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A. M. Gibson
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The Clwyd-Powys Archaeological Trust
7a Church Street, Welshpool,Powys, SY21 7DL
tel (01938) 553670, fax (01938) 552179

THE WALTON BASIN PROJECT
1993-1997

Alex Gibson

With contributions by

Richard Hankinson, Philippa Bradley, David Jenkins & John Williams, Mark Walters, Paul Courtney, Randolph Donahue, Richard Evershed & Stephanie Dudd, Julian Henderson, John Crowther, Graham Morgan, Astrid Caseldine & Catherine Barrow, Su Johnson, Mike Walker & Jon Bradley, Nigel Jones, Peter Barker, John Milsom & Claire Thomas

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The illustrations emanate from the skilled pen of Brian Williams with the exceptions of figs 7.11-17 which were mostly by AMG with P33, P34, P35, and P68 being the work of Joanne Hutchinson. The Iron Age pot (fig. 7.18) was drawn by Alice Mayer.

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PART 1

THE WALTON BASIN PROJECT

1 INTRODUCTION

The Walton (or Radnor) Basin has for many years been recognized as an area of great archaeological potential. Its well-drained and fertile soils has made it an attractive area for settlement from the Mesolithic onwards but ironically it is these good soils and their potential for arable agriculture which today pose the main destructive threat to the archaeology of earthworks and cropmarks alike.

The present study was intended to quantify this threat to the total archaeology of the Basin and make recommendations for the better management of the important sites in this rich and intensively farmed landscape.

2 THE SURVEY AREA

The Walton Basin lies in the SE part of Radnorshire, on the border with Herefordshire, just to the SW of Presteigne and to the NW of Kington (figs 1.1-1.2). The survey area is a block of land roughly 10km by 10km covered by the map sheets SO25NW, SO25NE, SO26SW, SO26SE. The Basin, situated in the centre of the block, is about 5km in diameter and is bounded on all sides by steeply rising uplands, including to the W the Radnor Forest and Glascwm Hill. The Basin is considered to be the former bed of a post-glacial lake and is now drained by the Summergil and Knobley Brooks. A relict shoreline of this lake, represented by a marked terrace, is particularly visible in the Hindwell area running from Hindwell pool to the Four Stones circle.

A low, broad ridge or spine runs roughly E-W along the axis of the Basin rising to a maximum of *c.*25m above the surrounding countryside (fig. 1.2). From the crest of this ridge may be obtained good views of both the N and S halves of the valley and the well-drained soils afforded by this ridge have provided extensive evidence for prehistoric settlement in the form of flint scatters, round barrows and occupation sites (see below parts 4-7).

The Basin soils comprise well drained, fine loamy soils, some over stream terrace gravels, but mostly over drift from Palaeozoic and Mesozoic sandstones and shales. Seasonal waterlogging is a property of some of the soils.

3 THE RAPID LAND-USE SURVEY

The rapid land-use survey of the Walton Basin was undertaken during August 1992. The watershed was used to delimit the study area which encompassed the whole Basin with upland areas defining the edges on all sides. The pass to the E and out of the Basin between Burfa Bank (SO2861) and Herrock Hill (SO2759) is closed for the purposes of this present study by the English Border.

The main land-uses in the Basin are arable agriculture (cereals and root crop), pasture, rough pasture/moorland, and woodland. A distinction has been made between pasture and fallow fields on the land-use map (fig. 1.3) but this distinction is by no means clear-cut and pasture on Basin farms should not be regarded as permanent.

The majority of the known earthwork, cropmark and artefactual archaeology is concentrated in the roughly rhomboid parcel of land limited by New Radnor (W: SO2159), Beggar's Bush (N: SO2664), Lower Harpton (E: SO2760) and Walton (S: SO2559). Furthermore, within this land-parcel lies the greatest threat to the known archaeology through active arable agriculture.

The majority of pre-medieval archaeology is represented by cropmarks and artefact scatters themselves a result of a history of intensive arable agriculture and a testimony to the degradation of archaeological contexts. Prehistoric standing monuments are few, comprising a stone circle (Four Stones SO2460), standing stones (only three of which appear to be *in situ*) and round barrows. A further possible round barrow (PRN 3651) was discovered during the survey. With few exceptions, ploughing continues over these mounds and around the stones irrespective of their scheduled/unscheduled status. All barrows are well-spread and low as a result of the erosive effect of the agricultural regime.

The Four Stones stone circle now stands on a slight knoll or spur as the surrounding land has been lowered by intensive ploughing. This might suggest that even cropmark sites, whose degradation might have been assumed to have stabilized, are in fact still deteriorating as a result of annual plough-truncation. Furthermore, possible associated features outside this stone circle may now be poorly recoverable. Medieval and post-Medieval archaeology was deemed to be least at threat.

Monuments such as mottes were generally stable and village earthworks appeared to be in truly permanent pasture. Tree-cover on some mottes, however, such as at Castle Nimble (PRN 360), is almost certainly causing root damage.

Field-walking was undertaken on ploughed land over the valley floor and artefacts recovered at a number of points (see below Part 4, Table 4.5). These can be added to the previously known flint scatters documented in the Basin (Dunn 1964; 1965; 1966: below Part 7).

4 METHODOLOGY

The project was carried out as follows:

4.1 Stage 1 - Preliminary assessment

The preliminary assessment comprised

1 - aerial photograph consultation,
2 - cataloguing and mapping,
3 - library and SMR research,
4 - land-use survey and
5 - liaison with local landowners.

Steps 1- 3 were essentially desk-top exercises followed by field visits to complete steps 4 and 5 which ran concurrently. Further information on the archaeology of the region and the morphology of specific sites was obtained from steps 1 and 3 which were the last tasks to be completed. This preliminary assessment allowed the characterization of the Basin's archaeology.

4.2 Stage 2 - survey

The survey comprised earthwork survey, geophysical survey, aerial photography and fieldwalking.

The main earthwork survey mainly took place in November/December 1992 with a team of four people with the aim of assessing the agricultural effects on the archaeological monuments. The round barrows in the Basin were judged to be most at risk from the present regime and therefore selected as a group for survey. These results could be compared against the work of C.J. Dunn (1974) which gave a point-in-time description of the condition and dimensions of the mounds. This comparison would enable a quantitative assessment to be made. Throughout the project other earthwork sites were surveyed where landowner permission allowed. The earthwork surveys are discussed in Part 4 below.

Geophysical survey took two main forms. Firstly it was undertaken over the areas of dense flint scatters in grid squares SO2461 and SO2561 to try and detect buried features from which the flints may have been derived. Secondly, specific sites were targeted either to provide extra information prior to excavation or to attempt to shed light on areas of poor cropmark cover. The geophysical survey is discussed in Part 4 below.

Aerial photography was undertaken principally in the dry summers of 1994-6 inclusive and was successful in both shedding new light on known monuments as well as identifying previously unrecorded sites. The results of this element of the survey work is discussed in Part 4 below.

Fieldwalking was undertaken during the winters and springs of 1993/4, 1994/5 and 1995/6. Some "new" flint scatters were identified and post-medieval pottery was collected from several locations. The fieldwalking is discussed in Part 4 below and the finds are discussed in Part 7.

4.3 Stage 3 - excavation

The sites chosen for excavation were as follows

<u>PRN 307</u> Hindwell Ash barrow. The N half of this barrow appeared to have been substantially destroyed and a trial excavation over the mound was designed to assess its condition.

<u>PRN 305</u>, Upper Ninepence Barrow. This site comprised a low mound which had been substantially lowered since Dunn's survey. Furthermore Dunn had trial-trenched the site and found evidence for disturbed secondary burials. This degraded mound was completely excavated.

<u>PRN 50187</u> Upper Ninepence enclosure. This enclosure was trial-trenched to obtain details of its morphology and date.

<u>PRN 26548</u> Rough Close flint scatter. A small excavation was mounted to determine whether any features associated with the flint scatter had survived ploughing.

<u>PRN 3664</u>, Knapp Farm enclosure. The site was trial-trenched to determine its nature and date.

<u>PRN 4222</u>, Hindwell enclosure I. The site was trial-trenched to determine its nature and date.

<u>PRN 5134</u> Walton Green cursus. The site was trial-trenched to confirm its identification and to obtain dating material.

<u>PRN 19376</u>, Hindwell enclosure II. The site was trial-trenched to determine its nature and date.

The results of these investigations are presented in Parts 4-7 below.

PART 2

CHARACTERISATION OF THE ARCHAEOLOGY OF THE WALTON BASIN

1 INTRODUCTION

The archaeology of the Walton Basin is characterised and quantified in tables 2.1-2.5. In the majority of cases, the assignment of broad chronological period to many of these untested and unexcavated sites has been largely intuitive and must be regarded as such.

2 PREHISTORIC

The earliest signs of human activity are represented by a Paleolithic artefact from the excavations in the medieval town of New Radnor (Jones, forthcoming). The flint is a shouldered point of upper Palaeolithic date made of black translucent flint with a thick white patina and is dated to late-glacial interstadial and before the Younger Dryas stadial (13,00-11,800BP).

The majority of evidence for earlier prehistoric occupation, however, is to be seen in the lithic scatters which have been found after ploughing on stream terraces and low ridges - the ridge to the S of Rough Close Farm for instance has produced over 6000 flints (fig. 2.1). Mesolithic forms are well represented in these assemblages, although the majority show Neolithic and early Bronze Age affinities. It is likely that these scatters represent plough-truncated settlement sites though it is not known whether the settlement was permanent, temporary, continuous or intermittent. The flint scatters are dealt with separately below (Part 7).

Other than the lithic scatters, no Mesolithic monuments have been identified and the earliest visible earthwork monuments date from the late Neolithic and early Bronze Age and include 21 round barrows (see below table 2.1). A further 18 ring-ditches, visible only as cropmarks, probably represent former barrows. The distribution of these sites falls into four main groups (fig. 2.1). The first is a linear group running along the horizon on the N edge of the basin. The second, also linear, forms a chain from Kinnerton to Burfa and may represent a former route way. A similar distribution may be detected amongst the standing stones (see below). A third group runs approximately from Downton Farm (SO2360), E to Walton Green (SO2659) (corresponding to the present A44 to Walton) then continues E to the Walton cursus and the English border. The final group is more clustered and occupies the top and S slopes of the central ridge of the basin between Hindwell and Rough Close farms, within and to the N of the Hindwell palisaded enclosure. This is an area of dense flint scatter attesting Neolithic and Bronze Age settlement and the S linear arrangement of standing stones also passes through this barrow cluster (see below).

Other cropmark sites may also be attributable to the Neolithic and Bronze Age, for instance a rather enigmatic large curvilinear enclosure defined by individual evenly-spaced pits (PRN 4255). This monument (fig. 2.1), with a possible pit-avenue to the SW, resembles the later Neolithic enclosure at Meldon Bridge, Peeblesshire (Burgess 1976). The recently discovered palisaded enclosure at Hindwell (PRN 19376) also broadly dates to this period (see below) and two possible cursus monuments have been identified on Walton Farm (PRN 5134) and immediately S of the Four Stones (PRN 33109). A large ring-ditch W of Walton village (PRN 375) may represent a hengiform monument though it appears on the SMR as a possible Roman *gyrus*. A multiple pit alignment at Upper Ninepence (PRN 4281) may also date to this period or may represent a later land boundary or even be the result of agricultural activity (inf Chris Musson).

There are 6 standing stones in the Basin (see below, table 2.1) as well as 'stone' placenames. Only three of the stones appear to be *in situ*, though the displaced stones need not have been moved far from their original positions. Like the barrows and ring ditches, they form two linear arrangements (fig. 2.1). The first runs from the Four Stones stone circle towards Burfa Bank (PRN 1073, 306, 4226) and the second runs from Downton (Carreg placename PRN 2191) to Hindwell Ash and then to the same point (incorporating PRN 1069, 1070, 299). Both these routes are followed by present routes or tracks and may well represent ancient routes from the basin interior to the pass into the Midlands plain. The Fourstones stone circle (PRN 1072) is of four-poster type (fig. 4.1) and is one of only two in Wales, the other being at Cwm Saesan, 6 miles N of Rhayader (Burl 1988, 202-3) though another possible site has been located at Bryn-yr-Aran in Montgomeryshire but remains to be surveyed.

PERIOD	SITE TYPE	NUMBER	PRN'S
Neolithic	Cursus	2	5134; 33109
	Enclosure	2	4255; 19376
	Mound	1	?359
	Pit alignment	1	5295
	Hengiform ?	1	375
Bronze Age	Enclosure	1	50187
	Ring ditch	18	365; 373; 4223; 4224; 4254; 5650; 7022; 33100; 33111; 33112; 33113; 33118; 33128; 33129; 33148; 34059; 34400; 50188
	Round barrow	21	296; 300; 303; 305; 307; 309; 310; 314; 358; 369; 1078; 1081; 1991; 1992; 1994; 1995; 1996; 2184; 3651; 4464; 19242;
	Standing stone	6	299; 306; 1069; 1070; 1073; 4226
	Stone placename	4	2116; 2191; 2209; 2212
	Stone Circle	1	1072
Iron Age	Ditch system	1	33122
	Enclosure	22	2207; 2274; 2275; 2276; 3664; 4222; 4225; 5133; 5137; 6121; 7025; 19358; 19374; 19427; 19428; 33101; 33117; 33120; 33127; 33131; 33134; 33135; 33155; 33156
	Hillfort	2	297; 312
	Pit alignment	1	50186
	Round house	1	33126
Undated	Bank	5	6831; 7899; 19010; 26297; 26298
	Ditch	2	33130; 33188
	Enclosure	3	6098; 6839; 33108
	Mound	1	6830
	Scoop	1	6837

Table 2.1: The Prehistoric sites of the Walton Basin.

The large mound at Knapp Farm (PRN 359) may possibly be a prehistoric monument rather than a motte which it is generally assumed to be. Firstly there is no trace of either surrounding ditch or bailey nor are there the traces of the ridge and furrow cultivation which generally occurs in the vicinity of the mottes. Secondly, the top of the mound is remarkably rounded (fig. 4.2) rather than flat-topped like the other mottes in the Basin. That this site should be seen alongside other large prehistoric mounds such as Silbury Hill, Marlborough, Hatfield Barrow or Duggleby Howe is a distinct possibility.

Two spectacular finds were made during ploughing in 1981 on Maesmelan farm (PRN 5141; SO19455875). They comprise two gold Capel Isaf type hook-fastened bracelets of the middle to late Bronze Age (Green *et al.* 1983). Now in the collections of the National Museum and Galleries of Wales, these bracelets had been deposited together, one inside the other, close to the surface and were declared Treasure Trove. Subsequent excavation at the site failed to provide a context for the finds.

Later prehistoric sites include the hillforts of Burfa Camp and Pen Offa (PRN 297, 312) and possibly some of the 22 recorded cropmark enclosures in the Basin (fig. 2.2). These include a rectilinear enclosure on Hindwell Farm (PRN 4222) another at Harpton (PRN 5225) and a larger enclosure below the present road at Knapp (PRN 3664). Other enclosures (PRN 5137, 5123, 6121) are visible amongst the cropmark complex at Walton Farm and a rectilinear enclosure N of Rough Close (PRN 19374) was located during project-based aerial photography in 1994.

Relict field ditches visible on aerial photographs may also belong to this later prehistoric phase. None of these cropmark ditches have been tested by excavation, but their disregard for the present field system suggests that they are earlier and they may well be associated with the later prehistoric enclosures.

3 ROMAN

Roman activity takes the form of a Roman fort at Hindwell (PRN 315) with a well-defined road network emanating from the W and E gates (fig. 2.3). A small excavation at this fort in 1975/6 during the construction of a new silo at Hindwell Farm, discovered a two-phased oven and two phases to the outer ditch (Pye 1979). The first phase was V-shaped, 5.2m wide and 2.6m deep and the second was a Punic ditch 6.5m wide by 2.35m deep. There were traces of ironworking in the upper ditch fills. All the finds suggest a pre-Flavian date for both phases of the fort; the majority being Claudio-Neronian in date.

Some clearly-defined cropmark marching camps around Walton village (PRN 370, 371, 372) and at Crossways Lane, Hindwell (PRN 313) were discovered by St Joseph (1980). The latter site is large, covering 17.4Ha (43 acres), and is irregularly rectangular. Traces of a palisade inside the ditch can be detected on aerial photographs. Rectilinear ditches may represent traces of 3 other possible marching camps (see below table 2.2).

SITE TYPE	NUMBER	PRN'S
Bath house	1	316
Gyrus ?	1	375
Fort	1	315
Marching camp	7	313; 370; 371; 372; 710; 5291/5292; 5294
Road	5	5293; 33121; 33124; 33125; 33140
Signal station	1	34055

Table 2.2: Roman sites in the Walton Basin.

The hengiform monument W of Walton village mentioned above (PRN 375) has also been identified as a possible *gyrus* though the likelihood of a hengiform function for this site has already been voiced above. A possible Roman road defined by two parallel ditches (PRN 5293) can be seen emanating from one of the marching camps (PRN 372). A possible signal station (PRN 34055) defined by a double square ditch with entrances to the E was discovered during routine aerial photography undertaken as part of the present project

4 MEDIEVAL

Evidence that interest in the area was maintained into the early medieval period is provided by the presence of 5 mottes (PRN 298; 301; 302; 311; 1071) and 3 motte and baileys (PRN 304; 317; 360) (table 2.3). There is also the possibly Mercian, later Norman, defended settlement of New Radnor with its masonry castle (PRN 1075) and associated town defences and the shrunken settlements of Evenjobb, Kinnerton and Old Radnor (fig. 2.4). These mottes and settlements are also adjacent to areas of ridge & furrow cultivation. Exceptions to this are the mottes at Barland (PRN304) and Evancoyd (PRN298) though their generally wooded environments preclude the identification of relict agricultural regimes. Also noteworthy is the presence of ridge and furrow at Downton (PRN 33107, 33142, 33143) which occurs without an associated motte and may therefore be part of an outfield system. Lying equidistant between New Radnor and Old Radnor, this site may well benefit from further survey. Ring ditch PRN 4224, lying some 40m to the E of Downton, exhibits traces of a central cross on some aerial photographs and may well be the site of a windmill serving this area.

The distribution of these settlements and mottes forms two main linear arrangements (fig 2.4) reflecting the barrow and standing stone routes outlined above.

The Basin was clearly defended in the early medieval period. A short linear earthwork cutting off the neck of the W entrance to the basin at Vron Farm 1.5 km to the W of New Radnor (PRN 2145) may be associated with the Mercian settlement, and Offa's Dyke passes through the NE of the survey area. A possible moat or ringwork (PRN 374), interpreted as a moated parsonage (see Part 3) is situated at Old Radnor.

Old Radnor and Kinnerton are both shrunken medieval settlements with extensive earthwork traces of the former settlements located in the fields outside the present villages. Building platforms have also been noted in vacant intra-mural plots in New Radnor and excavation on one such vacant plot at the Porth, has produced evidence for intensive medieval activity (Jones forthcoming).

A well-defined hollow way (PRN 3665) edges the fields between Downton and Hymns farms and may well fossilize the Roman road emanating from the W gate of Hindwell Fort. A pillow mound (PRN 3650) has also been recorded in this area.

SITE TYPE	NUMBER	PRN'S
Bank	5	2145; 19126; 19129; 33001; 33037
Boundary	11	33000; 33001; 33008; 33009; 33013; 33041; 33042; 33043; 33045; 33060; 33189
Burgage plot	1	17409
Corn drying kiln	1	17483
Deserted settlement	2	5296; 33023
Ditch	1	33106
Earthwork	3	15832; 15833; 19012
Enclosure	1	19124
Hollow way	11	26329; 26330; 26331; 26332; 26333; 26334; 33002; 33012; 33014; 33133; 33139
Masonry castle	1	1075
Mill pond	1	19136
Motte	6	298; 301; 302; 311; 1071
Motte and bailey	3	304; 317; 360
Offa's Dyke	1	33119
Platform	27	7901; 16296; 16299; 19125; 19127; 19133; 19134; 19135; 33003; 33004; 33005; 33006; 33010; 33011; 33027; 33032; 33033; 33034; 33047; 33048; 33049; 33050; 33051; 33052; 33135; 34967; 34968
Ridge & furrow	21	15831; 16267; 16268; 16269; 16271; 19128; 19132; 19137; 19138; 19350; 33103; 33104; 33107; 33132; 33142; 33143; 33145; 33146; 33149; 33150; 33151
Ringwork	1	374
Road and track	15	3665; 16298; 19113; 19114; 19115; 19119; 19120; 19122; 19139; 19140; 19142; 19143; 33007; 33037; 33053
Town	1	16181; (29195-7,19130, 19131)
Town defenses	6	1076; 50634; 50635; 50636; 50637; 50638
Town gate	5	19112; 19116; 19117; 19118; 19141

Table 2.3: Medieval sites in the Walton Basin.

5 POST-MEDIEVAL

The post-medieval archaeology of the Basin (fig. 2.5), other than finds and buildings, comprise boundaries, ditches and earthworks, field systems, pillow mounds, leats and quarries as well as other sites in fewer numbers (table 2.4). Some of these sites undoubtedly have medieval origins though this cannot be proven without excavation.

SITE TYPE	NUMBER	PRN'S
Boundary	2	33035; 33036
Dam	1	4484
Ditch	6	33102; 33105; 33110; 33114; 33115; 33154
Drainage works	1	5135
Enclosure	2	33137; 33136
Field banks and systems	10	7900; 5280; 5282; 6661; 7023; 33116; 33144; 33147; 33152; 33153
Inscribed stones	2	2112; 5219
Leat	7	33024; 33025; 33026; 33038; 33039; 33046; 33054
Milestone	2	32064; 32066
Mill	2	23000; 23002
Pillow mound	3	2143; 2165; 3650;
Quarry	15	7898; 19121; 22512; 22513; 22524; 22547; 22548; 22549; 22550; 22551; 22552; 22553; 22598; 22600; 33141;
Water meadow earthworks	5	19349; 33028; 33029; 33030; 33031
Well	1	33190

Table 2.4: Post-medieval sites in the Walton Basin.

6 MULTIPERIOD

Multiperiod sites in the SMR comprise find scatters and settlements. As already mentioned, the former category of sites is dealt with separately and the settlements are listed below. Many of these sites probably had medieval origins and have already been discussed elsewhere (Silvester 1994a).

SITE TYPE	NUMBER	PRN'S
Settlement	13	16121; 16132; 16136; 16138; 23068; 23069; 23070; 23073; 23074; 23076; 23077; 23078; 26794

Table 2.5: Multiperiod sites in the Walton Basin.

PART 3

DOCUMENTARY RESEARCH ON THE MEDIEVAL AND POST-MEDIEVAL ARCHAEOLOGY OF THE WALTON BASIN.

Richard Hankinson

1 BACKGROUND AND METHODOLOGY

As part of this study, primary and secondary documentary and cartographic sources held by the following repositories were examined: the Hereford and Worcester County Record Office, Hereford, the Powys County Record Office, Llandrindod Wells, and the National Library of Wales, Aberystwyth. The Sites and Monuments Record (SMR) held by the Clwyd-Powys Archaeological Trust has also been examined and forms the basis of the study.

The available sources were examined in a search for previously unknown sites of the medieval and post medieval periods, and those discovered have been added to the project database. Houses and farms which appear to be still extant have not been specifically recorded, but it has been demonstrated that a large number of the present houses and farms of the Walton basin were extant in the post-medieval period, specific primary documentary records dating to the mid-16th century are available.

Thirty-eight previously unrecorded sites were located during the desk-top assessment and are listed in table 3.1.

2 MEDIEVAL PERIOD

The area of the Walton basin was much contested during this period and changed hands between English and Welsh control many times. This inevitably led to upheaval and would have made living conditions difficult for the local population. The 14th century appears to have been the only relatively stable period.

Edward the Confessor (1042-66) is said to have had a castle (presumably PRN 317) at Womaston, and controlled the basin prior to the taking of Old Radnor by Gruffydd ap Llewelyn in 1052 (Howse 1949, 35). Davies (1905, 125), however, considers that the first castle erected in the area was New Radnor (PRN 1075), which, he suggests, was erected in 1064, following the Saxon capture of the Walton Basin by Harold Godwin, then Earl of Hereford. The Domesday Book of 1086 demonstrates the significance of the Walton basin during the 11th century; it describes Radnor as being held by the King (Silvester 1994b, 2), although there has been some debate as to whether this refers to Old or New Radnor (Silvester 1994a, 124). Also mentioned in Domesday are Knill, Harton (Harpton ?), Querentime (Kinnerton), and Dountoun (Downton ?) (Davies 1905, 29).

The castle at New Radnor was taken by Rhys ap Gruffydd in approximately 1163. It was subsequently lost in 1195 to the Marcher lords, and then retaken but lost again soon afterwards by the Welsh (Howse 1949, 37). During the period of control by Rhys ap Gruffydd, the area was visited by Baldwin, Archbishop of Canterbury, who stayed for a night at New Radnor on the start of his journey through Wales to preach the next Crusade (Howse 1949, 37-8). The location of the church in which Baldwin preached is not known, but it may have been on the castle site; Silvester (1994a, 126) states that the first record of a church in New Radnor dates to 1291. The visit of

Baldwin during this period of conflict would tend to suggest that New Radnor, and the Walton Basin generally, continued to be viewed as an area of high importance.

Control of the basin continued to alternate between the English and Welsh in the 13th century, passing between the de Breos family, Llewelyn ap Iorwerth, King John, and Llewelyn ap Grufydd, before coming into the possession of the Mortimer family (Howse 1949, 38-9). Each time the area changed hands there would inevitably have been much disruption and destruction and the continual unrest most probably led to the high concentration of defensive sites of the medieval period within the basin. In addition to New Radnor Castle and the ringwork known as Old Radnor Castle (PRN 374), a total of 8 motte or motte and bailey sites (e.g. Kinnerton Court Motte, PRN 1071) have been located within the Walton basin. The lesser defensive sites may represent attempts by various warring parties to consolidate their gains, or the efforts of the local landholders to provide some means of protection during periods of fighting.

With the advent of the 14th century and under the control of the Mortimer family, there came a period of greater peace and stability in the Walton basin. There was, for example, a weekly market operating in New Radnor and in 1306 the town obtained a charter permitting an annual fair (Silvester 1994a, 124).

New Radnor town was first documented in 1235 (Silvester 1994b, 3), and its apparently increased prosperity in the 14th century may well have resulted from increased levels of agricultural production in the Walton Basin, which became possible with the establishment of more settled conditions. New Radnor parish church was rebuilt in the 14th century (Silvester 1994a, 126), further suggesting an increase in prosperity. Although other possible archaeological support for this has not been precisely dated, the deserted medieval villages identified at Old Radnor (PRN 5296) and Kinnerton (PRN 33023) may have been expanding during this period.

Other evidence which points to a thriving agricultural community in the Basin during the medieval period relates to arable agriculture. Concentrations of ridge and furrow cultivation can be found in the vicinity of the settlements of Kinnerton (PRNs 15831, 19009, 19350), Evenjobb (PRNs 16268, 16269, 16271, 33145), and Old Radnor (PRNs 16267, 33132). Strip fields have been noted to the W, S, and SE of New Radnor (Silvester 1994a, 126), and no traces of ridge and furrow have been recorded just to the NW and SW of the town defences (Silvester 1977, fig.12.4). Of particular interest is the possible relationship between defensive sites and areas of ridge and furrow; examples of possible relationships of this type occur at Bogs Mount (PRN 33146), Castle Nimble (PRN 33151), and Womaston (PRN 33150). Support for the presence of larger areas of arable is also provided by placename evidence, particularly the name 'Maes', which generally refers to common arable land and can be found in the field names of the Tithe survey (PRNs 35290, 35292, 35293, 35297, 35299).

Processing of the corn produced in the arable fields identified above would normally have been carried out in two stages. The first stage would have involved drying of the corn in kilns, and this would then have been followed by milling. Evidence of medieval corn mills is suggested by early post-medieval documentary sources (eg Heynesmyll mentioned in the New Radnor charter of 1562). Medieval corn drying kilns have been revealed by excavations in New Radnor (PRN 17483; Jones (1992, 1 & 4)), and a mid-17th century reference to a 'water grist mill' (PRN 35168) and 'kiln house' (PRN 35169) at Womaston may well identify the site of a medieval mill and corn drying kiln. Corn mills are said to have multiplied throughout Radnorshire in the 14th century (Howse 1949, 41).

In 1401 New Radnor was severely damaged by Owain Glyndwr, and there is a probable relationship between this and the subsequent decline of the town (Howse 1949, 43). Following the end of the rebellion the border area was said to be in poor state with much lawlessness and unrest (Howse 1949, 44). A descendant of the

Mortimer family became Edward IV, and this led to lands in the basin becoming vested in the Crown (Howse 1949, 45), although following the defeat of the house of York in the Wars of the Roses the area was again the scene of lawlessness and unrest, and the Forest of Radnor became known as a refuge for criminals (Howse 1949,46). This period of instability lasted until the mid-16th century and would undoubtedly have damaged the prosperity of the area leading to the decline of the settlements of the Walton Basin, particularly New Radnor and the deserted medieval villages identified at Old Radnor (PRN 5296) and Kinnerton (PRN 33023).

3 POST-MEDIEVAL PERIOD

The Act of Union between Wales and England, passed in 1536 and revised in 1542, provides the division between the medieval and post-medieval periods. It is an important point in the history of the Walton basin as the Act abolished the majority of the special powers of the Marcher lords and brought England and Wales under a uniform set of laws, giving the inhabitants greater security than had been the case following the close of the 14th century (see Howse 1949, 48).

Radnorshire was made a county under the Act of Union and New Radnor became the shire town, with a court alternating between there and Rhayader (Presteigne from 1542), but it appears that the court ceased to be held at New Radnor from the mid-17th century (Howse 1949, 48). Howse (1949, 50) states that Borough status was granted to New Radnor in 1562, and the parishes which he names as being incorporated in the Borough encompass the entire Walton basin. The borough was dissolved in 1886 (Howse 1949, 51).

The more settled and peaceful conditions which existed following the Act of Union appear to have allowed for greater prosperity in the area. The pattern of settlement in the Walton basin during the period incorporated scattered farms and houses, mills, and villages, supported by mixed arable and pastoral agriculture. Control of the land was vested in local or, more often later, absentee landlords. The surviving estate records of these landlords demonstrate their importance as the lord of the manor in the life of the district, their rights in this position were a survival of elements of the land tenure of the Marcher Lords. Howse (1949, 69-70) refers to gentry holding seats at Womaston, Newcastle Court, Evancoyd (Evenjobb), Harpton Court, and Trewern (Llanfihangel Nant Melan), although other manors were no doubt present within the area of the study. Many of the manors were held by the King at the close of the medieval period, but were subsequently sold by Charles I (Howse 1949, 52).

Enclosure of common land in and around the Walton basin during the 19th century, mostly to the benefit of the larger landowners, inevitably caused some changes in the pattern of agriculture. The use of open arable fields appears to have continued up to the time of enclosure, but thereafter the land appears to have been apportioned to adjacent farms. The general mixture of arable and pastoral agricultural production seems to have continued, was supplemented by less common means. Two examples of this supplementary economy are the keeping of rabbits in pillow mounds (eg PRN 3650 at Hymns Farm) and the construction of fish ponds. It seems most probable that the fish ponds were for the exclusive use of the landowners, the pond (PRN 35256) in the demesne of Harpton Court seems to bear out this hypothesis.

Many of the surviving farms in the area had their origins in the 17th century (Howse 1949, 52), and this is borne out by examination of the detailed documentary sources referring to their leasing etc. Of particular interest in these sources is the large group of Harpton Court estate papers, which refer to the S part of the Walton Basin.

The lime quarrying and burning industry of Old Radnor is relevant to farming practice in the Walton Basin during this period. The earliest reference to the industry which has been encountered during the examination of the documentary sources is an early

18th-century document which mentions limekilns (PRN 35268) at Stockwell Farm, Old Radnor.

The lime burning industry would have required plentiful supplies of fuel, and coal appears to have been used. This would have originally been brought in by road, but the condition of the roads in the district appears to have been very poor during the early 19th century (see National Library of Wales Ms 13174A). In order to overcome this difficulty, a tramway (PRN 35263, immediately outside the study area) was constructed in approximately 1818-20 which ran from Kington to the Dolyhir quarries, near Burlingjobb. In the 1860s or 1870s the tramway was superseded by a railway (PRN 35236) on a similar course, which extended as far as New Radnor. The tramway and later railway would undoubtedly have provided a useful means of transporting agricultural produce to centres of population and may have had an impact on the prosperity of the area in the later 19th century.

A description of the Walton Basin in the early 19th century is provided by a manuscript relating to a tour by Iolo Morgannwg (National Library of Wales Ms 13174A) which began in 1802. The Walton basin is described as being '...a very fine, very large, fertile and beautiful vale well managed, clean, well fenced...'. However, it appears that the town of New Radnor had undergone a considerable decline from its importance of the later 16th century, and is described as '...a very poor town, with a market house used only for sheltering wagons...'. A possible explanation for this decline may have been the suggested absenteeism of the landlords, leading to a lack of capital in the local economy, noted by Iolo Morgannwg, who refers to 'The great unresiding proprietors'. However, Iolo Morgannwg almost certainly had a particular political view on this subject.

4 CONCLUSIONS

The Walton Basin underwent many changes during the medieval and post-medieval periods. At the beginning of the medieval period, it was a disputed area with control passing between English and Welsh hands and was evidently seen as an area of significant importance, perhaps due to the fertility of the land. A period of relative calm during the 14th century appears to have brought increased prosperity led by agricultural output, but this was short lived, and the remainder of the medieval period saw a return to unrest.

The advent of the post-medieval period, and the passing of the Act of Union, saw a return to more settled conditions. This would appear to have resulted in increased agricultural activity, but the activities of landowners, increasingly divorced from the daily life of the Walton Basin during the later part of the post-medieval period, appear to have resulted in a gradual decline of the outward level of prosperity enjoyed by the inhabitants of the area. Some improvement in conditions may have been provided by the enhanced communications of the 19th century.

SITE TYPE	NUMBER	PRN
Corn Drier	1	35169
Farm	2	35250, 35279
Fish Pond	2	35256, 35284
House	8	35174, 35178, 35260, 35266, 35272, 35280, 35285, 35295
Leat	1	35264
Limekiln	1	35268
Mill	2	35168, 35261
Placename	10	35267, 35290, 35291, 35292, 35293, 35294, 35296, 35297, 35298, 35299
Quarry	6	35228, 35251, 35259, 35273, 35274, 35275,
Quillets	1	35278
Railway	1	35236
Sand Pit	1	35281
Smithy	1	35269
Wheelwrights shop	1	35258

Table 3.1: Sites Identified as part of the desk-top assessment.

PART 4

SURVEY

1 PHYSICAL SURVEY

1.1 Introduction

The earthwork types identified as being most vulnerable were chiefly the round-barrows and stone circle of presumed late Neolithic and early Bronze Age date. These monuments, lying on the Basin floor, were being repeatedly ploughed and gradually leveled. Other earthwork sites were surveyed, dependent on landowner permission for record purposes. These are discussed by period below.

1.2 Prehistoric

1.2.1 The round barrows

Twenty-one barrows or remains of barrows are presently recorded in the survey area. The seven on Bache Hill and Whimble in the NE of the area have obviously been sited so as to be visible from the floor of the basin. In the Basin itself thirteen barrows can be recognised from surface remains. Generally situated on knolls or crests, most are now spread and low from continued ploughing. Another seventeen are recorded through aerial photography as ring-ditch cropmarks.

The earthwork (as opposed to cropmark) round barrows in the Basin were systematically surveyed as a means of monitoring the survival of Basin earthworks within a given agricultural regime. Christopher Dunn's undergraduate thesis *Radnorshire Barrows: East of The River Ithon,* completed in 1974, provided information on the state of the barrows at that time against which to compare the present state of the barrows. Using Dunn's descriptions it has been possible, nearly twenty years later, to make comparisons with the present state of the monuments and to gauge any damage to or denudation of them. These data are summarised in table 4.1. The drawn surveys are included under the relevant PRN entry in the catalogue (Part 11).

Table 4.1 clearly shows that in most cases where the barrows are situated within arable land, ploughing has considerably lowered the observed heights of the mounds. In the case of PRN 310 where the mound appears to have 'grown' this must be due to the position of the barrow on a crest making the limits of the mound difficult to define with certainty. Realistically, this mound may not have changed since Dunn's description. Barrows 300, 303, 305, 307, 309 and 1078 give particular cause for concern having been lowered by between 0.3 and 0.95m over the last twenty years. Disturbed mound material was clearly visible in some of these barrows during the present survey.

Barrows PRN 310 and 314 also show considerable damage from burrowing animals. The former is home to an active badger colony and the latter falls on a boundary between arable and scrubland. The scrubland portion is infested with rabbits making use of the protection offered by the thicket. The burrows clearly extend into the arable section which often appears voided, especially after ploughing.

PRN	1974 height	1974 diam	1992 height	1992 diam	height variation	diam variation	Landuse at time of 1992 survey
296	0.75	25	0.5	25	-0.25		Arable
300	1	36 x 40	0.25	23 x 25	-0.75	-13 x -15	Pasture
303	1	36	0.4	38	-0.55	+2	Arable
305	1	30	0.35	20	-0.65	-10	Pasture
307	1.10	36	1	28 x 23	-0.10	-8 x -13	Pasture
309	1.10	36	0.80	32	-0.30	-4	Arable
310	1.80	27	2	25	+0.20	-2	Pasture
314	0.90	31	0.90	38	-0.10	+7	Arable/ Woodland
358	1.60	20	1.60	20			Pasture
369	0.75	38	0.50	37	-0.25	-1	Arable
1078	1.50	34	0.55	40	-0.95	+6	Arable
1081	1.60	25 x 21	1.60	25 x 21			Pasture
1991	3	20	3	21		+1	Moorland
1992	1.25	17	1.25	17			Moorland
1994	1.60	19	1.60	19			Moorland
1995	1.20	14.50	1.20	14.50			Moorland
1996	1.20	19	1.20	19			Moorland
2184	0.50	10	0.50	10			Moorland
3651			0.10	17 x 12			Pasture
4464	1.30	22	1.30	22			Moorland

Table 4.1: Survey data for the Round Barrows in the Walton Basin.

1.2.2 The Four Stones (PRN 1072)

The field in which the Four Stones stone circle stands was recorded as arable in 1874 (Banks 1874) when an excavation round the base of the SE stone was also documented. The removal of 'three or four' stones from the monument is mentioned in 1863 (anon 1863, 366) but it is possible that glacial erratics may have been confused with removed elements of the stone circle since the name 'Four Stones' was already in use as early as the 17th century (Burl 1988, 203) and again when reconfirmed as a land boundary in 1767 (Banks 1874, 216). The regular spacing of the stones suggests that the monument is relatively complete, based on a circle of 5.3m diameter (fig.4.1).

The area around the Four Stones circle is still regularly ploughed up to the edge of the scheduled area. Cereals were planted in 1994 and 1995, and potatoes in 1996. The result of this regime is that the circle now stands on a slight knoll close to the hedge (fig.4.1) and any external associated features are likely to be severely truncated.

1.2.3 The Knapp Mound (PRN 359)

One large mound by Knapp Farm is variously interpreted as a motte, a barrow or, less subjectively, a mound. The site is truncated on the E side by the garden of Knapp Farm and on the S by the present road (fig. 4.2). It measures approximately 25m in diameter at the base and 2.2m high. It has a sparse cover of mature trees which are being allowed to die naturally and which are not being replanted. There are eroded areas on the S and W sides. This site differs from the other mottes in the Basin in that it has a completely rounded top while the others are flattened. There are also no traces of a bailey associated with this site (fig. 4.2). The name 'Knapp' meaning mound, is also worthy of comment. It suggests that the mound was of considerable antiquity prior to the establishment of the farm but is unusual in that the other mottes have castle names (e.g. Castle Nimble, Kinnerton Castle) or are recorded as mottes. Large prehistoric mounds are of course known in both Wessex (Silbury Hill, Hatfield Barrow, Marlborough Mound) and Yorkshire (Duggleby Howe) and it is therefore conceivable that this site may belong to this class of large barrows. It's proximity to two other well-preserved barrows (PRN 358 and 1081), the Walton and Hindwell enclosures, may also be relevant in this respect.

1.3 Roman

There are few earthworks of proven Roman date in the basin. The early pre-Flavian fort at Hindwell (PRN 375) does survive as an earthwork and was surveyed using an EDM (fig.4.3). Emanating from the W of the fort is a linear earthwork (PRN 33124) flanked by two ditches which is assumed to be the road from the W gate. A junction with a similar curving earthwork at its E extent about 15m from where it enters the wood on the W side of the present road represents what may be a branch route leading to the S of the fort. The survey of the fort (fig. 4.3) indicates that the defences at the W end are still visible as shallow earthworks. They comprise the remains of three ditches occupying an area 40m wide (E-W) by 180m long. The defences on the N side are no longer visible though the outermost ditch may still be seen on occasional aerial photographs. The S defences are obscured by woodland. There are slight areas of animal poaching on the ramparts but the fort is otherwise stable.

1.4 Medieval

The medieval archaeology of the Basin has been summarised above. Survey was undertaken on medieval monuments where landowner permission was obtainable and in order to present a point in time document as to the relative condition of the monument.

1.4.1 Castle Nimble (PRN 360)
Castle Nimble is a well-preserved motte and bailey castle 600m to the S of Knapp Farm (fig. 4.4). The site measures 70m E-W by 45m N-S (fig. 4.4). The motte measures 25m in diameter, with a flat-topped building platform 16m in diameter. It is surrounded by a shallow ditch 0.5 deep, running from the NE round the W side to the SE. The bailey is transected by a rough-metalled track and the NW and SW defences appear to be breached by this route. The bailey is surrounded by a ditch and internal bank, the former surviving to 0.5m deep and the latter 0.0.5m high. There are trees growing on the bailey bank and the motte but other than this and the above-mentioned road, the monument is stable.

1.4.2 Bogs Mount Castle (PRN 311)
This site lies in the Burfa nature reserve on a terrace on the N bank of Knobley Brook. This too was surveyed using an EDM (fig.4.5) during which survey traces of a possible bailey bank were located. The motte measures 40m NE-SW by 35m NW-SE. It is 1.8m high, and flat-topped with a building platform measuring 20m by 15m. There are areas of animal poaching particularly on the N side but also on the W. The site is currently home to an active rabbit warren.

1.4.3 Kinnerton Earthworks (PRN 19349) **(by Nigel Jones)** (fig.4.6)
The earthworks which are the subject of this survey lie in two fields to the E of the present village of Kinnerton and its well-preserved motte. The surviving earthworks present an interesting and unusual example of a series of water meadows. The earthworks clearly show on a Cambridge University aerial photograph (No. AWO 96) but have since been considerably reduced in places by ploughing, particularly in the E field.

Water meadows date from as early as the 16th century although the majority date from the 18th and 19th centuries. The basic principle was for water to be collected and directed into fields via a system of leats with sluices used to control the water flow. The leats were allowed to overflow allowing water to percolate through the soil but without flooding, to encourage earlier spring grass. The water was then collected in another leat and directed to the next field. This particular example is slightly different in that, according to the present farmer, the water was mixed with a silage run-off, or perhaps slurry, as a fertilizer to further promote improvements in the grass.

The water was collected, perhaps from a variety of sources, and directed via a leat (PRN 33046) which led into a field from the NW. The course of the leat is now lost beneath a modern barn. A sluice was presumably used to control the flow of water and direct it into one of two leats (PRN 33024 and 33025) which flow across the field on raised embankments up to 3m across and 0.8m high. Having percolated through the soil, the water was then collected in a lower leat (PRN 33026) and directed across the lane and into the E field.

A series of lynchets (PRN 33028-31) represent former field boundaries which may be associated with the water meadows.

In the E field, the earthworks have been much reduced by ploughing although the leats are still visible. Water was directed into the field via a leat (PRN 33054) before flowing into a second leat (PRN 33038) which flows E before curving to the S. This leat survives to a width of *c.*5m although it is now in-filled and appears as little more than a terrace. The water flowed naturally into the lowest part of the field, which has been partially infilled, and then S into a pond which formerly existed in the next field, the site of which is now beneath a barn. Alternatively, a second leat (PRN 33039) would have been used to direct the water into the next field, to the SE, where the leat may still be traced.

1.4.4 **Old Radnor Earthworks** (PRN 5296) **(by Nigel Jones)** (fig.4.7)

The earliest records of Old Radnor refer to the supposed acquisition of church lands by the See of Worcester in 887. The settlement is also mentioned in the Domesday Book of 1086 which records the settlement as 'Raddrenoue'. To the S of the church are the remains of a ringwork or moated site (PRN 374) which is defined by a substantial ditch up to 2.6m deep. A terrier of 1607 refers to the site as a moated parsonage. Earthwork evidence surrounding the settlement indicates that its former extent may have been greater than the present settlement core suggests and platforms are visible to the N (PRN 5296), the S (PRN 16298) and the E (PRN 16299).

The present survey concentrated on a series of complicated earthworks 300m NE of the church and clearly visible under a light covering of snow on Cambridge University aerial photographs (Nos CIJ 31 & CIJ 33). The field in which these earthworks are situated slopes downwards to the N and is bounded to the SE by the present road. The SW and W boundary of the site is formed by Wellin Lane, now a deep and well-defined hollow way (PRN 33014). The earthworks contain at least four and possibly six platforms together with associated tracks, hollow ways and former field boundaries. It seems logical to conclude that these earthworks are medieval in origin and belong to the shrunken settlement.

