1 activity began in *2415–2130 cal BC at 95% probability* (Fig. 2.48A; *start: Burnt Mound 1, Marham Park*), and probably in *2245–2140 cal BC at 68% probability*. The dated activity ended in *2145–1855*

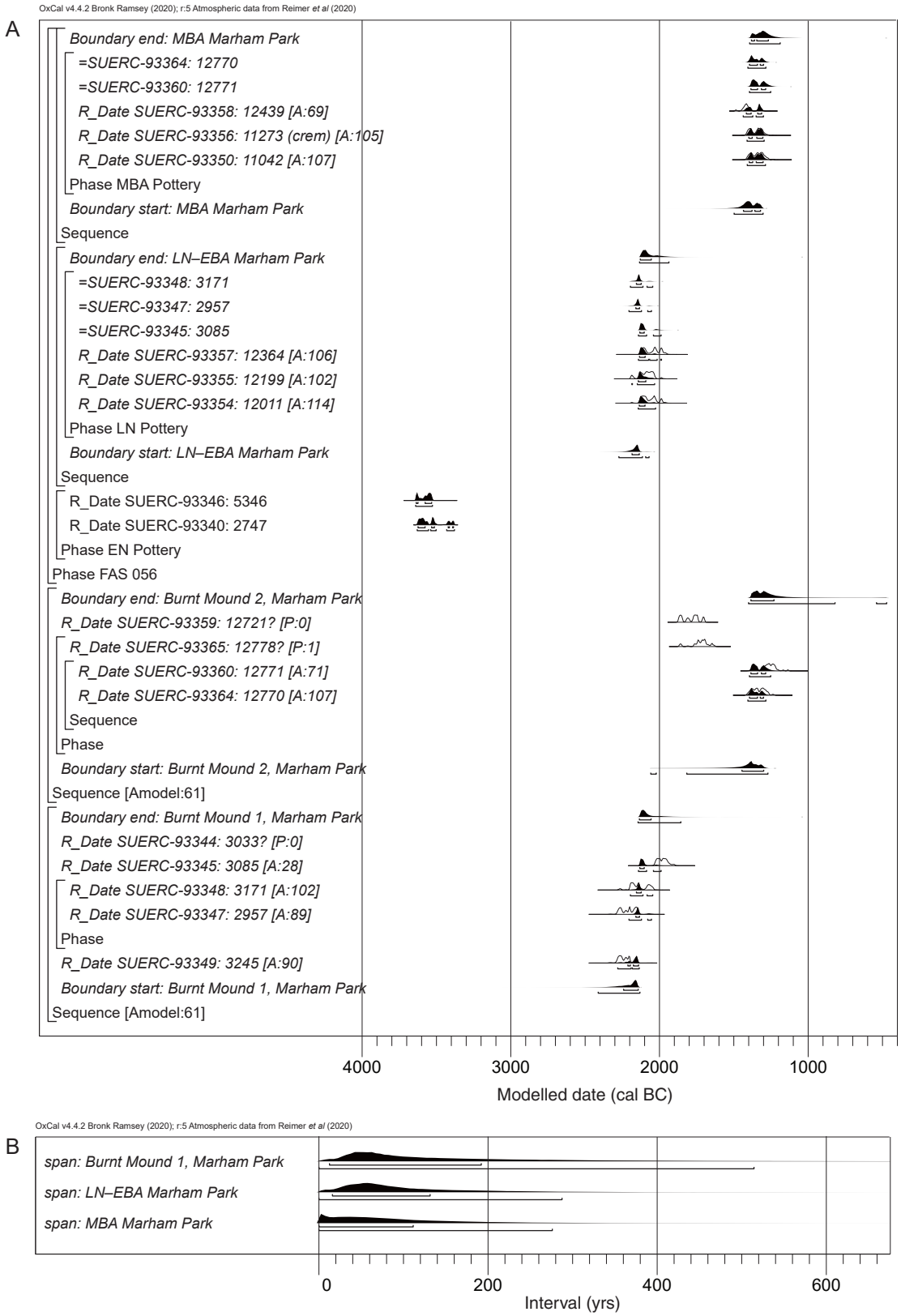


Figure 2.48 Marham Park, Fornham All Saints: chronological model for activity at Marham Park (A). (Each distribution represents the relative probability that an event occurred at some particular time. For each radiocarbon measurement, the outline distribution is the result of simple radiocarbon calibration, and the solid is based on the chronological model. Other distributions correspond to estimated dates based on the model. The large square 'brackets' with the OxCal keywords define the overall model exactly). Spans of the activity modelled at Marham Park (B)

cal BC at 95% probability (Fig. 2.48A; *end: Burnt Mound 1, Marham Park*), and probably in *2140–2055 cal BC at 68% probability*. The overall span of dated activity at BM 1 was *1–515 years at 95% probability* (Fig. 2.48B; *span: Burnt Mound 1, Marham Park*) and probably *10–195 years at 68% probability*.

Burnt Mound 2

Since the four results from the three dated features in the BM 2 group come from two discrete chronological periods, with two dates coming from each, they have not been modelled together. The results in the sequence in well 12776 have been placed in a sequence, so that their relative position can inform on the dating from that specific feature. The result is that the lower sample dates to *1410–1285 cal BC* (*95% probability*; Fig. 2.48A; *SUERC-93364*) and the upper sample dates to *1400–1250 cal BC* (*95% probability*; Fig. 2.48A; *SUERC-93360*), dating the well to a period in the 14th–mid 13th century cal BC. The fill in pit 12776 dates to *1870–1630 cal BC* (*95% probability*; Table 2.19; *SUERC-93365*), while the sample from the burnt mound fills dates to *1880–1690 cal BC* (*95% probability*; Table 2.19; *SUERC-93359*).

Beaker

The model for the chronology associated with the Beaker pottery at Marham Park – with an assumption that the Beaker pits and Structure 2 were of the same general phase of activity as BM 1 – estimates the use and deposition of this pottery began in either *2275–2115 cal BC* (*94% probability*; Fig. 2.48A; *start: Beaker Marham Park*) or *2095–2070 cal BC* (*1% probability*) and probably in *2185–2135 cal BC* (*68% probability*). The dated activity ended in *2135–1935 cal BC* (*95% probability*; Fig. 2.48A; *end: Beaker Marham Park*) and probably in *2130–2055 cal BC* (*68% probability*). The overall span of dated deposition of this pottery was *1–290 years* (*95% probability;* Fig. 2.48B; *span: LN–EBA Marham Park*) and probably *15–135 years* (*68% probability*).

Middle Bronze Age

The model for the chronology associated with the Middle Bronze Age pottery and the cremation burial at Marham Park estimates the activity and deposition of this pottery began in *1500–1300 cal BC* (*95% probability*; Fig. 2.48A; *start: MBA Marham Park*) and probably in either *1440–1375 cal BC* (*45% probability*) or *1360–1320 cal BC* (*23% probability*). The dated activity ended in *1395–1185 cal BC* (*95% probability*; Fig. 2.48A; *end: MBA Marham Park*) and probably in either *1385–1360 cal BC* (*11% probability*) or *1350–1265 cal BC* (*57% probability*). The overall span of dated activity in this period was *1–280 years* (*95% probability*; Fig. 2.48; *span: MBA Marham Park*) and probably *1–115 years* (*68% probability*).

Chapter 3
Laxfield

Abby Antrobus and Chris Fern

Introduction

Overview

This chapter provides an overall summary of the site sequence from the excavations at Laxfield, followed by details of the Bronze Age archaeological remains. Selected summary finds reports are presented where they relate to understanding the burnt mound recorded at the site. These include heat-altered stone (Michael Green), worked flint (Michael Green) and Bronze Age pottery (Stephen Benfield). The environmental evidence relating to the burnt mound and its landscape follows, including animal bone (Andy Clarke), charred plant remains (Anna West), geoarchaeological analysis (Keith Wilkinson), waterlogged plant remains (Sarah F. Wyles), pollen (Michael J. Grant) and radiocarbon dating (Sarah Cobain). Lipid analysis was carried out on samples of heat-altered stone, although there were limited results (Dunne *et al.* 2024). Full details of evidence from the site can be found in the archive report (Fern 2024) and in the site archive, which includes full catalogues of the material.

Project background

Two excavation areas were opened in October 2021 at the western end of the village of Laxfield (centred NGR 629054 272080), in advance of a residential development with the planning reference DC/19/02312 (Fig. 3.1). The work was undertaken by Cotswold Archaeology and was funded by Denbury Homes Ltd. The project was facilitated and overseen by Myk Flitcroft of RPS Consulting and specified and monitored by Rachael Abraham of Suffolk County Council Archaeological Service.

The site was subject to desk-based assessment (Newman 2019) and trial-trenched evaluation (Cuthbert 2021). The evaluation informed the location of the excavation areas within the wider 4.2ha development; these were placed to further investigate the archaeological features of prehistoric date which were revealed. Area 1 was *c.* 0.2ha in extent, and Area 2 was *c.* 0.6ha (Fig. 3.2). Full details of the methodology can be found in the site report (Fern 2024). Metal detecting was undertaken throughout. The site was allocated code LXD 135 by the Suffolk Historic Environment Record (HER).

Location, topography and geology

The site was situated on the edge of the clay upland above a tributary of the River Blyth. It was located to the south of Framlingham Road, in a single field of arable land *c.* 0.55km from the centre of the village and it was shown as an orchard on the 1981 OS map (Newman 2019). The site geology (Fig. 3.2) is characterised by superficial deposits of Lowestoft Formation (Diamicton) with underlying Crag Group (sands) bedrock (BGS 2025). The land was relatively flat at 55–57m above Ordnance datum (AOD) with a stream, a tributary of the River Blyth, running west–east *c.* 400m to the north; this stream, washing the flint out of the diamicton, was probably the source for the raw material used at the mound complex. Lower parts of the site became heavily flooded during the evaluation in December to January 2021, and again during the excavation phase.

Archaeological context

Archaeological discoveries made in the vicinity of the site that are captured in the Suffolk HER are shown in Figure 3.3 and are labelled where mentioned in the text. The only previous evidence for prehistoric activity in the vicinity of the site was a single Bronze Age worked flint found as a surface find 530m to the north of the site (HER LXD 078). Scatters of Roman pottery were recorded 200–900m to the east and south-east (LXD 024–026 and LXD 031).

Site sequence

Early to Middle Bronze Age (1950–1150 BC)

The remains of a burnt mound complex formed the focus of Area 1 (Fig. 3.4). There were few traces of the mound itself



Figure 3.1 Framlingham Road, Laxfield: site location

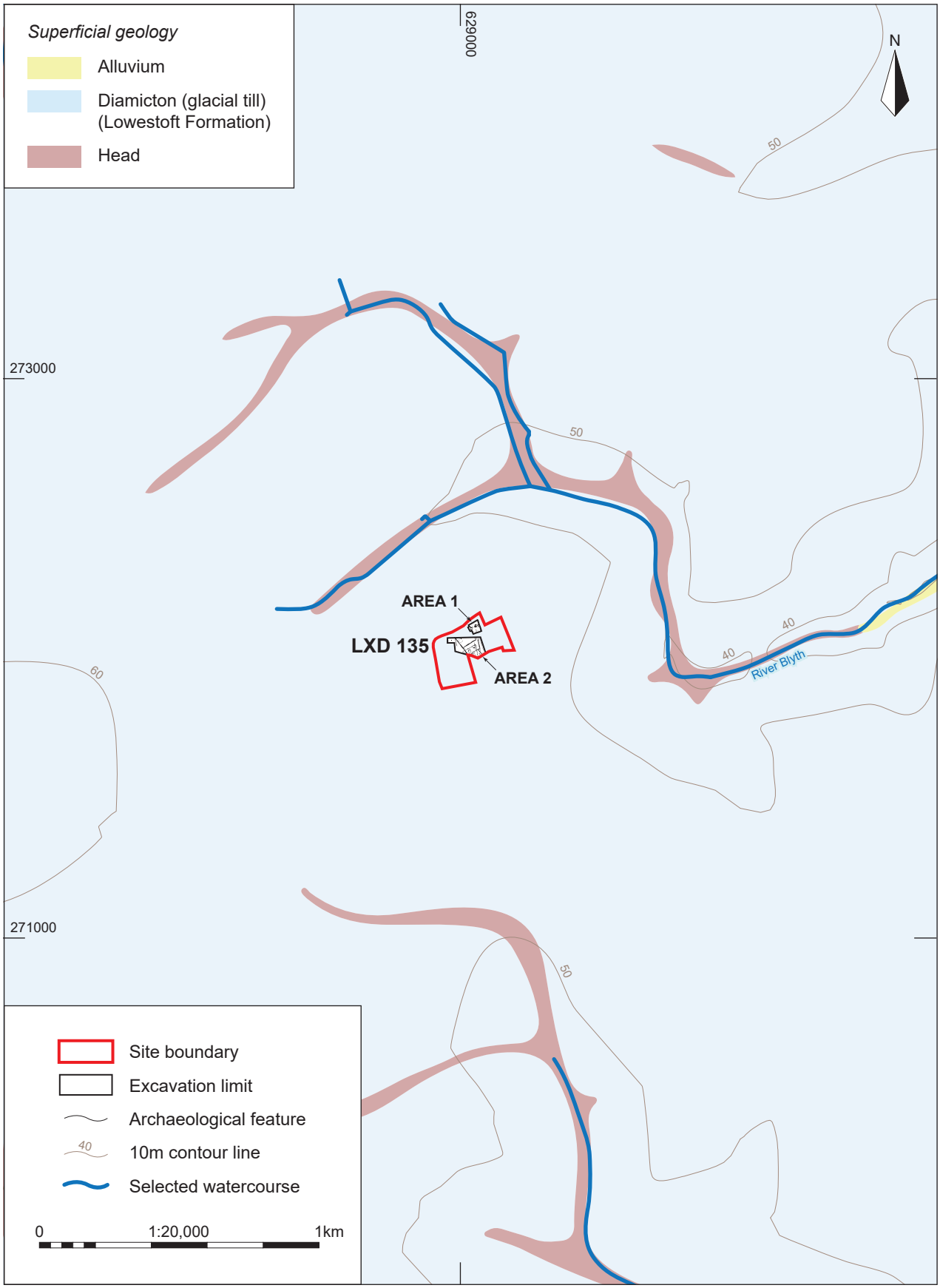


Figure 3.2 Framlingham Road, Laxfield: geology, rivers and contours

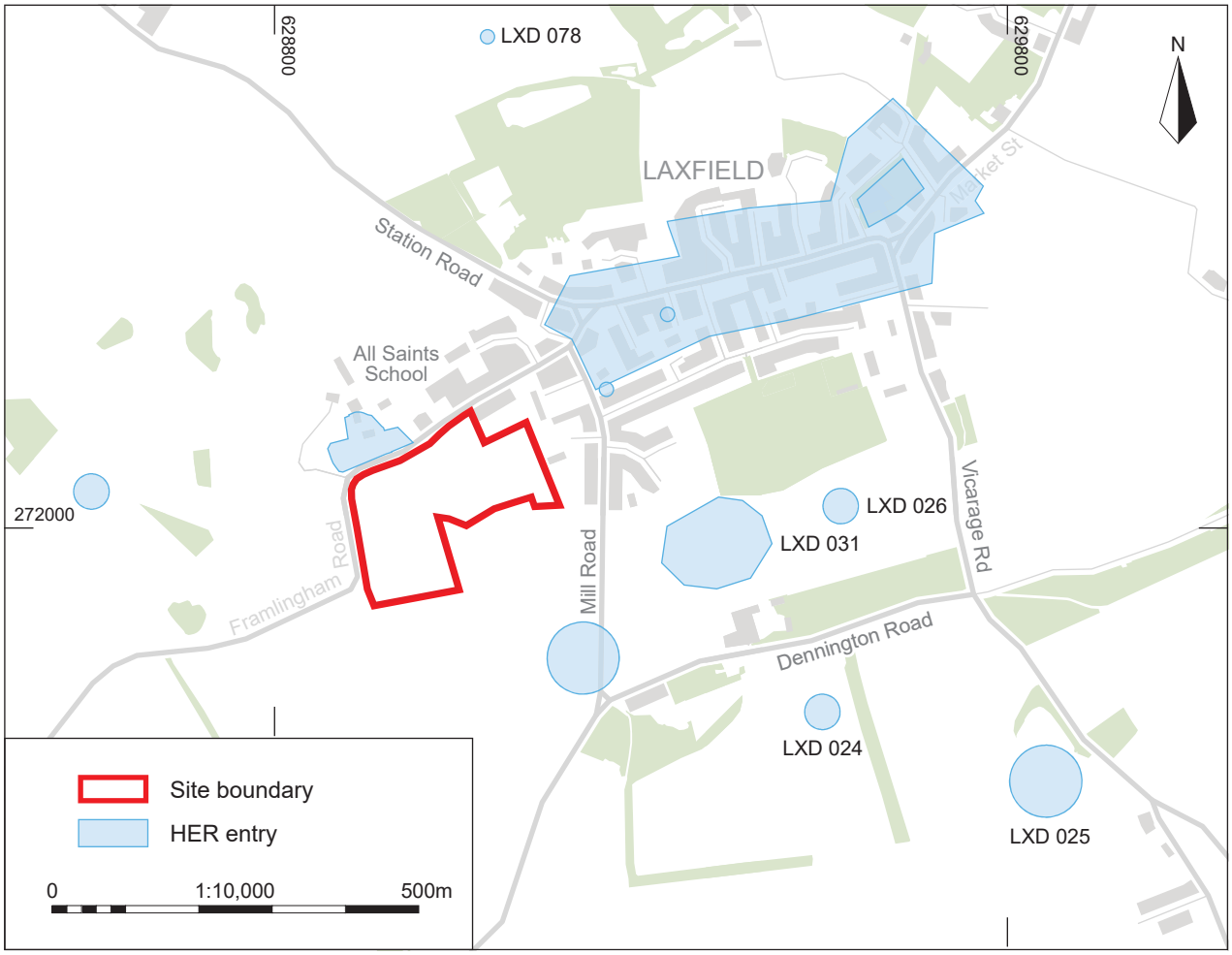


Figure 3.3 Framlingham Road, Laxfield: archaeological context

but a well and trough features were identified. Quantities of burnt stone were recovered from these and surrounding features. Area 2 encompassed the remains of a field system of Middle Bronze Age date (Enclosures 1 to 3, 1600–1150 BC). These features form the focus of this chapter and are presented in more detail below.

Middle Iron Age (350–50 BC)

Three roundhouses and other features of Middle Iron Age date were excavated in Area 2 (Fig 3.4). These were located within Enclosures 2 and 3, which were of Middle Bronze Age date and must have remained as earthworks/hedgebanks. The largest roundhouse, 4120, within Enclosure 3 (Fig. 3.5), was formed from a penannular gully *c.* 14m in diameter, with four breaks arranged at equal intervals; the largest gap of *c.* 2.7m was positioned to face north-east. Four triangular loom weights and an assemblage of Middle Iron Age pottery (80 sherds) were recovered, mainly from the upper fill of the gully. Other finds included fired clay (144 fragments), two worked flints, heat-altered stone (2.7kg) and animal bone (155g). A few sherds of Bronze Age and Iron Age pottery, fired clay, heat-altered stone and a further loom weight fragment came from nearby pits. An 11m stretch of the uppermost fill of the adjacent earlier coaxial boundary ditch 4180 was excavated, with finds retrieval in mind, and 174 sherds of pottery (1402kg) were recovered from a charcoal-rich upper fill within the earthwork, together with 144 pieces of fired clay (1.8kg), 9 worked flints, 4.4kg of heat-altered stone and 126g animal bone. These finds probably represent surface material surviving within the relict earthwork of the earlier ditch. A small quantity of charred plant remains and charcoal were present in an environmental sample.

Two smaller roundhouses (4036 and 4248), 8–9m in diameter, were situated within the adjacent Enclosure 2 to the south (Fig. 3.5). These appear to have had entrances that faced south-south-east. A number of pits/postholes were associated with roundhouse 4248, shown in outline on Figure 3.5. These were between 0.03 and 0.12m deep; they may have related to an entranceway or internal structural posts or fixtures although they were poorly dated, with only a single sherd of weathered Bronze Age pottery from one feature and 49g of animal bone from another. The fills included flecks of charcoal and fired clay, although environmental samples did not produce informative evidence.

The small assemblage of animal bone from the Iron Age included cattle, sheep/goat and pig, mainly identified from

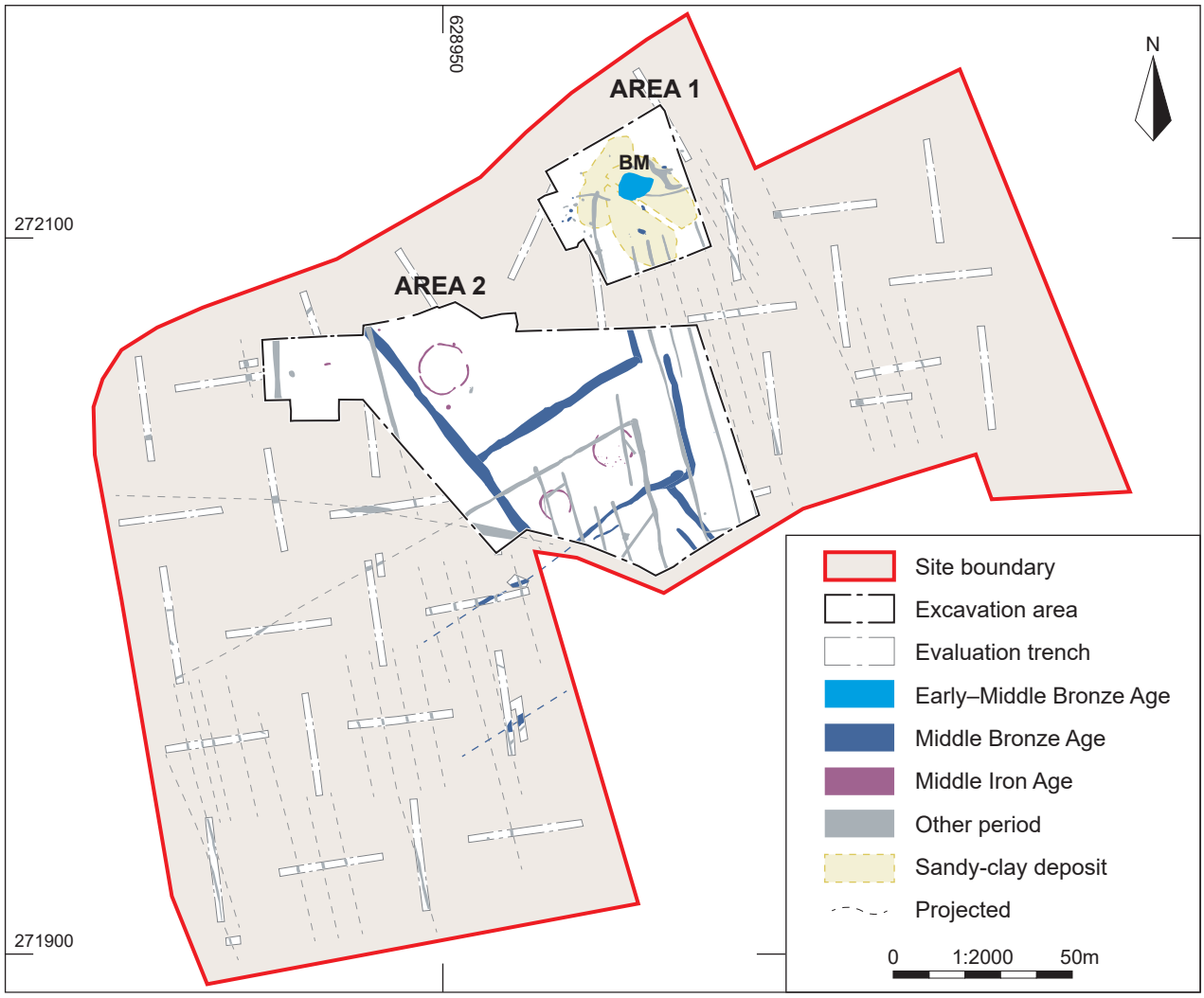


Figure 3.4 Framlingham Road, Laxfield: prehistoric phases

molar teeth. The pottery (2246g in total, a minimum of 16 pots), mainly jar or deep bowl forms, was of sand-tempered fabrics typical of East Anglia away from the fen edge, and without pottery with Belgic influence to indicate a later Iron Age date (Benfield 2024a). There were two main sandy fabrics gritted with quartz sand, with one more densely sanded than the other, and the pottery appears to have been locally made with raw materials of local origin (Benfield 2024a). A few smoothed or lightly burnished sherds were noted, with decoration on the rim tops. Three sherds from roundhouse 4120 showed evidence of internal burnt residue. From the site overall 4310g of fired clay was recovered, mostly found in association with Middle Iron Age pottery and probably from ovens and structures (Benfield 2024b).

Medieval to post-medieval/modern (AD 1066–present)

The prehistoric features in Area 2 were cut by multiple linear features on a north-north-west to south-south-east alignment (Fig. 3.5). These probably related to medieval farming, linked with the manor of Laxfield (Fern 2024), and single sherds of medieval pottery were recovered from features in evaluation trenches across the wider site. Historical records from *Domesday* onwards (AD 1086) suggest that the land was most probably within a pastoral regime of livestock grazing and meadowland, as was probably the case in preceding periods. Two pits or postholes and field boundaries that were shown on 19th-century maps were also recorded (Cuthbert 2021; Fern 2024). Finds included animal bone, an iron nail, pottery and the partial skeleton of a large dog.

Undated

An undated pit and a posthole were recorded in Area 2 (not illustrated) and three tree-throw holes were recorded across both areas (4028, 5075 and 1108).

Several undated features were recorded in the vicinity of the burnt mound (see below), and these may have been related to it, although they were also near to medieval ditches (Fig. 3.5). They included 13 pits or postholes and a ditch. Eight of the smaller pits formed part of a cluster to the west of the well, together with features that have been tentatively identified as contemporary to it, based on

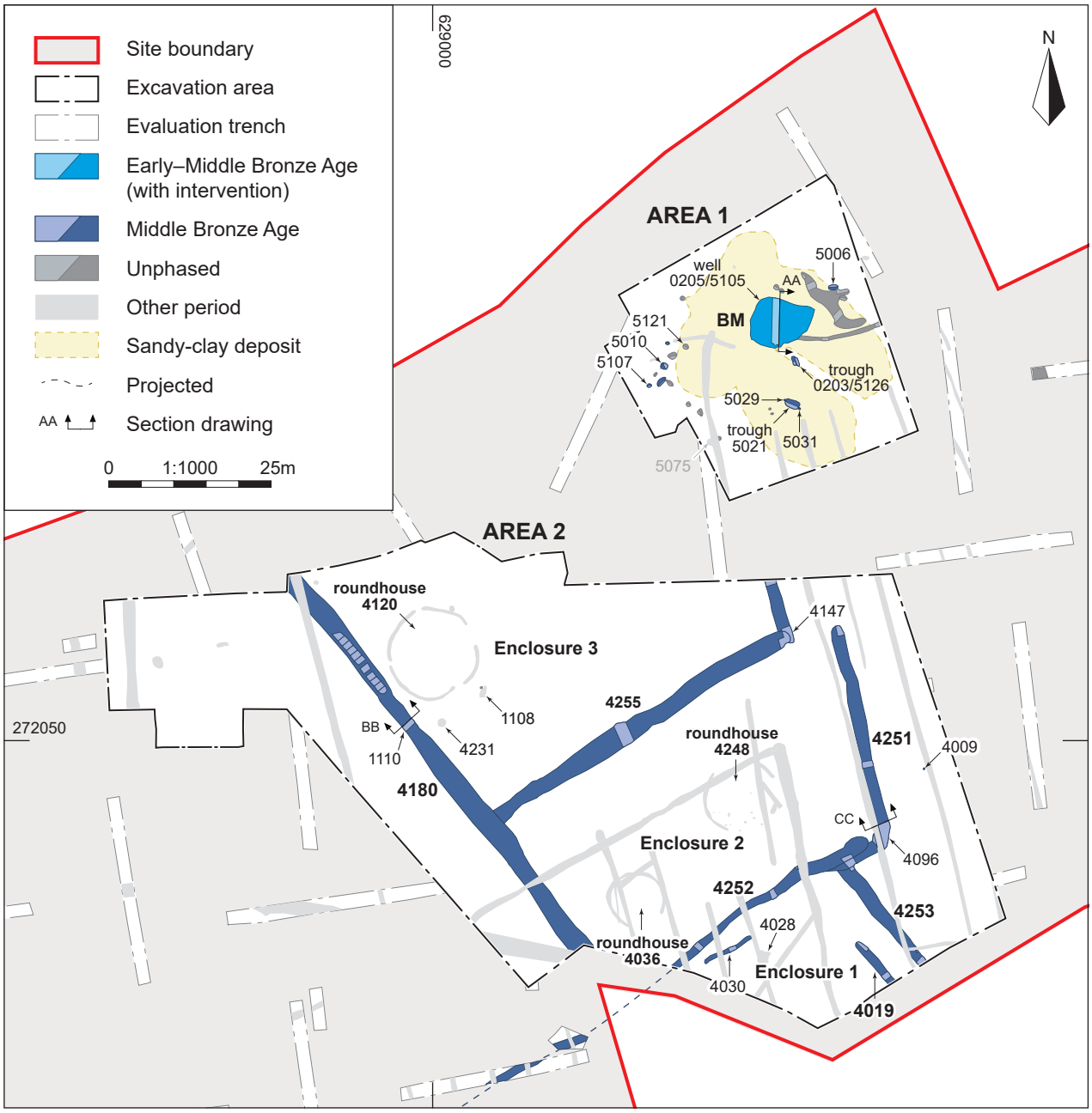


Figure 3.5 Framlingham Road, Laxfield: Bronze Age features

concentrations of heat-altered stone, worked flint and fired clay in their fills (see below). These undated features may also relate to the burnt mound, although it is feasible that some or all may have related to the subsequent Iron Age occupation; burnt traces were noted in three of them. Pit 5121 is illustrated (Fig. 3.6).

Early to Middle Bronze Age (1950–1150 BC)

As noted above, a well and trough features represent the remains of a burnt mound complex that formed the focus of Area 1 (Fig. 3.5), while the limits of Area 2 encompassed the remains of a field system of Middle Bronze Age date. The earliest activity at the burnt mound site is not precisely dated, but a well-preserved pollen sequence and plant macrofossils were recovered from a borehole sample through the deep waterlogged fills of the associated well (Wyles below and Grant below). The sequence is anchored by two radiocarbon dates which show that deposits had begun to build up in the well before the period *c.* 1425 to *c.* 1290 BC. Pottery from the enclosure ditches appears broadly contemporary with these infilling deposits. It may be, therefore, that the original activity associated with the burnt mound was slightly earlier and that the enclosures represent a slightly later phase of activity.

Burnt mound complex

The likely presence of a burnt mound site was first identified in evaluation from a localised distribution of burnt flint observed throughout the ploughsoil in a single trench, which also contained a trough-like pit feature which had a fill of burnt flint (0203/5126, Fig. 3.5). In the subsequent excavation of Area 1 a very large pit-well was recorded, 0205/5105, and there was a further rectangular pit, interpreted as a second trough (5021, Fig. 3.5). Finds of heat-altered flint that probably represented spread from a mound occurred in other pits across the excavation area. However, there were no surviving *in situ* deposits of burnt stone.

Well

Pit 0205/5105 was a substantial feature that was approximately 10m long and 7m wide, oriented east–west (Fig. 3.7, Section AA and photograph). It was located within a wider deposit of reddish-grey sandy clay, which may be indicative of earlier flooding in the area (Fig. 3.5). A slot of 1m wide was dug across its width, to a depth of approximately 1m, whereupon hand excavation ceased due to the high water table. It proved impossible to pump the water from the well sufficiently quickly to excavate the feature any deeper than this. The upper fills were variated blue-grey waterlain clayey silts. No prehistoric pottery was recovered, although a very small sherd of indeterminate character was recorded from a borehole sample (see below). The uppermost fill, 0206/5119, contained burnt flint, as well as 22 fragments of medieval pottery and a fragment of an iron horseshoe (Ra 7). This suggests that the well had remained as a wet depression at least into the medieval period. The complete profile of the feature is unknown but where it was hand excavated it had very steep sides.

Following identification of the feature as a probable well within a burnt mound complex, and given the high water table, a methodology was developed to characterise the lower fills through geoarchaeological borehole survey. ARCA attended the site in January 2022 and drilled two boreholes, BH01 and BH02 (see below and Fig. 3.7). These showed that the feature extended to a depth of 3.20m from the excavation horizon of 55.3m AOD (here termed ground level).

Three geoarchaeological units were identified (Fig. 3.7). The underlying clay geological soils were ascribed to Unit 1. The lower fills of the well, none of which were hand excavated, were recorded in BH01 as Unit 2, identified between 1.91m and 3.20m below ground level (bgl) as deposits of silt/clays. These were interspersed with thin beds of wood 50mm–100mm thick, at depths of 2.91–3.00m bgl, 2.76–2.80m bgl and 2.54–2.57m bgl. Terrestrial and freshwater molluscs were noted at 2.56–2.70m bgl and burnt inclusions were noted at 2.24–2.34 bgl. Waterlogged plant remains also included species which favour an aquatic environment. Together these fills may represent a sequence of deliberate introduction of material into the well (wood),



Figure 3.6 Framlingham Road, Laxfield: photograph of undated pit 5121 (facing NE, 0.5m scale)

natural accretion and the incorporation of burnt material (*Geoarchaeology*, Wilkinson below), suggesting perhaps that material was washing into a lined open well. Two radiocarbon dates were obtained from waterlogged twig remains from the fill sequence (Table 3.3), with a date of 1426–1291 cal BC (at 95.4% probability; SUERC-105079) from 2.87–2.93m depth, and a date of 1225–1051 cal BC (at 95% probability; SUERC-104457) from 1.95–2.00m depth (see below). The pieces of twig were from within Unit 2 and at its upper horizon respectively and they indicate the date for the formation of the bulk of the fill as *c.* 1420–1050 BC. A third sample from material from the base of the well failed to produce a radiocarbon date but it can be reasoned that the earliest primary fill (of Unit 2) must pre-date *c.* 1500 BC. Geoarchaeological analysis also highlighted that the cut appeared to be sloping to the south and there may have been a deeper element to the feature that was not encountered in the investigations.

The radiocarbon dates broadly indicate that changes observed between two identified local pollen assemblage zones (LPAZs), LAX-01 and LAX-02 (see Grant below) were occurring into and through the Middle Bronze Age, with evidence for a transition from open water within the well, an infilled sequence and a change in local woodland communities. The latest LPAZ, LAX-03, stratigraphically higher than the second radiocarbon date of *c.* 1225–1050 BC, showed evidence for a shift in land use in the area, with grassland appearing in the record.

The uppermost unit identified in geoarchaeological work, Unit 3, was noted as representing post-abandonment fills, and it contained less burnt material than fills below. The uppermost part of Unit 3 equates generally with contexts 5118 and 5119, which were hand excavated.

A small pit, 5116, was recorded in the cut section of the well (Fig. 3.7). It was undated by finds but was sealed by fill 5119 which contained medieval pottery.

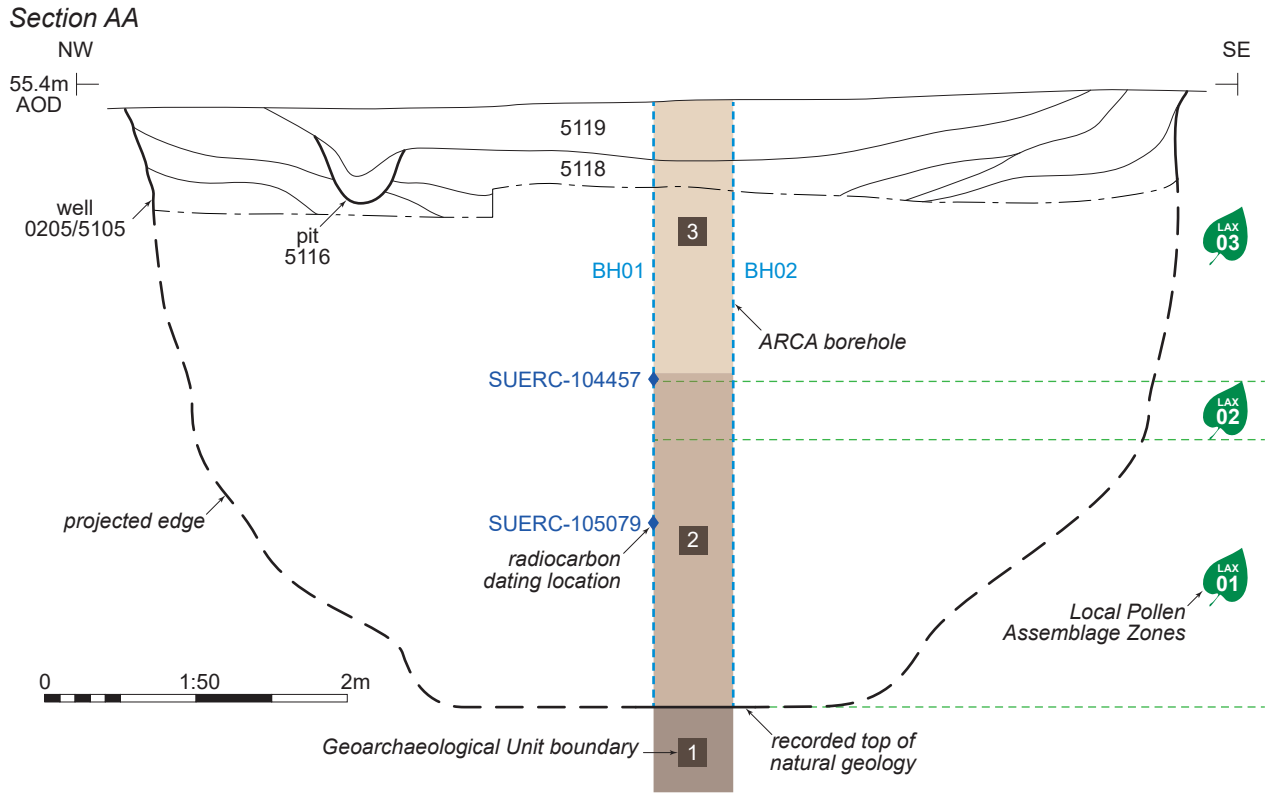




Figure 3.7 Framlingham Road, Laxfield: section and photograph of well 0205/5105



Figure 3.8 Framlingham Road, Laxfield: photographs of trough 5021 flanked by pits 5021 and 5031 (A, facing NE, 0.2m, 0.5m and 1m scale), and pit 5107 (B, facing N, 0.5m scale)

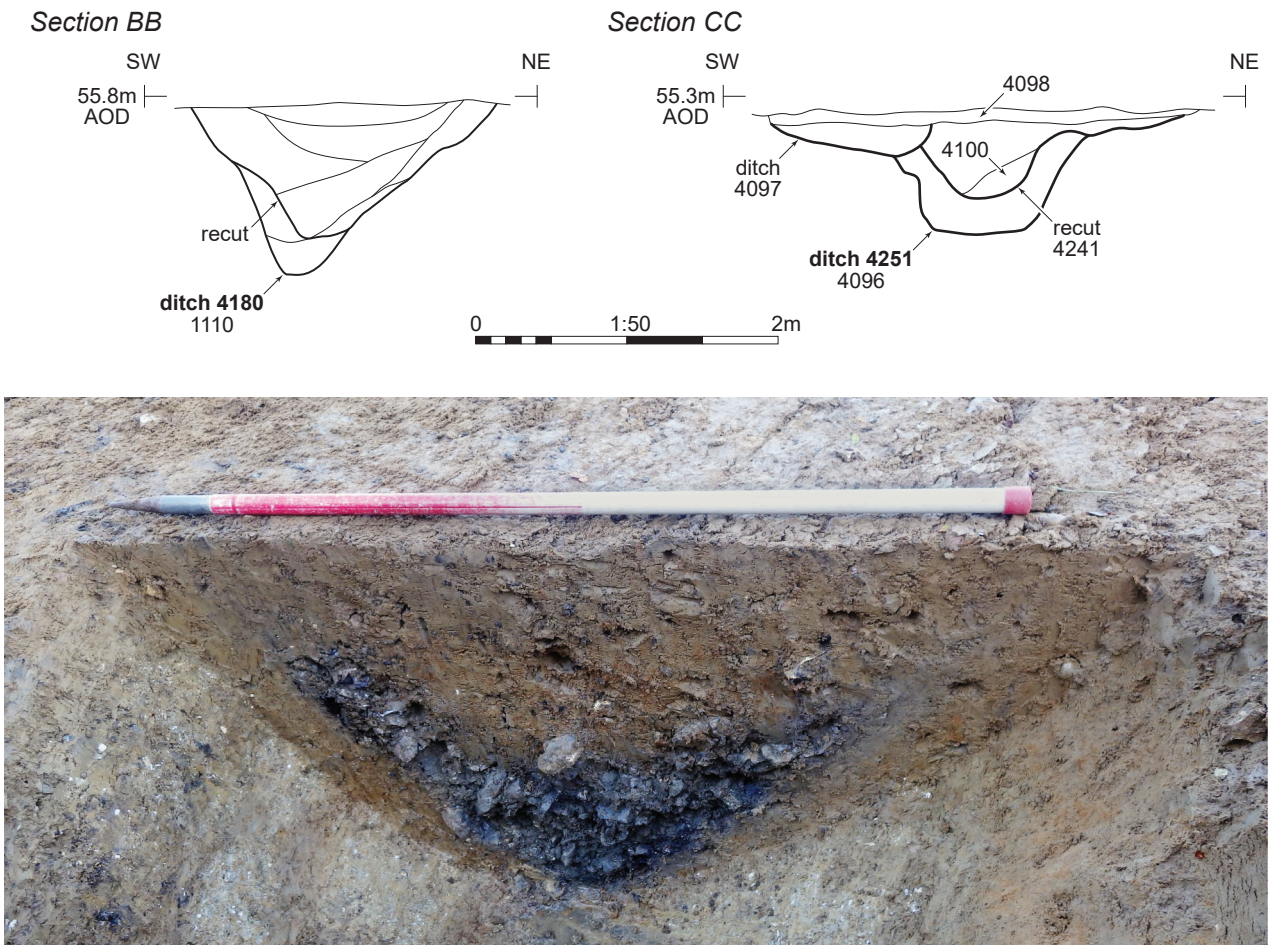


Figure 3.9 Framlingham Road, Laxfield: sections and photograph (cut 4253, facing NW, 1m scale) of Middle Bronze Age enclosure ditches

Troughs

Feature 0203/5126 was just to the south of well 0205/5105. It was roughly rectangular in plan, with steep sides and a flat base. It measured 1.35m long, 0.75m wide and 0.25m deep. Its single fill, 0204/5127, was a dark brownish-black silty clay, moderately compact, from which 9188g of heat-altered stone was collected. It appears to have been a trough, similar to those from other burnt mound sites, serving the 'hot stone technology'. A sample of this heat-altered stone was submitted for lipid analysis (Dunne *et al.* 2024), although the results were not as successful as those from Marham Park (see Chapter 2). A soil sample produced no plant macrofossil or charcoal remains.

