Worcestershire Archaeology

ARCHAEOLOGICAL INVESTIGATIONS 2012-2016 AT CLIFTON QUARRY, KEMPSEY, WORCESTERSHIRE

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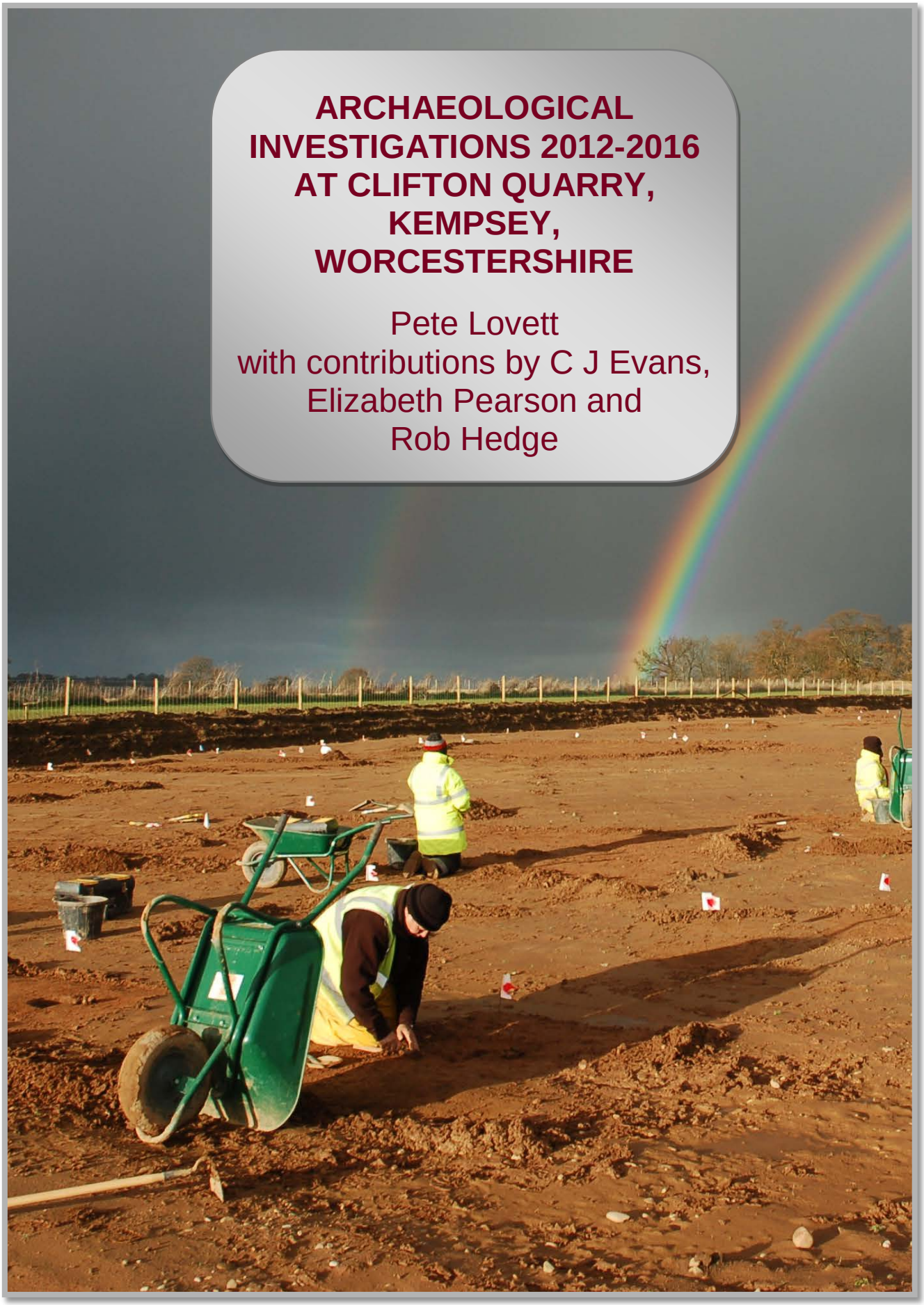
with contributions by C J Evans, Elizabeth Pearson and Rob Hedge



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Archaeological Investigations 2012-2016 at Clifton Quarry, Kempsey, Worcestershire

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Contents

Archaeological Investigations at Clifton Quarry, Kempsey, Worcestershire

Pete Lovett

With contributions by Elizabeth Pearson and C. Jane Evans and illustrations by Laura Templeton and Carolyn Hunt

Summary

A series of archaeological investigations was undertaken at Clifton Quarry, Kempsey, Worcestershire (NGR SO 8450 4700). It was undertaken on behalf of Tarmac Limited in advance of the permitted extension of mineral extraction.

These investigations formed the final stages of an extended programme of archaeological work at the site, and took place between 2012 and 2016. Incorporating extensive palaeoenvironmental analysis from previous works on the site, these investigations mapped peat deposits and alluvial formations derived from a palaeochannel alongside archaeological remains from a number of periods.

A mammoth tusk recovered from within the sand and gravel provided a rare and well preserved example of Late Glacial large mammalian fauna. This was probably deposited between 16-12,000 years ago when the terrace deposits it was found within were being laid down.

A series of burnt mounds were identified along the edge of the palaeochannel in the southern part of the investigated area. Radiocarbon dating placed these in the Late Neolithic-Early Bronze Age transition, significantly earlier than the usual range for such features in the West Midlands.

Iron Age deposits in the same area were limited to a number of pits from the middle of this period and these were located on the edge of the floodplain as defined by an extensive spread of peat. It is conjectured that an Iron Age settlement may have existed to the north-west of the study area, but has subsequently been lost to quarrying.

Nine cremation deposits were identified in the northern part of the site, including one urned. A potentially hand dug pond was excavated in this area, and was found to contain five of the nine cremation deposits. These were dated to 1st-2nd century AD, and were likely associated with the a Roman settlement immediately to the north.

A rare example of a well preserved midden was also excavated in the southern area. This dated to the 12th-14th century AD, and was likely created as part of a manuring regime to service the arable fields around the village of Clifton to the east. Post-medieval remains consisted of a series of channels dug to irrigate an area given over to water meadows.

Report

1 Background

1.1 Reasons for the project

A series of archaeological investigations was undertaken on behalf of Tarmac Limited at Clifton Quarry, Kempsey, Worcestershire (NGR SO 8450 4700).

The investigations completed between 2012-16 and reported here formed the final stages of a staged, long-term programme of archaeological work at the site and were undertaken in response to an archaeological condition placed upon planning permission for mineral extraction granted to Tarmac.

The permitted extraction area at Clifton was considered by the Archaeological Curator to have the potential to affect an archaeological site (reference WSM 01352 and WSM 34498) and the planning condition required 'implementation of a programme of archaeological work in accordance with a written scheme of investigation that has been submitted by the applicant and approved by the Mineral Planning Authority (Application ref 407531, 02/01530/COM: Condition 14).

This long term programme of archaeological investigations at Clifton, began with a selection of non-intrusive surveys (Miller *et al* 2002). This was continued with the evaluation by trial trenching of two areas in 2005 (Vaughan 2005), and was followed by two large scale programmes of investigation completed between 2006 and 2009 (Mann and Jackson, forthcoming).

The final stages of the programme of investigation as reported here comprised a watching brief affecting a small part of Quarry Area 10 and much of Area 11 as shown on Figure 1.

The project conforms to a brief prepared by Worcestershire County Council (WCC 2012a) and for which a project proposal (including detailed specification) was produced (WA 2012b).

The project also conforms to the *Standard and guidance: Archaeological watching brief* (CIfA 2014a), and *Standards and guidelines for archaeological projects in Worcestershire* (WCC 2010).

The event reference for this project, given by the HER is WSM46456.

2 Aims

The aims of the programme of archaeological work were to ensure the preparation of an appropriate record of any archaeological remains present before they were affected by quarrying operations.

Previous stages of work in the vicinity include evaluation (covering Areas 10 and 11 (Fig 1)) as well as other mitigation phases (excavation and watching brief in Area 10) and these have identified:

- Palaeoenvironmental remains surviving in one or more former watercourses (palaeochannels) and of a potentially complex nature; and
- Neolithic, Bronze Age, Romano-British and Early Medieval (Saxon) deposits surviving adjacent to former channels and potentially buried beneath alluvial clay horizons.

The following research themes were identified as potentially relevant to this phase of work:

- Neolithic and other earlier prehistoric seasonal occupation;
- Bronze Age activity within the landscape (burnt mounds and associated activities);
- Roman field boundaries;
- Early medieval rural activities (wells, flax retting, field boundaries, etc)
- Long-term patterns of environmental change and human impact on the landscape (as reflected in the palaeoenvironmental and geoarchaeological record).

These have been considered within the context of both regional and national research frameworks and in particular the West Midlands Regional Research Framework (Watt 2011) as well as within the specific research frameworks developed through the ALSF for Archaeology and Aggregates in Worcestershire (Jackson and Dalwood 2007).

3 Methods

3.1 Personnel

The first phase of the project was led in the field by Andrew Mann (BA (hons.); MSc); who joined Worcestershire Archaeology in 2004 and has been practicing archaeology since 2001. The second phase was led by Graham Arnold (BA (hons.), MSc), who joined Worcestershire Archaeology in 2009 and has been practicing archaeology since 2002. They were assisted by Timothy Cornah (BA (hons.), MSc), Andrew Walsh (BSc (hons); MSc; ACIfA; FSA Scot), Nick Daffern (BA (hons), MSc), and Robin Jackson (BA (hons.); ACIfA). The project manager responsible for the quality of the project was Robin Jackson (BA (hons.); ACIfA). Illustrations were prepared by Carolyn Hunt (BSc (hons); PG Cert; MCIfA) and Laura Templeton (BA; PG Cert; MCIfA). Elizabeth Pearson (MSc; ACIfA) contributed the environmental report, Jane Evans (BA, MA, MCIfA) and Robert Hedge (MA Cantab; PCIfA) contributed the finds report.

3.2 Documentary research

This stage of work follows on from previous evaluation work covering Areas 10 and 11 (Vaughan 2005) as well as an extensive programme of mitigation across Area 10 (Mann and Jackson forthcoming).

3.3 Fieldwork strategy

A detailed specification has been prepared by Worcestershire Archaeology (WA 2012a).

Fieldwork was undertaken between April 2012 and May 2016. The site reference number and site code is WSM 46456.

Area 11 overall covers approximately 7.5 ha, of which 1.5 ha was stripped during Phase 1 (Area 11a) in 2012. The remainder of the area (Areas 11b and 11c) was stripped between 2014 and 2015. Subsequent to the completion of the watching brief in Area 11, during mineral extraction in March 2016 in an area to the immediate north of Area 11 (linking previously investigated areas with Area 11), one of the plant operators uncovered a mammoth tusk. The find was promptly reported by the driver and work was stopped in the area. Tarmac staff immediately notified WA of the discovery and WA staff were provided safe access to record the location of the find, recover the tusk and ensure no further remans were present in the vicinity. Lastly, an additional section of Area 10 was stripped in May 2016 and is reported here. It measured 0.77ha. See Figure 2 for specific area locations. Prior to the main site strip, geo-technical test pits throughout the area were monitored. These were excavated using a 360º tracked excavator employing a toothless bucket and under archaeological supervision.

During the subsequent area stripping, deposits considered not to be significant were removed using a 360º tracked excavator, Subsequent excavation was undertaken by hand. Clean surfaces were inspected and significant deposits were excavated to retrieve artefactual material and environmental samples, as well as to determine their nature. Deposits were recorded according to standard Worcestershire Archaeology practice (WA 2012b).

3.4 Structural analysis

All fieldwork records were checked and cross-referenced. Analysis was effected through a combination of structural, artefactual and ecofactual evidence, allied to the information derived from other sources.

3.5 Artefact methodology, by C. Jane Evans

The finds work reported here conforms with the relevant sections of *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA 2014b; http://www.archaeologists.net/codes/ifa), and the multi-period *A Standard for Pottery Studies in Archaeology* (http://romanpotterystudy.org/2016/06/29/now-standard-pottery-studies-archaeology/ PCRG *et al* 2016) with archive creation informed by *Archaeological archives: a guide to the best practice in the creation, compilation, transfer and curation* (AAF 2011; http://www.archaeologyuk.org/archives/), and museum deposition by *Selection, retention and dispersal of archaeological collections* (SMA 1993; http://www.socmusarch.org.uk/publica.htm).

3.5.1 Artefact recovery policy

The artefact recovery policy conformed to standard Worcestershire Archaeology practice (WA 2012b; appendix 2).

3.5.2 Method of analysis

All hand-retrieved finds were examined, along with finds from environmental samples. They were identified, quantified and dated to period. A *terminus post quem* date was produced for each stratified context. The date was used for determining the broad date of phases defined for the site. All information was recorded on a pro forma Access database 'Finds Summary Record.'

The pottery and ceramic building material was examined under x20 magnification. Pottery fabrics were recorded with reference to the Worcestershire fabric reference series maintained by Worcestershire Archaeology (Hurst and Rees 1992 and www.worcestershireceramics.org). The Iron Age pottery was recorded with reference to the coding system devised for the major Iron Age site at Beckford, Worcestershire (Wills unpublished), and medieval and later forms with reference to published examples from excavations at Deansway, Worcester (Bryant 2004). Decoration, and evidence for manufacture (eg misfired sherds), use (eg sooting, limescale, wear etc) and re-use (eg repair) were recorded where present. No evidence for manufacture or re-use was noted, but evidence for use, in particular sooting was present. The pottery was quantified by sherd count, weight and Estimated Vessel Equivalent for rims (henceforth rim EVE). Diameters and percentages were not recorded for bases. The Area 10, Roman cremation urn and a selection of Iron Age pottery from Area 11 are illustrated.

3.6 Environmental archaeology methodology, by Elizabeth Pearson

3.6.1 Project parameters

The environmental work conforms to relevant sections of the *Standard and guidance for archaeological watching brief* (CIfA 2014a); and *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2011).

3.6.2 Sampling policy

Samples were taken according to standard Worcestershire Archaeology practice (WA 2012b). A total of 51 samples (each of up to 40 litres) were taken from the site, from which 23 samples were assessed. Assessment focussed on a burnt mound and associated pits identified in Area 11a. Palaeochannel samples were not processed as this is thought to be broadly contemporary with palaeochannel deposits encountered during previous phases and on which detailed analysis has been carried out and reported on in Mann and Jackson (forthcoming).

Samples from the burnt mound and pits directly beneath the mound were rich in charcoal, the assemblages being similar in that they were all dominated by well-preserved hazel (*Corylus avellana*) and alder (*Alnus* sp) fragments. Both roundwood and hardwood fragments were

apparent. Two contexts were chosen for full analysis, in order to compare charcoal from the phase of pits beneath mound and the burnt mound itself (12065 and 12073 respectively).
Analysis was also carried out on charred plant remains from two medieval deposits (13033 and 13040).

3.6.3 Processing and analysis

The samples were processed by flotation using a Siraf tank. The flots were collected on a 300μm sieve and the residue retained on a 1mm mesh. This allows for the recovery of items such as small animal bones, molluscs and seeds.

The residues were fully sorted by eye and the abundance of each category of environmental remains estimated. A magnet was also used to test for the presence of hammerscale. The flots were sorted for charcoal using a low power MEIJI stereo light microscope and plant remains identified using modern reference collections maintained by Worcestershire Archaeology, and a seed identification manual (Cappers *et al* 2012). Nomenclature for the plant remains follows the New Flora of the British Isles, 3rd edition (Stace 2010).

The cell structure of all the non-oak identification samples was examined in three planes under a MEIJI dark illumination microscope and identifications were carried out using reference texts (Schweingruber 1978 and Hather 2000) and reference slides housed at Worcestershire Archaeology.

3.6.4 Discard policy

The remainder of samples and scanned residues from deposits containing significant assemblages will be retained for further analysis, and remaining sample material and scanned residues will be discarded.

3.7 Cremated bone analysis methodology, by Gaynor Western

3.7.1 Introduction

A total of nine cremated bone deposits were retrieved of Roman date and submitted for analysis. The osteological analysis aims to provide a detailed description of the nature of the cremated bone present, to quantify and differentiate, where possible, between animal and human cremated bone, to assess the age, sex and presence of pathological changes and to identify any evidence of pyre technology used during the cremation process.

3.7.2 Methods and process

The cremated material was analysed according to the standards laid out in the guidelines recommended by the British Association of Biological Anthropologists and Osteologists in conjunction with the CIfA (*Guidelines to the Standards for Recording Human Remains*, Brickley and McKinley (eds) 2004) as well as by English Heritage (*Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports*, Centre for Archaeology Guidelines, 2002).

- The material was analysed macroscopically and where necessary with the aid of a magnifying glass for identification purposes.
- The material was sorted into three fractions of 10mm, 5mm and 2mm using UKAS accredited calibrated sieves.
- The material was weighed using calibrated digital scales to an accuracy of 0.1g.
- The material was analysed without prior knowledge of associated artefacts
- The material was recorded on an Access database, a copy of which was provided for the archive.

Osteological analysis was carried out to ascertain:

- The type of deposit
- Total weight of the bone
- Identification and quantification of human bone
- Demographic data
- Pathology data
- Degree of fragmentation
- Efficiency of the cremation
- Presence and type of pyre goods
- Presence and type of pyre debris

3.8 Statement of confidence in the methods and results

The methods adopted allow a high degree of confidence that the aims of the project have been achieved.

4 The application site

4.1 Topography, geology and archaeological context

The evaluation which preceded these investigations outlines thoroughly the physical and archaeological context of the site (Vaughan 2005). Further discussion of the broader landscape is provided in the reporting of the mitigation work that took place between 2006 and 2009 (Mann and Jackson, forthcoming).

In summary, the application site lies immediately west of the village of Clifton, and approximately 900m east of the River Severn.

Area 10 as reported here was 0.75 hectares in size and was the last part of a much larger block of land, the remainder of which was investigated in 2006 (Mann and Jackson forthcoming). Area 10 had provided the main focus of the previous investigations at the site and revealed evidence of an extensive Early to Middle Iron Age settlement. This included 678 postholes and 130 pits and has been interpreted the storage zone of a much larger, but so far unidentified, unenclosed settlement (Mann and Jackson forthcoming). A group of Late Neolithic pits was also discovered in Area 10, one of which contained a number of polished axes, flint tools, pottery and charred grains. Later Bronze Age activity comprised a burnt mound and associated features, with a high quantity of fire-cracked stones and charcoal. Roman activity consisted of two graves, associated with a probable settlement to the north of the quarry. In the Early Medieval period, field boundaries and a timber lined structure were constructed.

Area 11 to the south occupies approximately 2.5 hectares of rough pasture, and is at *c.* 12m AOD. Three trial trenches were excavated in Area 11 during the 2005 evaluation and although no archaeological features were discovered, a peat layer was identified in one trench.

During previous stages of work, in both Areas 10 and 11, a palaeochannel was identified running through the landscape. As well as helping to define ancient land use, the deposits filling these channels allowed for an extensive environmental analysis to be undertaken. A series of radiocarbon and OSL dates were also obtained from these deposits, revealing an alternating sequence of peat formation and alluvial inundation, beginning in the Late Neolithic and ending in the late first millennium AD.

4.2 Current land-use

The site lies to the west of Clifton village and is currently in use as rough pasture on the edge of a gravel quarry.

5 Structural analysis

The trenches and features recorded are shown in Figures 3-11. Context groups are detailed in Appendix 3.

5.1.1 Phase 1: Natural deposits

The natural geology for the site comprised Worcester Member Sand and Gravel superficial deposits, overlying Sidmouth Mudstone Formation (BGS 2016), though this Sidmouth bedrock was never observed during excavation. The sands were a soft brownish orange coarse sand, and in the north-west corner of the site, were augured to a depth of 2.6m. Along the edges of the palaeochannels, the sand was occasionally a blueish grey, influenced by the peat deposits sealing it in anaerobic conditions.

During gravel extraction works, a mammoth tusk was discovered by a machine driver; this was notified to WA and recovered. It lay in gravel deposits approximately 24m north of Area 11a at 4.4m AOD, some 6.3m below the top of the gravel profile (Fig 1; Plates 1 and 2).

5.1.2 Phase 2: Palaeochannel deposits

The palaeochannel (13005) ran north to south along the eastern edge of the site, through Areas 11a and 11b (Figs 3, 8, and 11; Plate 3). Incised through the sands and gravels, it was filled with an alternating sequence of peat deposits and alluvial clays. Optically Stimulated Luminescence (OSL) and radiocarbon dating of this sequence, excavated in previous works, suggests a mid third millennium BC date for the lowest peat deposit which had formed in what is understood to be the primary channel incision. This was sealed by an alluvial formation around 500BC (reflecting a period of channel abandonment), before a second peat deposit formed about a thousand years later reflecting a re-incision of the channel. This is then similarly abandoned and sealed by a further alluvial deposition around 800AD (Jackson et al 2011).

Radiocarbon dates extracted from another part of the primary palaeochannel infill yielded a date range of 5200-4480 cal BC at the base to 1060-650 cal BC at the top of the sequence (Mann and Jackson, forthcoming). These samples were taken from a trial trench in the south of Area 11, in what is thought to be an area close to the middle of the channel. Here, no alluvial formation was present; rather there was one homogeneous peat deposit.

The northern end of the channel bore east upon meeting a high ridge of natural sand, though the peat deposit that helps to define the channel resumed immediately north of the ridge, and spread out to the west. This area of peat may be a remnant oxbow lake, though it is flat in profile and is more likely to have been formed within the flood plain of the abandoned channel.

The full width occupied by the palaeochannel sequence was not revealed during these investigations. At its widest, it measured approximately 60m, for a large part of which it maintained a relatively flat profile, only becoming steeper to the east. The path of the southern end of the channel is unclear. The land bordering the southern limit of the investigation area had previously been stripped for a haul road, before archaeological monitoring was undertaken at the quarry.

This broad span of time recorded by the radiocarbon dates on the channel deposits is further highlighted by the range of archaeological deposits sealed by the peat; at the north-west limit of the deposit lay a cluster of Iron Age pits, some of which were beneath the palaeochannel fill whilst others lay just beyond its limits. To the south, a ridge of gravel rose up and separated two palaeochannel courses. Upon this ridge were a number of burnt mound deposits, dated by radiocarbon analysis to the later Neolithic to Early Bronze Age.

Dating of the peat deposit reported here is complex due to the dynamic nature of channel incision, peat deposition and subsequent alluvial infilling. Whilst the radiocarbon dating analysis yielded a Late Bronze Age to Early Iron Age date for the upper levels of the peat deposit, these samples were taken further to the south, and closer to the middle of the palaeochannel. Crucially, there was no alluvial formation in this sequence, highlighting the difficulties in trying to broadly characterise and link deposits across fluvial landforms.

The Middle Iron Age features excavated here were covered by the encroaching peat layer, as was a buried soil horizon overlying the high ridge, which contained Roman pottery. This indicates that the peat deposits must belong to the upper peat formation as dated in Jackson *et al* (2011), and that they continued to form across a wider expanse both spatially and temporally than indicated by the samples obtained from the middle of the channel.

A second area of organic deposits was identified in Area 11c (14003; Fig 10). This was more likely to have been a small pond, rather than a flowing channel. It was filled with a blue alluvial deposit and a later peat formation. Both deposits were confined to the extent of the channel, as opposed to the much more extensive spread of peat associated with 13005 as described above.

5.1.3 Phase 3: Neolithic/Bronze Age deposits

In the northern half of Area 11b, to the west of the palaeochannel on an area of slightly raised ground, were several pits (Fig 8). Whilst only one contained any datable artefacts, all of them are considered to be broadly prehistoric. The one dated feature (pit 13030) contained a flint flake that is likely to be Mesolithic to Early Neolithic (*c* 8,000-3,300 BC). Close to this feature was an elongated pit of indeterminate function. All of these pits were sealed by a subsoil, rather than the peat that covered the burnt mounds and Iron Age features described below, indicating that the river's edge did not reach this area.

A number of burnt mounds (Burnt Mounds 1-4) were identified on the ridge of natural that, as described above, separated a palaeochannel from a possible associated flood plain (Figs 4-5; Plates 4-5, 16-17). These spreads of burnt material, rich with charcoal and fire-cracked stone, were associated with a series of pits, similarly filled. The mounds measured 3m x 6.5m (BM1), 4.5m x 4.6m (BM2), 16.7m x 5.4m (BM3), and 2.4m x 6.2m (BM4). The thicknesses ranged from 0.02m to 0.12m, and whilst the mounds may have been truncated by ploughing, they were by the early medieval period sealed beneath an alluvial layer, and thus offered some level of protection. The pits were often sealed by the burnt mound material, and certainly their fills were derived from the same processes that resulted in the mound deposits. The presence of fire-cracked stones and charcoal suggests that these features were used for the heating of water on a large scale. Their location on the edge of a water course also lends itself to such a function.

To the north of this ridge, and sealed under peat deposits on what has been tentatively identified as the flood plain, were a series of pits, and spreads of charcoal and fire-cracked stone. These were all close to the western edge of the peat formation, allowing for a limited understanding of the extent of inundation over time. The features were more spread out than the cluster on the ridge, but could be divided into discrete groups of activity. A spread of charcoal-rich sand (12068) in a slight depression was sealed by the peat, north-west of the ridge (Fig 3; Plate 6). A few metres north-west of this was a similar spread of material (12069), with fire-cracked stone as well as charcoal. Close by, a small pit contained fire-cracked stone and a flint tool (12066) (Fig 3; Plate 7).

North of those features was a pit (12063) with four postholes around it; two to the north (12059, 12061), and two to the east (12055, 12057) (Pit Group 7; Fig 7; Plates 8-9). The central pit contained fire debris, though no evidence for *in situ* burning was noted. The postholes potentially functioned as a structure for a wind break. Whilst no dating was recovered from these features, they are dated through association with the surrounding activity.