The main focus of the site is a series of platforms adjacent to the present road and which appear to represent deserted settlement earthworks. Two well-defined building platforms (PRN 33003, 33004) lie against the field boundary and occupy two raised terraces. They measure 15m by 10m and 14m by 6m respectively. The former has slight earthwork evidence for internal detail, strongly suggesting the location of a building, and is bounded to the W by a low bank (PRN 33013). The platforms may be separated by a track and the leveled area to the N suggests further terracing, possibly for other buildings, or perhaps representing former crofts. The position of these platforms relative to the present road may suggest a change in the alignment of the road post-dating the platforms.

To the N, two more building platforms are clearly visible terraced into the slope. The W platform (PRN 33005) measures *c.*8m by 5m while the E (PRN33006) measures *c.*10m by 5m.

A track (PRN 33007) terraced slightly into the slope, follows the contours to the N of the platforms. To the W this joins a well-defined hollow way (PRN 33002) running N-S and which has been recently filled in at the S end. To the E, low earthworks define a possible second hollow way (PRN 33012). A leveled area in the angle between this and the track (PRN 33007) may represent a further building platform (PRN 33011). A feature terraced into the slope, 25m to the N-W, may be another platform (PRN 33010), or possibly an area of quarrying.

Together with the series of tracks and hollow ways, the earthworks of former field boundaries (PRN 33000, 33001, 33008, 33009, 33060) define a field system presumably associated with the settlement earthworks. A pronounced scarp with outcrops of bedrock runs NE from the junction of the hollow way (PRN 33002) and track (PRN 33007) and while apparently of natural origin, may have been enhanced as a lynchet.

2 GEOPHYSICAL SURVEY

2.1 Introduction

With the exception of the geophysical survey of the perimeter of Hindwell II in Ox Pasture and Berrymeadow, Hindwell (see below), geophysical survey was undertaken commercially by Stratascan of Upton upon Severn. Survey of Hindwell I, Hindwell II (1995), and the Walton Green Cursus terminal was financed by the Department of Computing, Staffordshire University.

The geophysical survey of Hindwell I, Hindwell II (1995) and the Walton Green Cursus terminal were undertaken as research exercises on sites targeted for excavation in the hope that the excavation data would assist with the interpretation of the geophysical data. These researches are discussed below.

The geophysical survey of Hindwell II in Ox Pasture and Berrymeadow was undertaken by Claire Thomas of the Deptartment of Geology, University College London as part of her undergraduate fieldwork project under the supervision of Dr John Milson. The survey was designed to confirm the perimeter of the Hindwell II enclosure, only faintly visible as cropmarks, and to then test one of the geophysical areas to provide data against which Miss Thomas's results could be prepared.

2.2 Methodology (by Peter Barker)

Magnetic susceptibility, resistivity, magnetometer (fluxgate gradiometer and proton magnetometer) and ground probing radar were all employed.

2.2.1 Magnetic susceptibility

MS enhancement of soils may be caused by the alteration of iron minerals through biological activity. Thus measuring the MS of a soil can give a measure of past (i.e. archaeological) activity and can be used to target the more intensive and higher resolution techniques of magnetometer. Measurements of MS can be carried out in two ways:

1 Field coils provide rapid scanning and have the benefit of allowing *in situ* readings although problems with ground contact can be experienced.

2 Samples can be taken in the field for future laboratory analysis. This overcomes the ground contact problem but is slower and more laborious.

The equipment used in the present survey was an MS2 Magnetic Susceptibility meter manufactured by Bartington Instruments Ltd. A field coil known as an MS2D was used to take field samples at the nodes of a 20m by 20m grid. This assessed the top 200mm or so of topsoil. The readings were stored and later loaded onto a computer. From this data, grey-scale plots were produced; white being low and black, high. In addition to this, at about 100m centres, holes were created with an auger into the top of the subsoil and a 'down hole' reading taken with an MS2F probe. Two soil samples were also taken at each augur point, one of the topsoil and one of the subsoil.

2.2.2 Magnetometer

Magnetometer survey measures the changes in magnetic field resulting from differing features in the soil. These are usually weak, but changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48000nT can be accurately detected using an appropriate instrument. The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

The magnetometer survey was carried out using an FM36 Fluxgate Gradiometer manufactured by Geoscan Research. The instrument consists of two fluxgates mounted 0.5m vertically apart, and very accurately aligned to nullify the effects of the earth's magnetic field. Thus readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. Readings are taken automatically with a sample trigger and held in an 'on board' data logger. The data are later downloaded into a computer for processing and presentation.

Processing can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background, it is then possible to carry out low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies. The presentation of the data involves a print-out of the raw data both as grey-scale and traced plots together with grey-scale plots of the 'flattened' and despiked data and, if appropriate, after further processing to emphasise various aspects within the data.

2.2.3 Resistivity

This relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response.

The resistance meter used was an RM15 manufactured by Geoscan Research incorporating a mobile Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. The instrument uses an automatic data logger which permits the data to be recorded on site for later downloading onto a computer for processing and presentation.

The processing typically involves the 'despiking' of high contact resistance readings and the passing of the data through a high pass filter. This has the effect of removing the larger variations in the data often associated with geological features. The nett effect is to enhance the archaeological or man-made anomalies contained in the data. The presentation of the data for the site normally involves a print-out of the raw data as well as 'despiked and filtered' data.

Though the values logged are actually resistances in ohms, they are directly proportional to resistivity (ohm-meters) as the same probe configuration is used throughout.

2.2.4 Ground probing radar

This has two advantages as a prospecting technique; its ability to give information of depth as well as working through a variety of surfaces, including cluttered urban environments where other geophysical techniques would be useless.

A short burst of energy is emitted into the ground and echoes are returned from the interfaces between different materials in the ground. The amplitude of these returns depends on the change in velocity of the radar wave as it crosses these interfaces. A measure of these velocities is given by the dielectric constant (E_r) of that material. The travel times are recorded for each return on the radargram and an approximate conversion made to depth by calculating or assuming an average dielectric constant. Drier material such as sand, gravel and rocks, i.e. material which are less conductive (or more resistant), will permit the survey of deeper sections than wetter materials such as clays which are more conductive (or less resistant). Penetration can be increased using longer wavelengths (lower frequencies) but at the expense of resolution.

Under ideal circumstances the minimum size of a feature seen by a 35Mhz (relatively low frequency) antenna in a damp soil would be 0.7m (i.e. this antenna has a wavelength in damp soil of about 3m and the resolution is one quarter of this wavelength). It is interesting to compare this with the 300Mhz antenna which has a wavelength in the same material of 0.33m giving a theoretical resolution of 0.08m. A 500Mhz antenna would give 0.2m and 0.05m respectively.

As the antennae emit a 'cone' shaped pulse of energy an offset target showing a perpendicular face to the radar wave will be 'seen' before the antenna passes over it. A resultant characteristic diffraction pattern is thus built up in the shape of a hyperbola. A classic target generating such diffraction patterns is a pipeline when the antenna is passing across the line of the pipe. However, it should be pointed out that if the interface between the target and the target and its surrounds does not result in a marked change of velocity, then only a weak hyperbola will be seen, if at all.

The Ground Probing Impulse Radar used was an SIR3 manufactured by Geophysical Survey Systems Inc (GSSI).

Data were collected in traverses 20m long and 5m apart in an orthagonal grid. The radar surveys were mainly carried out mainly with a 500mhz antenna as this mid-range frequency offered the best compromise between depth penetration and resolution.

Data are displayed on a monitor as well as being recorded onto both paper and magnetic tape. The data held on the tape recording can then be later loaded onto a computer for processing and printing out onto paper in either false colour or monochrome.

The radargrams are produced from the recorded data using Radan software. They are filtered to improve the clarity by reducing noise and are printed out in black and white. The depth of scan is calculated from an assumed velocity of 0.11m/nsec which is typical for the types of soils encountered. These calculations indicate a maximum scan below ground level of about 1.9m but it must be remembered that this figure might vary by 10% or more. Very shallow features are also lost in the strong surface response experienced with this technique.

The anomalies to be seen in radargrams can be classified into various types. This classification can be broken down into 12 different categories. Inevitably some simplification has to be made to classify the diversity of responses found in radargrams, but this is felt necessary in order to demonstrate, on a two-dimensional plan, the nature and density of the anomalies. The types of anomalies likely to be present are as follows

Strong discrete reflector. These may be a mix of different types of reflectors but their limits can be clearly defined. Their inclusion as a separate category has been considered justified in order to emphasise anomalous returns which may be from archaeological targets and would not otherwise be highlighted in the analysis.

Convex shaped returns (as opposed to point diffractions) may be formed by a convex shaped buried interface. A development of the type of anomaly may be caused by a buried wall or slab where planar returns (see below) may start and/or end with a diffraction so giving the appearance of a convex shaped feature.

Complex reflectors would generally indicate a confused or complex structure to the subsurface. An occurrence of such returns, particularly where the natural soils or rocks are homogenous, would suggest artificial disturbances. These are subdivided into both strong and weak giving an indication of the extent of change of velocity across the interface, which in turn may be associated with a marked change in material moisture content.

Point diffractions may be formed by a discrete object such as a stone or a linear feature being crossed by the radar traverse (see also Convex shaped returns above).

Planar returns may be formed by a floor or some other interface parallel with the surface. These again are subdivided into both strong and weak giving an indication of the extent of change of velocity across the interface, which in turn may be associated with a marked change in material or moisture content.

Inclined events may be a planar feature but not parallel with the survey surface. However, similar responses can be caused by extraneous reflections. For example, an 'air-wave' caused by a strong reflection from an above ground object would produce a linear dipping anomaly and does not relate to any sub-surface feature. Normally this is not a problem as the antennae used are shielded, but under some circumstances these effects can become noticeable.

Conductive surface. The radiowave transmitted from the antenna has its waveform modulated by the ground surface. If this ground surface or layers close to the surface are particularly conductive a 'ground coupled wavetrain' is generated which can produce a complex wave pattern affecting part or all of the scan and so can obscure the weaker returns from targets lower down in the ground.

Focused ringing has been included as a category as this type of anomaly can indicate the presence of an air void. This is created by the signal resonating within the void, but with characteristic domed shape due to the pull-up effect.

'Short hiatus in radargram' or more correctly called a phase distortion. This category has been included to emphasise a break or marked change in the radargram which may not otherwise be noticed in the abstraction of features. The cause of such a hiatus is likely to reflect a marked vertical change or discontinuity of the subsurface.

Unclassified. This is used where the returns from the subsurface show no anomalies or indicate a homogenous character.

2.3 Results of the minor geophysical surveys

2.3.1 Magnetic Susceptibility Survey at Rough Close and the Four Stones
(by Peter Barker)

A magnetic susceptibility (MS) survey was undertaken in July 1994 on 20 by 20m grids over approximately 10Ha on 2 areas in the vicinity of Rough Close farm (SO250616 and SO255615), 6Ha in the region of Rough Close plantation (SO246614) and *c.*2Ha in the vicinity of the Four Stones stone circle (SO245607) (fig. 4.8). These areas were sampled as outlined above (section 2.2.2).

The areas chosen generally coincided with areas of flint scatter with the exception of the Four Stones where the survey was designed to search for areas of possible human activity around the stone circle.

The grey scale plots of the MS survey reveal areas of enhanced magnetisation (fig. 4.8). These would be areas which might indicate increased archaeological activity. To help differentiate between archaeological and geological variations in magnetisation, Dr John Crowther from the Department of Geography, University of Wales, Lampeter, has carried out a series of tests on the various soil and subsoil samples collected.

The tests involved carrying out low frequency mass specific magnetic susceptibility measurements on both the topsoil and subsoil from each sample point. The results indicated that the topsoil MS readings are generally higher than the corresponding subsoil samples and suggest that the probe used for the 'down hole' measurements was producing erratic results.

The fractional conversion of some samples was measured and plotted against the MS results. These results and conclusions have already been published (Crowther & Barker 1995).

The area around Rough Close Plantation (fig. 4.8) shows areas of enhanced MS from the field survey and high fractional conversions coinciding with two flint scatter sites. Similar correlation was seen in the area to the E of Rough Close farm and to a lesser extent near the Four Stones. These areas were recommended for further and more detailed geophysical prospection.

2.3.2 Resistivity and Magnetometer Surveys at Rough Close.
(by Peter Barker)

The geophysical survey, which comprised magnetometer and resistivity survey, was supplementary to the MS survey outlined above and concentrated on a field near Rough Close where an area of high MS readings were recorded. The site (SO253616) lies on a gentle NE slope on fine loams and silts derived from the underlying drift from Palaeozoic and Mesozoic sandstone and shale. The methodology used was as that described above (sections 2.2.3 and 2.2.4), undertaken on 0.5m (magnetometer) and 1m (resistivity) intervals.

The results of the survey initially appeared to be encouraging (fig. 4.8). The resistivity survey found a generally higher resistance area in the SW half of the site which is also the higher end of the survey area. Within this general higher resistance area are a number of discrete high resistance anomalies which are typically some 5-10m across. The processed resistivity data show these anomalies well. Between these higher resistance anomalies is a rectilinear low resistance anomaly (R1) running E-W. At its W end, the anomaly becomes less distinct.

The magnetometer survey picked up few features apart from a scatter of discrete positive anomalies which were not strong enough to mean metal 'spikes'. When plotted onto an Abstraction of Anomalies plan, it was found that each of these magnetic features coincided with an area of higher resistance (fig.4.9).

The interpretation of these results was that the areas of higher resistance were possible platforms for dwellings with a shallow drainage ditch passing between them. The magnetic anomalies were thought to be the thermoremnant effects of hearths within these dwellings.

Subsequent excavation has however shown these anomalies to be geological rather than archaeological (see below Part 5).

In retrospect it is reasonable to surmise that the flint scatters and magnetic enhancement (which are both topsoil features) are evidence of occupation material which is only surviving in the topsoil. If the occupational levels were very shallow, then ploughing would destroy them apart from the bottom of the deeper pits which reveal themselves only as the positive magnetic anomalies.

2.3.3 Resistivity and Magnetometer survey at Walton Court Farm
(by Peter Barker)

The methodology was as described above (sections 2.2.3 and 2.2.4), undertaken on 0.5m (magnetometer) and 1m (resistivity) intervals. There was a slight dusting of snow at the time of the survey but the conditions were otherwise dry, and the underlying soils are deep stoneless fine loamy clayey soils derived from river alluvium.

The object of the survey was to try and locate the N arc of the Walton pit enclosure which is presumed to cross the main road in this area (SO255600) but which has never shown as a cropmark in this field despite the regular appearance of the easternmost of the three Roman marching camps in the same field. If successful, one of the pits would be targeted for excavation to try and obtain dating material for site.

The resistance survey was the most productive of the two techniques used. The continuation of the N ditch of the Roman marching camp is clearly picked up (fig. 4.10). There is a 6m wide gap in the ditch suggesting an entrance at this point.

The evidence for a continuation of the pit enclosure is not so clear. It would be expected that pits should show up as discrete low resistance features and positive magnetic anomalies. The coincidence of each type of anomaly at a point would strongly suggest a pit. However, few such anomalies occur. M1/R3, M2/R4 and M3/R5 are three possible pit locations, with additional pits possibly at M4, R7, M5 and R6 (fig.4.10). The points sadly do not form an obvious arc in alignment with the curve of the pit enclosure cropmark to the W.

Other features found include a series of parallel rectilinear low resistance anomalies (R9) which are thought to be modern land drainage and the anomalies R11 and M7 are probably an early course of the brook to the N of the site.

It was not possible to test any of the pit identifications as permission to excavate was subsequently withdrawn by the landowner.

2.3.4 Magnetometer, Resistivity and Ground Probing Radar Survey at Hindwell II (field name : Little Monster)

(by Jon Bradley and Mike Fletcher)

2.3.4.1 Survey area selection and surveying strategy. The intention of the project team was to devote time during the 1995 season to a set of small exploratory geophysical surveys and an accompanying keyhole excavation on the site. The surveying, coupled with the results of the excavation, would serve the dual purposes of establishing details about the construction of the feature, and allowing selection of the optimum geophysical technique for tracing the boundary of the enclosure - a sort of 'calibration survey'. The following seasons objectives would then include an attempt to trace the remaining sides of the feature, possibly accompanied by magnetic surveys of selected areas of its interior. Note that because the intention was to establish the best technique with which to carry out a *very* large-scale survey, ground radar was immediately ruled out by both cost and time constraints. Consequently, although radar work *was* carried out at Hindwell 2, it was only along 5.0m transects (i.e. transects 5.0m apart), almost as an act of thoroughness on the part of the surveyor.

The area selected for survey lies in the SE corner of the field, close to where the S limb of the arc disappears from view into the hedgerow. The area covered by the surveying was 20m by 20m and lay on a N-S axis, roughly parallel to the E field boundary. The layout of the survey grid, and its relationship to the arc is seen in fig. 4.11a.

The survey parameters are summarized in table 4.2.

	Parameters
Resistivity	1.0m centres
Magnetometry	1.0m transects, 0.5m centres
GPR	5.0m transects (2 way) 500MHz

Table 4.2. Survey parameters.

2.3.4.2 Results of resistivity surveying. The results of the resistivity survey for Hindwell Enclosure 2 are shown in fig. 4.11b. The survey area was relatively small (compared to the sample interval) so it is not so easy to pick out shapes and features of definite rather than spurious interest. In fact the only definite thing which it appears possible to say is that there was a roughly linear, 2-3m wide feature which appeared to coincide with the line of the visible crop-markings. This feature was characterised by a generally low level of resistivity, with three (or possibly four) separate regions of very low resistivity along its length (fig. 4.11b).

The anomaly (and the corresponding cropmarks) was caused by the presence of an infilled ditch. Regions of low resistivity in the SW corner of the survey and a region of very high resistivity along the E edge of the grid in the NE corner of the survey were of unknown origin.

2.3.4.3 Results of magnetometry surveying. In terms of detecting the underlying cause of the cropmarks, the magnetivity survey turned out to be singularly uninformative. The results (fig. 4.11c and summarized in fig. 4.11d) show an almost random pattern of anomalies. The main features are a very high (almost spike-like) anomaly in the SE corner of the survey, a scattering of small anomalies near the W edge, and a larger and more coherent group of anomalies in the NE corner of the grid. This group appears to consist of two superimposed sets of anomalies: a single strong linear anomaly (a), aligned in a roughly WNW-ESE direction, and a weaker linear group of anomalies (b), running in a NW-SE direction, very roughly corresponding to the linear anomaly found in the resistivity surveying.

Although it is possible to make out a case for a correspondence between anomaly (b) (fig.4.11d) and the N end of the linear feature seen in the resistivity survey, this may be no stronger a correspondence than one might expect to find between features in two random patterns. The results are at best ambiguous, and to base conclusions on the magnetometry data would be unwise in this instance.

2.3.4.4 Results of radar surveying. Radar surveying was carried out on a 5.0m grid. As stated in the surveyors report the radar evidence is tenuous in nature, with the crop mark feature appearing as areas of weak responses or nulls in the data. A synopsis of the radar results, drawn up by the surveyor, is shown in fig.4.11e.

Unfortunately, the sparse nature of the grid, coupled with the fact that two of the data files (for transects 20E and 15N) were corrupt, meant that no meaningful activity analysis of the survey could be performed.

The unprecedented scale of the site makes further survey work of the highest priority. The first task is obviously to confirm the presence of a S boundary to the ellipse, and to this end trial surveys have been carried out in order to ascertain the best technique for further exploratory work. Ground probing radar is (unfortunately) too expensive on such a large scale, magnetic susceptibility generally proves inadequate for the delineation of features such as this and the heavily ploughed nature of the area makes it unlikely that any topographical trace of the circle survives; which leaves two alternatives - resistivity or magnetometry.

Of the two techniques, magnetometry is without doubt the most rapid in terms of data collection. However comparison of the results of the two trial surveys with the 'ground truth' (as revealed by the excavations), shows that for tracing the line of post-pits which define the perimeter of the enclosure, resistivity has the upper hand. At a meeting (1st March, 1996) of the collaborators in the Walton Basin project, it was decided that resistivity (despite its comparative slowness) be adopted for the task of tracing the S arc of the ellipse. Incidentally, it is interesting to note at this point that the resistivity surveying did actually pick up the fact that the arc of the enclosure boundary consists of closely spaced pits rather than a continuous ditch (fig.4.11b). However, because of the scale of the enclosure, such a possibility was not even considered by the surveyors (as witnessed by the survey report and it is only with hindsight and in light of the evidence thrown up by the excavation work that this fact was recognised.

The question of the possibility of features internal to the ellipse remains open. It is important that such features be identified, if at all possible, since they might shed light onto the possible functional nature of the enclosure. Because of the large internal area of the ellipse, the only really feasible possibility (in terms of geophysics) would be a low resolution magnetic susceptibility survey (in an attempt to locate archaeologically 'active' areas) followed up by finer resolution magnetometry surveying in areas deemed to be of interest.

2.3.5 Resistivity Survey at Hindwell II (field names: Berry Meadow and Ox Pasture)

(by Claire Thomas & John Milson)

Resistivity survey was carried out over the presumed line of the Hindwell II enclosure in the fields known as Berry Meadow and Ox Pasture as well as within a grid in the field known as Piece-over-the-lake (fig.4.12). It was carried out using a two-electrode array with a 60cm spacing between the two moving electrodes while the two remaining electrodes were positioned at distances of at least 30m from the blocks being surveyed. Readings were generally taken at 0.5m intervals on lines 2m apart and survey blocks generally consisted of 11 lines, each 20-30m long. The site planned for excavation in Berry meadow (Hindwell II, Site 2 below, Part 5.3) was surveyed with lines 1m apart (fig.4.13).

In all grids, with the exception of Block B in Ox Pasture, anomalies were recognised suggestive of the palisade trench of Hindwell II and subsequently proved on excavation. These anomalies involved a decrease in resistivity of between 100% and 200%. The anomalies along traverse at right-angles to the ditch are often, although not always, asymmetric with a gentle gradient on the outer flank and an abrupt change at the inner edge (fig.4.14-4.15). Individual postholes do not seem to have been identified by the most detailed survey, subsequently excavated, but features located in other blocks might be associated with such holes. In Ox Pasture B, a strong gradient was recorded (fig.4.15) but the ditch anomaly (if this is what it is) is more diffuse than elsewhere. Since resistivity patterns in this area seem to be more complex than those encountered elsewhere, and this complexity might relate to archaeological activity, further work would be justified. However, the Ox Pasture field is more topographically rough than Berry Meadow and surface irregularities may well have affected the resistivity results.

In Piece-over-the-lake, a strong linear, resistivity low was recorded running N-S within the block (fig.4.15) but its nature is unknown.

A number of blocks were also surveyed magnetically, using a Geometrics 853 proton procession magnetometer in Berry Meadow and Ox Pasture and a Geoscan fluxgate magnetometer in the field known as Piece-over-the-lake. Moderate levels of magnetic activity were recorded but there was no recognisable magnetic signature of the ditch.

2.4 Magnetometer, Resistivity & Ground Probing Radar Survey at Hindwell I

(by Jon Bradley & Mike Fletcher)

2.4.1 Introduction

In 1995 the Computing Archaeology Group became involved with the Walton Basin Project. The role of the group was (and still is) to provide analysis, interpretation and visualization of results from geophysical surveying carried out in the area. In return for these services, and for funding supplied by Staffordshire University, the results collected were to be used as test-cases for newly developed techniques for analysing ground probing radar (GPR) data.

This work provided the group with a golden opportunity to test radar results against results from other geophysical techniques and against 'ground-truth' data, as the intention was to carry out small *keyhole* excavations at a number of the sites surveyed. Due to intensive ploughing, the sites tend to leave little or no topographical trace (both of the sites discussed were first detected by aerial photographic means). Ground radar data from the sites was difficult to interpret manually, in part because of its sheer volume, but mainly due to the fact that the majority of sites consisted mainly of debris filled ditches and pits, the electrical properties of the fill being similar in nature to those of the surrounding medium. This resulted in low contrast data, in which it proved difficult to identify features of interest by eye. It was expected therefore, that the sites would prove an interesting and important test of the sensitivity of the new radar analysis algorithms.

Sites were selected largely on the basis of the aerial photographic evidence, and Hindwell Enclosure 1 was singled out as the primary objective (in terms of geophysics) in the 1995 season. The reasons for its selection from a number of possible candidates were its accessibility (as it appeared to lie completely within a single field), the fact that it appeared to be complete, well defined and reasonably localized or 'self-contained', and because of its unusual and striking morphology and uncertain function and age.

2.4.2 Survey area selection and surveying strategy.

The lack of any topographical evidence for the enclosure meant that decisions about the size, shape and orientation of the area to be surveyed were based only upon the aerial photographic evidence and the cropmark observations made on site (the visibility of the cropmarks from the ground rather helpfully removed the need for photogrammetric rectification of the aerial photographs). The main enclosure could be comfortably accommodated by an 80m by 80m grid, with enough leeway to leave a wide margin around the enclosure to allow a chance for any unseen peripheral features to be detected.

It was eventually decided that the grid would be oriented on a N-S axis roughly parallel to the edges of the field. In addition to the obvious advantages of this orientation in terms of map-making convenience, a N-S orientation meant that there was minimal correspondence between transect orientation and any visible linear features on the site. The importance of this point in the avoidance of the introduction of survey artifacts has been amply demonstrated by extensive simulation work carried out by Fletcher and Spicer.

A 20m by 20m N extension to this area was made on the NW corner of the grid in order to include an additional cropmark feature spotted from the ground (this area was to be covered only by the resistivity and magnetometry surveys due to tight fiscal and time constraints). The relationship between the survey grid and the cropmarks is shown in fig.4.16a.

The equipment and parameters used for the surveying are summarized in table 4.3.

	Parameters	20m by 20m extension covered	Equipment specifications
Resistivity	1.0m centres	Yes	RM15 twin probe array- Geoscan research
Magnetometry	1.0m transects, 0.5m centres	Yes	FM36 Fluxgate gradiometer - Geoscan research
GPR	1.0m transects, (2 way) 500MHz	No	SIR3 System- GSSI

Table 4.3: Survey parameters and equipment specifications.

2.4.3 Results of resistivity surveying.

The resistivity results for Hindwell Enclosure I were very revealing (and incidentally produced some rather beautiful images). Not only did they clearly show the enclosure boundary ditch with its entrance causeway, they also revealed the full physical extent of the hypothesised gravel pit and its physical relationship with the enclosure, the nature and extent of the channel to the N of the enclosure, and most importantly, they revealed the presence of several previously undetected internal features. A grey-scale map of the resistivity survey results is shown in fig.4.16b and features considered to be significant are marked in fig.4.16c.

The site as a whole appears to have an overall trend in resistivity from generally high in the NW corner of the survey, to low in the SE corner. This could reflect drainage patterns in the field, which slopes very gently down to a shallow hollow or depression in the SE and which might therefore be expected to be damper (and therefore less resistive) in that area. In the 20m extension to the survey, a very strong, linear feature of low resistivity, approximately 8-10m wide, runs in an E-W direction. A subsidiary branch of the feature runs S for about 5m, and the whole appears to correspond physically with the hypothesised palaeochannel. Such a feature would tend to provide extra drainage to the NW corner of the site, and its presence would therefore enhance the generally high resistivity in the surrounding areas.

The most obvious archaeological feature of note is the boundary of the enclosure. This shows up beautifully as a low resistivity feature between two and three metres in width, with a clear entrance gap of approximately three metres at the E end of the N boundary. The low resistivity of the feature, coupled with the cropmark evidence points conclusively to the presence of a silted ditch (with a characteristically enhanced water content). A large internal darker anomaly visible on the aerial photographs and interpreted as the result of gravel extraction, shows up much more clearly in the resistivity data, covering an irregular area of approximately 25m by 25m. The discrepancy in area between resistivity and cropmark data (where the workings appeared to cover an area of only 10m by 10m) is not fully understood, although it can be seen that the cropmark corresponds nicely to a W extension of the workings (A) into the highly resistive area (B). This area (B) stands out above the generally high resistivity in the NW quarter of the survey and exhibits numerous spike-like features. These spikes of very high resistivity, in conjunction with the proximity to the gravel workings are suggestive of stone debris scattered across the ground surface, then subsequently mixed with the topsoil by the action of ploughing. The N edge of the gravel workings merges into the low resistivity anomaly of the ditch. This would suggest that the two are unlikely to be contemporaneous, but it is not possible to tell from this data which came first --- i.e. was the ditch dug into the filled workings, or did the people who dug the workings unknowingly dig through and destroy part of the infilled ditch?

Turning now to other features in the interior of the enclosure, examination of fig.4.16b reveals the presence of a narrow, linear feature of low resistivity parallel to and just inside the E ditch of the enclosure. The feature starts at the S boundary ditch, is 1-2m wide, and is set in about 4m from the edge of the E boundary ditch. It runs alongside the boundary ditch for approximately 30m before crossing another (more irregular) linear region of low resistivity running in from the E boundary ditch for approximately 20m, just after which it appears to terminate. What these features represent is not known, although the first is certainly man-made, whilst the second, because of its irregularity, is of less certain origin.

In light of this discovery, it was felt that there was a possibility that large-scale trends in resistivity across the site might be obscuring or overwhelming other more subtle features of the data, both inside and outside the enclosure. Accordingly an attempt was made to remove these trends by a high pass filtering method to leave just the small-scale (residual) features. In fig.4.16d, residual data is displayed as a plan view of a surface artificially lit by a low angle light source to the NW.

The data is displayed in this way as it is often found that low-definition features can often be picked out by an extremely oblique light source --- rather like an aerial photograph of a 'shadow site' seen in the early morning or late evening.

The main feature of interest revealed by this exercise is a second linear feature inside the enclosure. This feature is about 10m W of and runs parallel to the first internal feature, and also starts at the S ditch. It is much more poorly defined, appearing to be about 1m in width (the width could be less than this but recall that 1m is the resolution of the survey), and is shorter than the first feature, at about 15m in length. Again its nature and function are not known, but the regular appearance and relationships between the two linear features and the enclosure boundary suggest internal structures of some description.

A final image of the resistivity data can be seen in fig.4.17a , where the data have been smoothed in order to remove spikes. The image is aesthetically pleasing and evocative and is a small object lesson in the 'double edged sword' nature of some of the more sophisticated visualisation techniques. It is extremely tempting to treat this image as a true representation of the *original topography* of the site --- after all low resistivity generally implies a negative ditch like or pit feature. Note, however, that the physical depth of a ditch is not necessarily a function of the resistivity (which is what the image subtly suggests), and of course not all of the features (notably the gravel working and the boundary ditch) are contemporaneous (although the image might appear to suggest this).

2.4.4 Results of magnetometry surveying

The magnetometry data for Hindwell I is generally less informative than the resistivity data. Fig.4.17b shows the data after despiking to suppress high single pixel anomalies in the area of the gravel workings.

The data is unfortunately heavily affected by survey anomalies, which produce both a 'patchwork' effect where the 20m square survey sectors adjoin each other, and a ploughed field effect (running from W to E). The former effect can be mitigated somewhat by the extraction of residuals from the data (fig.4.17c).

The dominant features are areas of enhanced magnetic activity corresponding to the boundary ditch of the enclosure and to the palaeochannel to the N. Various other small enhancement features outside the enclosure may be natural in origin (fig.4.17d). Note that there is no direct evidence for the presence of the gravel pit, but in this data the N boundary ditch of the enclosure has two gaps --- the first corresponding to the entrance causeway, and the second to the point where the workings and the ditch coincide. The fact that the ditch appears to have disappeared at this point suggests (as one might expect) that the gravel pit post-dates the enclosure.

2.4.5 Results of radar surveying.

A section of a typical profile taken from the Hindwell I radar survey is shown in fig.4.18a.

The data appears to consist of two distinct layers. The upper layer which extends to about two fifths of the profile (representing a signal return time of approximately 12 nano-seconds), is characterised by a very homogeneous level of return with a few faint, isolated point reflections. This homogeneity could be indicative of a heavily ploughed topsoil, but such an interpretation should be viewed with caution since details of shallow objects can often be masked by surface effects. Additionally, the level of instrument clutter is fairly high (as indicated by the horizontal stripes across the image), and may mask more subtle signals at this depth. At greater signal return times, the radar data exhibits a greater degree of variation, with numerous small hyperbolic returns --- the characteristic signature of reflections from small 'point reflectors', probably indicating the existence of a stony subsoil. This characterisation of the site by collections of small individual reflectors, rather than by large single reflectors corresponding to larger buried objects, is probably typical of sites of this type and suspected antiquity, where wooden and earth structures would be the norm. In cases such as this, activity analysis effectively relies on the ability to measure changes in texture between different areas of the image (caused by different soil types) in order to detect structures such as ditches and banks. This principle is shown in fig.4.18b.

The radargrams were obtained using a 500mHz antenna with a 40nSec time delay between samples. The soil, which is fairly stony, with large flat pebbles derived from the underlying shales and sandstones of the area, has an estimated relative permittivity E_r of approximately 7, and the signal propagation velocity is approximately 0.11m/nSec. This gives a maximum depth of detection of approximately 1.9m. From operational considerations a time window value of 8nSec was selected as being suitable for analysis of the survey. Using overlapping time windows, this gives seven time slices --- 8-16nSec, 12-20nSec, 16-24nSec, 20-

28nSec, 24-32nSec, 28-36nSec and 32-40nSec. Note that it was considered to be pointless to produce time slices for signal return times of less than 8nSec because of the levels of surface interference at such shallow depths. Assignment of actual depths to these time slices is an imprecise business, with error factors of the order of 10-15%. Rough values for the centre points of the above slices would be 0.3m, 0.6m, 0.8m, 1.0m, 1.2m, 1.4m and 1.7m respectively. Fig.4.18c shows the relative levels of activity for each of the time slices (the centre points of the bars on the graph show the mean activity values, whilst the length of the bars gives an indication of the standard deviation of the activity values).

The raw (i.e. unprocessed) results of the time slicing process are shown in figs 4.18d-e, 4.19a-d and 4.20a). These results are based upon an 80m by 80m grid produced from the intersection points of the transects. Each figure consists of the image of the time slice, accompanied by a sketch of anomalies considered to be of significance. These anomalies are shown on the sketches and references to them in the text are shown in bold. Note the presence of extended linear features (shown as features denoted **A** (fig. 4.18d), oriented in both the N-S direction and the E-W direction. These are caused by missing data due to corrupt (or partially corrupt) data files for several of the transects, or to calibration errors (see later point).

Examination of the time slices in this set of images reveals the presence of a wide band of higher activity (**B** in fig. 4.18d), running along the S side of the survey area. From the evidence in these images it is possible to say that on balance, this phenomenon is probably not archaeological in origin. Spatially, it does not appear to be connected in any way with the enclosure, and there appears to be no correlation between it and the results for the same region obtained using either resistivity or magnetivity surveying.

The enclosure itself (**ENC**) shows only very faintly, (mainly in the W and N), in the shallowest of the time slices (8-16nSec), which exhibits fairly uniformly low levels of radar activity (see graph of relative activity levels in fig. 4.18c). It only really begins to come to light in the second time slice (12-20nSec) (fig.4.18e) as a low activity feature in a higher activity background. This is consistent with the hypothesis of ditches cut through the less stony topsoil (low activity levels in first time slice) into the more stony subsoil (high activity background in second time slice), then backfilled or silted at a later data with topsoil (hence its appearance as a low activity feature). From the rough depth estimates for the time slices, this allows an 'informed guess' for the depth of the topsoil/subsoil interface as lying at approximately 0.4m. Whether this interface is a sharp one, or whether the transition from one to the other is gradual cannot be ascertained from the images. The infilled ditch shows up extremely strongly in both the 16-24nSec (fig.4.19a) and the 20-28nSec (fig. 4.19b) time slices, and in both these and the 12-20nSec slice there is a tantalizing trace of the easternmost set of internal linear features (**INT**) previously detected by the resistivity survey (fig. 4.16b). The enclosure boundary begins to fade from view in the 24-32nSec slice (fig. 4.19c), disappearing entirely by the time the survey reaches the 32-40nSec stage (fig. 4.20a). This would put a tentative depth on the base of the ditch of approximately 1.4-1.5m. At no point does the entrance causeway stand out really clearly (although prior knowledge of its position allows it to be seen best in fig. 4.19a), and the second internal linear feature located in the resistivity survey does not appear at all.

The quarry or gravel pit (**PIT1**) appears very strongly in all but the first of the time slices (where it can be seen only very faintly). It can be seen as a vaguely oval patch of uniformly low activity, approximately 30m on its long (WNW-SSE) axis, by 20m on its short (NNE-SSW) axis. From its inclusion in all time slices, its depth would appear to be in excess of the penetration range of the survey (approximately 1.9m). Interestingly, there appears (from time slices 24-28nSec through to 32-40nSec) to be a secondary or subsidiary pit (**PIT2**) just outside the entrance to the enclosure (about 10m to the NNE of the main pit). This can be seen as a roughly circular patch of low activity, approximately 10m in diameter) which coincides quite nicely with a previously unnoted and unnoticed patch of low resistivity in fig.4.17b. Whether this pit is contemporary with the enclosure, with the gravel pit or with neither cannot be ascertained from the data, although the similarity of its depth with that of the gravel pit suggests some connection.

Other features of possible interest include the existence of a mid-depth (between 16 and 28nSec) area of high activity (**C** in figs 4.19a and b) in the NW corner and W side of the survey. The high activity region corresponds fairly closely (both in shape and position) to previously described areas of high resistivity (fig.4.17b), and this, coupled with the spiky appearance of the data in this region, provides corroborating evidence for the hypothesis of scattered stony debris from the gravel workings. To the SE of the gravel pit, inside the enclosure boundary is another region of markedly high activity, and in the NE corner of the enclosure is a slightly less prominent high activity anomaly. These too could be caused by stone scatter, but they do not show up well quite so well in the resistivity survey. Finally, and most surprisingly, there exists in figs. 4.19c, d, and 4.20a a narrow linear feature of low activity (**D**) which runs from just outside the SW corner of the enclosure to a point midway along its E boundary. The nature of this feature is entirely unknown, but its continuation across adjacent transects would seem to rule out the possibility of a survey artefact.

2.4.5 Surveyor's interpretation of radar data.

The analysis carried out manually by the surveyor took approximately a month to complete. The synopsis of results contained in the excavation report is reproduced in fig. 4.20b.

No temporal information is included in the analysis, with significant features from all signal return times being superimposed on top of each other. Additionally, little in the way of information about strength of returns is included in the report (anomalies are classified simply as 'low response' areas, or as 'strong complex returns'). These shortcomings are no reflection on the skills and professional ability of the surveyor to analyse survey data. Rather, they are as a direct result of the nature of the site, the lack of strong reflectors and the unusually large scale of the undertaking.

The surveyor's interpretations are, on the whole, in accordance with those of the activity analysis, but one or two discrepancies need to be discussed. With respect to fig. 4.20a; firstly the report mentions areas of strong complex returns lying alongside the ditch at three points; two internally at the S and E sides (**RAD9** and **RAD10** respectively) and one externally at the NW corner (**RAD11**). These are identified (conjecturally) as evidence for the existence of banks around the enclosure. The activity analysis results do not really support these findings. In the case of the area **RAD11**, the strong returns are probably due to stone scatter, whilst it is difficult to tell whether the anomaly **RAD9** is a separate phenomenon or simply an extension of the large high activity region which lies on the S side of the survey area. The surveyor's report also mentions the existence of a semi-circular feature of high returns in the NW corner of the survey (**RAD12**). No evidence for this exists in the activity analysis results, and its nature remains a mystery.

3 AERIAL PHOTOGRAPHY

3.1 Introduction

Approximately eight hours of flying were undertaken as a result of project-based flying as well as RCAHMW cropmark recording. In addition, existing photographs of the area held by CPAT, Cambridge University Committee for Aerial Photography, and RCAHMW were systematically analysed to provide maximum information on sites already recorded on the SMR and to search for previously unnoted sites. These cropmarks were plotted as a series of overlays onto a digitised map-base using *Aerial,* Bradford University's aerial photograph rectification programme. A definitive plot was then drawn from these overlays using standard 'best-fit' procedures.

3.2 Results

Forty cropmark sites were recorded during the currency of the project either as a result of project-funded aerial photography (eg PRN 19376, 34055) or through the systematic analysis of existing aerial photographs. These sites are listed in table 4.4.

Hindwell II (PRN19376) is by far the most significant of these discoveries. The W end of this enclosure was first noted in 1994 and other arcs of ditches were recorded on existing Cambridge University photographs when closely scrutinised. The E arc of ditch to the N of Hindwell fort was recorded for the first time in 1995 and confirmed by geophysical survey and excavation in 1996 (see above Part 4.2.3.5 and below Part 5.3). The S arc of ditch was recorded as a faint cropmark on air photographs and by geophysics in the same year (see above Part 4.2.3.6). Only the extreme E and SE arcs of this enclosure remain to be located, but the rough pasture in which this part of the enclosure is situated is unlikely to provide cropmark evidence except in the most exceptional circumstances.

Presumed Period	Type	PRNs
Neolithic	Cursus	33109
	Enclosure	19376
Bronze Age	Enclosure	50187
	Ring ditch	33100, 33111, 33112, 33113, 33118, 33128, 33129, 33148, 50188
Iron Age	Enclosure	19374, 19427, 19428, 33101, 33117, 33120, 33131, 33127, 33134, 33155, 33156,
Roman	Ditch	33140
	Road	33121, 33124, 33125
	Signal station	34055
Medieval	Ridge & furrow	33142, 33143
Post-medieval	Ditch	33102, 33110, 33114, 33115, 33153, 33154
	Field banks & systems	33116, 33147
Undated	Ditch	33108, 33130

Table 4.4: Cropmark sites discovered during the Walton Basin Survey.

Also noteworthy is the possible Roman signal station at Harpton (PRN 34055). This was discovered in 1996. It lies on a small knoll and is defined by a double rectilinear ditch, the inner being considerably broader than the outer, with entrances to the E. The site measures approximately 20m square overall. The site is located 1.75km W of the Walton marching camps, 2.25 km WSW of Hindwell fort, and 1.5km SW of the marching camp at Crossways Lane, Hindwell. It would have been visible from all these sites given, of course, a relatively open environment.

4 FIELDWALKING

4.1 Introduction

Fieldwalking took place over arable fields where landowner permission was obtained during the autumn and spring of 1993-1996. Finds of flint, Roman and later ceramic, and a copper alloy brooch were recovered from this exercise. Sites discovered as part of the present fieldwalking programme are listed in table 4.5. The finds are discussed in Part 7 below.

Prior to this fieldwalking, 9 flint scatters were recorded on the Powys SMR from the study area. These were largely the work of Chris Dunn who documented his finds in the *Radnorshire Society Transactions* and whose collection forms the basis of a report below. Analysis of this collection, together with the Noble collection in Llandrindod Wells Museum has augmented the number of flint findspots to 159. Despite these collections numbering over 6600 flints, they nevertheless represent a small fraction of the total flint findspots in the Basin since numerous other finds have been made but have not been reported to the SMR. Indeed, each farmer contacted during the present survey claimed to have found flints during the course of normal ploughing and the 'flint forays' of the Field Section of the Radnorshire Society (anon 1990, 6) have probably also produced substantial quantities of undocumented finds.

4.2 Flint Scatters and Findspots Discovered in the Present Survey

A further 36 flint producing sites have been added as a result of the present survey (table 4.5).

These finds, combined with earlier collections, clearly demonstrate the wealth of the resource in this area but also demonstrate the destruction of archaeological contexts. While flints from barrow mound material may have little contextual value other than providing a *terminus post quem* for the barrow and attesting the possible proximity of settlement, flints from other locations must clearly be derived from unknown but truncated contexts. The regularity with which flint finds occur in the Basin demonstrates the rate at which these contexts are being destroyed.

The majority of the flint finds come from the top and slope of the central ridge running E-W across the valley. They lie on the better drained soils away from the seasonally flooding brooks. Interestingly, they tend not to coincide with the major cropmark complexes with few flints, for example, coming from the areas around either the Walton or the Hindwell enclosures. This may suggest the greater erosion of slope-situated soils as suggested by the Rough Close excavation (see below) or alternatively that the areas of major monument construction were situated away from the main settlement areas. The excavation of Upper Ninepence, however, indicates that there were at least some areas of overlap.

4.3 Other Find Sites

A single rim fragment of Roman pottery (Severn Valley Ware) was recovered from the ploughsoil at S0251608 over the site of the marching camp PAR 313 and a 2nd century Roman copper alloy brooch was recovered (SO 25056380; PRN 26326).

Medieval and post-medieval ceramics were recovered from 26 points within the valley (table 4.5). This again is a largely irrelevant figure since it reflects simply the fields walked and not a distribution *per se*. Dunn, Noble and the Radnor Society Field Section only collected the flint and occasionally Roman pottery from their fieldwalking rather than all archaeological material. Thus the pottery analysed here will serve as a sample only. It is discussed in Part 7 below.