Feature 5021 lay 5m to the south. Though it was on a different north-west–south-east orientation, it was similar to 0203/5126, being sub-rectangular and measuring 2.20m long, 1.30m wide and 0.18m deep (Fig. 3.8A). Though it only partially survived, the fill, 5123, largely comprised heat-altered stone. A soil sample from this fill produced a small amount of wood charcoal (West below), and a single worked flint was found in fill 5022.

At either end of 5021 there was a small shallow pit or posthole, 5029 and 5031, each *c.* 0.30m in diameter. Their fills, 5030, 5032 and 5039, contained further small amounts of heat-altered stone. Given their placement, it is possible they were part of some sort of structure related to the trough (see Chapter 5).

Pits

Six of the pits in proximity to the burnt mound site had heat-altered stone, worked flint or fired clay in their fills and may have been of similar date (Fig. 3.5). The absence of datable artefacts means that their contemporaneity with the burnt mound complex cannot be definitively established, although they may have been related to its operation. As noted above, other pits and features in the vicinity also remain undated, some of which may also have been contemporary. All of these pits were small to medium in size, measuring *c.* 0.60–1.70m.

Over 500g of burnt stone was recovered from both 5006 and 5010, and 488g of fired clay came from pit 5107 (Fig. 3.8B), with the others holding smaller quantities of finds. Elsewhere on the site (Area 2) there was a strong association between features of the Middle Iron Age and fired clay, hence it is alternatively possible that pit 5107 (and others) could relate to this later prehistoric occupation. A worked flint was recovered from fill 5012 of pit 5010.

Field systems

The remains of a coaxial field system were revealed across Area 2. A north-west to south-east aligned ditch, 4180, formed the main axis, off which were parts of several sub-rectangular enclosures (Enclosures 1, 2 and 3; Fig. 3.5). Only one, the smallest (Enclosure 2), was seen in its entirety, measuring 50m by 30m. The offset between the corner of Enclosure 3 and the termination of the eastern side of Enclosure 2, ditch 4251, suggests an entrance to the latter of 6m wide. The ditches were generally V or U-shaped in profile, with 4251 broadening towards the top, similar to 4147 that formed the eastern side of Enclosure 3. Ditches 4251, 4252 and 4253 formed conjoined Enclosures 1 and 2 on the eastern side of the axial ditch 4180. Stratigraphically 4253 appeared the earliest, cut by 4251 that was in turn cut by 4252, but they were probably closely contemporary. Finds included fired clay and pottery, with four sherds of Bronze Age pottery recovered from a slot at the intersection of the ditches (context 4053).

Axial ditch

Ditch 4180 was filled with a complex sequence of silty clays, with a possible indication of at least one episode of recutting. The ditch was 2.10–2.62m wide and 1.12–1.30m deep in the excavated sections (Fig. 3.9, Section BB). A considerable quantity of Iron Age pottery was found in the upper fill of the ditch adjacent to roundhouse 4120 but there were no finds from the lowest fills.

Enclosures 1 and 2

Ditch 4251 was 0.90–1.84m wide, and 0.55–0.90m deep (Fig. 3.9, Section CC). There was evidence for a recut and Bronze Age Deverel-Rimbury pottery was recovered from the lower fill of this: 17 sherds came from context 4043 (not illustrated), with 69 sherds (1442g) from the equivalent fill, 4100, of cut 4241 towards the corner (Fig. 3.9, Section CC).

Ditch 4253 was 1.33–2.70m wide and 0.58–0.67m deep (Fig 3.9, photograph). A concentration of heat-altered stone was recovered from one of the lower fills, 4013, possibly in a recut. Analysis of a sample of the stone showed only a 'soil lipid profile' and only poor results for plant macrofossils and charcoal were obtained from environmental sampling.

No finds were recovered from ditch 4252, which had steep sides, a flat base and three fills; it measured 0.82–1.32m wide and 0.53–0.76m deep.

There were some associated features. A short section of ditch, 4019, lay within Enclosure 1; it was 1.18m wide and 0.77m deep. Thirty sherds of pottery, including some of Deverel-Rimbury type, were recovered from the lowest fill, 4020, with over 1kg of heat-altered stone and a worked flint recovered from the fill above, 4021. A small assemblage of Early–Middle Bronze Age pottery was recovered from the single clay fill of a further short length of ditch, 4030, and a small pit, 4009, was located to the east of the enclosure; four pieces of pottery were recovered from it, with charcoal inclusions noted in the fill.

Enclosure 3

Enclosure 3 was the largest of the three, formed by ditches 4255 and 4147 (Fig. 3.5). Ditch 4255 joined the axial ditch, 4180, at a neat right-angle. It was 1.44–3.36m wide and 0.72–1.06m deep, with nine fills recorded. Two sherds of Bronze Age pottery and a worked flint were recovered from fill 4084, with 33 fragments of animal bone from this fill and another of the lower fills, 4080. Finds included 115g of heat-altered stone. Iron Age pottery and animal bone fragments were recovered from the upper fills, indicating that the ditch had remained as an earthwork. Where sectioned, ditch 4147 was U-shaped, widening towards the top, and it was 0.70–1.55m wide and 0.53–0.72m deep with up to three fills from which no finds were recovered.

The small quantity of Middle Bronze Age ceramics, including vessels in the Deverel-Rimbury tradition, could be an indication that the enclosures were broadly contemporary with the end of the activity at the burnt mound site as established through radiocarbon dating. The enclosures were probably used for the grazing of livestock, perhaps with temporary or sporadic occupation creating the small contemporary finds assemblage.

Bronze Age finds

Selected finds are presented here. Full details can be found in the archive report (Fern 2024).

Heat-altered flint and stone

Michael Green

Heat-altered stone – over 29kg – was found in both Bronze Age and Iron Age features, with much of the former probably derived from activities associated with the burnt mound site (Green 2024a). Both high and low temperature heat-altered flint is present in the assemblage. The high temperature altered flint has been discoloured white grey and is highly fragmented; the low temperature altered flint has been discoloured red to black and is only partly fragmented. The heat-altered stone is discoloured red-black.

Three features are of note as they suggest that major hot works were occurring on site. The two troughs (5021 and 0203/5126) close to well 0205/5105 (Fig. 3.5) contained sizeable assemblages of high temperature heat-altered flint with heavy evidence for quenching (5201g and 9188g respectively). These assemblages are similar to others recently discovered associated with burnt mounds, such as those at Marham Park (see Chapter 2) and Lakenheath (Green 2020).

Fill 4013 of cut 4011 of the Bronze Age ditch 4253 (not labelled on Fig. 3.5) also contained a large amount of heat-altered flint, 2460g (Fig. 3.9, photograph). There are

indications of both high and low temperature heat alteration and possible quenching within this material, which may have been related to activity at the burnt mound, some distance to the north, or could be from a separate cooking or water-heating event.

Other features contained smaller quantities of heat-altered flint and stone (below 30 count), suggesting accidental incorporation of the material into the fills.

Some of the heat-altered stone was subject to lipid analysis, although without significant results (Dunne *et al.* 2024).

Worked flint

Michael Green

In total 28 struck flints (523g) were recovered from the evaluation and excavation stages of work at Laxfield, ranging from the Late Mesolithic–Neolithic to potentially Iron Age in date (Green 2024b). Overall the small assemblage suggests that limited Neolithic and Bronze Age flint knapping occurred on the site, with most if not all of the material being residual within later features. Some cruder material was also present, such as squat flakes, which may suggest later Bronze Age or Iron Age activity (Humphrey 2007).

The assemblage from the excavation comprises 14 flakes, one core, one hammerstone, one blade and one tool (burin). The flint was struck from blue-black glassy flint, light grey glassy flint and orange-brown glassy flint (Shepherd 1972), with varying edge damage and patination. The majority came from the fills of the Bronze Age ditch 4180, but they show considerable edge damage, making it likely that the material is residual. Seven of the flakes, the core and the burin are crude, having been struck using hard hammers without platform preparation. The burin probably dates to the Bronze Age.

A single cobblestone hammerstone was recovered from roundhouse ditch 4120 (fill 4121), which shows signs of prolonged use. A single cruder flake was recovered from the same feature, and both may be Bronze Age in date, but are residual in their Middle Iron Age context.

Three flakes showed little or no edge damage and were less likely to have been residual. These came from trough 5021 (Fig. 3.8A) associated with the burnt mound, and pit 5010 to the south-west of it. The flakes are thick and fine and the knapping techniques are consistent with a Bronze Age date (Edmonds 1995).

Bronze Age pottery

Stephen Benfield

Summary

In total 447 sherds (4225g) of handmade prehistoric pottery were recovered from the excavation with an estimated vessel equivalent (EVE) of 1.21. The pottery is from two separate assemblages in terms of fabric and form, one of Early/Middle Bronze Age and Middle Bronze Age date, and the other, from parts of Area 2, of Middle Iron Age date. A detailed record has been made of the pottery (following Barclay *et al.* 2016, sect. 2.4.6), and full details can be found in the archive and report (Benfield 2024a).

Bronze Age pottery

Fabric

The Bronze Age pottery consists of 160 sherds (1,979g), and comprises flint-tempered, flint with grog and grog-tempered fabrics (Table 3.1). Flint dominated fabrics make up 56% by count and 78% by weight, although there is some overlap between the flint and grog-tempered material as the flint-tempered fabrics also contain occasional grog pieces. The flint itself is commonly coarse and poorly embedded, and often sitting proud of the surface of the pot. The grog temper is typically a mixture of ill-sorted material but includes prominent coarse lumps.

Form

The pot forms appear typical of the urn-like vessels of the Early and Middle Bronze Age and are primarily from simple bucket-shaped vessels with generally thick walls and simple upright and flat-topped, undifferentiated rims, although one pot from ditch 4019 (fill 4020, not illustrated) has a simple but distinct slightly expanded or flaring rim (Fig. 3.10: pot E).

Dating and decoration

Possibly earliest of the Bronze Age pottery is represented by the body and base sherds from one or more grog-tempered pots, the majority of which have buff-coloured surfaces. These came from the short ditch 4030 (fill 4031, not illustrated) with others residual in an Iron Age pit, 4231 (Fig. 3.5, fill 4232 not illustrated). There are no diagnostic pieces, although the base of a large vessel (like an urn) and a flat-topped rim sherd with a slightly concave, curving neck were recovered from ditch 4030. These may hint at an early phase of activity here, possibly linked with the burnt mound complex. However, close dating these sherds is not straight forward. Grog-tempered fabrics are frequently encountered in Bronze Age urns but the prevalence of flint-tempered fabrics among the rest of the Bronze Age pottery, dated to the Middle Bronze Age, may suggest that these sherds represent a separate group. In particular, their buff-coloured surfaces could indicate that they represent urn-like vessels of the Early Bronze Age (*c.* 2100–1700 BC). The sherds from pit 4231 include grog-tempered sherds (Fabric G2) as well as flint-tempered ones (Fabric F1 and F2), and the flint-tempered sherds are also in buff-coloured fabrics. However, the Bronze Age pottery from this pit is residual and could represent an accumulation or collection possibly spanning the Early to Middle Bronze Age, the coarse flint temper present in some of the sherds being more indicative of the Middle Bronze Age pottery.

More diagnostic are several sherds from bucket-like pots with simple, upright flattened rims that are part of the Deverel-Rimbury tradition of the Middle Bronze Age

Table 3.1 Pottery fabrics from Laxfield

Fabric code	Fabric description	Ct	Wt (g)	EVE
F1	Common to abundant small–medium flint with occasional larger pieces, coarse fabric flint protruding from surfaces, rare–common small dark clay/ferrous sand pellets, rare coarse grog	30	512	0.06
F2	Sparse–moderate small–medium flint, rare or occasional coarse grog lumps, rare–common small dark clay/ferrous sand pellets, flint relatively well embedded but often protruding from surface	51	989	0.21
F3	Common to abundant small–medium flint with occasional larger pieces, coarse fabric flint protruding from surfaces, rare clay and ferrous sand pellets (as F1 but lacking any grog or dark small pellets)	8	45	0
F4	Sparse–moderate small–medium flint, medium sand, rare small dark clay/ferrous sand pellets	16	106	0
G1	Moderate–common coarse grog (commonly oxidised in a moderate sand fabric with moderate–common small dark clay grog(?) or clay pellets	23	145	0.03
G2	Moderate ill-sorted grog in a sandy fabric, rare–occasional small/medium flint	2	27	0
F2G	Sparse–moderate small–medium flint, moderate–common small–coarse grog, common ill-sorted small dark clay/ferrous sand pellets	30	155	0.09
Totals		**160**	**1979**	**0.39**

(*c.* 1600–1150 BC) (Fig. 3.10: pots A–F). The rim sherds and other diagnostic pieces, as well as differences in the fabrics, suggest a minimum of six vessels. All are in flint-tempered or flint with grog-tempered fabrics, with most being flint-tempered. Decoration consists of cordons around the pot body. There are three examples of single horizontal cordons and one with a pinch-decorated band, producing the visual effect of a cog wheel-like cordon (Fig. 3.10: pot F). These came from ditches 4019 and 4251 (cut 4041, not illustrated, and cut 4096, Fig. 3.9, Section CC). One has an applied cordon indented with fingertip impressions (Fig. 3.10: pot B). On two pots the cordons may have been made during construction, or were raised from the fabric, but both are slightly pointed and plain; one is illustrated (Fig. 3.10: pot E). There are also modifications to three pots, all from ditch 4096 (fill 4100). These consist of small perforations just below the rim that were made before they were fired, one sherd showing two perforations spaced 55mm apart (Fig. 3.10: pots A, C and D). These may indicate that skins or fabric covers were attached and some of the vessels may therefore have been used for food storage. No traces of sooting or burnt residues were present.

Overall, the pottery would appear likely to represent domestic occupation rather than displaced funerary vessels and the distribution would suggest that the focus of this may have lain to the south-east of the site. The pottery can be broadly compared with that from large assemblage of Deverel-Rimbury pottery from Grimes Graves (Longworth *et al.* 1988), recovered from middens that filled several abandoned Neolithic mineshafts and representing extensive occupation nearby.

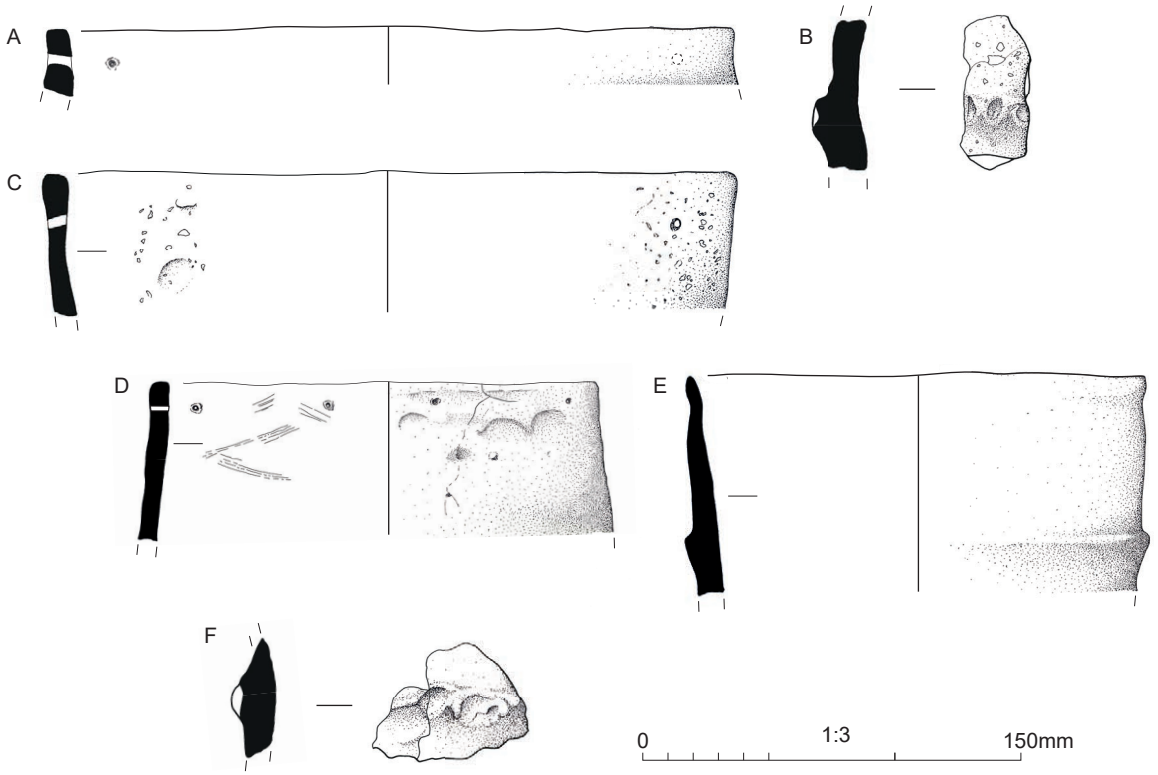


Figure 3.10 Framlingham Road, Laxfield: selected Bronze Age pottery

Catalogue of illustrated Bronze Age sherds
Fig. 3.10

A Simple flat-topped rim, two sherds probably from the same pot, bucket-shaped profile (like an urn); both perforated with small, pre-firing holes made around pot below the rim. Large pot *c.* 300 diam. at rim. Fabric F1: abundant moderately coarse flint, flint protruding above surface; buff/pale grey clouded surface. Ditch 4251, recut 4241, cut 4096, fill 4100 (Fig. 3.9, Section CC).

B Joining sherds with horizontal cordon decorated with fingertip indentations; body wall thicker below cordon. Fabric F1: abundant small–medium flint, flint slightly protruding above surface; buff and orange clouded surface; patchy grey fabric core. Context details as for A.

C Small rim sherd with simple rim, flattened top, probably from a bucket-shaped vessel (like an urn); small perforation just below the rim. Large pot *c.* 300 diam. at rim. Fabric F2: sandy fabric with sparse–moderate small–medium flint and some grog, dark grey fabric abraded buff exterior. Context details as for A.

D Simple upright rim, plain flattened top; two small pre-firing perforations below rim, 55mm apart. Rim *c.* 190mm diam. Fabric F2: spare–moderate small–medium flint, flint slightly protruding above surface, with occasional larger flint pieces and some grog; buff surfaces; dark grey fabric core. Context details as for A.

E Two groups of joining sherds from rim and upper body of a bucket-shaped vessel (like an urn), with simple, pointed, slightly flaring rim; plain, pointed raised body cordon; body wall thicker below cordon. Large pot *c.* 200mm diam. at rim. Fabric F2G: common fine–medium flint with some grog, orange oxidised surface, brown-grey fabric core. Ditch 4019, lowest fill, 4020 (cut not illustrated).

F Joining sherds from a vessel with horizontal, broad finger-pinched row, essentially forming a cordon. Large pot *c.* 280mm diam. Fabric F4: silty fabric with some flint, ferrous sand and clay/grog pellets; buff surfaces with patchy orange fabric core. Ditch 4251, recut 4245, lowest fill, 4043 (cut not illustrated).

Environmental remains and scientific analysis

Overview

Selected environmental and scientific evidence is presented here, where it relates to the burnt mound site and its landscape. Full details can be found in the archive report (Fern 2024).

Borehole samples were taken from well 0205/5105 for geoarchaeological analysis, and for recovery of waterlogged plant remains, palynological assessment and radiocarbon dating.

Four samples were analysed for the presence of lipids. One was from a dump of burnt stone in fill 4013 of ditch 4253 in Area 2 (Fig. 3.9, photograph). The others were from pit 5010 (fill 5012, not illustrated) and troughs 5021 (fill 5022, Fig. 3.8A) and 0203/5126 (fill 5127, not illustrated), which were located near to well 0205/5105, and that probably relate to burnt mound activity. However, it was not possible to establish lipid concentration weights for any of the heat-altered stone samples, with only soil lipids identified (Dunne *et al.* 2024).

Animal bone

Andy Clarke

A small assemblage of animal bone, 182 fragments weighing 2984g, was recovered from hand excavation and the processing of samples (Clarke 2024). Overall the material was highly fragmented and in poor condition. As a result 65% of the assemblage was unidentifiable.

In total 59 fragments (766g) were recovered from 17 Bronze Age contexts, mainly the fills of well 5105 and various enclosure ditches. A limited amount of cattle (*Bos taurus*), sheep/goat (*Ovis aries/Capra hircus*) and pig (*Sus scrofa* sp.) were identified from a mix of isolated molar teeth and fragments of meat-poor limb bones. Chop marks on a proximal cattle metacarpal from ditch 4255 (fill 4148, not illustrated) and a pig tibia shaft from ditch 2709/4252 (context 2710, not illustrated) may suggest possible butchery waste.

Plant macrofossils (charred plant remains)

Anna West

Introduction and methods

Twenty-three bulk samples (760 litres of soil) were taken from a range of features. The Bronze Age results are discussed here (full details can be found in West 2024).

Sub-samples were processed using standard flotation procedures of manual flotation/washover (CA 2012) and the flot was collected in a 250µm or 300µm mesh sieve. The dried flots were scanned using a binocular microscope at x10 magnification and the presence of any charred plant remains recorded. Identification of plant remains is with reference to Stace (1997).

Results

Middle Bronze Age

Twenty litre sub-samples were processed from trough 5021 (Fig. 3.8A), from sample 7 of fill 5023 (not illustrated), and from fill 5127 (not illustrated, sample 11) of trough 0203/5126. A small quantity of wood charcoal was recovered from pit 5021. The sample from trough 0203/5126 failed to produce any flot material, consistent with a sample processed at the evaluation stage, which gave a very small flot of less than 5ml mainly comprising rootlet fragments.

Ditches 4253 and 4180 formed part of the coaxial enclosure. The flots from ditch 4253, fill 4013 (burnt fill in Fig. 3.9, photograph, sample 101), and from ditch 4180 (sample 106, fill 4179, not illustrated) were both small (<2ml), although small quantities of wood charcoal fragments were recovered from the non-floating residues; these were recorded as being iron impregnated and this may have had some impact on poor recovery during the flotation process.

Conclusion

Overall the bulk samples processed for paleoenvironmental assessment yielded poor results in terms of identifiable material, with multiple samples selected failing to produce any charred plant remains. The small quantities of wood charcoal were insufficient for further analysis. They may have been generated during activities associated with the burnt mound site and with general activity in the vicinity.

Geoarchaeology

Keith Wilkinson

Borehole samples were taken from well 0205/5105 for geoarchaeological analysis, recovery of waterlogged plant remains, palynological assessment and radiocarbon dating.

Geoarchaeological assessment was conducted at the site in January 2022, with laboratory examination of the cores completed a week later. This report is an edited version of the full text presented in the archive report (Wilkinson 2024).

Methodology

The work comprised the drilling of two boreholes into the fills of well feature 0205/5105. The locations of the borehole collars were surveyed using an RTK GPS (Fig. 3.7, Section AA). The boreholes were drilled from the ground surface to 4m below ground level (bgl) by which point the pre-Holocene geological substrate was reached. The drilling equipment comprised a two-stroke petrol-powered Atlas Cobra TT hammer, used to drive a 54mm diameter by 1m-long core sampler. Labelled (with site code, depth increment and annotation indicating top and bottom of the core) 50mm diameter plastic tubes were inserted in the core sampler prior to each drive and held in place by a core-catching device (which prevented sediment loss during removal of the core sampler from the borehole) and a 50mm-long cutting shoe. The plastic tube containing the core was removed and caps were placed on each end to prevent contamination and moisture loss on completion of each 1m long drive.

In ARCA's Winchester laboratory the outer surface of the plastic tubes containing the cores were cleaned. Each core was then passed in 30mm increments through a 60mm core logging sensor (MS2c) attached to a Bartington MS2 meter in order to collect volume magnetic susceptibility data (Bartington Instruments 2022). Core tubes from one of the boreholes (ARCA BH01) were then cut open using a hooked knife, with the sediments so revealed 'cleaned' by removing *c.* 1mm of surface material; these were photographed and described using standard geological criteria (Jones *et al.* 1999; Munsell Color 2000; Tucker 2011). On completion the cores were wrapped in plastic film to prevent contamination and moisture loss. Core tubes from the second borehole (ARCA BH02) were retained intact for later sub-sampling by Cotswold Archaeology.

Lithological and magnetic susceptibility data were combined with RTK GPS-derived location data within a RockWorks 17 database (RockWare 2017) which was employed to generate the composite diagram shown in Figure 3.11.

Results and discussion

Three lithostratigraphic units (equivalent to archaeological contexts/phases) were noted in the cores described from ARCA BH01.

The lowest, BH01 Unit 1, sub-cropped below 3.20m bgl (+52.08m OD) and comprised a compact, poorly sorted silt/clay with moderate to frequent chalk gravel inclusions. Magnetic susceptibility in the unit was relatively low at <30 SI units x10-8m^3, except in the transition zone with the overlying Unit 2 at 3.36–3.20m, where highly magnetic particles in the latter have increased the apparent magnetisation. The components of the Lowestoft Formation are not inherently magnetised, being derived from weathering of chalk and crag strata to the north and transport southwards within a glacier. The unit comprises the pre-Holocene superficial geology of the site, i.e. the Lowestoft Formation (*sensu* BGS 2025). The latter is till formed as a result of glacier collapse during the Marine Isotope Stage 12 cold stage, *c.* 400,000 years ago.

BH01 Unit 2 sub-cropped between 1.91 and 3.20m bgl (+53.37 and +52.08m OD) and consisted of mineral silt/clays interspersed with thin beds of wood (the latter between 2.54 and 3.00m bgl). Burnt inclusions were noted at 2.24–2.34m bgl, while terrestrial and freshwater mollusc shell was encountered at 2.56–2.70m bgl. Magnetic susceptibility in Unit 2 was variable but generally high, reaching 258.3 SI units x10^{-8} m^3 at 2.87m bgl in ARCA BH01; in ARCA BH02 the readings reached 425.6 SI units x10^{-8}m^3 at 2.81m bgl. These measurements are an order of magnitude higher than in either Unit 3 or Unit 1. Indeed, given that the Lowestoft Formation does not contain ferromagnetic mineral, the high magnetic susceptibility of Unit 2 can only have been caused by the incorporation of burnt iron-containing minerals, e.g. ceramics or other burnt clay (but probably not flint). The Unit 2 deposits, therefore, appeared to be a mixture of deliberate deposition (the wood), accidental loss and/or discard (ceramics) and natural accretion (mineral silts and clays) – the latter comprising reworked fine-grained sediment from the Lowestoft Formation (Unit 3). It is very likely that Unit 2 accumulated during human use of the site. Also worthy of note is that magnetic susceptibility measurements >90 SI units x10^{-8}m^3 continued downwards to 3.51m bgl in BH02

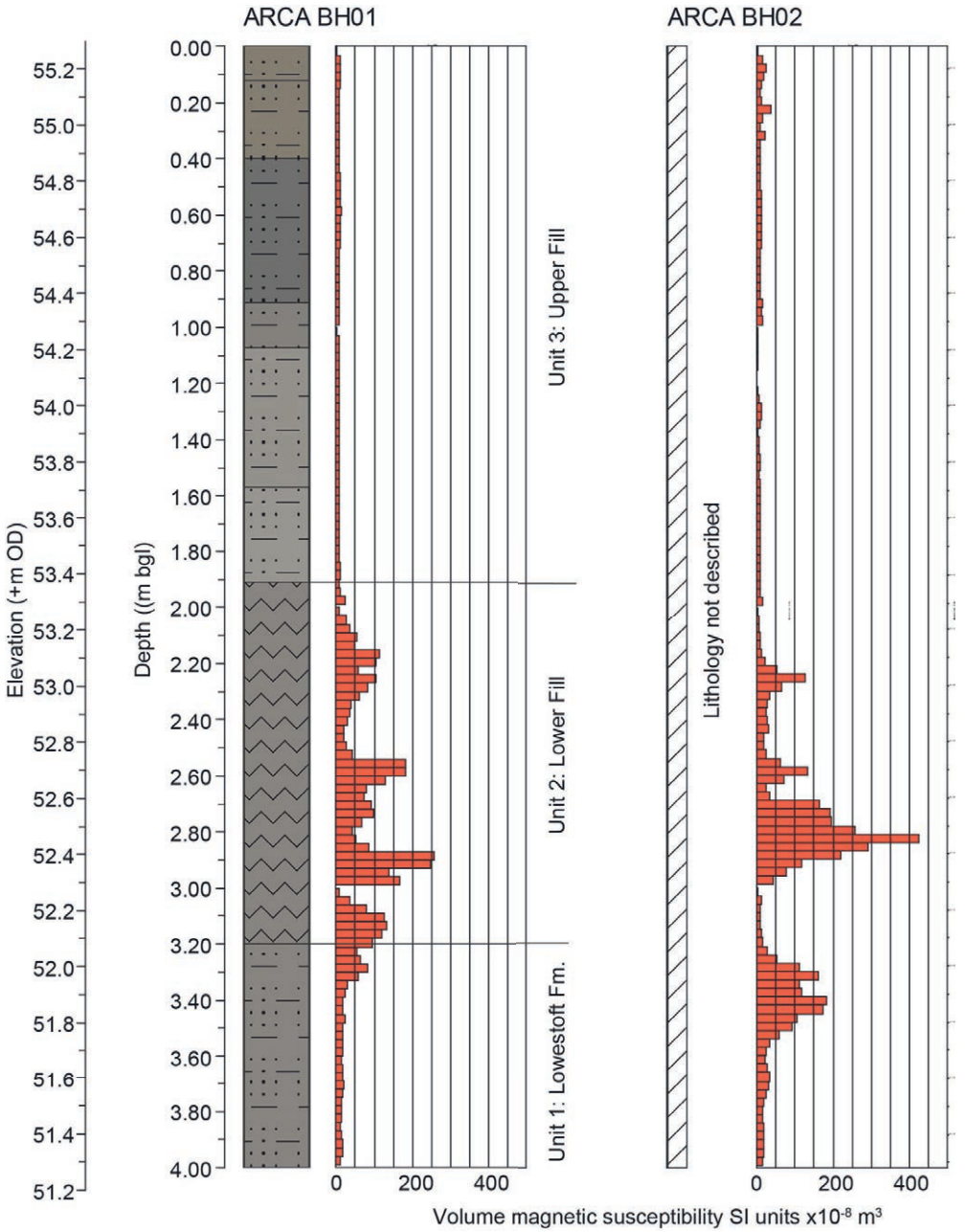


Figure 3.11 Framlingham Road, Laxfield: well 0205/5105, lithostratigraphy of BH01 and magnetostratigraphy of BH01 and BH02

(cf. 3.21m bgl in BH01). These data suggest that the lower contact of the Unit 2 stratum dips down southwards at *c.* 45⁰ between ARCA BH01 and ARCA BH02, suggesting in turn that the centre of the cut feature was south of ARCA BH02.

Unit 3 sub-cropped above 1.91m bgl (+53.37m OD). It comprised strata of varied colour and consisted of moderate and well sorted silt/clays. Iron stains were found throughout with a trend of change from a vertical alignment (probably following former root channels) below 0.91m bgl to granular and pebble-sized patches above this depth. These iron stains are diagenetic (post-depositional) and reflect water table movements within the strata, while the root channels highlighted by iron stains at 0.91–1.51m bgl suggest former stable surfaces at and/or above these depths. Magnetic susceptibility was recorded at <20 SI units $x10^{-8}m^3$ throughout the unit, indicating that burnt mineral particles were not incorporated within the deposits. The unit as a whole is likely to have formed because of weathering and reworking (by overland flow) of the fine-grained part of the Lowestoft Formation. Given the absence of artefacts and paucity of gravel-sized particles, it is likely that the infilling of the cut feature by Unit 3 took place following site abandonment.

The sequence in relation to archaeological interpretation of the well has been discussed above.

Table 3.2 Palaeoenvironmental remains from borehole sample (BH01) from well 0205/5105

Site		LXD 135	LXD 135	LXD 135
Area		BH01	BH01	BH01
Context		Unit 2	Unit 2	Unit 2
Depth		3.10–3.15m	2.30–2.38m	1.95–2m
Waterlogged material				
cf. Nuphar lutea (L.) Sm.	yellow water-lily	+	–	–
Ranunculus acris/repens/bulbosus L.	meadow/creeping/bulbous buttercup	–	+	–
Ranunculus Batrachium	crowfoot	–	+	–
Ranunculus sceleratus L.	celery-leaved buttercup	–	+	–
Ranunculus aquatilis L.	common water-crowfoot	–	+	–
Urtica dioica L.	common nettle	+	+	–
Urtica urens L.	small nettle	+	+	–
Corylus avellana L.	hazelnut shell	–	+	–
Chenopodium sp.	goosefoot	+	–	–
Stellaria sp. L.	stitchworts	+	+	–
Silene L.	campions	–	+	–
Rumex sp. L.	docks	+	+	–
Rumex crispus L. Type	curled dock	–	+	–
Rubus sp.	brambles	+	+	–
Prunus spinosa/Crataegus type thorn	blackthorn/hawthorn	–	+	–
Cornus sp. L.	dogwood	–	+	–
Torilis sp. Adans	hedge-parsley	+	–	–
Solanum cf. dulcamara L.	bittersweet	+	–	–
Lamium sp.	dead-nettle	+	+	–
Sambucus nigra L.	elder	+	+	+
Carduus/Cirsium sp.	thistle	+	–	–
Sonchus sp.	sow-thistle	–	+	–
Woody stems/twigs frags > 2mm		+	+	+
Bud		–	+	–
Thorns		–	+	–
Chara	stonewort	+	–	–
Other material				
Charcoal >2mm		+	+	–
Insect remains		+	+	–
Daphane ephiphibium	water flea eggs	+	+	–
Shells				
Open country species				
Vertigo sp.		–	+	–
Intermediate species				
Trochulus hispidus		+	–	–
Shade-loving species				
Carychium tridentatum		–	+	–
Aegopinella nitidula		+	–	–
Oxychilus cellarius		–	+	–
Merdigera obscura		–	+	–
Clausilia bidentata		–	+	–
Intermediate aquatic species				
Pisidium sp.		–	+	–
Ostracods		+	+	–

Key: + = 1–49 items; ++ = 50–99 items; +++ = 100+ item

Plant macrofossils (waterlogged)

Sarah F. Wyles

Introduction and methodology

Three small samples were taken from Unit 2 of Borehole 01 (BH01) at 3.10–3.15m, 2.30–2.38m and 1.95–2.00m, with a view to recovering environmental material to help determine the nature of the local environment and for radiocarbon dating. The samples were processed by standard wet sieving for the recovery of waterlogged remains using a 0.25mm mesh sieve (CA 2012). No charred plant remains and only a small number of comminuted charcoal fragments were recovered in these samples. However, preliminary identifications of the plant macrofossils preserved by waterlogging are noted in Table 3.2, following nomenclature of Stace (1997). Mollusc shells were noted in two of the samples and the range of species represented in them has been recorded in Table 3.2. Nomenclature for the mollusc assemblages follows Anderson (2005) and details of the ecological preferences of the species follow Evans (1972), Kerney (1999) and Davies (2008).

Results

Similar assemblages of waterlogged plant material were recovered from the samples from Unit 2 at 3.10–3.15m and 2.30–2.38m. Little material was noted in the sample from 1.95–2.00m. The waterlogged remains included those of species indicative of a number of different habitats: yellow water lily (*Nuphar lutea*), common water crowfoot (*Ranunculus aquatilis*) and stonewort (*Chara* sp.) would have thrived in the aquatic environments in the well; celery-leaved buttercup (*Ranunculus sceleratus*) and curled dock (*Rumex crispus*) would have favoured damper areas near

the well; hazel (*Corylus avellana*), brambles (*Rubus* sp.), blackthorn/hawthorn (*Prunus spinosa/Crataegus monogyna*) and dogwood (*Cornus* sp.) are all species which can thrive in woodland edge/hedgerow/scrub environments, and thistles (*Carduus/Cirsium* sp.), sow thistle (*Sonchus* sp.), deadnettle (*Lamium* sp.), common nettle (*Urtica dioica*) and small nettle (*Urtica urens*) are all species typical of waste land/rough grassland.

The mollusc remains were dominated by shade-loving species. These assemblages appear to be indicative of a hedgerow, scrub or woodland edge environment in the vicinity, also suggested by the pollen results (see below).

Pollen

Michael J. Grant

Introduction

Pollen analysis was undertaken on ten samples from the Borehole 01 (BH01) fill sequence from the Bronze Age well, 0205/5105 (Fig. 3.7, Section AA). The resulting pollen record study shows an environment dominated by open grassland with local woodland communities. These woodlands might have been managed and associated with the burnt mound. A change in land use is observed through the record, with a transition from open water within the well to an infilled sequence hosting damp ground communities. The infilling of the well coincides with a change in the local woodland communities, possibly as a result of a discontinuation of management/use of the woodland after the burnt mound site was abandoned. Coincidental with this change is a shift in land use, with calcareous, probably well-drained, grassland appearing in the record, possibly associated with the Middle Bronze Age coaxial field system established in Area 2, prior to a final phase of woodland clearance and renewed land use at the end of the sequence. These changes are to an extent fixed by the two radiocarbon assays achieved for the sequence (see also Aitken below).

Analysis aims

The analysis was undertaken following an assessment of four samples that demonstrated good preservation and potential for providing a robust palynological sequence. The pollen analysis aimed to increase the number of samples to identify any local changes in the pollen assemblage through the sequence; obtain extended pollen counts, up to 400 total land pollen, to produce more statistically robust results and increase the number of taxa identified in the pollen record; and provide an interpretation of the local environment based upon the pollen assemblage.

Methodology

Standard preparation procedures were used (Moore *et al.* 1991). Ten samples were selected for preparation from BH01, with 2cm³ of sediment processed from each. To each a *Lycopodium* spike was added (one tablet from batch 100320201) to allow the calculation of pollen concentrations (Stockmarr 1971). All samples received the following treatment: 20 mls of 10% KOH (80°C for 30 minutes); 20 mls of 60% HF (80°C for 120 minutes); 15 mls of acetolysis mix (80°C for 3 minutes); stained in 0.2% aqueous solution of safranin and mounted in silicone oil following dehydration with tert-butyl alcohol. Due to the highly minerogenic nature of these samples, additional sieving and decanting was undertaken between the KOH and HF stages.

Pollen counting was undertaken at a magnification of x400 using a Nikon Eclipse Ci-L transmitted light microscope. Determinable pollen and spore types were identified to the lowest possible taxonomic level with the aid of a reference collection kept at COARS, University of Southampton. The pollen and spore types used are those defined by Bennett (1994; Bennett *et al.* 1994), with the exception of Poaceae, which follow the classification given by Küster (1988), with Cerealia-type grains further classified using Andersen (1979) with plant nomenclature following to Stace (2010). A total land pollen (TLP) sum of 400 grains was achieved from all ten samples. Local pollen assemblage zones (LPAZs) have been determined through cluster analysis performed using CONISS (constrained incremental sum of squares clustering) (Grimm 1987). The results are plotted on a pollen diagram drawn using Tilia 3.0.1 (Grimm 1991).