Two further pits (12037, 12040) were excavated to the north, both containing high concentrations of charcoal and fire-cracked stone. A spread of similar material (12041) was situated close by. Again, there was no evidence for *in situ* burning. The features are possibly indicative of hot-stone

technology activity, with the heated material being brought from a pair of burnt mounds located to the north (BM5 and 6). These burnt mound features, as with the larger cluster on the ridge to the south, had associated pits and spreads of charcoal and fire-cracked stone. One of these pits, 12044, may have been a trough, used for the heating of water in conjunction with the heated stones. The mounds measured 2.1m x 2.7m and 2m x 4.8m (Fig 6; Plate 10). As with Burnt Mounds 1-4, they were shallow spreads, being 0.06m and 0.02m thick respectively.

5.1.4 Phase 4: Iron Age deposits

A cluster of Middle Iron Age pits (Pit Group 8) was revealed in the north-western corner of the investigated area (Fig 6). Most of these pits were filled by thin laminations of sand and clay, suggesting that they were abandoned after use and were subject to numerous flooding events. The presence of peat in their upper fills reinforces this hypothesis, as the landscape changed to a boggier environment.

One of the pits (12016) had evidence for a bark lining; though poorly preserved, a piece of bark was situated vertically on the pit side, with a small stake holding it in place (Plate 11). The pottery assemblage that was recovered from these pits was of a quantity to suggest that a settlement had existed nearby. The pit that contained the greatest quantity of pottery also yielded a large amount of fire-cracked stone (12003), similarly suggesting domestic activity (Plate 12). The siting of these pits to the west of the earlier burnt mounds again suggests that the water level is further encroaching on land that had previously been more accessible.

5.1.5 Phase 5: Roman deposits

The ridge and the burnt mound features upon it, were covered by a deposit tentatively interpreted as a buried soil horizon that itself was sealed by the peat deposit. Highly abraded Roman pottery was retrieved from this layer.

Two postholes (12029, 12031) situated to the east of the Iron Age pits, were excavated. Whilst both of the postholes contained prehistoric pottery, one also yielded a pot sherd in a Roman fabric. Due to their proximity, it is conjectured that they are contemporary.

Within the cluster of Middle Iron Age pits, was one of Roman date (12021). It contained Roman as well as prehistoric pottery, and a small quantity of fire-cracked stone. It is possible that the stone is residual from the Iron Age activity that is truncated by the Roman intervention, though it is entirely possible that similar activity was occurring during the Roman period.

Some 550m north of this activity, in Area 10, a total of nine cremations were excavated, as well as the fragmentary remains of a juvenile skull (15012) (Fig 12;). A pond (15005) in the west of this area had five of these cremations within it (Plate 18). These all cut lower pond fill 15015 and were sealed by upper pond fill 15006. The south and west edges of this pond appeared to be hand dug. It measured 57m x 22m x 0.52m deep. The four further cremations were located approximately 60m to the east (along with the juvenile skull), including the only cremation (15009) of the nine to be urned (Plates 13-14).

The subsoil in the northwest corner of Area 10 contained large amounts of Roman pottery, suggesting the presence of a settlement within close proximity.

5.1.6 Phase 6: Medieval deposits

An alluvial layer covered the majority of the excavated area, sealing the peat deposit. This was laid down during the latter half of the first millennium AD (Mann and Jackson, forthcoming). The land where Areas 11a and 11b meet seemed to have undergone a process of landscaping, thus removing any evidence of possible alluvial inundation.

Along the northern edge of Area 11b, a complex series of deposits were present associated with a hollow and shallow curvilinear ditch (Fig 8; Plate 15). Comprised of a complex series of dumps of silty sands and loams, these appear to represent a midden deposited initially within a slight

curvilinear feature (curvilinear - 13035, 13036, 13037, 13038), identified beneath a broad but shallow depression (13039, 13040, 13041 and 13044) and overlain by further dumps of material (13032, 13033 and 13034). The layers and fills making up this midden contained large quantities of charcoal and daub, with three (13034, 13038 and 13041) containing large quantities of pottery indicative of a 12th -14th century date. It was presumably derived from domestic waste dumping from the village of Clifton to the east, as no associated medieval settlement remains have been found in the quarry.

A fine sand deposit extant over most of Area 11c was observed. Initially it was considered to be the natural sand and gravel seen elsewhere on the site. However, occasional burnt stone and medieval pottery was present within the material, for a depth of approximately 0.5m, after which these cultural artefacts were no longer observed. It is likely that this sand was redeposited during the medieval period, although by which means (aeolian, alluvial, or anthropogenic) it is not clear. An alluvial action would likely result in a more silty or clay-rich matrix, with greater laminations. A human process would usually result in dirtier material, with tip lines, and foreign material entering the deposit. Aeolian (wind blown) processes could explain the accumulation of fine sands, but the pottery fragments were of too great a weight to have been distributed by wind alone. If this was the case then the pottery must have been deposited by human activity as the Aeolian process was occurring. Consequently, this could suggest that large sandy areas had been exposed within the wider landscape, possibly through use of overly intensive or poorly timed ploughing regimes. Palaeochannel 14002, was covered by this medieval sand layer.

5.1.7 Phase 7: Post-medieval deposits

A series of post-medieval ditches ran across the higher ground in Areas 11a and 11b, defining the western edge and bisecting the land north to south (Figs 3 and 8). These channels were dug to improve the irrigation of an area given over to water-meadows, and were still extant in the landscape. It is of note that the area of water meadow as defined by the irrigation channel in Area 11a very neatly mirrors the extent of the peat formation, despite the latter being sealed by a thick alluvial deposit.

5.1.8 Phase 8: Modern deposits

The soils most prevalent in this area are the Hollington Series (811c), reddish brown stoneless silty soils derived from a parent material of reddish brown stoneless silty riverine alluvium. To the west, the Worcester Series becomes predominant, being a reddish brown clayey soil developed from a parent marl (Soil Survey of England and Wales, 1983).

Modern services truncated the north-eastern side of the medieval midden deposits, and ran through the badger sett area in the north-west corner of Area 11b. The sett was protected by a 20m stand-off. Additionally, earlier quarrying work in this area had further disturbed the ground.

5.2 Artefact analysis, by C. Jane Evans and Rob Hedge

The artefactual assemblage recovered is summarised in Tables 1 to 9.

The assemblage, summarised in Table 1, was recovered from two discrete areas of the quarry; from 7 stratified contexts in Area 10, and 38 contexts in Area 11. The finds from these two areas are discussed separately below. Area 10 produced mainly Roman material and Area 11 primarily Middle Iron Age and medieval finds. Prehistoric worked flint was recovered from both areas.

5.3 Area 10 finds

5.3.1 Prehistoric worked flint, by Rob Hedge

Quantification and provenance

Seven pieces (22.6g) of worked flint were found within five contexts in Area 10 (Table 2). All were residual within deposits of Roman date or later.

Area	Period	material class	material subtype	object specific type	count	weight(g)
10	Mesolithic-early Bronze Age	stone	flint	tool	3	20.3
	Prehistoric	stone	flint	debitage	4	2.3
	Prehistoric	ceramic	earthenware	pot	3	23
	Roman	ceramic	earthenware	pot	96	1051
	Roman	ceramic	earthenware	brick/tile	2	19
	Roman	ceramic	earthenware	oven	4	513
	Roman	ceramic	earthenware	pot	3	134
	Roman	metal	iron	hobnail	3	5
	Roman	slag	slag(Fe)	smelting slag	25	2788
	Roman	slag	slag(Fe)	smelting slag (tap)	8	644
	Roman	stone	sandstone	tile	1	25
	Medieval	ceramic	earthenware	pot	9	34
	Late medieval/early post-medieval	ceramic	earthenware	pot	3	64
	Undated	ceramic	earthenware	brick/tile	1	25
	Undated	stone	limestone	fragment	1	66
11	Mesolithic-Early Bronze Age	stone	Flint	debitage	4	9.3
	Mesolithic-Early Neolithic	stone	Flint	tool	1	1.1
	Mesolithic-Early Neolithic	stone	Flint	debitage	1	1.3
	Early Neolithic	stone	Flint	debitage	1	8.4
	Early Neolithic	stone	Flint	tool	4	19.7
	Neolithic	stone	?	?axe flake	1	0.5
	Late Neolithic-Early Bronze Age	stone	Flint	tool	3	63.8
	Later prehistoric	stone	Flint	tool	1	20.4
	Iron Age	ceramic	fired clay	briquetage	37	483
	Iron Age	stone	millstone grit	quern	3	976
	Middle Iron Age	ceramic	earthenware	pot	101	1354
	Prehistoric	stone	Flint	debitage	7	71.7
	Prehistoric	stone	Flint	tool	1	9.7
	Prehistoric	ceramic	earthenware	pot	9	10
	Prehistoric	stone		burnt stone	22	1608
	Late Iron Age/ Early Romano-British	ceramic	earthenware	pot	1	13
	Roman	ceramic	earthenware	pot	22	235
	Roman	stone	sandstone	roof tile	2	1124
	Medieval?	ceramic	earthenware	tile	27	940
	Medieval	ceramic	earthenware	pot	110	1354
	Late medieval/ early post-medieval	ceramic	earthenware	pot	5	130
	Undated	bone		fragment	1	183
	Undated	ceramic	earthenware	brick/tile	1	39
	Undated	ceramic	fired clay	fragment	56	519
	Undated	ceramic	fired clay?	fragment	1	48
	Undated	slag	clinker	fragment	1	0.5
	Undated	slag	fuel ash slag	fragment	2	4
	Undated	slag	slag(Fe)	fragment	3	275
	Undated	stone		fragment	2	200
	Undated	stone	sandstone	tile	1	186
	Undated	wood		stick	5	307
				Totals:	**602**	**15608**

Table 1: Quantification of the assemblage by area, period and material type

Raw material

A variety of different sources of flint are evident, including translucent mid and dark grey flint of good flaking quality, some of which may have come from primary chalk sources. A mottled, coarse-grained, opaque mid-grey flint is also present, and one scraper was fashioned on a flake of good quality dark grey flint with patination on the dorsal surface indicating a secondary, possibly fluvial source.

Analysis and discussion

The assemblage is not closely dateable, but several indicators point towards a later Neolithic/ earlier Bronze Age date, including a side-and-end scraper from subsoil (15025) fashioned on a short, thick hard-hammer struck flake.

An end-scraper and truncation burin were also recovered; these are likely to be contemporary, but an earlier Mesolithic/Early Neolithic origin is possible. Three conjoining burnt flint flake fragments and a soft-hammer struck flake from cremation deposits (15002) and (15014) complete the small assemblage.

Phase		5	0	5	5	0	
Area		10					
Feature		**Cremation pit [15000]**	**?Pond [15005]**	**Cremation [15007]**	**Cremation [15013]**	**Subsoil**	
Context		**15002**	**15006**	**15008**	**15014**	**15025**	**Total**
type	Flake	3		1			**4**
	end scraper		1				**1**
	side-and-end scraper					1	**1**
	Burin				1		**1**
Quantity		3	1	1	1	1	**7**
Weight		1.1	3.9	1.2	4.5	11.9	**22.6**
Retouch?			1		1	1	**42.9%**
Edge-damage?							**0.0%**
Burnt?		3					**42.9%**

Table 2: Area 10 flint assemblage

5.3.2 Prehistoric, Roman, medieval and late medieval/ early post-medieval pottery

Fourteen fabrics were identified in the pottery assemblage from Area 10 (Table 3).The bulk of the assemblage dated to the Roman period, though small quantities of prehistoric, medieval and late medieval/post-medieval pottery were also noted.

Prehistoric pottery

Only three undiagnostic body sherds of probable prehistoric pottery were noted, all from subsoil layer 15025. The larger sherd was in a handmade sandy ware (fabric 5) and the other two tiny fragments in an unidentified fabric (97). These were associated with Roman pottery.

Roman pottery

There was more significant evidence for Roman activity in this area of the quarry, particularly associated with the cremations. The cremated remains of one individual were contained in a Severn Valley ware jar, placed in a pit (pit 15009, 15010). Although crushed, possibly as a result of plough damage, a significant proportion of the vessel survived. The form is a long lived type, with a

simple out-curving rim and pushed out cordon (Fig 13), but is likely here to date to the 1st-to-2nd century. This was the only deliberately placed vessel. Only two sherds of pottery were associated with cremation 15013 (fill 15014); the rim from a 1st century, carinated bowl (Webster 1976, fig 9.H59) in a grog-tempered fabric (16) and an undiagnostic body sherd of Severn Valley ware.

period	fabric code	fabric common name	count	% count	weight(g)	% weight
prehistoric	5.1	Sand, handmade	1	1%	20	2%
	97	Miscellaneous prehistoric wares	2	2%	3	0%
Total prehistoric			3	1%	23	1%
Roman	3	Malvernian ware	4	4%	13	1%
	12	Severn Valley ware, oxidised	72	65%	775	66%
	12.24	Severn Valley ware, sparse organic	3	3%	64	5%
	12.4	Severn Valley ware, shell temper	1	1%	14	1%
	12.6	Severn Valley ware, soft white inclusions	11	10%	126	11%
	14	Fine sandy grey ware	1	1%	3	0%
	16	Grog tempered ware (BD32/33)	1	1%	10	1%
	32	Mancetter/Hartshill mortarium	1	1%	8	1%
	33.1	Oxfordshire white mortaria	2	2%	38	3%
Total Roman			96	46%	1051	47%
medieval	55	Worcester-type sandy unglazed ware	6	5%	9	1%
	56	Malvernian unglazed ware	3	3%	25	2%
late med/early post-med	69	Oxidized glazed Malvernian ware	3	3%	64	5%
Total medieval/post medieval			12	6%	98	4%
Total pot			111	100%	1172	100%

Table 3: Quantification of the Area 10 pottery by period and fabric-type

Cremation 15013 (fill 15024) produced a single sherd of sandy reduced ware (Fabric 14), also probably dating to the 1st-2nd century, but also some intrusive sherds of medieval pottery, discussed below. The rest of the assemblage came from the fill of a palaeochannel, sealing some of the cremation deposits (15006) and the subsoil (15025). Both of these deposits produced pottery of mixed Roman, medieval and post-medieval date. Many of the Roman sherds from the palaeochannel could not be closely dated, but some forms were typical late 3rd to 4th century types; a pulley rim jar and a reeded, flange-rimmed bowl (Webster 1976, fig 3.A10, fig 9.G57). The assemblage from the subsoil included a rim from a bowl in handmade Malvernian ware copying a 2nd century BB1 type (Seager Smith and Davies 1993, type 23); Severn Valley ware forms dating to the 2nd to 3rd century (Webster 1976, fig 1.A6, fig 4.C22), and a reeded, flanged bowl similar to types noted in late 3rd to 4th century assemblages at Worcester (Evans forthcoming a).

Context	Material	Object specific type	Count	Weight	period	Start	End	TPQ date range	Phase
15002	Flint	flake	3	1.1	prehistoric	-10,000	43	10,000BC - 43AD	5
15006	ceramic	pot	20	238	Roman	2nd	4th	mid 13th-16th	0
	ceramic	pot	2	4	late med/early post-med	mid 13th	16th		
	ceramic	pot	3	25	medieval	12th	14th		
	ceramic	pot	1	65	Roman	43	410+		
	slag (fe)	smelting slag	14	1623	Roman	43	410+		
	slag (fe)	smelting slag(tap)	2	100	Roman	43	410+		
	stone	tile	1	25	Roman	43	410+		
	ceramic	brick/tile	1	25	undated	0	0		
	stone	fragment	1	66	undated	0	0		
	Flint	end-scraper	1	3.9	Mesolithic-early Bronze Age	-10,000	-1500		
15008	metal (fe)	hobnail	3	5	Roman	43	410+	Roman	5
	Flint	flake	1	1.2	prehistoric	-10,000	43		
15010	ceramic	pot	48	337	Roman	late 1st	4th?	late 1st-4th? (probably late 1st-2nd)	5
15014	ceramic	pot	2	18	Roman	mid 1st	late 1st	1st	5
	Flint	truncation burin	1	4.5	Mesolithic-early Bronze Age	-10,000	-1500		
15024	ceramic	pot	1	3	Roman	late 1st	2nd	late 1st-2nd?	5
	ceramic	pot	6	9	medieval	12th	14th	(intrusive med pot?)	
15025	ceramic	pot	1	20	middle Iron Age	400 BC	101 BC	late 15th-17th	?7
	ceramic	pot	2	3	prehistoric	1600 BC	43 AD		
	ceramic	pot	25	455	Roman	mid 2nd	late 3rd-4th		
	ceramic	brick/tile	2	19	Roman	43	410+		
	ceramic	oven	4	513	Roman	late 3rd	4th		
	slag (fe)	smelting slag	11	1165	Roman	43	410+		
	slag (fe)	smelting slag(tap)	6	544	Roman	43	410+		
	ceramic	pot	1	60	late med/early post-med	late 15th	17th		
	Flint	side-and-end scraper	1	11.9	Mesolithic-early Bronze Age	-10,000	-1500		

*Table 4: Summary of Area 10 context dating based on artefacts (*intrusive)*

Area 10: Illustrated Roman pottery, the cremation urn (Figure 13)

Cremation urn in Severn Valley ware; a globular, narrow-mouthed jar with a slightly overhanging rim (Webster 1976, fig 1.A1). The form is not closely dated, having been associated with 1st - 4th century deposits elsewhere (Webster *op cit*). Fabric 12. Diam 9cm (19%). Phase 5, pit 15009, cremation 15010. Database Recs 91-3

Medieval and early post-medieval pottery

The small assemblage comprised sherds of 12th to 14th century cooking pot, in Malvernian unglazed ware (Fabric 56; Bryant 2004, fig 184, type 2-4) and Worcester type sandy unglazed ware (Fabric 55), along with sherds of Malvernian glazed ware (Fabric 69). The latter included a flared bowl dating to the late 15th to17th century (Bryant 2004, fig 188, type 9) and a body sherd with a speckled green glaze, probably dating to the mid 13th-15th century.

5.3.3 Slag

Smelting slag was recovered from the palaeochannel (15006) and the subsoil (15025). Three classes of slag were noted. Most fragments were a dense, vesicular slag, but there were small quantities of very dense block slag, along with fragments of tap slag, with characteristic flow marks. The slag from the palaeochannel was associated with late 3rd to 4th century pottery. This may date the ironworking, although a small quantity of post-Roman pottery was also present. The pottery from the subsoil was mainly Roman but less-clearly dated. No soil samples were taken from associated features so it is not possible to comment on the presence/absence of hammerscale.

5.3.4 Other finds

Four fragments of pre-formed, Malvernian fabric, oven were found in the palaeochannel. This is usually associated elsewhere with late 3rd to 4th century activity (Evans forthcoming b), a date supported by the associated pottery here.

Other finds included a hobnail, from cremation 15007 (15008) and occasional small fragments of building material; ceramic brick/tile and sandstone roof tile.

The dating of contexts, based on finds, is summarised in Table 4.

5.4 Area 11 finds

5.4.1 Prehistoric worked flint by Rob Hedge

Quantification

Twenty-four pieces of worked flint, weighing 205.9g, were found within eleven contexts in Area 11 (Table 5).

Three distinct concentrations were noted: a small quantity was found in the north-west part of Area 11a, along the edge of the palaeochannel, and two pieces were recovered from the northern part of Area 11b. The majority were located within the vicinity of the burnt mound features (BM1-4).

Raw material

Several different sources of flint were evident within the assemblage. No clear distinction by phase could be observed, although this may be due to the small sample size. Most common were: a beige to orange-brown flint, and a dark grey flint, both of moderate to good quality. Both types had a chalky light grey cortex, sometimes abraded: at least some of the flint seems to have been derived from secondary sources such as river gravels, although several pieces appear to have come from a chalk-derived nodule. No cores were recovered, although one rejuvenation flake was present.

A single flake (SF19) of a light grey-brown stone of uncertain origin from burnt mound layer (12054) may be an axe-flake.

Analysis and discussion

The relative paucity of finds is consistent with other prehistoric burnt mound sites in the region (Hedge 2016, 8; Hodder 2011, 28). A small quantity of Early Neolithic material is present, but the majority of the assemblage is broadly technologically consistent with a Neolithic to Early Bronze Age date. Whilst this is early in relation to known sites of similar character in the region, which tend to date from the Middle Bronze Age onwards, it is supported by the surprisingly early radiocarbon dates, particularly those from mound feature (12073).

Fourteen pieces of debitage account for 58.3% of the assemblage. Of these, 4 exhibited characteristics consistent with soft-hammer percussion, 2 appeared to have been hard-hammer struck, and the remaining 8 could not be confidently ascribed to a flaking technique. Finished tools account for the remaining 41.7% of the assemblage.

Only one artefact showed traces of light heating, which appears to have taken place prior to or during the production process. None showed any sign of the post-depositional heat damage that would be expected had they been inadvertently incorporated into the burnt mound as residual material; the assemblage is therefore thought to result from human activity on the site.

Prehistoric (10,000-1500BC)

Two flakes from the northern part of Area 11b could not be closely dated on the grounds of typology, but are consistent with flaking techniques most common from the Mesolithic to the Early Neolithic, although a later date is possible. Although the piece from fill (13040) of pit [13041] is residual within a medieval context, the flake from fill (13031) of pit [13030] is likely to be contemporary with the feature.

Early Neolithic (4000-3000BC)

The Early Neolithic material appears to be concentrated in the northwest of the area, distributed within features and layers along the edge of the palaeochannel. It includes two conjoining, snapped fragments of a backed knife, residual within fill (12018) of Iron Age pit [12003]. A serrated knife (SF2; Fig 14.1), also likely to be early Neolithic in date, was recovered nearby, from the base of peaty deposit (12017), interpreted as the fill of a hollow/palaeochannel. To the south, a broken flake (SF1) from a carefully-prepared blade core found within dump layer (12041) is thought likely to be Mesolithic or early Neolithic in date.

Further south, a flake from fill (12067) of pit [12066] could not be closely dated. Nearby, a rejuvenation flake (SF25) from BM 1-2 has the characteristic 'crested blade'-like appearance associated with early Neolithic examples (Butler 2005, 121).

Several further artefacts of possible early Neolithic date were recovered from BM 1-2:

- a small and finely-prepared blade (SF8) with some edge-damage along the left lateral margin, and:
- an exceptionally fine small leaf-shaped (or kite) arrowhead on translucent orange flint (SF3; Fig 14.2). Corresponding to Green's (1980, 71) Type 3C, it is a style more commonly occurring in the earlier Neolithic, although examples in later Neolithic/early Bronze Age contexts are known (Green 1980, 97; Butler 2005, 125).

Later Neolithic/early Bronze Age (3000-1500BC)

With the exception of the two artefacts noted above, the concentration of flint around the area of the burnt mound appears to be largely Late Neolithic/Early Bronze Age in date. Diagnostic pieces include:

- an unusual, proximally-retouched scraper (SF7) from burnt mound layer (12054),
- a finely-retouched denticulate (SF22) on the right lateral margin of a crude, squat flake from mound layer (12072),

- combination tool (SF23) from mound layer (12073), fashioned on a large, thick, slightly heat-affected hard-hammer struck flake with a distal scraper edge and a piercer at the distal end of the left lateral margin. Abrasion at the mid-point of both lateral margins suggests that it may have been hafted.

Phase		1	2	4	3	3	3	3	3	2	3	6	
Area		11											
Feature		**NATURAL?!**	**Palaeochannel**	**Pit [12003]**	**Layer**	**Layer over burnt mounds**	**Pit [12066]**	**Burnt feature**	**Burnt feature**	**Palaeochannel [12075]**	**Pit [13030]**	**Midden hollow [13041]**	
Context		**BM 1-2**	**12017**	**12018**	**12041**	**12054**	**12067**	**12072**	**12073**	**12076**	**13031**	**13040**	**Total**
Debitage type	flake	4				2	1	2			1	1	**11**
	broken flake				1								**1**
	rejuvenation flake	1											**1**
	chip	1											**1**
Tool type	blade	1											**1**
	knife	1											**1**
	backed knife			2									**2**
	serrated knife		1										**1**
	denticulate							1					**1**
	Leaf (kite) arrowhead	1											**1**
	end scraper									1			**1**
	other scraper					1							**1**
	retouched flake/ combination tool								1				**1**
Quantity		9	1	2	1	3	1	3	1	1	1	1	**24**
Weight		85.5	9.7	8.1	1.3	28.1	5.7	15.7	26	20.4	1.8	3.6	**205.9**
Retouch?		2	1	2		1		1	1	1			**37.5%**
Edge-damage?			1							1		1	**12.5%**
Burnt?									1				**4.2%**

Table 5: Area 11 flint assemblage

The possible axe-flake (SF19) within burnt mound layer (12054) is likely to be Neolithic in date, although it is not possible to say whether it falls within the earlier or later part of the period.

A highly unusual piece (SF4; Fig 14.3) from BM 1-2 warrants special attention: it appears to be a flake of considerable antiquity, with both ventral and dorsal surfaces entirely covered with a glossy white cortication. It has subsequently been retouched, with the proximal end of the original flake invasively retouched across the ventral surface, and invasive retouch along the proximal half of the dorsal surface; the effect has been to transform the flake into what could loosely be described as a

knife, with the retouched exposing the fine, translucent dark grey flint below the cortication that covers the original flake. The degree of cortication suggests that the original flake is likely to be Palaeolithic in origin. A comparable example in the form of a fabricator on an earlier flake was recovered from a Neolithic pit [2024] deposit from the 2006-9 phase of work in Area 10 to the north (Anderson-Whymark forthcoming). This fabricator appeared to have been extensively used and deliberately placed within a structured pit deposit, suggesting a particular significance. The knife from the burnt mound area does not appear to have been subjected to similar degrees of use or depositional significance, but it is likely that the original artefact, with clear flake scars and extensive cortication, would likewise be readily recognisable to the later knapper as a product of human activity in a distant past.

The remainder of the assemblage from this area comprises flakes technologically consistent with a Late Neolithic/Early Bronze Age date.