PRN	PERIOD	DESCRIPTION
3652	Prehistoric	Flint from near the Four Stones
3653	Prehistoric	Flint from near the Four Stones
3654	Prehistoric	Flints from Knobley Brook Barrow
3655	Prehistoric	Flint from Court Farm Barrow II
3656	Prehistoric	Flint from Hymns Farm
3657	Prehistoric	Flint from Crossways Lane
3658	Prehistoric	Flint from near the Four Stones
3659	Prehistoric	Flint from Hindwell Barrow II
3660	Prehistoric	Flint from Hindwell Barrow I
3661	Prehistoric	Flint from near the Four Stones
3662	Prehistoric	Flint from Walton Green Barrow
3666	Prehistoric	Flint from Crossfield Lane Barrow
17233	Prehistoric	Flint from Tal y Coed
17234	Prehistoric	Flint from Pool House, Disgoed
26320	Prehistoric	Flint from Maes Melin Farm
26327	Prehistoric	Flint from Hoddell Farm
3663	Roman	Pottery from Hindwell Marching Camp
26326	Roman	Brooch
26306	Medieval	Pottery from Burfa Farm
26304	Post-medieval	Pottery from Knapp Farm
26317	Post-medieval	Post-medieval pottery from Maes Melin Farm
26321	Post-medieval	Pottery from Lower House Farm
26322	Post-medieval	Pottery from Burfa Farm
26324	Post-medieval	Pottery from Highgate Farm
26300	Multiperiod	Flint and Post-medieval pottery from Rough Close
26301	Multiperiod	Flint and Post-medieval pottery from The Four Stones
26302	Multiperiod	Flint and Post-medieval pottery from Bache Farm
26303	Multiperiod	Flint and Post-medieval pottery from Bryn Farm
26305	Multiperiod	Flint and Post-medieval pottery from Water Street Farm
26307	Multiperiod	Flint and Post-medieval pottery from Burfa Farm
26308	Multiperiod	Flint and Post-medieval pottery from Hindwell Farm
26310	Multiperiod	Flint and Post-medieval pottery from Kinnerton
26311	Multiperiod	Flint and Post-medieval pottery from Upper Womaston
26312	Multiperiod	Flint and Post-medieval pottery from Bestbrook Farm
26313	Multiperiod	Flint and Post-medieval pottery from Vron Farm
26314	Multiperiod	Flint and Post-medieval pottery from Maes Melin Farm
26315	Multiperiod	Flint and Post-medieval pottery from Kinnerton Court
26316	Multiperiod	Flint and Post-medieval pottery from Waterstreet Farm
26318	Multiperiod	Flint and Post-medieval pottery from Bestbrook Farm
26319	Multiperiod	Flint and Post-medieval pottery from Bestbrook Farm
26323	Multiperiod	Flint and Post-medieval pottery from Lower House Farm
26325	Multiperiod	Flint and Post-medieval pottery from Bache Farm
26326	Multiperiod	Flint and Post-medieval pottery from Kinnerton Court
26328	Multiperiod	Flint and Post-medieval pottery from Ednol Farm

Table 4.5: Find sites recorded during fieldwalking.

4.4 Earthwork Sites

Earthwork sites discovered during the currency of the Walton Project are relatively few though this is perhaps to be expected in a well-studied area which is so extensively farmed. These sites are listed in table 4.6.

Presumed Period	Type	PRNs
Bronze Age	Round Barrow	3651
Iron Age	Ditch	33122
Medieval	Bank	33137
	Boundary	33000, 33001, 33008, 33009, 33041, 33042, 33043, 33045, 33060,
	Ditch	33106
	Earthwork	15833, 19012
	Hollow way	26329, 26330, 26331, 26332, 26333, 26334, 33002, 33012, 33133, 33139
	Platform	7901, 33003, 33004, 33005, 33006, 33010, 33011, 33027, 33032, 33033, 33034, 33047, 33048, 33049, 33050, 33051, 33052,
	Ridge & furrow	16254, 16267, 16268, 16269, 16271, 19009, 19138, 19350, 33103, 33104, 33107, 33132, 33145, 33146, 33149, 33150, 33151,
	Road and track	3665, 16298, 33007, 33037, 33053
Post-medieval	Boundary	33035, 33036,
	Ditch	33105
	Enclosure	33136
	Field banks and systems	6661,7900, 33144, 33152
	Leat	33024, 33025, 33026, 33038, 33039, 33046, 33054
	Pillow mound	3650
	Water meadow earthworks	19349, 33028, 33029, 33030, 33031

Table 4.6: Earthwork sites discovered during the present survey.

Arguably the most interesting of these discoveries are the triple ditches at Hindwell (PRN 33122, SO260604) which show as slight earthworks as well as cropmarks. The ditches describe an arc and are concentric. They measure a total of about 30m across. The date of these ditches is unresolved but they may be later prehistoric or Roman. If the latter, they may be associated with Hindwell Fort lying immediately to the W.

PART 5

TRIAL EXCAVATIONS

1 TRIAL EXCAVATION AT ROUGH CLOSE (PRN 26548: SO253617)

1.1 Introduction

The site at Rough Close was an area of flint scatter which forms a more generalised scatter along the N edge of the central ridge of the Basin within grid square SO2561. The site was initially investigated as part of a general magnetic susceptibility survey of the subsoil and topsoil along this ridge and was identified as an area with a strong positive response and therefore having a high potential for anthropogenic ground alteration. Consequently an area was investigated in more detail using magnetometer and resistivity surveys and when the results were again positive, a small trench was opened over an area of high response. The geophysical survey results are given in Part 4 section 2.3.1 above.

1.2 Excavation

An area measuring 15m by 5m was excavated over an area of anomalies revealed by both the magnetometer and resistivity surveys. The stubble and topsoil was removed by machine and the surface subsequently cleaned and excavated by hand.

The subsoil was found to be very irregular in composition from gleyed stone-free patches to areas of dense shale in a yellow soil matrix. Towards the E end of the trench was a patch of smooth stone-free hillwash filling a natural gulley running approximately N-S in line with the natural slope. Within this hillwash was a small circular pit (F300) 0.44m in diameter and with a rounded bowl-shaped profile up to 0.2m deep. This pit was filled with a charcoal rich dark brown soil but was devoid of artefacts. There were no traces of *in situ* burning on the sides or base of the pit and its function remains unresolved.

Charcoal from the fill of the pit has been idenified as oak, hazel and gorse. A radiocarbon date has been obtained from this charcoal and is given in table 5.1. This Mesolithic date attests evidence for the early occupation of the area but clearly insufficient evidence survives to assess the nature of this evidence.

Context	Lab No.	Date BP	Cal BC 68%	Cal BC 95%
Pit F300, basal fill	SWAN-114	5860±70	4900-4880 or 4850-4670	4940-4540

Table 5.1: Radiocarbon date from Rough Close.

The identification of a mesolithic presence at this site is particularly interesting since analysis of the flint scatter located in the Dunn collection (below Part 7) has highlighted a largely Neolithic and Bronze Age affinity with the possibility of a single, lightly burnt, end scraper, possibly dating to the Mesolithic. Doubtless further Neolithic and Bronze Age features remain to be located at other points within the field.

Nineteen findspots of Mesolithic flint were identified in the Dunn collection, and of these ten occur in grid squares SO2461 and SO2561 in the region of Rough Close. In this light, the discovery of the Mesolithic pit is not surprising and this area must surely be the main focus for any research into the Mesolithic archaeology of the region. The remaining sites are evenly spread in a linear arrangement of about 1km wide between Evenjobb and Walton following the valley of the Knobley Brook.

2 TRIAL EXCAVATION AT THE WALTON GREEN CURSUS (PRN 5134)

2.1 Introduction

The Walton Green cursus extends from to the E of Walton Green Farm (NGR SO26195978) to the field immediately E of Watery Lane (NGR SO26826001). It comprises two parallel ditches running for a distance of 680m and 60m apart. At intervals the cursus is overlain by enclosures considered to be of Iron Age date (PRN 6121, 19427, 19428) while a round barrow (PRN 369) is situated to the W of the W terminal. The cursus is of Loveday's (1985) Bi type having well-spaced parallel ditches and square terminals.

The cursus has never shown in its entirety as a cropmark but instead has been recognised from composite plots taken over a number of years (Musson 1994).

2.2 Excavation

Three trenches were excavated over the ditches of the cursus monument, two (trenches A and B) at the E terminal (SO26826001) and the third (trench C) across the N ditch (at SO 265599). These trenches were intended to obtain dating material from sealed contexts to confirm the identification of the monument as a cursus and to enable it to be placed within its chronological context within the Walton complex. Accordingly, the topsoil and alluvium were removed by machine and the ditch contexts excavated by hand but no dating evidence was recovered.

2.2.1 Trench A

This excavation measured 3m by 5.5m and was located at what appeared to be the mid-point of the cursus terminal where it became indistinct in both the geophysical survey and on the aerial photographs. The trench was designed to test for a causeway at this point.

The cursus ditch was located in the hard natural riverine gravel below 1m of hard-packed grey alluvium. The ditch measured 2.8m across at the gravel surface in the N section and attained a depth of 0.3m below the gravel. It was shallow and rounded in profile and decreased in depth towards the S section where it faded out into a rounded terminal confirming both the cropmark and geophysical evidence (fig. 5.1).

The fill of the ditch comprised fine-fractioned leached silts with occasional small pebbles and with no indication of silting patterns. The only finds comprised three flint flakes and a possible piercer (see below, Part 7) from high in the ditch silts.

2.2.2 Trench B

This trench measured 7m by 2m and was located at the NE corner of the monument (fig. 5.1) where the cursus ditch was located below 0.9m of alluvium. At the natural gravel surface, the ditch measured 2m across and 0.8m deep and was filled with fine-fractioned silt and gravel lenses (fig. 5.1). The tip lines indicated that the ditch had silted from the interior of the monument attesting the presence of internal banks.

Flint flakes were recovered from the upper silts of the ditch (see below).

2.2.3 Trench C

Trench C measured 2.5m by 8m and was located over the N ditch which at the time of excavation was showing as a well-defined cropmark. The turf and topsoil overlay the natural yellow-brown subsoil which was scarred with modern ploughmarks and at which point the cursus ditch could be recognised.

The ditch was 3m wide and 0.7-0.8m deep below the natural subsoil. It was flat-bottomed and filled with silts indicating filling from the interior.

The only find from this trench was a large, possibly Neolithic flint side-and-end scraper from the upper silts towards the outer edge of the ditch.

2.3 Discussion

The excavations succeeded in locating the ditches of the monument. They proved to be shallow and narrow in keeping with other cursus monuments excavated in Wales (Gibson 1994; Houlder 1968). They failed in recovering datable material, however, and while the flint finds are consistent in indicating a third or second millennium date, their recovery from high in the silts implies that they cannot be regarded as reliable chronological indicators.

The site bears comparison with the nearby parallel ditches near the Four Stones (the Hindwell cursus) some 2km to the NW and recently interpreted as a possible cursus (Gibson 1996a; forthcoming). Like Walton Green, the plan of the Hindwell site has been recovered from aerial photographs taken over a number of years. The terminals have not yet been located but the parallel ditches can be traced for a distance of 474m and are some 54m apart. The NE end can be traced as far as the field known as 'Little Monster' on Hindwell Farm in which the westernmost arc of the Hindwell palisaded site was found (Gibson 1996a).

The cursus monuments and possible cursus monuments of Wales have been the subject of a recent study (Gibson forthcoming). Eleven possible sites have been recognised one of which (Holywell) is possibly a bank barrow, and of the rest only three have been excavated to any degree - Walton Green, Sarn-y-bryn-caled (Gibson 1994) and Llandegai (Houlder 1968). These three sites have morphologically similar ditch profiles They approximately 3m wide at the gravel surface and around 1m deep. They are also flat bottomed and have clear silting patterns. Sarn-y-bryn-caled appears to have had external banks suggested by a rise in the protected gravel surface and silting patterns from the outside of the monument (Gibson 1994, fig. 23) while the others demonstrate silting from the interior.

Superficially, the Walton sites differ to Sarn-y-bryn-caled and Llandegai since the latter have widths of only 10m and 14m respectively and belong to Loveday's (1985) Elongated Ditch class. These sites contrast with the 60m width of the type Bi Walton Green cursus and the 54m width of the possible Hindwell site. Little meaningful may be said of the lengths of Welsh cursus monuments since only Sarn-y-bryn-caled and Walton Green are known in their entirety. The widths of sites, however, may be broken into three main size-ranges, 10-15m (4 sites - 40%), 20-30m (4 sites - 40%) and 50m or over (2 sites - 20%). Only the narrowest and widest categories include sites which are fairly certainly cursus monuments. The middle range sites are all possible or unlikely identifications.

In keeping with cursus monuments generally, the Welsh sites seem to have association with other ritual sites (Gibson forthcoming). There is a possible henge site to the NW of the Llandissilio cursus. At Spread Eagle there is a cluster of eight ring-ditches on the gravel terrace some 150m to the E and the parallel ditches seem to be alligned on a ninth large ring-ditch 450m to the NW and across the river. The possible Llyn-y-Cefn site incorporates a ring-ditch in its S ditch and At Tyn-y-Cefn, there is also a ring-ditch close to the W of the N end of the monument. At Llandegai, there are two ring-ditches extending the NW orientation of the cursus and to the NE and SW of the NW terminal are two henge monuments and a ring-ditch.

The ritual complex at Sarn-y-bryn-caled has been recently studied (Gibson 1994) and a developmental sequence based on relative and absolute chronologies as well as site analogy has been proposed. The cursus appears primary attracting close to its NE terminal a horseshoe-shaped ring-ditch, a substantial standing post and Peterborough pits. These sites are followed by a hengiform ring-ditch, a timber circle, two ring-ditches, both of which show evidence for central pits, and a Beaker-associated henge. The complex was developed over the course of almost two millennia. This complex is, of course, at the SW end of the second possible cursus at Sarn-y-bryn-caled though the authenticity of this second site is doubted.

The Hindwell cursus, if such it is, is also set within a ritual landscape. It passes close to the Four Stones stone circle some 2m to the N of the cursus and off the NE end of the known site there are two substantial round barrows, one of which covers a triple ring-ditch visible on some aerial photographs. Some 20m from the NE end is also the Hindwell Palisaded enclosure (Gibson 1996a) dated to *c.*2500 Cal BC.

At Walton Green, there is a large barrow covering traces of a ring-ditch 60m to the SW of the SW terminal. Flint artefacts have been recovered from the barrow. Less than 1km to the WNW of the SW terminal is the Walton Meldon Bridge type enclosure which remains undated but which is likely to belong to the early third millennium Cal BC and which may well pre-date the cursus.

Only the Sarn-y-bryn-caled Cursus has been firmly dated; charcoal from the base of the ditch giving a radiocarbon date of 4960±70 BP (OxA-3997) and proving it to be the primary monument in the ritual complex. Loveday's (1985) scheme would prefer to see the narrow sites as earlier and the wide Bi type as later in the monument type's period of currency and the Sarn-y-bryn-caled date is consistent with this hypothesis. The Bi sites appear to be associated with later Neolithic material such as Grooved Ware from Lechlade (Gibson & Loveday 1989) and Peterborough Ware from Springfield (Hedges & Buckley 1981) and Drayton (Ainslie & Wallis 1987). In this case the limited dating evidence (a Neolithic scraper providing a *terminus ante quem*) from Walton Green is in accordance with the national pattern. The narrower sites tend to be earlier and the radiocarbon dates from Inchtuthil (Barclay & Maxwell 1991) and North Stoke (Case 1982) are consistent with Sarn-y-bryn-caled (Gibson 1994, fig. 28).

3 TRIAL EXCAVATIONS AT HINDWELL II PALISADED ENCLOSURE (PRN 19376)

3.1 Introduction

A large arc of ditch was discovered from the air during routine flying in 1994 (Gibson 1995c and above Part 3). It lay on Hindwell Farm in the field known as 'Little Monster', the field in which the Four Stones cursus is expected to terminate, and it described an arc from a circle with an approximate diameter of 400m. Possible traces of an external bank showed on the aerial photograph and, when combined with perceived breaks in the ditch circumference, suggested the possibility of a Neolithic date for the monument. Accordingly, geophysical survey and a small excavation were mounted to elucidate on the nature of the site and to try and recover dating material from secure contexts (Site A). In 1995 further aerial photography produced evidence for a ditch of similar character in the field known as 'Berry Meadow' at SO257607. This ditch appeared to be emergng from beneath the modern minor road which described a peculiar curve at this point. It was a distinct probability that the track fossilised the line of the earthwork and that the Berry Meadow ditch was indeed part of the same site. If this was the case, then the ditch described an oval some 800m by 400m. Accordingly a second season of geophysical survey and excavation was mounted to test the character of the new discovery (Site B). Subsequent air photography and geophysical survey in 1996 located further arcs of ditch comprising the S perimeter of the enclosure with the result that some 75% of the circumference can now be traced (fig. 5.2).

3.2 Site A (Little Monster)

An area measuring 20m by 20m was subject to geophysical survey by magnetometer, resistivity and ground probing radar survey (see above Part 2.3.4). During the summer of 1995, a small trench measuring 5m by 15m was opened over the line of the ditch at SO25076065. The was placed at an oblique angle over the ditch to keep it close to the present hedge line and thus to minimise damage to the growing crop. The topsoil and ploughsoil were removed by machine and all cleaning and subsequent excavation was done by hand. The subsoil was generally an orange-yellow soil with a large (90%) ill-sorted stone content which made the recognition of features difficult.

A line of darker relatively stone-free soil was visible running at an angle across the centre of the trench on the estimated line of the enclosure ditch. This showed much narrower than the wide ditch revealed in the geophysical survey. Further cleaning produced the traces of a post-pipe with carbonised outer rings still present in the W end of this trench. This darker soil proved to be the slow fill of the settling hollow in the backfill of the trench. The edges of the trench proved difficult to locate in the plough disturbed stoney subsoil until a depth of *c.*0.3m had been reached, when natural banding lines in the gravel could be noted. The ditch could then be widened out to a solid wall at the N (interior) but to a series of elongated post-ramps on the outer edge. These ramps were up to 4m long in the area excavated and provide the reason for the broad geophysical anomaly.

The trench proved on excavation to comprise a series of four intersecting post pits each with attendant post ramp. It was not possible to completely excavate all the pits as a consequence of time and safety considerations. On average they measured 1.75m in diameter at the top and the two which were completely excavated, postholes 3 and 4 proved respectively 0.75 and 0.6m in diameter at the base and were 2.10 and 1.80m deep. The filling of each posthole was a mixture of coarse mixed gravel. Each posthole contained a well-defined post-pipe which was filled with pinkish-brown sandy clay and was relatively stone-free. The carbonised rings of *in situ* posts were found at all levels in all four postholes and indicated regularly-spaced oak posts (see below Part 9 for charcoal identifications) measuring *c.*0.7m in diameter and set at intervals of between 0.7m and 0.9m edge to edge (fig. 5.5).

Each posthole was attended by a post ramp extending to the outside of the enclosure. These ramps extended 2-3m out from the edge of the postholes proper and where completely excavated, they sloped down to 1.6m below the gravel surface (posts 2 and 3). Each was filled with redeposited earth and gravel as were the postholes and it would appear that the hoiles and ramps were filled in a single act after the erection of the posts.

There were no finds of any date from stratified contexts within the area of excavation but sufficient charcoal was obtained from the outer rings of the oak posts for radiocarbon dating (see below).

3.3 Site B (Berry Meadow)

Site B was situated at SO257618 and measured 16m by 5m. It was laid out at right angles to the ditch as located on the aerial photographs and by geophysical survey.

The topsoil and turf was 0.3m thick and overlay up to 0.4m of fine-fractioned hillwash. The gravel surface was, therefore, deeply covered which accounts for the ephemeral nature of the cropmark.

Traces of four large postholes were found excavated into the gravel surface (fig. 5.3). These were identical in nature to those located in Site A. They intersected, measured 2m in diameter at the gravel surface and each contained a post-pipe 0.9-1m in diameter. Once again the posts had been carbonised and charcoal from the outer rings was recovered *in situ*.

Strictures of time did not permit the complete excavation of any of the postholes or their attandant post-ramps which were visible against the natural gravel surface and extended up to 3m from the postpipe. Like the postholes, their upper fills comprised loose jumbled gravel, difficult to distinguish from the natural. Charcoal from posts 2 and 3 was submitted for radiocarbon dating.

Also in Site B were traces of six other pits describing a circle some 4m in diameter (fig. 5.3). These pits varied from 0.4-0.6m in diameter and from 0.12-0.4m deep. These were noted in both the natural gravel outside the enclosure and also cutting through the filling of the post-ramps. The fill of these pits was remarkably similar to the fills of the post-pipes of the main enclosure and it may be that the pits themselves held posts which had rotted *in situ*. There were, however, neither packing stones nor indications within the fill of each pit to confirm the former presence of posts. This circle clearly post-dates the palisaded enclosure but no dating evidence or datable material was recovered from the fills and the nature and date of these features remain elusive.

3.4 Radiocarbon dating

Four radiocarbon dates were obtained from the excavations on Hindwell II, two from Trench A and two from Trench B. The results of these determinations are as follows:

Context	Lab No	Date BP	Cal BC 68%	Cal BC 95%
Tr A: Post 1	Swan-116	3960±70	2590-2350	2900-2800 or 2700-2200
Tr A: Post 4	Swan-117	4070±70	2870-2810 or 2750-2720 or 2700-2560 or 2540-2500	2880-2800 or 2780-2460
Trench A Combined date		4015±49	2610-2470	2870-2810 or 2700-2450
Trench B Post 2	Swan-230	4040±80	2860-2810 or 2700-2470	2900-2350
Trench B Post 3	Swan-231	4130±80	2880-2800 or 2780-2600	2910-2500
Trench B combined Date		4085±56	2870-2810 or 2750-2720 or 2700-2570 or 2530-2510	2880-2800 or 2780-2490
Trench A & B combined dates		4045±37	2860-2830 or 2660-2640 or 2620-2560 or 2540-2500	2870-2810 or 2740-2720 or 2700-2470

Table 5.2: Radiocarbon dates from Hindwell II.

All four dates are remarkably similar and statistically indistinguishable, despite their large margins of error and the apparent lateness of Swan-116. They may be combined as in table 5.2 above to provide a date of 4045±37 BP. They clearly place the construction of the palisade between *c.*2800-2500 Cal BC (fig. 5.4).

3.5 Discussion

The palisaded enclosure at Hindwell is truly a remarkable discovery. With an internal area of some 35Ha it is by far the largest Neolithic enclosure in Britain and in Europe is only exceeded by the early Neolithic, Michelsberg-associated enclosure at Urmitz, on the Rhine near Koblenz, in Germany (Boelicke 1977). Clearly much work needs to be undertaken on this site, the location of entrances, internal arrangements and the determination of the function(s) of the enclosure are fundamental research priorities and will involve substantial geophysical survey and trial excavation.

The reconstruction of the Hindwell enclosure is problematic. The site consists of postholes only and clearly no evidence survives, earthwork or otherwise, for the above-ground nature of the site. There was no trace of an inner or outer bank to suggest that the palisade was a revetment. It appears to have been a free-standing fence of uprights. However, we know the depths of the postholes as well as the diameters of the oak posts which they contained. The depths of the postholes, averaging *c.* 2m below the gravel surface suggests that the 0.8m diameter posts probably stood at least 6m above the ground assuming that at least one third of the post height would have to have been buried to ensure stability. The spacing of the posts in the two excavated sections indicates that there were three posts every 5m. Therefore, in a monument with a circumference of 2.35km, 1410 posts would have been needed to complete the perimeter. Each post would have weighed in the region of 4.5 tonnes (allowing 1.07 tonnes per cubic metre for green oak) involving the manhandling of some 6300 tonnes of freshly felled oak timbers. Entrances remain to be certainly identified though some of the gaps tentatively identified on the aerial photographs may be contenders. Whether these gaps were marked by larger posts as at Mount Pleasant (Wainwright 1979) remains to be tested.

The original appearance of the Hindwell enclosure also remains uncertain. Gaps between the posts averaged 0.7m. There were no traces of smaller intermediate posts as encountered at Meldon Bridge (Burgess 1976) and it is impossible to judge whether the posts were free-standing with gaps between or whether horizontal timbers, pegged to the uprights, formed a solid impenetrable fence. Clearly this knowledge might shed important light on the possible functions of the enclosure; open free-standing posts being more suited to a ritual rather than defended site.

There are three main types of palisaded enclosure in Neolithic Britain. Enclosures with a perimeter of individual postholes such as at Walton, at Meldon Bridge, Peeblesshire (Burgess 1976), Forteviot, Perthshire (Harding & Lee 1987, 409-11), Dunragit, Dumfriess (Mercer 1993) Newgrange, Co. Meath (Sweetman 1985) and Ballynahatty, Co. Down (Hartwell 1991; 1994). The second type are those like Hindwell with perimeters composed of closely-spaced postpits such as Greyhound Yard, Dorchester, Dorset (Woodward *et al.* 1993) and the third type comprises sites with perimeters with uprights set in bedding-trenches such as at West Kennet I and II (Whittle 1991; 1992), Orsett, Essex (Hedges & Buckley 1978), Mount Pleasant, Dorset (Wainwright 1979), Knowth, Co Meath (Eogan 1984, 219), Donegore, Co Antrim (inf J Mallory) and possibly Lyles Hill in the same county (Simpson & Gibson 1989) though the exact nature of this latter palisade cannot yet be determined.

In terms of size, the areas of these enclosures can at best be estimated since the only sites with fully known circumferences are Ballynahatty, Forteviot and Mount Pleasant (table 5.3). Of the rest, *c.*75% of the Walton perimeter is known and the area can therefore be guessed. Similarly at West Kennet I and II, and Dunragit where the perimeter can be rounded off to provide a rough estimate. Dunragit has been broken into two sites, the outer pit circuit with a scalloped effect and no entrance corridor, and an inner site marked by a more regular double palisade. At Walton and Meldon Bridge the riverine location of each site suggests that the river course was utilised in the perimeter and at Orsett the palisade appears to follow a line inside the second ditch circuit. The perimeter of Greyhound Yard is less certain but the arc of pits is regular and, combined with similar pits found in Church Street in 1982/3, the area of the enclosure can be estimated, albeit tentatively (Woodward *et al.* 1993, 30).

These estimations show that the average area for Neolithic palisaded sites (excluding Hindwell) is 4.5Ha but that there is a large variation in the areas of individual sites. At 35Ha, Hindwell is far greater than any other Neolithic palisaded site yet known. Even compared with causewayed enclosures, the size is well in excess of known examples which rarely exceed 8Ha (Palmer 1976). The posts, however, would appear not to be as imposing as those from Greyhound Yard or Mount Pleasant but compare favourably with the other sites. The Lyles Hill, Newgrange, Knowth and Orsett palisades are much flimsier than the other sites even allowing for erring on the side of generosity in estimating the post dimensions, and this may suggest either a difference in date or function or both. The Newgrange site is problematic in its interpretation since many postholes were later re-used for other purposes of ritual deposition. These smaller sites may justifiably be termed fenced sites to distinguish them from the larger more imposing palisades.

Site	Type	Est area Ha	Est post ht (m)	Est post lngth (m)	Est post diam (m)	Est Post wt (tonnes)
Ballynahatty	I	0.69	3.6	5.4	0.3	0.4
Dunragit outer	I	6.59 +				
Dunragit inner	I	1.56				
Forteviot	I	4.55				
Meldon Bridge	I	7.21 ?	2.8 (3.4)	4.2 (5.1)	0.4 (0.6)	0.6 (1.5)
Newgrange	I	0.64	2	3	0.3 ?	0.2 ?
Walton	I	7.69				
Greyhound Yd	II	11 ?	6	9	1	7.6
Hindwell	II	35	4	6	0.8	3.2
Mount Pleasant	III	4.32	6 (5)	9 (8)	0.4 (1.6)	1.2 (17.2)
West Kennet I	III	4.35 +	4	6	0.3	0.5
West Kennet II	III	5.55 ?	4	6	0.5	1.3
Lyles Hill inner	III	?	<2	<3	0.25	<0.2
Lyles Hill outer	III	?	<1	<1.5	0.20	<0.08
Knowth E	III	?	1	1.5	0.25	0.2
Knowth W	III	?	1	1.5	0.25	0.2
Orsett	III	1.7 ?	<2	<3	0.25	<0.2
Donegore	III ?	2 ?	1.5	2	0.3	0.15
Haddenham	III	8	2.25	3	0.3	0.23

Table 5.3: The estimated dimensions of Neolithic palisaded sites. The bracketed values at Meldon Bridge are for the larger posts found in the N sector of the perimeter. The bracketed values at Mount Pleasant are for the entrance timbers.

The dating of these sites has recently been discussed (Gibson 1996). The British evidence is limited to some thirty dates from ten sites and there appears to be a pattern visible within the date ranges. Firstly the smaller fenced sites, Lyles Hill, Donegore and Orsett are early and date to the earlier Neolithic. Of the more massive sites, the individual posthole sites such as Meldon Bridge and Ballynahatty appear to be earlier, the close-set posthole sites such as Hindwell and Greyhound Yard appear to occupy the middle range just before 2500 Cal BC with the sites composed of contiguous posts such as Mount Pleasant and West Kennet clustering some time after this date. The sample is admittedly small and further excavation with judicious dating may further refine or disprove this pattern.

The radiocarbon dates are, however, also supported to an extent by the artefactual evidence. The small fenced sites are all associated with earlier Neolithic pottery, Meldon Bridge with Later Neolithic Impressed Ware, West Kennet and Greyhound Yard with Grooved Ware and Mount Pleasant with Beaker. A sequence of development may therefore be envisaged for these sites from individual posthole construction via close-set posts to contiguous palisades.

Whether this hypothesis will be supported or demolished by subsequent researches remains to be tested, but clearly the most important observation is that, within the later Neolithic, large palisaded enclosures were being constructed and involved considerable outlay in both human and natural resources. They attest to the sophistication of Neolithic engineering, the organisation and motivation of populations and the effectiveness of the stone axe.

Site	Type	Date BP	Lab No	Cal Bc 68%	Cal BC 95%	Context
Meldon Bridge	I	4280±80	HAR-796	3040-2870 or 2810-2770 or 2720-2700	3300-2600	burnt wood, base of BF3
		4100±130	HAR-797	2880-2800 or 2780-2560 or 2540-2500	3050-2250	charcoal from packing of DF3
Ballynahatty	I	4293±30	UB-3402	3020-3000 or 2930-2890	3030-2980 or 2930-2880 or 2800-2780	charcoal from posthole packing
		4355±26	UB-3403	3030-2970 or 2940-2920	3040-2910	charcoal from posthole packing
Greyhound Yd	II	4020±80	HAR-6686	2860-2810 or 2700-2680 or 2660-2460	2900-2300	charcoal from the post-pipe
		4090±70	HAR-6687	2870-2810 or 2770-2720 or 2700-2570 or 2530-2510	2890-2490	charcoal from the post-pipe
		4080±70	HAR-6688	2870-2810 or 2770-2720 or 2700-2570 or 2540-2500	2880-2800 or 2780-2470	charcoal from the post-pipe
		4140±90	HAR-6689	2880-2610	2920-2490	charcoal from the post-pipe
		4020±80	HAR-6663	2860-2810 or 2700-2680 or 2660-2460	2900-2300	antler from fill of post-ramp
		4070±70	HAR-6664	2870-2810 or 2750-2720 or 2700-2560 or 2540-2500	2880-2800 or 2780-2460	antler from fill of post-pipe
		4060±90	HAR-5508	2870-2810 or 2770-2720 or 2700-2490	2900-2350	charcoal from post-pipe at Church St site
Hindwell	II	3960±70	SWAN-116	2590-2350	2900-2800 or 2700-2200	charcoal from outer rings of post
		4070±70	SWAN-117	2870-2810 or 2750-2720 or 2700-2560 or 2540-2500	2880-2800 or 2780-2460	charcoal from outer rings of post
						charcoal from outer rings of post

						charcoal from outer rings of post
W Kennet 1 outer ditch	III	3810±50	BM-2579	2450-2430 or 2350-2190 or 2160-2140	2460-2130	antler from ditch
		3620±50	BM-2602	2120-2080 or 2040-1920	2140-1880	antler from ditch
		3860±70	CAR-1289	2460-2280 or 2230-2210	2570-2540 or 2500-2140	bone from ditch
		3900±70	CAR-1290	2500-2290	2580-2190 or 2160-2140	bone from ditch
		3960±70	CAR-1293	2590-2350	2900-2800 or 2700-2200	bone from ditch
W Kennet 1 inner ditch		3890±70	CAR-1291	2500-2280	2580-2530 or 2510-2190 or 2170-2140	bone from ditch
W Kennet 2	III	3620±70	CAR-1294	2130-2070 or 2050-1900	2200-1770	bone from ditch
		4050±70	CAR-1295	2870-2810 or 2740-2730 or 2700-2490	2880-2800 or 2780-2460	bone from ditch
Mt Pleasant	III	3635±60	BM-662	2140-2070 or 2050-1930	2200-1870	antler in palisade trench
		3645±40	BM-665	2130-2070 or 2050-1970	2140-1910	charcoal from palisade trench
		3955±45	BM-794	2580-2530 or 2510-2450 or 2420-2400	2590-2330	
Lyles Hill Inner	III	4433±40	UB-3074	3300-3240 or 3110-3030 or 2980-2930	3330-3230 or 3190-2920	
Lyles Hill Outer	III	3974±50	UB-3062	2580-2460	2900-2800 or 2700-2300	
Orsett	III	4726±74	BM-1378	3630-3570 or 3540-3370	3690-3350	charcoal from post-pipe
		4741±113	BM-1213	3640-3370	3800-3100	charcoal from post central to the entrance
Donegore inner	III	6066±60	UB-3070	5200-5170 or 5140-5120 or 5070-4900	5210-4840	charcoal from palisade
		4583±50	UB-3073	3500-3470 or 3380-3310 or 3240-3110	3510-3100	charcoal from palisade
Donegore outer	III	5080±50	UB-3071	3970-3900 or 3880-3810	4000-3780	charcoal from palisade

Table 5.4: Radiocarbon dates from Neolithic palisaded enclosures.

The functions of these sites remain to be discovered. The posthole positioning at Meldon Bridge indicates that even the spaced posthole sites very probably presented a solid wall. The evidence is less clear for sites of the close-set type. Nevertheless, the size of the original monument would have presented a physical, if purely visual, barrier. Whether the Hindwell enclosure represent a defended site, a settlement, a ritual enclosure or whether indeed it possessed a combination of functions must await further investigation of the interior.

4 TRIAL EXCAVATION AT THE UPPER NINEPENCE ENCLOSURE, HINDWELL (PRN 50187; SO253613)

4.1 Introduction

The Upper Ninepence enclosure was discovered from the air in 1969 by Professor St Joseph (CUCAP AP No AYB34). It showed as a continuous irregular curve emanating from and returning to the S hedgeline of the field (fig. 5.5). It intersects a ring-ditch at the NE arc and cropmark resembling a multiple pit alignment runs SSW-NNE through the centre of the enclosure. Ground observation in 1995 and 1996 suggest that this cropmark may be of an agricultural, rather than archaeological, origin.

Though the S circuit of the enclosure has not been identified, it is obvious that it lies on moderately sloping ground on the middle to lower slopes of the S side of the Basin's central ridge and does not appear to encompass any level ground. Its date and function was therefore difficult to determine. Excavation was designed to obtain datable material from the ditch silts and to shed further light on the morphology of the monument.

4.2 Excavation (fig. 5.5)

A small trench measuring 15m by 4.5m was opened over the ditch. The modern turf and humus (context 1) and ploughsoil (context 2) were removed by machine and the remaining contexts were cleaned and excavated by hand. The ditch was located near the centre of the trench. It proved to be 2m across at the top where it showed in the natural subsoil, and 1.2m wide at the base. It was flat-bottomed and measured 0.7m deep. The fill was fairly homogenous, comprising fine fractioned silts in which silting episodes could be detected. These silts suggested that the ditch had silted from the interior and that the site therefor had had an internal bank. Flint flakes (see below Part 7) were found in all levels of the ditch. They comprise five flint flakes, one retouched, and a core fragment.

4.3 Radiocarbon dating

Charcoal was recovered from the base of the ditch (context 9) and from the top of the uppermost silts (context 5). The upper sample has been identified as short-lived material comprising ash, rowan, poplar, hawthorn and gorse (see charcoal identifications in Part 9 below). The lower sample also comprised short-lived material including hazel, blackthorn and small diameter oak. These samples provided the following radiocarbon dates.

Context	Lab No	Date BP	Cal BC 68%	Cal BC 95%
U9D II. Basal ditch silts	SWAN-21	3390±70	1870-1840 or 1780-1610	1880-1520
U9D II. Upper ditch silts	SWAN-22	2010±70	110-AD60	200-AD130

Table 5.5: Radiocarbon Dates from Upper Ninepence Enclosure.

The difference in date between these two determinations confirms the slow silting of the ditch but interestingly illustrates that the enclosure is early Bornze Age in origin.

4.4 Discussion

The full extent of the Upper Ninepence enclosure, if such it is, has not yet been determined. The enclosure is currently known to describe a sub-polygonal form 130m across at its widest point (fig. 5.5 inset). Silting patterns in the ditch suggest an internal bank but the enclosure is constructed on a gentle S-facing slope and does not appear to be in an ostensibly defensive position. Furthermore, the ditch is comparativly narrow and shallow suggesting that any bank derived purely from the spoil from this ditch could not have been very substantial. The site is unlikely therefore to be defensive, though it could have been protective if the bank was surmounted by a fence or even a hedge.

Internal arrangements are also unknown. The site is generally under pasture and is rarely ploughed. Cropmarks are rarely seen and when they do appear, they are usually ill-defined. Only the perimeter of the enclosure has been noted on aerial photographs. The enclosure ditch coincides with a ring-ditch on it's E arc.

Parallels for the Upper Ninepence enclosure are difficult to find. With the exception of the well-known stone-built enclosures of Dartmoor and the SW, early Bronze Age (pre-Deverel-Rimbury) enclosures are rare in Britain. The early date for the oft-discussed site at Rams Hill has recently been questioned as has the precision of the dating of other Bronze Age sites (Needham & Ambers 1994). The subangularity of Upper Ninepence resembles the possible later Bronze Age enclosure at Hog Cliff Hill, Dorset (Ellison & Rahtz 1987) though this site would appear to be later Bronze Age in date. The middle Bronze Age enclosures of South Lodge and Down Farm, recently discussed by Barret *et al.* (1991), share the sub-angularity of Upper Ninepence but at 50m and 40m across respectively, they are very small when compared with the present site.

The ditch at Upper Ninepence resembles the outer ditches of some double-ditched hengiform monuments. Arminghall, Norfolk, for example, has a slightly irregular and narrow outer ditch (Clark 1936) as does the possible hengiform site at West Cotton, Northamptonshire (Windell 1989). Like Upper Ninepence, this latter site lies on a gentle slope overlooking an area of intense Neolithic and Bronze Age ritual activity - in this case, the Nene Valley - including triple-ditched round barrows like those at Hindwell (PRN 309).

There are also parallels to be found for both the size and the sub-angularity of Upper Ninepence in the cropmark enclosures of Leicestershire (Hartley 1989, fig. 6.5). These sites are generally considered to be Iron Age but few have been securely dated.

Indeed, Upper Ninepence may be added to a small but growing number of final Neolithic or earlier Bronze Age enclosures. In addition to the palisaded sites discussed above, other enclosures types may well belong to this period. The roughly oval enclosure at Plasketlands, for example, remains largely undated but is assumed to be associated with Neolithic post-pits dated to *c.*3700 Cal BC (Bewley 1993). At Abermule, Powys, a pit associated with middle Neolithic Fengate ware was located within a rectilinear enclosure though the dating of the perimeter of this site remains tantalizingly unresolved (Gibson & Musson 1990).

5 TRIAL EXCAVATION AT HINDWELL ASH (PRN 307) (NGR 257611)

5.1 Introduction

The Hindwell Ash barrow straddled a field boundary and appeared to have been greatly destroyed by ploughing in its N half, dropping from 1m high to field level over a distance of only 7m (fig. 5.6). A trench 10 by 10m was opened over the central area of the visible mound during December and January 1992/3 .

The purpose of the excavation was to test the actual (as opposed to estimated) plough-damage to the site and this barrow was chosen for two reasons. Firstly the degree of damage to the N half was considerable and it appeared that little stratigraphy remained. Secondly, flints have been recorded in the fields around this mound as well as from the barrow itself and it was possible that pre-barrow features from which the flint was derived might still have been protected beneath the surviving stratigraphy.

The topsoil was removed using a JCB and the site otherwise excavated by hand. The archaeological features encountered are not fully understood but the sequence of events on the site as revealed by excavation is as follows.

5.2 Pre-Barrow Features

5.2.1 Postholes.

Seven certain and eleven possible features were found excavated into the clay subsoil (fig. 5.7). The certain features comprise postholes 10 and 12-15. a shallow flat-bottomed gully (11) and a possible pit (21) which largely underlay the section and was consequently not investigated. The postholes ranged from 0.3 - 0.5m in diameter and from 0.15 - 0.3m deep. Each contained traces of a central post *c.* 0.2m in diameter in the form of a softer, darker postpipe in the generally yellow-grey clayey backfill. Fragments of oak charcoal (see table 9.10 below) were recovered from postholes 10 and 12. The postholes form an irregular setting of unknown form and purpose. Taken with the features of uncertain origin, postholes 10 and 12-4 form a rectangular setting 1.6 by 1.2 m.

The following radiocarbon date was recovered from oak charcoal from one of the postholes (12). This calibrated date clearly places the postholes in the early Bronze Age and also acts as a *terminus post quem* for the barrow mound.

CONTEXT	DATE BP	LAB No	CAL BC 68%	CAL BC 95%
Posthole 12	3730±70	CAR-1480	2280-2230 or 2210-2030	2500-1900

Table 5.6: Radiocarbon date from Posthole 12, Hindwell Ash.

5.2.2 The Gully

The flat-bottomed gully (11) measured 0.8m wide by 0.15m deep. It was filled with a uniform stiff, leached grey clay with occasional flecks of elm, poplar, hazel and hawthorn charcoal (table 9.10). A small fragment of pottery with a smooth inner surface and containing abundant finely-crushed quartz and igneous inclusions was recovered from the lowest levels of the fill of this feature. The sherd weighs only 8g and the majority of the outer surface is missing. It is not possible to attribute a style or date to this pottery but the angular crushed quartz inclusions recall the Neolithic sherds from Bromfield (Stanford 1982, 283-5) and the Peterborough Ware from Upper Ninepence (see below).

5.2.3 The Buried Soil

These features described above were only recognised in the natural yellow stony clay subsoil. This was overlain by an orange-brown stony soil with a smooth clayey texture (context 10) which achieved a maximum depth of 0.2m (fig. 5.8; sections A-C and C-D). A utilised flint blade fragment was recovered from this buried soil.

5.2.4 Pit 21

This cut through the buried soil (fig. 5.8; section A-C) and filled with a grey sandy clay with manganese and iron oxide flecks (context 13). The pit measured 2.9m long where it entered the section and projected 0.3m into the excavated area. It was investigated to a depth of 0.16m at which point excavation became both dangerous and pointless in view of the small area concerned.

5.3 The barrow sequence

5.3.1 The Turf Mound

Overlying the buried soil and separated from it by a thin layer of iron pan, possibly representing a former turf-line was the remains of a turf mound (fig. 5.8; section A-C, context 12). This comprised a mound of soft sandy grey clay interspersed with intermittent lenses of iron-pan. The mound had suffered considerable damage from burrowing animals. The mound projected 2.8m into the excavated area and was recorded as a chord of 9.3m with a height of 0.7m in the exposed section. Finds from the turf mound comprised three flint flakes (two calcined) and a small blue glass bead (fig. 7.1,3). A high quality bifacially retouched oblique arrowhead (fig. 7.1,1) in a brown flint and with an impact fracture at the tip was recovered from the lowermost layers of the turf mound close to the section and *c.* 0.3m NW of and 0.2m above pit 21. Two fragments of pottery were found close together in the upper levels of the mound. One, weighing 6g is in an identical fabric to the sherd from gully 11. The second is in a much finer fabric, only 6mm thick with smooth surfaces, weighs only 1g and is probably Beaker. Both sherds are undecorated.

The turf mound appears to be a central or near-central core to the barrow and may well be associated with pit 21 which was cut through the underlying iron pan and was directly covered by the turf mound. Finds from this context may represent residual material already present in the turves at the time of the construction of the turf mound and thus may provide a *terminus post quem* for this phase of the barrow. However, the possibility that these finds, particularly the glass bead and the pottery, may have been introduced by the animal burrowing cannot be discounted.

5.3.2 The Ditch

A large curving ditch (fig. 5.7 20) was located running through the centre of the trench. It measured *c.* 2m wide by 0.6m deep below the natural subsoil. It had widely splayed straight sides and a rounded base though the exact profile was difficult to determine with absolute confidence due to the ditch being waterlogged throughout the excavation. The ditch was filled with grey silty sand and contained fragments of hazel and blackthorn charcoal in its uppermost fill (table 9.10). A utilised flint flake (fig. 7.1,3) was found in a similar context.