Results

The results of the pollen analysis are shown in Figures 3.12 and 3.13. Three LPAZs have been defined for the sequence. Pollen concentrations were high in all samples, between 23,280 and 180,240 grains cm^{-3}. The pollen assemblage is dominated by Poaceae (grasses) with *Plantago lanceolata* (ribwort plantain) abundant, indicating local ground disturbance. Tree and shrub pollen is between 30–40% TLP in LPAZ Lax-01, increasing to 50% TLP at the end of the zone and through LPAZ Lax-02, then reducing to <30% TLP in LPAZ Lax-03. The principal woodland components are *Quercus* (oak), *Corylus avellana*-type (hazel), *Acer campestre* (acer) and *Sorbus*-type (whitebeams and cherries), which were present throughout the sequence. *Alnus glutinosa* (alder) is also present throughout, increasing in abundance up-sequence. Other notable trees and shrubs present in lower amounts were *Pinus sylvestris* (pine), *Tilia cordata* (small-leaved lime), *Fraxinus excelsior* (ash), *Salix* (willow) and *Sambucus nigra* (elder), with occurrences of *Picea* (spruce), *Juniperus communis* (juniper), *Ulmus* (elm), *Fagus sylvatica* (beech), *Betula* (birch), *Populus* (poplar and aspen) and *Cornus sanguinea* (dogwood). *Hedera helix* (ivy) is only present in association with LPAZ Lax-02 and adjacent samples. The tree and shrub assemblage present throughout the sequence implies the presence of woodland edge components. It is worth noting that the increase in tree and shrub taxa occurs above the middle fill that contains wood remains, between 2.54 and 3.00m, where *Corylus avellana*-type (hazel) reduces and *Sorbus*-type (whitebeams and cherries) increases at the end of LPAZ Lax-01, prior to the expansion of *Alnus glutinosa*, *Acer campestre* and *Corylus*

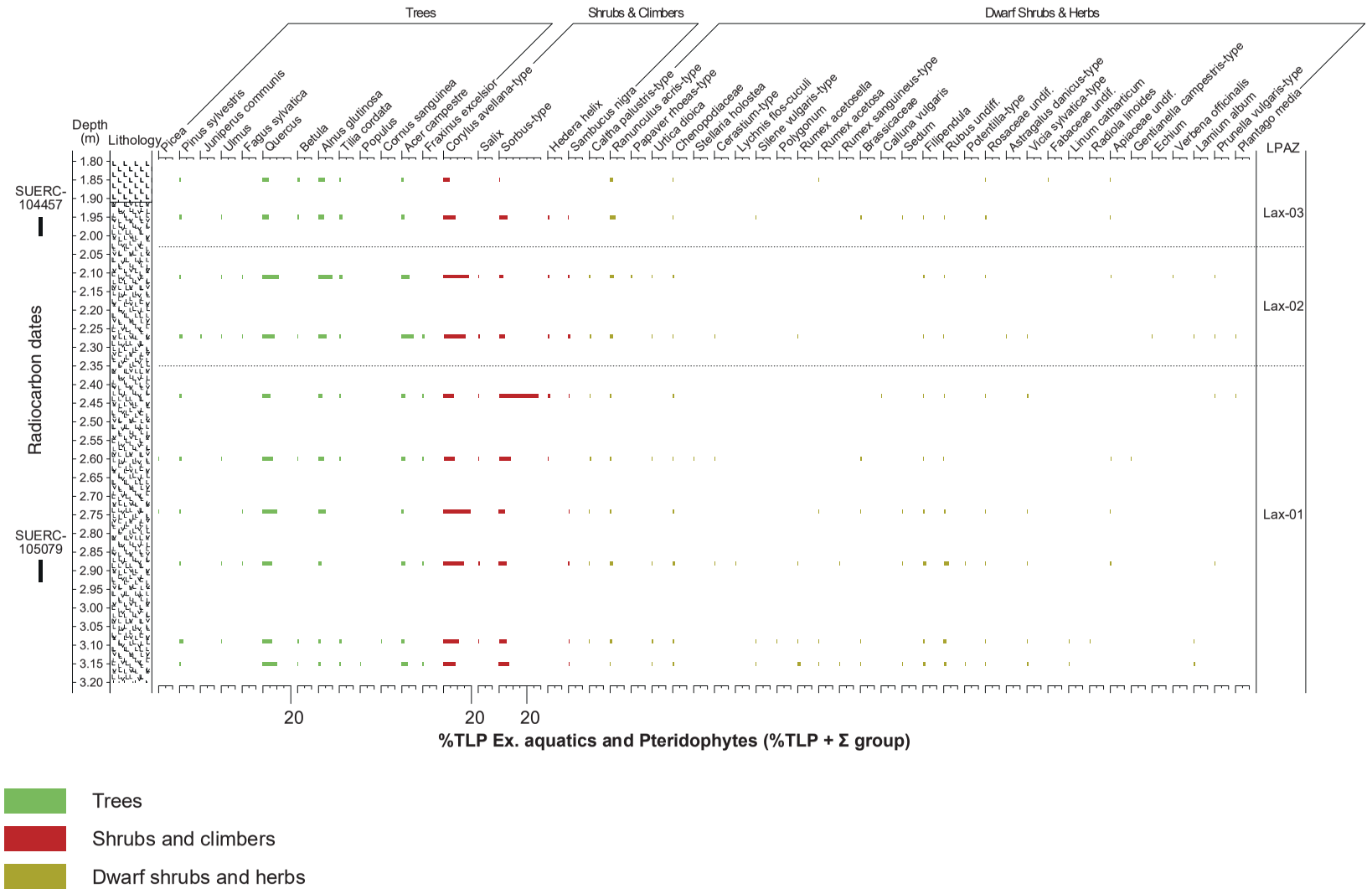


Figure 3.12 Framlingham Road, Laxfield: well, pollen analysis results from BH01

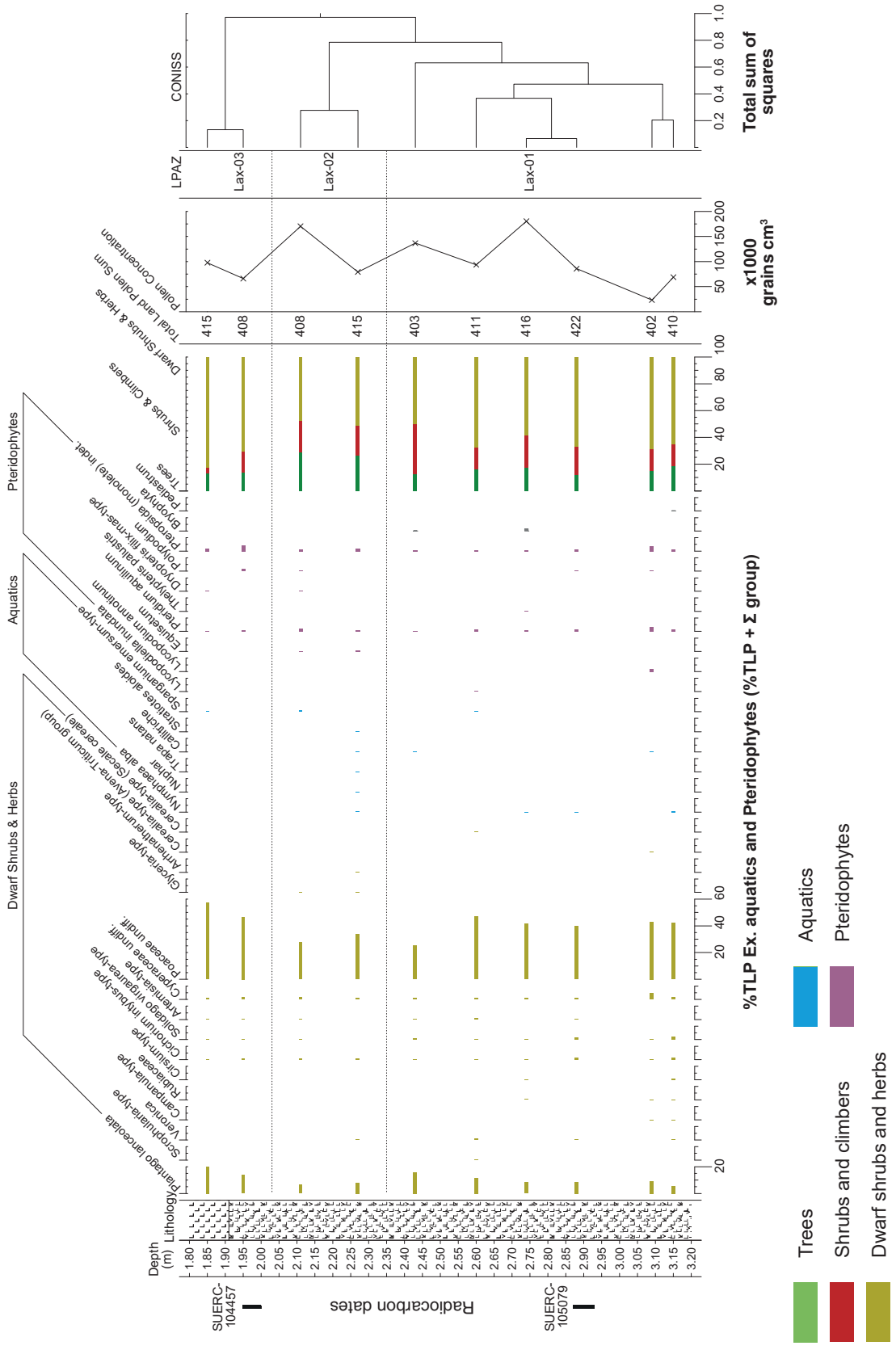


Figure 3.13 Framlingham Road, Laxfield: well, pollen analysis results from BH01

avellana-type (alder, acer and hazel) in LPAZ Lax-02 as *Sorbus*-type reduces.

A number of pre-Quaternary palynomorphs and foraminifera test linings were observed within the samples that indicate the incorporation of older reworked material from the local Lowestoft Formation, which might also be the origin of the *Picea* (spruce) (which was generally poorly preserved), some of the *Pinus sylvestris* (pine) and the *Lycopodium annotinum* (interrupted clubmoss).

Within the dwarf shrub and herb taxa *Plantago lanceolata* (ribwort plantain) is notably abundant, implying local ground disturbance. Other taxa present that are commonly associated with disturbance include *Urtica dioica* (common nettle), *Rumex acetosa* (common sorrel), *Rumex acetosella* (sheep's sorrel), *Cirsium*-type (thistle), *Cichorium intybus*-type (dandelions and chicory) and *Pteridium aquilinum* (bracken), which are all most abundant at the base of the sequence.

Many of the herb taxa present in the sequence are commonly associated with woodland edge, open woodland and/or scrub communities. These include *Stellaria holostea* (greater stitchwort), *Campanula*-type (bellflower), *Lamium album* (white deadnettle), *Rubus* sp. (bramble), *Rumex sanguineus*-type (wood dock), *Scrophularia*-type (figwort) and *Vicia sylvatica*-type (wood vetch). Taxa that may be associated with this environment could also include *Veronica* (speedwell) and *Radiola linoides* (allseed), though these can also be found in area of damp or bare ground, whereas *Sedum* (stonecrop) and *Arrhenatherum*-type (false oat-grass) can be found in both woodland margins and open ground. These taxa are more abundant towards the base of the sequence. *Dryopteris filix-mas* (male fern) and *Polypodium* (polypody) are also present, likely to be associated with areas of woodland, most commonly found in the same levels as *Hedera helix* (ivy) in LPAZ Lax-02/3. There are possible hints of some local heath communities in the form of *Calluna vulgaris* (heather) and *Lycopodiella inundata* (marsh clubmoss).

While woodland edge communities are an important component of the pollen assemblage, open ground is the dominant pollen signal, notably by the high percentage of Poaceae (grasses). Other indicators of grassland and open ground include *Cerastium*-type (mouse-ears), *Silene vulgaris*-type (bladder campion), *Polygonum* (knotweed), *Plantago media* (hoary plantain), *Potentilla* (cinquefoil; though this can also be found in hedgebanks) and *Gentianella campestris*-type (field gentian). Of note are a number of taxa that are commonly associated with calcareous soils, often well-drained, including *Papaver rhoeas*-type (poppy), *Astragalus danicus*-type (purple milk-vetch), *Linum catharticum* (fairy flax), *Echium* (viper's-bugloss) and *Verbena officinalis* (vervain). These taxa are more commonly found in LPAZ Lax-02. Also of note are single grains of Cerealia-type pollen, attributed to *Avena-triticum* (oat-wheat) and *Secale cereale* (rye), from the base of the sequence.

Local damp ground, probably associated with the well margins, is identified by the presence of *Lychnis flos-cuculi* (*Silene flos-cuculi*; ragged robin), *Filipendula* (meadowsweet), *Caltha*-type (marsh marigold), *Glyceria*-type (sweet-grass), *Thelypteris palustris* (marsh fern), *Sparganium emersum*-type (unbranched bur-reed), *Equisetum* (horsetail) and *Ranunculus acris*-type (buttercup family), the latter corresponding with the plant macrofossil record, which contained seeds of *Ranunculus aquatilis* (common water crowfoot) and *Ranunculus sceleratus* (celery-leaved buttercup) that are found in aquatic and damp ground areas. These pollen taxa were more prevalent in the upper part of the sequence, which coincides with the plant macrofossil record where the *Ranunculus* sp. were in the sample from 2.30 to 2.38m, coinciding with the base of LPAZ Lax-02. Aquatic plants within the well itself are shown by the presence of *Nymphaea abla* (white water lily), *Nuphar* (yellow water lily), *Calltirche* (water starwort), *Stratiotes aloides* (water soldier), as well as a single occurrence of *Trapa natans* (water chestnut). These imply the presence of shallow open water within the well at this time, coinciding with LPAZ Lax-01 and 02 but probably no longer present by LPAZ Lax-03.

Discussion

The pollen assemblage from well 0205/5105 clearly shows a complex local environment, consisting of open grassland, probably calcareous and in places well-drained, with areas of local woodland close to the well consisting predominantly of low-stature trees commonly found in woodland margins or hedgerows, notably *Acer campestre*, *Corylus avellana* (hazel), *Sambucus nigra* (elder) and *Sorbus*-type (whitebeams and cherries), along with some *Quercus* and *Alnus glutinosa* (oak and alder), the latter probably associated with damper soils. This woodland component is accompanied by a rich herbaceous layer associated with open woodland or woodland margin communities. Through the sequence there is a clear shift in the proportions of these taxa, with the understorey herb taxa most common in LPAZ Lax-01, coinciding with the main *Sorbus*-type phase and the presence of wood remains in the well sediments themselves. The presence of aquatic taxa throughout this zone, albeit in low amounts, suggests that the well held open water during this period, though damp margin taxa become more prevalent through LPAZ Lax-02 and 03, probably representing an infilling of the well and colonisations of the surface by vegetation leading to the loss of the open water aquatic species. This is consistent with the volume magnetic susceptibility measurements on BH01, which show increased values throughout Unit 2, reducing to low levels above *c.* 2.00m, coincident with the LPAZ Lax-02/03 boundary. These increased values are likely to be associated with human activity on the site and the incorporation of burnt iron-containing minerals into the well. The presence of the earlier Bronze Age burnt mound complex is likely to have been a key contributor, both to the delivery of these elevated magnetic susceptibility measurements into the well and to the increased ground disturbance indicated by the elevated *Plantago lanceolata*. This may

Table 3.3 Radiocarbon results from Laxfield

Lab ID	Sample ID	Cut	Context description	Details	Charred material dated	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calibrated date BC (95.4% probability)	Calibrated date BC (68.3% probability)
–	BH01	0205/ 0515	Borehole BH01 Unit 2 (3.10–3.15m)	Well	–	–	–	Failed	–
SUERC-104457	BH01	0205/ 0515	Borehole BH01 Unit 2 (1.95–2.0m)	Well	Waterlogged twig	-28.1	2943±24	1253–1250 (0.4%) 1225–1051 (95.0%)	1210–1119 (68.3%)
SUERC-105079	BH01	0205/ 0515	Borehole BH01 Unit 2 (2.87–2.93m)	Well	Waterlogged twig	-31.0	3099±24	1426–1291 (95.4%)	1415–1381 (33.8%), 1343–1308 (34.5%)

mean that LPAZ Lax-01 and -02 are contemporary with the subsequent use of the well, following the abandonment of the burnt mound activities. The change in the pollen assemblage at the LPAZ Lax-01/02 boundary is dated by the two radiocarbon samples below and above it to between 1290–1050 BC, with an increase in some woodland taxa at the expense of *Sorbus*-type, possibly representing the abandonment of the Middle Bronze Age field system and therefore a partial recovery of woodland species. For instance, if some form of woodland management had been taking place for fuel and other purposes, this would have led to a suppression of flowering of some trees if on a short management cycle, such as coppicing (see Waller *et al.* 2012), permitting increased light to the herbaceous understorey (see Bunting *et al.* 2016), which may account for their increased representation in LPAX Lax-01. An abandonment of such woodland management practices would have led to increased canopy development and flower production in some trees, notably *Alnus glutinosa* and *Corylus avellana*-type. This increase in canopy could have also led to an increase in climbers and ferns, such as *Hedera helix* and *Polypodium*, as seen in LPAZ Lax-02. It is also worth noting that LPAZ Lax-02 shows an increase in taxa associated with calcareous grassland, which might suggest a wider change in land use, possibly associated with the Middle Bronze Age coaxial field system. A shift in focus from Area 1 to Area 2 in LPAZ Lax-02 is consistent with the reduction in Poaceae and *Plantago lanceolata* observed in this zone, suggesting less local ground disturbance, some local woodland regeneration and the abandonment of the maintenance of the well, permitting it to infill in the upper reaches of Unit 2 and a shift in on-site conditions from open water to damp ground communities. By LPAZ Lax-03 grassland and local disturbance has significantly increased again, with the woodland showing a reduction towards the top of the pollen sequence, coincident with the change from Unit 2 to 3 in the well sequence.

Conclusion

The pollen sequence from well 0205/5105 shows a complex local vegetation pattern during the Middle Bronze Age, with open water within the well, marginal damp ground communities and areas of local woodland and grassland. Changes observed through the sequence suggest a shift in the use/management of the local woodland, which might be related to the use of the adjacent burnt mound and the subsequent construction, use and abandonment of field systems/enclosures. The well is shown to infill during the Middle Bronze Age, with the loss of open water communities, and what appears to be an expansion of calcareous grassland, with the woodland significantly reduced by the end of this record. The changes observed in the pollen record probably mirror the changes in Bronze Age land use observed in the archaeological record from Areas 1 and 2. The pollen and plant macrofossil records from the well are in strong agreement, showing many of the same plant species present in both.

Radiocarbon dating

Summarised by Emma Aitken

Radiocarbon dating was undertaken in order to confirm the date of three samples from borehole BH01 – Unit 2. The samples were analysed during June 2022 at Scottish Universities Environmental Research Centre (SUERC). The methodology employed by SUERC Radiocarbon Laboratory is outlined in Dunbar *et al.* (2016).

The uncalibrated dates are conventional radiocarbon ages. The radiocarbon ages were calibrated using the University of Oxford Radiocarbon Accelerator Unit calibration programme OxCal v4.4.2 (Bronk Ramsey 2009; https://c14.arch.ox.ac.uk/oxcal.html) using the IntCal20 curve (Reimer *et al.* 2020). Carbon isotope ($\delta^{13}C$) data was recorded (Table 3.3).

The results suggest that the earliest fills of well 0205/5105 had developed before *c.* 1500 BC.

Chapter 4
Hepworth

Abby Antrobus, Rebecca Smart and Richard Mortimer

Introduction

Overview

This chapter provides an overall summary of the site sequence from the excavations at Sumner Road, Hepworth, followed by details of the Bronze Age archaeological remains. Selected summary finds reports are presented, where they relate to understanding the remains of a burnt mound recorded at the site. These include heat-altered stone and worked flint (Michael Green). The results of geoarchaeological analysis (Agata Kowalska) and radiocarbon dating follow (Emma Aitken). Full details of evidence from the site can be found in the archive report (Smart and Mortimer 2022) and in the site archive, which includes full catalogues of the material. The site at Hepworth was smaller than those at Marham Park (Chapter 2) and Laxfield (Chapter 3), and more limited in both environmental and artefactual evidence, but it contributes to our growing understanding of these features and their dating within the high boulder clay landscape of central Suffolk.

Project background

Archaeological work took place in January and February 2022 in advance of a planning application for the development of Stanton Business Park at Shepherd's Grove, on a former RAF airfield that spanned the boundary between the parishes of Stanton and Hepworth (NGR 598813 273269, Figs 4.1 and 4.2). The work was undertaken by Cotswold Archaeology (CA) and funded by Jaynic Suffolk Park Ltd. It was facilitated and overseen by Chris Clarke of RPS Consulting and specified and monitored by Rachael Abraham of Suffolk County Council Archaeological Service.

An area of 0.112ha was excavated within the parish of Hepworth in the north-eastern corner of the wider development area (Fig. 4.2), following on from a desk-based assessment (Clarke 2020), geophysical survey (Magnitude 2020), monitoring of geotechnical investigations (Derosiers-Whalley 2021) and the trenched evaluation of the wider 37ha site (Smart 2022). Overall a high degree of disturbance was evident from previous airfield and industrial use, and the excavation focused on surviving remains in a previously undisturbed and undeveloped area, particularly where there was evidence of the burnt mound. The wider site was allocated code SNT 090 by the Suffolk Historic Environment Record (HER), with code HPE 011 for the excavation area (Figs 4.1–4.3).

Full details of the excavation methodologies and approaches to features are presented in the site archive report (Smart and Mortimer 2022).

Location, topography and geology

The excavation area was situated in the northern part of the wider development area, bounded by Bury Road to the north, Sumner Road to the east and an industrial estate to the south. It was located on a relatively high, north-facing plateau top of clay upland on generally level ground at a height of 55m above Ordnance datum (AOD), although the excavation area itself sloped down from east to west. Tributaries of the Little Ouse flow northwards to the west, north and east of the plateau, while the land to the south drops towards Stowlangtoft Stream (Fig. 4.2).

The underlying bedrock geology was Lewes Nodular Chalk Formation, overlain by superficial deposits of the Lowestoft Diamicton formation (BGS 2025). Across the site the substrate appeared as varied glacial tills of this formation. To the east light clay was observed, with clayey silt in the centre and a component of limestone brash to the west. Most archaeological features were on the siltier band on the higher part of the site; during rain the area in the slight valley to the west was noted to flood. The underlying chalk may possibly have provided a source of flint exploited at the burnt mound site, being washed out by the adjacent stream.

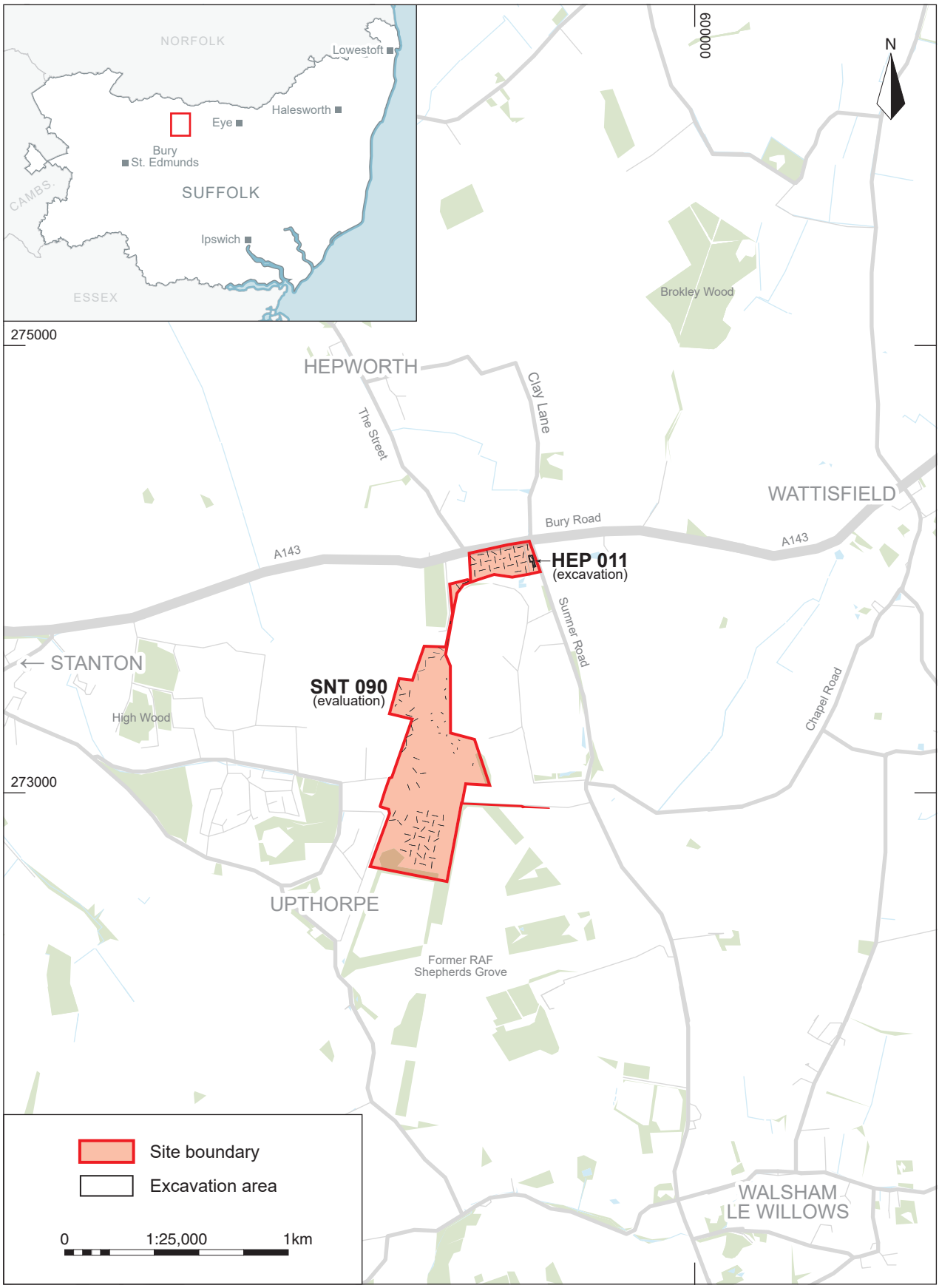


Figure 4.1 Sumner Road, Hepworth: site location

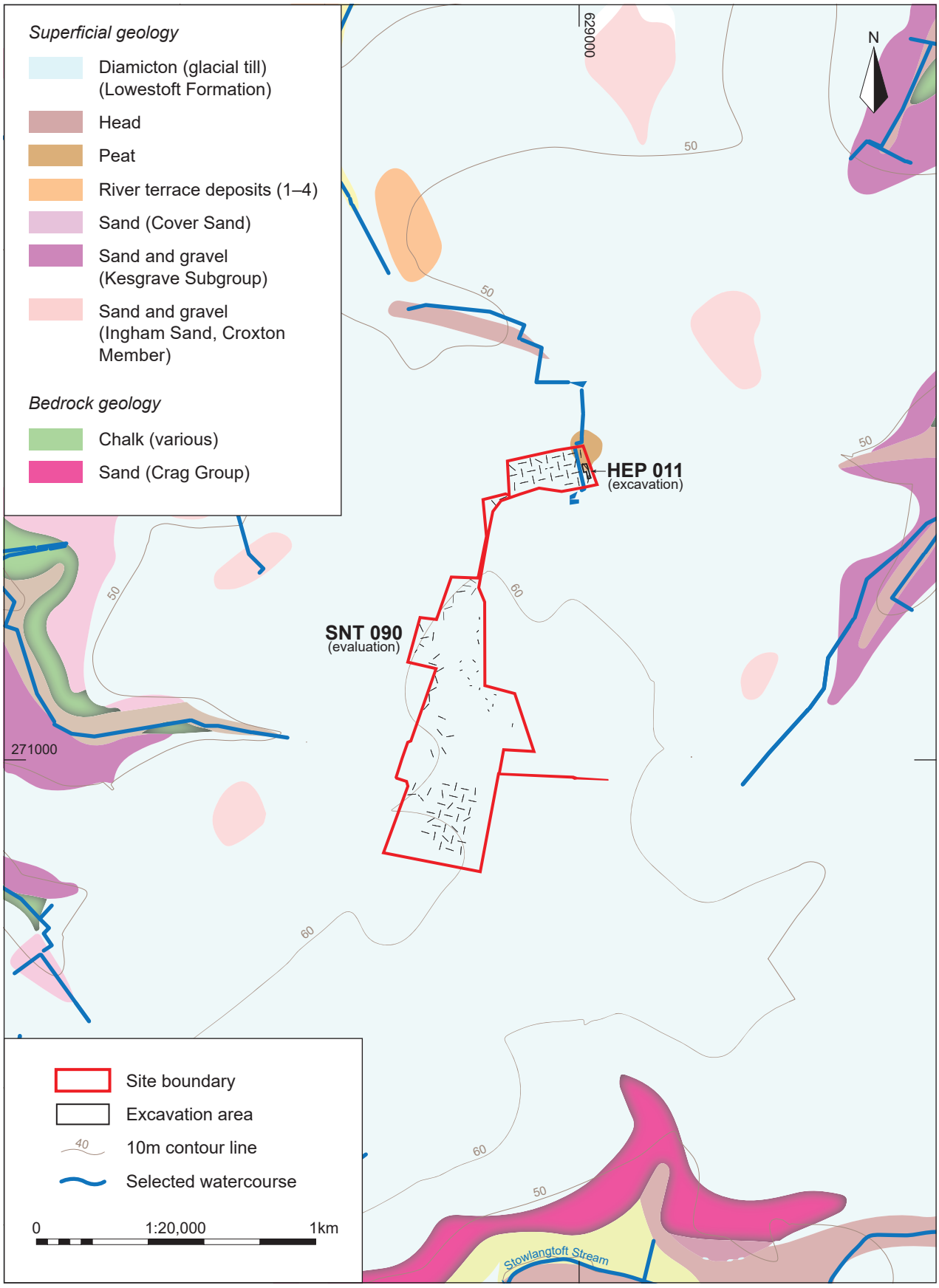


Figure 4.2 Sumner Road, Hepworth: geology, rivers and contours

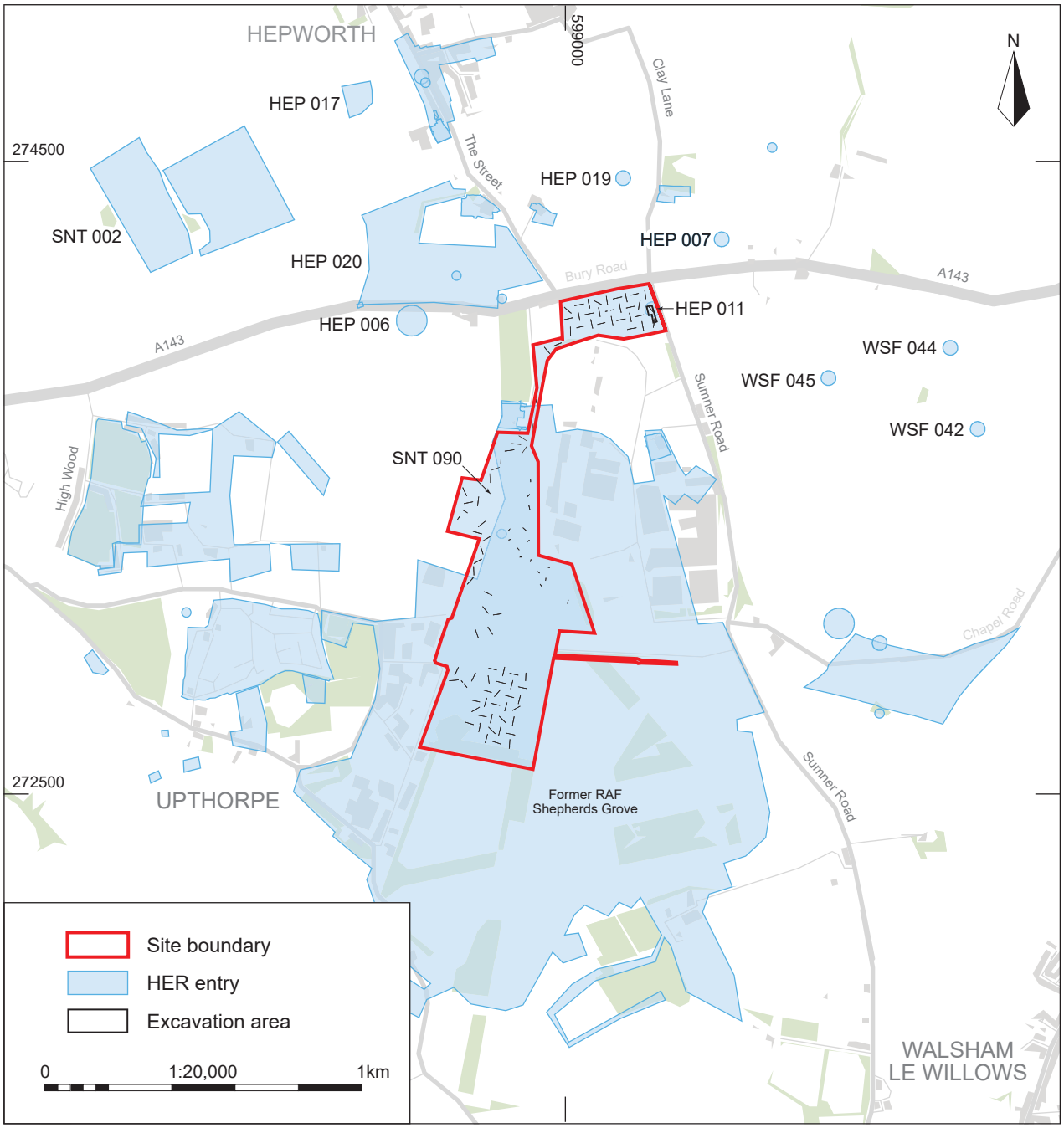


Figure 4.3 Sumner Road, Hepworth: archaeological context

Archaeological context

Archaeological discoveries made in the vicinity of the site that are captured in the Suffolk HER (SCC 2025a) are shown in Figure 4.3, labelled where they are mentioned in the text. Prehistoric finds have been recorded from the general area. These include two residual Neolithic flint axe heads, one discovered *c.* 900m to the north of the study site and the second recovered from *c.* 600m to the east, these both notably off the high clay plateau (HER HNY 051, not illustrated, and WSF 045). A spread of Neolithic flint flakes and cores was found further to the east near Wattisfield Hall, *c.* 1.1km to the east of the study site boundary (WSF 021, not illustrated). A Bronze Age spear head was recovered approximately 300m to the north-west of the study site boundary (HEP 020). A large burnt flint scatter was noted at SNT 028, on the same contour (*c.* 55m AOD) some 3km to the south-west on the plateau above the village of Stanton (not illustrated).

Isolated surface finds also attest to Roman activity in the area; a brooch and several coins were found *c.* 300m to the north-west (HEP 006, HEP 020), with further pottery sherds found to the north-east (HEP 007 and WSF 044). Several Roman pottery and tile kilns were excavated

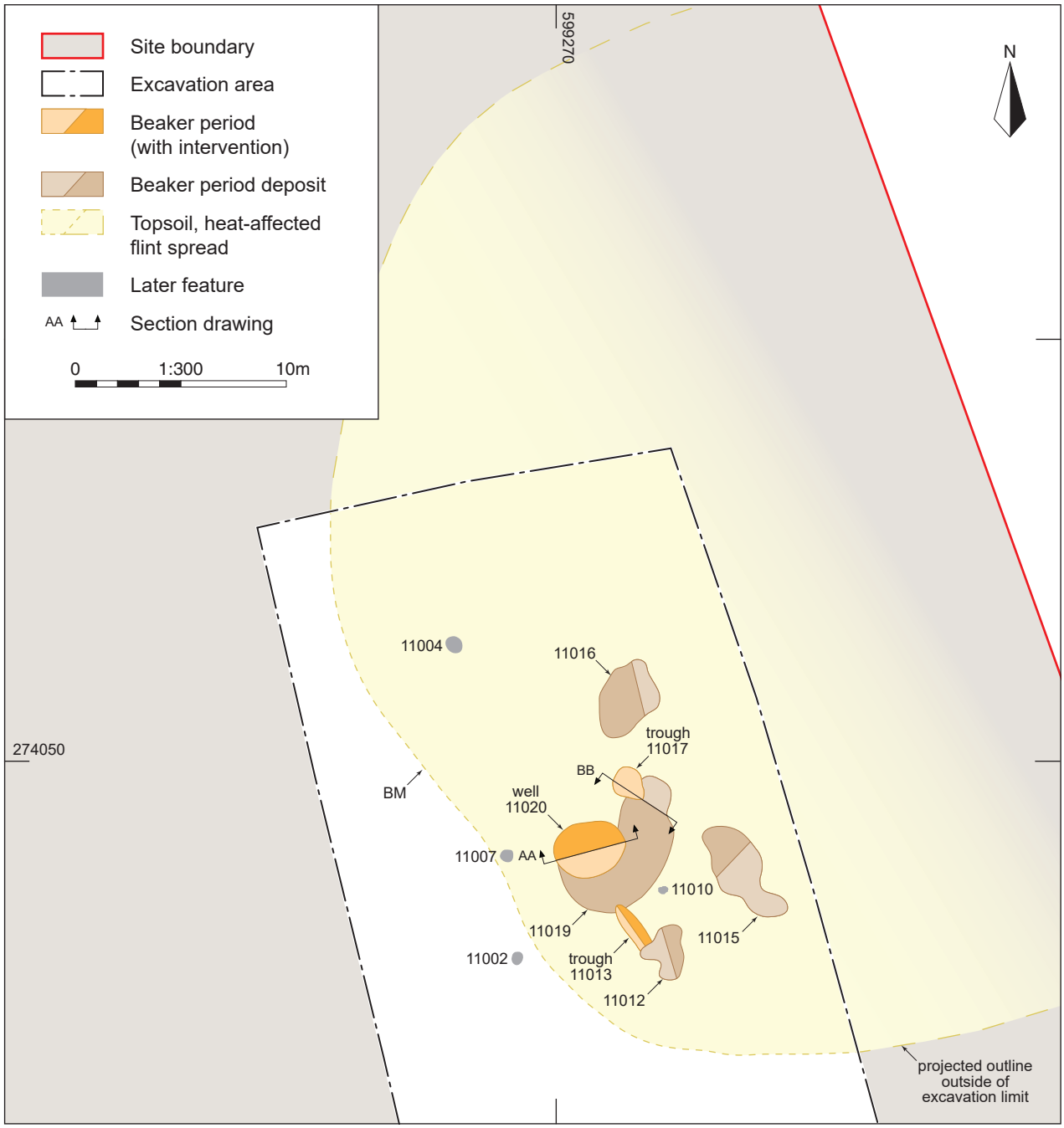


Figure 4.4 Sumner Road, Hepworth: Beaker period

approximately 1.2km to the north-west and 1.1km to the east during the mid 20th century (SNT 002 and WSF 042). Anglo-Saxon combs, brooches and rings have been recovered from the wider vicinity (HEP 017 and HEP 019). Again, all these finds were off the clay plateau.

Site sequence

Beaker period (2400–1950 BC)

The excavation uncovered the remains of a burnt flint mound site with an associated well and two trough features (Fig. 4.4). These features form the focus of this chapter (see below).

Romano-British (AD 43–410)

A scatter of small charcoal filled pits was recorded across the site. Four, 11002, 11004, 11007, 11010, were excavated to the west and south of the prehistoric well (Figs 4.4 and 4.5), and four others were excavated across the wider site in the evaluation (Smart 2022, not illustrated). The pits were probably originally similar; they were broadly circular or oval and approximately 0.7m in diameter (apart from 11010 which, at 0.32m across, was truncated) and were relatively shallow, ranging in depth from 0.1m to 0.29m. They generally had single compacted silty clay fills containing frequent charcoal inclusions, with large fragments in 11004



Figure 4.5 Sumner Road, Hepworth: Romano-British charcoal pit 11007 facing NNW, 0.5m scale

and 11007 and patches of scorched material in these and 11005. Where they were close to the burnt mound site, they contained incidental heat-altered flint from the spread of surface material.

No finds were recorded from these features and environmental samples from 11004 and 11007 did not produce any plant macrofossils. However, a sample of charcoal from fill 11008 of pit 11007 was identifiable to species as oak heart and sapwood, *Quercus* sp. (Challinor 2022) and a piece of new-grown timber returned a radiocarbon date of 23–204 cal AD at 95.4% probability (SUERC-106619, Table 4.1), within the Early Roman period. The lack of any other indication of Romano-British activity in the area suggests that these features were non-domestic. They share the characteristics of a growing number of similar and/or identical features that have been recorded across the Eastern region in the last few years which have been interpreted as the remains of clamps for the production of charcoal (e.g. Bishop and Proctor 2011; Moan 2018). Where radiocarbon dated, the vast majority are of the middle to late Anglo-Saxon period (*c.* 700 and 1100 AD) but at Cuckoo Farm, Myland, Essex one pit from a group of 30 was dated to the Late Iron Age/Early Roman period (Dyson 2015) and one pit from over twenty recorded during an evaluation at Colchester Northern Gateway, including one of late Anglo-Saxon/early medieval date, returned a Middle Iron Age radiocarbon date (Pooley 2018). The pits at Hepworth spanned an area of 1400m north to south and they may represent a period of charcoal-making within oak scrubland in the early Roman period.