Later prehistoric (1500BC-43AD):

A single end-scraper on a crude, hard-hammer struck, thick flake was recovered from the fill (12076) of palaeochannel [12075], which cuts the burnt mound layer (12054). Somewhat poorly executed and casually retouched, it is typical of flintworking of the Middle Bronze Age onwards (Butler 2005, 183).

period	fabric code	fabric common name	count	% count	Weight (g)	% weight
Middle Iron Age	3	Malvernian ware	86	35%	1143	38%
	4.3	Fossil Shell	5	2%	17	1%
	5	Sand	8	3%	55	2%
	9	Mudstone tempered ware; Group D)	2	1%	30	1%
Late Iron Age/ Early Roman	16	Grog tempered ware (BD32/33)	1	0%	13	0%
prehistoric	97	Miscellaneous prehistoric wares	9	4%	10	0%
total prehistoric			111	45%	1268	42%
Roman	12	Severn Valley ware	18	7%	137	5%
	12.2	Oxidised organically tempered Severn Valley ware	4	2%	98	3%
total Roman			22	9%	235	8%
medieval	55	Worcester-type sandy unglazed ware	54	22%	668	22%
	56	Malvernian unglazed ware	45	18%	545	18%
	64.1	Worcester-type sandy glazed ware	8	3%	106	4%
	69	Oxidized glazed Malvernian ware	1	0%	16	1%
	143.1	Ham Green, Iron poor fabric	2	1%	19	1%
late med/ early post-med	69	Oxidized glazed Malvernian ware	5	2%	130	4%
total medieval/ early post med pot			115	46%	1484	50%
total			**248**	**100%**	**2987**	**100%**

Table 6: Quantification of the Area 11 pottery by period and fabric-type

5.4.2 Iron Age, Roman, medieval and late medieval/ early post-medieval pottery

Fourteen fabrics were identified, including diagnostically Middle Iron Age, Roman, medieval and late medieval/early post-medieval wares (Table 6). The occurrence of pottery by phase and feature type is summarised in Table 7.

Phase	Feature type	Fill of	Period	count	weight(g)	average weight
0	Arbitrary		Roman	1	47	47
1	Natural		late med/early post-med	1	48	48
			Roman	4	17	4
2	Palaeochannel		Middle Iron Age	1	148	148
			Roman	2	49	25
3	Burnt Feature		prehistoric	3	7	2
	Layer		Roman	1	30	30
4	Pit	12003	Middle Iron Age	50	420	8
			prehistoric	6	3	1
		12012	Middle Iron Age	26	497	19
		12023	Middle Iron Age	1	1	1
		12027	Middle Iron Age	3	36	12
5	Pit	12021	Late Iron Age/Early Roman	1	13	13
			Middle Iron Age	2	19	10
	Posthole	12029	Middle Iron Age	10	57	6
		12031	Middle Iron Age	8	67	8
6	Pit	13018	medieval	1	14	14
	Midden deposits	13038	medieval	2	22	11
		13034	medieval	43	627	15
		13041	medieval	15	195	13
			Roman	5	32	6
6	Subsoil		late med/early post-med	1	39	39
			medieval	26	229	9
			Roman	4	37	9
		13013	medieval	4	38	10
8	Arbritrary		late med/early post-med	3	43	14
			medieval	9	88	10
			Roman	5	23	5
	Modern Layer		medieval	10	141	14

Table 7: Quantification of the Area 11 pottery by phase and feature type

Prehistoric pottery

A significant proportion of the assemblage comprised Iron Age pottery (Tables 6-7), with diagnostic forms and decoration indicating a Middle Iron Age date. Handmade Malvernian ware (Fabric 3) was by far the most common fabric. Other fabrics comprised local wares, shell tempered (Fabric 4.3) and sand tempered (Fabric 5), and Mudstone tempered ware (Fabric 9; Morris 1982, Group D), the latter produced in the Martley area of Worcestershire.

The largest groups came from pits 12003 and 12012. Joining sherds from a single vessel were noted in these two pits (Fig 15.1), indicating a contemporary relationship. However, the fill of pit 12003 (12006) is thought to represent a period of stasis when the pit is likely to have contained water, and the primary fill of pit 12012 (12011), in which the other sherd was found, is thought to result from frequent flooding. The relationship might therefore be more to do with fluvial processes than deliberate human activity, although the pits were clearly open at the same time. These two pits produced most of the diagnostic forms and decorated sherds (Fig 15.1-5), all similar to types identified from the major Iron Age site at Beckford, Worcestershire (Wills unpublished). The forms represented here were all barrel shaped or globular jars. Amongst these the jars with upright rims or faceted rims (Fig 15. 1, 2, 5), in Malvernian ware, were more common at Beckford in assemblages dated to the latter half of the Middle Iron Age. The jars with in-turned rims (Fig 15. 3, 4, 6) were more common in the earlier Middle Iron Age groups, particularly those occurring in the local shelly fabric (Fabric 4.3), like Figure 15.3 here. The radiocarbon dating of fabrics at Beckford also suggested that this local fabric was residual after the early Middle Iron Age. The forms are broadly similar to those recorded from previous fieldwork at Clifton (Griffin forthcoming, fig 4.25, 12-17).

The assemblages from the other Phase 4 and Phase 5 pits had a quite different profile. Only small quantities of pottery were recovered from the other Phase 4 pits, with no diagnostically Middle Iron Age vessels; pit 12023 (fill 12022) produced a single sherd of sandy ware (Fabric 5) and pit 12027 sherds of sandy ware and mudstone tempered ware (Fabrics 5 and 9). The Phase 5 pit (12021, fill 12020) produced only two body sherds in Malvernian ware (Fabric 3) and a Late Iron Age or Early Roman grog-tempered fabric (Fabric 16).

Sooting, indicative of use for cooking, was noted on eight sherds, including three of the vessels illustrated below (Fig 15. 1, 2, 6).

Area 11: Illustrated Iron Age pottery (Figure 15)

1 Upright rim with a slight internal facet, from a barrel shaped or globular jar, Beckford form BD2.2. Decorated with a single row of duck stamps facing right, Beckford decoration code Aa1. External sooting on the rim. Fabric 3. Diam 20cm (18%). Phase 4, joining sherds from pit 12003, fill 12006 and pit 12012, fill 12011. Database Recs 58 and 65

2 Barrel shaped or globular jar with a rounded rim and two internal facets, Beckford form BD3.41, decorated with a single row of V-shaped elements pointing left, Beckford decoration code Aa17. External sooting around the rim. Fabric 3. Diam 17cm (8%). Phase 4, pit 12003, fill 12006. Database Rec 59

3 Barrel shaped or globular jar with in-turned rim, Beckford form BD2.1, undecorated. Fabric 4.3. Diameter uncertain. Phase 4, pit 12003, fill 12006. Database Rec 68

4 Barrel shaped or globular jar with in-turned rim, Beckford form BD2.1, decorated with two rows of circular stamps, Beckford decoration code Ab3. Fabric 3. Diam uncertain. Phase 4, pit 12003, fill12004. Database Rec 63

5 Barrel shaped jar with one internal facet, Beckford form BD3.41, decorated with a single row of V-shaped elements pointing right, Beckford decoration code Aa16. Fabric 3. Diam 20cm (6%). Phase 4, pit 12012, fill 12009. Database Rec 61

6 Barrel shaped jar with in-turned rim, Beckford form BD2.1, undecorated. External sooting on the rim. Fabric 9. Diam 12cm (18%). Phase 4, pit 12027, fill 12026. Database Rec 60

Roman pottery

Small quantities of Roman pottery were recovered from ten contexts (Tables 6 and 7), either residual in medieval/post-medieval deposits (medieval pit 13041, fills 13039, 13040), or intrusive in various layers (BM 1-2, 12054, 13006, 13007, 14003) and a palaeochannel (13050). All sherds were very abraded and most were very fragmentary; only one sherd weighed more than 10g, from layer 13006 (47g). The only fabrics were Severn Valley ware (Fabric 12), not closely datable, and organic-tempered Severn Valley ware (Fabric 12.2), indicative of a mid 1st to 2nd century date.

Medieval and late medieval/ early post-medieval pottery

The majority of pottery dated to the medieval period, broadly 12th to 14th century, with five sherds dating to the late medieval/ early post-medieval period. Medieval pottery was found in Phase 6 pits but primarily derived from deposits associated with a midden (Table 7). The largest assemblage by far came from a deposit within the midden accumulations (fill 13033). The least fragmentary sherds, based on average sherd weights, came from the lower fill of this same feature (13032). The medieval pottery was generally in good condition with sherd size above average and with sooting surviving well on surfaces. The late medieval/ early post-medieval pottery came from the subsoil, an arbitrary layer and an intrusive sherd recorded as from natural.

Considering the medieval assemblage as a whole, fabrics and forms dated broadly from the 12th to 14th century. The assemblage included a variety of cooking pots in Worcester-type sandy unglazed ware (Fabric 55; cf Bryant 2004 type 2, fig 177.2) and Malvernian unglazed ware (Fabric 56; cf Bryant 2004 types 1 to 4, fig 184.1-6). The latter included a sherd with a vertical applied strip (cf Bryant 2004, fig 177.8). Sooting survived very well on a number of unglazed sherds, providing evidence of use. Glazed jugs were less common, including a couple of thumb-impressed bases, and body sherds decorated with incised cross-hatch, all in Worcester type sandy glazed ware (Fabric 64.1; cf Bryant 2004, fig 181.1-6). Two sherds of possible Ham Green ware (Fabric 143) were also noted, dating to the 13th–14th century. A handful of sherds in Malvernian oxidised glazed ware (Fabric 69) dated to the 15th–16th centuries, including rims from a baluster jug (Bryant 2004, fig 185.8), a large jar/bunghole jar with an applied thumb-impressed decorative strip (*ibid* fig 187.5), and body sherds from a glazed bowl.

Most of the medieval pottery (82% by count, 83% by weight) came from deposits attributed to Phase 6 (medieval; Tables 6 and 7) and was mainly in the form of cooking pots. Amongst these, vessels in Worcester-type sandy unglazed ware (Fabric 55, 44% by weight) were slightly more common than the Malvernian unglazed ware (Fabric 56, 36% by weight), reflecting the pattern in the site assemblage as a whole. Worcester was also the most common source for glazed vessels (Fabric 64.1, 9% by weight). These included sherds from a bowl, a pipkin, and jugs dating to the 13th to14th centuries, the latter including the thumb-impressed bases and cross-hatch decorated sherds noted above. The two sherds of Ham Green ware were associated with this phase, and two sherds of Malvernian oxidised glazed ware (Fabric 69). One of these, from the large bunghole jar, dates to the 15th to 16th century and is the latest datable piece from this phase of activity.

The remaining sherds of medieval and late medieval/early post-medieval pottery were residual in modern deposits, Phase 8 and these were also dominated by cooking pots.

5.4.3 Briquetage, Roman oven and other fired clay

Fragments of briquetage, vessels used for processing and transporting salt in the Iron Age, were found in four pits and a posthole (Table 8). The largest assemblage came from Phase 4 pit 12003, associated with the diagnostic Middle Iron Age pottery described above. A couple of fragments were found in a Phase 4 pit (12012), the pit that contained sherds joining with those from two other pits (pit 12003 and pit 12027. Further small quantities came from two Phase 5 pits (12021, 12027) and a posthole (12031), again associated with Middle Iron Age pottery.

The briquetage provided evidence for two sources of salt reaching the site. The most common type was an organic-tempered fabric (Fabric 2; Morris 1985, 343-4, fabric II), followed by a sandier fabric (Fabric 1). Both of these are associated with salt production in Droitwich. However, sherds of

probable Cheshire stony VCP (Fabric 140; Morris 1985, fig. 5-6, 8-10) were also present, all from one pit and representing a single vessel. A number of fragments had diagnostic characteristics, such as finger wiping, coil breaks and pale external surfaces.

Feature type	Fill of	context	fabric code	count	% count	weight(g)	% weight
Pit	12003	12004	1	1	3%	19	4%
			2	13	35%	109	23%
		12005	1	4	11%	94	19%
			2	2	5%	38	8%
		12006	2	1	3%	12	2%
	12012	12011	2	4	11%	34	7%
	12021	12020	1	1	3%	40	8%
	12027	12026	140?	10	27%	112	23%
Posthole	12031	12030	2	1	3%	25	5%
total				37	100%	483	100%

Table 8: Quantification of the Area 11 briquetage by phase, feature type and fabric

Twenty-seven fragments of ceramic tile were found associated with 12th–14th century pottery in two layers (13050 and 13051), and in a midden horizon (13041). They are, therefore, assumed to be contemporary. All were in a sandy fabric but none had any diagnostic features.

	Feature type	Fill of	context	count	% count	weight(g)	% weight
Middle Iron Age	Pit	12003	12005*	6	11%	46	8%
			12006*	2	4%	6	1%
			12018	6	11%	52	9%
		12012	12009	5	9%	46	8%
		12027	12026	2	4%	16	3%
Medieval	Midden deposits	13038	13037	1	2%	3	1%
		13034	13032	26	46%	306	54%
			13033*	4	7%	26	5%
		13041	13040*	3	5%	10	2%
	Natural		13007	1	2%	8	1%
	unstrat		0	1	2%	48	8%
total				57	100%	567	100%

*Table 9: Quantification of the Area 11 fired clay by phase and feature type (*context also producing heat-cracked stone)*

Fragments of undiagnostic fired clay were recovered from a number of deposits (Table 9). Small quantities were associated with three of the Phase 4, Iron Age pits. The majority, however, came from medieval features, particularly the midden deposits associated with 12th-14th century pottery. These fragments may, perhaps, derive from an oven structure somewhere in the vicinity. Fired clay was associated with heat-cracked stone, discussed below, in a few context (indicated by * in Table 7).

5.4.4 Other artefacts: stone, ceramic building material and slag

Fragments of Millstone grit saddle quern were recovered from two Phase 4, Iron Age, pits; two joining pieces from pit 12003 (fill 12006) and another from pit 12012 (fill 12009). The latter may well be from the same quern, as joins were noted between the pottery from these two features.

Phase	Feature type	Fill of	context	Frequency
3	Burnt Feature		12047	Abundant
			12048	Abundant
			12071	Abundant
			12072	Abundant
			12073	Abundant
	Pit	12037	12038	Moderate
		12040	12039	Moderate
		12044	12043	Abundant
		12063	12065	Occasional
		12083	12080	Abundant
		12105	12107	Abundant
		12108	12110	Abundant
		12111	12114	Occasional
4	Pit	12003	12006	Abundant
6	Midden	13034	13033	Occasional
		13041	13040	Occasional

Table 10: Area 11, occurrence of heat-cracked stones in environmental samples

Heat cracked stones, associated with the heating of water, were noted in a number of environmental samples (Table 10), particularly those from the burnt mound features and pits associated with Phase 3, Neolithic/Bronze Age activity. Further fragments were recorded amongst the finds from pit 12066 (fill 12067), although no environmental sample was taken from this feature. Heat cracked stone was also abundant in one of the Phase 4, Iron Age, pits (12003) suggesting this had a similar function to the Bronze Age pits. This pit also produced diagnostic Middle Iron Age pottery (Fig 13.1, 2). Further fragments were recorded amongst finds from another Phase 4 pit (12036, fill 12034), for which no environmental sample was taken and no datable finds recovered.

Occasional fragments were also noted in Phase 6, medieval, deposits and may be redeposited.

The fragments have not been analysed, but the burnt stone from previous field work at Clifton was identified as a mixture of Triassic sedimentary rocks and quartzites from the local Severn gravels (Roe forthcoming).

Five fragment of Old Red Sandstone roof tile were recovered; two from a Phase 5, Roman, pit (12021, fill 12020) and the others from machining of the topsoil and subsoil (layer 13050). All are likely to be Roman; this is a common building material on Roman sites in Worcestershire,

particularly associated with later Roman structures, and is thought to have been quarried in east Herefordshire, possibly around Wellington Heath, *c* 19km south-west of Worcester (Roe 2004, 463-6).

Finally, very small quantities of industrial waste associated with ironworking were recovered from three contexts, mainly undiagnostic iron slag. One was associated with Roman activity (Phase 4, pit 12003, fill 12004) and others with the Phase 6, medieval, midden deposit (13037) and subsoil 14003, 1 fragment of dense smelting slag). No hammerscale, indicative of ironworking in the immediate vicinity, was detected in the soil samples. Other finds associated with heat processes comprised a fragment of clinker from a Phase 6 midden deposit (13040), and a fragment of fuel ash slag from a Phase 2 palaeochannel (12017).

The dating of contexts, based on finds, is summarised in Table 11.

Context	Material	Object specific type	Count	Weight (g)	period	Start	End	Context TPQ date/range	Phase
BM 1-2	ceramic	pot	1	10	Roman	late 1st	mid 2nd	L1st-M2nd	1
	Flint	flake	1	30	prehistoric	-10,000	43	4000BC - 43AD	
	Flint	knife	1	9.7	prehistoric	-10,000	43		
	Flint	flake	1	28	prehistoric	-10,000	43		
	Flint	rejuvenation flake	1	8.4	Early Neolithic?	-4000	-3000		
	Flint	flake	1	2.3	Mesolithic-Early Bronze Age	-10,000	-1500		
	Flint	flake	1	3.8	prehistoric	-10,000	43		
	Flint	chip	1	0.3	prehistoric	-10,000	43		
	Flint	blade (broken)	1	1.1	Mesolithic-Early Neolithic	-10,000	-3000		
	Flint	kite arrowhead	1	1.9	Early Neolithic	-4000	-3000		
12004	ceramic	pot	29	202	Middle Iron Age	400 BC	101 BC	Middle Iron Age	4
	ceramic	briquetage	14	128	Iron Age				
	slag (fe)	fragment	1	244	undated				
	stone	burnt stone	2	278	undated				
12005	ceramic	briquetage	6	132	Iron Age			Iron Age	4
	ceramic	fragment	6	46	undated				
	stone	burnt stone	1	126	undated				
	stone	fragment	2	200	undated				
12006	ceramic	pot	16	195	Middle Iron Age	400 BC	101 BC	Middle Iron Age	4
	ceramic	pot	6	3	prehistoric				
	ceramic	briquetage	1	12	Iron Age				
	ceramic	fragment	2	6	undated				
	stone	burnt stone	10	526	undated				
	stone	quern	1	236	Iron Age				
12009	ceramic	pot	15	125	Middle Iron Age	400 BC	101 BC	Middle Iron Age	4
	ceramic	fragment	5	46	undated				
	stone	quern	2	740	Iron Age				
12011	ceramic	pot	11	372	Middle Iron Age	400 BC	101 BC	middle Iron Age	4

Context	Material	Object specific type	Count	Weight (g)	period	Start	End	Context TPQ date/range	Phase
	ceramic	briquetage	4	34	Iron Age				
12017	ceramic	pot	2	49	Roman	late 1st	4th	Roman	2
	fuel ash slag	fragment	2	4	undated				
	Flint	serrated knife	1	9.7	Early Neolithic	-4000	-3000	4000BC - 3000BC	
12018	ceramic	pot	5	23	Middle Iron Age	400 BC	101 BC	middle Iron Age	4
	ceramic	fragment	6	52	undated				
	Flint	backed knife	2	8.1	Early Neolithic	-4000	-3000	4000BC - 3000BC	
12020	stone	roof tile	2	1124	Roman			Roman	5
12021	ceramic	pot	1	13	Late Iron Age/Early Roman	100 BC	60 AD	late Iron Age/early Roman	5
	ceramic	pot	2	19	Middle Iron Age	400 BC	101 BC		
	ceramic	briquetage	1	40	Iron Age				
12022	ceramic	pot	1	1	Middle Iron Age	400 BC	101 BC	middle Iron Age	4
12026	ceramic	pot	3	36	Middle Iron Age	400 BC	101 BC	middle Iron Age	4
	ceramic	briquetage?	10	112	Iron Age				
	ceramic	fragment	2	16	undated				
12028	ceramic	pot	10	57	Middle Iron Age	400 BC	101 BC	middle Iron Age	5
12030	ceramic	pot	8	67	Middle Iron Age	400 BC	101 BC	middle Iron Age	5
	ceramic	briquetage	1	25	Iron Age				
12034	stone	burnt stone	8	662	undated			Iron Age?	4
12041	Flint	broken flake	1	1.3	Mesolithic-Early Neolithic	-10,000	-3000	10,000BC - 3000BC	3
12054	ceramic	pot	1	30	Roman	late 1st	early 2nd	late 1st-early 2nd	3
	Flint	scraper	1	26	Neolithic-Bronze Age	-4000	-700	4000BC - 700BC	
	Stone	flake	1	0.5	Neolithic?	-4000	-2400		
	Flint	flake	1	1.6	Mesolithic-Early Bronze Age	-10,000	-1500		
12067	Flint	flake	1	5.7	prehistoric	-10,000	43	10,000BC - 43AD	3
12072	Flint	flake	1	2.2	prehistoric	-10,000	43	3000BC - 43AD	3
	Flint	denticulate	1	11.8	Late Neolithic-Early Bronze Age	-3000	-1500		
	Flint	flake	1	1.7	prehistoric	-10,000	43		
12073	ceramic	pot	3	7	prehistoric			Iron Age?	3
	Flint	retouched flake/combination tool	1	26	Neolithic-Early Bronze Age	-4000	-1500	4000BC-1500BC	
12075	ceramic	pot	1	148	Middle Iron Age	400 BC	101 BC	middle Iron Age	2

Context	Material	Object specific type	Count	Weight (g)	period	Start	End	Context TPQ date/range	Phase
12076	Flint	end-scraper	1	20.4	later prehistoric	-1500	43	1500BC - 43AD	2
12077	stone	flint	1		prehistoric				3
13006	ceramic	pot	1	47	Roman	mid 1st	mid 2nd	Roman	0
13007	ceramic	pot	3	7	Roman	mid 1st	4th	Roman	1
	ceramic	fragment	1	8	undated				
13010	ceramic	pot	1	48	late med/early post-med	15th	16th	15th-16th	1
13012	bone	fragment	1	183	undated			undated	7
	wood	stick	5	307	undated				
13017	ceramic	pot	3	22	medieval	12th	14th	13th-14th	6
	ceramic	pot	1	16	medieval	13th	14th?		
13025	ceramic	pot	2	22	medieval	12th	14th	12th-14th	6
13031	Flint	flake	1	1.8	Mesolithic-Early Bronze Age	-10,000	-1500	10,000BC - 1500BC	3
13032	ceramic	pot	2	79	medieval	12th	14th	12th-14th	6
	ceramic	fragment	26	306	undated				
13033	ceramic	pot	34	385	medieval	12th	14th	13th-14th	6
	ceramic	pot	4	69	medieval	13th	14th		
	ceramic	pot	3	94	medieval	late 12th	13th		
	ceramic	fragment	4	26	undated				
13037	ceramic	pot	1	14	medieval	12th	14th	12th-14th	6
	ceramic	fragment	1	3	undated				
	slag (fe)	fragment	1	2	undated				
13039	ceramic	pot	7	76	medieval	12th	14th	12th-14th	6
	ceramic	pot	2	3	Roman	mid 1st	4th		
	ceramic	brick/tile	1	39	undated				
13040	ceramic	pot	8	119	medieval	12th	14th	12th-14th	6
	ceramic	pot	3	29	Roman	mid 1st	4th		
	ceramic	fragment	3	10	undated				
	clinker	fragment	1	0.5	undated				
	Flint	flake	1	3.6	Mesolithic-Early Bronze Age	-10,000	-1500	10,000BC - 1500BC	
13050	ceramic	pot	3	43	late med/early post-med	15th	16th	15th-16th	8
	ceramic	pot	9	88	medieval	12th	14th		
	ceramic	pot	5	23	Roman	mid 1st	4th		
	ceramic	tile	14	547	medieval?				
	stone	tile	1	186	undated				
13051	ceramic	pot	10	141	medieval	12th	14th	12th-14th	8
	ceramic	tile	13	393	medieval?				
14003	ceramic	pot	1	39	late med/early post-med	15th	16th	15th-16th	6
	ceramic	pot	20	173	medieval	12th	14th		
	ceramic	pot	6	56	medieval	13th	14th		
	ceramic	pot	3	26	Roman	mid 1st	4th		
	ceramic	pot	1	11	Roman	mid 1st	mid 2nd		

Context	Material	Object specific type	Count	Weight (g)	period	Start	End	Context TPQ date/range	Phase
	slag (fe)	smelting slag	1	29	undated				
0	ceramic	fragment	1	48	undated			undated	0

*Table 11: Summary of Area 11 context dating based on artefacts (*intrusive)*

5.4.5 Conclusions

The finds from Areas 10 and 11 reflect a chronological sequence of occupation across the landscape. Early Neolithic activity along the edge of the wet area at the north-west edge of Area 11 is attested by a background scatter of diagnostic flint artefacts. Later Neolithic or Early Bronze Age activity focused on the area of the contemporary burnt mound features within Area 11 is indicated by a small but significant distribution of worked flint. No Neolithic or Bronze Age pottery was recovered, though the burnt mounds and associated pits of this period (Phase 3) produced quantities of heat-cracked stone. Sparse artefactual assemblages are common in association with this particular monument type, but the small assemblage of worked flint contains examples characteristic of this unusually early date for the burnt mound features, further corroborated by the radiocarbon dates for one deposit (12073).

Only a few Iron Age finds came from Area 10, but Middle Iron Age pottery made up a significant proportion of the assemblage from Area 11, deposited in various Phase 4 pits. The pottery included a number of diagnostic rims and decorated sherds (Fig 15). Briquetage was another find associated with this Iron Age activity, along with smaller quantities of heat-cracked stones. The focus of Roman activity (Phase 5) was in Area 10, which produced an assemblage of Roman pottery dating broadly from the mid-1st to late 3rd-4th century. The most significant find was a cremation urn in Severn Valley ware (Fig 13). Much of the pottery, however, was mixed with later material in palaeochannels and not from stratified Roman deposits. Industrial waste provided evidence for iron smelting during the Roman period, but not iron smithing. Four fragments of pre-formed Malvernian oven were also noted in this area. Similar material has been found on other rural sites in the area, for example in the unpublished Roman assemblage from Beckford. But it was not properly identified until fairly recently, when a large group excavated at The Hive in Worcester allowed the form of the ovens to be reconstructed (Evans forthcoming b). On present evidence, these ovens seem to be associated with later Roman deposits. Medieval activity was centred in Area 11, with only a scatter of medieval finds from Area 10. The Area 11 assemblage, associated with Phase 6 pits and ditches, dated predominantly to the 12th-14th century, with only a handful of sherds from the subsoil indicating any 15th – 16th century, late medieval/early post medieval activity in the vicinity. The dominance of Worcester and Malvernian unglazed and glazed wares in this medieval assemblage is not surprising, given the date range and the proximity of the site to these two production sources (Worcester and Hanley Castle respectively).