The ditch forms the irregular arc of a circle of *c.*30m in diameter and appears to be slightly acentric to the turf mound and the surviving earthwork barrow. The ditch was also unexpected not having been recorded previously by ground observation, survey or aerial photography, apparently covered by the material of the plough-spread barrow. No material which could be certainly identified as being derived from the ditch was found within the turf mound or earlier contexts and therefore the ditch apparently represents a later acentric enlargement of the original mound.

5.3.3 The Secondary Mound

Material from the ditch described above appears to have been deposited as a capping over the turf mound (fig. 5.7; 5.8 context 3). There were no finds from this layer. As mentioned above, this mound enlargement seems to have been slightly acentric with the turf mound if indeed it is correct to see this phase of activity associated with the ditch. Nor is this ditch concentric with the surviving earthwork. It therefore remains a possibility that a third phase, perhaps represented by the orange-brown context 2 (fig. 5.8) further seals the surviving contexts and this material may well be derived from a second, outer ditch beyond the limits of the excavation. There were no finds from this context.

5.3.4 The Hearths

Two hearths (fig. 5.7, 5-6) were located within layer 3 and over the surviving turf mound (12). They were recognised by the fire-reddened soil around them and their abundant charcoal. Both hearths were disturbed by animal burrows. Hearth 5 was oval, measuring 1.2 by 1m and occupied a dished hollow 0.1m deep. Hazel, ash and oak charcoal (table 9.10) was recovered from the hearth as well as a calcined flint flake. Hearth 6 was more circular, 1.4m in diameter and occupied a similar dished hollow. It was associated with hazel, elm and oak charcoal (see Part 9 below), a calcined flint flake and spall.

These hearths pose stratigraphic problems. The following radiocarbon date of was recovered from one of the hearths (5). The calibrated date places the hearths in the late Iron Age or early Roman period. Yet hearth 6 was situated on top of the turf mound and cut into it slightly and hearth 5 was located in the grey-brown leached sandy clay (context 3) which overlay the turf mound (fig. 5.8).

CONTEXT	DATE BP	LAB No	CAL BC 68%	CAL BC 95%
Hearth context 5	1970±60	CAR-1481	60BC - AD80	160-140 or 120BC-AD190

Table 5.7: Radiocarbon date from hearth 5, Hindwell Ash.

Both features were either within or sealed by layer 3 which is interpreted as being the up-cast from the ditch representing a phase of barrow embellishment. The position of these hearths appears to suggest that this took place in the Roman period or later. Thus the following may be suggested to explain the apparent discrepancy:

1 The radiocarbon date obtained is incorrect, perhaps from the incorporation in the sample of later material introduced by the animal activity noted above.
2 The date is acceptable and the hearths were inserted into the enlarged mound. If this is the case, no trace of this insertion was noted during the excavation perhaps as a result of a combination of poor light, animal disturbance and weather conditions.
3 The ditch and layer 3 are, in fact unconnected. If this is the case then the whereabouts of the upcast from the ditch has yet to be identified.
4 The irregularity of the turf mound at this point may suggest that the secondary mound had been damaged in this area, presumably in antiquity.

There were no supporting finds for this late date but the use of the mound at this period is not incomprehensible. The mound offers a high vantage point over the surrounding fields from which an Iron Age pastoralist might keep watch of flocks and herds. Equally the Roman camps at Walton and Crossways Lane and the fort at Hindwell Farm are all visible from the Hindwell Ash barrow from which views to the N half of the Basin may be obtained. It would have provided an excellent vantage point for a Roman look-out. The lateness of the hearth also draws parallel with that discovered in the Upper Ninepence mound discussed below. The prominence of the mound is further attested by the presence of the Ordnance Survey triangulation pillar.

A domestic interpretation for the hearths seems likely. Amongst the charcoal from hearth 5 was a sample which has been described by Dr Graham Morgan as follows: 'a sample of vesicular charred material with traces of cereal grains and other vegetable matter. Assuming that bread would not have contained unground grains, this material could have been burnt "porridge" or burnt coprolite. There was a semicircular section about 20mm in diameter to part of it suggesting the latter'.

5.4 Discussion

Conclusions drawn from such a small-scale excavation of such damaged features must necessarily be tentative. Nevertheless some observations may be safely made. Firstly, the barrow appears to have had a complex history. Enigmatic pre-barrow features dated to c.2200-1985 BC (see above), with evidence for some structural activity and loosely associated with late Neolithic pottery were covered by a turf barrow. This may have taken place after a considerable period of time, long enough for the buried soil (context 10) to develop. Alternatively, the features may have been cut through context 10 only becoming archaeologically visible in the light-coloured subsoil. A *terminus post quem* for this turf mound may be provided by the oblique arrowhead and possible Beaker sherd from the mound material and by the radiocarbon date obtained for the pre-barrow features.

The barrow appears to have been enlarged with material derived from a ring-ditch forming a circle with an estimated diameter of *c.*30m. This ditch does not appear to be concentric with either the turf mound (fig. 5.7) or the surviving earthwork (fig. 5.6) which may imply that either a sequence of acentric embellishment has been employed or that agricultural degradation has so altered the profile of the monument that its apparent centre is far removed from its original position.

Arguments in favour of the former hypothesis may be provided by sites such as Four Crosses in N Powys (Warrilow *et al.* 1986) where the three phases identified at barrow 5 involved the digging of three acentric ditches. Similar internal acentricity may be noted in cropmark barrows in the Dyffryn Lane henge complex, also in N Powys (Gibson 1995b) and at Site XII (and to a lesser extent Site XI) at Dorchester on Thames, Oxfordshire (Whittle *et al.* 1992, 175). In view of the irregularity of the arc of the Hindwell Ash ditch, obviously the degree of acentricity at this site cannot be evaluated without further investigation.

Hearths of the later Iron Age or early Roman Period were located within the upper levels of the mound. They may have been dug into the mound or set within damaged areas of the mound but their stratigraphy is not clearly understood.

5.5 General conclusions

The agricultural regime had clearly had a devastating effect on the surviving archaeology, particularly on the N semicircle. Where the mound entered the field boundary, and was thus protected from ploughing by its proximity to the fence and by the overlying triangulation pillar, the barrow was seen to have a potentially complex and deep stratigraphy. This had, however, been severely plough-truncated in the N half to the extent that the observed ground surface radius from the centre to the S perimeter was 15m while the radius from centre to N was a mere 9m. The dramatic truncation of the mounds can also be seen in the sections in (fig. 5.8).

The pre-barrow features located in the natural subsoil below the mound were all small and shallow. Their survival was almost certainly due to the protection offered by the covering mound and any similar data outside the confines of the mound would be unlikely to survive.

The surface indications seemed to suggest that the barrow appeared to survive better in the S half. Whether this is a correct observation or whether an optical illusion caused by siting the mound on a natural knoll might only be tested by excavation.

6 TRIAL EXCAVATION AT KNAPP FARM (PRN 3664; SO244600)

6.1 Introduction

The rectilinear enclosure at Knapp Farm (PRN3664) was discovered on aerial photographs in 1989. The enclosure was bisected by the present road and the ditch, visible in grass, described an area 75m by 60m. A break in the cropmark in the SE corner, may well represent an entrance causeway (fig. 5.9).

The present excavations were concentrated on the ditch and were designed to shed light on the original form of the enclosure perimeter and to provide dating evidence for the site.

6.2 Excavation

A trench measuring 11m by 3m was excavated across the line of the ditch (fig. 5.9). The turf and ploughsoil were removed by machine and the surface cleaned successively by hand. The ditch was entirely hand-excavated.

The top of the ditch was visible as a less stony band crossing the trench. Its uppermost fill of sparse stones within grey clayey matrix stood out against the yellow ill-sorted gravel subsoil. It measured 3.5m wide.

The ditch was completely filled with varying lenses of gravel in a soil matrix. The dryness of the 1995 summer made the ditch difficult to excavate and the fills were difficult to identify: they were generally differentiated by their degree of stoniness. Nevertheless, the wetting of the section by a rare shower of rain, however, elucidated the fills and indicated that the ditch had originally been V-sectioned and 1.15m deep below the gravel surface (fig. 5.9). This had been recut, apparently when the ditch had been more or less fully silted. The silting patterns appeared to be quite flat though there is a slight indication that the silting was from the inside suggesting an internal bank (fig. 5.9).

There were no finds from the ditch. Some sparse charcoal flecks and small fragments of calcined bone were recovered from context 102, a smooth grey silt representing the slow final silting of the second recut but the charcoal was insufficient and too dispersed for reliable radiocarbon dating.

6.3 Interpretation

The dating of this enclosure remains unresolved but it appears to have been occupied over a considerable period of time though not necessarily continuously. The silting patterns within the ditch and the lack of features within the excavated part of the interior may be used to infer the presence of an internal bank. The ditch had been recut from a high level to a similar design. The V-section resembles the ditch at Hindwell I which had a similarly stony fill and which had also silted from the interior. The site may be assumed to be of later prehistoric date, but only by analogy with other sites.

The sharp rectangularity of the enclosure resembles a similarly regular, though slightly more elongated, enclosure approximately 500m to the E at Summergil Bridge (PRN 5137) which lies at the W extent of the Walton marching camp complex. A similar enclosure lies at Walton approximately 900m to the SE. This enclosure (PRN 5133) lies to the S of the marching camp complex within an area of linear cropmarks interpreted as field boundaries and, like PRN 5137, is slightly more oblong than the

Knapp Farm site. Garden Enclosure (PRN 4225) lies 750m to the W and, like Knapp Farm, is slightly more square than the Walton and Summergil Bridge sites. All these enclosures are, however, undated and their Iron Age affinity is only assumed. Nevertheless, there does seem to be a growth in enclosed settlements or enclosed elements of settlements in the later part of the prehistoric period and the recut V-shaped ditch of both the Hindwell I (see below) and Knapp Farm sites suggest a common architectural tradition.

7 TRIAL EXCAVATION AT HINDWELL ENCLOSURE I (PRN 4222: NGR SO23986060)

7.1 Introduction

Hindwell I is a trapezoidal enclosure situated in low-lying pasture at the W end of Hindwell farm. It has appeared frequently as a cropmark in grass, particularly resulting from clover re-growth after hay or silage cropping. The cropmark reveals a single-ditched enclosure, orientated roughly E-W, with an entrance causeway near the NE corner. The E, broader end is markedly bowed towards the exterior and the narrow W end is also bowed, though less dramatically, this time towards the interior. The N ditch frequently shows as a tram-line cropmark indicating truncation of the ditch silts. A large depression in the interior of the site is probably the result of gravel quarrying and palaeochanels also show as cropmarks to the N of the site. There are traces of a ring-ditch (PRN 33126) near the centre of the monument on some aerial photographs and this feature was also noted on analysis of the geophysical survey data (see above Part 4). This may be a round house or may equally be a result of the gravel quarrying.

This site was selected for excavation to assess the plough damage to the site and to retrieve dating evidence for this strangely-shaped site.

7.2 Excavation

7.2.1 Trench A (fig. 5.10)

Trench 1 measured 7.75m by 9m and was situated over the entrance causeway designed to locate and excavate the E ditch terminal and to locate any features on the entrance causeway.

A length of ditch terminal 3.5m long was completely excavated. It was interesting that it did not exactly coincide with the cropmark but was as much as 1m N of where it was expected. The cropmark was also much broader than the ditch proved to be. The ditch was 2.15m wide at the gravel surface where it entered the section and was V-sectioned and was 1m deep. The ditch had been quickly filled with few layers noted within the generally gravel fills. There is evidence in the form of context 504, a thick layer of yellow-brown loamy sand and gravel, to suggest that the ditch was filled from the interior and that there was, therefore an internal bank.

The ditch was substantially re-cut as may be seen in the section (fig. 5.10). This recut feature was slightly narrower and shallower than the original and it is from layers in this recut that the finds are derived.

Occasional small flecks of comminuted charcoal were encountered from the upper levels of the ditch and from context 502 in the upper silts came fragments of four vessels in the Saucepan pot tradition (see below) of the 4th to 2nd centuries BC (fig. 7.18).

The gravel subsoil was extremely dry and ill-sorted and, despite watering, the location of features was difficult. Nevertheless, six small pits were certainly identified and five of these were aligned on the centre of the causeway. The two largest of these features, pits 100 and 600, were oval and measured 0.9m by 1.3m by 0.3m deep and 1.75m by 1m by 0.4m deep respectively. Their fills comprised dark loamy soil with gravel and while no post-pipes were visible in the dry fills, there is the suggestion of a void in pit 600 (fig. 5.10). Pit 700, also on the centre line of the causeway, measured 1.25m by 1m by 0.4m deep. The fill was as for the previously described features and once more there is the hint of a void in the centre of the feature which may suggest the former presence of a post. It is likely that these features are severely truncated, as the tram-line ditch cropmark in this area shows, and that they represent postholes associated with some gate mechanism for the enclosure although it must be acknowledged that no datable material was recovered from any of the features and consequently their association with the enclosure can only be assumed.

Pit 900 also lay on the centre-line of the causeway though some 3m outside the enclosure. It measured 0.6m across where it entered the section and was 0.35m deep. Feature 1200 also entered the N section and is either a ditch terminal or an oval pit. It was 0.95m wide where it entered the section and projected 1.5m from it. It was 0.5m deep and contained a sandy-clay and gravel fill. Once more no distinction in fill was noted though there is suggestion of a void in the distribution of stone near the centre of the pit perhaps indicating that this too was originally a posthole.

7.2.2 **Trench B** (fig. 5.11)

Measuring 10m by 3m, this trench was located over the W curving ditch. The cropmark did not show as a tramline here and it was therefore assumed that the preservation was better than it was on the N side. In this case, the cropmark and archaeology coincided exactly. The ditch was 2.9m wide at the gravel surface and measured 1.1m deep in the N section and 1.2m deep in the S. Once again the ditch was V-sectioned and had been backfilled rapidly with loose gravel and gravel in a sandy matrix. There is the hint of silting from the interior in the N section but the S section is less convincing. The only finds recovered from the ditch in this trench comprised a single sherd of Iron Age pottery from the uppermost silts (context 101). Two possible postholes were located in the far E end of the trench. These were noted as two distinctly circular depressions filled with dark loamy soil. They measured 0.2m in diameter but were only in the region of 0.1m deep. These, too, were devoid of finds.

7.3 Discussion

The excavations at Hindwell I were limited in scale and scope on a site that had suffered considerably from agricultural processes. The features in trench 1 were all severely truncated and their interpretation remains tentative. Ceramic evidence does, however, confirm the middle Iron Age date of the enclosure. The ditch seems to have been rapidly backfilled, perhaps suggesting that the internal bank was deliberately slighted or that it was originally unstable and a line of possible postholes suggests the presence of a gate structure.

There are some 22 possible enclosures presently known within the Basin but few are trapezoid and most lack the curvature of the narrower sides of Hindwell I. One site near Lower Harpton (NGR SO278602) which lies just over the English border and immediately outside the study area does seem to closely mirror Hindwell I (ref CPAT AP 90-MB-1053). This site is orientated roughly NNW-SSE and is located on the S side of the valley floor in the E access to the Basin.

Trapezoid enclosures are themselves well-known in Iron Age contexts but such enclosures with concentrically curved ends are rare. Indeed in the comprehensive aerial photographic survey of the well-studied Danebury region, there are no exact parallels despite the identification of over 120 sites (Palmer 1984). Similarly in Warwickshire and the Upper Thames where similar air photographic studies have taken place (Hingley 1989; Hingley & Miles 1984).

The Montgomery Small Enclosures survey (Silvester 1993) has similarly identified a large range of enclosure morphology and no sites are directly comparable with the regularity of the Hindwell I site. However, Rhos enclosure (PRN7098) at Trewern near Welshpool, has a mixture of linear and curvilinear ditches forming an approximately trapezoid shape. The innermost of the triple-ditched enclosure at Pen-y-llan, Forden (PRN 3599) is an incomplete cropmark but does show two diverging straight lateral ditches with an externally convex broad end (the narrower end has not been recorded and as such is morphologically close to the Hindwell and Lower Harpton sites. Pen-y-llan is a more complex site, however, being multivallate. These sites are, however, undated.

PART 6

EXCAVATIONS AT UPPER NINEPENCE: A NEOLITHIC SETTLEMENT AND POSSIBLE BRONZE AGE BARROW.

(PRN 305: NGR SO25126136)

1 INTRODUCTION

The barrow at Upper Ninepence, Hindwell lies on the top of the ridge between the Knobley and Summergil brooks in a discreet corner of the field. It survived as a low spread mound some 20m in diameter and 0.3m high (fig. 6.1). Finds of some 700 flints had been recovered from the surface of this barrow (Dunn 1966) as well as fragments of pottery identified by Dunn as 'Cinerary Urn'. This ceramic find coupled with the fragments of calcined bone and of an adult occipital bone found in the ploughsoil over the barrow, lead Dunn to conclude that secondary burials had been ploughed. The flint artefacts generally comprised small flakes or knapping waste though some artefactual material was also recognized, namely, a *petit tranchet* derivative arrowhead, polished axe fragments, various points and scrapers. Analysis of this material has identified a mainly Neolithic assemblage but also with a mesolithic and Bronze Age presence (see Part 7).

Limited excavation in the mound confirmed that the barrow contained lithic material indicative of a nearby settlement and that ploughing was indeed having a detrimental effect on the mound (Dunn 1966, 14). A hearth was located in the top of the surviving barrow.

The barrow was surveyed by Dunn in 1973 (Dunn 1974) and was recorded as being 1m high and 30m in diameter (table 4.1). The site was re-surveyed in 1992 and was found to be only 0.35m high and 20m in diameter. The site had lost 0.65m in height in the last 20 years and this despite only limited ploughing restricted to once or twice every ten years (inf Mr C. Goodwin of Hindwell Farm).

2 EXCAVATION

2.1 The Mound and Old Ground Surface

The archaeological potential of this site was clear from Dunn's fieldwalking and limited excavation. The site also had been shown to be at risk from the agricultural regime and was therefore chosen for rescue excavation which took place over 14 weeks during the summer of 1994. The barrow was excavated in quadrants with the turf and topsoil (context 1) being removed by machine. The barrow mound (context 2) and old ground surface (OGS) (context 72) were also machined off in thin layers and under close archaeological supervision in the SW and NE quadrants. In the NW and SE quadrants, these contexts were removed by hand. The OGS was sampled for palaeoenvironmental material and phosphate analysis and soil micromorphology samples were taken at the mound/OGS interface, at the OGS/natural interface and within the area of structure 1 (Part 9 below).

During the mechanical stripping of the SW quadrant, the hearth described by Dunn (1966) was relocated immediately below the topsoil and was sampled. The hearth measured 0.8m across and comprised a fire-reddened depression similar in size and appearance to the hearths located at Hindwell Ash (see above). There was no evidence to suggest that the hearth had been excavated into the mound. The hearth was found to contain abundant charcoal (mainly oak, hazel, pomoideae, and blackthorn) and charred grain (see below, Part 9). This was radiocarbon dated and the results are presented in table 6.1.

Context	Lab No	Date BP	Cal AD 68%	Cal AD 95%
Hearth - 195	SWAN-115	1640±70	260-290 or 330-460 or 480-530	230-590

Table 6.1: Radiocarbon date from Upper Ninepence (hearth over mound).

This date, clearly in the Romano-British period, acts as a *terminus ante quem* for the construction of the mound but raises questions on the observations made above regarding the survival of the barrow. The mound had been shown to have lost 0.65m in height since 1973. Yet this Romano-British feature which could only have been constructed on the top of the mound survived more or less intact. This leaves us with two options.

Firstly, that the survey data are incorrect. This is a possibility since the mound sits on top of a rounded ridge into the slopes of which it merges. The discrepancy therefore may be one of definition. Secondly, that the mound had been augmented in the post-Roman period and it is this later augmentation that was being plough-truncated. This augmentation may well have been in the 19th century when the site was used as a rabbit warren (see below). However, neither explanation is entirely satisfactory. For example, Dunn's measurements for the well-preserved and unploughed barrows on the uplands around the Basin agree closely with those from the present survey (table 4.1) suggesting that the same criteria were being measured and confirming the accuracy of both surveys. Regarding mound-augmentation, there was no archaeologically recognizable evidence for this although ploughing may well have destroyed it totally. A similar discussion applies to the broadly contemporary hearths located in the top of Hindwell Ash (see above Part 5.5).

The mound material comprised grey clayey soil with occasional flecks of iron-panning and contained flint flakes and potsherds (see below Part 7). In the S half of the barrow, particularly around its perimeter, there was severe damage caused by rabbit burrowing which had also affected the OGS and underlying natural. Information from the present landowner states that the farm accounts show that in the mid 19th century, the farm was buying rabbits from the local warrens at New Radnor and Presteigne. By the late 1870s, however, he was selling rabbits on a fairly large scale. It seems that in Upper Ninepence we have inadvertently discovered the farm's rabbit production centre!

The OGS was up to 0.1m thick and comprised a similar soil to that of the barrow mound but was separated from that context by a well-defined layer of iron-pan often up to 25mm thick (fig. 6.2). Rabbit disturbance could clearly be seen in this material in both the SE and the NW quadrants. Once more, small potsherds and flint flakes were recovered from throughout this layer.

No trace of any burials were located in or below the mound though sherds of two early Bronze Age vessels, possibly a Collared Urn and a Food Vessel Urn (see below P89 and P90) from the mound material and OGS respectively may hint that the mound had had a sepulchral role at least during part of its history.

2.2 Features below the mound

There were 41 pits discovered cut into the buried natural subsoil. In addition, there were 5 hearths and 227 stakeholes. All these features were only noticeable at subsoil level. The majority of the features, particularly the stakeholes, are undated but Peterborough and Grooved Ware pottery and associated flint assemblages were recovered from some of the pits. The artefacts and radiocarbon dates suggest that there were two main phases of activity at the site, the first, associated with Peterborough Ware and dating to *c.*3000 Cal BC and the second, associated with Grooved Ware and centering on *c.*2700 Cal BC (fig.6.4).

2.2.1 The Peterborough Phase

Peterborough Ware ceramics were located in fourteen contexts (table 6.2).

Feature (context)	Dimensions (m) Diam	Length	Width	Depth	Description	Finds	Date BP
Mound (2)						P3-4	
Pit 6 (7)	0.40			0.09	Roughly circular pit filled with dark sandy soil & stone	P10	
Pit 10 (11)	0.6			0.33	Oval pit filled with charcoal-rich loam	P8	
Pit 12 (13)	0.55			0.27	Large round-based pit filled with clayey loam & charcoal flecks	P1	
Pit 16 (17)	0.79			0.20	Round-based pit filled with clayey loam & charcoal flecks	P5-7	4400±50 BM-2967
Pit 20 (21)	0.52			0.20	Round-based pit filled with clayey loam & charcoal flecks	P11	4410±35 BM-2966
Pit 37 (38)	0.24			0.11	Round-based pit filled with clayey loam & charcoal flecks	P9	
Stakehole 47 (48)	0.12			0.22	Circular stakehole filled with clayey loam	P13	
Pit 65 (66)	0.60			0.15	Round-based pit filled with clayey loam & charcoal flecks	P2	4470±80 SWAN-23
Pit 154 (155)		0.80	0.70	0.20	Rectangular pit filled with dark charcoal-rich soil and abundant pottery	P16	
Pit 200		0.92	0.72	0.25	Oval pit filled with dark carbonaceous soil	P15 P19	4590±60 BM-3071
Stakehole 325 (326)	0.15			0.19	Stakehole filled with dark clayey loam	P14	
Pit 500 (502)	0.55			0.37	Round pit filled with grey clayey loam and charcoal flecks	P18 P20	4490±60 BM-3070

Table 6.2: Features Associated with Peterborough Ware (Upper Ninepence).

In only one instance, pit 154, was it associated with Grooved Ware and in this case the collar from a Fengate style vessel was clearly residual. Analysis of the flint artefacts (Part 7) confirm the ceramic identifications but does little to extend the distribution of features belonging to this phase.

The distribution of the Peterborough bearing features are restricted to the E and NE part of the site (fig. 6.4). The exception to this rule is pit 500 which contained exclusively Fengate sherds. This pit is located on the W of the excavated area and the reason for its isolation is uncertain. The pit contained only Fengate style Peterborough Ware yet its radiocarbon date is indistinguishable from the other dates obtained from this phase (table 6.3).

The dates obtained from small diameter charcoals for pits containing Peterborough Ware are listed in table 6.3. The dates are remarkably uniform and confirm the middle Neolithic dates for Peterborough Ware (Gibson & Kinnes 1997).

Context	Date BP	Lab No	Cal BC 68%	Cal BC 95%
Pit 16	4400±50	BM-2967	3100-2920	3310-3230 or 3180-3160 or 3140-2910
Pit 20	4410±35	BM-2966	3100-3020 or 3000-2920	3300-3240 or 3110-2920
Pit 65	4470±80	SWAN-23	3340-3220 or 3190-3030	3360-2920
Pit 200	4590±60	BM-3071	3500-3420 or 3380-3310 or 3240-3180 or 3160-3130	3520-3090
Pit 500	4490±60	BM-3070	3340-3220 or 3190-3090 or 3060-3040	3360-3030 or 2980-2930

Table 6.3: Radiocarbon dates from Peterborough Ware associated contexts (Upper Ninepence).

Other than the generally restricted distribution of the pits, there is little patterning in their distribution. The pits are generally circular to oval, single filled and relatively shallow (fig. 6.5). The flint assemblage suggests a domestic origin, though clearly the deposition of the waste and artefacts in pits need not be solely a domestic act.

2.2.2 The Grooved Ware Phase

Grooved Ware was found in the contexts listed in table 6.4. These features are distributed more widely over the site and appear to form the main period of pre-mound activity (fig. 6.4). Some 68 Grooved Ware vessels are represented plus occasional and unidentifiable sherds from other contexts. The associated flint assemblage (Part 7.2) confirms the ceramic identifications but does not augment the Grooved Ware distribution; no diagnostic flints were recovered from contexts without ceramic associations.

Feature (Context)	Dimensions (m)				Description	Finds	Date BP
	Diam	Length	Width	Depth			
Mound (2)						P58, P83-5	
Palaeosol (72)						P51, P79-81	
Ditch 8 (9)			1.20	0.55	Curved ditch	P50, P54, P61	
Pit 22 (23)	0.40			0.25	Roughly circular round-based pit	P70	

					filled with dark charcoal rich soil and burnt stones		
Hearth 28 (29)		1.25	0.60	0.12	Hearth central to Structure 1	frags	4240±70 SWAN-24
Pit 33 (34)	0.35			0.08	Small circular shallow pit filled with dark charcoally soil	frag	
Pit 35 (36)	0.10			0.07	Small circular round-bottomed pit filled with dark clayey loam	P56	
Pit 43 (44)	0.35			0.07	Small circular pit filled with clayey loam and charcoal flecks	P60	
Pit 55 (56)		0.90	0.70	0.27	Pit cut by animal disturbance filled with grey charcoal-rich soil	P32, P71-6	
Pit 85 (86)	0.65			0.26	Circular round-bottomed pit with brown charcoal-rich soil	P62-3, P78	4060±40 BM-3069
Pit 132 (133)	0.83			0.23	Large roughly circular pit filled with dark soil, charcoal and stones	P66-9	4160±35 BM-2968
Pit 136 (137)	0.35			0.07	Shallow circular pit filled with charcoal rich soil	P49, P58-9	
Pit 146 (147)	0.48			0.22	Circular pit filled with charcoal rich soil	P57	
Pit 152 (153)	0.53			0.10	Shallow circular pit filled with dark clayey loam	frag	
Pit 154 (155)		0.84	0.70	0.20	Large rectangular pit filled with charcoal rich soil and abundant pottery	P33-6, P38-41	4050±35 BM-2969
Stakehole 180 (181)	0.12			0.08	Stakehole filled with dark clay with charcoal flecks	P55	
Pit 188 (191)		1.10	0.84	0.21	Small oval pit filled with dark charcoal-rich soil	frag	
Pit 198 (289)	1.60			0.65	Large sub-rectangular pit. 289 comprises dark compressed charcoal-rich soil	P21-2, P25, P37, P77	
Pit 198 (291)					291 = compressed charcoal	P88	

Pit 198 (199)					199 = dark carbonaceous soil	P23-4, P26-31, P37, P48	
Stakehole 277 (278)	0.08			0.12	Stakehole filled with dark charcoal-rich soil	P87	
Pit 293 (294)		0.55	0.50	0.07	Pit filled with dark charcoal-rich soil	P64-5, frags	
Stakehole 297 (298)	0.10			0.17	Stakehole filled with dark charcoal-rich soil	P42-5	
Pit 299 (300)		0.48	0.34	0.11	Pit filled with dark charcoal-rich soil	P52, P86	
Stakehole 422 (423)	0.08			0.15	Stakehole filled with clayey loam and occasional charcoal	P46	
Stakehole 448 (449)	0.11			0.17	Stakehole with grey-brown clayey fill and charcoal flecks	frags	
Posthole 478 (479)	0.16			0.26	Posthole with grey-brown clayey fill and charcoal flecks	P82	

Table 6.4: Grooved Ware contexts from Upper Ninepence.

The pits vary from oval to circular to subrectangular. The majority are shallow with single fills though a notable exception is the large sub-rectangular and generally flat-bottomed pit 198 which is 0.65m deep and contains 5 different fills, all of which are carbon-rich (fig. 6.5). Grooved Ware was found throughout the fills of this feature with the exception of context 292 which was found at the base of the pit and lining the E edge. This material comprised yellow-brown clayey soil and is interpreted as weathered and/or redeposited natural. This may represent material recently excavated from the pit, being replaced as part of a rapid, anthropogenic filling process.

Grooved Ware was also recovered from six post- or stakeholes (35, 180, 297, 422, 478, 448). These fall within the general Grooved Ware distribution on site and in the main comprise eroded and residual sherds. Sherds from five vessels (P42-5) were found in Stakehole 297 representing by far the largest stakehole assemblage. In addition, a radiocarbon date was obtained from charcoal from stakehole 18 (table 6.5) which places this feature within the same phase of the site's history.

Context	Date BP	Lab No	Cal BC 68%	Cal BC 95%
Stakehole 18	4170±80	SWAN-25	2890-2850 or 2820-2660 or 2640-2620	2920-2570 or 2540-2500

Table 6.5: Radiocarbon date from Stakehole 18.

2.2.2.1 Structure 1 (fig. 6.6). Structure 1 has already been published in interim form (Gibson 1996b). It lies within the concentration of pits containing Peterborough Ware, but radiocarbon chronology (table 6.6) and the association of possible Grooved Ware fragments in the central hearth indicate that it post-dates the Peterborough phase (see below).

The structure comprises a broken circle of 13 stakeholes describing an area 6m in diameter (fig. 6.6). The stakeholes were only detectable at subsoil level and thus were undoubtedly truncated. The very bases of two stakes were also found in the sides of ditch 4 which had cut through the E and consequently more damaged part of the structure. The stakeholes averaged about 100mm in diameter and 100-200mm deep. They had pointed bases and were clearly formed by driven stakes. The majority (24, 26, 47, 49, 57, 59, 279, 281) contained charcoal flecks suggesting that the posts may have been charred prior to their use, but there is no evidence for burning *in situ* and none contained sufficient charcoal for conventional radiocarbon dating. Four stakeholes outside the structure on the SW arc (271, 273, 281, 283) form what appears to have been a trapezoidal arrangement perhaps representing some formalised porch or entrance feature though the association of these stakeholes with the structure may only be surmised. Similarly, the association with the structure of the internal stakeholes is also uncertain given the proliferation of these features over the site as a whole.

The central hearth (28) was probably originally oval measuring 1.25m by 0.6m but has been damaged on the N side by animal burrowing. It was set in a small scoop, 0.12m deep and the pink, burned subsoil attested prolonged use but the absence of ash in the soil micromorphology samples suggests that the hearth had been subject to substantial weathering prior to being sealed by the mound (Part 9). There was no trace of an associated floor level with this structure though the soil micromorphology samples of the OGS at this point suggested an elent of trampling (Part 9). This was not recognised archaeologically.

2.2.2.2 Ditch (context 8). The penannular ditch (context 8) must also belong to the Grooved Ware phase. It cuts structure 1 (dated to 4240±70 BP) but is in turn cut by pit 85 which contained Grooved Ware and is dated to 4060±40 BP (table 6.6). The ditch averaged 1.2m deep by 1.4m across and had sloping sides and a rounded base. The fill of the ditch was almost totally mixed by burrowing animals but where a silting pattern could be detected, the silts appeared to derive from redeposited subsoil piled on the inner (W) edge of the ditch (see Part 9.1 below). The function of this ditch remains unresolved. It appears to have had the excavated material piled on the inside but the mound as excavated was composed entirely of turf and topsoil. The ditch was also full by the time that pit 85 was excavated and therefore seems to have pre-dated the mound by a considerable period. It remains the most puzzling feature of the pre-barrow complex.

2.2.2.3 Dating. Four radiocarbon dates have been obtained from contexts securely associated with Grooved Ware (table 6.6). These dates cluster around 2700 Cal BC and represent a distinctly later period of activity than that associated with the Peterborough Ware (fig. 6.7).

Feature (Context)	Pot Nos	C14 Date BP	Lab No	Cal BC (68%)	Cal BC (95%)
Hearth 28 (29)	crumbs	4240±70	SWAN-24	2930-2860 or 2820-2660	3040-2850 or 2830-2610
Pit 132 (133)	P66-9	4160±35	BM-2968	2880-2860 or 2820-2800 or 2780-2660 or 2640-2620	2890-2850 or 2830-2610
Pit 154 (155)	P33-6, 38-41	4050±35	BM-2969	2860-2820 or 2660-2640 or 2540-2500	2870-2810 or 2740-2720 or 2700-2490
Pit 85 (86)	P62-3	4060±40	BM-3069	2860-2820 or 2660-2640 or 2620-2570 or 2540-2500	2870-2810 or 2780-2720 or 2700-2490

Table 6.6: Radiocarbon dates from Grooved Ware contexts (Upper Ninepence).

In the interim statement on structure 1 (Gibson 1996b), a Peterborough association was postulated. Peterborough Ware, however, comes only from a circular pit (65) within the structure and from a stakehole (47) in the perimeter. The sherds from the latter context (P13) are small and abraded and are almost certainly residual. The sherd from context 65 (P2) is better stratified but there are no direct stratigraphical relationships between the pit and the structure. The radiocarbon date from this pit (SWAN-23) confirms its association with the Peterborough phase (table 6.3; fig.6.7)

The central position of the hearth suggests that it is more reliably associated with the structure despite the lack of unequivocal stratigraphy. The radiocarbon date from this feature (SWAN-24) is statistically later than that from pit 65 and is a more reliable indicator placing the structure within the Grooved Ware phase of the site, albeit early in the Grooved Ware phase (fig. 6.7). There is, however, a large margin of error on this date which is especially significant at the 2σ calibrated date range (table 6.6).

If the attribution of this structure to the Grooved Ware phase is correct, then the structure must belong to the earlier or middle part of this phase. This is supported by the radiocarbon date but also by the stratigraphy since the structure is cut by the curving ditch (8) which itself is cut by a Grooved Ware pit (85). It is interesting that this pit contains vessels very different from the rest of the assemblage (P62-3) in their pitted fabrics and Clacton style decoration. These vessels must be late in the pre-mound sequence yet the radiocarbon dates show that they are broadly contemporary with, for example, the Durrington Walls style vessels from pit 154.

The radiocarbon dates from pit 85 and hearth 28 act as chronological brackets for the ditch. It would appear to have been constructed sometime during the two radiocarbon centuries which separate these dates and this would agree with the site stratigraphy of house - ditch - pit. It can be demonstrated that structure 1 represents the earliest Grooved Ware activity on site with the pit digging activity taking place after the structure has gone out of use. While these dates position the ditch in the site's history, unfortunately they do not elucidate the ditch's function. It may, partly, define the area of pit-digging, but, pit 22, also Grooved Ware-associated lies outsde this area and, as pit 85 demonstrates, the ditch was already substantially filled prior to *c.* 4000 BP.

2.2.3 Undated Features (fig. 6.8)

The majority of the pre-barrow features remain undated. They consist in the main of small hearths, postholes and stakeholes which are generally dispersed, apparently randomly, throughout the excavated area. Within this general distribution there are three recognisable patterns identified as structures 2 and 3. These feature groups will be discussed below.

2.2.3.1 Hearths. Of the apparently randomly distributed features, three of them are hearths (158, 160 and 715) or at least patches of fire-reddened subsoil. All were only recognised at the subsoil level and none penetrated the subsoil more than 50mm. Charcoal from these three features was sparse comprising small flecks embedded within the burnt subsoil and none contained the comparatively large quantities of charcoal noted in the upper layers of hearth 28 within structure 1. This may suggest that either the hearths were short-lived or, that they were originally open and that the dry ash and charcoal had blown away. Whatever the true explanation may be, they were, compared with hearth 28, fairly ephemeral features and none seem to be associated with any meaningful posthole or stakehole arrangements.

2.2.3.3 Stakeholes. Some 180 stakeholes were recognised during the excavation in addition to a large number of possible stakeholes (fig. 6.8). These were distributed over the whole of the excavated area, particularly where they had been protected by the barrow mound: few were recognised beyond the confines of the surviving barrow (fig. 6.3). The stakeholes were fairly uniform at around 100mm diameter, they were invariably pointed towards the base and they were generally 100-200mm deep.

Within the stakehole spread, three groupings could be recognised and are designated here as structures 1-3. Only structure 1, consisting of 16 stakeholes, could be dated and has been discussed above. Structures 2 and 3 are undated and are discussed below.

2.2.3.2 Pits. Fifteen pits remain undated and were generally devoid of datable material. They are spread over the whole excavated area and form no recognisable pattern of distribution. Their dimensions are listed in table 6.7. Pit 335 is remarkable by virtue of its large size and peculiar heel-shaped plan. The pit was devoid of finds and its purpose remains unresolved.

Pit (Fill)	Dimensions (m)				Description	Fill
	Diam	Length	Width	Depth		
14 (15)	0.67			0.16	Shallow flat-bottomed pit	Light brown soil with sparse stones
63 (64)	0.33			0.16	Small irregular pit	Dark brown loam with occasional charcoal
67 (68)		0.60	0.45	0.12	Oval flat-bottomed pit	Dark grey, charcoal rich clayey soil
130 (131)	0.40			0.09	Small oval round-bottomed pit	Dark brown loam
150 (151)		1.25	0.54	0.28	Elongated oval pit	Dark brown clayey loam with charcoal flecks
164 (165)	0.20			0.08	Small circular pit	Dark brown loam
166 (167)		0.78	0.40	0.10	Oval pit	Dark brown loam
241 (242)		0.64	0.50	0.30	Oval pit	Dark brown loam
275 (276)		1.05	0.92	0.07	Large sub-rectangular pit	Dense charcoal-rich soil
287 (288)	0.20			0.10	Small circular pit	Grey clayey loam
295 (296)		0.44	0.40	0.16	Small oval pit	Brown clayey loam
299 (300)		0.48	0.34	0.11	Small oval pit	Dark grey charcoally clay loam
335 (336)		1.80	1.70	0.20	Large heel-shaped pit	Charcoal-rich soil
372 (373)		0.40	0.35	0.10	Small lozenge-shaped pit	Dark grey loamy clay with charcoal flecks
492 (493)	0.40			0.10	Small circular pit	Grey-brown clayey loam with charcoal flecks

Table 6.7: Descriptions of undated pits.

2.2.3.4 Structure 2. The stakehole group tentatively identified as structure 2 is represented by a roughly circular arrangement of stakeholes in the W part of the site (figs 6.3 & 6.8) defining an area some 8m in diameter and with hearth 73 slightly S of centre. The perimeter of this structure would overlap with the projected perimeter of structure 3 in the area around pits 150 and 132 (figs 6.3 & 6.8) but there is no evidence to define the stratigraphic relationship between these two stakehole arrangements. None of the stakeholes, nor indeed hearth 73, provided sufficient charcoal for a conventional radiocarbon date.

The stakeholes average *c.*100mm in diameter and were generally 100-200mm deep. They have pointed profiles indicative of driven stakes. The spacing of these stakeholes in the better defined N arc is in the region of 0.3m. No trace of a W arc was located and on the S and E, the structure appears to merge with the large number of random stakeholes encountered near the middle of the site. However, an arc of stakeholes running from SW of pit 492 round to pit 132 and incorporating stakehole 478 seems sufficiently regular to represent the S arc of the arrangement (fig. 6.8).

The structure, if such it is, bears a strong resemblance in terms of size, construction and having the presence of an internal hearth to structure 1 and it may well be broadly contemporary. Indeed, Grooved Ware sherds were recovered from stakeholes 136, 448 and 478 which all lie on the proposed perimeter of the structure. It must be stressed, however, that the Grooved Ware sherds from these contexts cannot be regarded as anything but residual.

It is also interesting to point out the presence of pit 500 in close proximity to structure 2. Structure 1, while dated to the Grooved Ware phase, is nevertheless situated in an area of former Peterborough Ware activity. Structure 2 is therefore similarly placed, in this case adjacent to pit 500 which contained pottery in the Fengate style and is the only pit containing non-residual Peterborough Ware in this area of the site.

2.2.3.5 Structure 3. This comprises a circular arrangement of fairly uniform stakeholes in the S half of the site (figs 6.3; 6.8) describing approximately 60% of a circle with a diameter of 12m. Near the centre of this assumed circle is context 752, a broadly rectangular patch of discoloured subsoil measuring 3.25m by 2.5m and orientated E-W.

The stakehole arc can be traced S from the W side of pit 150 round to pit 293 in the extreme S of the excavated area, then N and E to the S edge of pit 198. The northern 40% could not be identified with certainty though it is possible that some of the larger stakeholes in this area (for example nos 18 and 41) belong to this arrangement.

The stakeholes are close set and average 100mm in diameter and are generally 100-200mm deep. They have pointed bases indicative of driven stakes. The only finds came from stakehole 325 in the form of residual sherds of Peterborough Ware (P14).

Only stakehole 18 contained sufficient charcoal for a radiocarbon date. The date obtained is given in table 6.5 above. It clearly places the feature within the Grooved Ware phase of the site but it cannot be demonstrated with certainty that stakehole 18 does in fact form part of the perimeter of structure 3.

Feature 756, apparently central to this stakehole arrangement, comprised a patch of discoloured subsoil. The area was investigated in the belief that this represented the upper fills of a primary grave pit. However, the feature appeared to have little depth (50mm max) and soon became indistinguishable from the surrounding natural. The high phosphate count from this feature, however (see below Part 9) is consistent with the depression having originally held an inhumation, presumably unaccompanied, which had entirely decayed. A sepulchral role for this feature, therefore, remains a probability.

If the association of 752 with structure 3 is accepted, then these postholes may well be associated with the primary sepulchral phase of the barrow. Upper Ninepence would, then, have been a stake-circle barrow of a type common in Bronze Age Britain.

3 DISCUSSION

3.1 Introduction

The excavation at Upper Ninepence has demonstrated the wealth of archaeological information that might survive within a context protected from the rigours of modern agriculture by an archaeological feature such as round barrow. It also demonstrates the vulnerability of such an earth-built monument in an area of intensive arable agriculture. The distribution of the surviving features, particularly the more ephemeral features such as the stakeholes and hearths, is restricted to the area of the mound itself with few lying outside in unprotected contexts (fig. 6.3). The buried soil (context 72) similarly did not survive beyond the confines of the barrow mound though in this case the palaeoenvironmental potential of the context was minimised as a result of animal disturbance.

3.2 Phase 1 : Mesolithic/Neolithic

The earliest activity recorded at Upper Ninepence is Mesolithic in the form of a possible microlith (L13) from the mound material. In addition there are blades and blade-like flakes as well as a leaf-shaped arrowhead (L24) from unstratified contexts which may further attest a Mesolithic and earlier Neolithic presence. From the surface collection over the mound, an obliquely blunted point and some blades and blade-like flakes may further attest a Mesolithic presence. No recognisable flint artefacts from this period were recovered from stratified contexts below the mound.

3.3 Phase 2: Middle Neolithic

Shortly before 3000 Cal BC, the hilltop at Upper Ninepence saw a period of activity associated with Peterborough Ware (fig. 6.7). This activity is represented by the excavation of at least nine small pits within a restricted area into which ceramics, flint and charred materials were deposited. Pit 500 lies outside this restricted area and contains exclusively Fengate Ware material in a fabric resembling more the grog-filled Grooved Ware than the other material in the Peterborough Ware assemblage. However, the radiocarbon date for this pit (BM-3070, table 6.3) is consistent with the other dates for the Peterborough assemblage and confirms the early appearance of the Fengate style nationwide (Gibson & Kinnes 1997). The artefactual evidence suggests that this material is derived from a domestic context: waste flint debris is present in the lithic assemblage and well-used and occasionally burnt scrapers are the predominant tool type (see below Part 7). Some of the pottery vessels provide evidence for the cooking of meat derived from ruminant animals (see below Part 7). Petrographic analysis of the pottery (Part 8), while indicating a generally uniform fabric, does suggest that with their schist inclusions, P1, P10 and P20 may all have been derived from approximately 50km outside of the Basin and that the lithic sandstone in P11 may be similarly foreign.