Beaker period (2400–1950 BC)

Burnt mound complex

A spread of heat-affected flint 30–40m across was observed and recorded in the topsoil prior to trenching, indicating the presence of ploughed-out mound material in both the subsoil and topsoil, which were 0.2 and 0.16m deep respectively; plough scars were also observed at the base of the sequence (Smart 2022, 14). The presence of burnt mound features was confirmed by trial-trenching.

The burnt flint mound site comprised spreads of material around and infilling an associated well and two trough features (Figs 4.4 and 4.6). Very few artefacts were recovered from any of the features and neither environmental bulk sampling nor pollen assessment from core samples produced any significant results (Grant 2022; West 2022). A single crumb of unidentifiable prehistoric pottery was recovered. However, six worked flints of Late Neolithic/Early Bronze



Figure 4.6 Sumner Road, Hepworth: spread of burnt mound material, facing S (1m scales)

Age technology were recovered and a radiocarbon date from a hazelnut shell from the well produced a date within the Beaker period.

It should also be noted that dating evidence was only recovered from one of the small number of pits ascribed to the Romano-British period (see above) and while these are suggested to have been of that date based on this and their similarity to each other, some of them may have been prehistoric and associated with activity at the mounds.

Well

The principal feature within the complex was well 11020. This was roughly circular, with a maximum diameter of 3.3m. It had steeply sloping sides, undercut in some areas, leading to an uneven concave base at 1.6m depth (Fig. 4.7, Section AA and photograph). The first three fills of the well covered the base and the lower parts of the south and east sides. Fill 11021 was a firm clay which included some heat-affected flints and was probably slumping from the edge of the feature. Above this, fills 11022 and 11023 (not labelled on Fig. 4.7) were a soft clay silt and a firmer clay respectively, with occasional and frequent flecks of charcoal and small heat affected flint fragments. These were sealed by a substantial deposit, 11019, a slump of burnt mound material, also noted towards the eastern edge, which contained abundant heat-affected flint and charcoal. Similar deposits also covered the area around the well, particularly to the east and south (see below). These four fills probably related to the use-life of the feature, with deposit 11019 representing thermolithic activity.

A clay fill with occasional heat-affected flints, 11024, covered the remainder of the base of the well. No plant

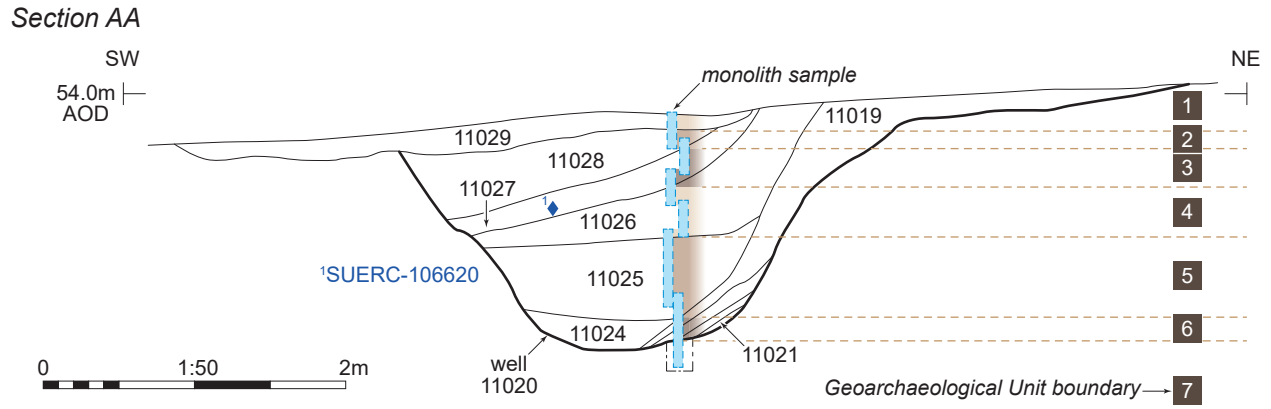




Figure 4.7 Sumner Road, Hepworth: well 11020, section and photograph

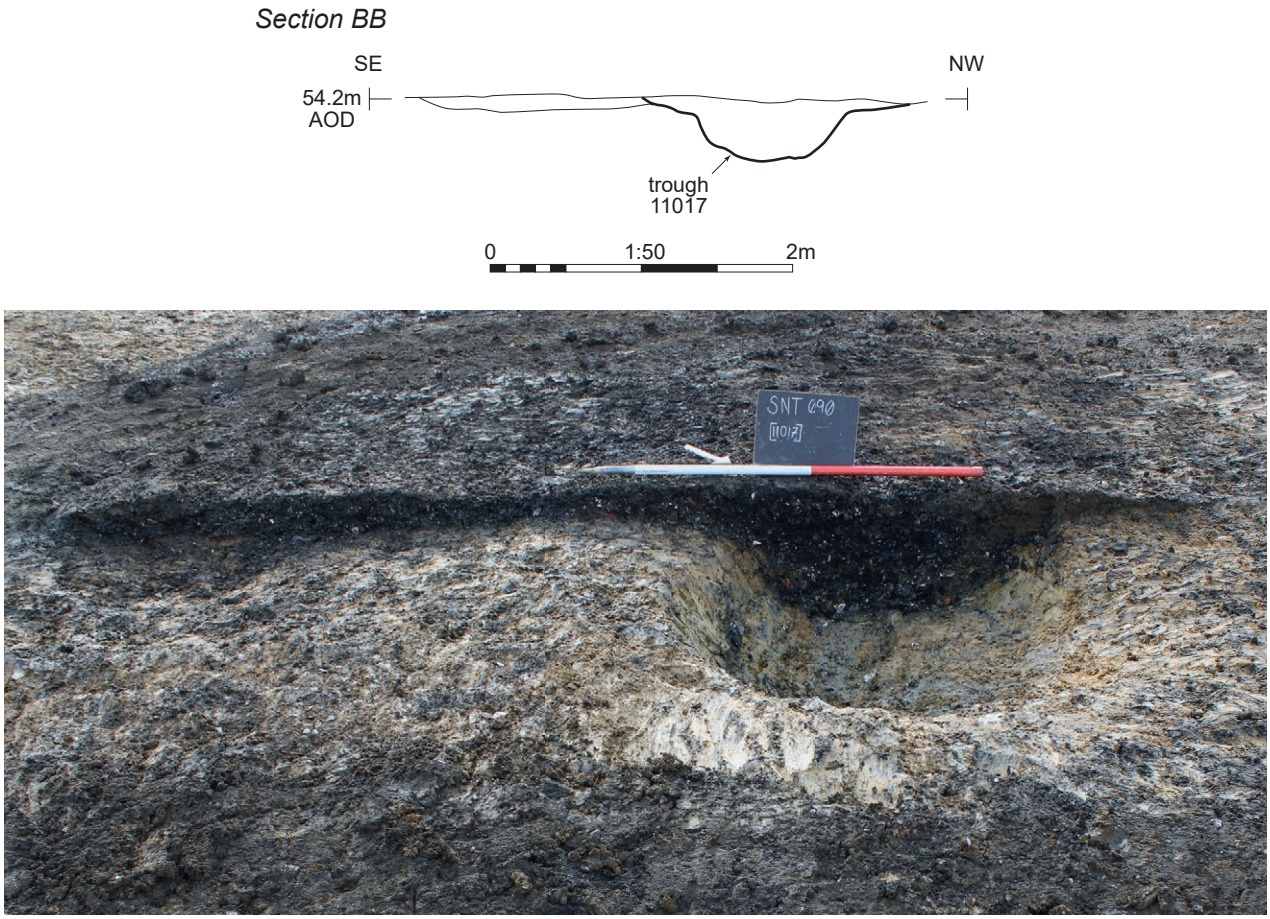


Figure 4.8 Sumner Road, Hepworth: trough 11017, section and photograph

remains were recovered from an environmental sample taken from this, and only a very small amount of comminuted charcoal fragments (<5g from a 40-litre sample) was recovered, which were unsuitable for species identification or radiocarbon dating. The fill was overlain by five further clay fills of varying colour and firmness which included heat affected flint and stones (in sequence, 11025, 11026, 11027, 11028, 11029). The final fill, 11029, was a soft silty material that may have been a remnant of a buried soil within the well hollow.

Three struck flints were recovered from the second to last fill, 11028, and one was recovered from fill 11019. None are diagnostic but they could have been contemporary with the feature. A radiocarbon date of 2205–2036 cal BC at 95.4% probability was obtained from a charred hazelnut shell from fill 11027 (SUERC-106620, Table 4.1), which is within the Beaker period.

A sequence of monolith samples was taken to analyse the depositional processes leading to the infilling of well 11020 (Fig. 4.7 and Kowalska below) and to provide recommendations for the pollen assessment. However, pollen preservation was found to be extremely poor throughout, with little scope for detailed interpretation of the surrounding environment (Grant 2022).

Troughs

Trough 11013, to the south of well 11020 (Fig. 4.4), was sub-rectangular in shape and measured 3m by 0.75m by 0.21m deep. It had moderately steep sides and a generally flat base and, as with the troughs at Marham Park and Laxfield, would originally have been lined. The single fill, 11014, was of firm clay with very frequent heat-affected flint fragments, although, unlike the other fills associated with the burnt mound features, charcoal was notably absent; this could indicate that this feature was infilled before others in the area. The feature was overlain by deposits 11019 and 11012, part of the deposit of spread burnt mound material (see below). No finds were recovered.

Trough 11017 was located slightly to the east of well 11020 and was oval in shape, measuring 1.5m long, 1m wide and 0.41m deep. It had moderately sloping sides and a concave base (Fig. 4.8, Section BB and photograph). The single sill comprised dark black-grey silty clay, with an abundance of heat-affected flint and stone; this was the same deposit which covered the rest of the features, indicating that it was only infilled at the time the material was deposited across the site, and perhaps went out of use later in the use-life of the burnt mound.

Burnt flint spreads

There were several deposits of dark black-grey silty clay with an abundance of heat-affected flint and stone – 11012, 11015/0203, 11016, 11019 – which infilled and covered the features associated with the burnt mound site (Fig. 4.6). The spread closest to the well, 11019, measured 5m across. Deposit 11015 was 0.16m deep and over 2.7kg of flint was recovered from a small intervention excavated during evaluation of the site (Smart 2022, 19). A single fragment (less than 1g) of abraded flint-tempered prehistoric pottery was recovered from deposit 11016.

These deposits probably represent the base of the original mound, and – within natural dips and hollows – a wider spread caused either by an infilling event of a single deposition of material after the activity ceased or by the gradual spread of the collapsing mound over a longer period of time. As noted above the majority of the material has been ploughed up and into the subsoil and topsoil.

Deposit 11019 covered the surface of the well and infilled pit 11017. It slumped into well 11020 from upslope on the eastern side, which indicates that the burnt mound was located in that direction and either slumped naturally or was deliberately pushed down the slope, over the well and other associated features.

Selected finds

Finds which could have been contemporary to activity at the burnt mound include heat-altered flint and worked flint.

Heat-altered flint and stone

Michael Green

In the evaluation (Smart 2022, 19) 7.3kg of burnt flint were recovered from pits and the burnt mound site, comprising 80% burnt flint and the rest sandstone/quartzite. The flints were calcined, generally white and pale grey in colour – probably from heating directly in a fire – and were also crazed or shattered, indicative of significant heating and/or thermal shock. Sandstone/quartzite pieces were discoloured to orange and grey and generally fragmented to a similar size to the flints, although there were some larger pieces from an undated pit 0305 approximately 30m to the south of the burnt mound complex (not illustrated). Sandstone/quartzite has better thermal properties than flint and on occasion appears to have been preferentially used, although it is generally much less common on East Anglian soils.

A total of 50 heat-altered flints (342g) was sub-sampled from sample 13 from fill 11024 of well 11020 (see Fig. 4.7). The burnt flint was again high temperature heat-altered, discoloured white-grey and highly fragmented, and showed signs of quenching. Overall it was similar to that from other burnt mound sites (e.g. Marham Park, Chapter 2, and Green 2020; 2022), suggesting that the heating of water was occurring on the site.

No worked flints were noted amongst the heat-altered material.

Worked flint

Michael Green

Six struck flints weighing 110g were recovered from the topsoil and from features. The assemblage contained four flakes from well 11020 and a blade fragment and scraper from the topsoil. The flint was struck from blue-black glassy flint and light-grey glassy flint and showed differing edge wear/damage and patination.

The two pieces from the topsoil were of mixed date and damaged. The broken large blade probably dates to the Mesolithic to Neolithic periods. The large scraper probably dates to the Neolithic to Bronze Age periods and could have been contemporary with activity at the burnt mound.

The four thick and fine flakes from well 11020 (fills 11019 and 11028) showed less sign of residuality, with little or no edge damage. Again the knapping techniques used to create them suggest a probable Neolithic to Early Bronze Age date (Edmonds 1995).

Overall the small assemblage suggests that limited Late Neolithic and Early Bronze Age flint knapping was undertaken on the site. The assemblage is probably related to the burnt mound activity, although it conceivably represents residual material.

Environmental remains and scientific analysis

Geoarchaeological analysis was undertaken on the fills of well 11020. Neither environmental bulk sampling nor pollen assessment produced any significant results, with pollen sparse and poorly preserved (Grant 2022; West 2022).

Geoarchaeology

Agata Kowalska

Introduction

Six monoliths were recovered from well 11020 in order to characterise the depositional processes leading to its infilling (Fig. 4.7). This report is an edited version of the archive report (Kowalska 2022).

Geological background

The underlying geological bedrock at the site is mapped as Lewes Nodular Chalk Formation formed in the Late Cretaceous, *c.* 100.5–66 Ma. This was overlain by a superficial deposit of the glacial till of the Lowestoft Formation which formed during the Anglian glaciation

(480–430 ka; MIS 12) and consists of white to dark grey, clay-rich, massive to faintly stratified, matrix supported diamicton of outwash sands and gravels, silts and clays (BGS 2025).

Methodology

The samples were retained in steel tins measuring 80 by 80 by 500mm and 80 by 80 by 250mm, which were wrapped for later cleaning, photography and recording following standard sampling procedures (CA 2017). The lithostratigraphy of the samples was described according to standard geological criteria provided by Jones *et al.* (1999), Munsell Color (2018) and Tucker (2011), allocated to seven units (Fig. 4.7).

Results

Unit 7 represents the weathered upper part of the glacial till in which the well was dug. It consisted of a firm (GLEY 1 6/N) grey silt/clay with rare (<5%) small limestone gravel. Common (5YR 4/6) yellowish red iron oxides were recorded throughout. Fine channels, formed by rooting, and occasional charcoal granules were recorded between 0.26–0.30m. The upper 0.05m were bioturbated by root action that caused some translocation of charcoal. The yellowish red iron accumulations recorded along cut 1120 could be remnants of bioturbated iron pan. Iron pans usually form at the interfaces between different lithological units and/or within the increased zones of oxidisation (Limbrey 1975, 82).

Contexts 11019 and 11023 were grouped as Unit 6 as no differences were visible in the monolith sample, tin 1. Unit 6 was *c.* 0.15m thick and consisted of a firm (2.5 3/1) very dark grey silt/clay mixed with rare (<5%) burnt flints (<30mm). A sharp and angled contact boundary separated Unit 6 from underlying Unit 7. This fine and humic unit, mixed with burnt components, is a washed in layer that settled at the bottom of the well. In excavation of the feature, 11019 was also noted to contain burnt flint.

Unit 5, context 11025, was *c.* 0.40m thick and consisted of a firm (GLEY 1 4/N) dark grey silty/clay with rare fine to mid sand and common (<10%) burnt flint and limestone (<10mm). Common (5YR 4/6) yellowish red iron oxides and iron/manganese nodules were recorded throughout. Channels formed by roots, rootlets, rare to common charcoal and a mineralised wood fragment were also present. The contact boundary between Units 5 and 6 was sharp and angled. This unit consisted of mineral silt/clays interspersed with burnt flint gravel and humic lenses of silt/clay. The fine-grained material derived from the erosion of sides of the well and/or from washed in former subsoil/topsoil mixed with the burnt material associate with the burnt mound. The common redox features are post-depositional and reflect water table movement. The root channels are potentially indicative of a stable surface within and/or above this unit. No waterlogged sediments or plant material were noted to indicate the presence of permanent standing water within the well.

Unit 4, context 11026, was *c.* 0.15m thick and was separated from Unit 5 by a sharp contact boundary. Unit 4 was a firm (GLEY 1 3/N) very dark grey slightly sandy silt/clay with common (5YR 4/6) yellowish red iron oxide mottling. Rare (<5%) burn flints and charcoal were recorded. Pores formed by root channels and rootlets were noted. The darker colour, humic content and relatively higher quantity of burnt clast mixed with the mineral silt/clays suggests that Unit 4 is a product of weathered natural substrate eroded into the well and mixed with the burnt component by reworking by root action.

Unit 3, context 11027, was a firm (2.5Y 2.5/1) black silt/clay with (2.5 Y 5/3) light olive brown silt/clay lenses. Common burnt flints and limestones and charcoal were recorded along with channels left by roots. Unit 3 was *c.* 0.20m thick and separated by a sharp boundary from Unit 4.

There was a sharp contact boundary separating Unit 4 and Unit 3, suggesting a change in deposition. This unit consisted of accumulations of fire-cracked stone and fuel residues washed into the well from the burnt mound located to the east. The lenses of the clay are likely to be redeposited natural substrate. Some of the clays recorded along root channels may be an illuvial clay that was translocated down the profile by water action.

Unit 2, context 11028, consisted of a firm (2.5Y 3/1) to (2.5Y 2.5/1) black very dark grey silt/clay mixed with occasional fine to coarse sand. Common (<15%) burnt flints, limestone (<10mm) and charcoal granules were recorded throughout. Unit 2 was *c.* 0.25 thick and its lower contact boundary was diffuse. The diffuse contact boundary is suggestive of a gradual change in deposition. It can be suggested that, based on the texture and inclusions, Unit 2 represents the remnant of the burnt mound washed into the well.

Unit 1, context 11029, was separated by a diffuse contact boundary from underlying Unit 2. Unit 1 was *c.* 0.10m thick and consisted of a firm, (5Y 3/2) very dark greyish sandy silt/clay mixed with rare (<5%) burnt flints and limestones (<5mm). This unit was porous, and roots were recorded. Unit 1 consisted of mineral silt/clays covering fills made from redeposited burnt mound material. The presence of pores, formed by root channels, and fine roots is indicative of the reworking of the context by root action. The top fill of the well accumulated by natural silting of the remaining hollow. No evidence for deliberate backfilling was recorded in these monoliths.

Discussion

The well was likely to have been contemporary with the burnt mound recorded to the east. No deposits characteristic of sediments which had accumulated in a standing water body or of the presence of a permanently high water table were noted within the monolith samples. This may indicate that the water may have been present within the well only during wetter seasons and/or after rainfall. It is also possible that the feature was cleaned and maintained while in use,

Table 4.1 Radiocarbon results from Hepworth

Lab ID	Sample ID	Context	Period	Cut/ deposit	Details	Feature	Charred material dated	$\delta^{13}C$ (‰)	Radio-carbon age (BP)	Calibrated date (95.4% probability)	Calibrated date (68.3% probability)
SUERC-106619	<11>	11008	Romano-British	11007	Pit fill	11007	Charcoal: oak (*Quercus* sp.)	-24.7	1931±25	23–174 cal. AD (89.9%) 181–204 cal. AD (5.5%)	31–41 cal. AD (4.7%) 60–128 cal. AD (63.6%)
SUERC-106620	<12>	11027	Beaker	11020	Fill of well	11020	Hazelnut shell (*Corylus avellana)*	-23.3	3734±24	2205–2112 cal BC (57.2%) 2104–2036 cal BC (38.2%)	2198–2167 cal BC (26.8%) 2149–2132 cal BC (13.8%) 2087–2049 cal BC (27.6%)

thus no natural waterlain sediments would be present. The disturbed upper part of the Lowestoft Formation could be a result of mixing by such cleaning activities and trampling, or else by vegetation and/or earthworms that bioturbated the strata while the hollow was still open and relatively dry.

The well could have been left open after disuse, allowing sediments to be washed in. It is perhaps possible that as the burnt mound grew in size erosion of its unstable sides combined with rain action may have washed the burnt residues into the well (Unit 6). This was followed by Unit 5 which consisted of redeposited/slumped washed natural substrate and/or the former land surface mixed with material derived from the burnt mound. The presence of the redox features indicated that at this stage the well then became saturated with water that cyclically dried out leading to changing oxidation conditions. It may be suggested that the feature was left open and the rate of sedimentation decreased, as there is evidence of vegetation within the makeup of Unit 5 and Unit 4.

The mineral units were then sealed by the burnt residues washed in from the burnt mound – Units 3 and 2 – followed by accumulation of silt/clay, Unit 1. Although the upper fills are composed of anthropogenic material the processes associated could be natural, however deliberate backfilling cannot be ruled out.

Recent geoarchaeological analysis, which includes soil micromorphology, of burnt mounds by Gardner (2019), showed that burnt mounds are complex and multi-faceted structures, consisting primarily of fuel residues; wood, grasses and discrete deposits of bone, unburnt plant tissues and rubified sediments that accumulated due to repetitive activities rather than one single event. Although burnt mounds in theory have a high potential to contain evidence which may help with interpreting human activities at them, no soil micromorphology was recommended within the assessed well to answer questions regarding formation of this burnt mound because the encountered burnt mound deposit is redeposited and reworked.

Radiocarbon dating

Summarised by Emma Aitken

Radiocarbon dating was undertaken to confirm the date of pit 11007 (Fig. 4.5) and well 11020 (Fig. 4.7). The samples were analysed during October 2022 at Scottish Universities Environmental Research Centre (SUERC). The methodology employed by SUERC Radiocarbon Laboratory is outlined in Dunbar *et al.* (2016).

The uncalibrated dates (Table 4.1) are conventional radiocarbon ages. The radiocarbon ages were calibrated using the University of Oxford Radiocarbon Accelerator Unit calibration programme OxCal v4.4.2 (Bronk Ramsey 2009, https://c14.arch.ox.ac.uk/oxcal.html) using the IntCal20 curve (Reimer *et al.* 2020). The results are presented in Table 4.1.

The radiocarbon date from the hazelnut shell from the well lies within the Beaker period (SUERC 106620, Table 4.1).

Chapter 5
Discussion

Abby Antrobus and Richard Mortimer

Overview

The three sites brought together in this publication yielded evidence of activity from multiple periods. However, each included the remains of one or more burnt mound sites of Beaker, Early Bronze Age (2400–1600 BC) or probably Early Bronze Age date, situated on higher ground in the Suffolk claylands. As noted in Chapter 1 these have potential to contribute to two current research themes. The first is the function(s) of burnt mounds and the second is the emerging evidence for Beaker and Bronze Age activity of such a character that it began to change the landscape of the Suffolk clay plateaus.

In relation to the function of burnt mounds, the faunal bone assemblages recovered from the three sites were negligible but, nonetheless, the combined artefactual and scientific evidence from Marham Park strongly suggests that animal products were being processed at the complexes there. The analysis of samples of burnt stone, stone implements and 'greasy deposits' from within the troughs showed the presence of lipids from ruminants and occasional non-ruminants in all these contexts (Chapter 2, Dunne and Evershed) and, additionally, evidence from the analysis of the use-wear patterns on the large lithic assemblage points more specifically towards the working of animal skins as a significant component of the activity that was taking place. Generally scrapers are frequently associated with the working of hides and this tool type formed 94% of the over three hundred flint implements that were recovered from the burnt mound sites (Chapter 2, Bates). Furthermore, in the sample of tools selected for analysis of microwear, only traces that were caused by use in the scraping of dry hides were identified (Chapter 2, Donahue). The scraping of a hide after curing or tanning is one of the later stages of the work involved in the conversion of animal skins into a viable product.

Based on these observations a major argument of this chapter is that burnt mounds were places where, at least in part, animal skins were treated from start to finish. The lithic assemblage from Marham Park also included knives, other cutting edges, awls, piercers and combination tools, all of which could have had application at different stages of such work. The discussion draws on research into prehistoric leather technology (particularly Harris 2006; 2011; 2012; 2014) and on information and insights from other burnt mound sites where a role in tanning has, with greater or less confidence, been considered as a possible function (e.g. Bliss 2015; Ripper *et al.* 2011; Brown *et al.* 2016; Mortimer 2005; Mortimer *et al.* in prep; Tourunen 2008). It suggests that it may be anachronistic to seek widespread evidence for vegetable and chemical tanning agents in the Bronze Age and, after review of the interpretation of the presence of lipids and the faunal remains, proposes that the pits, wells, troughs and burnt flint at the burnt mounds may have been used in the processes of curing hides using smoke and fats, with hot or warm water perhaps playing a role in the cleaning and soaking of skins and/or in the preparation and application of curing agents.

The framing of burnt mounds as places where carcasses were processed leads to a consideration of their possible role in pastoral landscapes and so on into the second major theme of this chapter, which is the contribution that these and other burnt mound sites make to an increasing body of evidence for Bronze Age agricultural expansion onto parts of the central Suffolk clay uplands – recently advocated as earlier than widely assumed (Brudenell and Kwiatkowska 2022). In exploring this theme the chapter draws in the *longue durée* of Bronze Age landscape use and highlights the evidence from Marham Park and Laxfield for Middle Bronze Age (1600–1150 BC) and Late Bronze Age/Early Iron Age (1150–350 BC) land use and division, also significant to emerging pictures of the perhaps seasonal uses of the central clayland plateau in those periods.

Prior to addressing these themes the chapter provides a brief recap of the site sequences, followed by a review of the form and date of the four burnt mound sites and their environmental contexts.

Summary of site sequences

The greatest number of archaeological phases were recorded at Marham Park on the south side of the valley of the River Lark in West Suffolk. The site was located broadly above the Neolithic Fornham cursus, the eastern end of which lay within 250m of the northern edge of the development area (Suffolk Historic Environment (HER) record FAS 005, SCC 2025a, Fig. 2.3). The remains at Marham Park were generally clustered either towards the river valley at the base of the slope of land which lay within the site, or at the top of the rise, on the plateau.

A spread of Early Neolithic pits was recorded across the latter (Fig. 2.7). There was then a gap in the sequence of dated features until the Beaker period burnt mound complex (BM 1), which was located within a natural hollow at 50m AOD on the edge of the clay upland; micromorphological analysis of the soil beneath the working surface of the burnt mound indicated that the area could have been previously wooded (Chapter 2, French). A Beaker period structure (Structure 1), a roundhouse and pits to the north-west of the burnt mound site may have been contemporary to the later stages of activity at it (Fig. 2.10). A second, Early Bronze Age, burnt mound site (BM 2) was situated in a similar topographic location around 110m to the west. One of the wells associated with the earlier burnt mound site, BM 1, appears to have been recut in the Middle Bronze Age, perhaps to serve as a water source within the Middle Bronze Age field system evident at the site (Fig. 2.26). A Late Bronze Age or Early Iron Age ditched and banked boundary cut across the Middle Bronze Age field system, negating it, and represented a rewriting of the landscape (Fig. 2.26); it was in turn truncated by Middle Iron Age pits (Fig. 2.9).

Extensive evidence of Middle Iron Age occupation was located closer towards the River Lark (Fig. 2.8) and it is one of a number of such sites recorded from the valley (e.g. Craven 2012; Fern 2022; Newton and Mustchin 2015). Roman enclosures were also located at the crest of the land, broadly following the new alignment established by the Late Bronze Age–Early Iron Age (LBA–EIA) boundaries: these and the similar Middle Bronze Age enclosures may have had a similar purpose, perhaps for the keeping of livestock (Fig 2.6).

Deeper into the Suffolk claylands at Laxfield, a burnt mound site was excavated at 55m AOD on the edge of the clay upland above a tributary of the River Blyth. This also appears to have preceded Middle Bronze Age field systems (Fig. 3.5).

At Hepworth, a Beaker period burnt mound site was located at 55m AOD on the edge of the clay upland on a plateau above a watercourse that was part of the hydrological system of land that overall fell gradually towards the Little Ouse River, approximately 6.6km to the north of the site (Fig. 1.1). Probable Roman charcoal pits occupied the same area, pointing to the wooded or re-wooded character of the area at or by that date (shown on Fig. 4.4 as 'later features').

Four Suffolk burnt mound sites: date, form and environmental contexts

The four burnt mound complexes, with abundant burnt flint and associated wells, pits and troughs, form part of the more widely observed phenomenon of sites at which 'pyrolithic technology' was employed to heat stones using water, for purposes upon which there is not, currently, a consensus view (see Chapter 1). Following themes that are returned to in consideration of the Suffolk claylands in the Bronze Age (see below) this section briefly reviews their comparative dates, durations of use and environmental contexts.

Dates

The burnt mound site at Hepworth was represented by a well with two pits or troughs (Fig. 4.4), with a spread of burnt material in the overlying soils. A hazelnut shell from the well returned a Beaker period radiocarbon date of 2205–2036 cal BC at 95.4% probability (SUERC-106620, Table 4.1).

At Laxfield, the remains of the burnt mound complex comprised a well of up to four metres depth, with two rectangular troughs and other associated pits and features (Fig. 3.5). Redeposited burnt flint was noted in all of these, although there were no surviving *in situ* deposits of burnt material and it is assumed that these had been present but subsequently ploughed away; these were partially plotted as a topsoil spread prior to machine excavation. A radiocarbon determination on material from the lowest fill of the well failed to produce a date but results from well-preserved organic material from the base and top of the middle fill indicated its formation between *c.* 1400 and *c.* 1050 BC, showing that the well filled very gradually throughout the Middle Bronze Age (Table 3.3). If, as seems likely, this fill post-dated the use of the well, the radiocarbon dates give a *terminus ante quem* for the earlier use of the burnt mound complex (Chapter 3) and the basal fill of the well is estimated to have begun to form prior to 1500 BC. There were hints of a possible Earlier Bronze Age component in the pottery assemblage from the site, albeit residual in an enclosure ditch and not necessarily associated with the burnt mound (Chapter 3, Benfield).

At Marham Park the remains of activity at the two burnt mound sites comprised an array of working hollows, cobbled surfaces, large wells, pits, postholes and troughs. Several of these have been shown to have held water and there were some which contained 'greasy' deposits. Burnt flint was present in the fills of the majority of these features, with an estimated three and a half tonnes of this material in the backfill of the hollow within which the earliest complex was located (Chapter 2).

Although small to medium-sized assemblages of flint and ceramics have been recorded elsewhere (Ó Néill 2009, 170–1), that recovered from Marham Park is unusual for

burnt mound sites with *c.* 6000 struck flints and over 4kg of contemporary, stratified pottery recovered from the mound contexts. This may simply have related to the longevity of activity at the main site but could also reflect the preservation of accumulated deposits within the large deep hollow. As noted below, ceramic vessels may also have been employed in activities at the burnt mound sites. The pottery from the burnt mound sites at Marham Park formed a high proportion of that from the site overall and comprised domestic Beaker and Early Bronze Age ceramics, with a notable component of rusticated vessels including a small number of pot-beakers. Sherds from the burnt mound sites were generally abraded, indicating that they may have been incorporated into features from surface waste, and some of the pottery was heat damaged. Typologically early Beaker wares were absent from the overall assemblage and the ceramic sequence may indicate that there was a hiatus of activity between the use of the later Beaker pottery and the uptake of the Biconical Urn tradition – and hence perhaps between the periods of use of the two burnt mounds (Chapter 2, Barclay and Doherty). A relative absence of other ceramic traditions including Collared Urn and Food Vessel was also noted (Chapter 2, Barclay and Doherty). A series of radiocarbon dates confirms the chronological sequence of activity at the site.

Four dates were obtained from the limited material that was available from BM 1. To recap:

- Small pit, 3244, part of the early phase of the burnt mound complex, provided a piece of hazelwood charcoal that dated to 2291–2143 cal BC (at 95.4% probability, SUERC 93349, see Table 2.19).
- A similar date of 2287–2140 BC (at 95.4% probability) was produced from a piece of wood from pit/trough 2921, which cut the cobbled surface that sealed earlier features (SUERC-93345, Table 2.19).
- A hazelnut shell from a third pit, 3170, westwards of the well, and again cutting the cobbled surface, produced a date of 2267–2038 cal BC at 95.4% probability or 2199–2061 cal BC at 68.2%, with either date suggesting that the feature was broadly contemporary and perhaps slightly later in the sequence (Chapter 2, Figs 2.11 and 2.48, SUERC-93348, Table 2.19).
- A further hazelnut shell from the first infill of the hollow above the cobbled surface, layer 2917, produced the later date of *c.* 2113–1916 cal BC at 95.4% or 2022–1952 cal BC at 68.2% (SUERC-93345, Table 2.19), perhaps giving a broad indication of the end date to the initial activity within the area (Fig. 2.48).
- The pottery from the large secondary well 2718 (Fig 2.11), while comprising small, hard to date pieces, was most likely Collared Urn and would fit with activities taking place beyond the timescale indicated by these dates.

BM 2, the second burnt mound site at Marham Park (Fig. 2.21) appears to have been in use later within the Early Bronze Age, perhaps between *c.* 1800–1700 BC, based on a radiocarbon date from pieces of charred hazelwood from the fills of the hollow that preceded the activity, and from one of the subsequent covering layers; these give an approximate period of use for the features that lay stratigraphically between them (Chapter 2, Hamilton and Table 2.19).

Durations of use

Overall the series of radiocarbon dates from Marham Park indicates that the earliest complex was of Beaker period date, with activity starting between 2290–2140 BC and ending by *c.* 1900 BC, perhaps as early as 2000 BC (Chapter 2, Hamilton). The longevity suggested by the radiocarbon dating is borne out by the stratigraphic evidence for phased and probably episodic activity. The main well, 3106, was recut at least twice and there were features both beneath and cutting a cobbled surface that appeared, at least in part, to relate to one of the recuts. Feature 2718 was identified as a secondary shorter-lived well, along with two other deeper pits which may also have been used to access water. The patterns drawn out from the flint waste support the perception that there was a migration of activity within the hollow, with, for example, a number of cores and waste pieces dumped in the backfill of the earliest well that may have been generated by ongoing activity in the vicinity (Chapter 2, Bates). A-horizons in the soil were also recorded over the earliest deposits in some of the troughs, indicating that time had passed before they were filled, with either dumped or slumped material (Chapter 2, Allen). The site therefore represents one of the more complex burnt mounds. By way of parallel for the possible duration of use, at Crowthorne in Berkshire a span of activity in the region of 176 years was estimated for one of the wells, based on the dendrochronological sequence from planks of wood within it (Chittock *et al.* 2021, 238).

The later burnt mound site at Marham Park, BM 2, was less complex, corroborating the indication from the scientific dates that it was a focus of activity for a shorter period of time. The quantity of heat-affected flint was smaller and the wells themselves were relatively 'clean', with worked flint noted to have been incorporated into deposits while still relatively sharp, suggesting that they had spent less time on the ground surface (Chapter 2, Bates). Two radiocarbon dates from the upper fill of the largest well, 12769, indicated it was still infilling well into the Middle Bronze Age, *c.* 1400–1300 BC, and it was suggested in Chapter 2 that, at least in this iteration, the feature may have been of that date and related to the field systems recorded in the area.

The troughs of BM 2 were located further from the wells than those of BM 1 and may have been adjacent to mounds of spent flint that have since been dispersed (Fig. 2.21). That the mound was perhaps located to the south-west, in the area without features above 12566 and features 12619 and 12621–23, is possibly indicated by the greater

quantities of burnt flint in these features, and the relative lack of heat-affected flint in the main hollow. It is possible that trough 12586 – and by implication its attendant waste mound and fires – was used with the northernmost well, and those to the south were used with the southernmost, an observation that shows either chronological or spatial variation in the working of the site.

The two complexes fit in with the established view of some burnt mounds as places in the landscape where repeat activity was undertaken (Chapter 1) and cover a similar period to those at Bradley Fen, for example, which spanned the entire period from *c.* 2100 to 1500 BC in a fairly clear sequence (Knight and Brudenell 2020).

At Hepworth, by contrast, the simplicity of the complex and a notable lack of finds might suggest that activity here was of short duration. Interestingly, heat-altered quartzite and sandstone was present at the site; this is noted to have better thermal properties than flint (Chapter 4, Green), and it may have been more readily available here from local outcrops. Something to take into consideration, at all these sites on the boulder clay, is the abundance, or lack of it, of an available stone resource. It is perhaps unlikely that stone for heating would have been transported very far and the longevity of a particular burnt mound site might have been directly related to the quantity of available stone within a particular radius of the site.

Environmental contexts

That activity was probably seasonal at Marham Park is indicated by geoarchaeological analysis, which suggests that the wells were not wet all of the time, perhaps seeing no significant use through the summer months, until sufficient autumn rain had fallen (see Chapter 2, Allen). As a result of the lack of permanent waterlogging there was poor preservation of pollen and diatoms, although the modest pollen assemblage did hint at an open Bronze Age landscape of predominantly pasture with only a few trees and shrubs locally (Chapter 2, Langdon), with micromorphological analysis of the soil beneath the working surface of the burnt mound indicating that the area could have been previously wooded (Chapter 2, French). The charred plant remains hint at arable crops, presumably slightly further down the slope to the north, off the heavy clays (Chapter 2, West).

At Hepworth, as at Marham Park, geoarchaeological analysis of the fills of the well indicated that water was probably only present during wetter seasons and/or after rainfall, with no evidence of standing water, although fills relating to this could perhaps have been removed by the cleaning or maintenance of the feature (Chapter 4, Kowalska).

At Laxfield the well-preserved pollen sequence and plant macrofossils recovered from the borehole sample of the well allows partial reconstruction of the ancient local, largely Middle Bronze Age, landscape (Chapter 3, Grant), with indications of a mixed woodland and grassland environment in the vicinity and changes which suggested fluctuations in the extent of herbaceous understorey that may have been the result of changes in the use or management of the local woodland during and following the use of the burnt mound. The main basal fills of the wells, possibly post-use, showed a growth in this layer which may suggest that surrounding woodland had been actively coppiced to provide wood for fuel, possibly for the 'hot stone technology' undertaken at the mound. Coppicing would have reduced the density of the woodland canopy to the benefit of lower layers of foliage. As the well filled in the Middle Bronze Age there was a noted loss of open water flora, and possible evidence in the period between 1290 BC and 1050 BC of woodland recovery, perhaps reflecting a change of coppicing practices or the abandonment of the Middle Bronze Age field system. This was subsequently reversed with the possible expansion of grassland, and woodland significantly reduced, by the end of the record sometime after 1225–1050 BC, around the Middle–Late Bronze Age transition (Chapter 3, Grant).

Exploring the purpose of the burnt mounds

Evidence for animal products

Lipid analysis

In the context of one of the prevalent interpretations of burnt mounds as cooking sites (see Chapter 1), lipid analysis was carried out at Marham Park on soil samples, burnt flint and selected stone tools (Chapter 2, Dunne and Evershed). Such analysis is most usually undertaken on residues on ceramics rather than stone but, while samples from Laxfield did not produce useful results, at Marham Park it revealed the presence of animal fats in the various sampled contexts. Four specific fatty acids were identified: mainly ruminant (cattle, sheep/goat), some non-ruminant (pig)/ruminant, dairy fat and the possibility of plant fatty acids (Table 2.18). In some cases there were mixed fats from ruminants and non-ruminants.

The burnt flint samples were taken from three of the similarly sized troughs which cut through or were abutted by the cobbled surface, and all were located in the north-eastern quadrant of the hollow (Fig. 2.11). Non-ruminant and ruminant lipids were identified on the burnt flint from trough 2932, while non-ruminant lipids were recovered on those from 2919, possibly the latest trough in the sequence (Chapter 2). Ruminant lipids were identified on burnt flints from trough 2921 and separate analysis of the 'greasy' lower fill of this pit also identified lipids of animal origin, the latter suggested to perhaps have originated from an 'industrial' or sustained use of the feature. Lipids plotting between those characteristic of ruminant and non-ruminant fats were identified on a scraper recovered from the cobbled surface while fats of probable dairy origin were identified on a scraper from gully 3174 in the north-west quadrant and on one from the first overlying fill layer in the south-west quadrant.

From the Early Bronze Age BM 2 both ruminant and non-ruminant lipids were identified on burnt flints from trough 12586 and on a scraper that came from the deposits overlying the hollow.

While we advance the theory that these traces related to the use and production of animal products at burnt mound sites, particularly skins, there is mileage in exploring how they may have related to some of the other suggested purposes of burnt mound sites (see Chapter 1), albeit purposes for which there are less strong pointers in the sites covered in this volume, particularly Marham Park.

First, an interpretation of sites for bathing (see Chapter 1) could offer a niche for the presence of fats in deposits and on scrapers if, perhaps, fats were applied to skin and removed with hot water and perhaps tools – although the microwear on the scrapers does not suggest this and is interpreted as a signature developed from the force of working with tanned hides (Michael Green pers. comm., see also Chapter 2, Donahue).