5.5 Environmental analysis, by Elizabeth Pearson

The environmental evidence recovered is summarised in Tables 12-14 and Charts 1-5.

5.5.1 Aims

The aims of the analysis were to investigate the use of the woodland resources during the Neolithic/Bronze Age (Phase 3), using material from a burnt mound and associated pits, and to determine the selection strategy for wood fuel and/or management techniques.

5.5.2 Animal bone

Woolly mammoth tusk
A well preserved and nearly complete tusk of a woolly mammoth (*Mammuthus primigenius*) was recovered from the gravel terrace (BGS Terrace 2). The distal end has been lost but the proximal end is nearly complete. The size of the tusk suggests that it was from a fully grown male animal (Danielle Shreve, Professor of Quaternary Science, University of London: pers comm).

The tusk has been subject to specialist conservation by Nigel Larkin at Natural History Conservation (see Appendix 1).

Other
A single poorly preserved horse or cattle sized limb bone (183g) was recovered from a water-meadow ditch (13012) which is probably post-medieval in origin, of which little interpretation could be made.

5.5.3 Charcoal

Prehistoric: Late Neolithic to Early Bronze Age transition
The burnt mound and associated activity is dated to the late Neolithic/Bronze Age transition. Radiocarbon dates were obtained from layers in Burnt Mound 1 and Burnt Mound 3 (12071 and 12073). Two radiocarbon dates were obtained for each layer, ranging from 2340 to 2130 cal BC for layer 12071 and 2569 to 2040 cal BC for 12073.

The composition of the charcoal assemblages from both contexts analysed was very similar (Table 12). Alder and hazel predominate in both assemblages, illustrated by the percentage by weight shown in Charts 1 and 2, and was similar in both a pit fill (12065) and one of the two dated burnt mound deposits (12073). Although the percentage by weight of alder is slightly less in the burnt mound (12073), this is largely a result of a slightly greater species diversity.

Although roundwood was common, only one fragment was complete with pith and bark (*Alnus* wood from pit fill 12065 with a diameter 15mm), and hence the largest diameter could not be recorded accurately; however, for pit fill 12065, estimated diameters of 30+mm and 40+mm were recorded for alder and one hazel fragments. Larger fragments of 50+mm and 60+mm were recorded for alder from the burnt mound (12073). This does not represent the original wood diameter as there will have been shrinkage during charring, roughly 12 – 20% radially/tangentially (Marguerie and Hunot 2007). Diameters for hardwood fragments were not estimated (according to Marguerie and Hunot 2007).

The age range of the wood selected appeared to be slightly larger for the pit fill (12065). The oldest wood (fragments with the largest number of rings) was *Alnus* wood from pit fill (12065) at 45+ years, and also in the burnt mound (12073), also *Alnus,* at 32+ years. As no bark was present this does not provide a maximum age for the wood, and the age range will have been affected by the extent of fragmentation. Average ring width of charcoal from the pit fill (12065) varied from 0.3mm to 2.25mm with a median value of 0.78mm. Average ring width from (12073) varied from 0.31 to 4mm, and a median of 1.00mm. The average ring width appeared to be slightly larger for the burnt mound (12073), but as the results are affected by a couple of outliers, the difference is thought to be insignificant.

Ring curvature (irrespective of species) was also similar (Chart 3), although when alder and hazel are compared, the largest diameter fragments were of alder wood for the pit fill (12065; Chart 4), and for the burnt mound (12073; Chart 5), the largest fragments were of hazel.

Overall, the assemblages were very similar, suggesting that the pits beneath the burnt mound were filled at a similar time to the creation of the burnt mound, and that the features represent the same phase of activity.

Context	Sample	Feature type	Interpretation	Fill of	Phase	Sample volume (L)	Volume processed (L)	Residue assessed	Flot assessed
12006	308	Pit		12003	4	40	8	Yes	Yes
12017	301	Palaeochannel	Peat deposit below the clay alluvium		2	10	0	Yes	Yes
12017	300	Palaeochannel	Peat deposit below the clay alluvium		2	10	0	No	No
12017	302	Palaeochannel	Peat deposit below the clay alluvium		2	10	0	No	No
12017	303	Palaeochannel	Peat deposit below the clay alluvium 1201		2	10	0	No	No
12017	304	Palaeochannel	Peat deposit below the clay alluvium 1201		2	10	0	No	No
12017	305	Palaeochannel	Peat deposit below the clay alluvium 1201		2	10	0	No	No
12026	307	Pit		12027	4	40	0	No	No
12032	310	Pit		12036	4	5	5	Yes	Yes
12038	309	Pit	Likely location of sauna/sweat lodge	12037	3	30	8	Yes	Yes
12039	311	Pit		12040	3	40	10	Yes	Yes
12042	312	Pit	Secondary fill	12044	3	40	0	No	No
12043	313	Pit	Primary fill	12044	3	20	7	Yes	Yes
12047	314	Burnt Feature	Burnt Mound layer		3	20	0	No	No
12047	315	Burnt Feature	Burnt Mound layer		3	20	10	Yes	Yes
12048	316	Burnt Feature	Charcoal Spread		3	20	8	Yes	Yes
12054	40	Layer	Clay layer over burnt mounds		3	40	0	No	No
12056	317	Post Hole		12055	3	10	0	No	No
12062	318	Post Hole		12061	3	5	0	No	No
12064	319	Pit	Primary fill	12063	3	10	0	No	No
12065	320	Pit	Secondary fill	12063	3	30	10	Yes	Yes
12071	325	Burnt Feature	Burnt mound layer on top of ridge		3	8	8	Yes	Yes
12071	326	Burnt Feature	Burnt mound layer on top of ridge		3	10	0	No	No
12071.1	328					10	10	Yes	Yes
12071.3	327					10	0	No	No
12072	330	Burnt Feature	Burnt mound layer on top of ridge		3	10	10	Yes	Yes
12072	329	Burnt Feature	Burnt mound layer on top of ridge		3	10	0	No	No
12072.1	333					10	10	Yes	Yes

Context	Sample	Feature type	Interpretation	Fill of	Phase	Sample volume (L)	Volume processed (L)	Residue assessed	Flot assessed
12073	345	Burnt Feature	Burnt mound layer on western edge of		3	10	0	No	No
12073	344	Burnt Feature	Burnt mound layer on western edge of palaeochannel		3	10	0	No	No
12073	347	Burnt Feature	Burnt mound layer on western edge of palaeochannel		3	20	10	Yes	Yes
12073	354	Burnt Feature	Burnt mound layer on western edge of palaeochannel		3	20	0	No	No
12073	346	Burnt Feature	Burnt mound layer on western edge of palaeochannel		3	10	0	No	No
12073	343	Burnt Feature	Burnt mound layer on western edge of palaeochannel		3	10	0	No	No
12073.1	348					20	10	Yes	Yes
12074	339	Burnt Feature	Burnt mound layer		3	10	0	No	No
12074	340	Burnt Feature	Burnt mound layer		3	6	6	No	No
12074	338	Burnt Feature	Burnt mound layer		3	10	0	No	No
12074	337	Burnt Feature	Burnt mound layer		3	8	8	Yes	Yes
12077	322	Pit	Upper fill of pit 12079	12079	3	322	0	No	No
12080	323	Pit	Tertiary fill	12083	3	40	10	Yes	Yes
12081	324	Pit	Secondary fill	12083	3	40	0	No	No
12088	336	Pit	Secondary fill	12086	3	10	0	No	No
12092	331	VOID			0	10	0	No	No
12092	334	VOID			0	10	0	No	No
12092	332					10	0	No	No
12099	335	Burnt Feature	Charcoal spread		3	40		No	No
12101	341	Pit		12100	3	10	0	No	No
12104	342	Pit	Upper fill	12103	3	10	10	Yes	Yes
12107	349	Pit	Top fill	12105	3	40	8	Yes	Yes
12110	350	Pit	Secondary fill	12108	3	40	8	Yes	Yes
12112	355	Pit	Primary fill	12111	3	10	0	No	No
12114	351	Pit		12111	3	40	10	Yes	Yes
12118	352	Post Hole		12116	3	30	0	No	No
12120	353	Post Hole		12119	3	7	0	No	No
12125	356	Pit	Upper fill	12128	3	40	0	No	No
12126	357	Pit	Secondary fill	12128	3	20	0	No	No
13033	400	Midden	Upper fill, tip	13034	6	40	40	Yes	Yes
13040	401	Midden	Lower fill,tip	13041	6	40	40	Yes	Yes

Table 12: List of bulk samples

Latin name	Family	Common name	Habitat	12065		12073	
				count	weight (g)	count	weight (g)
Quercus robur/petraea wood	Fagaceae	oak	C	2	0.947	1	0.860
cf *Tilia* sp wood	Tiliaceae	lime	C			1	0.160
Alnus glutinosa (wood)	Betulaceae	alder	CE	30	7.976	19	7.424
Corylus avellana wood	Betulaceae	hazelnut	C	11	3.496	18	4.041
cf *Corylus avellana* wood	Betulaceae	hazelnut	C	1	0.091		
Alnus/Carpinus/ Corylus sp wood	Betulaceae	alder/hornbeam/ hazel	C			1	0.199
Total				**43**	**12.510**	**40**	**12.684**

Table 13: Charcoal from 12073 and 12065

Latin name	Family	Common name	Habitat	13033	13040
Triticum dicoccum/spelta grain	Poaceae	emmer/spelt wheat	F	1	
Triticum aestivo-compactum grain	Poaceae	club wheat	F	1	
Triticum sp (free-threshing) grain	Poaceae	free-threshing wheat	F	3	3
Triticum sp grain	Poaceae	wheat	F	1	1
Hordeum vulgare grain (hulled)	Poaceae	barley	F		
Triticum/Hordeum sp grain	Poaceae	wheat/barley	F	1	
Secale cereale grain	Poaceae	rye	F		1
Cereal sp indet grain	Poaceae	cereal	F	7	1
Cereal sp indet grain (fragment)	Poaceae	cereal	F		+
cf *Avena* sp grain	Poaceae	oat	AF	1	1
Vicia/Lathyrus sp	Fabaceae	vetch/pea	ABCD	3	
Glebionis segetum	Asteraceae	corn marigold	AB	2	

Table 14: Plant remains from contexts 13033 and 13040

Key:

habitat	quantity
A= cultivated ground	+ = 1 - 10
B= disturbed ground	++ = 11- 50
C= woodlands, hedgerows, scrub etc	+++ = 51 - 100
D = grasslands, meadows and heathland	++++ = 101+
E = aquatic/wet habitats	* = fragments
F = cultivar	

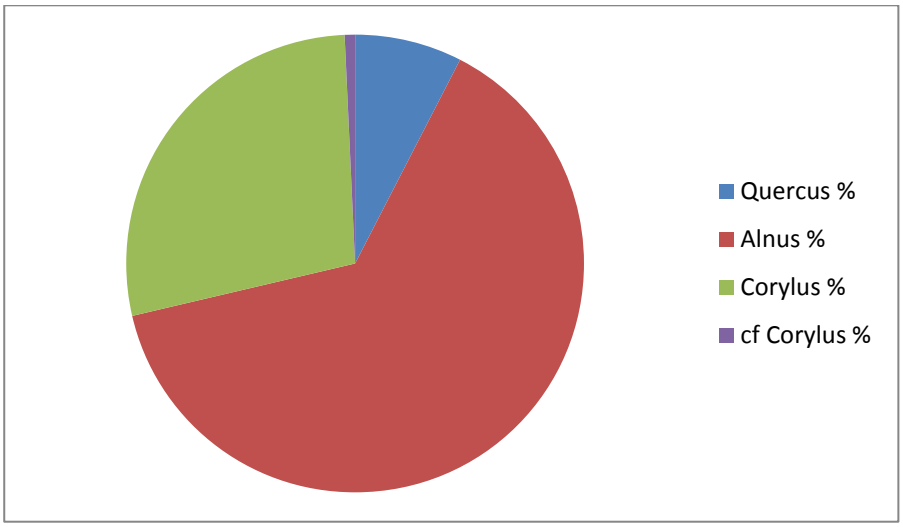

Chart 1: Context 12065 Charcoal by % weight

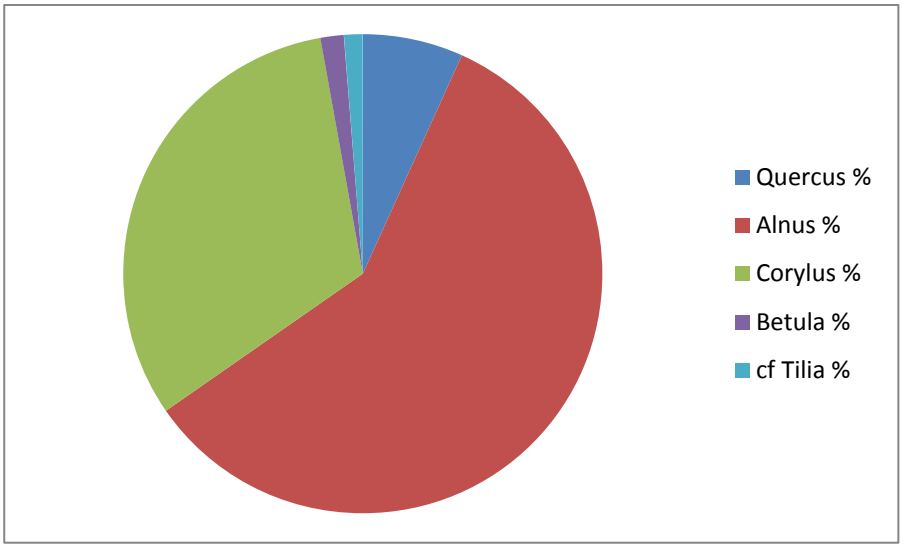

Chart 2: Context 12073 Charcoal by % weight

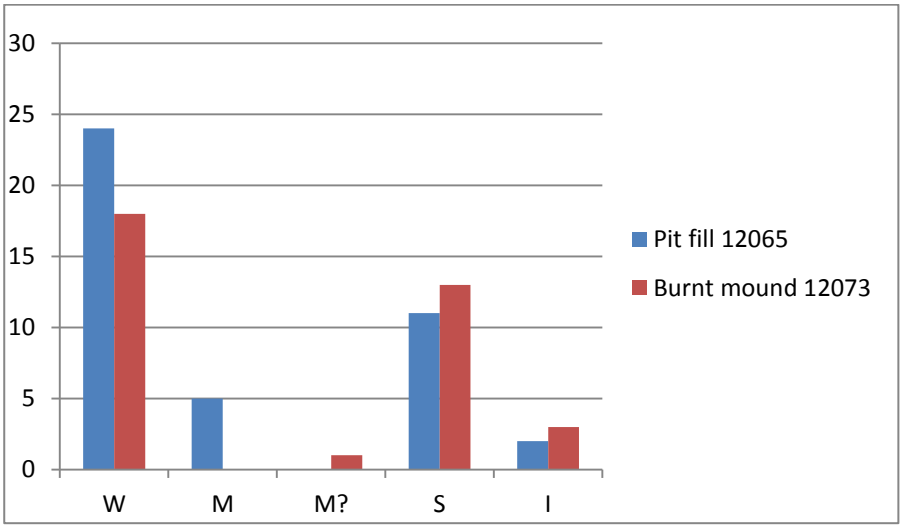

Chart 3: Ring curvature for (12065) and (12073), irrespective of species; W =wide curvature, M = moderate curvature, S = strong curvature, I = indeterminate curvature

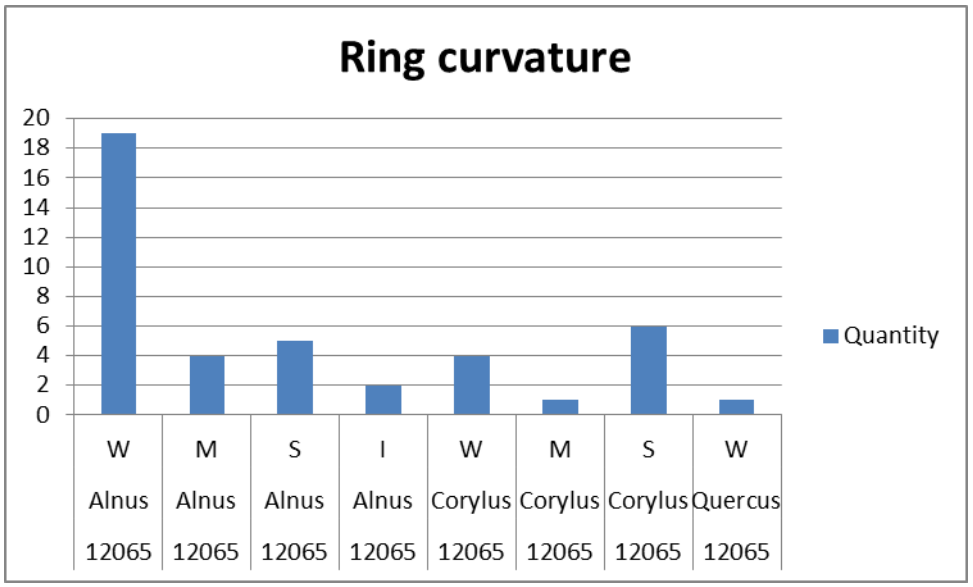

Chart 4: Comparison of ring curvature of alder and hazel for pit fill (12065); W = wide curvature, M = moderate curvature, S = strong curvature, I = indeterminate curvature

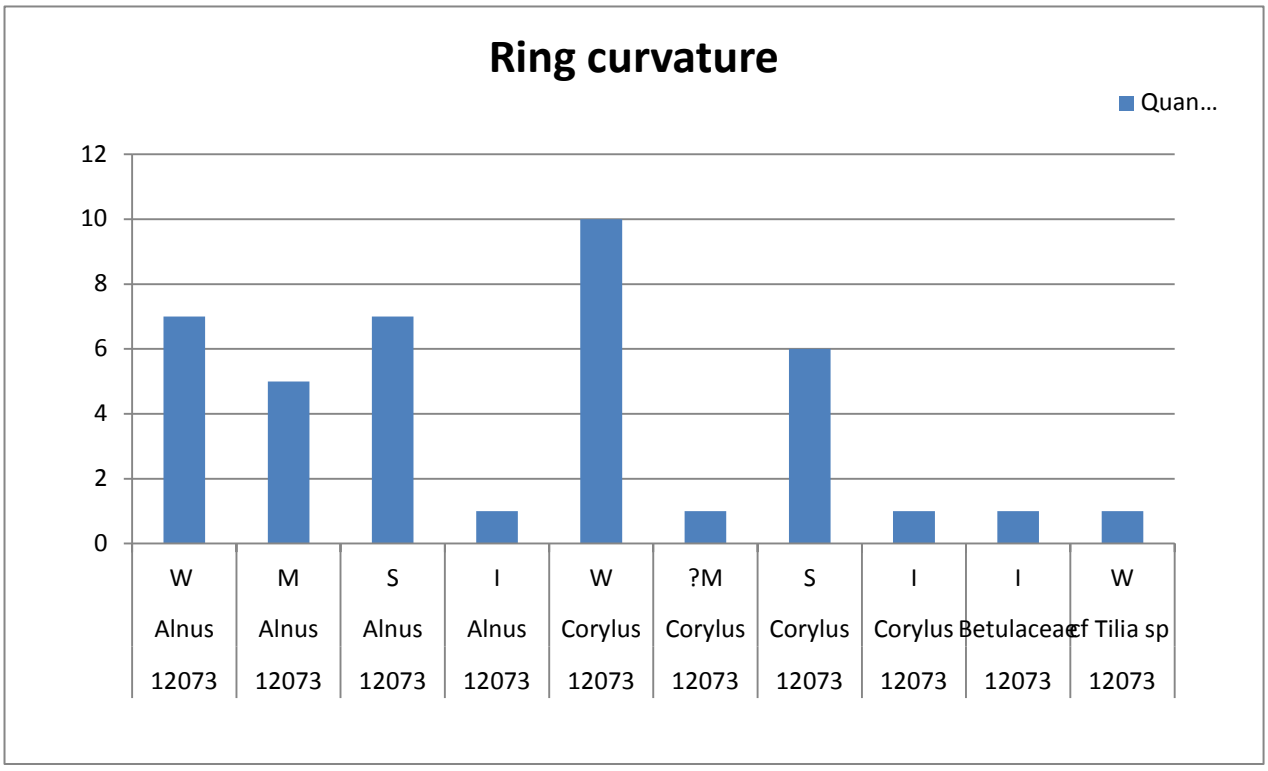

Chart 5: comparison of ring curvature of alder and hazel for burnt mound (12073); W = wide curvature, M = moderate curvature, S = strong curvature, I = indeterminate curvature

Medieval

Identifiable environmental remains were poorly preserved in both midden fills (13033 and 13040; Table 12). However, the presence of rye (*Secale cereale*), albeit a single grain, indicated cultivation on poor soils (probably sandy and acidic) as charred residues of rye are often found on sites where these soils are dominant. Corn marigold is also a weed of acid arable soils, particularly sands and lighter loams (Garden Organic 2007); moreover, the author has noted its common association with rye in charred crop residues. At Clifton, this suggests that the rye is most likely to

have been cultivated locally on the nearby Worcester Member sand and gravel deposits or the Holt Heath Sand and Gravel Member (BGS 2016). Both the corn marigold (*Glebionis segetum*) and vetch/pea (*Vicia/Lathyrus* sp) are likely to have been growing as weeds with the cereal crops.

Other remains included unidentifiable charcoal fragments. Uncharred material such as fine herbaceous root fragments, insect pupae and seeds are likely to be modern and intrusive as they are unlikely to have survived in the soils on site for long. Occasional very small burnt fragments of animal bone were also noted in one deposit (13040).

Possible post-medieval
Waterlogged roundwood fragments from the water-meadow ditch (3012), of possible post-medieval origin, were well preserved and demonstrate the potential for recovery of further waterlogged wood and organic material in the vicinity. However, in the absence of artefactual dating it is uncertain whether these deposits accumulated in the post-medieval period or later, and therefore no further work was carried out.

5.5.4 Radiocarbon dating

Charcoal was selected for radiocarbon dating from burnt mound layers (12071 and 12073) and from an associated pit fill (12114).

The results are expressed as conventional radiocarbon ages (Stuiver and Polach 1977) and are listed in Table 15. The calibrated date ranges for the samples have been calculated using the maximum intercept method (Stuiver and Reimer 1986), and are quoted with end points rounded outwards to ten years. The probability distributions of the calibrated dates, calculated using the probability method (Stuiver and Reimer 1993) are shown in Graphs 6 and 7 in Appendix 3. They have been calculated using OxCal v4.2 (Bronk Ramsey 2009) and the current internationally-agreed atmospheric calibration dataset for the northern hemisphere, IntCal13 (Reimer *et al* 2013).

Laboratory code	Context number	Material	$\delta^{13}C$ (‰)	Conventional Age	OxCal calibrated age (95.4% probability or 2 sigma)
SUERC-69130 (GU41774)	12073	Charcoal: *Corylus avellana*	-27.8	3960 ± 33	2569 – 2350 cal BC
SUERC-69131 (GU41775)	12073	Charcoal: *Alnus* sp	-27.0	3769 ± 33	2300 – 2040 cal BC
SUERC-69132 (GU41776)	12114	Charcoal: *Alnus* sp	-25.3	3835 ± 33	2460 – 2150 cal BC
SUERC-69133 (GU41777)	12114	Charcoal: cf *Corylus avellana*	-26.1	3803 ± 33	2350 – 2140 cal BC
SUERC-69134 (GU41778)	12071	Charcoal: cf Maloideae	-24.5	3803 ± 33	2350 – 2140 cal BC
SUERC-69135 (GU41779)	12071	Charcoal: *Corylus avellana*	-25.5	3795 ± 33	2340 – 2130 cal BC

Table 13: Radiocarbon dating results

5.5.5 Discussion

Neolithic to Bronze Age transition
The use of charcoal relating to activities which resulted in the burnt mounds and associated pits corresponds with secondary clearances (more substantial than earlier clearance) apparent in the pollen record from the palaeochannel in Area 10 dating to *2465–2090 cal BC (95% probability)* (Head and Daffern forthcoming). These clearances appear to have been relatively short-lived and were colonised by regenerating woodland. They may, therefore, largely relate to the appearance of burnt mounds as opposed to localised clearance on the floodplain for agricultural purposes, particularly as the relative abundance of alder, hazel, oak, birch and lime correspond well with the relative abundances of these tree species in the pollen profile. Although cereal cultivation is also apparent in the pollen profile, the cultivation is likely to have occurred further away from the palaeochannel on drier ground, and presumably would have had a smaller impact on the contemporary pollen deposition.

There was some similarity in species identified in charcoal from the Bronze Age burnt mound excavated in Area 10 in 2006 (Clapham forthcoming) in that similar species were identified in two pits adjacent to the burnt mound, but in the burnt mound itself, and an associated trough and pit, charcoal was very fragmented. Species identified were sloe/damson/plum/cherry, etc (*Prunus* sp), buckthorn (*Rhamnus cathartica*) willow (*Salix* sp).