The environmental data for the Peterborough phase is quite sparse (Part 9) though the presence of fat-hen, emmer and bread wheat grains indicate agriculture in the vicinity. Other weed seeds such as docks, violet, grass and ribwort plantain are indicative of grassland. Overall the evidence points to open grassland with areas of cultivation and hazel scrub. Hazel is, however, also a good hedge shrub and hedging rather than scrubland may well account for its presence. This may also be supported by the presence of pomoideae (possibly hawthorn) and blackthorn in the charcoal assemblages in this phase. Cereal cultivation therefore, coupled with the evidence for animal husbandry suggested by the residue and microwear analysis (Part 8) may well suggest that an elemnt of stock control would have to be practiced and it would not be too difficult therefore to envisage a field landscape with hedge boundaries.

The contents of the Peterborough pits varies considerably (table 6.8). Generally they contain fragments of 1-3 vessels, but the flint assemblage shows greater variation. Pit 37, for example, contained no flint waste at all, pits 200 and 500 contain only 2 waste flakes each while pits 10 and 16 contained a far greater amount of waste material as well as artefacts. The environmental content of the soil samples do little to alleviate this problem with hazel fragments representing the predominant plant remains in each pit and with an element of hawthorn and blackthorn represented in the wood charcoal (Part 9). The apparent differences in content do not appear to be reflected in either the distribution pattern or the shape and dimensions of the pits. It may, however, reflect a difference in ritualistic detail and even an element of deliberate selection (Barrett *et al.* 1991, 79-82).

Whether these pits were excavated specifically to be the repositories of discarded domestic detritus or whether they had a deeper significance is at present difficult to determine. A survey of the buried material indicates that the lithic material is waste, well-used or broken and presumably therefore had become redundant. The ceramic material was all in a fragmentary state when deposited with no complete vessels represented. The material was, therefore expendable and at face value represents no great sacrifice on the part of the depositors. Nevertheless, in purely practical terms, the deliberate act of burying this material in pits which were quickly back-filled seems alien to an agrarian community which would have been well-acquainted with manuring regimes. Furthermore, the fact that the pottery vessels are so fragmentary suggests that only a small proportion of the total waste was receiving such well-defined deposition and if this is the case, then the pits must represent a different and also rare form of rubbish disposal.

Pit	Nos of vessels	Flint Waste (burnt)	Retouched pieces	Cores	Artefacts
6	1				
10	1	40 + (2)	2	2	2 arrowheads 2 end & side scrapers (1 burnt)
12	3	5	1		
16	3	17 + (1)	1		1 serrated flake 1 piercer
20	1	5 + (2)			1 serrated flake
37	1				
65	2	5 + (3)			
200	2	2			
500	1/2	2			

Table 6.8: Peterborough Pits - Summary of Contents.

The full contents of each pit are not known. In the dry and acid soil bone and uncharred food remains would not survive. Nor would other organic materials such as leather or fabrics. The microwear analysis of the lithic artefacts attests that leather and bone-working were carried out at the settlement, however, and the presence of ruminant residues akin to sheep fats in the ceramics suggests that woollen fabrics would also have been present. The surviving contents of the pits, ceramics with food traces, stone and charred plant remains probably represent only a fraction of the range of materials that were actually deposited. Nevertheless, both the presumed archaeologically invisible deposits and the surviving materials are united in the fact they derive from the soil: animals feed from the soil, plants grow from it, the raw materials for pottery are dug from it and flint is foraged or quarried from it. The surviving artefacts are also united in that they are spent materials representing a small percentage of the whole.

In the same way that seeds represent a small percentage of the plant but, when returned to the soil, reproduce the resource so the deposition of fragmentary material in this apparently illogical way may be an attempt to ensure the continuation of the supply of raw materials. Thus symbolically returning a percentage of materials to their source will ensure their constant availability to a society who depended entirely on Earth's bounty. Whether this deposition took the form of a continuous process or whether it was undertaken at specific events or festivals, as at our contemporary harvest festivals, is at present beyond our powers of archaeological detection. To what extent the pit-ritual at Upper Ninepence extended beyond the confines of the later mound is also unknown but more important is that the activity took place on a physically high point from which the surrounding countryside, the immediate area of local earth-exploitation, could be surveyed. This might ensure that the practitioners in the ritual were physically as well as mentally conscious of the reasons for their ritual.

The best local parallels for the deposition and context of the present assemblage are the finds from Cefn Bryn, Glamorgan (Ward 1987), Llanilar, Ceredigion (Taverner *et al.* forthcoming; Gibson 1995a) and Ysgwennant, Denbighshire (Day 1972). These site have all produced small quantities of Peterborough Ware from pits sealed by later mounds and have recently been discussed elsewhere (Gibson 1995a). The Llanilar pits in particular are considered by their excavators to be ritual in function though being filled with burnt (including bagged) settlement-derived material.

At Meole Brace, Shrewsbury, Shropshire, lying adjacent to a ring-ditch, a distinct cluster of 12 pits were associated with Peterborough Ware (Hughes & Woodward 1995). These pits were similar to those from Upper Ninepence in that they were of roughly the same size and also generally single-filled. They also contained fragmentary locally-made vessels, charcoal and occasional burnt pebbles. A similar, if smaller pit group, also with Peterborough Ware and charcoal flecks, was located at Wasperton, Warwickshire (Hughes & Crawford 1995) where the excavators also found difficulty in distinguishing between ritual and domestic. The argument is, however, somewhat academic as it is possible to see domestic material ritually deposited and economics and symbolism are rarely unconnected in primitive societies (Barrett 1994; Grant 1991).

3.4 Phase 3: Later Neolithic

The second visible phase of datable archaeological activity centres on *c.*2700 Cal BC and is manifested by a phase of Grooved Ware-associated pit digging and structural activity. The Grooved Ware appears to be all locally made though the calcite and shell inclusions of P62-3 suggest an element of importation of fillers if not clays. This phase is broadly contemporary with the construction of the Hindwell II palisaded enclosure and this major monument would have been clearly visible, given an open environment, from the hilltop at Upper Ninepence.

The pit digging in this phase is more extensive than in the preceding one in that the pits are distributed over a wider area (fig. 6.4) and that archaeological finds are more prolific. Ten pits are securely dated to the Grooved Ware phase including the large pit 198 and the sub-rectangular pit 154 which between them produced fragments of 23 vessels. In addition seven stakeholes also contained Grooved Ware pottery though the strict association of the ceramic with these features is less certain. Stakehole 18 was radiocarbon-dated to this phase.

The flint assemblage associated with this phase comprises high quality material but is again used, waste or broken. Indeed, other than the obvious ceramic difference, the contents of the pits in this phase are remarkably similar to those of the former: waste material, pots used for cooking, and carbonised plant material. Once again there is considerable variation in content (table 6.9) despite the restricted nature of the surviving material. Pit 22, for example, contains little pottery but an abundance of flint waste and artefacts. By far the largest and deepest feature, pit 198, contains abundant ceramic in its various fills, but remarkably little flint. Pits 132 and 154 are rich in ceramics as well as lithics. It is also from these features that the internally decorated vessels originate. Given the rarity of internally decorated vessels in Grooved Ware assemblages generally (see below Part 7.5), and given the richness of the pit contents, these two comparatively close pits may well represent special depositories of selected redundant material of a nevertheless prestigious nature.

These putatively rich pits (55, 132, 154, 198) occupy the highest point of the site and form a roughly trapezoid arrangement (fig. 6.4) resembling the posthole structures at Willington, Derbyshire (Wheeler 1979) though there is no evidence to suggest that the Upper Ninepence pits ever held posts. Pits 293 and 22, however, are also apparently rich yet lie outside this general distribution.

Pit	Nos of vessels (residual Peter-borough)	Flint Waste (burnt)	Retouched pieces	Cores	Artefacts
22	1	25 + (4)		2	1 chisel arrowhead 2 end scrapers 4 end & side scrapers 1 misc scraper
35	1	19			
55	7	4			
85	2	9			
132	4	34 + (3)	3	2	1 end scraper
146	1				
150	1	11			
152	1	22 + (3)			
154	8 (1)	32 + (6)	3		1 end & side scraper 1 end scraper 2 misc scrapers 1 knife
188	1				
198	15 (1)	35 + (2)	4		1 end & side scraper
293	4	8 + (2)		1	
300	1				
370	crumbs				

Table 6.9: Grooved Ware Pits - Summary of Contents.

With the change in ceramics comes an apparent change in diet as the lipid analysis suggests that it was pig that had become the predominant cooked meat (see above Part 7.6). This is in keeping with Grooved Ware faunal assemblages elsewhere, for example Durrington Walls where the preponderance of young pig was regarded as evidence of feasting (Wainwright & Longworth 1971). Other Grooved Ware assemblages, however, suggest a strong element of cattle as well as pig (Pollard 1995; Harding 1988; Barrett *et al.* 1991, 79) but this is not represented by the limited evidence at Upper Ninepence. The residue analysis of the pottery (Part 8) while admittedly limited in scope, nevertheless demonstrates a distinct difference between the animal associations of the Peterborough and Grooved Ware phases. Does this represent a change in husbandry, economy, a change of ritual or indeed an increase in ritual is at present unclear.

The palaeoenvironmantal data from the Grooved Ware phase is sparse (Part 9). There is however less evidence for cereal cultivation and more evidence for woodland. Taken with the evidence for pig fats in the ceramics, this may suggest a more closed environment with less evidence for open fields. However the data are too limited to allow more than supposition.

Structure 1 and structure 2 have been described in detail above. While Structure 1 definitely dates to this phase, the chronology of Structure 2 is less certain, relying as it does on the finds of residual Grooved Ware from the stakeholes. Nevertheless, the two structures are superficially similar and may be discussed together. In terms of size and construction, the stakehole circles of structures 1 and 2 resemble the Grooved Ware-associated structures at Trelystan Powys (Britnell 1982) though at this site the central hearths were formally edged with stone and heat-crazed stones were recovered from internal pits. (Other than occasional burnt flints, there were no burnt stones from Upper Ninepence.) Also at Trelystan, the perimeter stakes had been driven in at an angle whereas at the present site the stakes were vertical. Nevertheless, the overall similarity of the four structures concerned is remarkable given their shared cultural backgrounds.

Other stakehole arrangements which bear comparison with Structures 1 and 2 are the circular structures at Marden, Wiltshire (10m diameter), Litton Cheyney, Dorset (10m diameter) and Hockworld-cum-Wilton, Norfolk (6m diameter). The two former sites lie within larger henge monuments considered to have ritual functions (Wainwright *et al.* 1971; Catherall 1976). Neither of these sites have central hearths, and the stakes of the Litton Cheney example are set within a bedding-trench. These sites are not ostensibly domestic. At Hockwold-cum-Wilton (Bamford 1982) a slightly dished circular floor area was discovered with traces of a double stakehole wall around its perimeter resembling the better preserved structure at Gwithian, Cornwall (Megaw 1976). Both these sites do have internal hearths, but their association with Beaker ceramics places them later than the Upper Ninepence structures.

More numerous parallels for the Upper Ninepence structures may be found in Ireland (see Grogan 1996 for a useful summary). In particular, the stakeholes structures with roughly central hearths set within a palimpsest of pits and postholes at Lough Gur are associated with Beaker and Irish Grooved Ware (Gibson 1987; Grogan & Eogan 1987). House 1 at Slieve Breagh (Grogan 1996, fig. 4.3) is also of a similar size to structure I at Upper Ninepence and appears to have a possible porch to the S. At Newgrange, circular arrangements have been identified around hearth sites around the base of the great passage grave (Coney & Grogan 1994) associated with Irish Grooved Ware and Beaker ceramics. These sites did not have stakehole walls but there were internal roofing stakes and they appear to have been arranged in four groups of four each varying between 5m and 6m in diameter.

The Irish circular Neolithic houses range in diameter from 4.5 to 8m in diameter (Grogan 1996, table 4.2) which again corresponds well with the dimensions of structures 1 and 2. Indeed the similarity of the Welsh sites (Upper Ninepence and Trelystan) with the Irish material may be one facet of the strong Hiberno-Cambrian links in the Neolithic and Bronze Age manifested, for example, by passage graves, Food Vessels, megalithic art and metalwork, and it may be no coincidence to note the presence of Irish style Grooved Ware at Upper Ninepence (see below Part 7).

The curving ditch also belongs to this phase but its function remains obscure. The ditch and the problems it presents have been discussed above suffice it to emphasis here that the spoil from the ditch appears to have been ultimately returned to the ditch (see below Part 9). Many of the postholes also date to this period

3.5 Phase 4: ? Final Neolithic/Early Bronze Age

The posthole arrangement here designated structure 3 possibly dates to this period. As with structure 2, the dating is problematic. Grooved Ware has been recovered in a residual state from stakehole 325 on the S perimeter of the group, but a Grooved Ware phased radiocarbon determination was obtained from charcoal from stakehole

18 which is believed to have formed part of the NE arc. More or less central to the stake circle is the shallow feature 752 believed to represent the site of the primary burial. Stake circles within barrows are common and they are well paralleled in Welsh barrows where the construction, like Upper Ninepence, is of earth or turf. The single circle of close-set posts measuring some 15m in diameter at Six Wells 271' and the irregular circle some 8m in diameter at Six Wells 267' are particularly relevant (Fox 1959). The turf-built barrows at the Brenig cemetery in Denbighshire also have stake circles beneath them (Lynch 1993) though the excavators were uncertain as to whether these features were symbolic or structural. This uncertainty must also persist at Upper Ninepence. Since no traces of the stakeholes were visible within the makeup of the barrow mound, it may well be that the circle is ritual and pre-dates the mound construction. However, the perimeter of the mound was so badly disturbed by rabbit activity that the evidence may have been destroyed. If a vertical revetment similar to those at West Heath, Sussex, (Drewett 1976) is envisaged for Upper Ninepence, then the flimsiness of the posts suggests that the revetment was probably not very high.

3.5 Phase 5: Early Bronze Age

This marks the final construction of the mound at Upper Ninepence. it was composed of turf and topsoil and built directly onto the old ground surface. Fragments of Peterborough Ware and Grooved Ware as well as flintwork from this mound material attest the slight truncation of buried features during the scraping up of this soil. Fragments of two early Bronze Age vessels, a probable Collared Urn and a Food Vessel Urn (see below Part 7) suggest the presence of former secondary burials in the mound itself the destruction of which had already been suggested by Dunn some thirty years ago.

PART 7

THE FINDS

1.1 LITHICS FROM THE PRESENT SURVEY

The number of flint and lithic artefacts recorded from the Basin cannot be estimated. The Dunn collection alone numbers over 6000 flints and indeed, each farmer contacted during the present survey claimed to have found 'numerous' flints during the course of normal ploughing. The documented 'flint forays' of the Field Section of the Radnorshire Society (anon 1990, 6) have probably also produced numerous finds, probably still in private possession and largely undocumented.

PRN	NGR	NO OF FLINTS	DATE
310	SO254606	3	
3652	SO244604	2	
3653	SO24506061	1	
3654	SO254606	8	
3655	SO258621	1	EBA
3656	SO244619	1	
3657	SO253608	1	N
3658	SO24506048	1	
3659	SO252609	3	BA
3660	SO253607	4	
3661	SO244605	6	
3662	SO262598	3	
3666	SO243624	1	
26300	SO24906150	39	N: BA
26301	SO24556100	5	
26302	SO22656240	5	
26303	SO22506046	4	
26304	SO24435990	2	
26305	SO22006040	7	
26307	SO28216120	2	
26308	SO25266080	1	
26309	SO23856546	2	
26310	SO24356360	9	BA
26311	SO26756027	8	
26312	SO24346155	2	
26313	SO20106045	14	M
26315	SO25056380	9	
26316	SO21976055	2	
26318	SO24006264	13	
26319	SO24676179	1	
26320	SO18755930	1	
26325	SO22966250	14	
26326	SO25056380	44	EBA
26327	SO24606405	8	
26328	SO23526493	1	

Table 7.1: Flint finds made and identified during the present survey.

The previously recorded flint scatters are PAR 2150, 5239, 1074, 76, 3532, 2211, 2213, 305, and 307. The last two scatters numbered above are also barrow sites and represent flint from the mound material and surrounding area. Flint has also been recorded from the ploughed mounds of barrows 300, 303, 309, 310, 314, and 369.

In addition, during limited field walking as part of the present survey, flint was recovered from the same field as the Four Stones stone circle (PAR 3652-3, 3658, 3661), from the field to the North (PAR 3656), and from the same field as barrows 309 and 314 (PAR 3657). Flint finds from the present survey are summarised in table 7.1 and a selection are illustrated in fig. 7.1.

1.2 Catalogue of Illustrated Pieces from the present survey (fig 7.1)

1 SO254606, PRN3654. End scraper.
2 SO254606, PRN3654. Mesolithic blade
3 SO254606, PRN3654. Mesolithic blade
4 SO256623, PRN3655. Thumbnail scraper.
5 SO253608, PRN3657. Core from a polished flint axe in a milky grey flint.
6 SO253607, PRN 3660. Large retouched flake.
7 SO252609, PRN3659. Calcined retouched flake.
8 SO252609, PRN3659. Serrated flake with some cortex remaining.
9 SO252609, PRN3659. Awl with bifacial retouch and fine ripple-flaking on dorsal side.
10 SO253607, PRN 3660. Plano-convex knife fragment with some cortex remaining.

These finds, combined with the more than 6000 recorded flints from PAR 76 and the 1000 from PAR 305 clearly demonstrate the wealth of the resource in this area but also demonstrate the destruction of archaeological contexts. While flints from mound material may have little contextual value other than providing a *terminus post quem* for the barrow and attesting the possible proximity of settlement, flints from other locations must clearly be derived from unknown but truncated contexts. The regularity with which flint finds occur in the Basin demonstrates the rate at which these contexts are being destroyed.

2 THE WORKED FLINT FROM THE DUNN COLLECTION AND THE EXCAVATIONS (Philippa Bradley)

2.1 Introduction

A total of 7901 pieces of worked flint was recovered from excavations and surface collections in the Walton Basin. This total includes a small quantity of burnt unworked flint and stone (42 pieces) and six pieces of worked stone. The largest group of material recovered forms the Dunn Collection from the National Museum of Wales, Cardiff, some of which has already been published (see for example Dunn 1965; 1966). The assemblages are summarised in table 7.2, selected pieces are illustrated in figs. 7.2-6 and described in the catalogue. Further information about these assemblages may be found in the archive. Selected groups of material were studied in greater detail and these are dealt with below by site. In addition the assemblage from Upper Ninepence was examined by Dr R. Donahue for traces of microwear.

Site	Flake	Blade-like flake, blade	Chip	Irreg. waste	Core, core frag.	Retouched forms	Burnt unworked flint/stone	Total
Dunn Collection	4354	67	748	82	138	669	37	6095
Fieldwalk	159	5	6	3	13	53	2	241
76D	2	-	-	-	-	1	-	3
Walton Cursus	3	-	-	-	-	2	-	5
4222/I/501	2	-	-	-	-	-	-	2
Upper Ninepence	1122	27	271	8	16	93	3	1540
Upper Ninepence II	4	-	-	-	1	1	-	6
Hindwell Ash	5	-	1	-	1	2	-	9
TOTAL	5651	99	1026	93	169	821	42	7901

Table 7.2: Assemblage composition.

2.2 Method

All of the material was examined but to different levels according to the context from which the assemblages came. The excavated assemblage from Upper Ninepence was therefore recorded in some detail and was subjected to attribute analysis to facilitate the characterisation of the material. Metrical analysis was not undertaken given the high proportion of burnt and broken pieces amongst the assemblage. The flint from the Dunn Collection was quantified and technological traits were recorded were relevant. The general appearance of the flint including raw material and condition was also noted. Diagnostic forms, particularly retouched pieces, are therefore the main dating tool for this collection. However, some use can be made of the more generalised attributes which were noted but the unstratified nature of the collection must be remembered when drawing conclusions form the material.

2.3 Flint scatters - The Dunn Collection and other fieldwalked assemblages

The Dunn Collection comprises 6095 pieces of worked flint and stone. Other fieldwalking within the Walton Basin produced a total of 241 pieces of flint. The assemblages are summarised in tables 7.3-7.7 and selected pieces are described in the catalogue and illustrated in figs 7.1-6

2.3.1 Raw materials and condition

The majority of the collection is composed of flint although quartzite, chert and various fine-grained rocks were used. A few pieces of probably unworked rock crystal were also recovered. Fourteen pieces of Bullhead flint (Shepherd 1972, 114) were recovered This flint is particularly distinctive with a dark green to black cortex and a band of tan discolouration immediately underneath the cortex. Where discernable, the original colour of the flint is usually mid-brown. The flint is good quality and seems to have been especially sought for its attractive appearance as well as for its flaking properties (Bradley in prep). Dark grey, light grey and a variety of orange and brown chert was also used. There appeared to be no period bias to the use of these other materials although they are perhaps more common amongst the Neolithic and Bronze Age flintwork. The flint was generally very good quality with excellent flaking properties. The flint varied in colour from dark grey almost black to dark brown, light brown, buff, orange and grey. Cherty and crystalline inclusions were commonly noted but these generally did not affect the flaking properties of the raw materials. Cortex where present is either quite thick, buff, white and sometimes chalky or brown, smooth and iron-stained. Cortication was recorded on much of the flintwork and was either light or medium, a few pieces were very heavily corticated. Plough damage to the edges of pieces was frequently recorded and many pieces were broken. Burning was recorded on approximately 32% of the assemblage much of which was very heavy calcining.

Good quality flint does not occur in the locality and much of this material must have been imported; the nearest sources of high quality flint are the Berkshire Downs to the south and the Chiltern Hills to the south-east. Bullhead flint occurs in the south-east (Rayner 1981, 357) although it has been recorded on flint from the Kennet Valley (Healy 1992, 48) and may occur more widely within gravel deposits. A small proportion of poorer quality iron-stained flint with a smooth, frequently worn cortex was also included in the collections. This material is derived flint and may have come form superficial deposits in the northern Cotswolds (Charlesworth 1957, 77; Tyler 1976, 4) or within gravel deposits around Cardiff and the Vale of Glamorgan (Dutton 1903, 111). Polished flint and stone axes were used as a source of raw material presumably once they had broken; reworked fragments and polished flakes are well represented amongst the collection (table 7.4). The flint used for axes includes a creamy white material which may originate around the Louth area of Lincolnshire (J. Humble pers. comm.). A good quality grey flint was also used for axes. The stone axes include fine-grained material; many of the fragments have been thin-sectioned although many of the resulting sections could not be located.

Single platform	Opposed platform flake/blade	Multi-platform	Keeled	Discoidal/ Levallois	Core on a flake	Other	Frags	Total
8	4	23	4	18	1	2	91	151

Table 7.3: Surface collection: core typology.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
204	29	144, 19	51	26	33	1, 7	1	5	1	179	3	7	12	72 2

Table 7.4: Surface collection: retouched forms. 1= scrapers, 2 = Knives, 3 = Retouched & serrated flakes, 4 = Arrowheads, 5 = Polished flakes, 6 = Piercers & awls, 7 = Axes and axe frags, 8 = Denticulates, 9 = Fabricators, 10 = Gunflint, 11 = Miscellaneous retouch, 12 = notched, 13 = Microliths, 14 = Worked stone, 15 = Total

The chert may derive from Carboniferous Limestones which occur in north Wales, for example in the Vale of Clwyd, although this raw material seems to have been used most extensively in the Mesolithic period. At Rhuddlan Denbighshire for example, various coloured cherts including black, dark brown, grey and greyish white were used (Berridge 1994, 95; Manley & Healey 1982, 21). Chert was also used in the Brenig Valley during the Mesolithic (Healey 1993, 187).

2.3.2 Technology and dating

Flint dating from the Mesolithic to the Bronze Age was included in the collection. However, the bulk of the material dates from the Neolithic and early Bronze Age. A small quantity of worked stone includes two spindlewhorls which are likely to be Iron Age in date. The dating of surface collections is fraught with difficulties given the lack of stratigraphy, other associations and the frequently large numbers of relatively undiagnostic pieces recovered. Dating has been based on certain diagnostic retouched forms such as arrowheads, some scraper types and a variety of other well established forms to provide broad date ranges. Diagnostic pieces of debitage have also been used for dating purposes although cores for example can only provide a general date range. Technological attributes may also be used to provide some indication of date (cf. Holgate 1988; Brown 1991) which together with the diagnostic forms can be used to provide relatively firm dating.

Mesolithic flintwork is represented by seven microliths and a possible microburin; many of the numerous blades and blade-like flakes may also belong to this activity although they may equally be of earlier Neolithic date. Two small opposed platform blade cores from grid reference SO254630 (1675) and SO257615 (1480) are also likely to be of Mesolithic date. A single large, quite crude fabricator from SO244615 (1577; fig.7.2, 8) may also be of Mesolithic date. Although these artefacts occur in Bronze Age assemblages, this example can be parallelled at Oakhanger, Hampshire (Rankine 1960, 250, fig. 6, no. 16) and Thatcham, Berkshire (Wymer 1962, 350, fig. 12, nos.165-7); Bronze Age examples tend to be smaller and less robustly worked. The microliths are simple, quite large obliquely blunted and edge blunted points. The simple microlith forms occur throughout the period (Pitts and Jacobi 1979, 169, fig. 5) and are thus difficult to date precisely. However, their size, together with their relative simplicity in terms of retouching would perhaps indicate an earlier Mesolithic date around 9800-8500 BP. Two probable microlith fragments were recovered from grid references SO246613 and SO270612 (78 and 89). The latter are later Mesolithic in date and are forms which began to be made around 8500 BP. The possible microburin (276, SO246612) attests microlith manufacture and the blade core indicates that knapping was occurring. Fabricators seem to have been multi-purpose tools, used for repeated rubbing and striking functions such as knapping, and in the production of fire. The sparse distribution of Mesolithic material, consisting mainly of microliths indicates chance losses during hunting episodes. The fertile area of the Walton Basin would have provided good hunting opportunities and temporary camps would have been established.

Earlier Neolithic flintwork is chiefly indicated by the occurrence of leaf-shaped arrowheads. Sixteen leaf-shaped arrowheads and several other fragments were recovered. These ranged from finely retouched ones with little sign of use to cruder, perhaps purely utilitarian examples. A number of other retouched forms, including scrapers, piercers, serrated flakes and simple flake knives would also indicate Neolithic activity. Many of the blades and blade-like flakes may also be of earlier Neolithic date although it is difficult to distinguish debitage and these pieces may equally belong to the sparse Mesolithic activity identified. Earlier Neolithic core types tend to include the simpler examples such as single platform types. Platform preparation on some examples indicates the removal of overhangs and projections between knapping episodes. The removal of these projections strengthens the working platform edge and enables previous flake arises to be followed in subsequent flaking. The numerous polished implement fragments and flakes indicate Neolithic activity although the re-flaking of these objects may have occurred throughout the Neolithic and into the early Bronze Age.

Middle to later Neolithic flintwork is again mainly recognised by transverse arrowheads which were distributed quite widely. Both chisel and oblique arrowhead forms were recovered although the former are more numerous. A single possible *petit tranchet* derivative arrowhead was recovered from grid reference SO252613 (bag 536), the scatter above the barrow at Upper Ninepence; another example was recovered from the subsequent excavation at the site (context 50). Diagnostic mid-later Neolithic debitage was also recovered including Levallois and keeled cores, for example, fig. 7.2, 1; 7.4,39), other examples of these cores were recovered from the excavation at Upper Ninepence, for example, fig. 7.8, 10.

Beaker and Bronze Age activity is chiefly recognised by `thumbnail' scrapers, barbed and tanged arrowheads, and a variety of flake knives. The arrowheads are quite varied in terms of quality of retouch. Some examples were clearly intended for use and some even have possible impact fractures indicating that they have been fired from a bow (for example, bag numbers 320, 321 and 326 SO274627, SO274627 and SO250613). Other examples are in mint condition and may not have been intended for use. Approximately forty `thumbnail' scrapers were recovered, these varied from very small extensively worked examples to larger, partly cortical ones (fig. 7.3, 20;7.4, 30; 7.5, 48). Many fine scale-flaked knives including some plano-convex examples were recovered. Technically these are very accomplished pieces. Other retouched forms including small neatly retouched scrapers, piercers and fabricators may also be of Beaker and early Bronze Age date. Very little flintwork was demonstrably later Bronze Age. A single tanged arrowhead is likely to be of mid-later Bronze Age date. Debitage to accompany these diagnostic pieces is generally fairly uncharacteristic, although many of the small, hard-hammer struck flakes would appear to be contemporary.

A small quantity of post-Bronze Age material includes two stone spindlewhorls which are likely to be of Iron Age date and a single post-Medieval gun flint was recovered from SO254615 (1512).

2.3.3 Summary of flint scatters

The flint from each grid reference has been summarised below. Numbers in brackets refer to individual bag numbers. Illustrated material is referred to by catalogue number. Abbreviations: CRF - core rejuvenation flake.

Unprovenanced material

197 pieces of worked flint and a single piece of burnt unworked flint have no provenance. This material is summarised below and discussed in very general terms only given the problems with its location.

Flake	142
Utilised flake	1
Blade-like flake	3
Bladelet	1
Blade	1
Chip	9
Irregular waste	4
Polished flake	2
Core	2
Core fragment	4
Axe fragment	1
Arrowhead	1
Scraper	3
Retouched flake	11

Knife	2
Miscellaneous retouch	10
Burnt unworked	1
Total	198

Burning was recorded on 45 flakes, 5 chips, 1 piece of irregular waste, 2 core fragments and 3 pieces of irregular waste.

Mesolithic material includes a possible obliquely blunted point (1588) and another microlith fragment which cannot be assigned to type (1984). Occasional blade-like flakes, blade, bladelet and soft-hammer struck flakes are probably Mesolithic also although they may equally be of earlier Neolithic date. Blade scars were also noted on the dorsal faces of some flakes and blades (for example, 45, 1676). A flake from an oppose platform blade core (1985) and an keeled core with blade scars support the Mesolithic date for some of this material.

Diagnostic retouched pieces include an oblique arrowhead (1986) and bifacially worked piece (1987) is probably a fragmentary transverse arrowhead. A possible chisel arrowhead was also recovered (57). These arrowheads are of mid-late Neolithic date. A Levallois core on a polished implement fragment (No.30, fig. 7.2, 1) is likely to be of mid-late Neolithic date. Less diagnostic artefacts include flakes from polished implements (31, 55) which are of Neolithic date. Beaker activity is indicated by the recovery of a `thumbnail' scraper (1589) and a fragmentary barbed and tanged arrowhead (1590). An invasively retouched knife (1912) may be of early Bronze Age date.

SO18755930 (PRN 26320) - A single piece of miscellaneous retouch, possibly a scraper fragment was recovered from this grid reference.

SO20106045 (PRN26313) - 14 pieces of worked flint were recovered from this grid reference. The material consists of 10 flakes, 4 of which are burnt, a blade, a core fragment, a possible microlith fragment and a possible end-and-side scraper.

S0206629 (PRN 13220) - A single flake was recovered.

SO214617 (PRN 5239) - 101 pieces of worked flint and a single piece of burnt unworked flint was recovered. The material can be summarised as follows:

Flake	83
Chip	5
CRF	1
Polished flake	1
Core	1
Axe fragment	1
Arrowhead	1
Scraper	2
Scraper/piercer	1
Retouched flake	4
Miscellaneous retouch	1
Burnt unworked flint	1
Total	102

The leaf-shaped arrowhead, the axe fragment and the polished flake (283, 1594, 1812) indicate probable earlier Neolithic activity. Some of the other retouched forms would also be consistent with this date. A invasively retouched disc scraper (318, fig. 7.2, 3) is likely to be early

Bronze Age in date. The flakes included many hard-hammer struck examples and hinge fractures were common, this material would suggest a Neolithic to Bronze Age date.

SO2161 (PRN 23499) - 11 pieces of worked flint were recovered from this grid reference. The material consists of 3 flakes a blade-like flake, 4 scrapers, a plano-convex knife and 2 retouched flakes. Burning was recorded on 2 flakes. The diagnostic pieces recovered suggest an early Bronze Age date for this small scatter.

SO215635 (PRN 23326) - A single, possibly reworked knife was recovered. The retouch cuts through the cortication indicating re-working. The blank is slightly blade-like with proximal and distal breaks. The left-hand side has been steeply retouched.

SO21976055 (PRN 26316) - A single soft-hammer struck flake and a chip were recovered from this grid reference.

SO22006040 (PRN 26305) - 7 pieces of worked flint were recovered from this grid reference. The material consists of 2 flakes, a polished flake, 2 pieces of irregular waste, a small opposed platform core and a scraper. The scraper and both of the flakes were burnt. The flakes is from a ?quartzite object.

SO224617 (PRN 19060) - A single flake was recovered.

SO22506046 (PRN 26303) - 4 flakes, 3 of which are burnt, were recovered from this grid reference. 1 of the flakes is soft-hammer struck.

SO226620 (PRN19042) - 2 flakes, a polished flake, a discoidal core and a chip were recovered. The polished flake would indicate some Neolithic activity and the discoidal core would indicate a later Neolithic date.

SO226624 (PRN 23329) - A single flake was recovered.

SO22656240 (PRN 26302) - 3 flakes and a chip were recovered from this grid reference.

SO22966250 (PRN 26325) - 14 pieces of worked flint were recovered from this grid reference. This material consists of 11 flakes, a notch on a core tablet and 2 scrapers. 1 of the flakes was burnt. 1 of the scrapers was on the end of a blade-like flake, the other was on an irregular flake.

SO23526493 (PRN 26328) - A single flake was recovered.

SO237615 (PRN19041) - 3 flakes and a miscellaneous retouched piece were recovered. The miscellaneous retouched piece is a bifacially worked fragment, probably from an arrowhead although not enough of the object survives to enable further identification.

SO23856546 (PRN 26309) - 2 flakes, 1 of which was burnt, were recovered from this grid reference.

SO238615 (PRN 23330) - A finely retouched plano-convex knife (fig. 7.2, 4) was found at this grid reference. An early Bronze Age date is indicated by this artefact type.

SO24006264 (PRN26318) - 13 pieces of worked flint were recovered. The material consists of 9 flakes, 1 core fragment, 1 end scraper and 2 pieces of miscellaneous retouch. 6 of the flakes and 1 piece of miscellaneous retouch are burnt.

SO24346155 (PRN 26312) - 2 flakes, 1 soft-hammer struck, were recovered from this grid reference.

SO24356360 (PRN 26310) - 8 pieces of worked flint, 6 flakes, a retouched flake and a barbed and tanged arrowhead, were recovered. 2 of the flakes are burnt. The retouched flake has a worn area at its distal end and it may be an atypical fabricator. A late Neolithic to early Bronze Age date is indicated by the arrowhead. The possible fabricator may be Bronze Age in date.

SO243624 (PRN 3666) - A multi-platform flake core (fig. 7.2, 5) and 2 pieces of irregular waste were recovered from this grid reference. Subsequent fieldwalking at this location produced a possible knife fragment.

SO24435990 (PRN 26304) - A flake and a core fragment were recovered from this grid reference.

SO244604 (PRN 3652) - 2 flakes were recovered from this grid reference.

SO244605 (PRN 3661) - 6 pieces of flint were recovered; 4 flakes, a serrated flake and a piece of miscellaneous retouch. The serrated flake is on Bullhead flint and is worn. It has been very finely serrated along its left side (approximately 8 serrations per 10 mm). 1 of the flakes has been soft-hammer struck.

SO244613 (PRN 23334) - 104 pieces of flint were recovered from this grid reference. The material is summarised below:

Flake	81
Chip	1
Irregular waste	1
Core	1
Scraper	11
Retouched flake	3
Piercer	1
Knife	3
Miscellaneous retouch	2
Total	104

6 flakes, the core, an end and side scraper and the chip were burnt. Diagnostic retouched forms recovered include 5 `thumbnail' scrapers (1438, 1439, 1442, 1848, 1869) and an invasively retouched knife (1441). A later Neolithic to early Bronze Age date is provided by these artefacts. Many hinge fractures were recorded amongst the flakes and hard hammers seem to dominate. The single core (1936) recovered is a small multi-platform type which was rejected because it could not be reduced further due to the many hinge fractures covering its flaking faces. An early Bronze Age date would be consistent with the debitage.

SO244615 (PRN 50222) - 299 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	233
Blade-like flake	1
Utilised flakes/blade	3

Chip	2
Irregular waste	7
Cores	3
Core fragment	2
Axe fragment	1
Arrowhead	3
Scraper	15
Retouched flake	11
Serrated flake	3
Knife	1
Fabricator	2
Miscellaneous retouch	12
Total	299

Burning was recorded on 70 flakes, a chip, a blade-like flake, a `thumbnail' scraper, a retouched flake and 6 pieces of miscellaneous retouch. Diagnostic retouched forms can be dated to the mid Neolithic through to the early Bronze Age. 2 chisel arrowheads and a broken transverse (probably another chisel arrowhead) are of mid to late Neolithic date (312, 313, 265). 5 `thumbnail' scrapers indicate Beaker activity (1546, 1552, 1565, 1578, 1579) and 2 other scrapers may also be of later Neolithic to early Bronze Age date (1558, 1575). A scale-flaked-knife is probably early Bronze Age in date (fig. 7.2, 7; 1567). Less diagnostic artefacts include 2 fabricators of probable Bronze Age date (fig. 7.2, 8, 1577, 1988). An axe fragment and serrated flakes indicate Neolithic activity (298, 1560, 1576, fig. 7.2, 6; 1701). 2 of the cores are discoidal (1257, 1697), a type which is more common in later Neolithic industries. The third core is a single platform type which cannot readily be dated. Many of the flakes were hard-hammer struck and hinge fractures were commonly noted. This material would be consistent with a later Neolithic to early Bronze Age date.

SO244619 (PRN 3656) - A backed knife was recovered from this grid reference.

SO24506048 (PRN 3658) - A retouched flake on an irregular flake was recovered from this grid reference.

SO24506061 (PRN 3653) - A single flake was recovered.

SO24556100 (PRN 26301) - 4 flakes and a small discoidal core were recovered from this grid reference. The core might suggest a mid to later Neolithic date.

SO245607 (PRN 19026) - 5 flakes, a chip, a `thumbnail' scraper and a retouched flake were recovered. The `thumbnail' scraper, the chip and one flake were burnt. The `thumbnail' scraper provides a later Neolithic-early Bronze Age date and the remaining material may also be of that date.

SO245610 (PRN 19059) - 39 pieces of flint were recovered from this grid reference. The material is summarised below:

Flake	27
Blade-like flake	2
Chip	1
Core fragment	2
Scraper	2
Retouched flake	1
Backed blade	1

Miscellaneous retouch	3
Total	39

1 core fragment, the chip and 10 flakes were burnt. The backed blade (1766) has been soft-hammer struck and may be of Mesolithic date. The distal break on this piece may be deliberate truncation. 2 of the miscellaneous retouched pieces have bifacial retouch and both seem to belong to arrowheads, 1 possibly a leaf-shaped (286)and the other an oblique arrowhead (1906). The remaining miscellaneous piece may belong to a chisel arrowhead (1762). These pieces indicate earlier and mid-later Neolithic activity respectively. The scrapers are both end-and-side types, for example fig. 7.2, 9, (304). 1 of these scrapers has shallow retouch and may have been broken during use (1928). This piece may be early Bronze Age is date. This small scatter has diagnostic retouched forms dating from the Mesolithic through to the later Neolithic, additionally 1 of the scrapers may be of early Bronze Age date (1928).

SO246612 (PRN 50625) - 338 pieces of worked flint and 2 pieces of burnt unworked flint were recovered from this grid reference. The material is summarised below:

Flake	273
Blade-like flake	2
Chip	36
Irregular waste	2
CRF	1
Core	1
Core fragment	2
Micro-burin	1
Scraper	4
Retouched flake	7
Serrated flake	1
Notch	1
Miscellaneous retouch	7
Burnt unworked flint	2
Total	340

133 flakes, 4 chips, 1 scraper and a retouched flake were burnt. Mesolithic activity is indicated by the possible micro-burin, a notch and the blade-like flakes. Some soft-hammer struck flakes may also be Mesolithic in date. A small neatly retouched end and side scraper (1491) may be early Bronze Age in date. The majority of the debitage was, however, hard-hammer struck, hinge fractures and other accidents of knapping being frequently recorded. The miscellaneous retouched pieces are mostly flakes with sporadic retouch although 1 possible scraper fragment was recovered (1490). The remaining retouched forms are not particularly diagnostic, these forms occur throughout Mesolithic, Neolithic and early Bronze Age flint assemblages. Edge gloss was recorded on the serrated flake. The core is a discoidal type which may suggest that some of the material is of later Neolithic date. The chips are mostly micro-flakes and burnt flake fragments.

SO246613 (PRN 23331) - A microlith and a piece of miscellaneous retouch were recovered from this grid reference. The microlith is broken and may be part of a rod (fig. 7.2, 10) which would indicate a later Mesolithic date. The miscellaneous retouched piece is a flake with steep retouch along its right-hand side; it may be an unfinished microlith. Unfortunately the dating of these pieces cannot be refined given their broken and unfinished state.

SO246617 (PRN 23333) - A single flake was recovered.

SO246620 (PRN 50224) - 108 pieces of worked flint and 2 pieces of burnt unworked flint were recovered. The material is summarised below:

Flake	83
Blade-like flake	2
Chip	11
Irregular waste	1
Polished flake	1
Core fragment	1
Arrowhead	1
Scraper	5
Point	1
Miscellaneous retouch	2
Burnt unworked flint	2
Total	110

33 flakes, 9 chips, 1 `thumbnail' scraper and a piece of miscellaneous retouch were burnt. Earlier Neolithic activity is indicated by the leaf-shaped arrowhead (260) and possibly the polished flake (1463) although polished implements may have been reworked throughout the Neolithic and probably into the early Bronze Age. Beaker activity is indicated by the `thumbnail' scraper (1460); a side scraper (1383)may be early Bronze Age in date. A bifacially worked point (281, fig. 7.2, 11) may be a broken piercer, it has scale-flaking over much of both faces and is probably of early Bronze Age date. Fewer hinge fractures were recorded in this collection than some of the other scatters and it is possible that more of this material is Neolithic in date. The remaining retouched forms would be consistent with a Neolithic date although none is particularly diagnostic.

SO24606405 (PRN 26327) - 8 pieces of worked flint were recovered. The material consists of 4 flakes, a serrated flake, a retouched flake on Bullhead flint, a piece of miscellaneous retouch an a scraper. 3 of the flakes are burnt. The serrated flake is worn, the right side has been serrated perhaps by use rather than formal retouch. The scraper may have been broken during use.

SO24676179 (PRN 26319) - A retouched flake was recovered from this grid reference.

SO247614 (PRN 19037) - A single possible end scraper on a core rejuvenation flake was recovered from this grid reference.

SO247615 (PRN 23335) - A single retouched flake was recovered from this grid reference.

SO248610 (PRN 23336) - 3 flakes and a piece of irregular waste were recovered from this grid reference.

SO249613 (PRN23337) - 4 flakes, an arrowhead fragment (1968) and a piece of burnt unworked flint were recovered from this grid reference. The arrowhead fragment has been bifacially worked and may be part of either a leaf-shaped arrowhead or a barbed and tanged arrowhead.

SO249614 (PRN 13221) - A flake from a polished implement was recovered.

SO249615 (PRN 50223) - 398 pieces of worked flint, a stone spindlewhorl and a piece of burnt stone were recovered from this grid reference. The material is summarised below:

Flake	292
Blade	2
Blade-like flake	2
Chips	17
Irregular waste	2
CRF	3
Polished flake	1
Core	4
Core fragment	12
Axe fragment	3
Arrowhead	1
Scraper	29
Retouched flake	13
Serrated flake	3
Piercer	1
Awl	1
Knife	2
Miscellaneous retouch	10
Spindlewhorl	1
Burnt stone	1
Total	400

112 flakes, 2 core fragments, 5 chips, a core rejuvenation flake, a scraper and 2 pieces of miscellaneous retouch were burnt. Diagnostic retouched forms include a chisel arrowhead (mid-late Neolithic, 279, fig. 7.3, 13) and `thumbnail' scrapers (Beaker, 263,1401,1409, 1413, 1663, 1804, 1813,1495). Less diagnostic forms include axe fragments (for example 1481) and a flake from a polished implement (69, fig. 7.2, 12) which may suggest earlier Neolithic activity. Serrated flakes (for example 1386) occur in earlier and later assemblages The cores are keeled and discoidal forms; types which are more frequently found in later Neolithic assemblages. Amongst the miscellaneous retouched pieces there are 2 possible leaf-shaped arrowheads (34, 1658) and a single possible transverse arrowhead (299). Neatly retouched scrapers (for example 1380, 1431), knives (251, 1545) and an awl (522, fig. 7.3, 14) may be of early Bronze Age date. The remaining retouched forms would belong equally well in a Neolithic or early Bronze Age context. The debitage is dominated by hard-hammer struck flakes, many of which ended in hinge fractures. Such material would be consistent with a later Neolithic or Bronze Age date. The spindlewhorl (261) is probably Iron Age in date.

SO24906150 (PRN 26300) - 39 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	28
Blade	1
Core	2
Core fragment	1
Arrowhead	1
Scraper	3
Piercer	1
Knife	1
Miscellaneous retouch	1
Total	39

3 of the flakes and 1 of the scrapers is burnt. Diagnostic retouched forms include a later Neolithic/early bronze Age chisel arrowhead, a possible Bronze Age piercer and an early Bronze Age knife. The cores are a discoidal and a multi-platform type, the former is probably of mid to late Neolithic date.

SO249625 (PRN 23338) - A single piece of irregular waste was recovered.