There is also a possibility that the lipid residues could have been deposited through cooking, particularly as fires, heat, pits and troughs may have been used for multiple purposes. A cooking-related origin was suggested for lipids identified in another pilot study of burnt stones from Errarooey More, Co. Donegal, where traces of fats from large herbivores such as deer or cattle, along with plant sterols, were interpreted as possible evidence of a hot stone boiling technique in which the stones, meat and possible vegetable matter had all had contact with the water (Hawkes and Malainey 2018). That cooking in the troughs was practically possible was demonstrated in an experiment published by O'Kelly in 1954, which showed that a trough of 450 litres of water could be boiled using hot stones in half an hour. With the addition of further stones to maintain the temperature a 5kg leg of mutton was cooked in under four hours and half a cubic metre of broken stone was generated in the process (O'Kelly 1954). Further, at Marham Park, implements that could have been used in cutting and butchery and hence perhaps cooking were noted amongst the flint assemblage (see Chapter 2, Bates).

However, a model that places cooking at the centre of activity at the burnt mounds would need to account for the very large number of scrapers and the microwear evidence for the scraping of dry hides (Chapter 2, Donahue). It is possible that this activity was undertaken around a cooking place as a different and separate task to that which left the residues of fats on burnt stones and in the troughs, and study of traditional practices has shown that in some societies both cooking and work with hides was entwined, which could provide a tenuous link between the two activities (Keeley 2010). However, it is a contention of this chapter that the scraping of dry hides could instead have been undertaken as part of a longer sequence of interrelated tasks at such sites where the primacy of purpose was the production of useable skin products, and where the intermediate stages relating to earlier processing of skins was also significant; these stages are explored further below.

Faunal remains

As has been noted elsewhere the assemblages of faunal remains from the four burnt mound sites were small. At Marham Park just 408g of bone was recovered from the Beaker period. This was almost completely composed of cattle bone, with a single piece from a sheep or goat, although the partial remains of a dog were recovered from well 2718, later in the sequence of BM 1, associated with Early Bronze Age pottery. The Early Bronze Age assemblage was larger, *c.* 2.5kg, and was also dominated by cattle bone, including fragments of teeth, ulna, radius, tibia and humerus, along with six fragments of sheep or goat (29g) and an eel vertebra. No real conclusions can be drawn as to the relationship between these remains and activity at the burnt mounds but, consumption aside, and of relevance to the argument developed below, the hides of all could undoubtedly have been useful, even perhaps that of the eel; it has been suggested that the prehistoric use of the skins of fish, birds and smaller game has probably been underestimated (Harris 2011, 59). The assemblages from Laxfield and Hepworth were also small, with the number of fragments too small to support meaningful conclusions about butchery patterns or husbandry. A caveat worth noting is that cattle may be over-represented in bone assemblages due to the robustness of their skeletons, with a resultant need also for more intensive butchery of these larger animals (Bartosiewicz 2013, 329–31).

As noted in Chapter 1 the lack of significant assemblages of animal bones from burnt mound sites formed a significant basis from which to question the interpretation that their primary function was cooking and/or 'feasting'. It is, however, notable that an increase in sieving has increased the recovery of animal bones from Irish sites, representing a range of domesticates and wild animals (Bradley 2019, 149). A high level of fragmentation may have arisen through waste management practices; if bones were discarded on a surface, for example, they could have been subject to considerable damage over time (Tourunen 2008). However, activities which generated some faunal remains but not the considerable quantities that may be expected in sites of consumption and discard may also have been undertaken. Practices and traditions of carcass division may have seen parts of animals moved to different places at stages of skinning, evisceration, dismemberment into units, processing and filleting of meat, consumption and, ultimately, discard (Johnson 2017, 498; Roycroft 2006; Stolle 2020, 182).

Although from a geographically different area, these themes have informed important conclusions drawn by Tourunen (2008) in a study of the Early Bronze and Iron Age faunal remains from the Carlow Bypass section of the N9/N10 road scheme in Ireland (Tourunen 2008). She concluded that body part representation in the four largest assemblages, dominated by cattle but also including some horse, red deer, sheep, goat and pig, and with a general bias towards heads and limbs, showed the presence of carcasses but not necessarily rich meat-bearing bones and could

point towards activity related to primary butchery, tanning and horn working, with cooking and consumption taking place elsewhere (Tourunen 2008, 37–42).

The study noted that boiling water, such as could have been available at a burnt mound site, could have been used to soften antler and horn for working and, in relation to work with skins, highlighted the frequent presence of scrapers and whetstones, with the conclusion that burnt mound sites may have been multifunctional 'backyard' sites where various activities of a messy nature were carried out, with meat-processing, tanning and antler working among these functions (Tourunen 2008, 42).

This resonates with the combination of evidence from lipid and microwear analysis at Marham Park and the suggestion from these that work with skins was a possible function of burnt mound sites.

Prehistoric leather technology

Generally, in the eastern region and beyond, there is little evidence for the processes and activities that went into prehistoric leather production and many of these may not have archaeological visibility. However, the evidence from Marham Park prompts consideration of the importance, scale and temporality of the activity and the landscape settings of where it took place.

The possibility that leather processing may have been a principal industry at burnt mounds was raised in the discussion of a site at Birstall in Leicestershire (Ripper and Beamish 2011). The authors noted that warm water in troughs could have been used to soak hides to facilitate the removal of fat, flesh and hair, and that ash may have been used as a rub to facilitate de-hairing, while skins may have been stretched and dried at fires. Uncertainty was expressed, though, partly because evidence for tanning agents such as oak bark and leaves was absent from the environmental assemblages (ibid., 200). However, as set out below, early methods of curing skins need not have required these and the results from Marham Park in particular show that there is mileage in revisiting these suggestions for activities at burnt mound sites.

Historical, experimental and modern tradition-based craft-practitioner sources from Europe and North America attest to numerous types of cured hide product and to the varied methods that can be used to produce them (Harris 2011). Products ranged or range from pelts, rawhide and cuir-bouilli (boiled leather) to more supple materials. Technologies of manufacture included or include the simple scraping and drying of skins; smoking so that resinous chemicals from smoke permeate a hide; tawing, involving treatment with minerals such as alum and salt or, less effectively, ash; and oil or fat dressing, where a solution of fats derived from substances such as brain, liver or eggs is soaked or worked into a hide such that, when it oxidises, it react with the skin collagen to give a preservative effect (Harris 2006, 2011, 2014, 9–10, 64; Herriett 2021; Hodges 1989, 149–50). The true tanning of leather, which has an effect that cannot be reversed should the product be immersed in water, is achieved through the prolonged soaking of animal skins in a bath of chemical or vegetable tanning agents, traditionally including urine, oak galls or bark, certain nuts and berries and other plants such as birch, willow, spruce and larch (Coles 1979, 197–8; Grömer *et al.* 2016, 72; Hodges 1989, 149–50). However, while tanning in this manner is well attested from the Roman period onwards (Coles 1979, 198) other ways to create viable products from animal hide may have been more predominant in earlier technology and a general lack of survival of earlier prehistoric leather in otherwise waterlogged contexts may perhaps indicate a tendency towards curing rather than vegetable or other tanning (Harris 2011).

In support of this, the very small number of preserved skins from prehistoric Europe which are suitable for analysis appear, generally, to have been cured rather than fully tanned (Harris 2011). Some, such as prehistoric leather items from the bogs and oak coffins of Bronze and Iron Age Denmark, have been preserved in tanning environments such that chemical changes wrought in the depositional context mask any evidence of the original treatments, but items preserved in the Bronze and Iron Age salt mines at Halstatt, Austria, appear to have been oil tanned or of rawhide (Harris 2011, 57) and, although dating considerably earlier, to *c.* 3300 BC, the clothing of the man found in the ice at Otzi on the border of Austria and Italy was probably prepared using smoke and fat. This conclusion was based on experimentation with different methods to see which best replicated the form of grains of pollen that had been trapped in the animal hair prior to treatment, as they differed physically to those that had been picked up when the clothing was worn (Groenman-van Waateringe *et al.* 1999).

Given the likelihood that early curing was largely undertaken using fat, oil, smoke or drying, Susanna Harris has highlighted that the suite of evidence for a hypothetical prehistoric leather working site need not necessarily include the tanning pits and tanning agents such as may be seen for later periods. Sites may be characterised by assemblages of animal remains relating to slaughter, butchery and skinning; tools appropriate for the same and for defleshing; bone and stone scraping tools; ceramic pots for soaking; smooth stones for rubbing in fat or other substances and fires for generating smoke (Harris 2011, 57–8). There appears to be a marked resonance with these observations and some of the features of burnt mounds. For example, Harris also notes that tools which are used to work a single skin could involve both blunt and sharp edges (ibid., 62), and 'combination tools' were found at Marham Park, of a form that Sarah Bates has pointed out may have been particularly useful during various stages of scraping, cutting and piercing hides, and which could have been multipurpose tools used by one person for different tasks and modified as required (Chapter 2, Bates).

Finds, features and stages of skin preparation

A useful framework against which to consider the possible relevance of the features and finds at the three Suffolk sites and other burnt mounds is provided by methods of smoke and fat curing in the traditional practice of Native American people, described by John Coles in his works on experimental archaeology (1973 and 1979), and also from modern accounts and insights from experimentation (Harris 2011, 61, citing Kellogg 1984; Coles 1973; 1979).

Skinning

The first stage following slaughter is the skinning of an animal, which requires sharp implements. The largest portion of the over three hundred tools from Marham Park were scrapers but alongside awls, piercers and combination tools, knives and cutting edges were also present. These included utilised, un-retouched flakes along with other more natural pieces that had been used without much modification, with overall more of a concern for functionality for the work in hand rather than tool form (Chapter 2, Bates). The efficacy of un-retouched flints for skinning deer has been demonstrated in experimental work (Coles 1973, 143). This work also noted the need for regular resharpening of blunted tools (Coles 1979, 197–8), such as might be reflected in the retouching evident in the Marham Park assemblage; the large volume of debitage from knapping shows that, generally, implements were being created or sharpened and remodelled as work progressed, with an impression of intensity of activity (see also Chapter 2, Bates). Six hammerstones/grinders were also recovered from BM 2, perhaps for diverse purposes.

A similar insight was given by the assemblage of 542 pieces of worked flint from the remains of a burnt mound at a Beaker and Early Bronze Age site on the base of a ridge at a fen edge location at Fordham in Cambridgeshire, with excavations led by one of the present authors (Mortimer 2005 and Mortimer *et al.* in prep., see Fig. 1.1 this volume for location). Here, as at Marham Park, scrapers also predominated, with large 'mushroom' scrapers, piercers, coarse cutting tools and cores also present, and there appears to have been a similar concern with the functionality of implements rather than their style, especially when compared to the more finely worked arrowheads, knives and scrapers known from other regional Beaker period sites (Barry Bishop and Richard Mortimer, in Mortimer *et al.* in prep.; see also Bliss 2015 for review of an assemblage of over a thousand pieces from two burnt mounds at Bow Hill, West Sussex, which again included knives, piercers and flakes, along with a high incidence of debitage and evidence for knapping). A relatively large faunal assemblage was recovered from the burnt mound site, chiefly of butchered cattle with smaller amounts of sheep/goat, horse, red deer and pig and, notably, the degraded remains of three cattle heads were recorded in the upper fill of the well there. Overall the suggestion was made that the large-scale processing of animals and animal skins was undertaken at the site (Mortimer 2005; Mortimer *et al.* in prep.).

Defleshing and dehairing

Following separation of the skin from the animal, the inner flesh and fat layer need to be removed, along with the epidermis (outer layer) and hair – unless a pelt is the desired product, in which case the hair remains. This removal prevents decay and allows curing agents to penetrate the skin. There are various documented methods for achieving these stages, including the initiation of some controlled putrefaction through burial of a skin or the soaking of it for day or two in urine or solutions of dung or a wood ash; pits for such purposes – and tanning generally – are well attested from later and historic sites. Hides may also have been chewed or rubbed with salt. These preparatory stages, if used, could be followed by kneading, sweating, beating, treading and scraping (Coles 1973, 144 and 1979, 197–8; Harris 2011, 61; Hodges 1989, 148–50). Scrapers and sharper tools may have been used for defleshing (Chapter 2, Donahue) and awls and piercers may have been used to create holes so that skins could be threaded and stretched on to frames to facilitate the work (Coles 1979, 197). There were probably tools to achieve these aims in those discarded at Marham Park. Skins may also have been beaten over beams and the wooden beaters excavated in a waterlogged context from a burnt mound site at Perry Oaks, Heathrow (Lewis *et al.* 2006) could perhaps have been employed in such a process.

Fire and ash would have been readily available at burnt mound sites and the pits and troughs could feasibly have been used for burying and/or soaking hides (see also *Application of curing agents*, below). These observations could sit well with the results of trace element analysis of soils from troughs from two sites in Ireland, at Inchagreenoge and Coonagh West, Co. Limerick, which showed elevated levels of heavy metals. It was suggested that these may have had an origin in soil imported to the site from elsewhere, or from ash or urine, with an observation that the most obvious reasons for the presence of these might have been for use in the tanning and cleaning of skins or for washing and processing wool, with soil as a mordant (Brown *et al.* 2016, 24; Reilly *et al.* 2012). Overall the preferred interpretation of these burnt mound sites was for a textile-related role for them, related to the cleaning and dyeing of fibres for plant-derived or woollen textiles; this was framed in the context of a 'textile revolution' and drew on plant remains of potential dyestuffs – berries and catkins – and on the usefulness for this purpose of the wet and self-filling nature of the troughs at the sites and the occasional structures, which were suggested to perhaps have been used to dry cloth (Brown *et al.* 2016). However, there may be scope to review, with these infrastructure elements, as noted, potentially also applicable to work with skins.

The occasional structures at burnt mound sites that are represented by postholes could potentially have made frames for stretching and drying skins. The two possible postholes at either end of trough 5021 at Laxfield could have carried a beam to facilitate the draining or handling of hides or work upon them (Fig. 3.8A), and the six postholes

associated with the earliest activity at Marham Park (Structure 1, Fig 2.11) may have formed part of a frame or structure for supporting skins for scraping, stretching, drying or smoking.

The ready availability of relatively clean water is a long-established deciding factor in the location of burnt mound sites (see Chapter 1) and this marries well with the fact that skins may have been washed and dried at various points in the process of curing, particularly after skinning but not necessarily exclusively. Water could also have been needed for preparing soaks and solutions. All four burnt mound sites presented in this volume included deep wells which had been dug into the perched water table. Elsewhere, in waterlogged conditions with good preservation, wooden or wattle linings have been recorded in wells associated with burnt mounds. Examples include the remains of stakes and planks found in a Middle Bronze Age well associated with a burnt mound site at Crowthorne, Berkshire (Chittock *et al.* 2021, 235–7, fig. 4) and a large hollowed-out tree used to line another example at Reepham in Norfolk (Mason *et al.* 2024). Perhaps the fragments of wood observed in the geoarchaeological sampling at Laxfield were the remains of a lining. A notched birch log ladder was found in the well at Crowthorne (Chittock *et al.* 2021, 234–5, figs 4–5), showing how water was obtained regardless of fluctuations in the water table, and two postholes in the base of the Early Bronze Age well associated with BM 2 at Marham Park may also have served to hold a ladder. A Late Bronze Age yoke of oak, made for human use, was excavated at Swalecliffe, Kent, which may show how water was lifted and carried from the wells (Masefield *et al.* 2003).

Application of curing agents

Following the removal of hair and flesh, in oil tanning hides are rubbed with oils or fats such as tallow, egg yolk or, especially, a solution of the brains of animals (Hodges 1989, 148–50). One North American method of curing was noted to involve a preparation of animal brain simmered in a pan of water which was then mashed with additional fat: the skin was then dipped into the cooled mixture, firmly rubbed and left to soak (Coles 1979, 197–8), perhaps overnight (Harris 2011, 64). The simmering stage is of particular interest in the light of the generation of hot water at burnt mound sites; such a use for the troughs at Marham Park, for example, may explain the presence of the 'greasy deposits' as an alternative to their origin in cooking. The possibility appears ripe for exploration through experimental archaeological work.

Chapter 1 highlighted the well-preserved examples of troughs with linings of timber, wooden vessels or wattle, or clay and moss, such that they would have held water (Mighall *et al.* 2017, fig. 10; Ó Néill 2009, 80). John Coles, drawing on study of traditional practices and experimental archaeology, has also noted that pits for soaking hides may themselves have been lined with skins (Coles 1979, 197). The sub-rectangular shape of the troughs at Marham Park and trough 0203/5216 at Laxfield in particular, with their steep sides and flat bases – characteristics shared with some of the pits – indicate that they were probably lined with timber, as with features elsewhere. Further, geoarchaeological work on a sample of troughs at Marham Park highlighted the presence of waterlain silts at their bases.

The size, shape and depths of the troughs would have made them suitable for the purposes of soaking and preparing skins. Those at Marham Park that post-dated the cobbled surface at BM 1, for example, were all very similar – square-cut, near-vertical sided and flat bottomed – and approximately the same size, 1.6–2.0m long, 1.2–1.7m wide and 0.5–0.7m deep (see also Table 5.1). It is possible that the lining of the pits and troughs could have extended above ground height, making them deeper. The largest trough at Marham Park, even if lined, may still have measured *c.* 1.9m long and 1.6m wide, which would probably have taken a large animal skin, such as from cattle, although again experimental work may confirm this hypothesis. At Marham Park there were five other pits ranging from 0.6 to 1.2m in diameter and 0.25 to 0.8m deep, also with near-vertical sides and flat bases and similar fill sequences to the larger pits. These could also have been lined and used in similar ways (Green and Mortimer 2023, 121). At Laxfield, in addition to the troughs, at least six other pits of various size and form were broadly contemporary to the burnt mound site. The variety of pit sizes may well have accommodated skins of different sizes.

Significantly, the trough sizes are consistent with pits recorded more generally at burnt mound sites, particularly in Ó'Néill's gazetteer (2009) of nearly seven hundred pits from over thirteen hundred excavated sites (Table 5.1; Fig. 5.1). In this work pits were sorted into a typology based on shape (rectangular, oval, circular), with subcategories based on size and lining type. By way of illustration the dimensions of the features identified as rectangular and oval troughs at Marham Park, Laxfield and Stanton (summarised in Table 5.1) are shown alongside the distribution of dimensions of sub-classes of rectangular and oval pits captured by Ó Néill, those simply described as of those shapes with no further details of linings (2009, figs 8.25 and 8.79).

Among a wealth of data, overall, a broad peak in pit capacity of up to 1 cubic metre was observed, regardless of shape or evidence of lining, with another much smaller peak for examples greater than 4m³ (Ó Néill 2009, fig. 11.1, 91–2). Ó Néill also observed that, of pits associated with faunal remains, the pits with capacities over 2 cubic meters were mainly oval or rectangular and, in the small number of reports where an association could be made, coincided with cattle and horse bones (Ó'Néill 2009, 179 and 194).

The suggested interpretation of burnt mounds as places for working with animal skins perhaps places a new focus on these data and it appears that to date, while they have been discussed in relation to cooking (Ó Néill 2009, 194), pit sizes have not been explicitly considered in terms of the sizes of animal skins. Perhaps the broad peaks were related to different species, such as reflected in the lipid results, or

Table 5.1 Dimensions of troughs associated with the burnt mound sites

Site	Period	Feature	Details	Length	Width	Depth	Width as % of length	Approx. vol. (m^3)	Approx. shape
FAS 056	Beaker	3162	trough (early)	1.1	0.8	0.26	73	0.18	oval
FAS 056	Beaker	3275	trough (early)	2.5	1.7	0.36	68	1.20	oval
FAS 056	Beaker	2919	trough	2	1.7	0.6	85	2.04	rectangular
FAS 056	Beaker	2921	trough	2	1.7	0.6	85	2.04	rectangular
FAS 056	Beaker	2926	trough	1.7	1.6	0.56	94	1.52	rectangular
FAS 056	Beaker	2932	trough	1.9	1.4	0.7	74	1.86	rectangular
FAS 056	Beaker	2976	trough	1.6	1.2	0.5	75	0.96	rectangular
FAS 056	Beaker	2617	pit outside hollow (trough?)	1.48	1.24	0.54	84	0.78	oval
FAS 056	Beaker	2569	pit outside hollow (trough?)	1.2	0.8	0.28	67	0.21	oval
FAS 056	Beaker	2591	pit outside hollow (trough?)	1.46	0.76	0.16	52	0.14	oval
FAS 056	EBA	12566	trough	1.7	1.2	0.2	71	0.41	rectangular?
FAS 056	EBA	12586	trough	1.25	0.5	0.18	40	0.11	rectangular
FAS 056	EBA	12521	trough	1.4	1.1	0.5	79	0.77	rectangular?
LXD 135	EBA?	0203/0516	trough	1.35	0.75	0.25	56	0.25	rectangular
LXD 135	EBA?	5021	trough	2.2	1.3	0.25	59	0.72	rectangular
HEP 011	EBA	11013	trough	3	0.75	0.21	25	0.47	rectangular
HEP 011	EBA	11017	trough	1.5	1	0.41	67	0.62	rectangular

Note: For oval features the volume is calculated as: π x depth x ½ length x ½ width

perhaps even reflected cull patterns in neonatal and mature animals that may have been practised in herding for milk. The latter is a more speculative suggestion, particularly in the absence of major assemblages of faunal remains from the vicinity of the four Suffolk sites, although it may be fair to draw in insights from geographically and broadly chronologically contemporary local assemblages. At an Early Bronze Age settlement site excavated at West Row Fen between 1982 and 1986 an interpretation drawn from the large assemblage of over 31,000 pieces of animal bone is that cattle were probably used as draught animals, with sheep and goats providing milk (Olsen 1994) while dairy herding is probably discernible in the age profile of remains from Middle Bronze Age Grimes Graves (Rowley-Conwy *et al.* 2020, 404).

It is possible that troughs could have been used for different stages of work with hides, for cleaning, washing and soaking. They may have been multipurpose, or there may have been cleaner troughs for washing and soaking using fresher water and greasier troughs for the application of curing agents. The wells at Marham Park and Laxfield were each associated with at least two troughs, which may indicate specialised activities within them. Such a hypothesis could perhaps be tested at future sites, although it would depend on the survival of lipid remains, and the lack of results from Laxfield (Chapter 4) and from five of the troughs at Marham Park all show that determinations may not always be successful, although it cannot be proven whether the absence was down to survival or an original lack of presence; experimental archaeology may have a role to play in exploring the absence of evidence. The presence of 'greasy' deposits in trough 2921 at Marham Park, for example, may have been a chance survival, as geoarchaeological analysis suggests that this feature was infilled relatively quickly, with a clean horizon between the deposits relating to use and dumped material, whereas others had been open for a time such that a stabilisation horizon had developed over the primary fill. Further, the stones from which lipid were obtained from troughs 2932 and 2919 (BM 1) and 12568 (BM 2) were from secondary material dumped within them rather than directly and securely relating to the primary use of the features.

Last, it is possible that the ceramic vessels represented in the pottery assemblage at Marham Park could have been used as containers for solutions and fats; the Beaker and Bronze Age pottery from BM 1 at Fornham came from the fills and upper fills and was abraded, suggesting that the sherds had been present in general waste.

Scraping

Following treatment, hides require stretching and scraping to manipulate them back into softness – a laborious process. In the North American process of brain tanning described by John Coles, skin was wrung out, tied with cord and stretched on a frame, and then scraped and shaved to uniformity (Coles 1979, 198). Skins may also have been stretched with a wooden rod until supple, and the reapplication of brain solutions may also have been necessary (Coles 1979, 198). Donahue (Chapter 2) also notes that hides may have been stretched on the ground.

Two piercers were noted amongst the eleven worked flints associated with the very earliest phase of activity at Beaker BM 1 at Marham Park, with two of these and a burin also recorded in the large assemblage of worked flint from Fordham (Bishop in Mortimer *et al.* in prep.). These tools, and awls, could have been used to perforate skins for threading, and the small assemblage from Laxfield also included a burin. Hides may also have been pierced for stretching for defleshing (Coles 1979, 197) or drying (see Furlong 1951) although there was microwear evidence

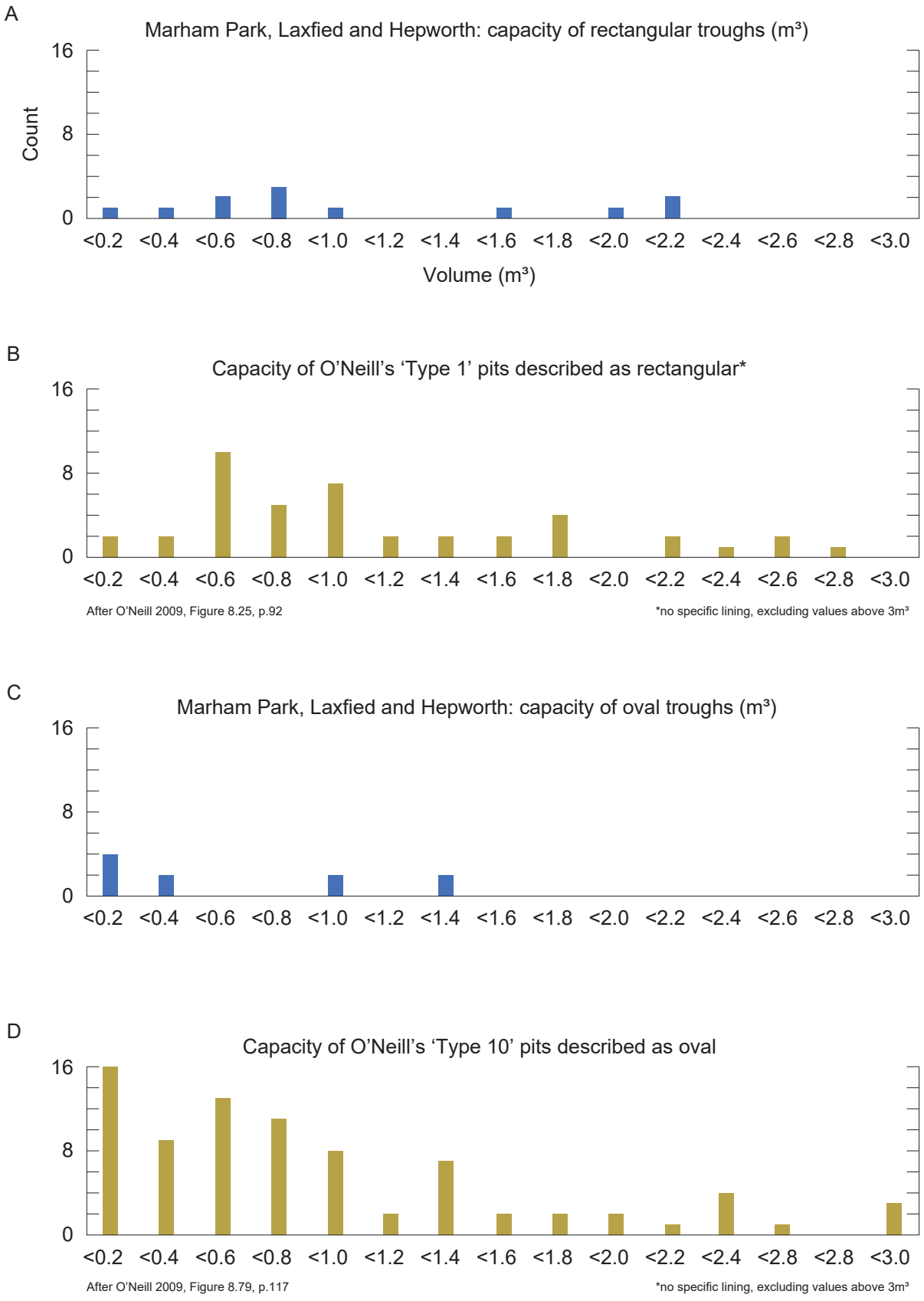


Figure 5.1 Graphs of trough sizes at Marham Park compared to those in Ó Néill 2009

from some piercers at Marham Park for their use on dry hides; hides may also have been pierced for sewing.

The overriding evidence for the scraping stage of the process, however, comes from the scrapers themselves. These were ideal tools for this task, with the curved edge allowing pressure to be applied without snagging the skin. They may have been held in the hand or hafted with a bone or wooden handle for more force (Chapter 2, Donahue). As has been noted above, 94% of the over three hundred tools from Marham Park were scrapers, with awls and piercers also well represented (Chapter 2, Bates) and assemblages which contain high proportions of scrapers have generally been associated with the processing of animal hides (Bradley 1978, 56). Indeed, in researching an assemblage from two possibly Middle Bronze Age burnt mounds at Bow Hill, West Sussex, excavated by University College, London, a review of 93 excavated burnt mound sites highlighted that scrapers appeared most commonly, alongside retouched flakes (Bliss 2015, 28–34). Fewer struck flints were recovered from BM 2 at Marham Park, with only 20 tools, but again the majority of these were scrapers.

Seventy-seven artefacts from features and deposits across the burnt mound sites at Marham Park were submitted for analysis of microwear, mainly scrapers but also cutting tools and piercers, including a piercer and three scrapers from BM 2 (see Table 2.3). Forty-five of these showed the distinctive use-wear characteristics from having worked with dry hides, with no evidence of any other processes since the tools were last retouched (Chapter 2, Donahue). The remainder of the sample, 22 out of 77, showed no evidence of having been used since the last episode of resharpening or had suffered post-depositional damage to the degree that no information could be obtained. There was no evidence of tools in the sample having been used for any other purpose, although future researchers may wish to revisit the wider assemblage.

The lipid residues identified on flint implements at Marham Park could support the suggestion that they were used in curing processes involving fats. Those on a scraper from the Early Bronze Age BM 2 and one from the metalled surface associated with the Beaker period BM 1 suggested mixed non-ruminant and ruminant sources, which may have come from the skins themselves or from fats applied to them. Two further scrapers from BM plotted within or on the border of a dairy signature, leading to the suggestion that perhaps they had been used in conjunction with some sort of butter as a grease to help soften hides (Chapter 2, Dunne *et al.*).

There were hints in the microwear analysis that organic material may have been used in the process at some point, perhaps leaves or something which left particles on a hide (Chapter 2, Donahue). In this context it is perhaps worth noting that, although it could have been a modern contaminant, the lipid analysis identified erucic acid as an unusual component in all samples. This acid is a component in oils from Brassicacea such as radish and rapeseed and is also a component of mustard oil. The *Handbook of Herbs and Spice*s notes that mustard today is used for the manufacture of a blown oil (oil that is heated and aerated), which is a viscous and oxidised oil that can be applied to leather to soften it (Thomas *et al.* 2012, 396). It may be anachronistic to suggest an application of this in prehistoric leather technology, but the presence of the acid and its possible origin suggests a potential subject for further investigation and experimental work. Notably, in the lipid analysis of stone from the burnt mound site at Errarooey More, Co. Donegal, plant sterols were also identified and, in the environmental remains from this site, seeds of vetch (*Vicia sativa*) and mustard (*Sinapsis* sp.) were recovered (Hawkes and Malainey 2018), although both are food plants.

Smoking

A final stage in accounts of brain-tanning is the smoking of the hide in order to make it less susceptible to rotting or stiffening should it come into contact with water (Coles 1979, 198); smoking may have taken perhaps three to five days (Harris 2011, 61) and scraping may have been undertaken beside a fire so that the skin could periodically be held in the smoke to absorb gaseous formaldehydes (Harris 2012). As for ash, which could also be used to absorb fats as hides were drying (Harris 2011, 61), smoke would have been readily available at burnt mound sites. Traditional examples include practices whereby hides were shaped into cones and placed over pits filled with green wood and bark that produced smoke but not heat, with turning essential (Coles 1979, 198); perhaps some of the pits and structures at the burnt mound sites were used for this purpose. It has also been commented upon that some of the structures suggested as possible sweat lodges at bathing sites might have been very smoky (Ripper and Beamish 2011, 200), perhaps intentionally.

While the four fabricators (e.g. Ra 2338, Fig. 2.36CC) from BM 1 at Marham Park could have been used for fire lighting, there was no evidence of the location of fires at any of the three sites. Early-phase hearths were recorded at the four low-lying and well-preserved burnt mound sites at Bradley Fen in the deep Cambridgeshire Fens (Knight and Brudenell 2020); on the upland clayland sites these are more likely to have been ploughed away (see also Hawkes 2018, 64, for discussion of the survival or otherwise of hearths at Irish sites).

Spatial distributions of activity

There are hints of spatial distributions in aspects of the activity in the burnt mound sites at Marham Park, although more related to understanding the physical layouts of the site than any task sequencing. Possible differences in uses of troughs have been mentioned above.

Generally the cobbled surfaces would have provided traction and solid working surfaces for the hot, wet, greasy work, and evidence for such a solid, consolidated surface has been noted elsewhere (Hawkes 2018, 97–8; Ripper and Beamish 2011, 198). The metalled surface at Marham only survived within hollows, safe from the plough, though it

Table 5.2 Distributions of lithic objects in the quadrants of BM 1

Implements locatable to quadrants	North-west	North-east	South-east	South-west
Awls, piercers, burins, points *(29 of overall assemblage of 42 pieces)*	48%	19%	10%	7%
Scrapers, including end, end-side, side, subcircular, thumbnail and double-end scrapers *(189 of overall assemblage of 230 pieces)*	58%	22%	15%	4%
Blades, including backed knife, blade-like flakes, crested blades, edge-ground knives, retouched blades, scale-flaked knives, serrated blades, truncated blades, utilised blades, utilised flakes *(438 of overall assemblage of 576 pieces)*	50%	28%	10%	10%

would probably have spread up and out into the surrounding area. Overall 344 worked flints were recovered from the surface associated with BM 1 at Marham Park, including 17 identifiable tools. The presence of the material suggests that both work and knapping may have been undertaken on the surface, with a noted concentration close to the edge of the main well (Chapter 2, Bates), although material was also dumped into the well when it fell into disuse.

At BM 1 there was a bias in the distribution of identifiable flint tools towards the north-western quadrant of the hollow. Some implements were recovered from slots dug into the feature, but Table 5.2 summarises the percentages of different types of tools and utilised pieces which could be assigned to a location across the four quadrants of the hollow. This shows that their distributions were similarly patterned. Of the scrapers recovered from the cobbled surface, four were from the north-east quadrant with one from each of the others. This northern distribution may reflect activity to the north of the wells but may also reflect the fact that the main well cut was in the north-west quadrant of the hollow, such that fills were deeper in this area. Overall the pattern of the deposits within the wells indicated that the initial infilling of the hollow occurred from the north and north-east, where it is assumed that a significant part of the burnt mound itself was located, along with many of the activities that created it. In relation to this it is potentially of interest that the troughs and smaller circular pits of BM 1 were arranged around the western, northern and eastern sides of the main well (Fig 2.11), perhaps implying that beyond them, on all three sides, the heaps of burnt stone and hearths would have been set, with the southern side the open part of the 'horseshoe'. This 'entrance' would have faced towards the only Beaker structure on the site, located 40m away (see Chapter 2 and below), though possibly more by coincidence than design.

Similarly there was some spatial patterning in material from BM 2, with five of the six scrapers excavated from fills associated with the hollow coming from the northern quadrant. Two of the piercers also came from the northern quadrant, with one each from the east and south and one and an awl from well 12779. Again, this northern distribution may reflect deeper fills over the depression of the well but, by contrast, the three knives in this case came from the east, south and west quadrants. Further, when the distribution of the other cutting implements in addition to knives – blades, blade-like retouched flakes and blades, utilised blades and utilised flakes – which can be allocated to quadrants is considered (65 of 79 objects), 35% came from the south side, 27% from the west, 21% from the east and only 15% from the north. This may perhaps suggest that scraping was preferentially done from the north and other activities, such as cutting, around the other sides, although it is based on a low number of objects. This might correlate with the observation that most of the burnt mound itself may have lain to the south-west (see *Durations of use* above). Trough 12586, however, from which burnt flints showed residues of ruminant and non-ruminant lipids, was on the northern side of the complex.

Overall the potential applications of fire, ash and water at various stages in the process of transforming an animal hide into a durable product would appear to support a model of the co-location of tasks to make efficient use of these resources, rather than the suggested alternative scenario of cooking and working with dry hides being undertaken simultaneously. The fires which provided hot stones for other processes may also have yielded smoke and scraping and smoking could have been undertaken while hides at an earlier stage in the process were soaking. It is also suggested below that other elements of a carcass may have been worked on at these sites, such as fats and organics of value to work with skins.

Sites of noxious activity

The burnt mound sites at Marham Park, Laxfield and Hepworth, as is commonly observed, were not found in the centre of areas with abundant evidence for associated settlement (see Chapters 2, 3 and 4 *Project background*). Although Marham Park was the only site excavated on a large scale (the Beaker structure here is considered further below) the Hepworth mound site was found as part of an extensive evaluation. This 'separateness' is one of the distinctive features of burnt mound sites and one, we suggest, that may be related to the hypothesis that they represented stations primarily for work with animal products, particularly skins.

The general perception of burnt mound sites as 'backyards' for messy tasks has been considered elsewhere (Tourunen

2008; Brown *et al.* 2016) and it is worth reiterating that the noxiousness of the procedures could provide a reason for their landscape location some way from settlement areas; in experimental working with hides the smell is noted to have been pungent (Coles 1979, 198) and even today tanneries, like abattoirs, are known to be extremely malodorous places.

Proximity to kill sites?

As has long been acknowledged, the location of burnt mounds is likely to reflect the availability of resources required for the activities undertaken there – water, fuel and stone. Of these, water would have been the least transportable; flint, for example, appears to have been imported to the sandy site at Feltwell Anchor in Norfolk in the Early Bronze Age (Bates and Wiltshire 2001, 409). The suggestion that burnt mounds may have been sites for the processing of animal skins and animal products, however, adds animals to the list of essential raw material (Green and Mortimer 2023).

The act of slaughter generally remains archaeologically invisible but there was likely to have been variation in the manner in which animals were killed, skinned, defleshed and dismembered, and the locations in which these tasks were undertaken need not have been the same for each (Johnson 2017, 498; Stolle 2020, 182). Primary butchery and division of a carcass may have been undertaken close to a kill site, with meat and other elements carried off for later division and consumption (a point also made in Bliss 2015, 48). It is possible that burnt mounds were created at locations that were convenient for the slaughter of animals and could have served for relatively immediate processing of animal products but such that more major assemblages of animal bones may be found elsewhere in other activity areas.

If animals were killed at a site close to where their skins were to be worked there would be less need to transport potentially heavy hides, as beasts could be brought in on the hoof. It is also easier to cut and peel a skin from a carcass when the corpse is still warm (Grömer *et al.* 2016, 70; Harris 2011, 59). Wider studies may offer some insight into traditional practices. In a study of the butchery practices of the Baralong and Bakwena people in Botswana it was noted that the killing of animals was undertaken within a *kraal* (enclosure) so that it could be controlled, with immediate activities there including skinning, division of a carcass for sharing and removal of offal and digestive systems for cleaning (Mooketsi 2001, 110).

Decay of skins sets in immediately after the death of an animal, such that immediate intervention is required to prevent uncontrolled activity of bacteria (Grömer *et al.* 2016, 71). As well as a fresh hide, slaughter of an animal would have generated a number of other valuable resources which would have required immediate attention, including fat and offal. As noted above, these, especially the brains, could have been significant resources for working the animal skins themselves. There is also resonance with the suggested interpretation for platforms and postholes at some Irish sites as relating to butchery and the hanging of carcasses, perhaps to collect blood (Hawkes 2015, 57). Further, the rendering of fats may also have been undertaken in pits of boiling water, with applications for many purposes in addition to work with hides such as for grease, tallow, soap, food, light, waterproofing, preserving and soap and Ó Néill (2009, 79) too has suggested a possible link between fats and thermolithic technology. Just as one example, in a reconstructed Iron Age farm occupied for a 1970s TV series, fat from a slaughtered pig was cut into cubes and simmered in a cauldron over a low heat to render it into lard (Percival 1980, 107). Such procedures may have been one of the messy 'backyard' processes suggested for some Irish sites (Tourunen 2008, 42).

While kill sites for domesticates are hard to identify, it may be significant for the wild animals that flint projectile points have been recorded from a number of Irish sites (Ó Néill 2009, 168). Of the eleven fragments of arrowheads, oblique arrowheads and barbed and tanged arrowheads recovered from Marham Park, four were found in fills associated with the Beaker BM 1 (in the second fill of the north-eastern quadrant, 2861, with an oblique arrowhead in each of the well and the cobbled surface) and two were associated with the Early Bronze Age BM 2 (in the eastern and northern quadrants).