Although the West Midlands has produced numerous examples of Bronze Age burnt mounds, few examples of Late Neolithic date are known. Two burnt mounds have been excavated at Meriden Quarry, Warwickshire, but no analysis has been carried out on the charcoal assemblages to date (Richard Bradley pers comm). A large burnt mound excavated at Willington, Derbyshire (Beamish 2001) has also been dated to the Late Neolithic period by Peterborough Ware pottery, from which hazelnut shells, and sloe stones were recovered but no charcoal has been identified (Beamish and Ripper 2000). At Bournville Lane/Woodbrook Road, Birmingham two pits were located along the line of a Severn Trent Water pipeline which were adjacent to a burnt mound identified by Mike Hodder (Ian Greig pers comm), but no definite relationship could be established. One was dated to the Late Neolithic period by Grooved Ware pottery, and the other assumed to be prehistoric. One pit was similar to those excavated at Clifton Quarry Area 11 as it was dominated by alder/hazel (*Alnus* sp/*Corylus avellana*) charcoal, with smaller quantities of oak (*Quercus* sp), pear/apple/ whitebeam/hawthorn (Maloideae sp), birch (*Betula* sp), lime (*Tilia* sp) and possible ash (cf *Fraxinus excelsior*). The second pit was dominated by oak with ash (*Fraxinus excelsior*) moderately abundant. Small quantities of hazel (*Corylus avellana*) and pear/apple/whitebeam/ hawthorn (Maloideae sp) charcoal and a single fragment of charred hazelnut shell were also identified (Pearson 2008).

5.6 Cremated bone analysis, by Gaynor Western

A total of nine cremated bone deposits of Roman date were retrieved from a series of shallow pits, one of which contained an urned burial. While previous excavations suggest that Clifton Quarry is a multi-phase site, in use throughout the Neolithic, Bronze Age, Romano-British and early medieval periods, two graves discovered during these earlier investigations were dated to the Roman period.

5.6.1 Type of deposit and disturbance

Recording of the type of deposit of cremated bone is necessary to make fair comparisons between different deposits from across a site, between one site and another and between cremated bone deposits from different historical contexts. Recording the type of deposit allows inferences to be made about the state of preservation of the material interred and how this may have affected bone content and fragmentation. This information is essential for accurate analysis of cremation processes due to diagnostic analytical techniques being based upon the weight and size of bone fragments present.

The nature of the deposit of the cremated bone was assessed during field excavation and recorded on the relevant context sheets. This information was subsequently classified according to the categories suggested by Brickley and McKinley (2004) and recorded on the Access database provided.

The cremated bone deposits were all retrieved from shallow but broad pits, between 0.15m and 0.38m deep and generally of a diameter of c. 0.6m. In all but one of the pits, the bone was found to be deposited along with a scatter of charcoal. At excavation, two deposits ([15017] and [15022] were thought more likely to represent pyre debris, given the plentiful presence of charcoal but little bone. One context, deposit [15011], was contained within an urn, the burial urn having been deposited on its side within a small pit cut to its size. The urn had been horizontally truncated during machining and therefore, only half of the urn was present. It is likely, therefore, that at least some of the other pits containing the burnt bone deposits have also been similarly truncated. These were therefore recorded as disturbed un-urned burials of bone.

5.6.2 Identification and quantification of cremated bone

Cremated bone deposits have been found on frequent occasions to contain both human and animal bone remains. Often, particularly if the bone fragments are very small, it is not possible to identify whether bone is categorically human or animal. However, it is clear from the analysis of cremated bone deposits that the deposition of both types of bone together is intentional and, therefore, it is imperative to approach the assessment of the cremated bone present holistically, as well as to attempt to identify human and animal elements.

Context	**15002**	**15004**	**15008**	**15011**	**15014**	**15017**	**15019**	**15022**	**15024**
Total Weight of Cremated Materials (g)	40.3	13.3	337.4	39.7	158.6	0.8	34.4	0.3	29.8
Total Weight of Identifiable ?Human Fragments (g)	7.9	1.5	120.3	14.2	47.1	0.0	9.5	0.0	3.4
Minimum Number of Individuals	1	1	1	1	1	1	1	1	1

Table 14: Results of the quantification of bone present

An assessment of the quantity of bone recovered may give an indication of the state of preservation of the associated feature in which the bone was interred or, if recovered from relatively undisturbed context, may provide valuable information regarding cremation processes. This may relate not only to the actual pyre technology itself but also to the collection and ritual deposition of bone after the process was complete. McKinley (1993) found that modern cremation processes resulted in the production of between 1227.4g and 3001.3g of bone from adult individuals. From this she inferred that the cremation of a whole body and deposition of the remains in an archaeological context would realistically produce between 1001.5g and 2422g of cremated human bone. In contrast, Whal (2015) found that average weights for cremated bone deposits dating to the Imperial Roman period from Baden-Württemberg, Germany were significantly lower, however; for men, 638g, for women, 479g and for children 106g.

Identification of particular elements of the human body serves to confirm the presence of human material and also may give an insight into any particular areas of the body which may have been

purposefully collected following cremation. The absence of elements, especially those that are smaller, may be due to the lack of their survival as a result of fragmentation during the cremation, post-depositional preservation conditions or may be due to their loss during the cremation itself.

The total amount of bone present in each context was weighed and subsequently analysed for identifiable fragments. These fragments were then weighed and recorded separately according the area of the body they originated from. Full quantification of bone is given in the database.

The results of the quantification analysis are summarised in Table 14.

The quantity of cremated bone present in all the deposits is low in comparison to the expected weight of bone produced through cremation of a complete individual, though context [15008] contained a similar, though still smaller, amount of bone to those reported for adult females by Whal (2015). As a result, few fragments could be conclusively identified as human from observable morphological skeletal features. However, human bone was positively identified from four contexts. Several fragments were identified as human from context [15008], including 2 distal hand phalanges, one of which was almost complete (See Plate 19), a right trapezium (wrist bone), fragments of humerus (arm) and femur (leg) and possible navicular (foot bone) as well as cranial vault and pelvic fragments. The distribution of these elements suggests that parts from a complete human body are represented, rather than fragments of peripheral skeletal elements that may have become separated from the body during the cremation process. Similarly, a partial mandibular tooth, fragment of pelvic bone, proximal radius and fibula fragment were identified from context [15011]. Fragments of a metacarpal or metatarsal head were identified in context [15024] and a fragment of frontal bone was recovered from context [15014] in addition to a worn tooth crown.

Human bone can, on some occasions, be differentiated from animal bone on account of the density of the cortex (the outer wall) of long bone fragments. However, this method tends to discriminate positively for the identification of animal bone rather than conclusively identifying human individuals since there is invariably some overlap between the two given the potential number of skeletal elements, the variation between human individuals and the restricted observability of small cremated bone fragments. Whal (2015), for example, observes that particular anatomical skeletal regions in humans, pigs and bear, once burnt and fragmented, can appear very similar. This is particularly problematic for Roman burials since pig remains are frequently included in cremated bone deposits (Wahl 2015, Simmonds *et al* 2008). Long bone fragments found in the remaining contexts appeared to be of a similar density observed in human bone. However, no diagnostic landmarks were present and based upon cortical density alone. Overall, the identification from morphological features suggested that at least some of the bone was likely to be human. However, many of the fragments of bone were non-diagnostic and no conclusive evidence was present to differentiate the fragments from animal species.

There were no repeated elements present, so the fragments contained in each context represent a minimum of one individual per context. However, given the variation in the nature of the deposits, i.e. bone burial and pyre debris pits, it may well be the case that bone originating from one individual may have been deposited in more than one context. Therefore, it cannot be assumed that each deposit represents the remains of one separate individual.

5.6.3 Demographic data

Demographic data recorded from human cremated bone gives an indication as to the age and sex of the individual. This information is derived from the macroscopic examination and metric assessment sexually dimorphic elements (e.g. Gejvall 1981, Van Vark (1975) and Whal (1982) as well as analysis of dental and bone development recommended by Buikstra and Ubelaker (1994). A large sample of well-preserved cremated bone deposits can provide a valuable insight into the demographic structure of the archaeological population and also into any ethnocentric funerary practices associated with the age and sex of the individual cremated.

Observations of material present and any indicators of age and sex were noted on the recording forms contained on the database.

No fragments present were large enough to allow metric assessments to be undertaken so any observations were based upon morphological features.

Age: Context [15014] contained a partial tooth crown likely to be a molar or premolar tooth exhibiting dental attrition, the occlusal surface being worn flat and small areas of exposed dentine observable. This suggests that the tooth originated from an adult individual.

No observable evidence of age at death was present in the remainder of the bone deposits.

Sex: Sex could not be assessed from any of the fragments present.

5.6.4 Pathology data

Palaeopathology is the study of diseases of past peoples and can be used to infer the health status of groups of individuals within a population as well as indicate the overall success of the adaptation of a population to its surrounding environment. Pathologies are categorised according to their aetiologies; e.g. congenital, metabolic, infectious, traumatic, neoplastic etc. Any pathological modifications to the bone are described. The size and location of any lesion is also noted. Pathology data is usually restricted, however, by intrinsic nature of cremated bone, although if fragment size is large enough, pathological changes may be observed.

Observations were recorded on the database.

No pathology was observed among the fragments of cremated bone present.

5.6.5 Bone fragmentation

The observation and quantification of bone fragmentation is essential in assessing its impact on the quality of the overall data retrieved from the analysis of cremated bone. It may also be an indicator of practices carried out during the cremation process and give and insight into pyre technology.

Context	**15002**	**15004**	**15008**	**15011**	**15014**	**15017**	**15019**	**15022**	**15024**
>10mm Weight (g)	2.7	0	87	1.4	14.3	0	2.9	0.2	1.5
>10mm Percentage of Total	*6.7*	*0.0*	*25.8*	*3.5*	*9.0*	*0.0*	*8.4*	*66.6*	*5.0*
>5mm Weight (g)	19.7	4.4	205.7	21.5	82.8	0	12.5	0	11.9
>5mm Percentage of Total	*48.9*	*33.1*	*61.0*	*54.2*	*36.9*	*0.0*	*36.3*	*0.0*	*40.0*
>2mm Weight (g)	17	8.8	37.8	16.1	58.6	0.8	17.6	0.1	16
>2mm Percentage of Total	*42.2*	*66.2*	*11.2*	*40.6*	*36.9*	*100*	*51.2*	*33.4*	*53.7*
Assessment of Bone Content Percentage <2mm residue	100	100	100	100	100	-	100	-	100
Total Weight (g)	**40.3**	**13.3**	**337.4**	**39.7**	**158.6**	**0.8**	**34.4**	**0.3**	**29.8**

Table 15: Weight by fraction of cremated bone

Fragmentation of bone is assessed by sorting all bone fragments into three sieve fractions (10mm, 5mm and 2mm) and comparing the proportion of bone in each fraction. Measurement of the maximum bone fragment length is also recorded.

The fragmentation of bone can occur for several reasons, i.e. from the raking of the remains during the cremation process, the collection and the subsequent interment of the remains, making it difficult to assess whether bone was deliberately fragmented as part of the cremation ritual (McKinley 1994a, 2001). It is, however, generally believed that both the excavation and post-excavation processes can lead to the largest amount of damage caused to the remains (Lange *et al* 1997, McKinley 1994a).

Observations of the weight of bone present in each sieve fraction and the percentage of each fraction of the total weight of bone were recorded on the database.

Table 15 summarises the results of the quantification of cremated bone present by sieve fraction weight and percentage of total weight.

These results indicate that the majority of the deposits contain very small quantities of bone compared to that expected from a complete adult skeleton. Fragments were between 2mm-9mm in length, with a small proportion of larger fragments present. The largest maximum bone size amongst the samples was 39.8mm from context [15008] and the smallest was 9.2mm from context [15004]. The bone fragments from context [15011] contained within the urn were not larger in size nor volume, which could in part derive from the post-depositional disturbance of the burial. The burial containing the largest quantity of bone with the largest fragments was from the deepest pit, indicating that depth of deposit was a key factor in the recovery of cremated bone from better preserved burials.

5.6.6 Efficiency of the cremation

Effective cremation of a human body requires basically two elements: burning at high temperatures and a sufficient length of time of the application of this heat. Differences in temperature and length of time of exposure will result in variation in how the bone is burned. Complete burning will result in complete oxidation of the organic element of bone, leaving the mineral portion remaining (McKinley 1994b, Lange *et al* 1987).

Holden *et al* (1995) report that generally, the range of colours seen in burnt bone relates to the temperature to which the bone was exposed:

Brown/Orange = Unburnt

BlackCharred = (*c*.300º)

Blue/Grey = Incompletely oxidised (*c*. 600º)

White = Completely oxidised (>600º)

The colour may vary from bone to bone as different elements of the body may be exposed to different temperatures for different lengths of time. It is, therefore, essential to record any differences in colouration according to skeletal elements affected and to the aspect of the element (i.e. interior, exterior) affected. The extent of the burning or oxidation of the bone represents the relative success of the cremation processed applied and contemporary knowledge of pyre technology. Body mass has been observed to also contribute towards the level of oxidation of bone, with males (i.e. larger individuals) exhibiting a greater range of variability of bone oxidation (McKinley 2015) while females (i.e. smaller individuals) tend to be more homogenous in complete oxidation of bone (Whal 2015).

Observations of dehydration of the bone should also be recorded. Shrinkage of bone due to dehydration can amount to a 25-30% decrease in cross-section width and accordingly approximately a 5% decrease in length (Lange *et al* 1987). Evidence of dehydration presents itself on the bone fragments in the form of fissuring, transverse, concentric and parabolic cracking, especially on articular surfaces of long bones and cranial vault fragments (Lange *et al* 1987,

McKinley 1994b). These are generally interpreted as occurring due to the result of cremating the bone when soft tissue was still present on the bone.

The results of the analysis of colour variation in the fragments of bone suggest that the vast majority of bone present was completely calcined or oxidised (Murray *et al.* 1993). This suggests that the bone had been exposed to a temperature of at least 600° for a substantial period of time. It is noteworthy that the fragment exhibiting the blue-grey variation in colour was of higher bone density.

Fissuring, transverse and longitudinal cracking was present on the vast majority of the elements contained in this instance. Concentric cracking was also noted on the articular surfaces of fragments. This indicates that soft tissue was present on the bone when it was cremated. The presence of both transverse and longitudinal fissuring confirms that the bone has been cremated long enough for substantial amount of dehydration of the bone to occur, in concordance with the coloration of the bone.

5.6.7 Presence and type of pyre goods

Pyre goods are those items that were placed on the pyre and have been deliberately included for interment along with the cremated human bone. These can consist of objects manufactured from glass, ivory or metal, for example, which may have formed items of personal adornment. Metal items may only leave a trace of their presence in the form of staining on the bone, especially those manufactured from copper alloys.

It is most common for animal bone to be included with deposits of human bone (e.g. Wells 1960). It is generally perceived that these represent animal sacrifice or food offerings to the dead (McKinley 1994a, Bond 1994). Williams (2005) has suggested, furthermore, that the deliberate admixture of animal and human cremated remains is deeply significant and may be associated with shamanistic rituals often observed ethnographically whereby not only can animals symbolically represent totemic ancestor lineages and but also both human and animal beings are seen to dynamically and mutually co-exist: “Animals were more than symbols of identity but agents of transformation, enabling the dead to be reconstituted into a new social status in death." (Williams 2005).

Observations regarding the identification, quantification and percentage of identifiable animal bone present were recorded on sheets contained in the database. Most of the bone present was non-diagnostic and no fragments could be conclusively identified as animal.

Only three contexts contained pyre goods and all in very small quantities. Context [15002] contained a curved, tubular fragment of what may have been animal bone that was charred throughout and context [15024] contained what appeared to be long bone fragments of animal bone with incomplete oxidation of the endosteal surface.

Ferrous deposits were found adhering to three long bone fragments from context [15008] with iron staining of a further three small fragments (Plate 20). The adhesions were small (*c* 3-6mm). It is not clear if the iron deposits had adhered to the bone through the cremation process, and therefore originated from a pyre item, or by post-depositional degradation of a residual inclusion.

5.6.8 Presence and type of pyre debris

The presence and type of pyre debris is analysed in order to ascertain the nature of pyre technology and can be used to provide an insight into the type of deposit. Recent experimental reconstructions of pyre sites have determined that distinct features and types of debris can be left by former pyre sites and in particular that the use of different materials alters the type and form of deposit (Marshall 2005).

Observations regarding presence, quantity and type of pyre debris were made and recorded on the forms contained in the database.

Pyre debris was observed to be present in the residual samples sorted during environmental processing consisting of small quantities of charcoal. Two contexts, [15017] and [15022] were

charcoal rich and contained very little bone, and at excavation were therefore identified as pyre deposits.

The deposition of cremated bone deposits in urns and pits of similar dimensions as well as the deposition of pyre debris in pits, clearly well sorted and separated from any associated bone, indicates both well managed disposal processes and formal funerary practices in cremation at the site.

5.6.9 Conclusion

The osteoarchaeological analysis of the cremated bone recovered from Clifton Quarry has confirmed the presence of human skeletal remains within four of the deposits of cremated materials. It is likely that the remainder of the contexts containing cremated material included at least some human bone, although none was formally identifiable as such. Two pits were rich in charcoal but contained little bone and therefore are likely to represent the burial of pyre debris.

The quantities of bone recovered were substantially smaller in volume than expected from a cremated complete adult skeleton and fragment size was generally small. The quantities and fragments sizes recovered are comparable with those excavated from the Roman cemetery at 120-122, London Road, Gloucester. Here, the majority of fragments were between 5-10mm in size and weights ranged from 1.5g to 1255.5g, with five of the nine deposits containing between 132.5g and 2812.5g of bone (Simmonds *et al* 2008). All but two of these cremated bone burials had undergone post-deposition truncation and were incomplete, despite six of the cremations being deposited in containers.

Since one pit from Clifton Quarry contained an urn laid on its side that had been horizontally truncated after deposition, it is likely that at least some of the other pits had undergone the same process, thereby reducing their depth and bone content. It is, therefore, difficult to determine if the pits contain token deposits or whether they originally contained the majority of cremated bone produced. However, the largest quantity of cremated bone and deposit with the largest fragment size, [15008], was contained within the deepest pit. Most areas of the body were represented within this deposit, including complete distal hand phalanges, which are small and can fall away from the body during the cremation process. Given that the pyre debris was almost free of bone and apparently well sorted, it appears that the larger deposits of bone at Clifton Quarry could well represent disturbed burials rather than token deposits. Additionally, the sorting of pyre debris from bone and the presence of smaller vulnerable skeletal elements suggests that the cremation process was well managed and carefully undertaken. This is also testified to by the well calcined state of the majority of the cremated bone, in concordance with the notion that the Roman belief that incomplete cremation was ‘to be deplored, being regarded as an insult to the deceased and…not enabling the soul to reach the afterlife’ (Noy 2005).

Where fragments could be identified, the majority of deposits from Clifton Quarry contained elements from the cranium and the long bones, with some pelvis/vertebral elements or hands/feet represented, possibly suggesting that these deposits of smaller quantities of bone also originated from the cremains of a complete individual rather than peripheral elements that may have fallen from a pyre. One context, [15014], contained a tooth crown exhibiting considerable attrition and was therefore likely to originate from an adult. No evidence of age and sex was present in the remaining deposits of bone. No pathology was observed, probably due to the small fragment size overall.

Some ferrous deposits were noted to be adhering to bone fragments in context [15008] that may represent pyre goods i.e. a pin or brooch. It may also be a possibility that the staining originates from post-deposition processes. Interestingly, little evidence of faunal pyre goods was found. Only contexts [15002] and [15024] contained bone that was likely to have been animal. This is in contrast to the majority of cremated bone deposits from 120-122 London Road, Gloucester, for example, where animal bone, frequently consisting of pig remains, was found in six of the nine deposits (Simmonds *et al* 2008). In Imperial Roman cremated bone deposits, Wahl (2015) has observed that 80% contain animal bones burned together with the human body.

Cremation burials dating to the Roman period are commonplace throughout Britain, though the archaeological evidence from the West Midlands suggests cremation was a more popular practice than inhumation from *c*. AD 100 to *c*. AD 200, after which inhumation burial becomes more prevalent and by AD 250 the dominant funerary rite (Noy 2000; Smith nd). Some cemetery sites spanning this period in date contain both inhumation and cremated bone burials (Barber *et al* 1990). Vessels containing cremated bone can be purpose made urns or as is the case here 'seconds' originally intended to be used for cooking or general storage and the provision of burial goods with cremated bone burials is less common than with inhumations (Barber *et al* 1990). Evidence for pyre sites (*ustrinatum*) or other structures used for cremation such as walled areas and pits such as *bustum*, historically recorded in use in the Roman Empire, is rare (Pearce 1999).

Only 81 cremation burials are recorded for the whole West Midlands region (Smith nd). The nine cremated bone deposits from Clifton Quarry are therefore a relatively rare discovery in Worcestershire, where the majority of Roman graves recorded to date consist of small groups of rural inhumation burials, such as those found earlier at the site itself (Mann and Jackson forthcoming), at Furzen Farm, St George's Lane and Upper Moor, Wyre Piddle (Western and Kausmally 2003, 2004). These often occur within bounded field systems, from which it is inferred that these burials reflect a land ownership status of the deceased. Larger groupings have also been recorded in the vicinity of Worcester city from the Sainsbury's site at St. Johns (Western 2009) and in the city itself at Deansway (Dalwood and Edwards 2002), the King's School (Brown and Wichbold 1991), 11-12 New Street (Worcester Urban Archaeology Strategy 2007) and The Butts (Western 2013). One Roman cremation cemetery is thought to have been discovered during the demolition of the castle earthworks in the city during the 19th century (Worcester Urban Archaeology Strategy 2007). Smith (nd) suggests that a peak of cremation burial across the West Midlands during the later 1st to 2nd century AD may be in part associated with the establishment of nucleated settlement.

The use of the site for cremation funerary purposes during the Roman period and how this relates to the previously discovered evidence for inhumation burial and settlement is clearly an important aspect of the long history of activity at Clifton Quarry and this archaeological evidence will aid interpretation as to the changing nature of the use of the area over time according to the impact of environmental and social factors.

6 Synthesis

6.1 Phase 1 Natural

The site sits on Worcester Member sand and gravel BGS Terrace 2, which dates to between 16 Ka and 12 Ka (Jackson *et al* 2011).

The tusk recovered derived from a woolly mammoth (*Mammuthus primigenius*). The size of the tusk suggests that it was from a fully grown male animal (Danielle Shreve, Professor of Quaternary Science, University of London: pers comm). Such animals were present across most of Europe during the Last Cold Stage (ca 115 to 12ka BP) and grew up to eleven feet height at the shoulder and weighed up to six tonnes. The tusk in this instance was recovered from the lower part of the terrace deposits implying deposition within the earlier stages of terrace deposition (ie aound 16 ka BP); however, since the tusk was not *in situ*, and was likely displaced by the glacial melt water that was flowing at the time, it is possible that the tusk was of considerably greater antiquity.

6.2 Phase 2 Palaeochannels

The palaeochannel that runs north to south along the eastern side of Area 11 offers a window into the landscape at various points through time. Alongside the scientifically dated sequence of peat and alluvial formations gained during previous reporting from Clifton Quarry, pollen analysis allowed for four pollen assemblage zones to be identified (CQ1-4; Jackson and Mann forthcoming).

The Late Mesolithic (CQ1) landscape is mainly grassland, with a low percentage of trees and shrubs, in an increasingly saturated environment. By the Early Neolithic transition (CQ2), peat has formed on the floodplain, and alder is beginning to dominate the landscape, with hazel and oak also present. Occasional small clearings in this woodland on the water's edge gave rise to herb species, and were likely of natural origin.

CQ3 represents the Early to Late Neolithic and sees a decline in alder, as oak and hazel increase. It also sees the arrival of cereals, indicating intentional clearing of small areas of woodland. The Early to Late Bronze Age (CQ4) sees the beginnings of large scale clearance, and the fall in tree species, though it is suggested that alder maintains a foothold on the riverbank.

6.3 Phase 3 Neolithic/Bronze Age

The Early Neolithic was represented only by residual flints recovered from later features and collected from a layer associated with palaeochannel/burnt mound activity. One exception is for a tentatively dated Mesolithic-Early Neolithic flint recovered from a pit close to the medieval midden in Area11b.

Activity dated to this period within the phases of investigation reported here, was primarily that associated with burnt mounds. Nearly 40 burnt mounds have been discovered in the Birmingham area (Hodder 2011, 28), with more in the wider region (see Bradley 2014; Mann and Jackson forthcoming; Lovett 2016). Whilst this does not match the thousands that are known in Ireland and Scotland (Dineley 2016), they do reflect the same characteristics, as outlined below (after Barfield and Hodder 2010):

- they are comprised of charcoal and heat-cracked stone
- they are located next to a water source in wet conditions
- few artefacts are recovered
- they generally seal underlying pits
- a lined pit or trough is usually present
- the typical date range is between 1700-800 BC.

The burnt mounds at Clifton comply with all but the last of these characteristics. Two mounds from the cluster in the south-east of Area 11a were dated; two samples were processed from the spread of Burnt Mound 1, whilst two dates were recovered from the spread of Burnt Mound 3 and two from a pit underlying that spread. The pit yielded dates of 2460-2150 cal BC and 2350-2140 cal BC respectively whilst the two dates from the overlying burnt mound spread were 2300-2040 cal BC and 2569-2350 cal BC. The other burnt mound spread returned dates of 2350-2140 cal BC and 2340-2130 cal BC. These place the burnt mounds in the Late Neolithic-Early Bronze Age transition, thus pre-dating the majority listed by Barfield and Hodder (2010). The dates provided by radiocarbon analysis are quite consistent, with only one sample (from BM3) being slightly anomalous. Even so, it would still fit in to the broader date range of the results.

A burnt mound had previously been excavated at Clifton Quarry, during investigations to the north in Area 10 in 2005 (Mann and Jackson forthcoming). This was substantially bigger than the majority of those investigated in Area 11, being 10m x 8m. In Area 11a, only Burnt Mound 3 was of comparable size, at 16.7m x 5.4m. The 2005 mound similarly had associated pits and a trough, as well as an abundance of fire-cracked stone. Radiocarbon dates for this feature yielded a range from 1410-1300 cal BC to 1370-1250 cal BC, a short-lived period of up to 140 years, but importantly up to a thousand years after the burnt mounds revealed in Area 11.