SO250608 (PRN 23342) - 2 flakes, a fabricator and a serrated flake were recovered. The fabricator is a thick example (249) with a very worn distal end and is probably Mesolithic in date (fig. 7.3, 15). The serrated flake (1323, fig. 7.3, 16) may also be Mesolithic although these artefacts do occur in later assemblages.

SO250613 (PRN 3533) - 518 pieces of worked flint and a piece of worked stone were recovered from this grid reference. The material is summarised below:

Flake	407
Blade-like flake	1
Chip	31
Irregular waste	3
CRF	1
Polished flake	1
Core	1
Core fragment	10
Arrowhead	5
Scraper	21
Retouched flake	13
Serrated flake	4
Knife	2
Denticulate	1
Piercer	3
Miscellaneous retouch	14
Polished object	1
Total	519

Burning was recorded on 157 flakes, 16 chips, three pieces of irregular waste, 1 core fragment, a core, 5 scrapers, 2 retouched flakes and 5 pieces of miscellaneous retouch. This scatter contains diagnostic retouched forms of Neolithic and Bronze Age date. Less diagnostic pieces of probable Mesolithic date were also recorded, for example a scraper on a blade-like blank (111) and a retouched blade (109) may be Mesolithic or earlier Neolithic in date. Occasional soft-hammer struck flakes may be Mesolithic or earlier Neolithic in date. As may a flake from an opposed platform blade core (1769).

The diagnostic forms include leaf-shaped arrowheads (for example, 315, 325, 527). Mid to later Neolithic activity is indicated by an oblique arrowhead (1352), a piece of miscellaneous retouch (113) may be a chisel arrowhead fragment. An invasively retouched knife fragment (110) may be later Neolithic or early Bronze Age in date. A Levallois core (1349) is also probably mid to later Neolithic in date.

Beaker activity is indicated by a barbed and tanged arrowhead (326) and `thumbnail' scrapers, for example 314, 526, 1332, 1333 and 1334. Other artefacts which might be contemporary include a piercer (2) and a backed knife (75) with invasive retouch. Early Bronze Age flintwork includes a variety of small, neatly retouched scrapers including 1331, 1336, 1337, 1341, 1343 and 1346 (fig. 7.3, 19). A denticulate (77) may be mid to late Bronze Age although it is particularly neatly retouched to form four points. The polished object (90) is probably earlier prehistoric as it has been re-worked as a core. It is a fine-grained rock with several areas of polishing and is probably a rubber or polisher.

Amongst the miscellaneous retouched pieces are 3 probable knife fragments, 3 scraper fragments and a piece which may be either a knife or scraper; the remainder are broken unidentifiable pieces. The remaining retouched forms would be consistent with a Neolithic or Bronze Age date.

SO250614 (PRN 13222) - A single burnt flake was recovered from this grid reference.

SO250616 (PRN 2200) - 306 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	224
Blade-like flake	2
Blade	2
Chip	35
Irregular waste	4
CRF	2
Core	3
Core fragment	4
Arrowhead	3
Scraper	4
Retouched flake	5
Microlith	2
Piercer	5
Knife	1
Miscellaneous retouch	9
Burnt unworked flint	1
Total	306

Burning was recorded on 78 flakes, 21 chips, 1 piece of irregular waste, a core fragment, a leaf-shaped arrowhead, and a scraper. Mesolithic, Neolithic and early Bronze Age activity is represented by a variety of diagnostic retouched forms. A small geometric microlith (519) is of later Mesolithic date. A sub-triagular blade fragment with steep retouch (521) may be of early Mesolithic date. A blade-like flake with truncations to its proximal and distal ends (844) and a flake with a proximal truncation (958) are also Mesolithic. A piercer on the end of a blade-like flake (991) may also be contemporary. The blade-like flakes and blades are also likely to be contemporary. Earlier Neolithic artefacts include a leaf-shaped arrowhead (4), a chisel arrowhead (262) is of mid-later Neolithic date. A keeled (1026) and a discoidal core (1027) may also be mid to later Neolithic in date. Beaker activity is indicated by the barbed and tanged arrowhead (301). 2 scrapers (770, 773) and a piercer (1) are probably early Bronze Age in date. A piercer with a worn and crushed point (1519) is probably of Bronze Age date.

SO250632 (PRN 19028) - 2 flakes and a retouched flake were recovered from this grid reference.

SO250633 (PRN 19027) - 10 flakes, a piercer and an end-and-side scraper were recovered from this grid reference. 1 of the flakes was burnt.

SO2505638 (PRN 26315) - A chip and a core fragment were recovered from this grid reference.

SO25056380 (PRN 26315) - 51 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	40
Chip	3
Core fragment	2
Scraper	2
Knife	1
Miscellaneous retouch	3
Total	51

Both of the core fragments and sixteen flakes are burnt. The knife has been scale-flaked and is probably early Bronze Age in date. The scrapers are an end and an end and side.

SO250639 (PRN 19048) - A single possible discoidal core fragment was recovered from this grid reference. The core was burnt.

SO25126136 (PRN 305) - 60 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	44
Chip	6
Irregular waste	5
Core fragment	1
Scraper	1
Piercer	1
Serrated flake	1
Miscellaneous retouch	1
Total	60

12 flakes, a chip, 2 pieces of irregular waste a piece of miscellaneous retouch were burnt. 2 flakes are soft-hammer struck (675, 720) and a number of flakes have parallel blade scars on their dorsal faces. The core fragment (703) is from a blade core and 1 or 2 of the flakes are slightly blade-like (for example, 704, 705). The serrated flake (700) is on Bullhead flint and both edges have been finely serrated; macroscopic gloss was noted on both edges. This material may be Neolithic in date. A single `thumbnail' scraper (672) indicates some Beaker activity. Many of the flakes end in hinge fractures and have been hard-hammer struck., and may be contemporary with the scraper. The miscellaneous retouched piece (683) may be an arrowhead but not enough of it survives for a full identification to be made.

SO251632 (PRN 19029) - A single burnt core fragment was recovered.

SO252607 (PRN 19057) - 16 pieces of worked flint were recovered from this grid reference (12 flakes, 1 blade, 2 core rejuvenation flakes and a piece of miscellaneous retouch). 3 of the flakes and both of the core rejuvenation flakes are burnt.

SO252609 (PRN 3659) - A tanged arrowhead was recovered from this grid reference. An early Bronze Age date is suggested by this artefact. Subsequent fieldwalking at this location produced a knife and 2 retouched flakes, 1 of which is burnt. The knife may be early Bronze Age in date.

SO25266080 (PRN 26308) - A single flake was recovered from this grid reference.

SO252611 (PRN 19025) - 16 pieces of worked flint were recovered from this grid reference (8 flakes, 3 blade-like flakes, 2 chips, a piece of irregular waste, a scraper and a piercer). 4 of the flakes, a chip and the piercer are burnt.

SO252613 (PRN 19065) - 1264 pieces of worked flint and 3 pieces of burnt unworked flint were recovered from this grid reference, above the barrow in Upper Ninepence. Subsequent excavation produced an assemblage of 1540 pieces of worked flint and 3 pieces of burnt unworked flint. The excavated assemblage was mainly mid-late Neolithic in date but a small quantity of Mesolithic and early Bronze Age flintwork was also recovered. The surface collection is summarised below:

Flake	706
Blade-like flake	13
Blade	1
Chip	464
Irregular waste	17
Polished flake	5
Core	7
Core fragment	5
CRF	4
Arrowhead	3
Scraper	11
Retouched flake	3
Serrated flake	2
Microlith	1
Piercer	1
Awl	2
Knife	2
Miscellaneous retouch	17
Burnt unworked flint	3
Total	1267

Burning was recorded on 255 flakes, 242 chips, 11 pieces of irregular waste, a scraper and 4 pieces of miscellaneous retouch. Mesolithic activity is indicated by the recovery of an obliquely blunted point (1641), 2 truncated blade-like flakes (1595) and a blade and some blade-like flakes (for example, 1687, 1147, 1149, 634). Possible earlier Neolithic material includes flakes from polished implements (for example, 661, 1095, 1434). Mid to later Neolithic material includes a chisel arrowhead (290), a possible *petit tranchet* derivative (536) arrowhead and possible unfinished oblique arrowheads (1685, 1809). Beaker flintwork includes `thumbnail' scrapers (for example, 264, 1902). A fine, bifacially worked piece (1685) may be a barbed and tanged or just possibly a leaf-shaped arrowhead. Early Bronze Age artefacts include a plano-convex knife (267), an end scraper (647), a backed knife (1081) and an awl (1142).

The debitage consists mainly of hard-hammer struck flakes, hinge fractures were commonly recorded. This material is consistent with a mid-later Neolithic to early Bronze Age date. Occasional soft-hammer struck flakes and blade-like flakes (for example, 1112, 1147, 1176, 1595) are likely to be Mesolithic or earlier Neolithic in date and associated with the sporadic activity identified by diagnostic retouched forms. The cores recovered are either single platform or multi-platform types. One core fragment is a re-worked polished implement fragment (1059) with one flat facet remaining. A large number of chips was recovered from this scatter many of which were burnt fragments, broken pieces from larger flakes or microflakes. Very few diagnostic chip forms were recovered. This probably reflects the general low level of platform preparation which was recorded.

SO252616 (PRN 19055) - 2 flakes were recovered from this grid reference.

SO252621 (PRN 19036) - A single flake was recovered from this grid reference.

SO253608 (PRN 3657) - A core made on a fragment from a polished implement was recovered from this grid reference.

SO253613 (PRN 13223) - 3 pieces of miscellaneous retouch were recovered from this grid reference. 2 of the pieces are flakes with sporadic retouch and the third piece is a burnt possible point. It may be a fabricator or rod but the piece is quite small.

SO253616 (PRN 6346) - 281 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	241
Chip	16
CRF	1
Polished flake	1
Core fragment	5
Arrowhead	1
Axe	1
Scraper	8
Retouched flake	4
Miscellaneous retouch	3
Total	281

48 flakes, 13 chips, 3 core fragments, a polished flake, 3 scrapers and 2 pieces of miscellaneous retouch were burnt. Earlier Neolithic activity is indicated by the leaf-shaped arrowhead (287) and the complete polished stone axe (1596). The stone axe is a small flaked and lightly polished example, only the higher ridges and flake scars show any sign of polishing. The leaf-shaped arrowhead is a finely worked example. Amongst the debitage occasional soft-hammer struck flakes were recorded; this material would be consistent with a Neolithic date. A single burnt `thumbnail' scraper (1623) indicates some Beaker activity. Many of the flakes are hard-hammer struck, hinge fractures and other accidents of debitage were also commonly recorded. An early Bronze Age date for this material is likely. A possible fabricator fragment (1633) may be of early Bronze Age date. The scrapers are neatly retouched examples which may be Neolithic or Bronze Age in date. A single, lightly burnt end scraper (1623) may be Mesolithic in date.

SO254600 (PRN 23344) - 2 flakes, 1 of which is burnt, and a core fragment were recovered from this grid reference. The core fragment has some platform edge abrasion and has a mixture of flake and bladelet scars.

SO254606 (PRN 3654) - 3 flakes and a blade were recovered from this grid reference. 1 of the flakes and the blade were soft-hammer struck. Subsequent fieldwalking at this location produced 6 flakes, 2 blade-like flakes, a core fragment, a core rejuvenation flake (face/edge) and an end-and-side scraper.

SO254615 (PRN 50174) - 106 pieces of worked flint and 4 pieces of burnt unworked flint were recovered from this grid reference. The material is summarised below:

Flake	76
Chip	5
Core	2
Core fragment	1
Polished flake	2
Arrowhead	1
Scraper	6
Retouched flake	3
Knife	2
Piercer	2
Miscellaneous retouch	5
Gunflint	1
Burnt unworked flint	4
Total	110

16 flakes, a scraper, a piece of miscellaneous retouch and a core fragment were burnt. Diagnostic retouched forms include a leaf-shaped arrowhead (291, earlier Neolithic), 2 `thumbnail' scrapers (1513, 1736, Beaker) and a gunflint (1512, post-Medieval). The leaf-shaped arrowhead is made on a flake from a polished implement. A miscellaneous retouched piece with fine bifacial retouch (1310) may be an oblique arrowhead Less diagnostic retouched forms include a possible Mesolithic piercer (5) which has been made on the distal end of a blade; its point is worn through use. The remaining retouched forms are probably Neolithic and early Bronze Age in date. A discoidal core (1517) may be of later Neolithic date. A miscellaneous retouched piece with inverse retouch may have been an arrowhead or a point.

SO254630 (PRN 23346) - 66 pieces of worked flint were recovered from this grid reference. The material is summarised below:

Flake	42
Blade-like flake	1
Chip	12
Irregular waste	2
Core	2
CRF	1
Arrowhead	1
Scraper	2
Retouched flake	2
Awl	1
Total	66

Burning was recorded on 17 flakes, 5 chips, 2 pieces of irregular waste and a scraper. An earlier Neolithic date for some of the material is indicated by a leaf-shaped arrowhead (1739); a burnt end scraper (1604) on a thin blank may also be Neolithic in date. A single blade-like flake (1680) and a soft hammer-struck flake (1761) may also be contemporary. An opposed platform blade core (1675) may be Mesolithic in date. Later Neolithic material is represented by an awl with a long point (1739). Beaker activity is represented by a `thumbnail' scraper (1679).

SO255617 (PRN50176) - 31 pieces of worked flint and a single piece of worked stone were recovered from this grid reference. The material is summarised below:

Flake	6
Blade	2
Blade-like flake	1
CRF	1
Arrowhead	4
Scraper	11
Retouched flake	2
Knife	1
Miscellaneous retouch	3
Polisher	1
Total	32

Burning was recorded on 1 flake, 1 piece of miscellaneous retouch and a scraper. This multi-period scatter contained flint mainly of Neolithic and Bronze Age date. A small neatly retouched end scraper (1642) may be of Mesolithic date. Neolithic material is represented by a leaf-shaped arrowhead; the blades and blade-like flake may also be earlier Neolithic or possibly Mesolithic in date. A piece of miscellaneous retouch (294) may be either a leaf-shaped or barbed and tanged arrowhead, unfortunately not enough of the object survives to enable identification. Mid-later Neolithic flintwork includes a chisel arrowhead (268) and a probable oblique arrowhead (295). 3 `thumbnail' scrapers (1667, 1669, 1670) and a barbed and tanged arrowhead (285) indicate Beaker activity. Early Bronze Age artefacts include an unfinished plano-convex knife (1821). A stone with a highly polished upper surface (1870) may be of earlier prehistoric date and has certainly been used as a polisher or rubber.

SO255646 (PRN 19066) - 34 pieces of worked flint were recovered from this grid reference. The flint is summarised below:

Flake	21
Blade	1
Chip	5
Irregular waste	1
Core	1
Core fragment	2
Scraper	1
Retouched flake	1
Miscellaneous retouch	1
Total	34

Burning was recorded on seven flakes, five chips, 2 core fragments, a piece of irregular waste and a piece of miscellaneous retouch. No diagnostic retouched pieces were recovered, however, 1 steeply retouched scraper (1729) is probably of early Bronze Age date and the rest of the material may also be of this date.

SO257610 (PRN 50178) - 133 pieces of worked flint were recovered from this grid reference. The flint is summarised below:

Flake	105
Blade-like flake	1
Chip	2
Core	2
Core fragment	3

Irregular waste	3
CRF	1
flake	2
Arrowhead	4
Scraper	4
Retouched flake	1
Miscellaneous retouch	4
Burnt unworked flint	1
Total	133

Burning was recorded on 40 flakes, a blade-like flake, a piece of irregular waste and a core. Earlier Neolithic material is represented by a leaf-shaped arrowhead (308) and flakes from polished implements (1305 - stone, 1306). The blade-like flake (1450) may also be Neolithic. Mid-later Neolithic flintwork includes 2 chisel arrowheads (300, 1313) and a probable oblique arrowhead (303). The scrapers are all neatly retouched and may be Neolithic or early Bronze Age in date. A possible fabricator fragment (1744).may be of early Bronze Age date. Many hinge fractures were recorded amongst the debitage and hard hammers dominate. Both of the cores are multi-platform types.

SO257614 (PRN 50177) - 519 pieces of worked flint were recovered from this grid reference. The flint is summarised below:

Flake	444
Blade-like flake	1
Chip	13
Irregular waste	5
CRF	1
Polished flake	2
Core	3
Core fragment	3
Arrowhead	3
Scraper	9
Retouched flake	13
Serrated flake	1
Awl	2
Miscellaneous retouch	19
Total	519

Burning was recorded on 131 flakes, five chips, seven miscellaneous retouched pieces and a scraper. Earlier Neolithic activity is indicated by 2 broken leaf-shaped arrowheads (250, 259), also possibly early are 2 flakes from polished implement (1722) and a serrated flake (1709). The blade-like flake may also be contemporary as may the occasional soft-hammer struck flakes that were recorded. Mid-later Neolithic activity is indicated by 2 chisel arrowheads (266, 1664). Another probable arrowhead fragment was also recovered (1661) although not enough of it survived to enable its type to be identified. Beaker activity is represented by a barbed and tanged arrowhead and 2 `thumbnail' scrapers (252, 1714, 1720). Many of the other retouched forms such as the scrapers, retouched flakes, awls and miscellaneous pieces would be consistent with a Neolithic or Bronze Age date. Many of the miscellaneous pieces are broken scraper fragments. 1 scraper (1722) is made on a flake from a polished implement. Hard-hammer struck flakes dominate the debitage. Much of this would be consistent with a later Neolithic to early Bronze Age date. The cores include a Levallois type which would be consistent with a mid-late Neolithic date.

SO257615 (PRN 23345) - 6 pieces of worked flint were recovered from this grid reference. The material consists of 3 flakes, a core fragment, an opposed platform blade/bladelet core and a probable scraper fragment.

SO257617 (PRN 19054) - A piece of burnt unworked flint was recovered from this grid reference.

SO257645 (PRN 23327) - 3 flakes, a leaf-shaped arrowhead and a possible leaf-shaped arrowhead fragment were recovered. An earlier Neolithic date is provided by the arrowheads.

SO258621 (PRN 3655) - A single scraper, possibly of early Bronze Age date was recovered.

SO258634 (PRN 19063) - 2 flakes and a chip were recovered. 1 of the flakes is burnt.

SO258645 (PRN 19067) - 51 pieces of worked flint and a single piece of burnt unworked flint were recovered. The flint is summarised below:

Flake	36
Chip	7
Irregular waste	1
CRF	1
Core	1
Arrowhead	2
Retouched flake	3
Burnt unworked	1
Total	52

15 flakes, five chips and a piece of irregular waste were burnt. Mid-late Neolithic activity is indicated by a chisel arrowhead (275). The core is a discoidal type which would be consistent with a mid-late Neolithic date. Beaker activity is indicated by the barbed and tanged arrowhead (273). Occasional soft-hammer struck flakes and retouched flakes (for example, 1207, 1221, 1232) may suggest earlier material although this is a rather tentative suggestion.

SO259613 (PRN 50179) - A total of 230 pieces of worked flint and 12 pieces of burnt unworked flint were recovered from this grid reference. The flint is summarised below.

Flake	165
Blade-like flake	5
Chip	8
Irregular waste	2
CRF	2
Polished flake	1
Core	8
Core fragment	6
Arrowhead	4
Scraper	8
Retouched flake	9
Awl	1
Piercer	1
Knife	1
Truncation	1
Miscellaneous retouch	7
Whetstone/hone	1

Burnt unworked flint	12
Total	242

Burning was recorded on 42 flakes and 2 cores. Diagnostic retouched forms dating from the mid-later Neolithic and the early Bronze Age were recovered. These artefacts are chiefly arrowheads, mid-late Neolithic activity is indicated by the presence of chisel arrowheads (328, 1751, 1800). Less diagnostic but also probably contemporary are a number of other pieces including a keeled core (1740) Some of the scrapers (for example, 316, 1752), the knife (329), the piercer (323) and the retouched flakes may also be mid-late Neolithic in date. Beaker activity is indicated by `thumbnail' scrapers (for example, 324 and 1884). A double ended awl (319) and 3 small, neatly retouched end and side scrapers (1892, 1800) may also be of Beaker date.

The debitage is dominated by hard-hammer struck flakes; hinge fractures and other accidents of debitage were recorded. Occasional soft-hammer struck flakes were recorded (for example 1800). Multi-platform flake cores dominate the assemblage but keeled (1740) and single platform (1759) examples were recovered.

Possible Mesolithic activity is suggested by 2 retouched flakes, a truncated blade-like flake (1800) and a notch (1886) although there is nothing particularly diagnostic about these artefacts. A possible unfinished leaf-shaped arrowhead (1760) attests earlier Neolithic activity. This is supported by the recovery of a flake from a polished implement. The blade-like flakes and the occasional soft-hammer struck flakes (for example, 1800) could be either Mesolithic or earlier Neolithic in date. A fragment of a sandstone whetstone or hone of circular cross-section and pointed outline was also recovered. Numerous marks on the object can be interpreted as knife sharpening damage.

SO260607 (PRN 23349) - A flake and a piece of miscellaneous retouch were recovered. The miscellaneous piece is a possible knife fragment with invasive retouch.

SO260646 (PRN 2204) - 181 pieces of worked flint and 2 pieces of burnt unworked flint were recovered from this grid reference. The flint is summarised below:

Flake	118
Utilised blade	1
Blade-like flake	1
Chip	25
Irregular waste	7
CRF	2
Polished flake	1
Core	2
Core fragment	4
Arrowhead	1
Scraper	6
Retouched flake	4
Piercer	3
Knife	2
Fabricator	1
Miscellaneous retouch	3
Burnt unworked	2
Total	183

Burning was recorded on 43 flakes, 2 core fragments, 13 chips, 1 piece of irregular waste and a scraper. Diagnostic retouched forms include a leaf-shaped arrowhead (271) indicating some earlier Neolithic activity; a discoidal core (342) suggests some mid-later Neolithic activity, a bilaterally scale-flaked knife (367) is typical of later Neolithic or early Bronze Age flintworking and a fabricator (357) provides a more general Bronze Age date. 2 end scrapers (371, 379) on the ends of long flakes may possibly be Mesolithic in date. A single flake from a polished implement (427) and some of the other retouched forms, for example, some of the scrapers (356, 346), retouched flakes (334) and piercers (378) would be consistent with a Neolithic date. 3 miscellaneous retouched pieces were recovered, these include a possible fragment from a chisel arrowhead (336) of mid-later Neolithic date, a possible arrowhead blank (339) of probable Neolithic or Bronze Age date and a possible piercer (376). A steeply retouched scraper on a core tablet (340) is likely to be Bronze Age in date.

The debitage is dominated by hard-hammer struck flakes; hinge fractures were fairly commonly noted. Some other accidents of knapping, for example *siret* fractures, were also recorded. Occasional soft-hammer struck flakes were recorded although these were generally infrequent and are probably related to the tentatively identified Mesolithic activity or the earlier Neolithic material. The single blade-like flake and utilised blade are probably of this date also. The cores recovered include a discoidal type (342) and a core on a flake (391). The latter was rejected because hinge fractures precluded further flaking. 1 of the core fragments has some evidence of platform preparation, perhaps indicating a relatively early date.

SO261613 (PRN 23350) - 7 pieces of worked flint were recovered from this grid reference including 5 flakes, a core fragment and a piece of miscellaneous retouch. 3 of the flakes and the miscellaneous retouch are burnt. The miscellaneous piece is probably a scraper.

SO261643 (PRN 19061) - 3 flakes were recovered from this grid reference. 1 of the flakes is burnt.

SO262597 (PRN 23348) - 10 pieces of worked flint and a piece of burnt unworked flint were recovered including 8 flakes, a chip and a retouched flake. The retouched flake is a broken blade-like flake with invasive retouch along its right-hand side and distal end.

SO262598 (PRN 3662) - 2 flakes and a piece of irregular waste were recovered from this grid reference.

SO262617 (PRN 19035) - A single burnt flake was recovered.

SO262630 (PRN 19031) - A spindlewhorl was recovered. It is likely to be Iron Age in date.

SO262639 (PRN 19062) - A flake and a burnt piece of irregular waste were recovered from this grid reference.

SO262645 (PRN 19069) - 8 pieces of worked flint were recovered including 4 flakes, a flake from a polished implement, a core, a piece of irregular waste and a piece of miscellaneous retouch. 1 flake and the miscellaneous retouched piece are burnt.

SO262647 (PRN 19070) - A single serrated flake was recovered from this grid reference. It has been finely retouched along its left-hand side with approximately 12 serrations per 10 mm. Edge gloss was recorded along this side, the right hand side was much more coarsely serrated.

SO263614 (PRN 23351) - 5 flakes and a chip were recovered from this grid reference. 1 flake and the chip were burnt.

SO263629 (PRN 23347) - 3 pieces of worked flint and a piece of burnt unworked flint were recovered from this grid reference. The material consists of a flake, 2 pieces of miscellaneous retouch, 1 of which is burnt. The miscellaneous pieces are a possible scraper fragment and a possible unfinished arrowhead.

SO264630 (PRN 19030) - 31 pieces of worked flint and a single piece of worked stone were recovered from this grid reference. This material consists of 25 flakes, a bladelet, a chip, 2 pieces of irregular waste, a scraper and a fragmentary leaf-shaped arrowhead. The piece of worked stone is an egg-shaped pebble with a central depression, the other side also has a central another depression. However, the object appears to have broken, possibly during manufacture, leaving only the very base of the second depression visible. 6 flakes and 1 piece of irregular waste were burnt. The leaf-shaped arrowhead provides an earlier Neolithic date. The flakes are mostly hard-hammer struck.

SO264634 (PRN 19044) - 2 flakes, a retouched flake and an end and side scraper were recovered from this grid reference. The scraper is steeply retouched and may be of early Bronze Age date.

SO264645 (PRN 19072) - 3 flakes and 2 chips were recovered from this grid reference. Both of the chips and 1 flake were burnt.

SO264-6B (mistranscribed NGR, PRN unassigned) - A single burnt flake was recovered from this location.

SO265629 (PRN 3532) - 153 pieces of worked flint and a single piece of burnt unworked flint were recovered from this grid reference. The flint is summarised below:

Flake	103
Blade	2
Blade-like flake	2
Chip	5
Irregular waste	5
CRF	3
Polished flake	1
Core	3
Core fragment	4
Scraper	7
Retouched flake	4
Awl	1
Knife	1
Notch	1
Fabricator	1
Miscellaneous retouch	10
Burnt unworked	1
Total	154

Burning was recorded on 38 flakes, 2 pieces of irregular waste, 2 chips, a polished flake, a core fragment, 3 scrapers and 3 pieces of miscellaneous retouch. No diagnostic retouched forms were recovered from this scatter to provide dating. However, some broad dates may be provided by less diagnostic pieces, for example a notch (186) which may be Mesolithic in date, the flake from a polished implement (35, earlier Neolithic), scrapers (for example 1046, 1047, 1048, 1049, ?early Bronze Age) which are all small, invasively retouched examples and an awl (1039) which is probably Bronze Age in date. The fabricator fragment (1036) is also probably of Bronze Age date. The remaining retouched forms would not be out of place in a Neolithic or Bronze Age context. The numerous miscellaneous retouched pieces include a possible scraper fragment on a flake from a polished implement (1053), many broken retouched pieces (for example, 160, 1599) and a bifacially worked piece which would seem to be an arrowhead that has been broken during manufacture (1055).

The debitage consists mainly of hard-hammer struck flakes although some soft-hammer struck material was recorded (for example, 166, 168, 209). A core fragment (1627) has some blade-like scars. 2 blades and 2 blade-like flakes were also recovered, this material is probably Mesolithic or earlier Neolithic in date. The cores include 2 multi-platform types and a discoidal core, possibly of mid-late Neolithic date.

SO266613 (PRN 19076) - 2 flakes, a chip and a probable rod or fabricator fragment were recovered from this grid reference. 1 of the flakes was burnt. The rod or fabricator fragment (297) is very steeply retouched and similar to find numbers 257 and 281. It is likely to be of early Bronze Age date.

SO266629 (PRN 13224) - An assemblage of 108 pieces of worked flint and a single piece of burnt unworked flint was recovered from this grid reference. The flint is summarised below:

Flake	94
Blade-like flake	1
Chip	10
Core fragment	3
Burnt unworked flint	1
Total	109

Burning was recorded on 43 flakes, 5 chips and a core fragment. The flakes are mostly hard-hammer struck although the occasional soft-hammer struck flake was recorded. No diagnostic pieces were recovered but the predominance of hard-hammer struck flakes would suggest a later Neolithic/early Bronze Age date. However, any dating must be regarded as tentative given the lack of retouched forms.

SO266636 (PRN 23074) - 21 pieces of worked flint and a single piece of worked stone were recovered from this grid reference. The material consists of 12 flakes, a core, a core rejuvenation flake, a microlith, a barbed and tanged arrowhead, a retouched flake, a borer, 3 pieces of miscellaneous retouch and a polisher. Burning was recorded on seven flakes, a core and four pieces of miscellaneous retouch. Diagnostic retouched forms include an obliquely blunted point (524) of early Mesolithic date. A barbed and tanged arrowhead (288) and a possible barb from a second arrowhead indicates Beaker activity. The polisher is a smoothed oval pebble.

SO26756027 (PRN 26311) - 6 flakes and 2 pieces of burnt unworked flint were recovered from this grid reference. 2 of the flakes are burnt.

SO267621 (PRN 23355) - 5 flakes 2 of which are burnt were recovered from this grid reference.

SO268612 (PRN 23352) - A single flake was recovered from this grid reference.

SO268614 (PRN 23353) - A single flake was recovered from this grid reference.

SO269599 (PRN 19050) - 65 pieces of worked flint and a single piece of rock crystal were recovered from this grid reference. The flint is summarised below:

Flake	51
Utilised flake	1
Chip	5
Irregular waste	1
Core	1
Scraper	1
Retouched flake	2
Miscellaneous retouch	3
Rock crystal	1
Total	66

Burning was recorded on 19 flakes and 2 chips. No diagnostic retouched forms were found, however, the small end scraper may be of Mesolithic date and the discoidal core, possibly reused as a scraper, is probably mid to later Neolithic in date.

SO269617 (PRN 23354) - A single flake was recovered from this grid reference.

SO270612 (PRN 23357) - 15 pieces of worked flint were recovered from this grid reference. The material consists of 10 flakes, a blade (115), a piercer, (84) a microlith (89) and 2 scrapers (87, 119). Burning was recorded on 2 of the flakes. The microlith is badly damaged but it would appear to be a minimally retouched rod type. A later Mesolithic date is indicated by this artefact. The blade, a soft-hammer struck flake (116) and a flake with blade scars on its dorsal face (82) may also be Mesolithic. The piercer has a long but minimally retouched point and may be of later Neolithic date.

SO270614 (PRN 19051) - A single chip was recovered from this location.

SO271590 (PRN 13225)- A flake, a blade-like flake and a retouched flake were recovered from this location. The latter has fine, bifacial retouch and may be of early Bronze Age date.

SO271616 (PRN 23358) - 2 flakes and an end scraper were recovered from this grid reference. The scraper is a small, steeply retouched example on a thin, non-cortical blank. An early Bronze Age date for this scraper is probable.

SO271618 (PRN 23359) - 7 pieces of worked flint were recovered from this grid reference. The material consists of 4 flakes, 2 core fragments and a piece of miscellaneous retouch. 1 of the core fragments and 3 of the flakes were burnt. The miscellaneous retouched piece (1360) has steep, slightly curving retouch along 1 edge and may be an arrowhead fragment. However, not enough of the object survives to enable a more precise identification to be made. 1 of the flakes has been soft-hammer struck (1365).

SO272588 (PRN unasigned) - 2 burnt chips were recovered from this grid reference.

SO272611 (PRN 23360) - A single flake was recovered from this grid reference.

SO272613 (PRN 23361) - 3 flakes were recovered from this grid reference.

SO272619 (PRN 3531) - An obliquely blunted point was recovered from this grid reference. An early Mesolithic date is indicated by this artefact.

SO273597 (PRN 13226) - 3 flakes and a burnt piece of irregular waste were recovered from this grid reference.

SO273615 (PRN 23362) - A flake, a retouched flake and a burnt polished flake were recovered from this grid reference.

SO273631 (PRN 19064) - A burnt flake and a retouched flake were recovered from this grid reference.

SO274601 (PRN 19049) - 36 pieces of worked flint were recovered from this grid reference. The flint is summarised below:

Flake	30
Blade-like flake	1
Truncated blade	1
CRF	1
Core fragment	1
Retouched flake	1
Miscellaneous retouch	1
Total	36

9 of the flakes were burnt. The truncated blade is probably Mesolithic in date; the blade-like flake may also be of this date. The miscellaneous retouched piece may be a scraper fragment.

SO274627 (PRN 13227) - A leaf-shaped arrowhead and 2 barbed and tanged arrowheads were recovered from this grid reference. These arrowheads provide earlier Neolithic and Beaker dates respectively. All of the arrowheads are finely worked.

SO275636 (PRN 19032) - 6 pieces of worked flint were recovered from this grid reference. The material consists of 2 flakes, a blade-like flake, a chip and 2 pieces of miscellaneous retouch. The chip is burnt. The miscellaneous pieces are a possible fabricator fragment (1428) and a knife fragment (1790).

SO276629 (PRN 19040) - A single flake was recovered from this grid reference.

SO277634 (PRN 19074) - A flake, 2 scrapers and a leaf-shaped arrowhead were recovered from this grid reference. 1 of the scrapers is burnt. The arrowhead provides an earlier Neolithic date. The scrapers are neatly retouched, 1 has invasive retouch (8) and these too may be Neolithic in date.

SO277636 (PRN 19073) - 2 scrapers and a core were recovered from this grid reference. The scrapers are both neatly retouched, 1 is an end and side scraper (1237) and the other is on an irregular flake (1238).

SO278633 (PRN 19045) - A piece of miscellaneous retouch was recovered from this grid reference. The object is steeply retouched and may be a scraper fragment.

SO28216120 (PRN 26307) - 2 burnt flakes were recovered from this location.

SO291593 (PRN 13228) - A flake and a burnt miscellaneous retouched piece were recovered from this grid reference. The miscellaneous piece is a bifacially worked object made on a flake from a polished implement.

SO295614 (PRN 13229) - A flake, a backed knife and a retouched flake were recovered from this grid reference. The flake is burnt.

SO349615 (PRN 13230) - A single core was recovered from this grid reference.

2.3.4 Discussion

Flintwork of Mesolithic to Bronze Age date was recovered although the collection included surprisingly little Mesolithic or earlier Neolithic material. This may reflect collection biases: microliths and other diagnostic pieces such as microburins are less visible than the larger retouched forms common to later periods. However, the recovery rate was extremely good with small pieces of burnt unworked flint and chips less than 10mm being retrieved. The period biases may therefore be real, with the bulk of the collection dating from the mid-later Neolithic through to the early Bronze Age. This would also coincide with the increase in monument building within the region.

Just over 11% of the collection is composed of retouched forms. This is a relatively high figure and may simply reflect collection biases. However, given the very high quality of recovery, collection biases would seem less likely. Wainwright (1972, 66) suggests a figure of 4 - 5% for retouched forms as being typical for the majority of settlement sites. However, certain specialised assemblages, such as those resulting from hide processing or funerary assemblages would necessarily have a higher proportion of retouched forms than those resulting from everyday activities (cf. Bradley 1994). The mixed nature of the collection will almost certainly have enhanced the percentage of retouched forms. The predominance of very fine retouched forms may be due to collection bias although as noted above this seems unlikely in this instance.

The collection is dominated by scrapers (approximately 28%), retouched and serrated flakes (23%) and miscellaneous retouched pieces (25%). These types are good indicators of domestic assemblages. Much of the miscellaneous category is composed of broken and unfinished artefacts such as scrapers, knives, piercers and arrowheads but also includes some atypical forms. Certain artefact types indicate that activities such as hunting (the microliths and arrowheads), and knapping were occurring. A possible scraper retouch chip indicates that some maintenance of tools was occurring. No flint or stone hammerstones were recovered from the surface collection but the excavation at Upper Ninepence Field produced some. Several of the cores from the surface collection exhibited areas of battering which may have resulted from use as hammerstones.

Many of the diagnostic retouched types have well documented ceramic associations, for example, barbed and tanged arrowheads and `thumbnail' scrapers with a variety of Beaker ceramics, oblique, chisel and *petit tranchet* arrowheads with Peterborough Ware and Grooved Ware, plano-convex knives with Collared Urns and other early Bronze Age pottery.

A wide range of raw materials were used, many of which are of very high quality. The use of high quality flint is of some interest given the lack of readily available local raw materials. The use of imported flint has been reported at other sites but has generally been reserved for grave goods (Healey 1993, 187). Stone and flint axes were re-used once they had broken and these provided a source of very high quality raw materials. All stages of the reduction sequence were recovered; the presence of wholly and largely cortical flakes indicates that the raw materials were being reduced in the locality rather than at the source. The recovery of core rejuvenation flakes indicates that there was some concern for raw material conservation. The average core weight for the surface collection is 16.9g, this is very low compared with the excavated assemblage from Peterborough Ware and Grooved Ware at Upper Ninepence, where the average is 26.3g. However, the high proportion of core fragments from the surface collection may have skewed the results. The low weight of the surface cores suggests more extensive working perhaps more typical of domestic assemblages.

The cores from the pits at Upper Ninepence were not being worked to their full potential, perhaps suggesting that the deposition of valuable, high quality flint was an important part of the ritual process. This deposition may have been especially important in an area of few locally available sources of flint. These assemblages also showed a relatively low incidence of rejuvenation, again indicating that raw material conservation was not seen as important. At Barrow Hills, Radley, Oxfordshire cores from a series of Grooved Ware pits were also less extensively worked than cores from the surface collection (Bradley forthcoming). At the same site a series of intercutting pits contained flint assemblages with a higher percentage of retouched pieces, more extensively worked cores and a very high proportion of broken pieces compared with the contemporary Grooved Ware pits. It has been suggested that these assemblages may represent domestic debris whilst the material from the Grooved Ware pits seems to have had a more complex history and was certainly deposited in a formal manner but perhaps also originated from domestic activities (Bradley forthcoming).

In general the surface collection showed little sign of careful flintworking strategies such as core preparation and maintenance. Soft hammers were used, for example from grid references SO250126136, SO250613, SO260646, SO265629 and SO270612, although hard hammers do dominate. Blade cores are relatively scarce in the collection (table 7.3) but the occurrence of flakes, blades and fragments from blade cores including opposed platform types suggests that the quantity of carefully flaked material might be higher than is suggested at present by the core types. Carefully controlled knapping strategies, using blade or single platform flake cores which are maintained and rejuvenated frequently, are indicative of the earlier periods of flintworking and although Mesolithic and earlier Neolithic artefacts were recovered, these tend to be scattered across the landscape. The lack of preparation and maintenance does not seem to have affected the overall quality of the flintworking; many fine later Neolithic and early Bronze Age artefacts are present in the collection. Preferred blank types continued to be produced, for example blades were used for specific artefacts such as the plano-convex knives (fig. 7.2, 2, 4; 7.4, 29, bags 3, 1856, 367). The frequency of keeled and Levallois cores is interesting (table 7.3). It has been suggested that the latter provided blanks for transverse arrowheads. These types of cores required a degree of skill to produce consistent blanks suitable for subsequent retouching as arrowheads or other artefacts.

Many artefacts are finely worked, scale-flaked knives are well represented and many of the arrowheads are also particularly finely worked (fig. 7.3, 17, 26; 7.4, 37, bags 325, 301, 300). The decline in the quality of flintworking, and the reduction in the number of retouched tools being produced, through time partly linked with the increased use of metal is now well established (see for example Ford *et al.* 1984, 167). However, the continued production of very fine artefacts, partly contemporary with this apparent decline in craftsmanship, indicates that the situation is complex. It seems likely that the emphasis changed to a more expedient everyday technology with very skilful knapping being reserved for particular artefact types or depositonal episodes.

Artefacts were used, some of the arrowheads have impact fractures at their tips indicating that they have been fired. Macroscopic edge gloss was recorded on serrated flakes, for example from grid reference SO244615 (fig. 7.2, 6, bag 1701). Scraping edges on many of the scrapers were worn, for example, from grid reference SO246610 (fig. 7.2, 9, bag 304). Many of the retouched flakes and some of the awls and piercers also exhibited signs of use. Some of the material from the Peterborough Ware and Grooved Ware pits at Upper Ninepence Field also showed signs of being used although some artefacts did not appear to have been used. 1 of the scrapers, a fairly small neatly retouched example from grid reference SO250613, seems to have been hafted as it has been provided with a tang (fig. 7.3, 19, bag 1336).

Seventeen scatters consisted of more than 100 pieces of worked flint (see above). Many of these scatters are dominated by debitage, for example, no retouched forms were recovered from grid reference SO266629. The majority of these scatters are multi-period with Neolithic and Bronze Age flintwork dominating. Some of the difficulties of dating surface collections have already been discussed and it is apparent that the identification of early Bronze Age material other than diagnostic forms such as `thumbnail' scrapers, barbed and tanged arrowheads or plano-convex knives is particularly difficult. Distinguishing Mesolithic and earlier Neolithic debitage without the accompanying retouched forms is also difficult. The large surface scatter above the barrow at Upper Ninepence is of some interest, its composition in terms of forms and date range being very similar to the excavated assemblage from the site. Mesolithic and Bronze Age flintwork from the site is poorly represented. The bulk of the excavated assemblage is firmly mid-later Neolithic and contemporary flint was recovered from the surface scatter.

The evidence for Mesolithic activity in Wales has recently been reviewed (see for example, Jacobi 1980; David 1989; Berridge 1994). In general, earlier Mesolithic activity is very sparsely distributed except to the south and west where there is much evidence for coastal exploitation (Jacobi 1980, 138; David 1989, 241; Berridge 1994, 130). Later Mesolithic activity is a little more widespread (Jacobi 1980, 169) and recent discoveries within the region of further Mesolithic sites and findspots continues (for example, Barton *et al.* 1995) enhancing our knowledge of hunter-gatherer communities.

Some comparable flint assemblages have been recovered from the immediate area, for example, at Trelystan, Powys (Healey 1982, 175), Four Crosses, Powys (Green 1986, 77-8) and material from the Welshpool cursus (Aldhouse-Green 1994, 177). At Clyro, Radnorshire a scalene triangle of the later Mesolithic and Neolithic to Bronze Age flintwork was recovered (Wainwright 1963, 101). The stratified assemblage from Upper Ninepence Field has obvious similarities with the flint scatter recovered from the area (see above) but its general characteristics can be parallelled at a number of other sites. Mesolithic to Bronze Age flintwork has been recovered from surface scatters in counties bordering Powys, particularly Herefordshire (Bradley 1988; Children & Nash 1994). Neolithic and Bronze Age activity within Wales was reviewed (Savory 1980; Lynch 1980; Burgess 1980) and the distributions of finds and monuments is widespread across the south and north-west of the Principality and along the Marches (Savory 1980, 211 fig,. 5.2, 2.18 fig. 5.4; Lynch 1980, 240, fig. 6.4).

2.3.5 Catalogue of illustrated pieces

Catalogue entries are ordered as follows: grid reference, brief description, weight (cores only), bag number. Abbreviations are as follows LHS left-hand side, RHS, right-hand side. Broad dates have been given where possible: M - Mesolithic, LM - late Mesolithic, EN - early Neolithic, N - Neolithic, M-LN - middle to late Neolithic, LNEBA - later Neolithic/early Bronze Age, EBA - early Bronze Age, BA - Bronze Age, MBA - middle Bronze Age.

1. Unprovenanced. Levallois core on polished stone axe fragment. 50g. M-LN. 30.

2. SO2161 (Knowle Hill). Plano-convex knife. On blade-like blank, steep, scale-flaking covers much of the dorsal face. Proximal break. EBA. 3.

3. SO214617. Neatly retouched disc scraper on oval blank. Fine invasive retouch at base and part of RHS, LHS and the distal end are more steeply retouched. Scraping angle 45-65°. ?EBA. 318.

4. SO238615. Plano-convex knife. Scale-flaking restricted to edges, dorsal face has a large area of cortex remaining. Distal end broken and reworked, probably during manufacture. EBA. 1856.

5. SO243624. Multi-platform flake core, some blade-like scars. 14g. 1536.

6. SO244615. Serrated flake on a core rejuvenation flake (face/edge). Light grey chert. RHS serrated, 6 serrations per 10mm, ventral gloss. 1701.

7. SO244615. Scale-flaked knife, proximal break. LHS scale-flaked, cortex present RHS. There is additional steeper retouch upper RHS and lower RHS. ?EBA. 1567.

8. SO244615. Fabricator. On blade-like blank, steeply retouched LHS and RHS. Characteristic crushing occurs at the distal end. BA. 1577.

9. SO246610. End-and-side scraper. Neatly retouched, scraping angle 65-75°. Worn/damaged scraping edge. Break at proximal end has been re-flaked, probably broken during use. Pink flint, small area of worn cortex. 304.

10. SO246613. ?Rod microlith, on dark grey chert. Broken at both proximal and distal ends. 78.

11. SO246620. Bifacially worked object, rod-like piece. Proximal break. Extensively and finely retouched. Point or piercer?, very similar to 257. ?EBA. 281.