Pasture

A suggestion that animals were being killed at burnt mounds prompts consideration of how activities at the sites may have fitted in with animal husbandry, wider patterns of land use and the agricultural round in this period. It resonates with the pasture or potential grazing context that has been observed for many of them. Specifically, the environmental evidence for the burnt mounds at Marham Park and Laxfield shows that they were probably established in open, grazing contexts. The survival of pollen and diatoms was not good at Marham Park but did hint at an open landscape in the Bronze Age with only a few trees and shrubs locally (Chapter 2, Langdon), while the waterlogged sequence from the well at Laxfield, although not fully dated, suggested an Early to Middle Bronze Age environment of mixed woodland and grassland (Chapter 3, Grant, Figs 3.12 and 3.13). A number of other sites have provided further evidence for the pasture setting of burnt mounds. Overviews of patterns in Irish burnt mound sites highlight the pollen evidence for grazing environments around them within wider mapped contexts of field systems and monuments (Waddell 2000, 177), and also their locations in areas peripheral to managed farmland, in woodlands and marginal wetland locations, with evidence for phases of woodland clearance at some (Hawkes 2018, 204–7). At a Beaker/Early Bronze Age to Middle Bronze Age mound site at Yaxley, also in Suffolk (see below), fungal spores of *Sordaria*, often found in herbivore dung, were

identified in association with the burnt mound, and the palaeoenvironmental assemblage was indicative of trampled soil with the presence of freshwater and aquatic species (Brudenell and Kwiatkowska 2022). At Crowthorne in Berkshire, scarabeoid beetles were noted at 'Well 2', also indicative of herbivore dung (Chittock *et al.* 2021, 238). Similarly, land snails and phytoliths from a Bronze Age burnt mound at Meur, Orkney, where there were faunal remains relating to a range of domestic, wild, land and marine resources, indicated a grassland environment, with a suggestion that the grasslands were associated with outlying burnt mounds and were places of sustained use separate from the contemporary settled landscapes, where cultivated plots lay closer to the settlements (Toolis and Carrasco 2005, 44, 46).

While animals could have been walked or transported to a kill site at some distance, at least one account of traditional slaughter highlights a benefit of dispatch close to pasture; in the Arctic some Sámi practices have involved killing reindeer with knives in the pastures close to the grazing of herds to avoid distressing the animals, so that the usefulness of the animal and its organs could be maximised (Sara *et al.* 2022). The processing of a large animal would also have taken some time, limited perhaps by the availability of the processors and the facilities and resources at the burnt mound itself. It is likely that animals would have been taken off the adjacent pasture one at a time for slaughter and processing, particularly if this was being done as part of a seasonal cull.

Seasonality

The killing, dismembering and processing of a large animal would have been a lengthy procedure, and it is unlikely that animals culled in a herd would have been killed all at once, even if there was a need to selectively kill animals in autumn to avoid feeding too many over winter, and to provide resources such as meat – perhaps salted, smoked or sealed in fat – and hides for clothing, tents, bags, straps etc. (Roycroft 2006). It is feasible that burnt mound complexes were, therefore, located at the limits of the pastureland and that animals, especially cattle, would towards the end of autumn have been chosen for the cull and taken one at a time or in manageable numbers to be processed, with meat, bones and other useable products taken back to settlement areas (Green and Mortimer 2023; see also Roycroft 2006).

While slaughter may also have taken place outside culls, of wild animals for example, the seasonality of use of the burnt mound sites on the Suffolk clays at least is suggested from the geoarchaeological analysis of the wells at Marham Park and Hepworth, which concluded that they were only seasonally wet. Pollen from the trough of a burnt mound in the Soar Valley, Birstall, Leicestershire, where a layer of burnt stones appeared to represent the final episode of the heating of water, also hinted at activity in the late summer/early autumn (Ripper and Beamish 2011, 199).

Community assets

Such a model as is proposed here, where burnt mounds were located in grazing lands as stations for working on slaughtered animals, could explain the apparent ubiquitousness of burnt mounds in the landscape, where they are generally framed as significant probably seasonal or episodically visited places albeit often without a particular purpose pinned to them (see Chapter 1). They may have served individual families, groups or communities and this has been suggested in a number of systematic surveys or large-scale excavation projects, where their frequency in the landscape and relationship to other settlement features and landscape use has been explored. In Wales 16 burnt mound sites were recorded in a 23ha excavation of farmland to the south of Bangor, Gwynedd, in low-lying wet clay and the valley edge, ranging from the Early to Late Bronze Age, but with a peak period from 2490–2290 cal BC to 2290–2020 cal BC; the presence of these showed that the same general areas were used repeatedly over a long period of time, even when individual mounds may have had a relatively short history, and it was suggested that the distribution probably spread over the Arfon plateau and may have been close to settlement areas (Kenney 2008, 65–6). Closer to the Suffolk sites, examples excavated at Bradley Fen in Cambridgeshire as part of landscape scale excavation work have been recorded in the context of other contemporary features including a roundhouse very similar to that at Marham Park. The four burnt mounds recorded at Bradley Fen were in a broad line along what would then have been the fen edge, separated by gaps of between 50 and 100m (Knight and Brudenell 2020).

In analysis of the burnt mound sites at Bow Hill, West Sussex (see above), Alex Bliss made a powerful argument for consideration of burnt mounds in their landscape and economic contexts (2015, 37). Making a link between burnt mounds and animals, based on the relatively large assemblage of stone tools relevant to the processing of animals that included scrapers and knives, the conclusions of his dissertation were that wool and skins may have been produced in large quantities, particularly inspired by the wider context of the field systems, tracks and grazing areas of Kingsley Vale and the Sussex Coastal Plain that were indicative of the presence of stock animals and the movements of herds to and from the chalk downlands (ibid., 37). Although his emphasis was on wool, sheepskin and potentially the washing of it or boiling to extract lanolin (ibid., 47), the conceptualising of burnt mounds within their landscapes along these lines has wider application.

At Irish sites burnt mounds have been noted together in groups of up to ten or more perhaps sited along the banks of streams or marshy areas, sometimes spaced within a few metres of each other, and it has been noted that their distribution probably related to settled agricultural communities (Ó Drisceoil 1998, 672, 677) and to activities on a family or community level (Grogan 2005), forming

an integrated part of a wider settlement pattern (Waddell 2000, 177). While a variety of domestic and wild animals are represented in the faunal assemblages at sites, cattle appear to predominate (Hawkes 2015, 57) and Niall Roycroft (2006) has pointed out that if they represent annual or biannual activities relating to the slaughter of animals by family groups operating in a pastoral economy, their frequency is perhaps not surprising; he made a link between the abundance of burnt mounds in the Irish landscape and the general understanding of the significance of cattle to the Irish Bronze Age economy. It is possible also that burnt mound sites may only have been used every few years as grazing lands were rotated (Bliss 2015, 48). It adds a dynamic sense of activity, industry and the seasonal round.

Suffolk claylands in the Bronze Age

The model for burnt mound sites as common features in the landscape meeting the needs of a pastoral economy offers a framework to review the growing number of burnt mound sites excavated on the Suffolk clayland. In recent years, a small group of such sites has been recorded through developer-funded work and, in addition to the four burnt mound sites presented in this volume, other examples in Mid Suffolk have been excavated at Haughley by Pre-Construct Archaeology (PCA) (Woolhouse and Pullen 2020; Suffolk HER HGH 058), and Yaxley near Eye, excavated by Oxford Archaeology on the former airfield in 2014–18 (Brudenell and Kwiatkowska 2022; YAX 040/41). At Bury Road, Woolpit, also recorded by PCA (WPT 059; Desrosiers-Whalley 2023), a number of intercutting pits containing burnt stone and charcoal were recorded in a natural hollow associated with a spring in an area of gravel close to areas of geology of Lowestoft Diamicton. A small assemblage of Late Bronze Age pottery (30 sherds, 168g) possibly dates the origins of activity to that date, although radiocarbon dating is planned (Desrosiers-Whalley 2023) – depending on dating, the site may provide another example to add to the corpus.

Consideration of them comes under the umbrella of two broad themes in the East Anglian Archaeology Regional Research Framework: LBA-MIA 13: 'When and how were the claylands settled?' and E-MBA 14 'How do we further our understanding of Bronze Age pioneer landscapes?' (RRF 2024, Medlycott 2011, 22–3). For much of the agricultural past, the claylands predominantly provided land for pasture and woodland. The heavy boulder clays would have been difficult to plough before iron ploughshares, and it is generally accepted that early ploughland would have occupied the valley bottom gravels or perhaps the gentle chalk slopes just above them. It was not until the 18th and 19th-century era of agricultural improvement, with the mass production and insertion of clay drains, that the upland clay areas began to be turned toward arable farming. However, a perched water table sits within the impermeable bed caused by the silt and clay content of the Lowestoft Diamicton (boulder clay) lying over the porous Lewes Nodular Chalk and Crag Sand bedrock. While causing waterlogging in the winter months it made these upland areas ideal for rich summer pasture in the warmer drier months, with water accessible through ponds and shallow wells for much of the year. This upland, once cleared, offered areas of pasture far more extensive than anything the narrow, and relatively crowded, river valleys could supply. In the late 18th century there was still an extensive 'dairying region' at the very centre of the upland clay plateau, as indicated by Arthur Young in his *General View of the Agriculture of the County of Suffolk* (1797); two of the three sites discussed here sit well within that region, with the third just off the edge.

There is now emerging evidence for the origins of these activities upon the upland clays, particularly through increasing developer-led archaeology, which begins to challenge the assumptions that they were largely densely wooded and unimpacted until later in the Iron Age (Brudenell and Kwiatkowska 2022).

Other burnt mound sites on the Suffolk claylands

Yaxley

At Yaxley (Brudenell and Kwiatkowska 2022), lying at 46–8m AOD on the edge of the clay upland 1km from an eastwards flowing tributary of the River Dove (Fig. 1.1), traces of a burnt mound with associated pits and postholes were recorded in excavation area YAX 040, adjacent to a natural pond within a periglacial water filled hollow. The mound itself was only evident through staining of the geology and in accumulations of burnt flint in features across the site and in the fills of the pond and later truncating ditches. Three radiocarbon determinations indicated that activity was taking place at the complex in the Early to Middle Bronze Age, with dating from the earliest exposed fill of the pond and a burnt flint-filled pit on its western edge setting its use *c.* 2200–2000 BC (Fig. 5.2, Table 5.3) – termed Early Bronze Age in the publication of the site, but Beaker period according to the chronology used in this current volume. Pollen analysis from the lower fills of the pond indicated an open, grassy landscape, with plants associated with damp meadow and rough ground rather than dense woodland, a signature characteristic of a largely pastoral landscape maintained by livestock grazing. Further, fungal spores of *Sordaria* were identified, a type often found in herbivore dung. The palaeoenvironmental assemblage was indicative of freshwater and aquatic species, and trampled soil. Overall the environmental evidence indicated that the local clayland was substantially cleared and given over to pasture during the first half of the second millennium BC, with pockets of mixed deciduous woodland in the wider landscape, and hints of the arable cultivation of barley, wheat and oats, probably down the slope of the Dove Valley

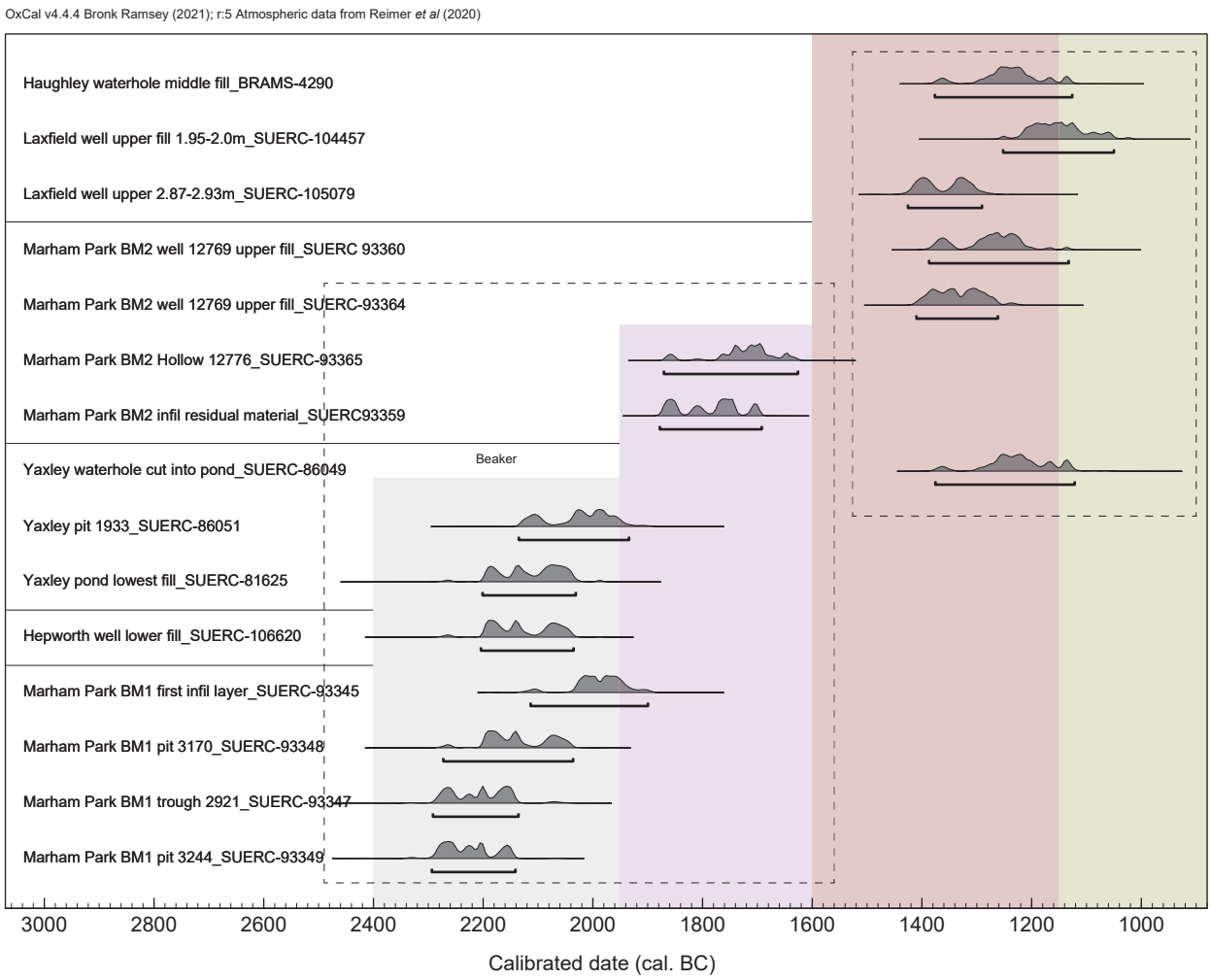


Figure 5.2 Radiocarbon dates for excavated burnt mound sites on the Suffolk claylands

to the south-east (Brudenell and Kwiatkowska 2022, 239). There was very little evidence for the use of the mound, with finds including a single worked flint and a few cattle and sheep bones (Brudenell and Kwiatkowska 2022, 239).

Haughley

At Haughley (Woolhouse and Pullen 2020) a waterhole was recorded at 55m AOD, on the upper slope of a valley leading down to a tributary stream of the River Gipping (Fig. 1.1). Layers of burnt flint in the fills were all that remained of the levelled burnt mound. Radiocarbon dates indicate that the well infilled during the Middle Bronze Age (Fig. 5.2, Table 5.3), but as at Laxfield the lowest fills could not be dated, so an origin earlier cannot be precluded. There was a modest assemblage of struck flint, including scrapers, which could suggest that skin/hide processing might have been taking place. A pollen study indicated a predominantly open grassland landscape on the valley sides, by the Middle to Late Bronze Age (Woolhouse and Pullen 2020).

Chronologies of clearance

Overall the six sites were recorded in an area of approximately 45km west–east by 12km north–south, and all were situated on the boulder clay at elevations of between 48m and 56m AOD. They represent markers of activity of such a nature that it changed the character of at least some parts of the Suffolk clayland from the Beaker period onwards, and illustrate a spread of Early Bronze Age incursions into this clayland, at least in those areas within close proximity to the major river valleys, if not across the entire interior, at an early date in relation to the established narrative for the clearance and colonisation of the Suffolk clays (see Table 5.3 and Fig. 5.2). Such a model and transient use of the claylands was recorded by Colin Pendleton, who suggested that intense arable cultivation may have destroyed evidence from sites on the clayland (Pendleton 1999, 89–90). Overall the claylands were perceived to have provided resources such as woodland and pasture for livestock, with utilisation by bronzesmiths of wood for fuel and charcoal

Table 5.3 Selected radiocarbon dates from clayland burnt mound sites in Suffolk. The radiocarbon ages were calibrated using the University of Oxford Radiocarbon Accelerator Unit calibration programme OxCal v4.4.4 (Bronk Ramsey 2009; Bronk Ramsey 2021, https://c14.arch.ox.ac.uk/oxcal.html) using the IntCal20 curve (Reimer et al. *2020)*

Site	Parish	Site code	Dated feature/ context	Material dated	Radiocarbon age	Period	Published calibrated date	Lab ref	Notes	Reference
Haughley	Haughley	HGH	Waterhole, middle (third) fill (356)	charcoal: hazel (*Corylus avellana*) timber	3000±25	–	1377–1127	BRAMS-4290	Infill, use earlier?	Woolhouse and Pullen forthcoming
Framlingham Road	Laxfield	LXD 135	Well 0205/0515, upper fills (BH01 Unit 1.95–2.00m)	waterlogged twig	2943±24	–	1225–1051 (95% probability)	SUERC-104457	Infill, use EBA?	This volume, Table 3.3
Framlingham Road	Laxfield	LXD 135	Well 0205/0515, upper fills (BH01 Unit 2, 2.87–2.93m)	waterlogged twig	3099±24	–	1426–1291	SUERC-105079	Infill, use EBA?	This volume, Table 3.3
Marham Park	Fornham All Saints	FAS 056	BM2, upper fill of well 12769 (12771)	wood: *Prunus* sp.	3020 ±25	–	1388–1134	SUERC-93360	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM2, upper fill of well 12769 (12770)	wood: Maloideae	3066 ±23	–	1406–1265	SUERC-93364	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM 2 fill of hollow 12776 (12778)	wood: hazel (*Corylus avellana*)	3424 ±23	EBA	1870–1658	SUERC-93365	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM2 third fill over southern quadrant 12721 (12719)	wood: hazel (*Corylus avellana*)	3459 ±19	EBA	1879–1694	SUERC-93359	–	This volume, Table 2.19
Eye Airfield	Yaxley	YAX 040	Waterhole cut into pond – lowest deposit	bone: sheep	2992±28	MBA/LBA	1371–1124	SUERC-86049	–	Brudenell and Kwiatkowska 2022, 239; Collie *et al.* 2021
Eye Airfield	Yaxley	YAX 040	Pit 1933, to west of pond	charcoal: (unident)	3648±28	Beaker	2134–1939	SUERC-86051	–	Brudenell and Kwiatkowska 2022, 239, Collie *et al.* 2021
Eye Airfield	Yaxley	YAX 040	Lowest investigated fill of pond associated with burnt mound with flecks of burnt flint	fragment of alder (*Alnus glutinosa*)/hazel (*Corylus avellana*) charcoal	3722±28	Beaker	2201–2033	SUERC-81625	–	Brudenell and Kwiatkowska 2022, 239, Collie *et al.* 2021
Shepherd's Grove	Hepworth	HEP 011	Principle well 11020, lower fill (11027)	hazelnut shell (*Corylus avellana*)	3734±24	Beaker	2205–2036	SUERC-106620	–	This volume, Table 4.1
Marham Park	Fornham All Saints	FAS 056	BM1, first infill layer over SE quadrant (context 3085 of deposit 2917)	hazel nutshell (*Corylus avellana*)	3624 ±23	Beaker	2113–1916	SUERC-93345	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM1, fill 3171 of pit 3170	hazel nutshell (*Corylus avellana*)	3739 ±24	Beaker	2267–2038	SUERC-93348	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM1, fill 2957 of pit/trough 2921	wood: unident	3781 ±24	Beaker	2287–2140	SUERC-93347	–	This volume, Table 2.19
Marham Park	Fornham All Saints	FAS 056	BM1, fill 3245 of early phase pit 3244	charcoal (hazel, *Corylus avellana*)	3794 ±21	Beaker	2291–2143	SUERC-93349	–	This volume, Table 2.19

Note: Published calibrated dates are at quoted at 95.4% probability unless stated

indicated by the pattern of hoard depositions, which were observed to lie within a kilometre of the edge of the clay (ibid.; Martin 1999, 52). The Marham Park examples were close to the Lark Valley, with its long evidence of occupation – a proximity which perhaps accounts for the potentially earlier date for the burnt mound sites here – while the others were at locations relatively deeper within the clay plateau, within landscape types characterised as 'plateau clayland' or 'ancient plateau clayland' in the Suffolk Landscape Characterisation; these are areas of clay plateau dissected by small streams or river valleys with, respectively, some ancient organic and coaxial field systems, and areas of ancient enclosure and woodland (SCC 2025b).

The link between the suggested function of burnt mounds as places where animals were processed and their location on these clayland sites supports the growing evidence for a more complex pattern of landscape use in the region from the Beaker period and Early Bronze Age, as raised by Brudenell and Kwiatkowska (2022): their 'first inroads' to clearance and stewardship of the clayland interior in the Early–Middle Bronze Age, inspired also by increasing evidence for occupation of the heavier soils of Essex and Cambridgeshire. For Yaxley it was suggested the site was used for short term stays and task-specific activities, in 'seasonal cycles, linked to the movement of livestock between blocks of summer and winter pasture, from valley side to clayland plateau during the agricultural round' (Brudenell and Kwiatkowska 2022, 244). The evidence for Marham Park appears to fill in some detail as to what some of those task-specific activities may have been. The uplands were probably used in a more complex and complementary manner to settlement on the river terraces (such as, for example, at Flixton Quarry in the Waveney Valley; Boulter 2022). The suggested model is of the grazing of livestock on the upland terrain in the warmer, dryer months from spring through to autumn, relocated from permanent settlements on the lighter well-drained soils of the valley base where crops could be grown and fresh running water was available (Green and Mortimer 2023). Tom Woolhouse has highlighted the presence of traces of ephemeral rectilinear ditches 600m south of the burnt mound site at Haughley, at Fishponds Way adjacent to a tributary of the River Gipping, suggesting that they may represent a Bronze Age field system similar to those seen on the coast, and also highlighted the potential for the extensive cropmark complexes along the Lark Valley close to Marham Park to hold evidence for land allotment and occupation. which may provide more detail for the context of the burnt mound sites (Woolhouse 2024, 309).

Seasonal cycles

The very presence of burnt mound sites on the clayland that were seasonally in use reinforces the link between animals and burnt mounds and the hypothesis that they fulfilled a role in the processing of animals as part of a pastoral economy. The examples explored in this volume were all located on the high clay even when gravel terrace river valley sites were available nearby, such as at Marham Park. If animals were not a key focus for activity at burnt mounds, topographically lower locations might perhaps have been preferable, where wells sunk into floodplains would be more likely to hold water in all but the driest of summers and where flint gravel would have been abundantly available in terrace deposits; choices were made to situate these complexes on the clay upland rather than in the valleys and this is likely to reflect the seasonal presence of animals. There is resonance with the model proposed for Middle Bronze Age burnt mounds at Bow Hill, West Sussex (see above) which were also in upland contexts with water supplied by large reservoirs and which have been conceived as linked to seasonal movements of sheep between the Sussex downs and coastal plains (Bliss 2015).

However, the main comparison sites within this region must be the mounds that populate the East Anglian fen edge, such as those at Bradley Fen (Knight and Brudenell 2020), Fordham (Mortimer 2005) and Northwold (Crowson 2004).

The clayland examples represent an inversion of the pattern generally seen in these low-lying, fen edge contexts, on the western fringes of Suffolk and Norfolk and around the Fen Basin in Cambridgeshire. In these areas, on the open chalk and sands and gravels, the summer pasture would have been down on the wetter fenland, out in the wide river valleys or along the low-lying coastal plains (Green and Mortimer 2023). In the fenland areas the autumn cull sites would have been located between the low-lying pasture and the 'agricultural and settlement zone' upslope, the inverse of the pattern seen on the clays.

Pastoral economies

In terms of direct evidence for domestic and/or wild animals, large assemblages of faunal remains from Early–Middle Bronze Age sites are still relatively rare in the eastern region. One exception is the Early Bronze Age assemblage excavated on the fen edge at West Row Fen between 1982 and 1986, 16km from Marham Park, which may be illustrative of the types of husbandry carried out at that period, in the fens at least, if not on the clays. The former assemblage was dominated by gracile short-horned cattle and small Soay-size two-horned sheep, with evidence of a dependence on stock rearing; there were also remains of goats, pigs, dogs, horses and wild species, with evidence for the skinning of fox, deer, cattle and horse (Olsen 1994, 132–3, 147). It was suggested, due to an absence of immature cattle bone but the presence of more gracile caprine and pig bones, that cattle may have been kept for draft with sheep and goats for milk (ibid., 132–3, 147). At the lowland Cambridgeshire site of Clay Farm (Phillips and Mortimer 2012) cattle again predominated, at 62% of the identifiable elements from an assemblage of over 3500 pieces from the Middle–Late Bronze Age phases. The range of species broadly represents

those seen in the meagre faunal assemblage from Marham Park and that from Fordham, and in the ruminant and non-ruminant fats from Marham Park.

Immediate contexts

Finally, these sites were all recovered as part of developer-led, focused excavations and their wider contexts of field systems and landscape are largely unexplored. The location of settlements may perhaps only be inferred. At Hepworth, for example, no other contemporary features or finds were recorded within the 18-ha evaluation area, an area that stretched south, away from the valleys and onto the higher clay. The head of a tributary valley of the Little Ouse River lies just 1200m east of the site at Wattisfield, with another, slighter, valley 1500m north at Hepworth, and it is likely that associated settlement would have been situated close to or within these valleys. In the immediate environment to the south of the burnt mound sites at Yaxley (YAX 041) the only features identified were Middle Bronze Age pits and a waterhole, falling broadly within the use life of the burnt mound (Brudenell and Kwiatkowska 2022, 242–3). A tributary valley of the River Dove lies just 500m to the south, with the main river valley *c.* 2km to the south-east (Fig. 1.1).

The closest recorded evidence for potentially related activity came from Marham Park, where a Beaker structure, Structure 2, was located 80m from BM 1, with some of the Beaker pit groups (Groups 1, 3 and 8) *c.* 40m away from it (Fig. 2.10). However, the relationship between the activity at the burnt mounds, the structure and the Beaker pit groups across the site is far from certain. Chronologically, radiocarbon dates from a hazelnut shell from the roundhouse and Pit Groups 3 and 4 (see Chapter 2) suggest that these sit well together in the latter half of the Beaker period, broadly 2140–2020 BC. This is slightly later than the earliest dates associated with BM 1 (see above), but still potentially within the use-life of the complex and broadly contemporary to the date from a hazelnut shell incorporated into the fill of the mound. They may represent a form of activity in the wider environs of the burnt mound sites. However, the burnt mound sites at Marham Park were directly overlooking the Lark valley to the north-east, just a kilometre down the slope.

Beaker structure

As noted in Chapter 2, the Beaker structure at Marham Park has features in common with the small number of other known structures from the Eastern region. Finds from the structure included worked flint and pieces of hazelnut shell, along with a single fragment of mammal bone. The presence of the roundhouse may suggest a more permanent occupation, if indeed it was meant for human habitation, although it could also have been seasonally occupied, particularly perhaps given the context on the high clay.

Beaker pits

Richard Mortimer

There are suggestions of spatial patterning in the pit groups that are broadly contemporary with the Beaker structure. Pit Groups 1, 3 and 8 were arrayed around the structure at distances of *c.* 40m, 'satelliting' it at different compass points, while Pit Group 7 lay 40m to the north-west of the Beaker burnt mound site (Fig. 2.10). It is worth noting that the other four pit groups were scattered across the site away from the principal features, though all were within 40m of the edge of excavation, and it is possible that they could potentially have been 'linked' to other features or foci of activity at similar distances beyond. We do not have a clear sequence of scientific dates for the structure and pit groups, but the three dates obtained – from the structure and Pit Groups 3 and 4 – are consistently later, occupying the second half of the Beaker period from *c.* 2150–1950, than the three dates obtained from BM 1 (*c.* 2300–2100). It is probable that whatever activities are represented by the structure, and at least some of the pit groups, they were not linked to those undertaken at the burnt mounds. Though it is possible that further burnt mound sites lie unseen to the south, west and north-west: more of the area to the east has been opened up and the boulder clay thins and disappears in that direction so no further wells could be dug.

Finds and environmental remains from the pits included pottery sherds and struck flints, some animal bone, a small concentration of cereal grains from Pit Group 1, chaff from Pit Groups 1 and 4, and acorn and hazelnut shell fragments also from Pit Group 4 (Chapter 2). By way of broad comparison to the evidence for intensive and specialist use of flint at the burnt mounds, only nine specialised tools were identified from the 68 Beaker pits across the rest of the site, adding further to the dating evidence suggesting that the pit groups and the burnt mound site were unconnected. There is little to go on to explore any links between the pits and activities either linked to the burnt mounds or otherwise, although within each group they may have been created through successive visits that could represent seasonal activity, perhaps in this location, at the very edge of the clay above the lighter-soiled slopes, linked to agricultural rather than pastural activities (Green and Mortimer 2023).

The quantities of finds within each pit were seen to change across the groups, with a general trend observed of pits within a group with no or few finds and an increase in the quantities of finds across the groups in one direction as the group expanded, with the more finds-rich pits also containing darker, charcoal-rich fills. These observations are compatible with a functional model which proposes that they were dug and backfilled in succession, with more material becoming incorporated into later pits due to a cumulative build-up of waste in the area from a longer duration of activity (Green and Mortimer 2023, 117). It is suggested that the pits represented repeated or cyclic activity, potentially seasonal, and that with each visit another pit

was excavated and used, and that that location was also used for the accumulation of the waste produced during the stay. At the end of the stay the pit would have filled in, with a mixed deposit of upcast and 'midden' material, to be repeated on every visit.

At Kilverston, Norfolk (Garrow *et al.* 2006), the number of Early Neolithic pits and pit groups enabled an extensive programme of pottery refitting to be undertaken, with the results showing that while there were no refits across the groups there were frequent refits within individual pits and pit groups, and a pattern emerged which showed the number of sherds of a particular vessel diminishing from one pit to the next, implying that as time passed there were fewer sherds of that pot with the 'midden' heap to become redeposited (Knight 2006).

The first large-scale early prehistoric pit site published in the region was the Early Neolithic site at Hurst Fen, Mildenhall, Suffolk (Clark *et al.* 1960), where they were interpreted as storage pits, infilled with incidental waste. Various practical interpretations for their purpose(s) were subsequently put forward, including that they were containers (for food or water), potholders and quarries. At the end of the 1980s theoretical perspectives in archaeology shifted the emphasis onto the contents of the pits, exploring ideas that pits may have been excavated specifically to bury 'waste' and/or that artefactual material was, to some extent at least, 'chosen'. The suggestion was that the digging of the pit and burial of the artefacts held meaning in itself, either consciously or unconsciously a ritual act (see Edmonds 1999; Evans and Knight 1997; Garrow 2006, 53; Pollard 1993, 268 and 1999; Thomas 1991, 75 and 1999). All, however, agreed that the pits in some way marked a seasonality of occupation or of activity, and this would appear to have been the case at Marham Park. The timespan that the Marham Park pits covered is unknown, and depends upon a number of crucial variables – what purpose did they serve? How frequently were they required? How large was the population that produced them? etc. If the Marham Park pits and structure were not contemporary to activities at the burnt mound site, they may represent other seasonal activities, either related to pastural or woodland activities on the clay upland to the south or to activities within the cropped areas on the lighter-soiled slopes to the north or potentially to both. Either way this 'occupation zone' would be at the edge of the areas being worked.

While none of the Beaker pit groups showed conclusive patterning from feature to feature – unlike those in the adjacent Early Neolithic pit group – there was a general picture of pits with no/few finds within a group, with both assemblages and charcoal content increasing in one direction as the group expanded. This would suggest that they were dug and filled in sequence and that the material used to backfill them was becoming progressively blacker, 'dirtier' and more finds rich with each infilling. On the assumption that each pit represented a visit to this location, with a group of people living on site for a few days or weeks, one interpretation would be that at each visit a camp is set up, either using portable structures such as tents or the roundhouse structure, and that life is lived as normal while the 'work' is carried out, be that clearing or planting or cropping the fields downslope or coppicing the woodlands behind. A group of people living in a location for any length of time would require a latrine, set up adjacent to the camp. They would also require somewhere to midden their waste, the debitage and used tools from flint working, the pots which break on the fire, more noxious waste such as food and fire waste etc. The latrine and the midden heap, which would get larger, dirtier and more material-rich with each visit, would be adjacent, keeping all forms of 'waste' in one tight location, cleanly and neatly. At the end of each visit the latrine would be backfilled from the adjacent heap of upcast and midden waste and on the next visit a new latrine would be dug in line. Unfortunately, because the pits are so shallow and well-drained, and because they are 4000 years old, any trace of cess has long since dissipated.

This scenario perhaps works best in those groups wherein the pits are smaller, perhaps up to 80cm in diameter; pits of a metre or more in diameter, of which there are a few in Pit Group 6, might perhaps lend themselves to interpretations as storage features.

At Marham Park there is insufficient evidence to support strong conclusions as to whether Structure 2 and the Beaker pit groups were associated with activity at the burnt mound sites, either spatially or chronologically, though the latter would appear to have been earlier. Generally, as noted above, burnt mound sites were located at some distance from settlement and there is a lack of evidence from the sites considered in this volume to challenge this observation.

Distribution and density of burnt mound sites

The density of burnt mound sites in the clayland is a further research question. There are nearly five hundred burnt mound sites recorded across Suffolk in the HER (SCC 2025a), most of which are only evidenced by burnt flint seen or recorded at the field surface, and the distribution of these is shown in Figure 5.3. There are three main concentrations: on the gravels along the fen edge to the west and north of Mildenhall; on the clay between Halesworth and Harleston and again around Debenham; there is a smaller concentration on the clay between Ixworth and Hepworth. The frequency of potential burnt mound sites in these clusters suggests a far greater density in the landscape, particularly on the clay, than is currently recognised. It is telling that the evidence for potential burnt mound sites is clustered in areas where there has been extensive fieldwalking, for example the landscape around Debenham in Mid Suffolk, fieldwalked by E. Savery in the 1990s.

The sites recorded may not all represent burnt mound sites, however, given that most have been identified from fieldwalking rather than intrusive work, many will represent their ploughed out remains; the burnt mound

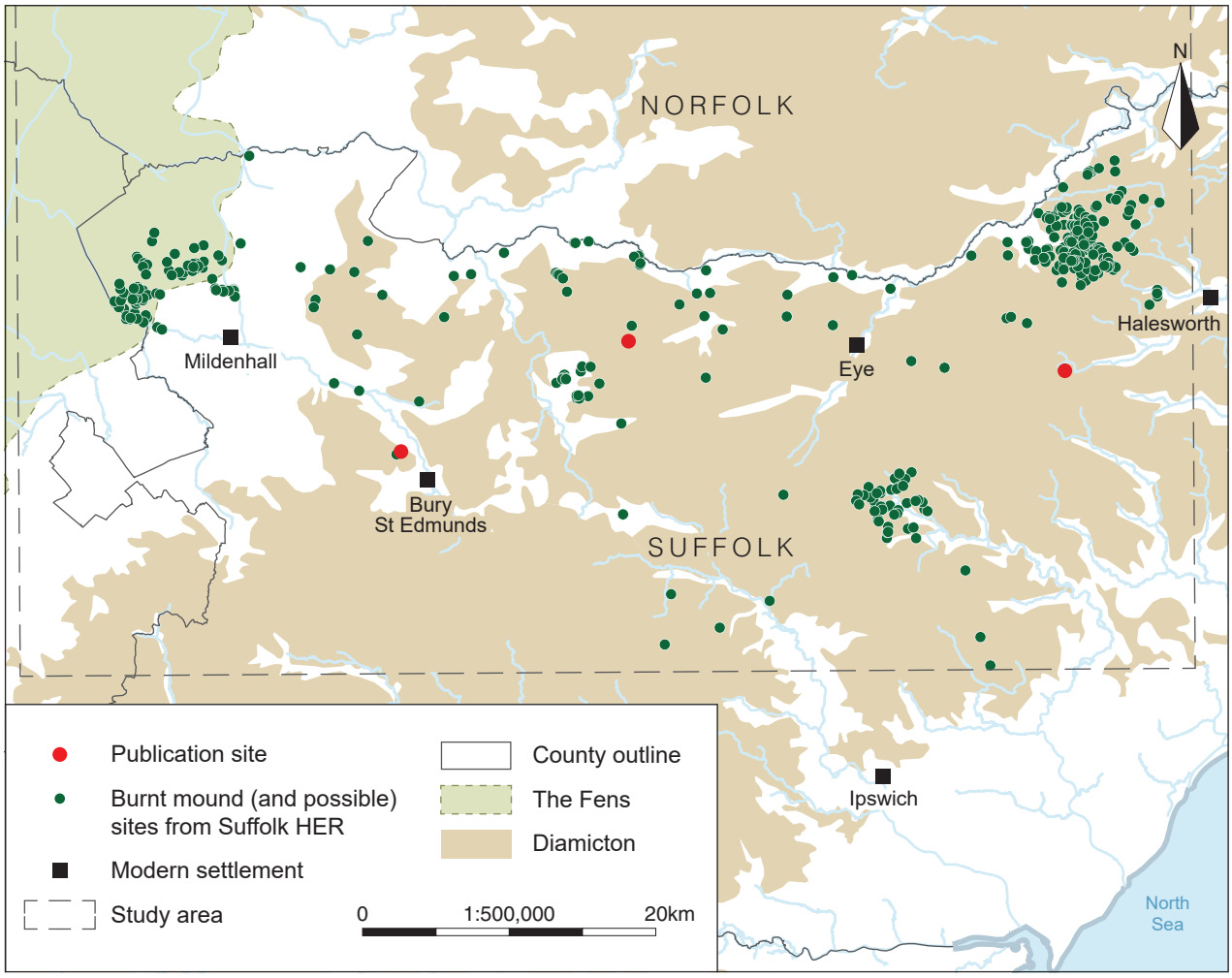


Figure 5.3 Confirmed and possible burnt mound sites recorded in the Suffolk HER within the study area

sites at Marham Park, Laxfield and Hepworth were all present in the ploughsoil, to some extent, indicated by spreads of material. At Marham Park, with hindsight, a thin distribution of heat-altered flint in the south-west corner of the site can be attributed to the presence of the burnt mound complexes (Stump 2012). At Hepworth a scatter of burnt flint spanned 30m to 40m (Smart and Mortimer 2022, 3) and this in fact had been noted previously by Basil Brown, excavator of Sutton Hoo in the 1930s, who, as noted in the entry in the Suffolk HER for the site (HER HEP 011, SCC 2025a), recorded in his notebooks (vol. IV, 152) that he 'went to Hepworth to see the large deposit of calcined flints near the airfield. Saw the owners, Mr and Mrs Gibson, who readily gave permission to look around… took two photographs of the site. The diameter is approximately 40 feet and worked flints were picked up'.

It is possible that they were not as densely packed as those in lower lying areas (e.g. at Bradley Fen, for example), perhaps due to factors of chronology and landscape use, and some may have been short lived, but the model now suggests that these sites were far more common on the claylands.

Into the Middle and Late Bronze Age

In terms of exploring pioneering landscapes, activity at burnt mounds may have been part of the 'package', contributing to landscape and environmental change in that early colonising period. When the prehistoric woodland of the East Anglian interior was substantially cleared is uncertain, likewise how dense the cover originally may have been and how large a part natural and managed woodland pasture played. However, it is likely that the clayland plateau would have been cleared and exploited in stages from the Neolithic onwards, coming up the valley sides from the river valleys that penetrate and drain it. It may have been a relatively slow, piecemeal, process, extending the areas of open grassland and establishing the stands of coppiced oak, ash, alder and hazel that would have been required. The claylands were too rich a resource to remain untapped for long and it would appear that as the Neolithic turned into the Bronze Age that colonisation gained momentum. The burnt mound sites of Beaker and Early Bronze Age date at Marham Park and Laxfield were followed at the beginning of the Middle Bronze Age by ditched enclosures. The burnt

mounds themselves suggest an increased presence on the clays, the enclosures a consolidation of that presence. Elsewhere the presence of burnt mounds has been linked to environmental evidence for clearance (Barfield and Hodder 2011), and on the Irish road schemes environmental evidence indicated that clustered mounds were related to the clearance of woodland on marginal land, as part of a wider processes of deforestation and expansion of agriculture into forested and marginal land (Brown *et al.* 2016; Johnston 2021, 148).

At Laxfield, while it is difficult to fully tie the pollen sequence to the site chronology in that it is not possible to demonstrate precisely when the burnt mound site was operational, it is likely that it was established during the Early Bronze Age (*c.* 2400–1500 BC) and played some role in the environmental transitions observed in the area (Chapter 3). It has been suggested above that the local environmental changes observed in the pollen sequence could be mapped to the operation of the burnt mound and the need for fuel, in the form of coppicing and the reduction of woodland, which in turn may have paved the way for increased pastoral use of the clay upland for summer pasture; this may have paved the way for the Middle Bronze Age enclosures which were present at the site (Fern 2024) and also at Marham Park. While some woodland recovery was suggested, the pollen sequence showed evidence for the subsequent development of grassland (at Yaxley also, grasslands were established).