Other burnt mounds in the wider region have yielded dates more in line with the proscribed characteristics of Barfield and Hodder; Long Itchington, Warwickshire ranged from 1410-1220 cal BC to 1390-1110 cal BC (Lovett 2016), again suggesting a short-lived period, this time of around 100 years.

Possibly of greatest comparison to the Neolithic burnt mounds at Clifton Quarry in the region are those from Meriden Quarry, Warwickshire (Bradley 2014). Here, two burnt mounds were excavated, and were shown by radiocarbon dating to be separated in time by 1000 years, with the earlier one dated to the Neolithic (2618-2609 cal BC to 2583-2470 cal BC). Further examples of Neolithic burnt mounds in the Midlands have been discovered in the Trent Valley (Knight and Howard 2004), including that at Willington, Derbyshire. Here the mound measured 7m x 5m and was situated on "a crest of a gravel island bordered by palaeochannels" (*ibid*, 57). This yielded Peterborough Ware pottery sherds, flints, hazelnut shells, and sloe stones. It was dated by the presence of the pottery rather than by radiocarbon analysis.

Large scale clearance of woodland at Clifton as indicated by the palaeochannel sequences occurred around 2465-2090 cal BC (Mann and Jackson forthcoming), and correlates with the appearance of the burnt mounds from Area 11. In addition, it is noted that the alder, hazel, oak, birch, and lime that dominate the wood species recorded in the charcoal recovered from the mounds corresponds with those species in decline in the pollen profile; in turn inferring that clearances of these species to provide fuel for the mounds contributed at least in part to the overall decline of woodland. This analysis of the environmental data provided by the sampling of the palaeochannel and the burnt mounds benefits some of the research agendas for the West Midlands, notably the need for scientific dating of Bronze Age activity, and for establishing some degree of understanding of landscape change for the period (Dalwood 2017, 27).

These clearances were short-lived, however, as the woodland recovered. A final clearance phase is dated 2105-1750 cal BC (95% probability), with woodland no longer regenerating. The charcoal recovered from the Bronze Age burnt mound recorded in Area 10 to the north included oak, alder, and hazel, suggesting that whatever activity was being undertaken at the mound, it was contributing to the clearance of woodland during this period (Mann and Jackson forthcoming).

Burnt mounds are the by-product of "hot-stone technology", a means of heating large amounts of water by the placement of preheated stones into it. These stones often crack due to the sudden changes in temperature. The discarded stones and charcoal form the mounds, and fill and cover the earlier pits. Whilst the method of formation of these features is relatively well understood, the function of burnt mounds is a heavily debated subject: theories range from the cooking of food in boiling water (Barfield and Hodder 2010), beer production (Quinn and Moore 2007), use in the craft and textile industry (Jeffery 1991), or as a sauna or sweathouse (Barfield and Hodder 1987; Laurie 2003).

The sauna theory, as postulated by Barfield and Hodder (2010, 39) involves the placement of a tent constructed of hides and branches over a hearth. This hearth would then be filled with stones, over which water would be poured, to produce steam. No specific hearth structures were identified at Clifton, and though any of the pits underlying the mounds could have been hearths, there was not any evidence of *in situ* burning.

The environmental evidence from the Long Itchington burnt mound in Warwickshire suggested a possibly deliberate selection of wood types. *Prunus* and *Maloidae* are both species that produce scent when burnt, and were the predominant varieties recovered here (Lovett 2016). Such use of scented woods could support the sauna theory, though further analysis of other assemblages would be needed to determine if a pattern exists. No such species selection is evident in the charcoal remains from the Clifton assemblage, either in Area 11 or in the previous work in Area 10.

As has been previously mentioned, few artefacts are recovered from burnt mound sites. This is evidence against these sites being used in the preparation and cooking of meats. It would be expected that butchered animal bone, cooking vessels, and flint tools would be more prevalent in the archaeological record were food being processed at one site over periods of 100 years or more. Whilst the number of artefacts recovered from this site is not high, it is nonetheless larger than normal. For example, the burnt mound at Cob Lane, Birmingham was sieved and yet produced just one flint and two bone fragments (Hodder 2011). Conversely, over 250 sherds of late Bronze Age pottery was recovered from Green Park, Reading (Brossler *et al* 2004).

The absence of any settlement close to the burnt mounds is to be expected. These feature types are invariably located in areas that are prohibitive to occupation, and as has been seen from the pollen analysis, the wider environment was already partially under peat.

It is unlikely that there was a sole function of burnt mounds, that was unchanged across the whole country and beyond. Rather that hot-stone technology was recognised as an efficient means to heat up large amounts of water, which could then be put to whatever use one might conceive. Those purposes have often left little evidence behind in the archaeological record, and the burnt mound at Clifton is no exception. It will however, add to the data being collected about this feature type, and is notable for its antiquity.

6.4 Phase 4 Iron Age

The small cluster of pits in the north-west corner of Area 11a dated to the Middle Iron Age, and contained enough pottery and fire-cracked stone to be indicative of domestic refuse from nearby settlement activity. This could potentially be associated with the large storage area of this date that was revealed in Area 10 (Mann and Jackson forthcoming). However, it would have required the crossing of a marshland or active channel in order to dispose of domestic waste. Rather it is conjectured that another Iron Age settlement may have existed to the north-west of Area 11a, on the western side of the palaeochannel, but which has subsequently been lost to quarrying before archaeological monitoring began at the site.

The site to the north consisted mainly of four-post structures, with 103 examples (including variants), along with a lesser number of storage pits. There was a distinct lack of domestic structures and associated material, with only two possible roundhouse structures identified. This suggested that the excavation area was a specialised part of a larger settlement, dealing with the storage of grain on a large scale. Any potential settlement area would have been located beyond the extent of the excavation. No evidence for enclosure of this site was visible, though it was sited between two large palaeochannels on the east and west, offering natural boundaries, as well as important communication and trade routes. It is suggested that pressure for land was low, allowing for the zoning of specialised areas, in this case for grain storage. It is also conjectured that this specialisation is influenced by the larger socio-economic landscape, with surplus crop from this settlement being traded with other specialised communities, for example for pottery from Malvern; salt from Droitwich; iron and copper from the Forest of Dean. Such an undertaking would likely have required a large communal effort, and it may be that a settlement on the west of the palaeochannel that separated Area 10 from Area 11 could have existed as part of the larger settlement structure.

As with the Area 10 settlement, the increasing inundation of the palaeochannel is evidenced by peat formation over the Iron Age pits in Area 11a.

6.5 Phase 5 Roman

Roman occupation across the Clifton landscape has not been revealed to any great degree during previous excavations in the quarry. However, a combined field walking, metal detecting and geophysical survey undertaken in 2001 (Miller *et al* 2002) to the north of Area 10 revealed extensive evidence for Roman occupation. Alongside enclosures detailed by the geophysics, large amounts of iron slag and ceramic building material were recovered, suggesting a settlement of some status, possibly associated with intensive trade in iron via the River Severn (*ibid*). Most recently, evaluation of a new area identified for mineral extraction to the south-east of Area 11 has recorded evidence for a further Roman settlement (Mann 2015).

The extent of evidence for Roman activity in Area 11 was restricted to a small number of pits and postholes on the western edge of the palaeochannel, in close proximity to the Iron Age pits in Pit Group 8 (Fig 6). A possible buried soil of Roman date covered the burnt mound deposits on the ridge of the palaeochannel.

Of greater significance was the cremation cemetery in Area 10. This contained nine discrete cremation deposits, with four of them containing human bone. One was an urned cremation, the rest unurned. The evidence in the wider archaeological record suggests that cremation was more prevalent than inhumation between *c* AD 100 AD 200 in the West Midlands. This dating concurs with the pottery analysis of the urn recovered. During the earlier excavations in Area 10 (Mann and Jackson forthcoming), two Roman burials were identified. Soil conditions meant that no bone survived but pottery dating from the Late Iron Age to 2nd Century AD was recovered. Both of these phases of interment are likely to be associated with the Roman settlement to the north, with the cremation area appearing to be more formally organised than the two isolated burials.

The pond in Area 10, infilling deposits of which some of the Roman cremations had been dug into, appeared to have been at least partially hand dug. This was possibly the result of management of the sides of a naturally occurring feature rather than the intentional creation of a waterhole. It was filled with a surprisingly inorganic silty sand. Two fills were identified, with the cremations being cut through the lower fill and sealed by the upper one. This later deposit contained moderate amounts of slag and pottery fragments. It is unclear how old the pond may have been, but it certainly had to have silted up, and presumably dried sufficiently, by the 1st-2nd century AD in advance of the cremations being deposited.

6.6 Phase 6 Medieval

Medieval activity was sparse, however, the exception was the rare discovery of a midden deposit. This was most probably associated with Clifton village to the east of the site and domestic pottery recovered from this feature dated from the 12th to the 14th centuries. The survival of a midden as a positive feature is unusual since they were used for temporary storage, thus were typically dispersed relatively shortly after formation, and also are liable to be ploughed out. The midden was most probably formed from domestic refuse transported by cart from the nearby village, whence it would have turned to manure and been used to service the arable land.

6.7 Phase 7 Post-medieval

A network of ditches criss-crossed areas 11a and 11b. These form part of a wider network known from cropmarks and earthwork remains on the east bank of the river around Clifton. The ditches provided irrigation for the water meadow system and were still extant in the landscape prior to the excavation. The increase in water meadows across the country during the seventeenth century was due to an increased demand for foodstuffs as a result of burgeoning populations (Vanda Bartoszuk unpublished). The innovation worked by allowing a controlled flow of water across a meadow, protecting the grass from winter frosts and depositing nutrients to enrich the hay crop. This created early growth in the grass, so that sheep and cattle could be fed on fresh ground earlier in the year.

7 Publication summary

Worcestershire Archaeology has a professional obligation to publish the results of archaeological projects within a reasonable period of time. To this end, Worcestershire Archaeology intends to use this summary as the basis for publication through local or regional journals. The client is requested to consider the content of this section as being acceptable for such publication.

A series of archaeological investigations was undertaken at Clifton Quarry, Kempsey, Worcestershire (NGR SO 8450 4700). It was undertaken on behalf of Tarmac Limited in advance of the permitted extension of mineral extraction.

These investigations formed the final stages of an extended programme of archaeological work at the site, and took place between 2012 and 2016. Incorporating extensive palaeoenvironmental analysis from previous works on the site, these investigations mapped peat deposits and alluvial formations derived from a palaeochannel alongside archaeological remains from a number of periods.

A mammoth tusk recovered from within the sand and gravel provided a rare and well preserved example of Late Glacial large mammalian fauna. This was probably deposited between 16-12,000 years ago when the terrace deposits it was found within were being laid down.

A series of burnt mounds were identified along the edge of the palaeochannel in the southern part of the investigated area. Radiocarbon dating placed these in the Late Neolithic-Early Bronze Age transition, significantly earlier than the usual range for such features in the West Midlands.

Iron Age deposits in the same area were limited to a number of pits from the middle of this period and these were located on the edge of the floodplain as defined by an extensive spread of peat. It is conjectured that an Iron Age settlement may have existed to the north-west of the study area, but has subsequently been lost to quarrying.

Nine cremation deposits were identified in the northern part of the site, including one urned. A potentially hand dug pond was excavated in this area, and was found to contain five of the nine cremation deposits. These were dated to 1st-2nd century AD, and were likely associated with the a Roman settlement immediately to the north.

A rare example of a well preserved midden was also excavated in the southern area. This dated to the 12th-14th century AD, and was likely created as part of a manuring regime to service the arable fields around the village of Clifton to the east. Post-medieval remains consisted of a series of channels dug to irrigate an area given over to water meadows.

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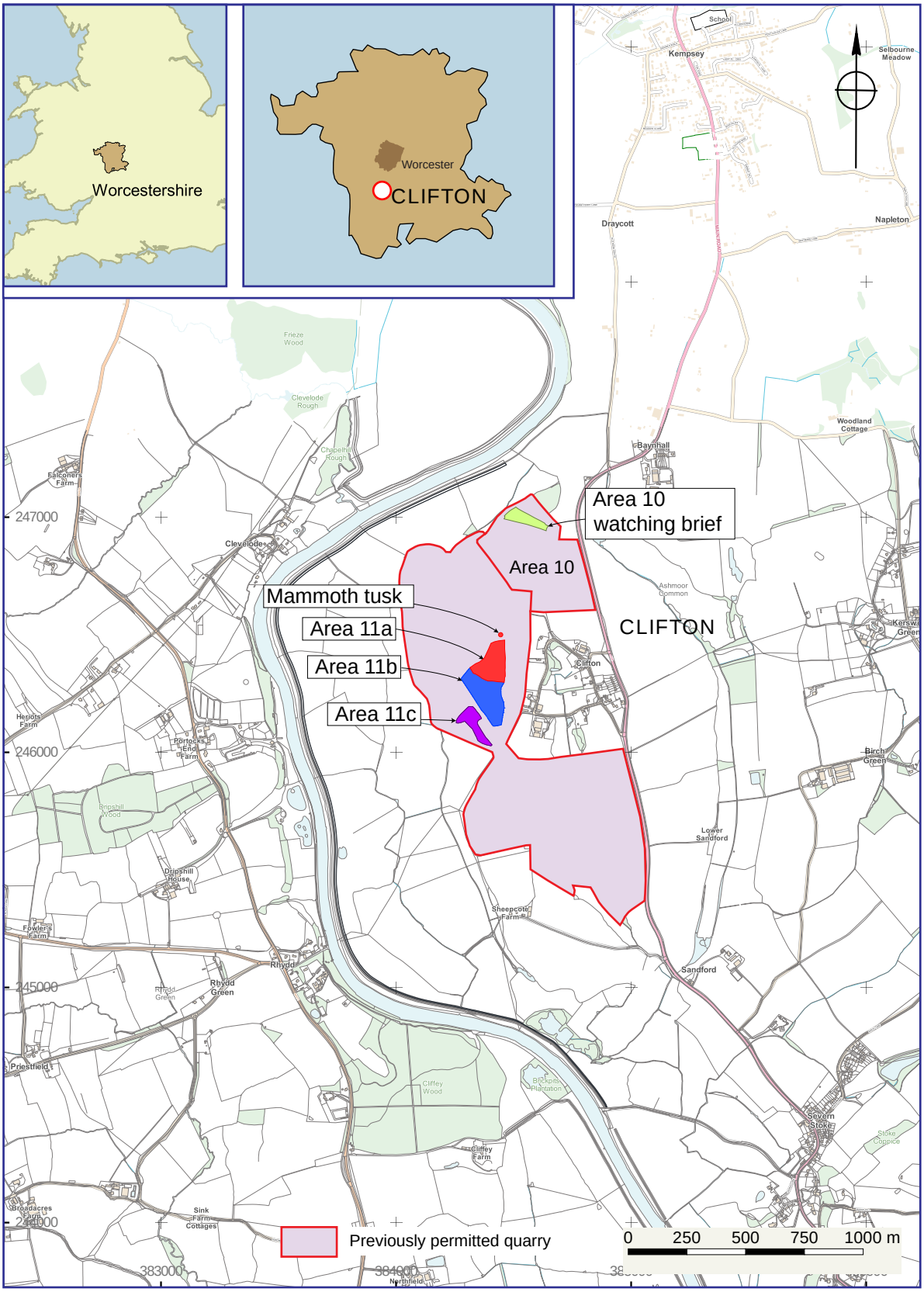
Figures



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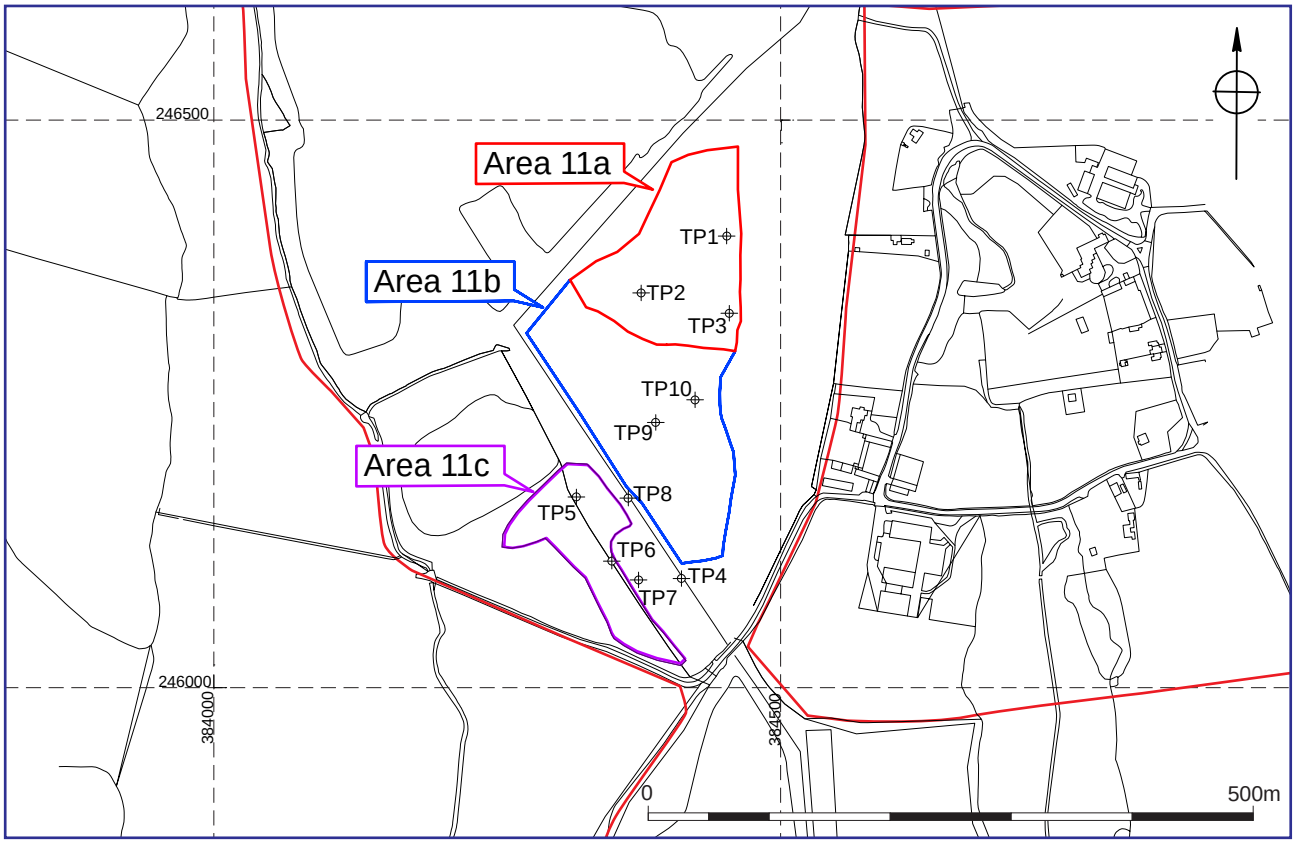
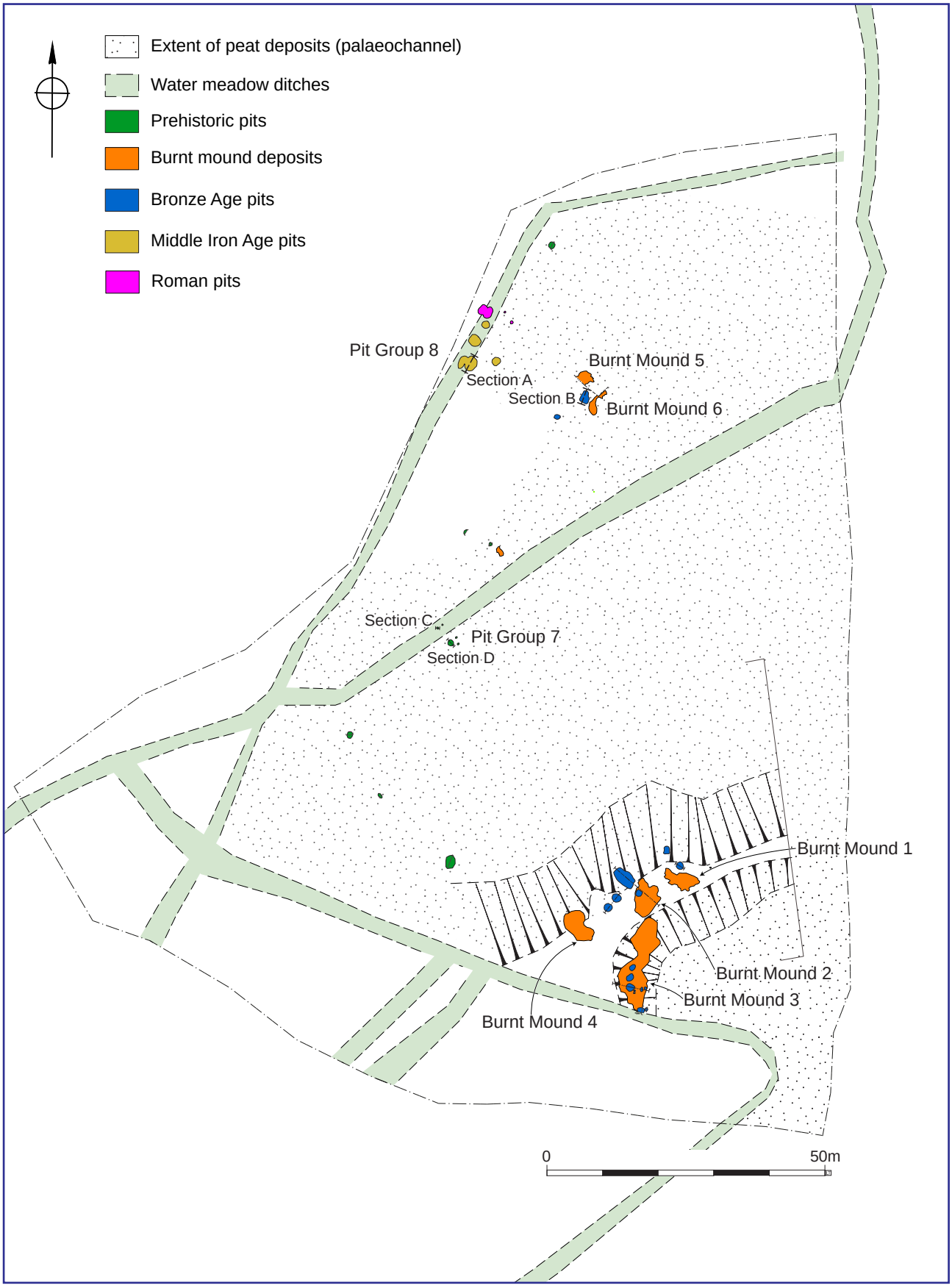
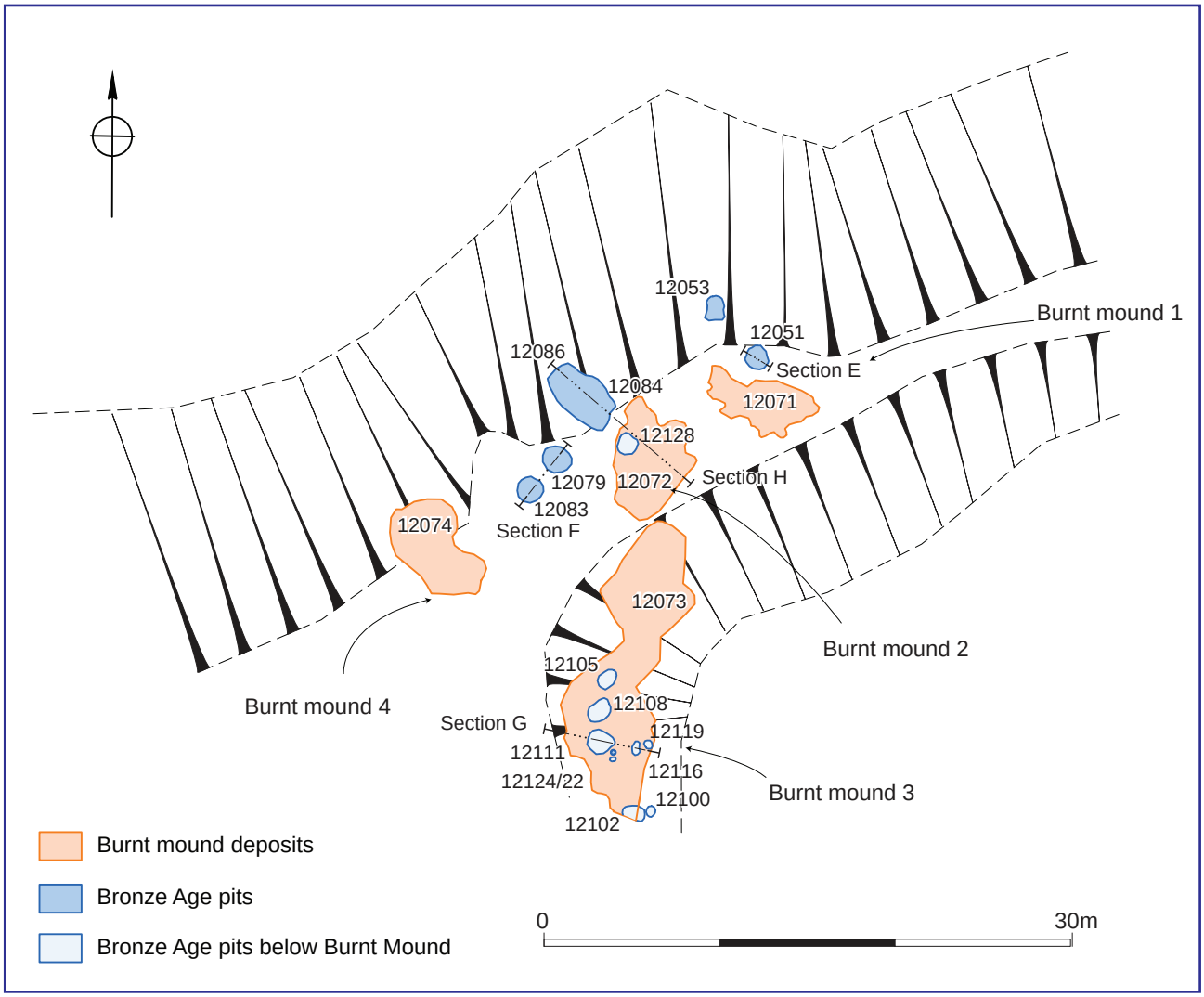
Location of the site *Figure 1*