12. SO249615. Flake from a polished stone implement. Fine-grained grey stone. 69.

13. SO249615. Chisel arrowhead, broken LHS. M-LN. 279.

14. SO249615. Double ended awl. Dark grey chert, very neatly retouched. N or EBA. 522.

15. SO250608. Fabricator. Large, robustly retouched fabricator, characteristic crushing at distal end and along both edges. ?M. 249.

16. SO250608. Serrated flake. Proximal break. On an irregular flake with large hinge fracture on dorsal face. LHS very finely serrated, approximately 15 serrations per 10mm, RHS possibly used. Ventral gloss LHS. 1323.

17. SO250613. Leaf-shaped arrowhead. Very small, neatly retouched example; retouch extends over much of dorsal face but is confined to the edges of the ventral face. EN. 325.

18. SO250613. Retouched flake. Proximal and distal breaks, neatly retouched LHS with cortical backing RHS. 1335.

19 SO250613. End and side scraper. Small, neatly retouched scraper, scraping angle 55-65°. Retouch extends around much of the circumference of the object. The butt has not been removed thus forming a slight projection or tang. This may have been used to haft the artefact. ?EBA. 1336.

20. SO250613. `Thumbnail' scraper. Small, neatly retouched example, lightly burnt. Steep retouch and area of smooth brown cortex RHS. Scraping angle 65-80°. LNEBA. 526.

21. SO250613. Backed knife. On a blade-like blank with invasive retouch LHS, slightly denticulate retouch RHS. Possibly also used as a piercer. LNEBA. 75.

22. SO250616. Microlith. LM. 519.

23. SO250616. Sub-triangular piece. Steeply retouched. ?M. 521.

24. SO250616. Chisel arrowhead, LHS slightly damaged. M-LN. 262.

25. SO250616. Piercer. Extensively retouched on a thick blank, worn point. LN. 1519.

26. SO250616. Barbed and tanged arrowhead, 1 barb broken. Very fine bifacial retouch. LNEBA. 301.

27. SO252609. Tanged arrowhead, damage to tip and tang. Retouched over much of both faces. MBA 274.

28. SO252613. Truncated blade, proximal and distal breaks. Obliquely truncated RHS. M. 1641.

29. SO252613. Plano-convex knife. On blade-like blank, proximal break. Very finely scale-flaked example with rough polishing on ventral face. EBA. 267.

30. SO252613. `Thumbnail' scraper. Small, very neatly worked example, retouched around its entire circumference. Scraping angle 55-75°. LNEBA. 264.

31. SO253616. Flaked and polished stone axe. Small axe, polishing confined to the higher arises, some plough damage. N. 1596.

32. SO253616. End scraper. On long blank with white, chalky cortex on dorsal face. Neatly retouched at distal end with additional retouch at proximal end, perhaps to aid hafting. Scraping angle 50-60°. ?EN. 1623.

33 SO254615. Piercer. On distal end of a blade-like blank, proximal break. Slender point, some wear to tip. ?M. 5.

34. SO254615. Backed knife. ?Derived flint. Shallow, slightly invasive retouch LHS with cortical backing RHS. 1738.

35. SO254630. Awl with quite finely worked long point. Some wear at the tip. ?LN. 1739.

36 SO255617. Leaf-shaped arrowhead. Broken at tip. Quite a large example with retouch confined to the lower part of the arrowhead. Possibly broken during manufacture or abandoned unfinished. EN. 256.

37. SO257610. Chisel arrowhead. Extensively worked arrowhead with hooked LHS. Unusually the cutting edge has also been retouched. M-LN. 300.

38. SO253608. Multi-platform flake core on fragment from a polished implement. Grey flint with some iron staining. 1 area of polishing remaining including a side facet of the original polished object. Rejected because of the many hinge fractures. 48g. PAR 3657.

39. SO257614. Single platform flake core, rejected because of many hinge fractures. A small area of cortex remains on the base of the core. No platform preparation. 22g. 305.

40. SO257614. Awl. Small neatly retouched awl. ?EBA. 253.

41. SO258645. Chisel arrowhead. Small, neatly retouched example with a wide cutting edge. M-LN. 275.

42. SO258645. Unfinished barbed and tanged arrowhead. Broken during manufacture, small neat example with large cherty inclusions which may have caused the breakage. LNEBA. 273.

43. SO259613. Bifacially worked piece, ?unfinished leaf-shaped arrowhead. Thick blank with bifacial retouch around edges EN. 1760.

44. SO259613. Flake from a polished implement. Part of side facet remains, striations visible. Light brown flint. N. 1749.

45. SO259613. End scraper on blade-like blank, faceted butt, scraping angle 75°. Some plough damage to edges. ?N. 317.

46. SO259613. Multi-platform flake core. Some cortex remaining. Areas of battering may indicate use as a hammerstone. Many hinge fractures may have led to the core's discard. 65g. No preparation. 13.

47. SO259613. Keeled core, flake removals, burnt. Many hinge fractures on the flaking faces may have led to the core's discard. 21g. No preparation. ?LN. 1740.

48. SO259613. `Thumbnail' scraper. Small, neatly retouched example, on a fairly thick blank. Retouched around the majority of its circumference. Scraping angle.65-70°. LNEBA. 1884.

49. SO259613. Awl, double-ended with 1 worn point. LNEBA. 319.

50. SO260646. End scraper. Soft-hammer struck, neatly retouched. Scraping angle 65°. 356.

51. SO260646. End and side scraper, finely retouched. Some cortex remaining on dorsal face. Scraping angle 65-75°. 346.

52. SO260646. Fabricator, made on a broken flake. Characteristic crushing at distal end and a smaller area at the proximal end. Steeply retouched lateral edges. ?BA. 357.

53. SO262647. Serrated flake, distal break. On a blade-like blank with opposed blade-like scars, soft-hammer struck. LHS very finely serrated, approximately 12 serrations per 10mm, RHS more coarsely serrated, worn. Ventral gloss recorded on both edges. 1190.

54. SO265629. Multi-platform flake core, some platform preparation. Small patch of cortex on base of core. 10g. Core rejected because of its small size and the many hinge fractures on most flaking faces precluded further reduction. 1052.

55. SO266636. Microlith. Obliquely blunted point on proximal end of a blade. LHS obliquely truncated, some additional retouch RHS, slight distal break. EM. 524.

56. SO266636. Bifacially worked piece on a blade-like flake. Distal break. Extensively retouched over bulbar face with scale retouch. Retouch is confined to the edges on the dorsal face. ?Unfinished plano-convex knife or awl. EBA. 257.

57. SO272619. Microlith. Edge blunted point. On the distal end of a blade butt intact, LHS retouched with additional retouch RHS. M. 523

58. SO271590. Scale-flaked knife, proximal and distal breaks. Bifacial retouch along 1 edge. ?EBA. 1933.

59. SO274614. Oblique arrowhead, slight break to RHS. Finely retouched along edges of arrowhead. M-LN. 254.

60. SO274627. Leaf-shaped arrowhead. Small, neatly retouched example, retouch extending over much of both faces. Slight breaks to tip and base, ?impact fracture. EN. 322.

61. SO274627. Barbed and tanged arrowhead. Very finely retouched over both faces. Slight damage to tip, ?impact fracture. LNEBA. 320.

62. SO275636. ?Knife. Proximal and distal breaks. Blade-like blank with invasive retouch along both edges. ?EBA. 1790.

63. SO277634. Leaf-shaped arrowhead. Very squat but finely bifacially retouched example. EN. 6.

2.4 Excavated Assemblages

2.4.1 Rough Close

Two flakes and a miscellaneous retouched piece were recovered from this site. The miscellaneous retouched piece is almost wholly cortical with some retouch and macroscopic edge gloss.

2.4.2 Walton Cursus

Three flakes, an end and side scraper and a possible piercer were recovered from the top of the Walton cursus. The scraper has minimal retouch (c. 60-70°), the possible piercer has a broken point and is worn.

2.4.3 Hindwell I

Two flakes were recovered from the upper fill of the enclosure. One flake has a hinge fracture and the other is broken.

2.5 Upper Ninepence

A large assemblage of 1540 pieces of worked flint and three pieces of burnt unworked flint was recovered from the excavations in Upper Ninepence Field. The assemblage is summarised in tables 7.2, 7.6-8, selected pieces are illustrated in figures 7.7-8 and are described in the catalogue.

2.5.1 Raw materials and condition

The flint is mostly mid to dark brown in colour with a buff or white cortex. Although frequent large cherty inclusions were noted, the flaking quality of the material is good. Cortication, where present is light to medium. The majority of the flint was relatively fresh with sharp edges, some of the material from the mound exhibits greater edge damage. Approximately 18.9% of the assemblage is burnt and 44.3% broken. Twelve pieces of Bullhead flint (Shepherd 1972, 114), seven pieces of grey chert and three pieces of worked quartzite (a flake and 2 chips) were also recovered. Three flakes from polished implements were recovered from the mound and unstratified contexts. 1 flake is possibly greenstone (L106) and the other 2 flakes are creamy white and grey flint respectively (L12 and L37). Several pieces of unworked rock crystal were found across the site and may have been deliberately collected. No good quality raw material occurs on the site and the nearest sources would have been some distance; flint occurs within superficial deposits around the northern Cotswolds (Charlesworth 1957, 77;Tyler 1976, 4) and gravel deposits occur around Cardiff and in the Vale of Glamorgan (Dutton 1903, 111). Good quality flint is available further south on the Berkshire Downs and Chiltern Hills. Bullhead flint occurs in the south-east around Thanet (Rayner 1981, 357) but has also been recorded in the Reading area (Healy 1992, 48) and it is possible that this distinctive flint occurs in gravel deposits closer to the site. The creamy white flint may have come from the Louth area of Lincolnshire (J. Humble pers. comm.).

2.5.2 Description

The flint assemblage was recovered from a series of pits, postholes, mound material and layers associated with the mound. Flints from the excavation were given numbers prefixed with the letter L to differentiate them from ceramic finds and from finds from fieldwalking assemblages. Approximately 1267 pieces of flint were recovered from the topsoil above the mound and forms part of the Dunn collection. This material is discussed above but a summary is included here. The material is dominated by debitage (table 7.5) and in keeping with the excavated assemblage very little burnt unworked flint was recovered. Although approximately 40.6% of the collection is burnt, twice the figure for the excavated assemblage The majority of the surface material would appear to be Neolithic in date but an obliquely blunted point would indicate some Mesolithic activity. The few blade-like flakes and blade may belong to this earlier activity. Two `thumbnail' scrapers, a plano-convex knife, a backed knife, an end scraper and an awl indicate Beaker and early Bronze Age activity. The retouched forms include scrapers, retouched and serrated flakes, piercers and transverse arrowheads. The cores recovered include multi-platform and single platform types. A polished implement fragment had been reworked as a core and five polished flakes also indicate the re-working of broken polished implements. Four core rejuvenation flakes (two tablets and 2 face/edge flakes) were also recovered. This accords well with the range material recovered from the excavation.

Flake	Blade-like flake, blade	Chip	Irregular waste	Core, core fragment	Retouched forms	Burnt unworked flint	Total
710	14	464	17	12	47	3	126 7

Table 7.5: Upper Ninepence flint from barrow surface.

Context	Multi-platform	Keeled	Levallois	Fragments	Total
000	-	-	-	1	1
11	1	-	-	1	2
23	-	-	1	1	2
133	-	-	-	2	2
294	-	1	-	-	1
465	-	-	1	-	1
Topsoil/U/S	1	-	-	-	1
Mound	1	-	-	3	4
Subsoil	-	-	-	2	2
Total	3	1	2	10	16

Table 7.6: Upper Ninepence excavated assemblage: core typology.

The bulk of the stratified assemblage is of mid-late Neolithic date associated with Peterborough Ware and Grooved Ware (table 7.8). However, a small quantity of earlier material included, a possible microlith (fig. 7.8, 16) from the mound, a few blades and blade-like flakes and a possible leaf-shaped arrowhead fragment was found in topsoil (L24). The type of microlith, an obliquely blunted point, occurs throughout the period (Pitts & Jacobi 1979, 169, fig. 5); so the dating of this piece cannot be refined. The blades and blade-like flakes may be of Mesolithic or earlier Neolithic date and the possible leaf-shaped arrowhead fragment provides an earlier Neolithic date.A small element of Beaker and early Bronze Age flintwork is represented by a single barbed and tanged arrowhead, and three `thumbnail' scrapers. Numerous other neatly retouched knives, scrapers and piercers may also belong with this activity. As may some of the small, hard-hammer struck flakes recovered from the mound and unstratified contexts.

However, the majority of the assemblage is of mid-late Neolithic date as indicated by the retouched forms present (see below) and confirmed by the ceramic associations. The debitage is characterised by relatively small, hard-hammer struck flakes. Occasional soft-hammer struck flakes were recorded, for example from contexts 11, 17, 133 and unstratified contexts. Butts tend to be plain or cortical, occasional faceted and dihedral butts (Tixier *et al.* 1980) were recorded, for example from contexts 133, 155 and 291. Hinge fractures and other accidents of debitage were noted amongst the material. All elements of the reduction sequence are represented although surprisingly few cores and pieces of irregular waste were recovered. The cores are mostly non-specific flake cores and core fragments dominate (table 7.6); two Levallois cores may have been used to produce blanks for transverse arrowheads (for example fig. 7.7, 10). The other core types present include a keeled core from context 294 and three multi-platform cores (for example fig. 7.7, 3; 7.8, 17). Few of the cores showed any evidence of preparation or maintenance during knapping. Only three core rejuvenation flakes were recovered (from contexts 72, 133 and the mound) indicating that careful controlled knapping strategies were not of great significance The cores are all well reduced; the average core weight for complete examples is 26.3g. The extensive working of the cores is as expected given the distance between the site and a good source of raw materials. It is a little surprising that more rejuvenation flakes were not recovered; it may be that the flint was easily obtained despite the distance from the nearest good source. The three flakes from polished implements indicate that once broken these tools were re-used as cores and worked as valuable sources of high quality raw material.

Chips are well represented in the assemblage (271 or 17.6%) and are mostly micro-flakes or broken and burnt fragments. This reflects the general lack of core preparation and maintenance and the dominance of plain and cortical butts. Chips were recovered from both Peterborough Ware and Grooved Ware associated contexts but were perhaps more common in the latter (table 7.8).

Apart from the probable obliquely blunted point, possible leaf-shaped arrowhead and the Beaker flintwork, the retouched forms are of mid to late Neolithic type (table 7.7). Diagnostic forms include chisel arrowheads (for example fig. 7.7, 4, 9, possibly 5 and 7.8,14), a *petit tranchet* arrowhead from context 50, a possible hollow based arrowhead, knives, a variety of scrapers, piercers, serrated and retouched flakes. Apart from the miscellaneous retouched pieces, generally broken or unfinished tools, scrapers are the most numerous retouched form (table 7.7). The dominance of scrapers is expected given the domestic nature of the assemblage. The scrapers tend to be small, neatly worked examples on thin non-cortical blanks (for example L80, L45, L14). End and end and side scrapers are the most frequent type (table 7.7). Several examples exhibit edge gloss some have worn scraping edges, for example L48, from context 23, L76 from context 133, L65 from context 155 and L142 from context 291. The true number of scrapers in the assemblage would perhaps have been higher as many of the miscellaneous retouched pieces are probably scraper fragments.

Context	Scrapers	Knives	Retouched Serrated flakes	Arrowheads	Polished flakes	Piercers	Misc retouch	Microlith	Total
09	-	-	-	-	-	-	1	-	1
11	2 end and side	-	-	2 chisel	-	-	2	-	6
13	-	-	-	-	-	-	1	-	1
17	-	-	1 serrated	-	-	1	1	-	3
21	-	-	1 serrated	-	-	-	-	-	1
23	2 end 4 end and side 1 other	-	-	1 chisel	-	-	-	-	8
50	-	-	-	1 petit tranchet	-	-	-	-	1
76	-	-	1 serrated	-	-	-	-	-	1
133	1 end	-	-	-	-	-	3	-	4
155	1 end 1 end and side 2 other	1	2 retouch-ed	-	-	-	1	-	8
289	-	-	1 retouch-ed	-	-	-	2	-	3
291	1 end and side	-	-	-	-	-	1	-	2
292	-	-	-	-	-	-	1	-	1
294	-	-	-	-	-	-	1	-	1
topsoil u/s	1 thumb	-	-	1 chisel	1	1	8	-	12
mound	1 thumb 2 end 2 other	1	2 serrated	1 barbed and tanged 1 hollow	2	4	11	1	28
top of natural	1 thumb	-	-	-	-	-	-	-	1
palaeosoil	3 end and side 1 end	-	-	-	-	1	6	-	11
Total	26	2	8	7	3	7	39	1	93

Table 7.7: Upper Ninepence excavated assemblage: retouched forms.

Ceramic assoc	Context	Flake	Blade	Chip	Core/core frag.	Irreg. waste	Retouched forms	Burnt un-worked	Total
Peterborough Ware	11	21	1	20	1 multi-platform core 1 core fragment	-	2 chisel arrowheads 2 end and side scrapers 2 misc. retouch	-	50
	13	4	-	1	-	-	1 misc. retouch	-	6
	17	3	2	12	-	-	1 serrated flake 1 piercer 1 misc. retouch	-	20
	21	4	-	3	-	-	1 serrated flake	-	8
	66	1	-	7	-	-	-	-	8
	292	-	-	-	-	-	1 misc. retouch	-	1
Grooved Ware	09	34	-	1	-	1	1 misc. retouch	2	39
	23	17	1	11	1 levallois 1 core fragment	-	1 chisel arrowhead 2 end scrapers 4 end and side scrapers 1 misc. scraper	-	39
	36	4	-	15	-	-	-	-	19
	56	-	-	4	-	-	-	-	4
	72	90	1	14	-	-	-	-	105
	86	3	-	6	-	-	-	-	9
	133	22	2	13	2 core fragments	-	1 end scraper 3 misc. retouch	-	43
	137	1	-	7	-	-	-	-	8
	151	19	-	6	-	-	-	-	25
	155	30	-	8	-	-	2 retouched flakes 1 end and side scraper 1 end scraper 2 misc. scrapers 1 knife 1 misc. retouch	-	46
	199	10	1	5	-	-	-	-	16
	289	3	-	14	-	-	1 retouched flake 2 misc. retouch	-	20
	291	-	-	4	-	-	1 end and side scraper 1 misc. retouch	-	6
	298	7	-	-	-	-	-	-	7
Peterborough and Grooved Ware	201	1	-	1	-	-	-	-	2
	502	2	-	-	-	-	-	-	2

Table 7.8: Upper Ninepence: assemblage composition - Peterborough Ware and Grooved Ware associated material.

Serrated and retouched flakes are also well represented in the assemblage (table 7.7). Many of the retouched flakes have sporadic retouch along 1 or more edges (for example fig. 7.8, 15). In some instances the retouch may simply be use damage. The serrated flakes are mostly finely serrated (between 7 and 9 serrations per 10mm) and worn. 1 example from the mound (L12) was very coarsely serrated with only 4 serrations per 10mm. Macroscopic edge gloss was recorded on three examples indicating use on silica-rich plant materials (Ungar-Hamilton 1988). Only two knives were recovered, one from context 155 (fig. 7.8, 12) and one from the mound (fig. 7.8, 18). Both examples are relatively large on oval or sub-oval flakes, cortex and or retouch form the backing for these knives. The higher number of retouched and serrated flakes may explain the relative paucity of this implement type. Other broken or unfinished examples are also undoubtedly represented amongst the miscellaneous retouched class. The knives bear some similarities to discoidal types but they have not been polished and are not as extensively worked.

Seven piercers were recovered from context 17, the mound and other unstratified context. Most of the examples are minimally retouched and one or two show clear wear at their tips, for example, L10. Miscellaneous retouched pieces are the most common retouched form (table 7.7) and include broken, unfinished and atypical pieces. Amongst the retouched forms there are ten possible scraper fragments, sixteen flakes with miscellaneous retouch, six arrowhead fragments and two fabricator fragments. The arrowhead fragments include a possible leaf-shaped and two transverse examples; the remainder could not be assigned to type.

2.5.3 Discussion

Comparing pit groups with ceramic associations there tend to be fewer flint artefacts from Peterborough Ware contexts (table 7.8). The range of flint artefacts from both the Grooved Ware and Peterborough Ware associated contexts are similar although the former tend to have greater numbers of retouched pieces (table 7.8). Technologically these two groups of material are similar; small, hard-hammer struck flakes predominate and there is little evidence for platform preparation. The quantity of chips would suggest that the collection of knapping debris rather than *in situ* knapping was occurring. However, this collection must have been partial as no long refitting sequences were found but Dr Donahue identified two pairs of refitting artefacts (see Part 8.1). Artefacts from these pits have used edges and macroscopic gloss was recorded on several pieces, notably the serrated flakes. Such edge gloss results from use on silica-rich plant materials (Ungar-Hamilton 1988). Artefacts within both Peterborough Ware and Grooved Ware contexts are frequently burnt, broken and have macroscopic use-damage. The flint assemblage suggests that several activities were occurring on the site including knapping, the preparation of hides and foodstuffs and hunting. The assemblage is therefore essentially domestic in character; the burning and breakage rates being consistent with this. The condition of the material, together with the predominance of domestic tools (notably scrapers, retouched and serrated flakes and piercers) would indicate that this material is collected domestic debris. However, this does not necessarily imply that the deposits were made in a purely domestic context.

The use of good quality flint is of some interest given the lack of locally occurring raw materials. Cores were extensively worked down although there does not appear to have been much attempt at raw material conservation through core rejuvenation. The flakes from polished implements suggest that quite distant sources of flint were being exploited, the creamy white material from the mound, perhaps coming from the Louth area of Lincolnshire (J. Humble pers. comm.). The use of chert and quartzite may indicate that more local sources of stone of suitable flaking quality were also being exploited. The occurrence of Bullhead flint is of interest, this material may have been available within superficial deposits locally rather than being imported from the south-east. However, a more distant source for this material should not be ruled out as it is good quality flint and has an attractive appearance. At Barrow Hills, Radley, Oxfordshire Bullhead flint appears to have been especially selected for deposition within Grooved Ware pits (Bradley forthcoming). The Bullhead flint from Upper Ninepence does not appear to have any particular ceramic association as the majority of it was recovered from the mound and unstratified contexts. A burnt end and side scraper was recovered from context 11 (fig. 7.7, 2); associated with Peterborough Ware and a burnt flake was found in layer 72 which also produced Grooved Ware. A piercer made from Bullhead flint was recovered from context 002. Similarly, the chert was mainly recovered from the mound but two flakes of dark grey chert were recovered from contexts 009 and 23, both of which also produced Grooved Ware.

The composition of the Peterborough Ware associated flint assemblages is typical of those from other parts of the Britain (see for example, Manby 1975). Apart from a few areas of the country, for example, Yorkshire, Peterborough Ware associated flint industries are ill-understood and are frequently small and largely composed of undiagnostic debitage. At Cam, Gloucestershire, for example, Fengate pottery, a fragmentary stone macehead, animal bone, daub and flint was recovered from a pit (Smith 1968, 16-20). The flint was rather undistinguished, consisting of a core fragment, utilised flakes and a flake from a polished implement (Smith 1968, 19). At Yarnton, Oxfordshire small Peterborough Ware associated flint assemblages have been recovered from a series of pit deposits on the Thames floodplain (Bradley 1996). Typically these deposits contain a range of debitage and retouched pieces including a *petit tranchet* arrowhead, scrapers, backed knives, serrated and retouched flakes (Bradley 1996).

The retouched forms from the Grooved Ware associated contexts are also typical of those found nationally (Wainwright and Longworth 1971, 254-261). No `fancy' items were recovered although some of the scrapers and arrowheads are very finely worked. There did not appear to be any difference in quality between the flintworking in the Grooved Ware and Peterborough Ware associated contexts.

Large well-stratified flint assemblages are relatively rare in Wales and little flintwork has been recovered in the immediate region. Comparable Grooved Ware associated flint was recovered from features beneath two barrows at Trelystan, Powys (Healey 1982, 175). A small flint assemblage, principally of late Neolithic and early Bronze Age date, was recovered from various features within the Welshpool cursus complex (Aldhouse-Green 1994, 177). Neolithic and Bronze Age flintwork was recovered from ring ditches at Four Crosses, Powys (Green 1986, 77-78). A small, generally poorly stratified, assemblage of worked flint, including Mesolithic and Neolithic to Bronze Age pieces was recovered from excavations in New Radnor (Aldhouse-Green forthcoming). Worked flint including mircoliths, a leaf-shaped arrowhead, scrapers and debitage were recovered as surface finds and from subsequent excavation at Fron Ddyrys (Pye 1975, 40). Peterborough Ware and a fragment of a polished stone axe were also recovered (ibid., A Gibson pers comm.). At Clyro, Radnorshire a later Mesolithic scalene triangle together with Neolithic and Bronze Age flintwork was recovered (Wainwright 1963, 101). The numerous flint scatters recovered from the Walton Basin by Chris Dunn (see above) also provide evidence for contemporary Neolithic and Bronze Age activity. The slight evidence for Mesolithic activity recovered from both the surface collection and the excavations within the Walton Basin adds to the growing body of evidence for early occupation within Wales.

In a wider context comparable flint assemblages have been recovered from the surrounding counties, particularly Herefordshire (Children & Nash 1994, 14-16; Bradley 1988). This material mostly comes from surface collections and concentrations of Neolithic and Bronze Age flintwork have been recorded from Dorstone Hill, Cefn Hill and the Golden Valley area (Children & Nash, 1994, 14-17; Bradley 1988, 30-31).

2.5.4 Catalogue of illustrated pieces

Entries are ordered as follows: context number, brief description, weight (cores only) and find number.

1. Context 11. End scraper, neatly retouched on a thick non-cortical blank. Scraping angle 60-70°. L257.

2. Context 11. End and side scraper, heavily burnt. Bullhead flint. Scraping angle 55-70°.

3. Context 11 (from sieving). Multi-platform flake core, 33g. Many hinge fractures on flaking faces, probably rejected because no further flakes could be removed.

4. Context 11. Chisel arrowhead. On a thick blank possibly unfinished. L259.

5. Context 13. Miscellaneous retouched piece, probably a transverse arrowhead. L182.

6. Context 23. Broken scraper, neatly retouched on a thin non-cortical blank. Scraping angle 30-65°. L80.

7. Context 23. Disc scraper, very finely worked around its circumference, invasive retouch. Scraping angle 40-50°. L 45.

8. Context 23. End and side scraper. On a large blank with cherty inclusions, burnt. Scraping angle 45°. L44.

9. Context 23. Chisel arrowhead. L 52.

10. Context 23. Discoidal core (22g). L53.

11. Context 133. Bifacially worked piece, possible fabricator fragment. Crushed and worn areas at tip. L73.

12. Context 155. Backed knife, on a large flake. Minimal retouch confined to edges. L86.

13. Context 155. End and side scraper. On a square flake, scraping angle 75-80°. L67.

14. Context 289. Bifacially worked piece with trimming at butt end, possibly an unfinished arrowhead. L148.

15. Context 289. Retouched flake. L164.

16. Context mound NW quadrant. Unfinished /broken microlith. Probably an unfinished obliquely blunted point on the proximal end of a blade-like flake. L13.

17. Context mound SE quadrant. Multi-platform flake core (14g). Greatly reduced. L111.

18. Context mound SE quadrant. Backed knife on large oval flake with steep retouch. L105.

19. Context old ground surface NE quadrant. End-and-side scraper. On a thick blank, steeply retouched, scraping angle 65-75°. L14.

2.6 Upper Ninepence II

Five pieces of worked flint and a single piece of worked stone were recovered from the excavations. The material consists of three flakes, a core rejuvenation flake (face/edge), a multi-platform flake core and a cupped-marked stone (table 7.2). The latter is relatively small measuring 33mm long by 27mm wide and it has a maximum thickness of 17mm. The maximum diameter of the depression is 13mm.

2.7 Hindwell Ash

A small assemblage of nine pieces of struck flint was recovered from the excavation of the barrow (fig. 7.9). Flakes were the most numerous category with a chip, a core fragment (fig. 7.9, 2) a possible unfinished microlith and an oblique arrowhead (fig7.9, 1) also being recovered (for assemblage composition see table 7.2). The oblique arrowhead is a very fine example made on a thin flake and is of later Neolithic date.

3 THE OTHER STONE ARTEFACTS FROM UPPER NINEPENCE (geological identifications by D. Jenkins, Discussion by A. M. Gibson)

The following stone artefacts were recovered from the excavations at Upper Ninepence (fig. 7.10)

3.1 Catalogue

L56 (pit 22). Disc-shaped stone pounder averaging 65mm in diameter and 35mm thick. There are traces of polish on both surfaces and abrasion to the edge of the disc. The rock is a fine grained (0.5mm) well-sorted Carboniferous quartz sandstone containing abundant quartzodes and iron ore minerals. The rock is unlikely to be local and may be an imported artefact (fig. 7.10, 4).

L72 (pit 22). Rounded oval pounder measuring 58mm by 50mm by 40mm thick. There are traces of abrasion on the rounded ends but one round-sectioned groove may be modern accidental damage. The rock is a weathered and river-rounded pebble of medium to coarse-grained igneous dolerite. The rock is not local (fig. 7.10, 2).

L80 (pit 154). Irregular stone pounder measuring a maximum of 95mm by 65mm by 60mm thick. The utilised end is rounded and bears well-defined abrasion. The rock is a coarse well-sorted Old Red Sandstone with particles upto 10mm in size. Possibly Devonian and probably imported (fig. 7.10, 3).

L97 (Mound, SE Quadrant). A damaged pounder with impact spalls on one edge. The surviving fragment measures 67mm by 70mm by 40mm (max) thick. The rock is a local fine-grained, well-graded siltstone broken along well-defined bedding planes (fig. 7.10, 1).

L106 (Mound, SE Quadrant). A fragment of a polished stone axe in a fine-grained uniformly grey rock with a thin brown patina. The geology is uncertain though it appears to be from a silicifed sedimentary rock.

3.2 Discussion

Of the five non-flint lithic artefacts, one represents an unprovenanced polished stone axe fragment while the other four are hammerstones or pounders. Of these, only one (L97) is local and the others are of foreign, and probably imported, materials. The stratified artefacts (L56, L72, L80) are all from Grooved Ware pits. Such non-flint associations are generally rare in Grooved Ware contexts. At Durrington Walls, for example, the only non-flint artefact was a single greenstone axe fragment, possibly of West Country origin (Wainwright & Longworth 1971, 183). At Marden no non-flint artefacts are recorded (Wainwright *et al.* 1971) despite a comparatively large Grooved Ware assemblage and at the Kennet Avenue settlement (Smith 1965) only to be expected sarsen fragments are associated in Grooved Ware contexts. Grooved Ware associated non-flint lithics are also apparently absent from the Cranborne Chase excavations (Barrett *et al.* 1991) and from the other Grooved Ware sites in Wales; Capel Eithin, Anglesey (White 1981; Lynch 1991) and Hendre, Rhydymwyn, Denbighshire (Brassil & Gibson forthcoming). L72 compares well in size with S1 from Trelystan, Powys (Britnell 1982), an oval quartzite pebble with end and side abrasion and from the buried surface below barrow 2. At Redgate Hill, Hunstanton, Norfolk, two simple, oval discoid quartzite hammerstones were recorded from Grooved Ware contexts (Bradley *et al.* 1993), a pebble hammerstone was recovered from Puddlehill, Bedfordshire, pit 6 (Matthews 1976), two quartzite rubbers were associated with Grooved Ware at Harmondsworth, Greater London (inf. J. Cotton) and a quartzite hammerstone and rubber fragment were found in a pit group at Martlesham, Suffolk (Martin 1993, 51).

Grooved Ware associated non-flint lithics are, however, more common in northern England. A pot-boiler and jasper hammerstone were associated with Grooved Ware at Rudstone Wold, East Reservoir Field 3, a piece of polished haematite was recovered from East Reservoir Field site 5, and a quartzite cobble anvil stone was recovered from Carnaby Top Site 12 (Manby 1974). A larger non-lithic assemblage was recovered from the North Carnaby Temple sites comprising three hammerstones and four rubbers; eight flint hammerstones were also recovered (Manby 1974). However, non-flint lithic associations in Grooved Ware contexts are comparatively rare.

4 POTTERY FROM HINDWELL ASH AND UPPER NINEPENCE

4.1 Hindwell Ash

Three sherds of pottery were recovered from the pre-barrow gully 11 (1 sherd) and the material of the turf mound (2 sherds), These finds must all pre-date the construction of the primary barrow. One small sherd may be tentatively identified as Beaker pottery from its thin light-brown fabric. The other two sherds have coarse fabrics with abundant angular crushed quartz inclusions. They may well be Neolithic but in the absence of formal elements or decoration, this identification is tenuous in the extreme.

4.2 Upper Ninepence

4.2.1 Introduction

The prehistoric pottery from Upper Ninepence may be divided into three main groups, Peterborough Ware, Grooved Ware and Early Bronze Age (figs 7.11-17). The last named group is represented by two vessels, P89 and P90 (fig. 7.17), both probably belonging to the Food Vessel Urn tradition. P89 comes from the mound material (context 2) while P90 comes from the OGS (context 72) though both contexts must be regarded as largely unstratified. The Peterborough Ware assemblage is represented by fragments of 20 vessels (P1-P20) and comes from both unstratified contexts in the mound material and the animal disturbed palaeosol as well as from pits in a generally restricted area below the NW quadrant of the mound. The Grooved Ware assemblage is represented by fragments of 68 vessels (P21-P88) which generally come from stratified contexts within pits dug into the natural subsoil. The Grooved Ware pits and Peterborough pits seem to have a mutually exclusive distribution on the site and the radiocarbon evidence demonstrates that there is also a chronological difference between the two periods (fig. 6.7). The only instance of cross tradition association is a small Fengate sherd, P16, which comes from Grooved Ware pit 154. P16 is, however, badly abraded and is almost certainly residual.

4.2.2 Peterborough Ware (P1-P20)

The Peterborough assemblage has been dated to *c.*3000 Cal BC (see above table 6.3) in keeping with other assemblages from Wales (Gibson 1993a; 1995a) and comprises vessels largely in the Mortlake style with a small Fengate component. The Mortlake vessels are decorated with impressions made with whipped and twisted cord, fingernail, incision or birdbone. Whipped cord maggots are present on vessels P2 and P18, while twisted cord impressions are visible as multiple horizontal lines on P1 and P17 and as diagonal lines on P12 and P16. Fingernail impressions are altogether much more common arranged in a pseudo-cord arrangement on P6 and P8, as herringbone motif on P7 and P15, as oblique impressions on P5 and as apparently random impressions on P9-11 and P20. Incised decoration is restricted to P1 where it occurs as diagonal lines on the inside of the vessel and P3 where it similarly occurs internally in the form of cross-hatching. The instance of birdbone impressions is restricted to a single vessel, P3, where they are found on the top of the rim.

The Walton assemblage brings the total number of Peterborough Ware findspots in Wales to 33 (Gibson 1995a) with the bulk of the material coming from the Marches. In the adjacent counties, Peterborough assemblages have been found in Shropshire at Meole Brace, (Hughes & Woodward 1995), Belle Vue, Shrewsbury (inf. H. Hannaford) and Brompton (inf. A. Woodward). In Warwickshire, it has been found at Barford (Oswald 1969; Loveday 1989), Polesworth (Gibson 1993b) and Wasperton (Hughes & Crawford 1995). Peterborough Ware has been found in Worcestershire at Kemerton (Dinn & Evans 1990) and in Gloucestershire at Tewkesbury (Hannan 1993), Cam (Smith 1968), Gloucester (Hurst 1972), Salmonsbury (Dunning 1976), Barnwood (Clifford 1930) and Bourton on the Water (Dunning 1932) as well as in the blocking of some Cotswold-Severn tombs (e.g. Saville 1979).

This scarcity of birdbone impressions on the pottery from Walton may be remarkable in view of their frequency in other Welsh assemblages (Gibson 1995a, fig. 3.4) and may suggest that the assemblage is better paralleled in England. Indeed, few direct parallels for the Walton material are to be found in the Welsh or the Marches material. The combination of birdbone impressions and incision on P3 may be paralleled at Sarn-y-bryn-caled, Powys (Gibson 1994, fig. 25:P1) and Cefn Bryn, Glamorgan (Gibson 1995a, fig. 3.7, No9). The twisted cord and fingernail impressions on the Walton material find closer parallel in the assemblage from Windmill Hill, Wiltshire (Smith 1965) and Cherhill, Wiltshire (Evans & Smith 1983) where both techniques are common, the latter particularly on vessels of the Fengate style. The ribbed exterior and fingernail impressions found on P5 are closely paralleled at Heathrow, Middlesex (Grimes 1960, 189) where, like P5, the vessel was also incised on the interior of the rim and neck. At Cherhill, too, ribbed vessels are common (Evans & Smith 1983) though at this site it tends to be twisted cord maggots which fill the depressions rather than fingernail impressions.

P3 has an elaborate motif of closely set fine birdbone impressions resembling toothed comb. The rim is decorated with a multiple chevron arrangement and horizontal lines. A similar motif is present on some Grooved Ware sherds from Site I at Dorchester, Oxon. (Atkinson *et al.* 1951) but such 'busy' decoration is rare within the Peterborough tradition.

P11, P16 , P18 and P20 may be identified as Fengate style from a combination of their collars (P16, P19), the dimples or stabs in the necks (P16), the tapering straight-sided bodies (P11, P20) and the flat bases (P11). P16 comes from pit 154 which is an otherwise predominantly Grooved Ware context with a radiocarbon date of 4050±35 BP (BM-2969) but the sherd is very abraded and may well be residual. P11 comes from pit 20 and is associated with 1 serrated flake, 4 flakes and 3 flint chips. P18 and P20 are associated in pit 500 and form a closed group with a radiocarbon date of 4490±60 BP (BM-3070). Fengate sherds are rare in Wales but have been recognised at Brynderwen, Powys (Gibson & Musson 1990), Ogmore, Glamorgan (Gibson 1990), and Castell Bryn Gwyn, Anglesey (Wainwright 1962). At this last named site, the same short multiple fingernail impressions are used to decorate the vessel as they are at Walton (P11) and similar decoration has been found on a Fengate collar from the Horslip long barrow, Wiltshire (Ashbee *et al.* 1979), Windmill Hill (Smith 1965), Downton, Wiltshire (Rahtz 1962), West Kennet chambered tomb, Wiltshire (Piggott 1962), Baston Manor, Kent (Philp 1973) and from the West Kennet avenue, Wiltshire (Smith 1965) though here the fingernail impressions are arranged in a filled triangle motif. The designation of P18 as Fengate ware is wholly dependent on the beginnings of a markedly concave neck present at the very base of the sherd. It once more finds parallel at Windmill Hill (Smith 1965) and Downton, Wiltshire (Rahtz 1962).

The conventional dating of Fengate Ware at the end of the Peterborough sequence, just before the end of the third millennium BC, has recently been challenged (Gibson & Kinnes 1997) with current radiocarbon chronology indicating that Fengate style vessels were fully developed by 3000 Cal BC. Radiocarbon dates are few, however, and the parameters of Fengate chronology are not yet understood. With this in mind, it was originally considered that the Fengate element at Upper Ninepence may have been late for a number of reasons. Firstly the fabric of P18 and P20 is similar to many of the Grooved Ware vessels suggesting a common potting tradition. Secondly, pit 500 in which P18 and P20 occur is set apart from the main Peterborough Ware distribution. Thirdly, P16 was associated with a Grooved Ware assemblage though the question of residuality has already been raised above. The radiocarbon date from pit 500, however, is exactly contemporary with the other Peterborough dates and reinforces the evidence for the early appearance of this style.

4.2.3 **Grooved Ware** (P21-88)

The Grooved Ware assemblage from Upper Ninepence is rich and varied and by far the largest assemblage from Wales. Grooved Ware has been found elsewhere in the Principality at Capel Eithin, Anglesey (White 1980; 1981; Lynch 1991), Coed-y-dinas and Sarn-y-bryn-caled, Powys (Gibson 1994), Trefignath, Anglesey (Smith & Lynch 1987) and

Lligwy, Anglesey (Lynch 1970). At Trelystan, Powys, a Durrington Walls style assemblage was associated with two similar sub-rectangular structures (Britnell 1982) and the vessels from Hendre, Rhydymwyn, Flintshire are probably also in the Durrington Walls style (Brassil & Gibson, forthcoming).

Barrel, bucket, bowl and tub-shaped vessels are represented in a variety of fabrics. The presence of applied and raised cordons, geometric decoration and the occasional use of twisted cord decoration, places the majority of the assemblage in Longworth's Durrington Walls style though P62, P63 and P78 with their converging incisions and lozenge motifs may well belong to the Clacton style (Wainwright and Longworth 1971). It is also interesting to note the difference in fabric between these vessels and the rest of the assemblage; P62, P63 and P78 being in a soft, 'corky' and pitted fabric.

Of particular importance in the Upper Ninepence assemblage is the presence of three internally decorated vessels, P34, P67 and P68 (fig. 7.14) all in a fine and well-finished fabric. P67 is represented only by a few sherds but none of them exhibit external decoration. The internal incised motif appears to have been triangular with herringbone or oblique infill. P34 is decorated on the upper part of the outer surface with incised oblique lines while the interior is decorated with incised triangular motifs (suitable for internal decoration as they narrow towards the base) with panels of fine whipped cord maggots between the triangles. P68 is decorated with similar oblique maggot impressions externally and internally. Longer lengths of this fine whipped material are arranged in zigzags on the internal bevel. Such fine whipped cord decoration, made with a thread rather than a cord, is found elsewhere on Grooved Ware vessels, particularly at Marden, Wiltshire (Wainwright *et al.* 1971).

Internal decoration is of course paralleled in the assemblage from Durrington Walls (Wainwright & Longworth 1971, fig.58) where sherds from ten internally decorated vessels were found in a variety of fabrics. The triangular incised motifs of P34 and P67 are directly paralleled at Durrington Walls where fine whipped cord impressions are also found. Fine whipped cord maggots and twelve internally decorated vessels were recovered from Tye Field, Lawford, Essex (Shennan *et al.* 1985) where once again internal triangular motifs predominate, including elongated triangles as in P34 at Walton. Decoration akin to P37 was also found on a bowl at Hengistbury Head (Cunliffe 1987) and at Willington, Derbyshire (Wheeler 1979) while broad triangular internal decoration is found at The Sanctuary, Wiltshire (Cunnington 1931), Wyke Down, Dorset (Barrett *et al.* 1991; Barrett *et al.* (eds) 1991) and at Woodhenge (Cunnington 1929). Profuse internal incised decoration in the form of triangular motifs is found on two vessels from Mercer's excavations at Grimes Graves, Norfolk (Mercer 1981) and include impressed in-filling though not the fine whipped cord of the Walton sherds. The vessel from Puddlehill, Bedfordshire (Matthews 1976) differs from the other vessels of this type in that the interior appears to be decorated with a chequer pattern of incised filled rectangles. The motifs on the internally decorated vessel from Colchester, associated with large Durrington Walls style vessels (Crummy 1992), is indistinct due to the small size of the sherds but converging lines imply triangular or lozengic patterns. A vessel from Harmondsworth, Middlesex appears to resemble P34 in shape and is decorated internally with what appear to be filled, elongated lozenges and externally with panelled filled lozenges in the Durrington Walls style (inf. J. Cotton).

These internally decorated vessels are united in their preference for internal triangular motifs, their splayed open forms, often with inturned rims, and the general lack of decoration on the outer surface, with the exception of occasional decoration near the rim. Clearly, the position of all the decoration and the form of the pots indicates that it was intended to be seen and that it had a display function. This is reinforced by the fact that carbonaceous residues are absent from the inner surfaces of these pots and they have clearly not been used for cooking purposes.

P26 and P38 are from fine-walled closed vessels in a hard well-fired fabric containing grog. P26 is unusual in having a simple rounded rim with a single well-executed horizontal incised line on the inside. These sherds bear comparison with similarly fine-fabriced tub-shaped vessels recently designated Irish Grooved Ware and found *inter alia* at the Co. Meath passage graves of Knowth (inf. Helen Roche), Newgrange (Gibson 1982, 211-12, 465-8; O'Kelly *et al.* 1983) and the timber complex at Ballynahatty, Co. Down (Hartwell 1994 and pers comm). This Irish fine ware material seems to be a true regional style and it occurs in contexts with, to British eyes, more familiar Grooved Ware and Beaker ceramics (Gibson 1982, 180, 210-12). In this context may be cited the knobbed vessel P48 in a soft sandy fabric. Once more such small circular knobs are found in Irish Grooved Ware contexts (O'Kelly *et al.* 1983) but are hard to parallel in Britain. Wales may well provide a link between the classic British assemblages and the increasingly recognised Irish material. The Capel Eithin sherds, for example, have clear similarities with some of the coarser material from Newgrange, Knowth and the Lough Gur area.

The rest of the Grooved Ware assemblage from Walton has all the traits of classic Durrington Walls style Grooved Ware, especially the opposed filled triangle motif (P21, P31, P35, P46, P52, P56, P57). The large barrel-shaped P33 has well-defined horizontal and vertical cordons and is largely undecorated. One scalloped rim sherd hints at intermittent rim decoration however, suggestive of the rim 'knots' on vessels in the Woodlands style. P39 is similar to P33 though less well-preserved and exhibits scars where the applied vertical and diagonal cordons have separated from the body of the pot. These breaks are not always associated with a fabric colour change suggesting that at least some of these cordons may have broken off during the firing process.