This would have helped to pave the way for the spread of pastoral farming out from the valley settlement base by the Middle Bronze Age (Fern 2024, 91). Limited and perhaps seasonal occupation would have accompanied this move, attested by the presence of the Deverel-Rimbury pottery within the enclosures at both Laxfield and Marham Park, though Marham, on the very edge of the clays overlooking the valley, had clearly been part of the occupied landscape since the Early Neolithic.

Middle Bronze Age enclosures

The Middle Bronze Age field systems and enclosures recorded at Laxfield and Marham Park add to those recorded from the county and are of some significance, as recognition of these on the Suffolk clays is still relatively rare. In 2007 when Yates published his thesis on *Bronze Age Field Systems in Southern England* a small number of examples were known along the sandy coastal plain around Lowestoft and Felixstowe and the Little Ouse valley to the north-west of the county as it ran into the fens, but none had been recognised on the central clayland plateau. Extensive systems have been recorded since on the gravels and sands of the coast and rivers (Meredith and Mortimer 2023; Boulter 2022; Woolhouse 2024) and, indeed, in other claylands regions but recorded clayland in Suffolk sites are still rare.

Perhaps at Laxfield the enclosures were used to hold livestock on the rich pasture that the pollen evidence indicates would have grown in the spring and summer months in cleared areas on the clay plateau. In the autumn and winter months, as suggested for the earlier Bronze Age, animals may have been returned to the vicinity of settlements on lower ground. For this reason, any attendant later occupation on the clay uplands as indicated by the Middle Iron Age roundhouses was probably also seasonal (Figs 3.2 and 3.4). The relative dearth of associated cultural material would add credence to this assumption.

Similarly, the *longue durée* at Fornham appears to be of an evolving pastoral landscape, with enclosures associated with a well within the earlier burnt mound complex, presumably to provide water for agricultural activities within the enclosures. Dating for the construction of the field and enclosure system is limited but the two radiocarbon dates obtained from the enclosure ditches suggests they were constructed between 1500 and 1400 BC. This would accord with other dated systems in the region, for instance at Clay Farm, Cambridgeshire (Phillips and Mortimer 2012), where the large and well-dated system saw strip fields set out in the decades before 1500 BC with the larger enclosures constructed between 1500 and 1400 BC. The subsequent settlement within the enclosures appeared relatively short lived, ending perhaps by 1250–1200 BC. At Marham Park there is very little evidence for settlement although there is evidence for activity within or around both the enclosures, with pottery recovered from Enclosure 1 and the remains of a possible oven or hearth in Enclosure 2. The two Late Bronze Age linear boundaries that cut diagonally across the Middle Bronze Age alignment could not have been constructed unless the earlier system was no longer recognised as 'in use', which could suggest an end date similar to that at Clay Farm.

The small Middle Bronze Age faunal assemblage from Marham Park (392g) was almost completely composed of cattle bone, all tooth and mandible fragments, with a single pig bone and two sheep or goat fragments (Curl 2023); the slightly larger Laxfield assemblage (766g) was basically identical (Chapter 3, Clarke). As the assemblage was mainly recovered from ditch fills, effectively open contexts, the volume of residual material is not known. However, inspired by the landscape character, it is probable that these were either agricultural in nature, enclosing arable fields to keep livestock and wild herbivores out or involved somehow in livestock management. If used for cattle, the size of the enclosures, at just under an acre, may not have been sufficient for large numbers of animals and herds may have been moved regularly or enclosures may have formed enclosed spaces to bring in animals overnight or for milking, calving or other stock management.

Late Bronze Age/Early Iron Age boundaries

At Marham Park two separate large, ditched/banked boundaries or trackways were recorded; both were aligned north-north-west to south-south-east, parallel and set approximately 200m apart. One was seen over a distance of

approximately 230m, the other 460m, and both continued beyond of the limits of the excavated areas in both directions: the latter can be assumed to extend northwards at least as far as the former, making it at least 1.1km in length. (Figs 2.26 and 2.27). The alignment was broadly perpendicular to the valley of the River Lark, and they may well have run from the valley up to the clay top and presumably beyond. They suggest an element of continuity in practice from that suggested for earlier periods in the axis of seasonal movement from the valley floor to the clay plateau but they also show that the landscape had been through a major reorganisation, and the arrangement is resonant of the long parcels ranging from the river valley to the upland plateau that have been identified in the suggested sheepwalk landscapes of Wessex (Green and Mortimer 2023, 128–30).

Here, as potentially seen at Marham Park, these boundaries divided the landscape into wide strips that frequently fronted onto a river, running upslope to larger, perpendicular, contour-defined boundaries on the watershed. Field (2008) describes 'lengthy spinal banks and ditches, often of up to 8km or more, that invariably follow the contour of the upper valley slopes or interfluves, sometimes along the lip or false crest. Subsidiary linear ditches abut them at right angles, invariably descending to the valley below and forming an interlocking system of strip parish-like holdings, each about 500m in width'. It is this latter which may well be evident at Marham Park. Such strips would have incorporated resources ranging from grazing, arable and summer pasture and, in Wessex, have been discussed in relation to animal husbandry, initially as ranches but more recently related to sheep husbandry, envisioned as a series of large, enclosed estates, associated with at least one large open settlement (Bradley 2019, 243; Bradley *et al.* 1994; Cunliffe 2004). At Marham Park they may have formed part of a system of banked boundaries that divided the land into large north-north-east–south-south-west strips that would have included varied landscape resources, from the river up through the floodplain, valley gravels, chalk slope and higher clayland. Such a sheep run landscape has not been clearly identified and published before within the Eastern region, though recent work on the Cambridgeshire and to a lesser extent Suffolk and Hertfordshire Dykes has highlighted similar large-scale boundaries based on ditched alignments of at least Early Iron Age date (Ladd and Mortimer 2017). A boundary of similar form has been identified in the same excavations which identified the burnt mound remains at Haughley, with a trackway or double ditched boundary running up the hillside to the clay plateau; pollen evidence was indicative of a grassland and pasture landscape and, although the boundary feature was not well dated, charred wood that gave a radiocarbon date in the Middle Bronze Age (1406–1257 cal BC at 91.0%) gives a broad *terminus post quem* (Woolhouse 2024, 309).

That the features at Marham Park did not respect the land divisions of the Middle Bronze Age echoes the extensive evidence from the downlands of Wessex, where the linear Late Bronze Age and/or Early Iron Age boundaries also cut across earlier fields, negating the systems, realigning and shifting to large linear fields. The Roman field system was on the same alignment as the LBA–EIA boundaries, and it is possible that this has also formed the basis for the modern-day layout of the landscape (see Fig. 2.6, which shows prehistoric and later features).

The narrative of progression from woodland to pasture is one on a grand arc, and the presence of Roman period charcoal-burning pits spanning an area of 1400m north to south at Hepworth (not illustrated), which indicates a scrubby, wooded landscape at that date, is a reminder of local differences and also that woodlands would have regenerated in some areas; places which were farmed, exploited and perhaps heavily used for pasture in various prehistoric and the Roman periods may well have reverted to scrub and woodland. Middle Anglo-Saxon charcoal pits, for example, have generally been found on 'waste' and heathland areas which may not have been so at earlier dates, and the development site as Hepworth was part of Hepworth South Common, possibly until enclosure.

Conclusions

In the late 1980s it was noted that there was little sustainable supporting evidence for the use of burnt mound sites for the three activities of brewing, working with textiles or leather production (Ó Drisceoil 1988, 671). While skins, carcasses and hides are largely absent from the archaeological record, the circumstantial evidence from the lithics, lipids and microwear in particular at Marham Park, especially when it is considered alongside evidence from elsewhere (Tourunen 2008, for example) suggests that there is scope for revision. While sites may have been multipurpose, analysis has pointed towards a hypothesis that the burnt mound complexes at Marham Park, and probably others too, were focused specialist industrial activity areas involved particularly in animal products and the production of cured hides. This observation goes hand in hand with a consideration of the broad landscape context of these clayland examples, which, as elsewhere, suggests that they may have represented the seasonal activities of communities engaged in pastoral practices. Such an explanation sits well with the generally observed ubiquitousness of burnt mound sites.

Overall, burnt mound sites would merit representation in research frameworks, particularly for the Eastern region, in which they do not currently feature – there may be a niche for them under the question E-MBA 24 'How can we characterise Bronze Age monuments?' (RRF 2024), as well as those relating to Bronze Age landscapes. The rest of this chapter suggests beneficial agenda-setting future methodological approaches, themes to explore and 'big questions' to consider.

Future experimental archaeology

Experimental work has already demonstrated the viability of stretching skins over hot stones so that they shrink, thicken and can be moulded while hot (Herriett 2021) and cuir-bouilli is another method of producing items from rawhide and leather that has not been oil dressed. The material is scalded in near boiling water and pressed into a form or die to set hard (Hodges 1989, 152). There has been experimental research into whether it was the method by which the only known example of a Bronze Age shield, from Clonbrin in Ireland, was made (Coles 1979, 200; Molloy 2020). This is of relevance as pits of diameter 0.5–0.75m, of which there is a statistical cluster at burnt mound sites, could have been used for this purpose (Ó Néill 2009, 194).

There is scope for experimental archaeology to test some of the ideas presented above, particularly the use of the troughs and the practical uses for warm or hot water. Experimental approaches to different processes of washing, soaking and treating of hides could be explored for their lipid signature and their practicality. On 12 of the Irish sites, troughs are noted to have had partitions, perhaps to keep the stones separate from the contents, and some were noted to have been interconnected with channels, perhaps related to water flow and emptying (Hawkes 2015, 63–4; 2018, 83–5); the exploration of different options may highlight optimal ways in which features at the sites may have been used.

There is potential to explore the origins of the anomalous fatty acid noted on all the samples from Marham Park, albeit a possible contaminant, and it has also been noted that work on residues on flints, which is relatively new in comparison to work on pottery, would benefit from experimental work to explore the residues on tools used to deflesh and soften hides (Chapter 2, Dunne and Evershed, see also Chapter 2, Donahue). Although we have suggested the possibility of largely smoke and fat based curing of hides, there may also be scope to experiment with plants such as the red fruit and alder catkins recorded in some troughs on Irish sites (Brown *et al.* 2016) and other tanning agents, although it was noted, for example, that high levels of tannins in association with waterlogged wood on the fen edge site of Feltwell may perhaps have come from wood and plants that ended up in the trough (Bates and Wiltshire 2001, 399).

Future fieldwork

In fieldwork agendas would merit thought about finds retrieval and scientific and environmental sampling.

Lithic recovery

Overall, a need for awareness of the types of stone tools that might have been employed has been highlighted by John Ó Néill (2009, 176) and the assemblage from Marham Park stands testament to good recovery. Stone tools are often recovered from burnt mound sites, the most common material found from the Irish burnt mound sites surveyed by Alan Hawkes (2018, 200), with the range of flint tools from the 1314 mounds surveyed by Ó Néill (2009, 169–174) including a number of projectile points, scrapers and knives, and hammerstones and axes. However, the cruder nature of implements, such as recorded at Marham Park (and Fordham and Bow Hill), which was probably a product of a need for tools for a job rather than a particular lack of technological knowledge, may also have been a barrier to recognition and recovery and Ó Néill (2009, 176) has also highlighted that, given the huge volumes of stone, coarse utilised stone tools (including of flaked sandstone and granite) may be missed on some sites, 'leaving this type of find, as a whole, vastly underrepresented in the archaeological record' (ibid.).

For Marham Park the recovery of the flint assemblage has been key to interpretation, with significant assemblages also recovered from Fordham (Mortimer 2005) and, further afield, Bow Hill in Sussex (Bliss 2015). These assemblages may, of course, be exceptional rather than the norm. The need for renewing flint tools at a long-lived site may have helped create a large assemblage and at Marham Park the location of activity in a hollow protected the assemblage from plough damage and from plough-truncation. This latter – the depth of the surviving contemporary deposits – has clearly contributed to the size of the recovered assemblage; more plough-truncated mound sites such as Hepworth and Laxfield suffered in comparison.

Worked flints from the other sites included in this volume were fewer in number but a single, residual scraper was found at Hepworth along with a blade fragment and some waste flakes, and a burin was amongst the 18 pieces of worked flint from Laxfield. Further, in some places, tools of other material may have been used, for example bone or metal (Harris 2011, 61), such that the type of assemblage in the flint-using region of Marham Park would not be present. However, methodologies for lithic retrieval and sampling merit consideration.

In a similar vein the importance of sampling for small finds and fragments has been demonstrated by the increased recovery of animal bone on Irish sites through sieving. The acidic soils of Suffolk do not preserve faunal material well but tooth enamel survives better; a more concerted effort to collect the remains of teeth might be suggested.

Scientific and environmental samples

The benefits of scientific analysis have been demonstrated. Further lipid analysis on future deposits and finds, including pottery, would add further comparative data if it is successful (although the attempts at recovery of residues from Laxfield shows that it may not be). There is also the possibility of sampling timbers from troughs on waterlogged sites (Hawkes 2018, 160). There may be scope to explore spatial or chronological patterns in residues, perhaps, at the more complex sites. Testing for heavy metal

and other trace elements may yield further results for added agents or materials used in cleaning (Brown *et al.* 2016).

The site at Laxfield adds another example to illustrate that deep waterlogged deposits from wells associated with burnt mounds have potential to capture and preserve pollen and other biological evidence for changing local landscapes and environments. However, further sampling with identification of tanning agents or dye plants may recover assemblages of waterlogged and charred plant remains that support (or contradict) the interpretation and could help to develop a narrative of changing technologies. Other sites on the Suffolk claylands and elsewhere may provide better assemblages of waterlogged plant remains – although there may be similar problems as were encountered at Marham Park, with seasonal dryness impacting preservation, or at Laxfield where the deep waterlogged well proved impossible to excavate.

Insect remains have the potential to offer insight into the character of sites and the presence or absence of species indicative of carrion etc. may be useful towards researching the hypothesis (Brown *et al.* 2016, 3). However, samples from four burnt mounds in the Midlands associated with backswamps and cut off channels did not produce insect remains that might be related to food waste – corpse flies and flesh flies (Smith 2011, 191). This may be another aspect for experimental reconstruction work to explore how filthy or otherwise would working areas have been? It might be assumed that, as a place of 'work', even a location synonymous with slaughter, carcasses and animal skins would have been kept as clean and wholesome as was possible.

Micromorphological assessment of *in situ* burnt mound deposits has also highlighted that they can be complex deposits containing fuel residues, wood, grasses and discrete deposits of bone, unburnt plant tissues and rubified sediments that accumulated due to repetitive activities (Gardner 2019).

Future synthesis

Synthesis at a range of scales could further research into the themes raised. An updated national synthesis would enable a new gazetteer of sites to be formed, particularly for lowland Britain, which would allow further collation of evidence which may relate to the function of sites.

Burnt mounds are not homogeneous across the wide geographical area in which they occur, with different shapes, forms, pit linings and materials used (Ó Néill 2009, gazetteer) and with different periods represented. Andy Crowson noted that sites in Norfolk appear different in composition and structure to some in the Midlands, Ireland, Orkney or mainland Europe, and that it might be unwise to accept a single function or end product (Crowson 2004, 35). Sites may well have had purposes and functions specific to their date and geography, within the broad *floruit* of burnt mounds. With reference to an Early Iron Age example at Ceann nan Clachan on North Uist in the Hebrides, for example, a review of Scottish sites has suggested that steam bathing, perhaps with secondary functions such as smoking and drying, could have been the principal function of Atlantic Scottish sites where there is evidence of substantial structures (Armit and Braby 2002, 254–6).

The quality of the evidence at Marham Park shows the importance of some chance factors in survival which may mean that some sites become proxies for others. At other sites the level of organic preservation has contributed a range of surviving environmental objects and wooden artefacts. A new synthesis would also allow an updated review of the features of sites and scientific evidence and a suggested function of work with animal skins could be a valid contender for reviewing evidence from sites when exploring their function, particularly as they may represent local responses to applications to a technology (see also Chittock *et al.* 2021, 255). Synthesis could enable refined dating across the density of burnt mound sites in an area, perhaps helping to chart chronological and spatial rise and decline, which may relate to details of overall landscape clearance, organisation, settlement and animal husbandry. Further finer-grained landscape research to explore the landscape context of sites would also be of benefit. Major infrastructure projects and landscape scale studies may offer some further insights and future discoveries.

Burnt mounds as monuments

Discourse on burnt mounds has for decades highlighted that they may have held possible significance beyond the functional for those who used or encountered them.

Communal effort, cultural knowledge

On one level at least they were probably places associated with communal hard labour. Although it only represented a proportion of the original burnt mound, it is estimated that there may have been approximately 3.5 tonnes of flint present in the hollow over BM 1 at Marham Park. At some sites attempts have been made to quantify the relative volume of troughs and extant burnt mounds to explore how many times troughs may have been used, as a minimum, although stone and flint were almost certainly re-used (Hawkes 2018, 56). Informed by real measured volumes, Niall Roycroft (2006) has argued that to generate a theoretical burnt mound with a footprint of approximately ten square metres a typical trough may have been filled 50 to 100 times; a significant amount of effort would therefore have been required to collect stones and fuel and prepare materials (Ó'Néill 2009, 197–8). At Marham Park fragments of charcoal of oak, hazel and plum from across the features associated with the burnt mounds suggest exploitation of woodland and 'hedgerow' species, with the attendant need for effort in gathering. It has been observed that the longer-lived examples in particular may

have been places important to the seasonal year, as places where cultural and technological knowledge was passed on or guarded (Ó Néill 2009, 197–8). The suggestion that these were sites where animal skins were processed adds a nuance to this, drawing in consideration of the transmission of knowledge of the stages involved in obtaining, washing, cleaning and preparing a skin. These would have been drawn out, intensive and potentially involved multiple people.

Landscape markers and places of transformation

Burnt mounds as monuments may also have engendered deeper emotions or understandings in contemporary practitioners and observers. As neatly summarised in a paper discussing these sites in Shetland, 'as locales of transformative processes by which the earth, fire and water come together to create new materials and substances, and alter the state of existing ones, burnt mounds can be seen to fit into a wider suite of practices used to actively engage with the landscape and negotiate a place within the world' (Doughton 2013, 43). Burnt mounds would have been recognisable in the landscape, as markers of activity at a place (Johnston 2021, 149) and burnt flint may have been deliberately mounded so that the heap was visible (Hawkes 2015, 67–8), representative of an act of creation of place or commemoration of the activities that had taken place (Hawkes 2018, 59–60 and 181). Burnt mounds may have served as cultural or landscape markers (Edmonds *et al.* 1999, 70), perhaps at the margins of high or low land, or at territorial boundaries (Mortimer *et al.* in prep) and may have been perceived differently by communities that expressed their cosmological world views in the creation of tumuli as acts of memorialisation and place-making (Doughton 2013, 40–2).

Fires and smoke would also have been visible in the landscape at certain times, and these and the changes wrought to stone, water and the products of the mound may have been understood or perceived as transformative – particularly in relation to fire, where a resonance with cremation practices may have carried a wider frame of cultural reference (Doughton 2013, 37).

In this context there are potentially powerful associations between burnt mounds and animal life and death, as well as potential symbolisms in the ongoing presence of a creature in another guise through the use of its skin, although these may not have been articulated materially. Communities may have had ideas about animal death and reverence for an animal and the effort of rearing it that are beyond understanding from archaeological evidence at most of the sites (Bartosiewicz 2013, 331; Herriett 2021). The suggested link between animal skins and kill sites opens up avenues for the framing of burnt mounds as liminal and transformative places in this regard, particularly where they were located within peripheral areas within territories. While this may be the case, however, it is rare for any placed or closure deposits to be found at burnt mound sites, although there are some possible instances (Chittock *et al.* 2021, 238; Hawkes 2018, 183–6; Ó Néill 2009, 185), and it might appear that they were not foci for structured votive deposition.

Bronze Age leather: a question of scale

The reason for the chronological patterning in the prevalence of burnt mound sites is a matter of speculation, tied up as it is with the question of the use of the sites, but the very broad-brush contexts for the phenomenon are those of the Bronze Age itself: migrations, trade and exchange, innovations in metal work and colonisation of wider landscape and intensification of land use (see Bradley 2019, Chapter 4). Suffolk in particular has seen a recent burgeoning of evidence from the broad period of the main prevalence of burnt mound sites, relating to settlement, funerary practices, monuments and changing landscapes (Cooper 2018).

If burnt mounds do represent specialised sites for working with animal hides, as is suggested by the evidence presented here, then, given the vast number of them and the observed density in some areas, the implication is that, at the time when they were most prevalent, a considerable volume of products were being created through specialised industry. This sits favourably with perceptions of the probable importance of skins to early societies.

Leather use

The ubiquitousness of flint scrapers throughout early prehistory has been suggested as a proxy indicator for the widespread presence of hides that is otherwise invisible and it is assumed that skins would have been available, prevalent and valuable for objects of practical, economic, clothing and probably prestige use (Grömer *et al.* 2016; Harris 2014). Preserved leather and hide products are rare from pre-Roman Europe, but chance survivals indicate a diverse range of uses. For example, a young Bronze Age woman from Skrydstrup, Jutland, buried in a tree-trunk coffin, had been laid on a cow hide and wore leather shoes resembling soft moccasins (Coles 1979, 192–5). The Bronze Age miners of Halstatt and Durrnberg-Hallein in Austria left evidence, in the drying environments of the salt mines, of a range of items for both heavy and finer uses, including straps, sacks of cowskin with wooden supports, hand protectors and a conical hat, and wooden trough buckets made of pieces of wood sewn together with skin strips. These were made from the skins of cattle, goat and sheep and also possibly chamois/gemse, steinbock, dog and other small animals, often with the hair left on and, in some cases, with neat seams and hems and attention paid to the grain of the fur (Harris 2006, 70–5). Other items have been recovered from peat bogs and leather and skins may also have been used for tents, windbreaks, cloaks, vessels for liquid, shrouds etc. (see e.g. Harris 2006, 76). These must all have been produced somewhere.

Big questions

One of the big questions relating to burnt mound sites is the 'why' of their general chronological distribution and the general proliferation of them in the Bronze Age. If an interpretation of burnt mounds as sites for producing leather is palatable, their appearance in the earlier part of the Beaker period, around 2300–2200 BC, and *floruit* through the later Beaker period and Early Bronze Age may also serve as a proxy for the leather industry within the wider context of the development of Bronze Age pastoralism and mixed herd farming and the possible pressures placed on landscape use, perhaps at different times in different places.

Such questions arise as: Did technologies for working with animal skins evolve with the development or arrival of short-horned cattle in Britain (e.g. Olsen 1994, 144–50)? Could trough/pit sizes reflect the potentially changing importance of relative species between sheep/goats and cattle? For Ireland, for example, it has been observed there are several peaks in the dates of burnt mounds: 1800 BC, 1500 BC and 900 BC, a chronological pattern that matches cumulative results from enclosures and settlement and burial (Bradley 2019, 249 citing Ginn 2016). Niall Roycroft has asked of the Irish Bronze Age 'Was there a surplus of cows, with the Iron Age less rich and affluent?' (2006, 39).

If burnt mounds did relate to the preparation of hides, it is unlikely to be the case that the craft died out as they became less prevalent. Other speculative questions regarding the chronological distribution of the incidence of burnt mounds, specifically their apparent demise in the Middle Bronze Age, are therefore: Could hide-curing technologies have evolved into the Middle Bronze Age and Iron Age? Did methods of heating water change? Did the development of cauldrons, large metal vessels or above-ground tanks replace troughs in the ground? When did stave technology develop to enable the creation of large above-ground barrels? When did vegetable tanning become more common? Even, perhaps, did changing patterns of production in salt as a commodity affect how people treated hides immediately after slaughter of animals? An overview of pre-industrial salterns highlights that in England the organised production of salt dates to the Bronze Age, around 1200 BC, and developed through the Iron Age and into the Romano-British period (Historic England 2018) – is this a coincidence of chronology, or of potential significance to work with animal skins? The earliest salt-making thus far recorded in the east of England appears to be that at Briggs Farm, Thorney, somewhere between 1450 and 1250 BC (Pickstone and Mortimer 2011), roughly when burnt mound technology disappears.

Overall, perceiving burnt mounds as sites for autumn culling and working with animal skins leads to possible avenues of enquiry about craft specialisation and its social impact (touched upon in Donohue 2023) and theoretical exploration of the macro-processes of consumption, trade and exchange. For textiles, Klavs Randsborg has argued that on the grand scale, textiles should be seen as one of the motors of Bronze Age economics, invisible when compared, for example, with the movement of metals and ores, but a commodity which may have provided a means of exchange for societies in the north (2011, 11–12); is there mileage in thinking about products made from animal skins in the same way? Finally, are there questions to be asked about changing relationships between textile and hide-use in early societies, perhaps through the Mid to Late Bronze Age in Europe, that may possibly relate to the chronological and spatial distribution of burnt mounds? In an earlier study exploring possible cloth production at burnt mounds, a hypothetical framework was suggested that linked the establishment of burnt mounds to a textile revolution (Brown *et al.* 2016, 26), but could the hypothesis that burnt mounds related to animal products turn this on its head? Could a decrease in their presence rather than an increase have related to developments in textile production? Future research and new burnt mound sites may support the exploration of such questions.

Bibliography

Albarella, U. and Salvagno, L. 2017 'A morphometric system to distinguish sheep and goat postcranial bones', *PLOSOne* https://doi.org/10.1371/journal.pone.0178543 (accessed 01 May 2025)

Allen, M.J., Dunne, J., Evershed, R.P. and French, C. 2023a 'Geoarchaeology of the burnt mound complexes', in Green and Mortimer 2023, volume 2, 403–428

Allen, M.J., Langdon, C. and Cameron, N. 2023b 'Palaeoenvironment of the burnt mound complexes: pollen and diatom analysis', in Green and Mortimer 2023, volume 2, 429–434

Andersen, S.T. 1979 'Identification of wild grass and cereal pollen', *Danmarks Geol. Undersøgelse Aarbog* 1978, 69–92

Anderson, R. 2005 'An annotated list of the non-marine mollusca of Britain and Ireland', *J. Conch.* **38**, 607–637

Anderson, S. 2018 'Human skeletal remains from FAS 056', in Green 2018, 291–292

Armit, I. and Braby, A. 2002 'Excavation of a burnt mound and associated structures at Ceann nan Clachan, North Uist', *Proc. Soc. Antiq. Scot.* **132**, 229–258

Arnell, R.D., Davies, P. B., Halling, J. and Whomes, T. L. 1991 *Tribology: principles and design applications,* London, Macmillan Education

Ashmore, P.J. 1999 'Radiocarbon dating: avoiding errors by avoiding mixed samples', *Antiquity* **73**, 124–130

Ashton, N. and David, A. (eds) 1994 *Stories in stone,* Oxford, Lithic Studies Society

Ashton, N., Lewis, S.G. and Parfitt, S. (eds) 1998 *Excavations at the Lower Palaeolithic site at East Farm, Barnham, Suffolk, 1989–1994*, London, British Museum Occasional Paper **125**

Ashwin, T. and Bates, S. 2002 *Norwich Southern Bypass part I: excavations at Bixley, Caistor St Edmund, Trowse*, E. Anglian Archaeol. **91**

Baker, P. and Worley, F. 2014 *Animal bones and archaeology: guidelines for best practice*, Swindon, English Heritage

Bales, E. 2003 *Land off Lowestoft Road, Worlingham, WGM 007 and WGM 008: a report on the archaeological excavations, 2001*, SCCAS Report **2002/19**

Ballin, T.B. 2002 'Later Bronze Age flint technology: a presentation and discussion of post-barrow debitage from monuments in the Raunds area, Northamptonshire', *Lithics: the Journal of the Lithics Studies Society* **23**, 3–28

Bamford, H.M. 1982 *Beaker domestic sites in the fen edge and East Anglia*, E. Anglian Archaeol. **16**

Barclay, A., Knight, D., Booth, P., Evans, J., Brown, D.H. and Wood, I. 2016 *A standard for pottery studies in archaeology*, Prehistoric Ceramics Research Group, Study Group for Roman Pottery and Medieval Pottery Research Group

Barfield, L. and Hodder, M. 1987 'Burnt mounds as saunas, and the prehistory of bathing', *Antiquity* **61**, 370–379

Barfield, L. and Hodder, M. 2011 'Burnt mounds in south Birmingham: excavations at Cob Lane in 1980 and 1981, and other investigations', *Trans. Birmingham Warwickshire Archaeol. Soc.* **114**, 13–46

Bartington Instruments 2022, 'MS2/MS3 system', https://www.bartington.com/products/magnetic-susceptibility/ms2-ms3-system/ (accessed 01 Feb. 2022)

Bartosiewicz, L. 2013 'Animals in Bronze Age Europe', in Fokkens and Harding (eds) 2013, 328–347

Bates, S. 1994 *Report of a watching brief on the Brundall to Whitlingham rising main*, Norfolk Archaeological Unit Report **84**

Bates, S. 2012 'Worked flint' in Boulter and Walton Rogers 2012, 33–42

Bates, S. 2023 'Struck flint', in Green and Mortimer 2023, volume 2, 195–281

Bates, S. and Wiltshire, P. 2000 'Excavation of a burnt mound at Feltwell Anchor, Norfolk, 1992', *Norfolk Archaeol.* **43**(3), 389–414

Bell, M. and Boardman, J. (eds) 1992 *Past and present soil erosion*, Oxford, Oxbow Books Monograph **22**

Benfield, S. 2024a 'Prehistoric pottery', in Fern 2024, 39–50

Benfield, S. 2024b 'Fired clay', in Fern 2024, 58–65

Bennett, K.D. 1994 *Annotated catalogue of pollen and pteridophyte spore types of the British Isles*, University of Cambridge, unpublished manuscript

Bennett, K.D., Whittington, G. and Edwards, K.J. 1994 'Recent plant nomenclatural changes and pollen morphology in the British Isles', *Quaternary Newsletter* **73**, 1–6

Bergen, P.F. van, Bull, I.D., Poulton, P.R. and Evershed, R.P. 1997 'Organic geochemical studies of soils from the Rothamsted Classical Experiments—I. total lipid extracts, solvent insoluble residues and humic acids from Broadbalk Wilderness', *Organic Geochemistry* **26**(1), 117–135

Bethell, P.H., Goad, L.J., Evershed, R.P. and Ottaway, J. 1994 'The study of molecular markers of human activity: the use of coprostanol in the soil as an indicator of human faecal material', *J. Archaeol. Sci.* **21**(5), 619–632

Beverton, A. 2013a *Land north-west of Bury St Edmunds, Fornham All Saints: evaluation*, SCCAS Report **2013/035**

Beverton, A. 2013b *Land north-west of Bury St Edmunds, Fornham All Saints: evaluation*, SCCAS Report **2013/117**

Beyries, S. and Rots, V. 2008 'The contribution of ethno-archaeological macro- and microscopic wear traces to the understanding of archaeological hide-working processes', in Longo and Skakun (eds) 2008, 21–28

BGS (British Geological Survey) 2025 Geology of Britain viewer https://geologyviewer.bgs.ac.uk/ (accessed 28 April 2025)

Billington, L., Brudenell, M. and Clarke, G. 2018 'Beaker pits and Iron Age settlement at Warren Hill, Saxmundham, Suffolk', *Proc. Suffolk Inst. Archaeol. Hist.* **44**(2), 187–193

Bishop, B. and Proctor, J. 2011 *Settlement, ceremony and industry on Mousehold Heath: excavations at Laurel Farm (Phase II) Broadland Business Park, Thorpe St Andrew, Norfolk*, London, Pre-Construct Archaeology Monograph **13**

Bliss, A. 2015 *Flints, flakes and 'sheepish' mounds; new perspectives and theories on the function of two burnt mounds on Bow Hill, West Sussex, through the medium of stone tool analysis, inter-site assemblage comparison and landscape context*, London, UCL undergraduate dissertation

Boismeier, W. and Gamble, C. (eds) 2012 *Neanderthals amongst mammoths: excavations at Lynford Quarry, Norfolk*, London, English Heritage

Boulter, S. 2022 *Living with monuments: excavations at Flixton II*, E. Anglian Archaeol. **177**

Boulter, S. and Walton Rogers, P. 2012 *Circles and cemeteries: excavations at Flixton volume 1*, E. Anglian Archaeol. **147**

Bradley, R. 1978 *The prehistoric settlement of Britain*, London, Routledge and Kegan Paul

Bradley, R. 2001 'The lithic artefacts', in Leah and Young 2001, 73–74

Bradley, R. 2019 *The prehistory of Britain and Ireland* (2nd edition), Cambridge, Cambridge University Press

Bradley, R. and Gardiner J. (eds) 1984 *Neolithic studies, a review of some current research*, BAR Brit. Ser. **133**

Bradley, R., Entwhistle, R. and Raymond, F. 1994 *Prehistoric land divisions on Salisbury Plain*, English Heritage Report **2**

Bronk Ramsey, C. 1995 'Radiocarbon calibration and analysis of stratigraphy: the OxCal program', *Radiocarbon* **37**, 425–430

Bronk Ramsey, C. 1998 'Probability and dating', *Radiocarbon* **40**, 461–474

Bronk Ramsey, C. 2001 'Development of the radiocarbon calibration program', *Radiocarbon* **43**, 355–363

Bronk Ramsey, C. 2009 'Bayesian analysis of radiocarbon dates', *Radiocarbon* **51**, 337–360

Bronk Ramsey, C. 2021 University of Oxford Radiocarbon Accelerator Unit calibration programme OxCal v4.4.4 https://c14.arch.ox.ac.uk/oxcal.html (accessed 13 November 2024)

Brooks, R., Green, M. and Smart, R. 2020 *KVF35 Expansion: phase 3 evaluation, monitoring and excavations, RAF Lakenheath*, *Suffolk,* Cotswold Archaeology Report **SU0089_1**

Brown, A.G., Davis, S.R., Hutton, J., O'Brien, C., Reilly, F., Taylor, K., Dennehy, E., O'Donnell, L., Bermingham, N., Mighall, T., Timpany, S., Tetlow, E., Wheeler, J. and Wynne, S.M. 2016 'The environmental context and function of burnt-mounds: new studies of Irish *fulachtaí fiadh*', *Proc. Prehist. Soc.* **82**, 259–290

Brück, J. and Goodman, M. 1999 (eds) *Making places in the prehistoric world: themes in settlement archaeology,* London, UCL Press

Brudenell, M. and Kwiatkowska, M. 2022 'First inroads; earlier Bronze Age activity in the Suffolk claylands', *Proc. Suffolk Inst. Archaeol. Hist.* **45**(2), 237–246

Buck, C.E., Cavanagh, W.G. and Litton, C.D. 1996 *Bayesian approach to interpreting archaeological data,* Chichester, John Wiley and Sons

Bull, I.D. and Evershed, R.P. 2012 'Organic geochemical signatures of ancient manure use', in Jones (ed.) 2012, 61–67

Bull, I.D., Simpson, I.A., Bergen, P.F. van and Evershed, R.P. 1999 'Muck 'n' molecules: organic geochemical methods for detecting ancient manuring', *Antiquity* **73**, 86–96

Bull, I.D., Bergen, P.F. van, Nott, C.J., Poulton, P.R. and Evershed, R.P. 2000 'Organic geochemical studies of soils from the Rothamsted classical experiments − V. The fate of lipids in different long-term experiments', *Organic Geochemistry* **31**(5), 389–408

Bull, I.D., Lockheart, M.J., Elhmmali, M.M., Roberts, D.J. and Evershed, R.P. 2002 'The origin of faeces by means of biomarker detection', *Environment International* **27**(8), 647–654

Bull, I.D., Elhmmali, M.M., Roberts, D.J. and Evershed, R.P. 2003 'The application of steroidal biomarkers to track the abandonment of a Roman wastewater course at the Agora (Athens, Greece)', *Archaeometry* **45**(1), 149–161

Bullock, P. and Murphy, C.P. 1979 'Evolution of a paleo-argillic brown earth (Paleudalf) from Oxfordshire, England', *Geoderma* **22**, 225–252

Bullock, P., Fedoroff, N., Jongerius, A., Stoops, G. and Tursina, T. 1985 *Handbook for soil thin section description*, Wolverhampton, Waine Research

Bunting, M.J., Grant, M.J. and Waller, M. 2016 'Pollen signals of ground flora in managed woodlands', *Review of Palaeobotany and Palynology* **224**(2), 121–133

Burroni, D.B., Donahue, R.E., Pollard, A.M. and Mussi, M. 2002 'The surface alteration features of flint artefacts as a record of environmental processes', *J. Archaeol. Sci.* **29**, 1277–1287

Butler, C. 2005 *Prehistoric flintwork*, Stroud, Tempus

Butler, C. 2006 'Flintwork', in Parfitt 2006, 229–232

Cameron, N. 2023 'Diatom assessment', in Green and Mortimer 2023, volume 2, 433

Canti, M.G. and Linford, N. 2000 'The effects of fire on archaeological soils and sediments: temperature and colour relationships', *Proc. Prehist. Soc.* **66**, 385–395

Casanova, E., Knowles, T.D.J., Williams, C., Crump, M.P. and Evershed, R.P. 2018 'Practical considerations in high-precision compound-specific radiocarbon analyses: eliminating the effects of solvent and sample cross-contamination on accuracy and precision', *Analytical Chemistry* **90**(18), 11025–11032

Case, H. 1993 'Beakers: deconstruction and after', *Proc. Prehist. Soc.* **59**, 241–268

Challinor, D. 2022 'Charcoal identification', in Smart and Mortimer 2022, 36–7

Challinor, D. 2023 'Charcoal for radiocarbon dating', in Green and Mortimer 2023, volume 2, 435

Chittock, H., Masefield, R., Allison, E., Crone, A., Hamilton, D. and Richer, S., Roberston, J. and Wood, A. 2021 'Hot stone technology at Bucklers Park, Crowthorne, Berkshire: the use and re-use of a persistent place during the Bronze and Iron Ages', *Proc. Prehist. Soc.* **87**, 231–236

Clark, J.D.G. 1934 'Derivative forms of the petit tranchet in Britain', *Archaeol. J.* **91**, 34–58

Clark, J.D.G., Higgs, E.S and Longworth, I.H. 1960 'Excavations at the Neolithic site at Hurst Fen, Mildenhall, Suffolk (1954, 1957 and 1958)', *Proc. Prehist. Soc.* **26**, 202–245

Clarke, A. 2024 'Animal bone', in Fern 2024, 67–69

Clarke, C. 2020 *Cultural heritage desk-based assessment: land at Shepherds Grove, Stanton, Suffolk*, RPS unpublished

Clarke, D.L. 1970 *Beaker pottery of Great Britain and Ireland*, Cambridge, Cambridge University Press

Cleal, R. 1984 'The later Neolithic in Eastern England' in Bradley and Gardiner (eds) 1984, 135–160

Coles, J. 1973 *Archaeology by experiment*, London, Hutchinson and Co

Coles, J. 1979 *Experimental archaeology*, London, Academic Press

Collie, T., Brudenell, M. and Phillips, T. 2021 *Progress Power project, Eye Airfield, Suffolk: archaeological excavation report*, Oxford Archaeology Report **2300**

Cooper, A. 2018 'Early and Middle Bronze Age resource assessment' https://researchframeworks.org/eoe/resource-assessments/early-and-middle-bronze-age/ (accessed 29 June 2024)

Copley, M.S., Berstan, R., Dudd, S.N., Docherty, G., Mukherjee, A.J., Straker, V., Payne, S. and Evershed, R.P. 2003 'Direct chemical evidence for widespread dairying in Prehistoric Britain', *Proc. Nat. Acad. of Sci. of the United States of America* **100**(4), 1524–1529

Correa-Ascencio, M. and Evershed, R.P. 2014 'High throughput screening of organic residues in archaeological potsherds using direct acidified methanol extraction', *Analytical Methods* **6**(5), 1330–1340

Cotswold Archaeology (CA) 2012 *The taking and processing of environmental and other samples from archaeological sites*, Technical Manual No. **2**

CA 2017 *Fieldwork recording manual*, Technical Manual No. **1**

Courty, M.-A., Goldberg, P. and Macphail, R.I. 1989 *Soils and micromorphology in archaeology*, Cambridge, Cambridge University Press

Craven, J.A. 2012 *Liberty Village, RAF Lakenheath, Eriswell*, SCCAS Report **2012/038**

Crowson, A. 2004 *Hot rocks in the Norfolk fens: the excavation of a burnt flint mound at Northwold, 1994–5*, E. Anglian Archaeol. Occ. Pap. **16**

Crowson, A. and Bayliss, A. 1999 'Dating a burnt mound and its Beakers at Northwold, Norfolk', in Evin *et al.* (eds) 1999, 243–248

Cunliffe, B. 2004 'Wessex cowboys?', *Oxford J. Archaeol.* **23**(1), 61–81

Curl, J. 2023 'Animal bone', in Green and Mortimer 2023, volume 2, 361–402

Cuthbert, M.J. 2021 *Land on the south side of Framlingham Road, Laxfield, Suffolk: archaeological evaluation*, Cotswold Archaeology Report **SU0200_1**

Davies, J. and Williamson, T. (eds) 1999 *Land of the Iceni: the Iron Age in northern East Anglia*, Norwich, Centre for East Anglian Studies