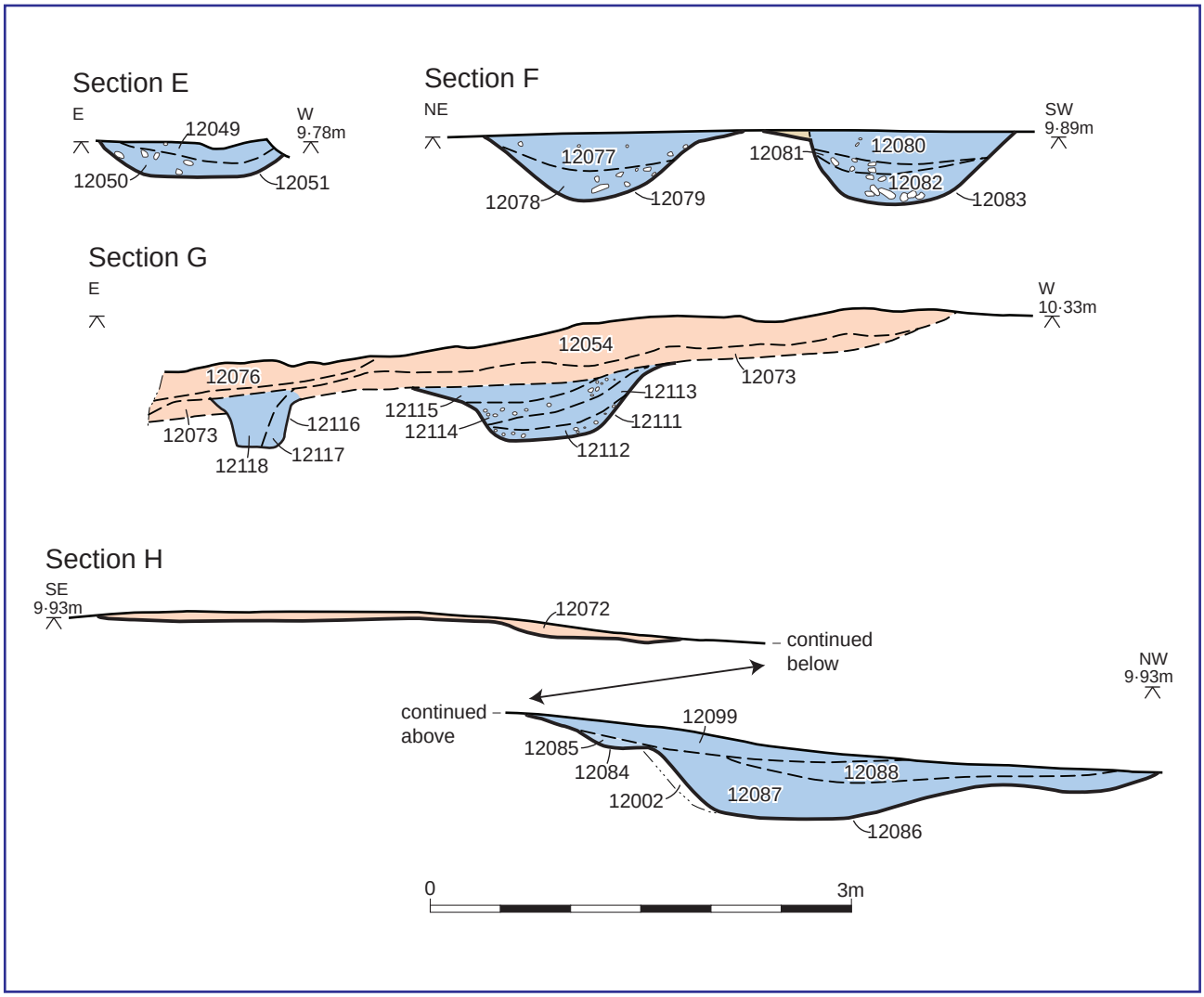
Areas 11 a, b and c: Geotechnical test pitting *Figure 2*



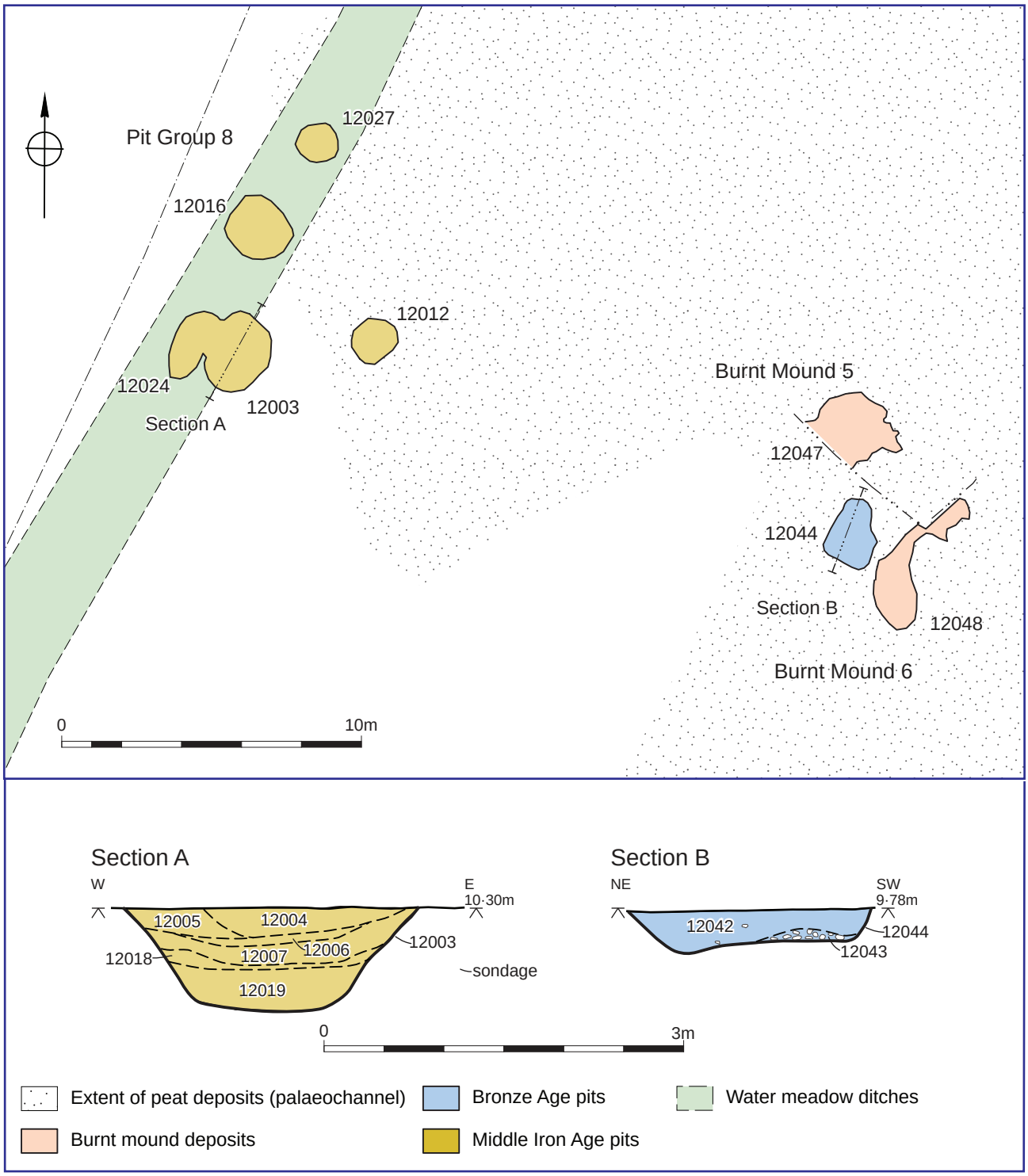
Area 11a: archaeological features *Figure 3*



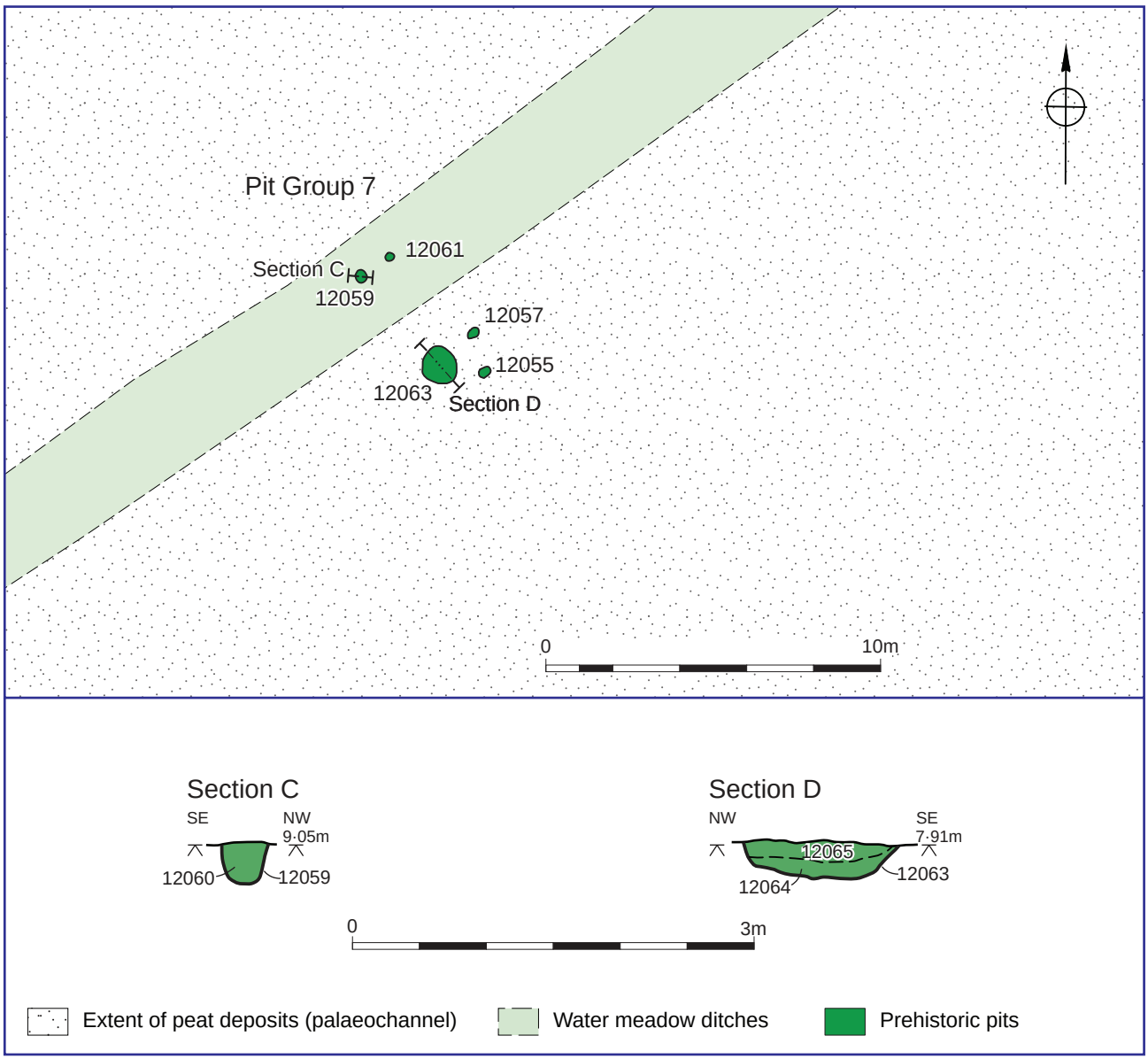
Area A: Burnt mounds 1–4 *Figure 4*



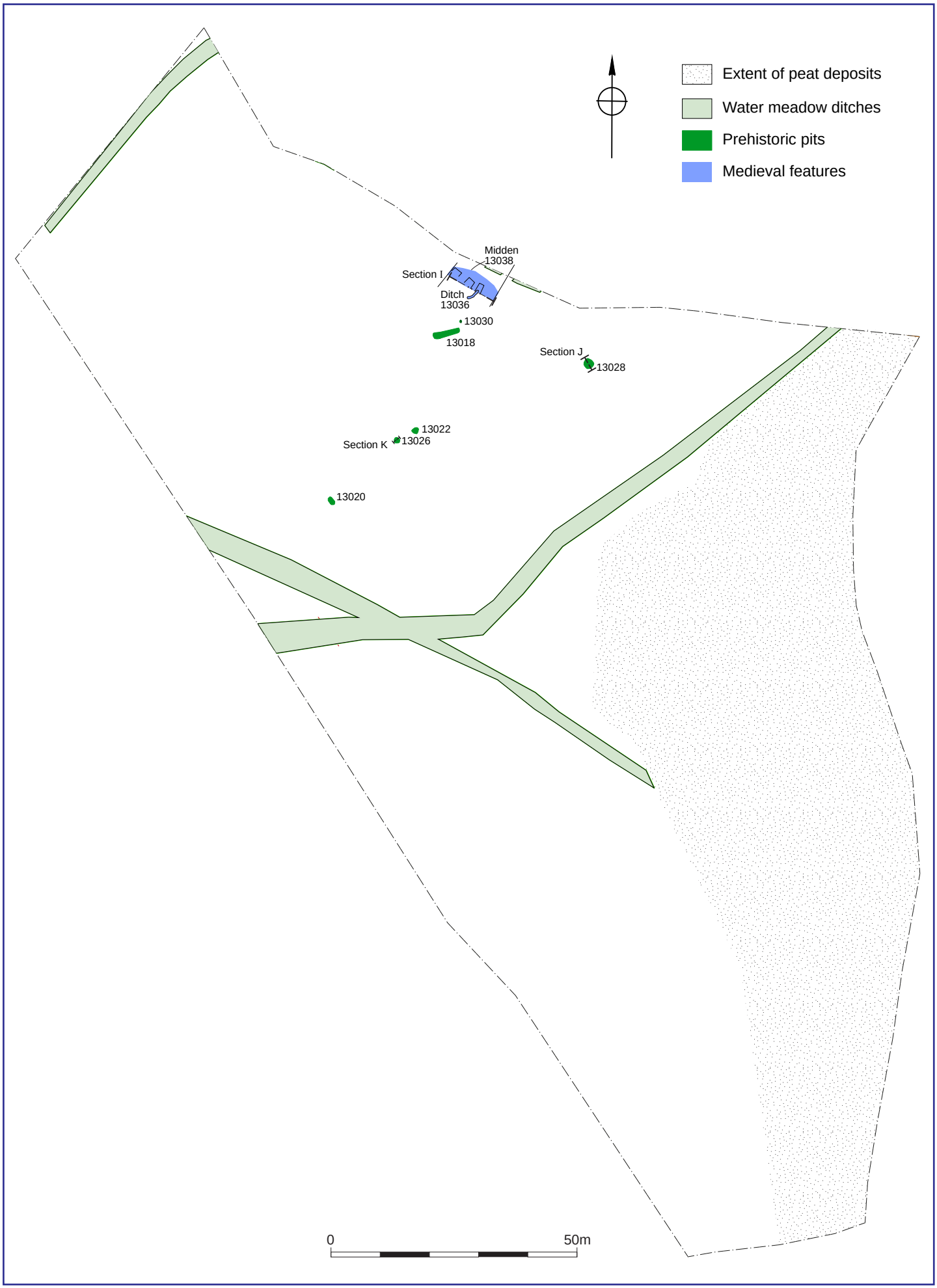
Area 11a: Burnt mounds sections E–H *Figure 5*



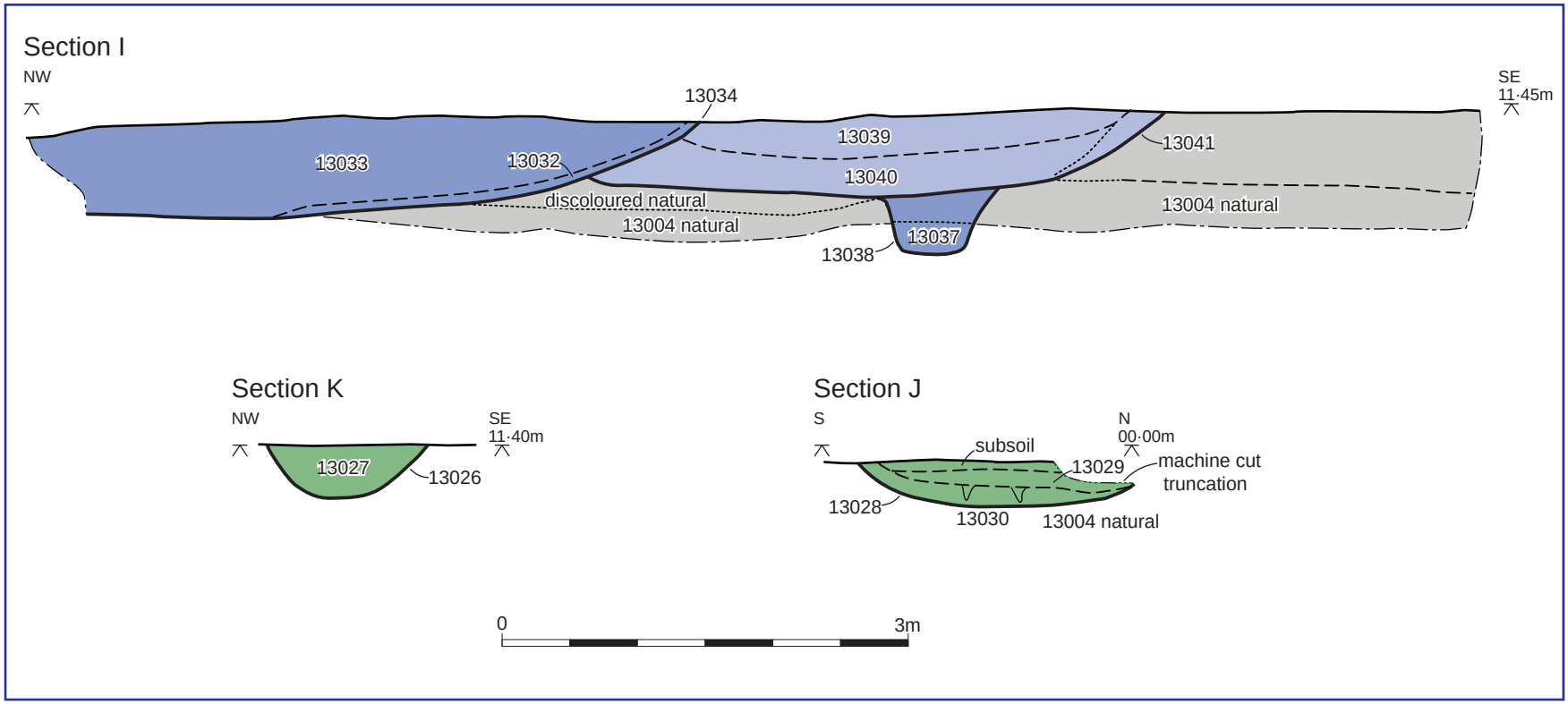
Area 11a: Pit group 8 and Burnt Mounds 5 and 6 *Figure 6*