Davies, P. 2008 *Snails, archaeology and landscape change*, Oxford, Oxbow Books

Davis, S. 1992 *A rapid method for recording information about mammal bones from archaeological sites*, English Heritage AML Report **71/92**

Desrosiers-Whalley, L. 2021 *Land at Shepherds Grove, Stanton, Suffolk: an archaeological watching brief*, Pre-Construct Archaeology Report **R15725**

Desrosiers-Whalley, L. 2023 *Land off Bury Road, Woolpit, Suffolk: post-excavation assessment and updated project design*, Pre-Construct Archaeology Report **R14379**

Dimbleby, G.W. 1957 'Pollen analysis of terrestrial soils', *New Phytologist* **56**(1), 12–28

Doherty, A. and Barclay, A.J. 2023 'The prehistoric and Roman pottery', in Green and Mortimer 2023, volume 2, 159–183

Donahue, R.E. 1994 'The current state of lithic microwear research', in Ashton and David (eds.) 1994, 156–168

Donahue, R.E. 1998 'Lithic microwear analysis of artefacts from Barnham', in Ashton *et al.* (eds) 1998, 245–250

Donahue, R.E. 2023 'Lithic microwear study', in Green and Mortimer 2023, volume 2, 282–311

Donahue, R.E. unpub. 'The lithic microwear analysis of the Royal Docks School site: evidence for a Bronze Age specialised hide processing area', Submitted to the Museum of London Archaeological Service

Donahue, R.E. and Burroni, D.B. 2004 'Lithic microwear analysis and the formation of archaeological assemblages', in Walker *et al.* (eds) 2004, 140–148

Donahue, R.E. and Evans, A.A. 2012 'Lithic microwear analysis', in Boismeier and Gamble (eds) 2012, 261–274

Donahue, R.E., Fischer, A., Burroni, D.B., Malm, T. and Johansen, M. 2019 'Microwear analysis aiding excavation prioritization at the submerged Mesolithic settlement of Orehoved, Denmark', *J. Archaeol. Sci. Rep*. **23**, 540–48

Doughton, L. 2013 'Burnt mounds: transforming space and place in Bronze Age Shetland', in Mahler (ed.) 2013, 35–46

Driesch, A. von den 1976 *A guide to the measurements of animal bones from archaeological sites*, Peabody Museum Bulletin 1

Dudd, S.N. and Evershed, R.P. 1998 'Direct demonstration of milk as an element of archaeological economies', *Science* **282**(5393), 1478–1481

Dumont, J.V. 1983 'An interim report of the Star Carr microwear study', *Oxford J. of Archaeol.* **2**, 127–45

Dunbar, E., Cook, G.T., Naysmith, P., Tripney, B.G. and Xu, S. 2016 'AMS ^{14}C dating at the Scottish Universities Environmental Research Centre (SUERC) radiocarbon dating laboratory', *Radiocarbon* **58**, 9–23

Dunne, J., Evershed, R.P., Salque, M., Cramp, L., Bruni, S., Ryan, K., Biagetti, S. and di Lernia, S. 2012 'First dairying in green Saharan Africa in the fifth millennium BC', *Nature* **486**(7403), 390–394

Dunne, J., Gillard, T. and Evershed, R.P. 2024 'Organic residue analysis of the heat-altered stone', in Fern 2024, 56–58

Dyson, A. 2015 *Cuckoo Farm Park and Ride, Myland, Colchester, Essex: post-excavation assessment and updated project design report*, Archaeology South-East Report **2015045**

Edmonds, M. 1995 *Stone tools and society: working stone in Neolithic and Bronze Age Britain*, London, Batsford

Edmonds, M. 1999 *Ancestral geographies of the Neolithic: landscapes, monuments and memory*, London, Routledge

Edmonds, M. 2000 'Worked flint' in Bates and Wiltshire 2000, 408

Edmonds, M., Evans, C. and Gibson, D. 1999 'Assemblage and collection – lithic complexes in the Cambridgeshire fenlands', *Proc. Prehist. Soc.* **65**, 47–82

Evans, C. and Knight, M. 1997 *The Barleycroft Paddocks excavations, Cambridgeshire*, Cambridge, Cambridge University Press CAU Report no. **218**

Evans, J.G. 1972 *Land snails in archaeology*, London, Seminar Press

Evershed, R.P. 1993 'Biomolecular archaeology and lipids', *World Archaeol.* **25**(1), 74–93

Evershed, R.P. 2008 'Organic residue analysis in archaeology: the archaeological biomarker revolution', *Archaeometry* **50**(6), 895–924

Evershed, R.P. and Bethell, P.H. 1996 'Application of multimolecular biomarker techniques to the identification of fecal material in archaeological soils and sediments', in Orna (ed.) 1996, 157–172

Evershed, R.P., Bethell, P.H., Reynolds, P.J. and Walsh, N.J. 1997a '5β-stigmastanol and related 5β-stanols as biomarkers of manuring: analysis of modern experimental material and assessment of the archaeological potential', *J. of Archaeol. Sci* **24**(6), 485–495

Evershed, R.P., Mottram, H.R., Dudd, S.N., Charters, S., Stott, A.W., Lawrence, G.J., Gibson, A.M., Conner, A., Blinkhorn, P.W. and Reeves, V. 1997b 'New criteria for the identification of animal fats preserved in archaeological pottery', *Naturwissenschaften* **84**(9), 402–406

Evin, J., Oberlin, C., Daugas, J. and Salles, J. (eds) 1999 *Actes du 3eme congres international: archaeologie et ^{14}C, Lyon, 6–10 Avril 1998 Lyon, France, Society prehistorique francaise*, Revue d'Archeometrie Suppl. 1999 et Soc. Prehist. Fr. Memoire, Mémoires de la Société préhistorique française, **26**

Fedoroff, N. 1968 'Genese et morphologie des sols a horizon b textural en France atlantique', *Science du Sol* **1**, 29–65

Fern, C. 2022 *Mildenhall Hub, Mildenhall, Suffolk*, Cotswold Archaeology Report **SU0143_1**

Fern, C. 2024 *Land on the south side of Framlingham Road, Laxfield, Suffolk: archaeological excavation (archive report)*, Cotswold Archaeology Report **SU0531_1**

Field, D. 2008 'Development of an agricultural countryside', in Pollard (ed.) 2008, 202–224

Fokkens, H. and Harding, A. (eds) 2013 *The Oxford handbook of the European Bronze Age*, Oxford, Oxford University Press

Ford, S. 2006 'Worked flint', in Oram 2006, 8–11

Frieman, C.J. 2014 'Double edged blades: re-visiting the British (and Irish) flint daggers', *Proc. Prehist. Soc.* **80**, 33–65

Furlong, J.R. 1951 'The drying of hides and skins', in *Colonial Plant and Animal Products* **11**(4), 233–245, https://gala.gre.ac.uk/id/eprint/11997/ (accessed 12 June 2025)

Gardner, T.H. 2019 'Assessing the contribution of integrated geoarchaeological approaches to understanding the formation and function of burnt mounds: the example

of Hoppenwood Bank, North Northumberland', *Archaeol. J.* **176**(1), 51–83

Garrow, D. 2006 *Pits, settlement and deposition during the Neolithic and Early Bronze Age in East Anglia*, BAR Brit. Ser. 414

Garrow, D. 2007 'Placing pits: landscape occupation and depositional practice during the Neolithic in East Anglia', *Proc. Prehist. Soc.* **73**, 1–24

Garrow, D., Beadsmoore, E. and Knight, M. 2005 'Pit clusters and the temporality of occupation: an Earlier Neolithic site at Kilverstone, Thetford, Norfolk', *Proc. Prehist. Soc.* **71**, 139–157

Garrow, D., Lucy, S. and Gibson, D. 2006 *Excavations at Kilverstone, Norfolk: an episodic landscape history*, E. Anglian Archaeol. **113**

Gibson, A.M. 1982 *Beaker domestic sites: a study of the domestic pottery of the late third and early second millennia BC in the British Isles*, BAR Brit. Ser. **107**

Gibson, A.M. 2019 *Beaker domestic architecture in Britain and Ireland*, Oxford, Oxbow Books, Prehistoric Society Research Paper **9**

Ginn, V. 2016 *Mapping society: settlement studies in later Bronze Age Ireland*, Oxford, Archaeopress

Goldberg, P. and Macphail, R.I. 2006 *Practical and theoretical geoarchaeology*, Oxford, Blackwell Scientific

Grant, M.J. 2022 'Pollen assessment', in Smart and Mortimer 2022, 34–36

Green, M. 2018 *Marham Park, Bury St Edmunds, Suffolk: post excavation assessment and updated project design,* Suffolk Archaeology CIC Report 2018/040

Green, M., 2020 'Lithics', in Brooks *et al.* 2020, 143–153

Green, M. 2022 *Brightwell Hall Farm, Brightwell, Suffolk: evaluation report*, Cotswold Archaeology Report **SU0422_1**

Green, M. 2023 'Heat altered flint and stone', in Green and Mortimer 2023, volume 2, 312–315

Green, M. 2024a 'Heat-altered flint and stone', in Fern 2024, 55

Green, M. 2024b 'Lithics', in Fern 2024, 53–54

Green, M. and Mortimer, R. 2023 *Marham Park, Fornham All Saints, Bury St Edmunds, Suffolk: archaeological excavation (2 vols)*, Cotswold Archaeology Report **BSELNW302_1**

Gregg, M.W., Banning, E.B., Gibbs, K. and Slater, G.F. 2009 'Subsistence practices and pottery use in Neolithic Jordan: molecular and isotopic evidence', *J. of Archaeol. Sci.* **36**(4), 937–946

Grimes, W.F. 1931 'The Early Bronze Age flint dagger in England and Wales', *Proc. Prehist. Soc. E. Anglia* **6**, 340–355

Grimm, E.C. 1987 'CONISS: a FORTRAN 77 program for stratigraphically constrained cluster analysis by the method of incremental sum of squares', *Computers & Geosciences* **13**, 13–35

Grimm, E.C. 1991 *TILIA and TILIA GRAPH*, Springfield, Illinois State Museum

Groenman-van Waateringe, W., Kilian, W. and van Londen, H. 1999 'The curing of hides and skins in European prehistory', *Antiquity* **73**, 884–90

Grogan, E. 2005 *The North Munster project volume 2*, Bray, Wordwell

Grömer, K., Russ-Popa, G. and Saliari, K. 2016 'Products of animal skin from antiquity to the medieval period', *Ann. Naturhist. Mus. Wien Serie A* **119**, 69–93

Gron, K.J., Sorenson, L. and Rowley-Conwy, P. (eds) 2020 *Farmers at the frontier: a pan European perspective on Neolithisation*, Oxford, Oxbow Books

Halmemies-Beauchet-Filleau, A., Vanhatalo, A., Toivonen, V., Heikkilä, T., Lee, M. and Shingfield, K. 2013 'Effect of replacing grass silage with red clover silage on ruminal lipid metabolism in lactating cows fed diets containing a 60:40 forage-to-concentrate ratio', *J. of Dairy Science* **96**(9), 5882–5900

Halmemies-Beauchet-Filleau, A., Vanhatalo, A., Toivonen, V., Heikkilä, T., Lee, M. and Shingfield, K. 2014 'Effect of replacing grass silage with red clover silage on nutrient digestion, nitrogen metabolism, and milk fat composition in lactating cows fed diets containing a 60:40 forage-to-concentrate ratio', *J. of Dairy Science* **97**(6), 3761–3776

Hamilton, D. 2023 'C14 and chronological modelling', in Green and Mortimer 2023, volume 2, 436–443

Harris, S. 2006 'A report on the examination of animal skin artefacts from the Bronze Age salt mines of Halstatt, Austria', *Papers from the Institute of Archaeology* **17**, 69–76

Harris, S. 2011 'Preparing skins in prehistory; a review of evidence and approaches', in Thompson and Mould (eds) 2011, 57–67

Harris, S. 2012 'Hide-working with dry scrape technique using stone and bone', *Archaeological Leather Group Newsletter* **36**, 12–14

Harris, S. 2014 'Leather in archaeology: between material properties, materiality and technological choices', in Harris and Veldmeijer (eds) 2014, 9–22

Harris, S. and Veldmeijer, A.J. (eds) 2014 *Why leather? The material and cultural dimensions of leather*, Leiden, Sidestone Press

Haselgrove, C. and Pope, R. (eds) 2007 *The earlier Iron Age in Britain and the near continent*, Oxford, Oxbow Books

Hawkes, A. 2015 '*Fulachtí fia* and Bronze Age cooking in Ireland: reappraising the evidence', *Proc. Royal Irish Acad.* **115C**, 47–77

Hawkes, A. 2018 *The archaeology of prehistoric burnt mounds in Ireland*, Oxford, Archaeopress

Hawkes, A. and Malainey, M. 2018 '*Fulacht* fats – Bronze Age cooking confirmed?', *Archaeology Ireland* **32**(4), 47–50

Herriett, S.E. 2021 'Prehistoric shield production, utilizing hides and hot-stone technology as an alternative to leather to reconstruct the Clonbrin shield',

J. Archaeol. Sci. Rep. **37** https://doi.org/10.1016/j.jasrep.2021.102951 (accessed 6 June 2024)

Hillman, G. 1981 'Reconstructing crop husbandry practices from charred remains of crops', in Mercer 1981, 123–162

Historic England (HE) 2018 *Pre-industrial salterns: introductions to heritage assets*, Swindon, Historic England

Historic England (HE) 2025 National Heritage list for England https://historicengland.org.uk/listing/the-list/ (accessed 09 March 2025)

Hodder, I. (ed.) 2013 *Humans and landscapes of Çatalhöyük: reports from the 2000–2008 seasons volume 8*, Oxford, Oxbow Books

Hodder, M. 1998 'Reconstructing burnt mounds', *West Midlands Archaeol.* **41**, 27–29

Hodder, M. 2017 'Burnt mounds and beyond: the later prehistory of Birmingham and the Black Country', in Hurst (ed.) 2017, 29–36

Hodder, M. 2018 'Book review: the archaeology of Prehistoric burnt mounds in Ireland by Alan Hawkes' https://www.prehistoricsociety.org/publications/book-reviews/3759 (accessed 28 June 2024)

Hodges, H. 1989 *Artifacts* (3rd edition), London, Duckworth

Hodgson, J.M. 1997 *Soil survey field handbook,* Silsoe, Soil Survey and Land Research Centre

Humphrey, J. 2007 'Simple tools for tough tasks or tough tools for simple tasks? Analysis and experiment in Iron Age flint utilisation', in Haselgrove and Pope (eds) 2007, 144–159

Hurst, D. (ed.) 2017 *Westward on the high-hilled plains: the later prehistory of the West Midlands*, Oxford, Oxbow Books

Jarvis, M.G., Allen, R.H., Fordham, S.J., Hazelden, J., Moffat, A.J. and Sturdy, R.G. 1984 *Soils and their use in South East England*, Harpenden, Soil Survey of England and Wales Bulletin **15**

Johnson, E. 2017 *A zooarchaeological study of butchery and bone fat processing practices among early Neolithic farming societies in Central Europe*, Exeter, University of Exeter PhD thesis https://core.ac.uk/download/132262900.pdf (accessed 7 June 2024)

Johnston, R. 2021 *Bronze Age worlds: a social prehistory of Britain and Ireland*, London, Routledge

Jones A.P., Tucker M.E. and Hart J.K. 1999 *The description and analysis of Quaternary stratigraphic field sections*, London, Quaternary Technical Association Technical Guide No. **7**

Jones, R. (ed.) 2012 *Manure matters: historical, archaeological and ethnographic perspectives*, Farnham, Ashgate

Keeley, L.H. 1980 *Experimental determination of stone tool uses*, Chicago, University of Chicago Press

Keeley, L.H. 1982 'Hafting and retooling: effects on the archaeological record', *American Antiquity* **47**, 798–809

Keeley, L.H. 2010 'The probable sexual division of labor in Magdalenian hide working: ethnological evidence', in Zubrow *et al.* 2010, 227–234.

Kellogg, K. 1984 *Home tanning and leathercraft simplified*, Chicago, Chicago University Press

Kenney, J. 2008 'Recent excavations at Parc Bryn Cegin, Llandygai, near Bangor, North Wales', *Archaeol. Cambrensis* **157**, 9–142

Kerney, M.P. 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland*, Colchester, Harley Books

Knight, M. 2006 'Mildenhall pottery', in Garrow *et al.* 2006, 29–52

Knight, M. and Brudenell, M. 2020 *Pattern and process: landscape prehistories from Whittlesey Brick Pits: the King's Dyke and Bradley Fen excavations 1988–2004*, Cambridge, McDonald Institute for Archaeological Research

Kowalska, A. 2022 'Geoarchaeological assessment of monolith samples', in Smart and Mortimer 2022, 29–33

Kuhn, P., Aguilar, J. and Miedema, R. 2010 'Textural pedofeatures and related horizons', in Stoops *et al.* (eds) 2010, 217–250

Küster, H. 1988 *Vom werden einer Kulturlandschaft Vegetationsgeschichtliche Studien am Auerberg (Südbayern) VHC*, Weinheim, Acta Humanoria

Ladd, S. and Mortimer, R. 2017 'The Bran Ditch: early Iron Age origins and implications for prehistoric territories in South Cambridgeshire and the East Chilterns', *Proc. Cambridge Antiq. Soc.* **106**, 7–22

Laplace, G. 1964 *Essai de typologie systématique*, Ferrara, Università degli Studi di Ferrara Annali dell'Università di Ferrara (Nuovo Series) Sezione 15: Paleontologia umana e paletnologia – Supplemento II al volume 1

Leah, M. and Young, C. 2001 'A Bronze-Age burnt mound at Sandy Lane, Charlton Kings, Gloucestershire: excavations in 1971', *Trans. Bristol Gloucestershire Archaeol. Soc.* **119**, 59–82

Levi Sala, I. 1986a 'Experimental replication of post depositional surface modification on flint', in Owen and Unrath (eds) 1986, 103–109

Levi Sala, I. 1986b 'Use wear and post-depositional surface modification: a word of caution', *J. Archaeol. Sci.* **13**, 229–244

Lewis, J., Brown, F., Batt, A., Cooke, N., Barrett, J., Every, R., Mepham, L., Brown, K., Cramp, K., Lawson, A.J., Roe, F., Allen, S., Petts, D., McKinley, J.I., Carruthers, W.J., Challinor, D., Wiltshire, P., Robinson, M., Lewis, H.A. and Bates, M.R. 2006 *Landscape evolution in the Middle Thames Valley, Heathrow Terminal 5 Excavations volume 1,* Perry Oaks, Framework Archaeology Monograph **1**

Limbrey, S. 1975 *Soil science and archaeology*, London, Academic Press

Lin, D.S., Connor, W.E., Napton, L.K. and Heizer, R.F. 1978 'The steroids of 2000-year-old human coprolites', *J. Lipid Research* **19**(2), 215–221

Lindbo, D.L., Stolt, M.H. and Vepraskas, M.J. 2010 'Redoximorphic features' in Stoops *et al.* (eds) 2010, 129–147

Longo, L. and Skakun, N. (eds) 2008 *'Prehistoric technology' 40 years later: functional studies and the Russian legacy*, BAR Int. Ser. **1783**

Longworth, I., Ellison, A. and Rigby, V. 1988 *Excavations at Grimes Graves, Norfolk 1972–1976: fascicule 2 – the Neolithic, Bronze Age and later pottery*, London, British Museum

Lovett, P. 2016 *Archaeological excavation at Marton Road, Long Itchington, Warwickshire*, Worcestershire Archaeology Report **2359**

Macphail, R.I. 1992 'Soil micromorphological evidence of ancient soil erosion', in Bell and Boardman (eds) 1992, 197–215

Magnitude 2020 *Land at Shepherds Grove, Stanton, Suffolk: a geophysical survey report*, unpublished

Mahler, D. (ed.) 2013 *The border of farming: Shetland and Scandinavia – Neolithic and Bronze Age farming*, Copenhagen, National Museum of Denmark, papers from the 'Northern Worlds' symposium 2012

Martin, E. 1998 'Swales Fen, Suffolk: a Bronze Age cooking pit?', *Antiquity* **62**, 358–359

Martin, E. 1999 'Suffolk in the Iron Age', in Davies and Williamson (eds) 1999, 45–99

Masefield, R., Branch, N., Couldrey P., Goodburn, D. and Tyres, I. 2003 'A late Bronze Age well complex at Swalecliffe, Kent', *Antiq. J.* **83**, 47–121

Mason, N., Rogers, M.A., Green, J. and White, J. 2024 *Hornsea Project Three, Norfolk: post-excavation assessment and updated project design*, Oxford Archaeology Report **2710**

Medlycott, M. 2011 *Research and archaeology revisited: a revised framework for the East of England*, E. Anglian Archaeol. Occ. Pap. **24**

Mercer, R. 1981 *Farming practice in British prehistory,* Edinburgh, Edinburgh University Press

Meredith, J. and Mortimer, R. 2023 *Land to the north of High Street, Walton, Felixstowe, Suffolk, FEX 451: post excavation assessment and updated project design,* Cotswold Archaeology Report **SU0262_1**

Mighall, T., Timpany, S., Wheeler, J., Bailey, L., Bamforth, M., Gray, L. and Taylor M. 2017 'Vegetation changes and woodland management associated with a prehistoric to medieval burnt mound complex at Ballygawley, Northern Ireland', *Environmental Archaeol.* **23**, 1–19

Moan, P. 2018 *Norwich Northern Distributor Road, Norfolk: archaeological excavation report*, Oxford East Report **2100**

Molloy, B. 2020 'A much-storied shield', *Archaeology Ireland* **34**(2), 27–29

Monk, M. 2007 'A greasy subject', *Archaeology Ireland* **21**, 22–24

Mooketsi, C. 2001 'Butchery styles and the processing of cattle carcasses in Botswana', *Pula: Botswana J. African Studies* **15**(1), 108–124

Moore, H. and Wilson, G. 1999 'Food for thought: a survey of burnt mounds of Shetland and excavations at Tangwick', *Proc. Soc. Antiq. Scot.* **129**, 203–237

Moore, P.D. and Webb, J.A. 1978 *An illustrated guide to pollen analysis*, London, Hodder and Stoughton

Moore, P.D., Webb, J.A. and Collinson, M.E. 1991 *Pollen analysis* (2nd edition), Oxford, Blackwell Scientific

Mortimer, R. 2005 *Neolithic to Anglo-Saxon occupation along the route of the Fordham Bypass*, Cambridgeshire Oxford Archaeology East Report **816**

Mortimer R., Bishop, B. and Percival, S. in prep. Fordham Bypass E. Anglian Archaeol., Cambridgeshire County Council/CamArc/Oxford Archaeology East

Moss, E. 1983 An investigation into the functions of flint implements: Pincevent and Pont d'Ambon London, University College London PhD thesis

Mukherjee, A.J., Copley, M.S., Berstan, R., Clark, K.A. and Evershed, R.P. 2005 'Interpretation of $\delta^{13}C$ values of fatty acids in relation to animal husbandry, food processing and consumption in prehistory', in Mulville and Outram (eds) 2005, 77–93

Mulville, J. and Outram, A. (eds) 2005 *The zooarchaeology of milk and fats*, Oxford, Oxbow Books

Munsell Color 2000 *Munsell soil color charts*, New Windsor, NY, Munsell Color

Munsell Color 2018 *Munsell soil colour chart (2009 revision)*, Michigan, Munsell Color

Murphy, C.P. 1986 *Thin section preparation of soils and sediments*, Berkhamsted, A.B. Academic

Needham, S. 2005 'Transforming Beaker culture in north-west Europe: processes of fusion and fission', *Proc. Prehist. Soc.* **71**, 171–217

Newman, J. 2019 *Land off Framlingham Road, Laxfield, Suffolk: archaeological desk based assessment*, John Newman Archaeological Services unpublished report

Newton, A.A.S. and Mustchin A.R.R. 2015 'Archaeological excavations at Ingham Quarry, Fornham St Genevieve', *Proc. Suffolk Inst. Archaeol. Hist.* **43**, 337–369

Nicosia, C. and Stoops, G. (eds) 2017 *Archaeological soil and sediment micromorphology*, Chichester, John Wiley and Sons

Ó Drisceoil, D.A. 1998 'Burnt mounds: cooking or bathing?', *Antiquity* **62**, 671–680

O'Kelly, M.J. 1954 'Excavations and experiments in ancient Irish cooking-places', *J. Roy. Soc. Antiq. Ir.* **84**, 105–155

Olsen, S.L. 1994 'Exploitation of mammals at the Early Bronze Age site of West Row Fen (Mildenhall 165), Suffolk, England', *Annals of the Carnegie Museum* **63**(2), 115–153

Ó Néill, J. 2009 *Burnt mounds in Northern and Western Europe: a study of prehistoric technology and society,* Saarbrücken, VDM Verlag Dr. Müller

Orna, M.V. (ed.) 1996 *Archaeological chemistry,* Washington DC, American Chemical Society

Oram, R. 2006 'A Middle Bronze Age burnt mound at Greywell Road, Hatch, Basingstoke', *Proc. Hampshire Fld Club Archaeol. Soc.* **61**, 1–15

O'Sullivan, J. and Stanley, M. 2008 *Roads, discovery and research*, Dublin, Transport Infrastructure Ireland,

Archaeology and the National Roads Authority Monograph 5

Outram, A.K., Stear, N.A., Bendrey, R., Olsen, S., Kasparov, A., Zaibert, V., Thorpe, N. and Evershed, R.P. 2009 'The earliest horse harnessing and milking', *Science* **323**(5919), 1332–1335

Owen, L. and Unrath, G. (eds) 1986 *Technical aspects of microwear studies on stone tools*, Tübingen, Early Man News 9, 10 and 11 parts I and II

Parfitt, K. 2006 'A prehistoric "burnt mound" site at Crabble Paper Mill, near Dover', *Archaeologia Cantiana* **126**, 219–237

Payne, S. 1969 'A metrical distinction between the sheep and goat metacarpal', in Ucko and Dimbleby (eds) 1969, 295–305

Payne, S. 1985 'Morphological distinctions between the mandibular teeth of young sheep, Ovis and goats, Capra', *J. Archaeol. Sci.* **12**, 139–147

PCRG (Prehistoric Ceramics Research Group) 2010 *The study of later prehistoric pottery: general policies and guidelines for analysis and publication* (3rd edition), Prehist. Ceramics Res. Group Occ. Pap. **1** and **2**

Pendleton, C.F. 1999 *Bronze Age metalwork in East Anglia: a study of its distribution and interpretation*, Oxford, BAR Brit. Ser. 279

Percival, J. 1980 *Living in the past: a journey back to the Iron Age*, London, BBC

Peter, K. (ed.) 2012 *Handbook of herbs and spices (volume 1)*, Sawston, Woodhead Publishing

Phillips, T. and Mortimer, R. 2012 *Clay Farm, Trumpington, Cambridgeshire: post-excavation assessment and updated project design*, Oxford Archaeology Report No. **1294**

Pickstone, A. and Mortimer, R. 2011 *The archaeology of Brigg's Farm, Prior's Fen, Thorney, Peterborough,* Oxford Archaeology Report No. **1094**

Pollard, J. 1993 *Traditions of deposition in the Neolithic of Wessex*, Cardiff, Cardiff University PhD thesis

Pollard, J. 1999 '"These places have their moments": thoughts on settlement practices in the British Neolithic', in Brück and Goodman (eds) 1999, 219–234

Pollard, J. (ed.) 2008 *Prehistoric Britain,* Oxford, Blackwell Studies in Global Archaeology **11**

Pooley, L. 2018 *Archaeological evaluation at Colchester Northern Gateway Sports Hub, plots 2–3, east of Colchester Park and Ride, Mile End*, Colchester, Essex Colchester Archaeological Trust Report **1219**

Quinn, B. and Moore, D. (2008) '*Fulachta fiadh* and the beer experiment', in Stanley *et al.* (eds) 2008, 43–53

Randsborg, K. 2011 *Bronze Age textiles: men, women and wealth*, London, Bristol Classical Press, Debates in Archaeology ser.

Rees, G. 2014 *An Early to Middle Bronze Age settlement at Fordham Road, Newmarket: post excavation assessment and updated project design*, Oxford Archaeology Report No. **1443**

Reilly, F., Brown, T., Davis, S., O'Brien, C., O'Donnell, L. 2012 'Possible evidence of textile-processing from a burnt stone mound at Coonagh West, Co. Limerick', *J. Irish Archaeol.* **21**, 57–84

Reimer, P.J., Austin, W.E.N., Bard, E., Bayliss, A., Blackwell, P.G., Ramsey, C.B., Butzin, M., Cheng, H., Edwards, R.L., Friedrich, M., Grootes, P.M., Guilderson, T.P., Hajdas, I., Heaton, T.J., Hogg, A.G., Hughen, K.A., Kromer, B., Manning, S.W., Muscheler, R., Palmer, J.G., Pearson, C., Plicht, J.v.d., Reimer, R.W., Richards, D.A., Scott, E.M., Southon, J.R., Turney, C.S.M., Wacker, L., Adolphi, F., Büntgen, U., Capano, M., Fahrni, S.M., Fogtmann-Schulz, A., Friedrich, R., Köhler, P., Kudsk, S., Miyake, F., Olsen, J., Reinig, F., Sakamoto, M., Sookdeo, A. and Talamo, S. 2020 'The IntCal20 Northern hemisphere radiocarbon age calibration curve (0–55 cal kBP)', *Radiocarbon* **62**, 725–757

Ripper, S. and Beamish, M. 2011 'Discussion', in Ripper *et al.* 2011, 196–203

Ripper, S., Beamish, M., Bayliss, A., Bronk Ramsey, C., Brown, A., Collins, M., Cooper, N.J., Cook, G., Cook, J., Gouldwell, A., Greig, J., Hatton, J., Marshall, P.D., Meadows, J., Monckton, A., Van Der Plicht, H., Smith, D. and Tetlow E. 2011 'Bogs, bodies and burnt mounds: visits to the Soar Wetlands in the Neolithic and Bronze Age', *Proc. Prehist. Soc.* **78**, 173–206

Robins, P. 2000 'Struck flint', in Ashwin and Bates 2000, 194–199

Roehrs, H., Klooss, S. and Kirleis, W. 2013 'Evaluating prehistoric finds of Arrhenatherum elatius var. bulbosum in north-western and central Europe with an emphasis on the first Neolithic finds in Northern Germany', *Archaeol. and Anthropological Sci.* **5**, 1–15

Rogerson, A. and Ashley, S. 2011 'A selection of finds from Norfolk recorded in 2011 and earlier', *Norfolk Archaeol.* **46**, 248–262

Ropke, A. and Dietl, C. 2017 'Burnt soils and sediments', in Nicosia and Stoops (eds) 2017, 173–180

Rots, V. 2003 'Towards an understanding of hafting: the macro-and microscopic evidence' *Antiquity* **77**, 805–815.

Rots, V. 2004 'Prehensile wear on flint tools', *Lithic Technology* **29**(1), 7–3

Rots, V. 2010 *Prehension and hafting wear on flint tools: a methodology*, Leuven, Leuven University Press

Rots, V. and Williamson, B. 2004 'Microwear and residue analysis in perspective: the contribution of ethnoarchaeological evidence', *J. Archaeol. Sci.* **31**, 1287–1299

Rowley-Conwy, P., Gron, K.J., Bishop, R.R., Dunne, J., Evershed, R., Longford, C., Schulting, R. and Treasure, E. 2020 'The earliest farming in Britain: towards a new synthesis', in Gron *et al.* (eds) 2020, 401–424

Roycroft, N. 2006 'A theory on boiled bull and burnt mounds', *Seanda (NRA archaeology magazine)* 2006(1), 38–9

RRF (Regional Research Framework) 2024 *East of England regional research framework* https://researchframeworks.org/eoe/ (accessed 05 June 2024)

Sara, R.B.M.E, Syske, K.L. and Mathiesen, S.D. 2022 'Precious blood and nourishing offal: past and present slaughtering perspectives in Sámi reindeer pastoralism', *Pastoralism: research, policy and practice* **12**(20)

SCC (Suffolk County Council) 2025a *Suffolk Heritage Explorer: the online Historic Environment Record for Suffolk* https://heritage.suffolk.gov.uk/ (accessed 28 April 2025)

SCC 2025b *Suffolk Landscape Character Assessment* https://suffolklandscape.org.uk/ (accessed 28 April 2025)

Scott, E.M. 2003 'The Third International Radiocarbon Intercomparison (TIRI) and the Fourth International Radiocarbon Intercomparison (FIRI) 1990–2002: results, analysis, and conclusions', *Radiocarbon* **45**, 135–408

Scott, E.M., Cook, G.T. and Naysmith, P. 2010 'A report on phase 2 of the Fifth International Radiocarbon Intercomparison (VIRI)', *Radiocarbon* **52**, 846–858

Seager Thomas, M. 2010 'Potboilers reheated', *Proc. Prehist. Soc.* **76**, 357–366

Shackley, M.L. 1974 'Stream abrasion of chert implements', *Nature* **248**, 501–502

Shennan, S.J. 1999 'The excavation of a burnt mound at Harbridge, Hampshire', *Proc. Hampshire Fld Club Archaeol. Soc.* **54**, 172–179

Shepherd, W. 1972 *Flint: its origin, properties and uses*, London, Faber

Shillito, L.-M., Bull, I.D., Matthews, W., Almond, M.J. and Evershed, R.P. 2013 'Integrated geochemical and microscopic analysis of human coprolites, animal dung and organic remains in burials', in Hodder (ed.) 2013, 77–80

Silvester, R. 1991 *The Fenland Project no. 4: Norfolk Survey, Wissey Embayment and Fen Causeway*, E. Anglian Archaeol. **52**

Smalley, D. 2012 *Land northwest of Bury St Edmunds: geophysical survey report*, Stratascan

Smart, R. 2022 *Land at Shepherds Grove, Stanton, Suffolk: archaeological evaluation*, Cotswold Archaeology Report **SU0325_1**

Smart, R. and Mortimer, R. 2022 *Land at Shepherds Grove, Stanton, Suffolk: archaeological excavation*, Cotswold Archaeology Report **SU0335_1**

Smith, D. 2011 'Insect remains', in Ripper *et al.* 2011, 191

Spangenberg, J.E., Jacomet, S. and Schibler, J. 2006 'Chemical analyses of organic residues in archaeological pottery from Arbon Bleiche 3, Switzerland: evidence for dairying in the late Neolithic', *J. Archaeol. Sci.* **33**(1), 1–13

Stace, C. 1992 *New flora of the British Isles*, Cambridge, Cambridge University Press

Stace, C. 1997 *New flora of the British Isles* (2nd edition), Cambridge, Cambridge University Press

Stace, C. 2010 *New flora of the British Isles* (3rd edition), Cambridge, Cambridge University Press

Stanley, M., Danaher, E. and Eogan, J. (eds) 2008 *Dining and dwelling: proceedings of a public seminar on archaeological discoveries on national road schemes, August 2008*, Dublin, Transport Infrastructure Ireland, Archaeology and the National Roads Authority Monograph **6**

Stapert, D. 1976 'Some natural surface modifications on chert in the Netherlands', *Palaeohistoria* **18**, 7–41

Stockmarr, J. 1971 'Tablets with spores used in absolute pollen analysis', *Pollen et Spores* **13**, 615–621

Stolle, B. 2020 'Ritual slaughter through the eyes of the butcher; perspectives on a complex practice', *Current Swedish Archaeol.* **28**, 181–200

Stoops, G. 2003 *Guidelines for analysis and description of soil and regolith thin sections*, Madison, WI, Soil Science Society of America

Stoops, G., Marcelino, V. and Mees, F. (eds) 2010 *Interpretation of micromorphological features of soils and regoliths*, Amsterdam, Elsevier

Stuiver, M. and Polach, H.A. 1977 'Reporting of ^{14}C data', *Radiocarbon* **19**, 355–363

Stump, D. 2012 *Land at north-west Bury St Edmunds: archaeological fieldwalking survey,* Cambridge, Pre-Construct Archaeology unpublished report

Thelin, V.H. 2007 *Were burnt mounds derived from prehistoric copper production activities?* Durham, Durham University unpublished MA thesis http://etheses.dur.ac.uk/2478/ (accessed 12 December 2024)

Thomas, J. 1991 *Rethinking the Neolithic,* Cambridge, Cambridge University Press, New Studies in Archaeology

Thomas, J. 1999 *Understanding the Neolithic,* London, Routledge

Thomas, J., Kuruvilla, K.M. and Hrideek, T.K. 2012 'Mustard', in Peter (ed.) 2012, 388–398

Thompson, R. and Mould, Q. (eds) 2011 *Leather tanneries: the archaeological evidence,* London, Archetype Publications / Prehistoric Leather Group

Toolis, R. and Ceron-Carrasco, R. 2005 'Excavation of a burnt mound at Meur, Sanday, Orkney', *Scot. Archaeol. J.* **29**(1), 31–49

Tourunen, A. 2008 'Fauna and *fulachta fiadh*: animal bones from burnt mounds on the N9/N10 Carlow Bypass', in O'Sullivan and Stanley 2008, 37–43

Trehy, J. 2012 *Desk based archaeology assessment: north west Bury St Edmunds*, Terence O'Rourke Ltd Report **180604**

Tucker, M.E. 2011 *Sedimentary rocks in the field: a practical guide* (4th edition), Chichester, Wiley-Blackwell

Ucko, P.J. and Dimbleby, G.W. (eds) 1969 *The domestication and exploitation of plants and animals*, London, Duckworth

Waddell, J. 2000 *The prehistoric archaeology of Ireland*, Bray, Wordwell

Walker, E.A., Wenban-Smith, F. and Healy, F. (eds) 2004 *Lithics in action: papers for the conference Lithic Studies in the Year 2000*, Oxford, Oxford Books

Waller, M., Grant, M.J. and Bunting, M.J. 2012 'Modern pollen studies from coppiced woodlands and their

implications for the detection of woodland management in Holocene pollen records', *Review of Palaeobotany and Palynology* **187**, 11–28

Watts, S.R. 2012 *The structured deposition of querns: the contexts of use and deposition of querns in the South-West of England from the Neolithic to the Iron Age,* Exeter, University of Exeter PhD thesis https://ore.exeter.ac.uk/repository/handle/10036/4016 (accessed 01 May 2025)

West, A. 2022 'The palaoenvironmental evidence', in Smart and Mortimer 2022, 28

West, A. 2023 'The palaeoenvironmental evidence', in Green and Mortimer 2023, volume 2, 336–360

West, A. 2024 'Palaeoenvironmental evidence', in Fern 2024, 70–72

Wilkinson, K. 2024 'Geoarchaeological study of well 0205/5105', in Fern 2024, 72–75

Woolhouse, T. 2024 'Bronze Age fields in Suffolk: a preliminary survey', *Proc. Preh. Soc.* **90**, 279–318

Woolhouse, T. and Pullen, A.G. 2020 *Land south of Green Road, Haughley, Suffolk: archaeological excavation report*, Pre-Construct Archaeology Report **R14147**

Woolhouse, T. and Pullen, A. forthcoming 'Excavations at Green Road, Haughley: a Bronze Age waterhole and burnt "mound", late Saxon farmstead, and remains of Mere Windmill, *c*. 1820–1898', *Proc. Suffolk Inst. Archaeol. Hist.*

Yates, D. 2007 *Land, power and prestige: Bronze Age field systems in Southern England*, Oxford, Oxbow Books

Young, A. 1797 *General view of the agriculture of the county of Suffolk: drawn up for the consideration of the Board of Agriculture and Internal Improvement,* London, B. Macmillan

Zohary, D., Hopf, M. and Weiss, E. 2012 *Domestication of plants in the Old World: the origin and spread of cultivated plants in West Asia, Europe and the Nile Valley* (4th edition), Oxford, Clarendon Press

Zubrow, E., Audouze, F. and Enloe, J. (eds) 2010 *The Magdalenian household: unravelling domesticity,* Albany, State Univ. of New York Press

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by Nicola King

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This volume presents remains from the Beaker period to the Late Bronze Age (*c.* 2400 BC – 800 BC) from three multi-period excavations undertaken by Cotswold Archaeology and its predecessor, Suffolk Archaeology Community Interest Company. The sites were located at Marham Park (Fornham All Saints), Laxfield and Hepworth. Features included pits, a Beaker period roundhouse, Middle Bronze Age field systems, possible traces of the long boundaries of a later Bronze Age sheep walk or ranch landscape and, significantly, four Beaker period/Early Bronze Age burnt mounds. Burnt mounds have been commonly recorded across the British Isles and parts of Europe, and are locations where 'hot stone' technology had been used for heating water. Their purpose has long been debated, but this volume presents the considerable evidence from Marham Park that the processing of animal products, particularly skins, was carried out at the burnt mound sites there.

These four burnt mound sites are part of an increasing number of this type of feature found on the clay uplands of East Anglia, compared to the wider known corpus from lower-lying topographic contexts such as the East Anglian fen edge. They, and environmental evidence from them, contribute to a wider and changing appreciation of the date and character of Bronze Age incursions beyond the river valleys and onto the upland clay and its woodlands, particularly on the higher clay plateau of Suffolk. The burnt mound sites are here suggested to have been significant locations linked to the pastoral use of elements of that landscape.

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DENBURY HOMES

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