Area 11a: Pit Group 7 *Figure 7*

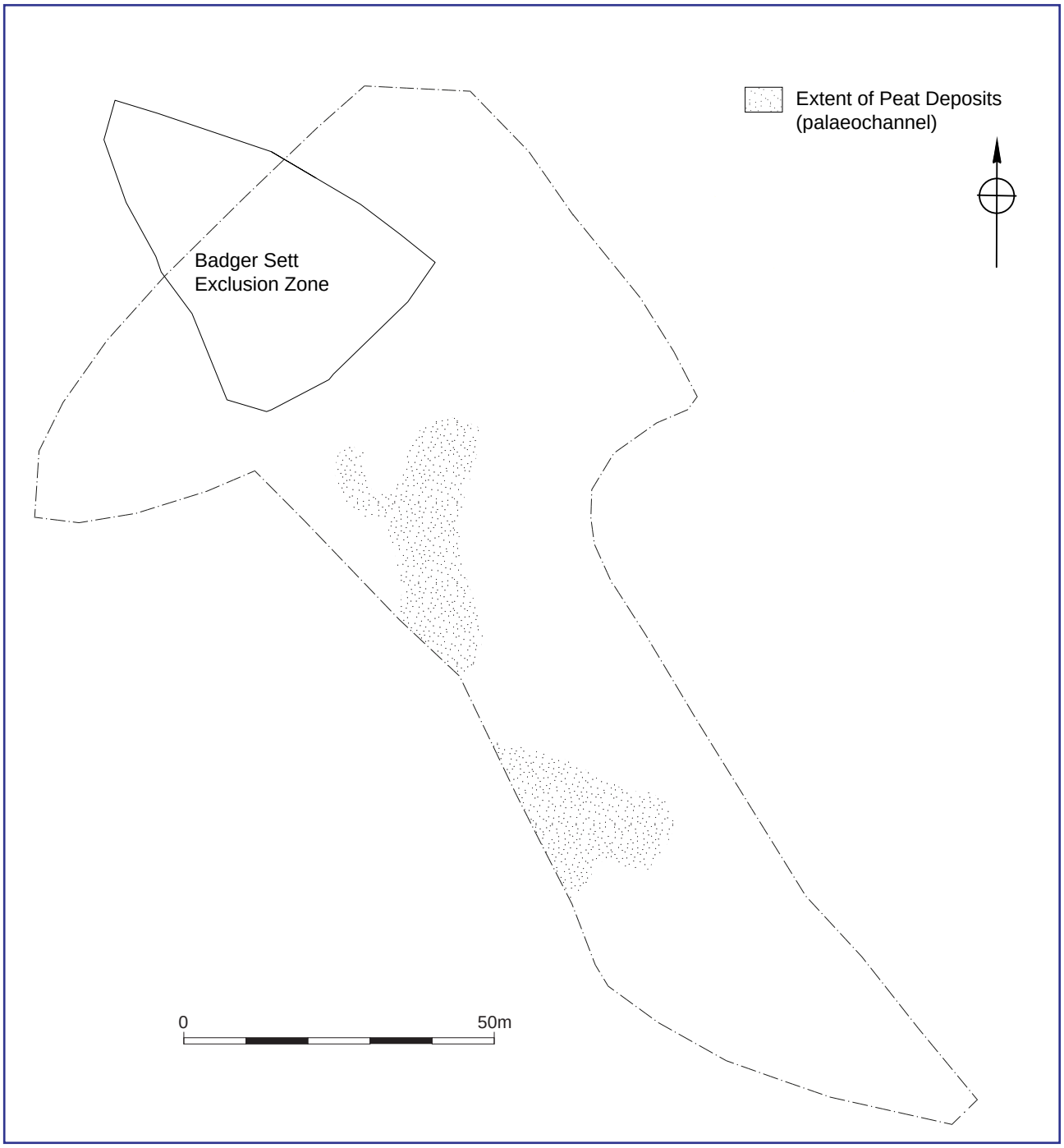


Area 11b: archaeological features *Figure 8*

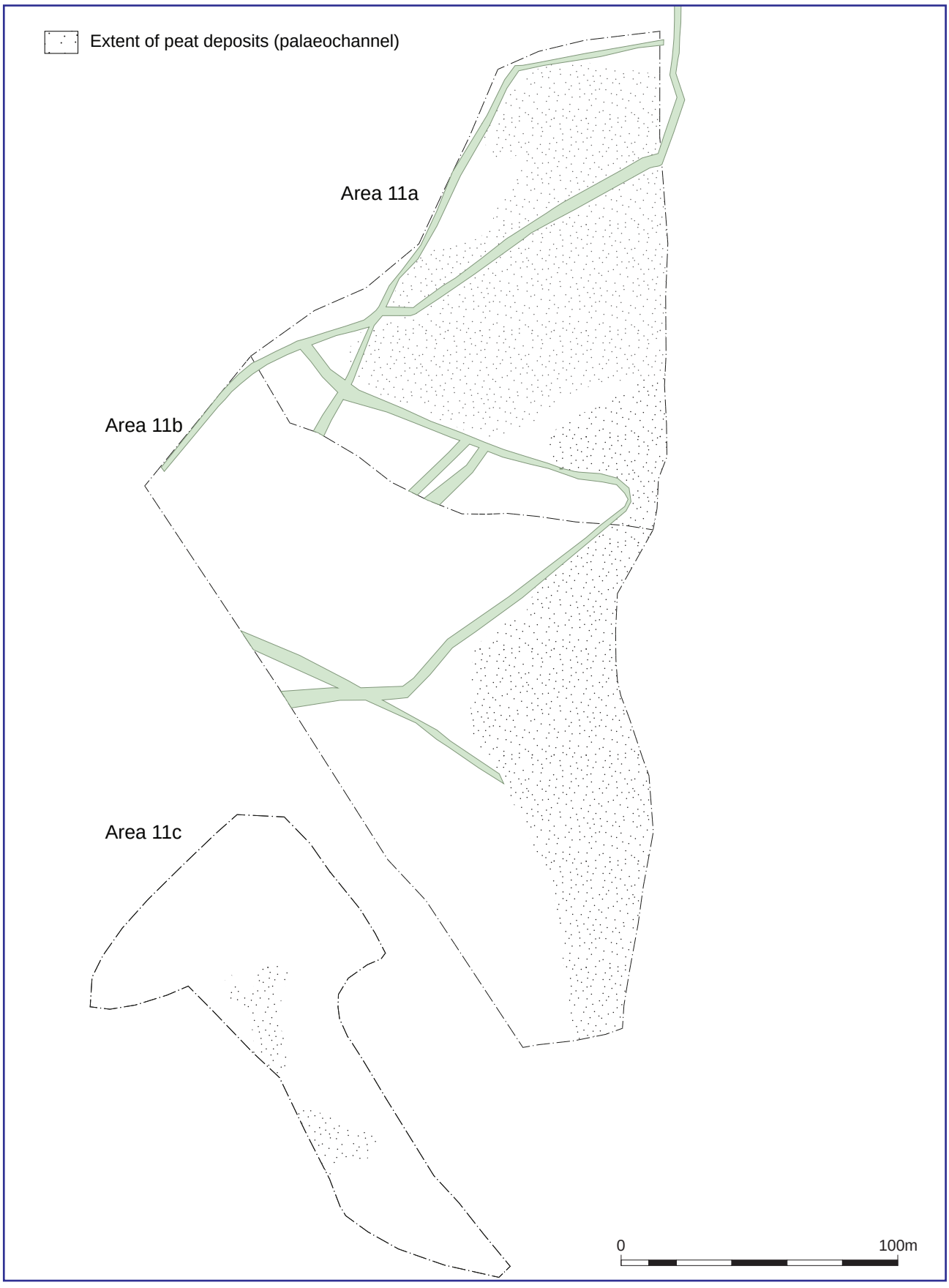


Area 11b: sections

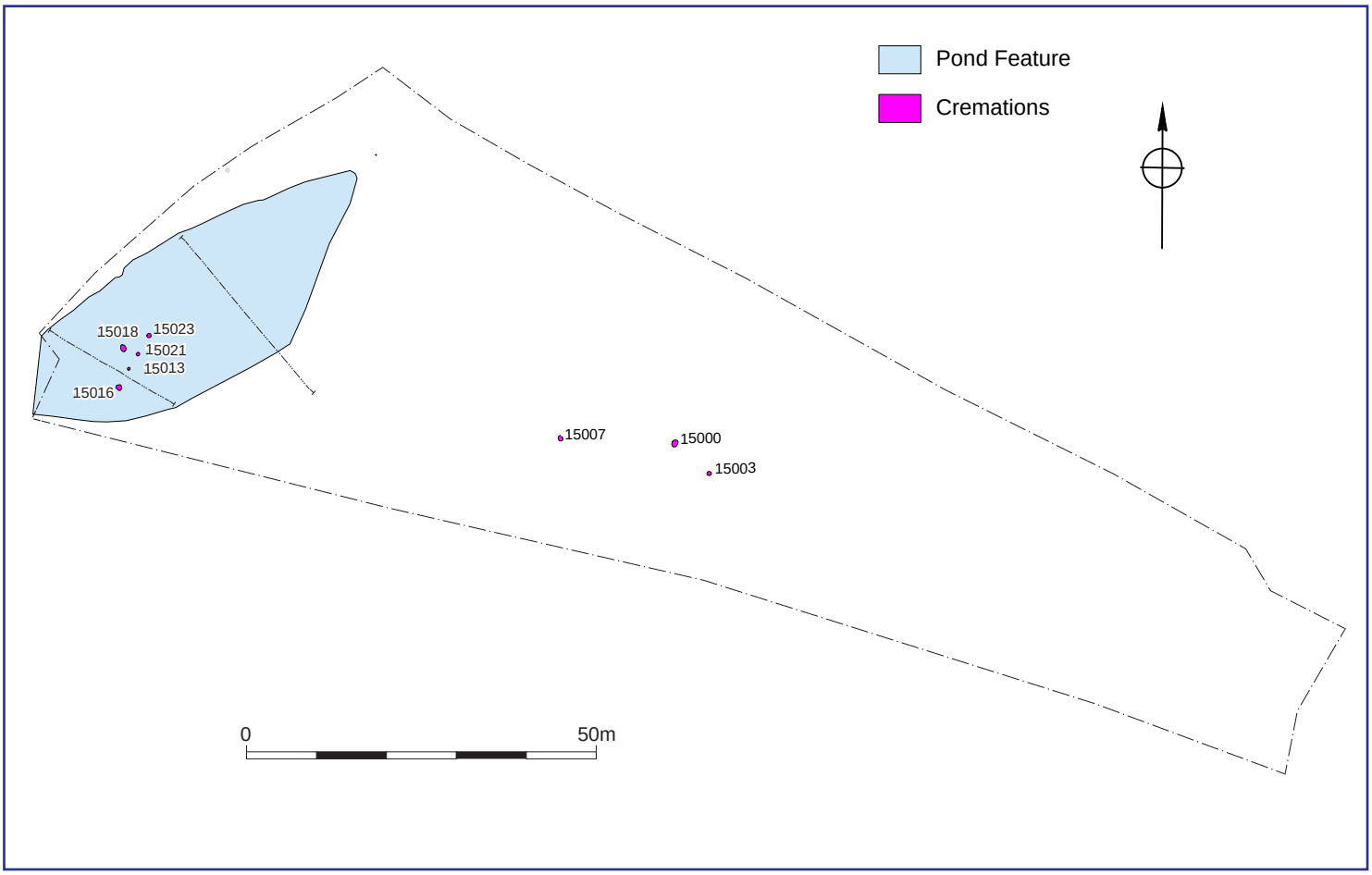
Figure 9



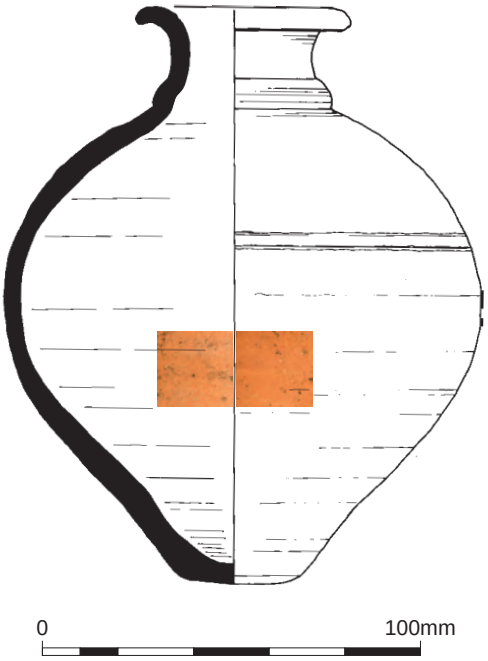
Area 11c *Figure 10*



Area 11 Extent of Peat deposits *Figure 11*

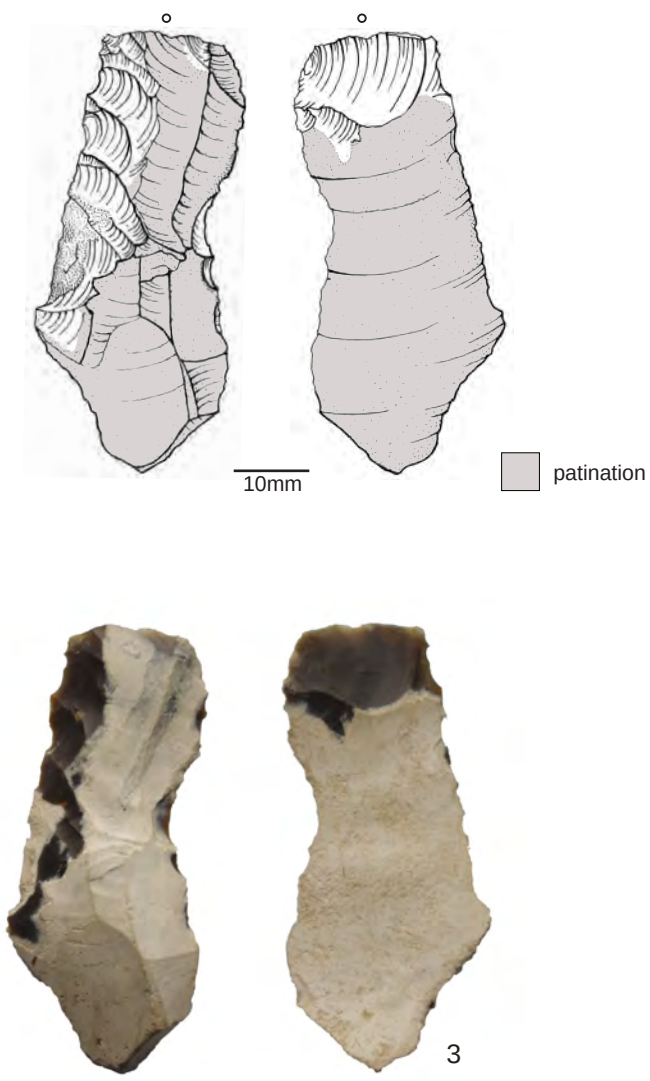


Area 10 - watching brief: archaeological features *Figure 12*

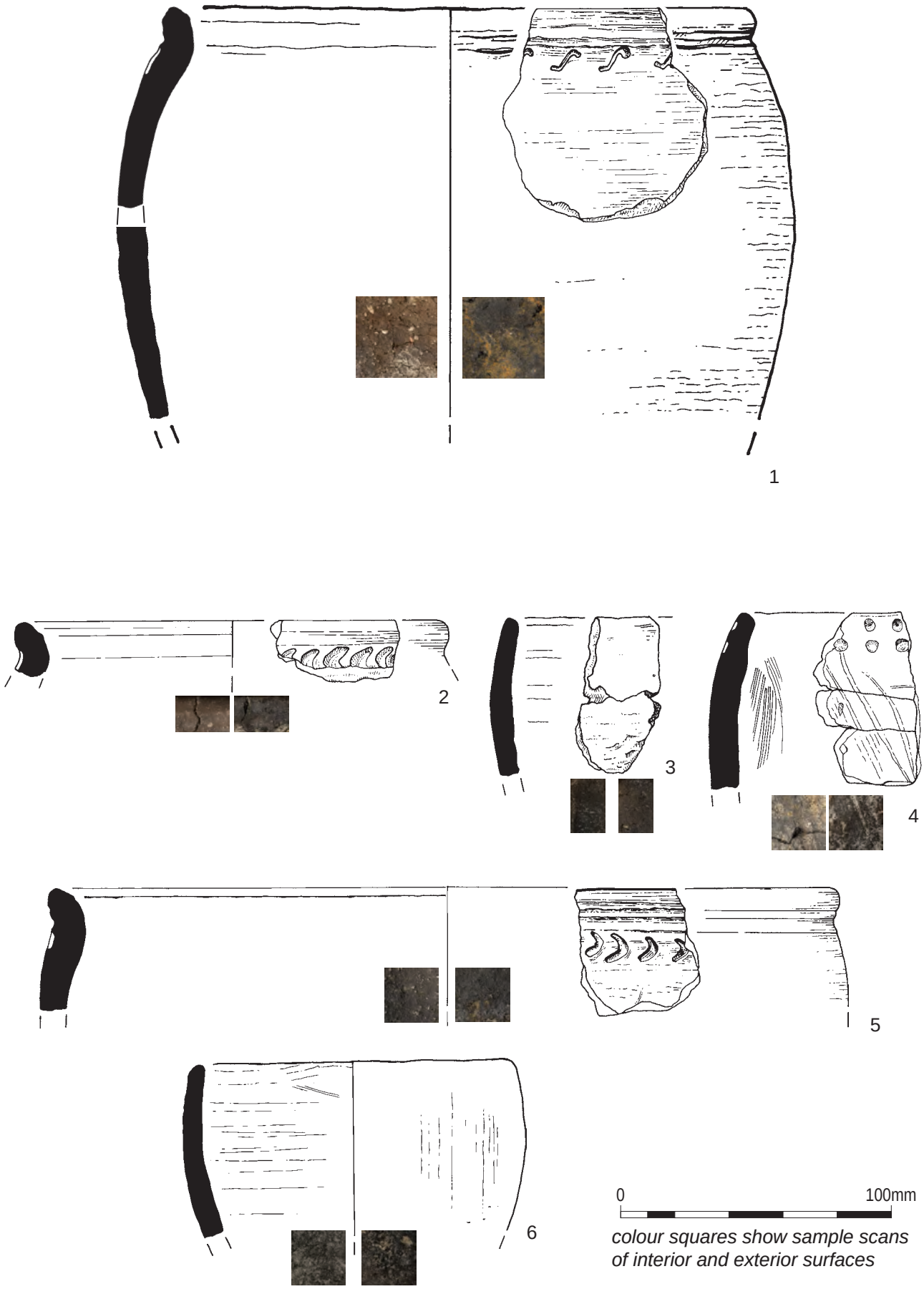


colour squares show sample scans of interior and exterior surfaces

Area 10 pottery: cremation urn *Figure 13*



Flints *Figure 14*



Area 11 Middle Iron Age pottery *Figure 15*

Plates

Plate 1: Excavating the mammoth tusk

Plate 2: Mammoth tusk following conservation (0.5m scale)

Plate 3: Peat palaeochannel visible as a dark line in section. A watermeadow ditch runs across the foreground (looking south)

Plate 4: Burnt mounds 1-4, on ridge, looking south-west (1m scales)

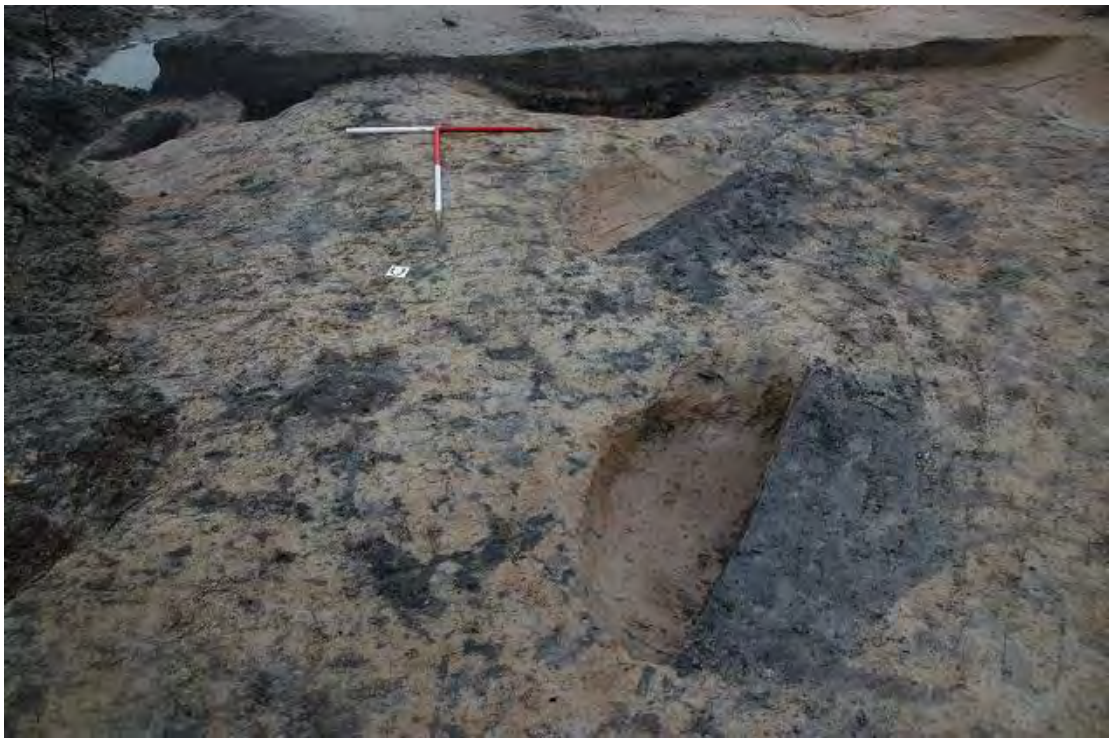


Plate 5: Pits below burnt mound 12073, looking south (1m scales)

Plate 6: Spread of sand and charcoal 12068, looking north-west (1m scale)

Plate 7: Pit 12066, looking south (1m scale)

Plate 8: Pit 12063, looking north-east (1m scale)

Plate 9: Posthole 12055, looking south-west (0.5m scale)

Plate 10: Burnt mound 12047 in background with pit 12044, looking north-east (1m scale)

Plate 11: Pit 12016 showing bark lining, looking north-west (1m scale)

Plate 12: Pit 12003, looking north-west (1m scale)

Plate 13: Cremation 15009, looking north (0.2m scale)

Plate 14: Urn from cremation 15009 (50mm scale)

Plate 15: Section across midden deposit 13034 (1m scales)

Plate 16: Section through Burnt Mound 1, looking south-east (1m scales)

Plate 17: Pit 12111 below Burnt Mound 3, looking south-east (1m scale)

Plate 18: Section through pond 15005 (1m scales)

Plate 19: Human Distal Hand Phalanges from Context [15008]

Plate 20: Ferrous adhesions and staining to cremated bone from context [15008].

Appendix 1 Mammoth conservation

Nigel R. Larkin BA MSc FRGS

Natural History Conservation

16 Old Smithy Road, Tibberton, Newport, Shropshire. TF10 8PR.

Website: www.natural-history-conservation.com Email: nrlarkin@easynet.co.uk

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26th July 2016

Conservation report re Woolly Mammoth tusk from Clifton Quarry (HER No. WSM 46456)

This reasonably complete tusk of a woolly mammoth (*Mammuthus primigenius)* was discovered in a gravel pit (Clifton Quarry). The proximal end with the 'pulp cavity' (the cone-shaped space) is relatively complete but the distal end has been lost. There is some damage to the midsection, but otherwise the tusk is in very good condition. It was waterlogged when found so it was left damp and covered in plastic to ensure that it dried out slowly to reduce the chances of splitting and delamination which is the biggest problem with tusks that get wet.

Once it had dried out enough the surfaces of the tusk were gently cleaned with a soft brush and where necessary with wooden spatulas and a scalpel (to remove patches of really stubborn sand and gravel). As the cleaning progressed, the specimen was consolidated with Paraloid B72 at 10% in acetone, with thicker consolidant (up to 20% in acetone) pipetted into the cracks and Paraloid B72 adhesive applied to breaks, to help hold the specimen together. Significant gaps were filled with a paste made from Paraloid B72 adhesive mixed with glass beads, 44 microns in size (see: Larkin, N. and Makridou, E. 1999. *Comparing gap-fillers used in conserving sub-fossil material*. The Geological Curator 7 (2), 81-90.). These gap fills were then painted-out with artists' acrylic paints to match the tusk.

The bespoke steel mount was made using blacksmithing and welding skills, was then sprayed with black satin paint and lined with inert black Plastazote foam between the tusk and the metal to protect the specimen. A wooden plinth was made from MDF, slightly larger than the length of the specimen, to protect it from knocks. This was coated with two applications of Dacrylate varnish to reduce emissions of VOCs. Pieces of wood are glued to the underside (with PVA wood glue) to enable fingers to get underneath the MDF to enable it to be easily lifted and moved. The plinth was then sprayed with black satin paint to match the mount. The mount is secured to the plinth with four metal screws and the tusk is simply lifted in to place. See below.

Once the project was completed, a wooden frame had to be built around the specimen (see below) to hold it firmly in place so that it would not move and suffer damage on its journey back to Worcester. It should remain in this frame until the tusk is put on display to reduce the chances of damage.

Above, the mounted tusk on its plinth. Below, in its travelling frame.

Appendix 2 Technical information

The archive (site code: WSM 46456)

The archive consists of:

204	Context records AS1
19	Field progress reports AS2
10	Photographic records AS3
680	Digital photographs
2	Drawing number catalogues AS4
92	Scale drawings
4	Context number catalogues AS5
2	Recorded finds records AS13
2	Sample number catalogues AS18
42	Flot records AS21
10	Trench record sheets AS41
2	Box of finds
1	Copy of this report (bound hard copy)

The project archive is intended to be placed at:

Worcestershire County Museum
Museums Worcestershire
Hartlebury Castle
Hartlebury
Near Kidderminster
Worcestershire DY11 7XZ
Tel Hartlebury (01299) 250416

Appendix 3 Context group number table

Group Number	Feature Context Number	Feature Type
Burnt Mound 1	12071	Layer
	12051	Pit
	12053	Pit
Burnt Mound 2	12072	Layer
	12079	Pit
	12083	Pit
	12128	Pit
Burnt Mound 3	12073	Layer
	12100	Pit
	12102	Pit
	12105	Pit
	12108	Pit
	12111	Pit
	12116	Pit
	12119	Pit
	12122	Pit
	12124	Pit
Burnt Mound 4	12074	Layer
Burnt Mound 5	12047	Layer
Burnt Mound 6	12048	Layer
	12044	Trough?
	12046	Pit
Pit Group 7	12055	Pit
	12057	Pit
	12059	Pit
	12061	Pit
	12063	Pit
Pit Group 8	12003	Pit
	12012	Pit
	12016	Pit
	12024	Pit
	12027	Pit
Midden	13032	Midden
	13033	Midden
	13034	Midden
	13035	Midden
	13036	Midden
	13037	Midden
	13038	Midden
	13039	Midden
	13040	Midden
	13041	Midden
	13044	Midden

Summary of data for Worcestershire HER

WSM 46456 (event HER number)

P2902

Artefacts

period	material class	object specific type	start date	end date	count	weight(g)	specialist report (note 2)	key assemblage? (note 3)
Mesolithic-early Neolithic	stone	tool	-10,000	-3000	1	1.1	yes	yes
Mesolithic-early Neolithic	stone	debitage	-10,000	-3000	1	1.3	yes	yes
Mesolithic-early Bronze Age	stone	tool	-10,000	-1500	3	20.3	yes	yes
Mesolithic-early Bronze Age	stone	debitage	-10,000	-1500	4	9.3	yes	yes
Early Neolithic	stone	debitage	-4000	-3000	1	8.4	yes	yes
Early Neolithic	stone	tool	-4000	-3000	4	19.7	yes	yes
Neolithic	stone	?axe flake	-4000	-2500	1	0.5	yes	yes
Late Neolithic-early Bronze Age	stone	tool	-3000	-1500	3	63.8	yes	yes
later prehistoric	stone	tool	-1500	43	1	20.4	yes	yes
prehistoric	stone	debitage	-10,000	43	11	74	yes	yes
prehistoric	stone	tool	-10,000	43	1	9.7	yes	yes
middle Iron Age	ceramic	pot	-400	-101	102	1265	yes	yes
Iron Age	ceramic	briquetage	-400	42	27	371	yes	yes
Iron Age	ceramic	briquetage?	-400	42	10	112	yes	no
Iron Age	stone	quern	-400	42	2	976	yes	no
Late Iron Age/ early Roman	ceramic	pot	-100	early 2nd	1	13	yes	no
prehistoric	ceramic	pot			11	13	yes	no
prehistoric	stone	burnt stone			22	1608	yes	no
Roman	ceramic	pot	mid 1st	4th	119	1351	yes	crematio n urn yes, rest

								no
Roman	ceramic	brick/tile	mid 1st	4th	2	19	yes	no
Roman	ceramic	oven	late 3rd	4th	4	513	yes	no
Roman	metal	hobnail	mid 1st	4th	3	5	yes	no
Roman	slag	smelting slag	late 3rd?	4th	33	3432	yes	no
Roman	stone	roof tile	late 3rd?	4th	3	1149	yes	no
medieval	ceramic	pot	12th	14th	119	1388	yes	yes
medieval?	ceramic	tile	1100	1499	27	940	yes	no
late med/ early post-med	ceramic	pot	15th	17th	8	194	yes	no
undated	bone	fragment	0	0	1	183	yes	no
undated	ceramic	brick/tile	0	0	2	64	yes	no
undated	ceramic	fired clay	0	0	57	567	yes	no
undated	slag	fragment	0	0	6	279.5	yes	no
undated	stone	fragment	0	0	3	266	yes	no
undated	stone	tile	0	0	1	186	yes	no
undated	wood	stick	0	0	5	307	no	no

Notes

1) In some cases the date will be "Undated". In most cases, especially if there is not a specialist report, the information entered in the Date field will be a general period such as Neolithic, Roman, medieval etc (see below for a list of periods used in the Worcestershire HER). Very broad date ranges such as late Medieval to Post-medieval are acceptable for artefacts which can be hard to date for example roof tiles. If you have more specific dates, such as 13th to 14th century, please use these instead. Specific date ranges which cross general period boundaries can also be used, for example 15th to 17th century.

period	from	to
Palaeolithic	500000 BC	10001 BC
Mesolithic	10000 BC	4001 BC
Neolithic	4000 BC	2351 BC
Bronze Age	2350 BC	801 BC
Iron Age	800 BC	42 AD
Roman	43	409
Post-Roman	410	1065
Medieval	1066	1539
Post-medieval	1540	1900
Modern	1901	2050

period specific	from	to
Lower Paleolithic	500000 BC	150001
Middle Palaeolithic	150000	40001
Upper Palaeolithic	40000	10001
Early Mesolithic	10000	7001
Late Mesolithic	7000	4001
Early Neolithic	4000	3501
Middle Neolithic	3500	2701
Late Neolithic	2700	2351
Early Bronze Age	2350	1601
Middle Bronze Age	1600	1001
Late Bronze Age	1000	801
Early Iron Age	800	401
Middle Iron Age	400	101
Late Iron Age	100 BC	42 AD
Roman 1st century AD	43	100
2nd century	101	200
3rd century	201	300
4th century	301	400
Roman 5th century	401	410
Post roman	411	849
Pre conquest	850	1065
Late 11th century	1066	1100
12th century	1101	1200
13th century	1201	1300
14th century	1301	1400
15th century	1401	1500
16th century	1501	1600
17th century	1601	1700
18th century	1701	1800
19th century	1801	1900
20th century	1901	2000
21st century	2001	

2. Not all evaluations of small excavation assemblages have specialist reports on all classes of objects. An identification (eg clay pipe) and a quantification is not a specialist report. A short discussion or a more detailed record identifying types and dates is a specialist report. This field is designed to point researchers to reports where they will find out more than merely the presence or absence of material of a particular type and date.

3. This field should be used with care. It is designed to point researchers to reports where they will be able to locate the most important assemblages for any given material for any given date.