Decorated cordons are rare but P28 has in effect a double cordon with oblique fingernail impressions. P70 also has a cordon, horizontal in this instance, with small oval impressions on its crest. An incised cordon, represented by two parallel incised lines acting as zonal seperators is visible on P35 and draws close comparison with P221 from Durrington Walls (Wainwright & Longworth 1971, 110). P59 has a wavy cordon formed by decorating the cordon with oval fingertip impressions.

The radiocarbon dates from Upper Ninepence are entirely consistent with the current Grooved Ware chronology. Of the 80 or so radiocarbon dates available for Grooved Ware nationally, 85% lie within the third millennium Cal BC and 70% fall between 2800 and 2400 Cal BC.

4.2.4 Early Bronze Age

P89 and P90 probably date to the early Bronze Age. P90, a narrow flat base in a thick well-fired fabric may be best assigned to a large vessel in the Urn tradition but further precision is difficult. P89 has twisted cord maggot decoration and a cavetto zone with vertical stop-ridges. The thickness of the fabric, the decoration and the formal traits suggest that the vessel may belong to the Food Vessel Urn tradition, similar in form to that from Brynford, Flintshire (Savory 1980, 345.1) or from Goatscrag, Northumberland (Burgess 1972).

4.3 Catalogue of Pottery

The stratigraphic details and quantities of pottery with information regarding residue analysis, thin sections and associated dates are given in tables 7.11 - 7.13.

4.3.1 Peterborough Ware

P1 Collar and neck sherd from a Mortlake bowl.
The fabric is dark grey-black, very crumbly with abundant inclusions up to 6mm across. There are carbon encrustations internally and traces of coil/ring-building visible in the breaks.
The collar is straight and everted and decorated with seven horizontal lines of twisted cord decoration. The neck is concave and bears traces of two deep stabs neither of which have completely pierced the fabric but which have both raised slight internal bosses. The body has slight traces of diagonal lines of twisted cord impressions. Internally, decoration comprises traces of two diagonal incised lines with a single horizontal line in the same technique corresponding to the collar base.

P2 Shoulder sherd from a Mortlake bowl.
The fabric is dark grey-black, 13mm thick and with abundant inclusions up to 10mm across. There are traces of ring breaks.
The shoulder is sharp and angular and has been decorated below with oblique to vertical coarse and closely spaced whipped cord maggots.

P3 Rim and neck sherd from a Mortlake bowl.
The fabric is crumbly, dark grey-black, 13mm thick and with abundant inclusions up to 10mm across. There are traces of ring breaks.
The top of the rim is rounded in section and decorated with closely spaced fine birdbone impressions arranged in a multiple chevron motif on the inner edge and in encircling lines on the outer half of the molding. The inside lip of the rim has small vertically arranged nicks or fingernail impressions and the inside of the neck is decorated with deeply incised lattice motif.

P4 Body sherds from a ? Mortlake bowl.
The fabric is dark grey-black, 13mm thick and with abundant inclusions up to 7mm across. The largest sherd has traces of a shoulder and internal carbon encrustations.
Decoration on one sherd comprises faint traces of diagonal twisted cord impressions.

P5 Shoulder and body sherds from a Mortlake bowl.
The fabric varies from light grey-brown to dark grey-black, is up to 16mm thick and has abundant inclusions up to 6mm across. There are traces of ring breaks.
The decoration comprises horizontal lines of regularly-spaced oblique fingernail impressions. Two rows are visible in the slightly concave neck above the shoulder and a total of four rows are visible on the two sherds representing the main belly of the vessel. Internally, a single row of the same type of fingernail impressions is visible in the neck and is bordered below with a single line of horizontal overlapping fingernail impressions.

P6 Rim sherd from a ?Mortlake bowl.
The fabric has light brown surfaces with a black, slightly porous core. It contains inclusions up to 6mm across and is 11mm thick.

The decoration comprises on the top of the rim traces of five horizontal lines of overlapping fingernail impressions resembling pseudo-cord. The inside lip of the rim is slightly concave and decorated with oblique fingernail impressions.

P7 Neck sherd from a ?Mortlake bowl.
The fabric is thin, hard and well-fired with a reddish brown outer surface and grey-brown inner surface. It contains inclusions up to 12mm across yet the fabric is only 8mm thick.
The decoration comprises a finely incised herringbone motif on the convex surface of the neck interior. The outer surface is undecorated.

P8 Rim sherd plus body flakes from a Mortlake bowl.
The fabric is hard and well-fired, has brown - dark grey surfaces and a black core, and is up to 12mm thick.
The decoration comprises 7 horizontal rows of overlapping fine fingernail impressions resembling pseudo-cord. On the internal lip of the rim is a herringbone arrangement in the same technique. One of the body flakes bears paired fingernail impressions arranged in a crowsfoot motif.

P9 Body sherd from a ?Mortlake bowl.
The fabric has a reddish-brown outer surface and a black inner surface and core. It is up to 13mm thick and contains inclusions up to 6mm across. Many of these inclusions break the inner surface but lie flush with it.
The outer surface bears a single pair of fingernail impressions arranged in a crowsfoot motif.

P10 Body sherds from a ?Mortlake bowl
The fabric has grey to brown surfaces and a black core. It is quite friable and contains inclusions up to 9mm across. The fabric is up to 17mm thick.
The decoration on four of the sherds appears to comprise random fingernail impressions while a shoulder sherd appears to have the shoulder accentuated with closely-spaced diagonal fingernail impressions arranged in a kind of cable pattern.

P11 Body sherds from a ?Mortlake/Fengate bowl.
The fabric has light brown to grey surfaces and a grey core. All the sherds are abraded and some sherds are quite friable. The fabric varies from 11mm to 22mm thick and contains inclusions up to 10mm across.
The decoration comprises multiple randomly scattered and lightly impressed horizontal fingernail impressions. The profiles of the body sherds suggest a flaring profile and thick, narrow base as if from a Fengate style pot. One neck sherd exhibits a deep circular stab resulting in the raising of an internal boss suggestive of Fengate decoration.

P12 Body and rim sherd from a ?Fengate bowl.
The fabric is coarse and heavy with black to brown surfaces and a black core. The sherds are up to 17mm thick and contain inclusions up to 7mm across.
One body sherd carries traces of random light fingernail impressions similar to P11 above. One rim sherd has a curved outer profile, and internal concave bevel and traces of diagonal twisted cord or pseudo-cord impressions on the outer surface.

P13 Crumbs of pottery in a fabric similar to the other Peterborough sherds above. None are decorated or exhibit formal traits. They may be residual and were recovered from the processed soil sample.

P14 Crumbs of pottery in a fabric similar to the other Peterborough sherds above. None are decorated or exhibit formal traits. They may be residual and were recovered from the processed soil sample.

P15 Sherd from a rim and shoulder of a small Peterborough bowl. The fabric is reddish brown externally, and grey internally. The surfaces are soft and friable and the fabric contains abundant angular stone inclusions upto 4mm across.
The rim has an external molding decorated with incised or fingernail herringbone. The neck is largely undecorated though there are traces of a possible fingernail impression. The sherd has broken near the shoulder.
The vessel may best be placed loosely within the Ebbsfleet substyle of the Impressed Ware tradition.

P16 Sherd in a soft orange-brown sandy fabric, very abraded, with crazed surfaces.
The sherd is from a collar with traces of the rim surviving and possibly with traces of a dimple below the collar. The collar itself is decorated with oblique incised lines.
The sherd is best interpreted as Fengate ware.

P17 Two sherds in a soft orange-brown fabric, very abraded, with abundant inclusions up to 3mm across and including quartz. The fabric is 10mm thick.
Externally, the decoration comprises three horizontal lines composed of close-set fine birdbone impressions. Probably Mortlake ware.

P18 Sherd in a soapy-textured grey-brown fabric with large black inclusions up to 7mm across. The fabric is 10mm thick.
The rim sherd is from a vessel with a diameter of c.200mm. The rim is inturned and has a vertical internal bevel. There are slight traces of a neck at the base of the sherd. The decoration comprises at the top two vertical lines of short whipped cord maggots and below this a zone of herringbone motif in the same technique.

P19 Badly abraded rim sherd in a hard well-fired fabric with abundant angular inclusions. The surfaces are light grey-brown and the core is black. The fabric averages 12mm thick.
The rim is strongly everted but is badly damaged. Nevertheless, the form of the vessel suggests a Mortlake bowl. There are faint traces of decoration on the body, possibly birdbone though the sherd is too abraded to be certain.

P20 Sherds in a hard well-fired fabric, reaching up to 23mm thick and with light brown surfaces and a black core. Inclusions up to 4mm across are abundant. The thickness of the sherds suggest that they come from the lower portion of a conical vessel, probably Fengate Ware.
The sherds are decorated with sparse vertical fingernail impressions.

Pot No	Feature (context)	No of sherds	Residue Analysis (yes/no)	Thin Section (yes/no)	C14 date
1	Pit 12 (13)	17+	Y	Y	
2	Pit 65 (66)	1	N	N	4470±80 (SWAN-23)
3	Mound (2)	5+	Y	N	
4	Mound (2)	6	N	N	
5	Pit 16 (17)	9	Y	N	4440±50 (BM-2967)
6	Pit 16 (17)	1	N	N	4440±50 (BM-2967)
7	Pit 16 (17)	1	N	N	4440±50 (BM-2967)
8	Pit 10 (11)	1+	N	N	
9	Pit 37 (38)	1	N	N	
10	Pit 6 (7)	15	Y	Y	
11	Pit 20 (21)	11+	N	Y	4410±35 (BM-2966)
12	Mound (2)	7	N	N	
13	Stakehole 47 (48)	crumbs	N	N	
14	Stakehole 325 (326)	crumbs	N	N	
15	Pit 200 (201)	1	N	N	4590±60 (BM-3071)
16	Pit 154 (155)	1	N	N	4050±35 (BM-2969) residual
17	U/S	2	N	N	
18	Pit 500 (502)	5	N	N	4490±60 (BM-3070)
19	Pit 200 (201)	1	N	N	4590±60 (BM-3071)
20	Pit 500 (502)	3	N	N	4490±60 (BM-3070)

Table 7.11: Stratigraphy and quantities of the Peterborough Ware from Upper Ninepence.

4.3.2 Grooved Ware

P21 Sherds in a hard, well fired pink/brown fabric with black core and interior. The inner surface is coated with carbon encrustations and the fabric varies between 8mm and 13mm thick. The fabric is voided and contains grog inclusions up to 6mm long.
The decoration consists of narrow raised vertical cordons with incised filled chevron motif in the resulting panels.

P22 Sherds in a soft friable sandy fabric with abundant well-crushed inclusions breaking both surfaces. The fabric varies between 10mm and 15mm thick, has an orange-brown outer surface and dark grey inner surface and core.
The decoration comprises narrow, raised vertical cordons. Some sherds have incised diagonal lines in the resulting panels. One sherd has a small round applied pellet on the outer surface.

P23 Rim sherd from a barrel-shaped vessel in a porous, dark brown fabric with black core and inner surface. There are internal carbon encrustations. The fabric contains inclusions up to 4mm long and reaches a thickness of 8mm. The rim is simple and rounded.
The decoration comprises four deeply incised horizontal lines on the outer surface.

P24 Sherd in a hard black fabric, well-fired and with smooth surfaces. The fabric has carbon encrustations externally and is 9mm thick.
The decoration comprises two oblique fingernail impressions on the outside.

P25 Sherd in a dark brown fabric, hard and well-fired with crisp fractures and smooth surfaces. It contains grog and sand and is 8mm thick.
The decoration comprises an arrangement of oblique finely incised lines, probably opposed diagonals separated by three verticals.

P26 Light sandy-brown fabric, hard and well-fired with crisp fractures and smooth surfaces. The fabric contains micaceous sand and is up to 7mm thick.
One sherd has a simple inturned rim with a single shallow internal scored line below, perhaps a result of finishing the rim.

P27 Light sandy-brown fabric, slightly crumbly texture. The fabric contains sand inclusions plus pieces of angular stone up to 10mm across.

P28 Light brown, hard and well-fired fabric with smooth, slightly sandy outer surface and a black, heavily carbon-encrusted inner surface. The fabric contains grog and sand inclusions.
The decoration comprises an undecorated vertical cordon with multiple diagonal incisions on either side.

P29 Base angle from a vessel in a light pink-brown fabric with abraded surfaces. The fabric contains grog inclusions.
The base of what appears to be a vertical finger-pinched cordon is visible on the outer surface.

P30 Single sherd from an inturned rim though the actual rim is missing. The fabric is soft and abraded with evidence of coil or ring-building in the breaks. It is light brown in colour with a grey core and contains sand inclusions.

P31 Rim sherd from a barrel-shaped vessel in a dark grey fabric with finely crushed grog inclusions. The fabric is up to 12mm thick and there are traces of a drilled hole 13mm down from the rim. The rim has been drilled prior to firing.
The rim is simple and rounded. Externally the decoration comprises incised filled triangles.

P32 Sherds, including base, in a hard, well-fired fabric with pink-brown surfaces and a grey core and interior. The base in particular has heavy carbon encrustations. The fabric contains quartz and grog with occasional stone inclusions upto 11mm across. The fabric is upto 12mm across and traces of ring or coil-building can be seen in the breaks.
The rim has had a diameter of approximately 120mm. The body sherd is decorated with opposed diagonal incised lines.

P33 Upper portion and 1 small base sherd from a large undecorated barrel-shaped vessel. The fabric is hard and well-fired with large inclusions up

to 6mm across. It is grey-brown throughout and the inner surface has considerable carbonaceous build-up.
The rim is slightly inturned, has a sharp rounded top and vertical internal bevel. One sherd has a pie-crust effect on the rim suggesting that the rim may have been decorated at intervals on its circumference. A low, applied cordon encircles the vessel at the point of maximum diameter *c.*45mm below the rim and vertical applied cordons run down from this.
The rim has had a diameter of *c.*300mm and the fabric averages some 12mm thick.

P34 Sherds in a hard and well-fired fabric with smooth, well-finished grey-brown surfaces and a black core. The fabric contains finely crushed grog and sand.
The splayed bowl has had an inturned rim with a diameter of *c.*160mm. The base diameter is *c.*70mm. The fabric averages 7mm thick.
The vessel has been decorated internally and externally. Externally, the decoration appears to be restricted to the upper part of the vessel and comprise panels of multiple oblique incised lines. Internally the decoration comprises multiple lenticular stabs or impressions inside the rim with narrow panels of incised herring bone which narrow towards the base. The herringbone motif changes to oblique lines as the panels narrow. Between these elongated chevrons are panels of extremely fine twisted cord maggots.

P35 Sherds in a light brown to grey fabric with black core and internal surface, the latter being covered with carbon encrustations. The fabric is hard and well-fired, 7mm thick, and appears to contain grog and fine sand inclusions.
Decoration is restricted to the outer surface and appears to represent an incised vertical cordon delineated by a double incised line to the left of which is a panel of multiple horizontal incised lines while to the right, in the same technique, is a panel of oblique and horizontal lines.

P36 Sherd in a well-fired but coarse fabric similar to P33 above. The outer surface is light brown, the inner is black with a carbonaceous crust. The fabric is 9mm thick.
The external decoration comprises a narrow raised cordon, 5mm wide, with traces of either oval impressions or broad grooves on either side.

P37 Sherds from a straight-sided vessel in a soft, friable fabric with grog inclusions. The fabric is 9mm thick, orange-pink externally and black internally with heavy carbon encrustations.
The vessel has vertical applied cordons decorated with diagonal fingernail impressions. The flat base has had a diameter of 135mm.

P38 Sherds from a vessel in a fairly hard, well-fired fabric with a grey-brown outer surface, brown-black core and an inner surface varying from brown to black with patchy carbon encrustations. The fabric averages *c.*8mm thick and contains well-crushed inclusions.
The rim is slightly inturned, has a diameter of *c.*180mm and has a vertical internal bevel 7mm deep. Sherds from the base angle of the vessel suggest a base diameter in the region of 130mm. The vessel is undecorated.

P39 Sherds from a large vessel in a fabric similar to P33 above but softer and with lighter brown surfaces. The fabric also appears less well-fired. The internal surface, particularly towards the base, is heavily carbon encrusted with the deposits reaching 5mm thick. The fabric averages 11mm thick.

The vessel is decorated with vertical and oblique applied cordons which have been imperfectly bonded and which have in many cases flaked off the surface. There appears to be no other decoration.
The base sherds suggest an estimated base diameter of *c.*160mm.

P40 Base and wall sherds with an estimated base diameter of 130mm. The fabric is coarse and friable with crazed surfaces through which erupt abundant inclusions up to 5mm across. The outer surface is light pink-brown. The fabric is 11mm thick and slightly laminated in texture.
The outer surfaces bears traces of three oblique, lightly incised lines. The inner surface is heavily carbon encrusted, up to 2mm thick in places.

P41 Sherd in a hard well-fired fabric with grog inclusions and up to 8mm thick. The outer surface is dark brown and the inner black.
The inner surface is decorated with traces of five vertical(?) broadly incised lines.

P42 Two sherds including 1 rim in a hard well-fired, dark brown or grey-brown fabric with well crushed inclusions and occasional voids. The rim-sherd fabric averages 11mm thick, the body sherd, probably a base, has the inner surface missing.
The rim is pointed with an internal bevel and has an estimated diameter of 140mm. Externally the profile is curved and the sherd is decorated with multiple lines of horizontal fingernail impressions arranged to resemble pseudo-cord. Six lines are visible.

P43 One sherd in a hard well-fired fabric with light grey-brown outer surface and black inner surface. The inclusions are finely crushed and the fabric slightly porous. The fabric averages 8mm thick.
The decoration is incised and comprises a filled chevron motif.

P44 Four sherds in a hard well-fired fabric up to 15mm thick. The outer surface is light grey-brown to brown and the inner surface grey with a dark grey core. The inclusions are finely-crushed.
One rim sherd is pointed, apparently upright and has two faintly incised diagonal lines on the internal bevel which is steeply angled and 12mm broad.

P45 Three sherds in a very soft porous fabric from near the base of the vessel. The fabric is dark grey to black throughout and the outer surface is pitted. The inner surface is missing.

P46 Single hard, well-fired sherd with a light brown outer surface and black inner surface and core. There are internal carbon encrustations. The fabric contains abundant inclusions, some of which break the inner surface, and averages 10mm thick.
External decoration comprises lightly incised lines arranged in a filled chevron motif.

P47 Rim sherd in a hard, well-fired and slightly porous fabric, 15mm thick, and with a light brown outer surface, grey-brown inner surface and core. The fabric contains grog and other inclusions up to 3mm across.
The rim is internally beveled. The decoration comprises faint traces of fingernail impressions on the outer surface.

P48 Sherds in a soft friable sandy fabric with light brown surfaces and a grey core. Abundant sandy inclusions up to 3mm across break both surfaces and the fabric itself has a laminated appearance in section.
A rim sherd displays a simple rounded rim with, externally, a small applied pellet 10mm below the rim. Other sherds carry small, raised

narrow cordons which appear to run vertically. Otherwise the vessel is undecorated.

P49 Sherds in a fairly well-fired fabric with light orange-brown outer surfaces and a black inner surface and core. The fabric averages 12mm thick. Undecorated

P50 Abraded base sherd too small to allow an estimation of diameter. The fabric is soft but quite well-fired, has brown surfaces and a black core. It contains abundant finely crushed grog. Undecorated

P51 Small sherd in a hard well-fired fabric with smooth well-finished outer surface with traces of carbon encrustations. The outer surface is black-brown, the inner light brown and the core is black. The fabric averages 9mm thick and contains large angular inclusions up to 6mm across.
The decoration comprises four lightly incised lines divided into two parallel pairs.

P52 Sherds in a hard, well-fired fabric with grey-brown surfaces and a dark grey core. The fabric is well-finished but abraded and averages 8mm thick. It contains well-crushed grog.
The decoration comprises lightly incised lines in a filled chevron arrangement.

P53 Sherds in a soft abraded fabric with light brown surfaces and a black core. The fabric is porous, 10mm thick and contains abundant crushed grog. Undecorated

P54 Small abraded sherd in a light orange-brown fabric with micaceous inclusions up to 5mm across. Black inner surface, outer surface missing. Undecorated

P55 Rim from a vessel with a diameter of *c.*160mm. The fabric is hard and well fired with abundant angular inclusions up to 5mm across. Much of the outer surface is missing but the fabric has been grey throughout with a black carbon encrusted inner surface.
The rim is pointed with a steep internal bevel 10mm deep. Externally, the surviving decoration comprises two rows of short vertical incisions. Internally, below the bevel are two rows of what appear to be vertically set birdbone impressions though the exact nature of these is masked by the carbon encrustations.

P56 Base and body sherds. The fabric is quite soft but well-fired has light brown surfaces and a black core. The fabric contains finely crushed grog and averages 9mm thick at the walls, while the base is 17mm thick at the centre. The base diameter has been in the region of 80mm.
The decoration comprises zones of multiple diagonal incisions separated by applied converging cordons.

P57 Rim sherd in an extremely hard and well-fired fabric The fabric contains angular inclusions, including quartz, up to 10mm across and is 17mm thick. The fabric has light brown surfaces and a grey core. The curvature of the vessel suggests a barrel-shaped pot.
The rim is pointed with a steeply sloping internal bevel 18mm deep. The bevel is decorated with five horizontal lines of twisted cord impressions. On the outer surface, the decoration comprises lightly incised or scored lines arranged in a filled chevron motif.

P58 Sherds in a hard well fired fabric, abraded and with angular inclusions up to 6mm across. The fabric appears grey throughout though the outer surface is missing.

P59 Sherd in a hard but abraded well-fired grey fabric. It contains grog and averages 10mm thick.
The sherd is decorated with a wavy fingernail-dimpled cordon to one side of which are multiple diagonal lines.

P60 Well-fired but abraded sherd with brown surfaces and a black core. The fabric contains grog and is 7mm thick.
Two faint incised lines are visible on the outer surface.

P61 Single sherd in a hard sandy fabric. Very abraded with a brown outer surface and black inner surface and core. The fabric is 10mm thick. Undecorated.

P62 Sherds from a soft, friable thin-walled vessel with pitted fabric and generally abraded breaks. The outer surface is dark brown and the inner surfaces generally grey-brown with a black core. The voids in the fabric and pits on the surfaces indicate organic inclusions. The fabric averages 5mm thick.
The decoration is incised and comprises multiple horizontal and diagonal lines defining empty lozenges and/or elongated chevron panels.

P63 Sherds similar to the above but in a harder and better-fired fabric though still slightly pitted. The outer surface is brown and the inner grey-brown with a black core. A rim sherd, by contrast, is black throughout. The fabric averages 8mm thick and the rim has had a diameter in the region of 140mm.
The decoration comprises multiple horizontal and diagonal lines with reserved lozenge and chevron panels. There appears to be a dot-filled border around at least one of the reserved lozenges. The rim sherd has an internal bevel decorated with a single encircling grooved line giving a concave or stepped appearance.

P64 Sherds in a hard grey fabric with abundant coarsely crushed white inclusions upto 3mm across. The fabric is up to 10mm thick. and traces of join voids may be detected in the breaks. The rim diameter has been in the region of 120mm.
The rim appears to have been slightly inturned. It is pointed with a narrow internal bevel. One of the rim sherds is decorated externally with a pair of diagonal finely incised lines.

P65 Undecorated sherds in a hard well-fired fabric with light brown outer surfaces, black inner surfaces and core. The fabric has large coarse inclusions up to 7mm across, many of which break the otherwise smooth surfaces. The fabric exhibits many coil breaks and averages 10mm thick.

P66 Sherds from a coarse thick-walled vessel in a fairly soft fabric with a light brown to grey outer surface, light brown to black inner surface and a black core. The fabric averages some 15mm thick. Inclusions appear to comprise grog and angular stone up to 7mm across. One sherd from near the base of the vessel suggests a base diameter of *c.*120-140mm.
Three sherds are decorated with incised lines arranged apparently in a filled lozenge motif.

P67 Five sherds in a hard, well-fired grey fabric with finely crushed grog inclusions. The fabric has smooth, well-finished surfaces and averages

7mm thick. One sherd from near the base of the vessel suggests a base diameter of *c.*100mm.
The decoration is internal, comprising panels of multiple oblique lines and interrupted herring bone.

P68 Sherds in a fabric similar to P67 above. The fabric is grey throughout, slightly soapy in texture and with apparently ferrous concretions on both surfaces. The rim diameter is 160mm and the base diameter in the region of 100mm. The estimated height of the vessel has been in the region of 120mm.
The rim is rounded with a near vertical internal bevel or molding. The decoration comprises small whipped cord maggots arranged in an irregular double chevron on the rim bevel, short evenly spaced oblique impressions on top of the rim and a rectilinear arrangement of multiple impressions on the outside. Internally, below the rim bevel, the same decorative technique is employed with multiple horizontal impressions arranged in broadly vertical zones converging towards the base. None of the base sherds are decorated either internally or externally suggesting that the decoration stopped short of the bottom of the pot.

P69 Small rim sherd in a soft and soapy textured fabric with finely crushed grog inclusions. The fabric is light brown throughout and averages 7mm thick.
The vessel appears to have had a slightly inturned rim with a near-vertical internal bevel. There are faint traces of slight dimples on this bevel indicating abraded decoration.

P70 Sherds in an extremely soft and friable fabric with pitted grey-brown surfaces and a voided black core. There are traces of incised lines on some sherds and a raised cordon decorated with oval impressions, probably fingernail 'nicks'.

P71 Rim sherd in a hard well-fired fabric with brown surfaces and a black core. The fabric averages 10mm thick and contains finely crushed grog as well as stone inclusions up to 10mm across. The rim is pointed and has a steeply angled internal bevel.
Externally the sherd is decorated with 5 parallel diagonal lines.

P72 Two undecorated rim sherds in a soft soapy-textured fabric with a patchy brown outer surfaces, black inner surface and core. The fabric is 7mm thick an contains grog. The outer surface is slightly pitted. The rim is rounded and slightly inturned.

P73 Rim sherd with an estimated diameter of 180mm. The fabric is brown externally, black internally and with a black core. It is up to 12mm thick and contains grog. It has a slight internal bevel and the laminated texture of the sherd indicates that this bevel has been applied.
The decoration comprises deep oblique impressions on the top of the rim giving a cabled effect to the top of the vessel. Below this are multiple parallel incised lines.

P74 Sherds in a soft and friable fabric varying between 10 and 18mm thick. The surfaces are brown and the core black.
One sherd is decorated with multiple diagonal lightly incised lines.

P75 Sherd in a fairly well-fired fabric with a brown outer surface, black inner surface and core. The fabric is 8mm thick and contains finely crushed inclusions.

The decoration comprises a zone of incised herringbone motif separated from a zone of multiple parallel diagonal incisions by a narrow raised cordon.

P76 Sherds in a soft fabric with brown outer surfaces, and black inner surfaces and cores. The surfaces are frequently crazed and/or pitted and the sherds are generally abraded. There are carbon encrustations on the inner surface and the fabric is generally 10mm thick. Two base sherds suggest an estimated diameter of 100mm.

P77 Sherds in a hard well-fired fabric, 9mm thick and with dark brown outer surface, black inner surface and core. Inclusions up to 4mm across seem sparse. One sherd, with a crescentic fracture, may be a firing waster.
Decoration comprises a narrow horizontal raised cordon below which are multiple oblique lines of conjoined fingernail impressions, probably arranged in a filled triangle or similar motif.

P78 Sherd in a fairly hard fabric with pink-brown outer surface, black core and grey-brown inner surface. The fabric averages 7mm thick and is pitted and porous from the leaching out of calcitic inclusions. Coil breaks are visible in both the upper and lower sections.
The decoration comprises 4 broad incised horizontal lines with a multiple chevron motif in the same technique below. The left arm of this multiple chevron motif comprises 5 rows on incisions and the right arm 4.
The curvature at the base of the sherd is strongly suggestive of the beginnings of a base angle.

P79 Sherd in a hard and well-fired fabric which is grey throughout. The fabric has good surfaces but is abraded. It averages 11mm thick.
The rim sherd thinned internally resulting in a slight internal bevel. Externally the decoration comprises a roughly horizontal fingernail impression.

P80 Sherd in a hard and well-fired but abraded fabric with a brown outer surface, grey inner surface and core. The fabric contains finely crushed grog and averages 14mm thick.
The decoration is very abraded and comprises linear arrangements of fingernail impressions.

P81 Undecorated sherd in a hard and well-fired fabric with a brown outer surface, black core and inner surface, the latter being covered with carbon encrustations. The fabric is 12mm thick and contains white stone inclusions up to 5mm across.

P82 Sherd from a thinned but rounded rim in a hard well-fired fabric reaching 7mm thick and containing finely crushed grog inclusions. The curvature of the sherd suggests that it may be from a barrel-shaped vessel or closed bowl.
There is a single external incised line below the rim.

P83 Abraded sherds in a well-fired fabric with a light brown outer surface, black core and inner surfaces. The fabric contains grog and averages 13mm thick.
Decoration comprises multiple incised diagonal lines with raised cordons.

P84 Small black rim sherd in a hard and well-fired fabric with smooth well-finished surfaces. The rim is simple and rounded. Probably Grooved Ware.

P85 Sherd in a hard and well-fired fabric with a dark grey outer surface, black carbon encrusted inner surface and black core. The fabric contains grog and measure 12mm thick.
The decoration comprises two rows of sub-triangular impressions.

P86 Abraded fragments in a hard well-fired fabric with reddish-brown to brown outer surfaces, black core and grey inner surface. The fabric averages 8mm thick and contains finely crushed grog inclusions up to 3mm across.
Some sherds are decorated with diagonal incisions suggesting a filled (lozenge ?) motif.

P87 Wall and base sherds in a soft, porous fabric with brown outer surfaces, dark brown inner surfaces and grey-black cores. The fabric contains grog. Undecorated.

P88 Single sherd with a dark brown outer surface, dark grey-brown inner surface and black core. The fabric is hard and well-fired, 9mm thick, and with inclusions up to 3mm across.
The decoration comprises horizontal fingernail impressions above a raised cordon. Below this cordon is a zone of oblique, regularly-spaced fingernail impressions, a zone of herringbone motif in the same technique, and traces of a line of horizontal fingernail impressions at the base of the sherd.

Pot No	Feature (context)	No of sherds	Residue Analysis (yes/no)	Thin Section (yes/no)	C14 date
21	Pit 198 (289)	7	Y	N	
22	Pit 198 (289)	15	N	Y	
23	Pit 198 (289)	3	N	N	
24	Pit 198 (289)	1	N	N	
25	Pit 198 (289)	1	N	N	
26	Pit 198 (289)	4	N	Y	
27	Pit 198 (289)	1	N	N	
28	Pit 198 (289)	2	Y	N	
29	Pit 198 (289)	1	N	N	
30	Pit 198 (289)	1	N	N	
31	Pit 198 (289)	1	N	N	
32	Pit 55 (56)	2	N	N	
33	Pit 154 (155)	35	Y	N	4050±35 (BM-2969)
34	Pit 154 (155)	30	Y	Y	4050±35 (BM-2969)
35	Pit 154 (155)	2	N	N	4050±35 (BM-2969)
36	Pit 154 (155)	1	N	N	4050±35 (BM-2969)
37	Pit 198 (199, 289) Pit 188 (191)	15	Y	Y	
38	Pit 154 (155)	45	Y	N	4050±35 (BM-2969)
39	Pit 154 (155)	75	Y	Y	4050±35 (BM-2969)
40	Pit 154 (155)	1	N	N	4050±35 (BM-2969)

41	Pit 154 (155)	1	N	N	4050±35 (BM-2969)
42	Stakehole 297 (298)	2	N	N	
43	Stakehole 297 (298)	2	N	N	
44	Stakehole 297 (298)	4	N	N	
45	Stakehole 297 (298) & U/S	4	N	N	
46	Stakehole 422 (423)	1	N	N	
47	Pit 198 (291)	1	N	N	
48	Pit 198 (199, 289)	10	Y	Y	
49	Pit 136 (137)	2	N	N	
50	Pit 150 (151) & U/S	3	N	N	
51	OGS (72)	1	N	N	
52	Pit 99 (100)	9	N	N	
53	Mound (2)	5	N	N	
54	U/S (9)	1	N	N	
55	Pit 180 (181)	1	N	N	
56	Pit 35 (36)	5	N	N	
57	Pit 146 (147)	1	N	N	
58	Pit 136 (137)	2	N	N	
59	Pit 136 (137)	1	N	N	
60	Pit 43 (44)	1	N	N	
61	U/S (9)	1	N	N	
62	Pit 85 (86/7)	12	Y	Y	4060±40 (BM-3069)
63	Pit 85 (86/7)		N	N	4060±40 (BM-3069)
64	Pit 293 (294)	14	N	N	
65	Pit 293 (294)	14	Y	N	
66	Pit 132 (133)	30	Y	N	4160±35 (BM-2968)
67	Pit 132 (133)	5	N	N	4160±35 (BM-2968)
68	Pit 132 (133)	78+	Y	Y	4160±35 (BM-2968)
69	Pit 132 (133)	1	N	N	4160±35 (BM-2968)
70	Pit 22 (23)	7	N	N	
71	Pit 55 (56)	1	N	N	
72	Pit 55 (56)	2	N	N	
73	Pit 55 (56)	2	N	N	
74	Pit 55 (56)	13	N	Y	
75	Pit 55 (56)	1	N	N	
76	Pit 55 (56)	13	N	Y	
77	Pit 198 (289)	6	N	N	
78	Pit 85 (86)	1	N	Y	4060±40 (BM-3069)
79	OGS (72)	1	N	N	
80	OGS (72)	1	N	N	
81	OGS (72)	5	N	N	

82	Posthole 478 (479)	1	N	N	
83	Mound (2)	7	N	N	
84	Mound (2)	1	N	N	
85	Mound (2)	1	N	N	
86	Pit 299 (300)	12	N	N	
87	Stakehole (278)	9	N	N	
88	Pit 198 (292)	1	N	N	

Table 7.12: Stratigraphy and quantities of the Grooved Ware from Upper Ninepence.

4.3.3 Early Bronze Age

P89 Two sherds in a hard well-fired if slightly abraded fabric. It has a dark brown outer surface, brown inner surface and black core. The fabric contains grog and finely crushed stones and measures 10mm thick.
The decoration comprises vertical twisted cord impressions above a cavetto formed by two raised cordons. Within the cavetto is a row of short diagonal twisted cord impressions with attendant fingernail impressions towards the top. Vertical stop ridges fill the cavetto at intervals.
Probably from the upper portion of a Food Vessel Urn.

P90 Sherds in a hard and well-fired but grog-filled fabric. The sherd has good quality surfaces, brown externally and internally and with a black core. Grog inclusions break both surfaces but lie flush with them. The fabric is 10mm thick at the wall and 17mm thick at the base. The base has had a diameter of *c.*80mm.
Probably the base of a Collared Urn or Food Vessel Urn.

Pot No	**Feature (context)**	**No of sherds**	**Residue Analysis (yes/no)**	**Thin Section (yes/no)**
89	Mound (2)	2	N	N
90	OGS (72)	1	N	N

Table 7.13: Stratigraphy and quantities of the Early Bronze Age ceramics from Upper Ninepence.

4.3.4 Ceramic crumbs/undecorated sherds from context sample residues:

The following contexts in table 7.14 produced small crumbs of pottery from processed environmental samples.

Feature (context)	Pottery ID	C14 Date
Mound (2)	Grooved Ware ?	
OGS (72)	Grooved Ware ?	
Pit 22 (23)		
Hearth 28 (29)	Grooved Ware ?	4240±70 (SWAN-24)
Pit 33 (34)	Grooved Ware ?	
Pit 35 (36)		
Pit 55 (56)		
Pit 65 (66)		4470±80 (SWAN-23)
Pit 146 (147)		
Pit 152 (153)	Grooved Ware ?	
Pit 200 (201)	Peterborough ?	4590±60 (BM-3071)
Pit 188 (289)		
Pit 188 (291)	Grooved Ware ?	
Pit 293 (294)	Grooved Ware ?	
Pit 313 (314)		
Pit 370 (371)		
Posthole 440 (441)		
Stakehole 448 (449)	Grooved Ware ?	
Pit 500 (502)	as P20 ?	4490±60 (BM-3070)

Table 7.14: Quantification of ceramic crumbs from sampled contexts.

4.3.5 Daub/Fired Clay

Two pieces of fired clay were recovered from context 199. Both pieces are very porous having contained abundant organic inclusions.

A single piece of fired clay was recovered from context 147 (fill of pit 146). The fabric is quite dense.

5 THE IRON AGE POTTERY FROM HINDWELL I

5.1 Description

Fragments of four vessels (fig. 7.18) were recovered from the upper silts (context 502) of the enclosure ditch in site A and a single sherd was recovered from the uppermost silts (context 101) of the ditch in site B. This latter material comprises an undecorated wall sherd in a gritty textured, slightly laminated fabric. The fabric contains abundant quartz sand and is slightly micaceous.

The sherds from site A are in two similar but different fabrics. Vessels IA1, 3 and 4 are in a well-fired fabric which contains finely crushed sandstone and organic and calcitic inclusions which have burnt out and leached out of the fabric leaving pitted surfaces. Vessel IA2 is also in a well-fired, grog-filled fabric and with slight traces of mica visible in the surfaces. The outer surfaces of all the vessels are well-finished and burnished and vary in colour from black to grey. The inner surfaces are also generally well-finished though lack the burnishing, and vary from purplish-grey to brown in colour. Vessel IA4 has extensive carbonaceous deposits in the interior. Macroscopically, the fabric corresponds to Peacock's (1968) fabric group C which is sandstone (as opposed to limestone) based and which can be sourced to the area to the W of the Malverns.

Vessel IA2 is decorated with a zone of diagonal incisions between an upper and lower horizontal scored line. Vessel IA4 exhibits a fire-spall on the outer surface indicating that it was damaged during firing, or possibly, though less likely, as a result of its subsequent use as a cooking pot. The spall, therefore, though damaging the vessel, was not sufficient to warrant the pot's discard.

Vessels IA1, 3 & 4 all have slightly everted rims and appear to have had bulbous or at least slightly sinuous profiles. Pot IA2 differs in having a slightly thickened and angular rim and is more straight-sided, though the walls are still slightly convex. Only IA1 appears to be from a closed vessel though it must be stressed that so little survives of this pot that the rim angle is not unequivocal.

The vessels belong firmly to the Saucepan Pot tradition of the middle Iron Age the distribution of which covers central southern England and extends into the southwestern counties, south Wales and the Marches (Cunliffe 1991, 79-82). The simple scored or incised linear decoration below the rim of IA2 places the vessels in Cunliffe's Croft Ambury-Bredon Hill style which clusters around Herefordshire and the Cotswolds (Cunliffe 1991, 81) though the 'duck-stamped' elements of this style are absent from the present assemblage. Savory (1976, 111) illustrates a parallel for IA1 from Llanmelin and a close parallels from Bredon Hill are illustrated by Peacock (1968, fig. 3, 19-20). Dating of these styles in southern England suggests a currency from *c.*400-100 BC though their currency in Wales and the Marches may well have continued until the Roman occupation.

5.2 Catalogue

IA1 Closed jar with a bulbous body and everted rim. The rim itself is rounded and slightly thickened. The diameter of the rim is 220mm.

IA2 Slightly convex-sided vessel with angular rim and external decoration. Rim diameter 160mm.

IA3 Open vessel with a slightly everted rounded rim with slight internal flattening. Rim diameter 140mm.

IA4 Convex sided vessel with everted rim which is flattened internally to provide an internal bevel. Characteristic traces of a substantial firing spall on the outer surface. Rim diameter 160mm.

6 THE ROMAN BROOCH FROM FIELDWALKING (Mark Walters)

This artefact (fig. 7.19) was found in ploughsoil at Kinnerton Court (SO25056380; PRN 26326) in March 1995. It is a dolphin type copper alloy brooch of the first century AD. It is slim and plain in unornamented style with missing spring, pin, one wing, base of foot and catchplate. The head would originally have been 15mm wide and the length would have been in the region of 30mm. There are traces of iron corrosion at the back of the spring housing.

7 MEDIEVAL AND POST-MEDIEVAL CERAMICS FROM FIELDWALKING (Paul Courtney)

7.1 Type Series

Medieval (Med)
The limited number of medieval sherds belong to the Clwyd-Powys Pottery Type group MB. They contain quartz, fine textured rock fragments (?siltstones) and fine mica, including some larger biotite flakes. They are derived from clays with material from the Palaeozoic sediments of the Welsh Basin. Date ?late 12th-?15th century. These wares were presumably displaced by oxidised Malvernian wares in the 15th century but none of these were recovered

Herefordhire-type Red Earthenwares (HRE)
These are post-Medieval wares with clays derived from the Old Red Sandstone. Several kiln sites are known in NW Herfordshire. They are lead glazed (green to black) and fabrics tend to oxidised red with fine mica inclusions. Also some unglazed post-medieval ridge tiles were found in this fabric. ?Late 16th-mid 18th century.

Coal Measures Buff (CMB)
Post-medieval oxidised wares made from Coal Measures clays (Staffordshire/Shropshire) with little iron content. Glazes are yellow, brown or black and often decorated with red or white slips. Forms include molded dishes. 17th-mid 18th century.

Coal Measures Red (CMR)
Post-medieval oxidised wares with higher iron content than CMB, firing pink to red, sometimes with white clay streaks or rounded inclusions. Lead glazes tend to be brown or black and occasionally have white slip decoration. 17th-mid 18th century.

Cistercian/Blackware (BW)
Drinking vessels with brown or black all-over glazes on high fired brick red fabrics. 16th century forms are globular, becoming cylindrical in 17th century. Difficult to provenance, very similar wares being produced alongside Coal Measures and Herefordshire wares. 16th-17th century.

English Stonewares
A single sherd of brown glazed English stoneware of 18th-19th century date was recovered.

7.2 Discussion

The types of ceramics produced resembled those found in the recent excavations in the borough of New Radnor (Jones forthcoming). The Medieval MB fabrics predominated in the town but were probably not produced locally. Thin section analysis suggests the bulk come from the Llandrindod area. In the post-medieval period Coal Measures wares predominate in the field walking assemblages as at New Radnor. There were also some wares from the North Herefordshire kilns. It is uncertain on current evidence if the latter form an earlier stratum and were forced out of local markets by the Coal Measures products or continued to be sold alongside them. The post-medieval wares appear utilitarian in character with storage/food preparation forms (bowls or jars) predominating alongside a few black glazed, drinking vessels and slip-decorated, molded dishes. No tin glazed wares or other quality wares were recovered.

PRN	NGR	DESCRIPTION
25006	SO22006040	1 fragment of clay pipe stem with bulbous terminal: 1 bowl fragment. Late C17 or early C18th.
26300	SO29906150	CMR - 2 sherds (18g): CMB - 1 sherd (2g): HRE - 2 sherds (25g): Ridge Tile (unglazed HRE), 4 sherds (111g).
26301	SO24506100	CMB - 5sherds (87g), 1 bowl rim: CMR - 1sherd (61g): HRE - 15 sherds (130g), 1 bowl rim: Ridge Tiles (unglazed LRE) 17 sherds (25g).
26302	SO22656240	CMB - 1 sherd (17g): CMR - 2 sherds (62g): HRE - 1 sherd (14g): Stoneware - 1 sherd (47g), base from ?jug in English brown stoneware, 18th-19th century.
26303	SO22506046	HRE - 13 sherds (245g), 1 bowl rim, also 5 rims and 1 base possibly from unglazed flower pots: CMR - 8 sherds (136g), 2 bowl rims and 2 slip decorated body sherds 1 bowl and ? molded dish: CMB - 3 sherds (28g), two rims from slip decorated molded dishes: Ridge Tile (HRE) 2 sherds (38g): Ridge Tile (?med or post-med, probably Old Red Sandstone source) 1 sherd (29g), unglazed, fine mica. black core and buff surfaces: 2 fragments of partly glassy slag.
26304	SO24435990	CMR - 15 sherds (290g), includes 2 bowl rims: CMB - 12 sherds (262g), includes 2 bowl rims and 2 rims from slip decorated, molded dishes: HRE - 2 sherds (12g): Ridge Tile crest (? Post- med), 1 sherd (17g), simple pressed crest applied to ridge tile: Glassy slag on rock fragment
26305	SO22006040	Med - 2 sherds (25g), one base with traces of internal glaze and one body sherd with glaze splashes and possible fragment of applied handle: HRE - 2 sherds (6g): CMR - 9 sherds (103g), 1 bowl rim: CMB - 9 sherds (135g), 1 rim from slip decorated molded dish and 2 body sherds from slip decorated bowl: 6 fragments of high temperature slag and ? coke.
26306	SO27426136	Med - 1 sherd (4g).
26307	SO28206120	CMR - 2 sherds (51g), 1 bowl rim: CMB - 1 sherd (34g), molded dish: HRE - 2 sherds (15g).
26308	SO25266080	CMR - 4 sherds (206g), 1 bowl rim: HRE - 6 sherds (44g): Post-med ridge tile (unglazed HRE) 1sherd (48g).
26309	SO23856546	BW - 1sherd (2g), Rim: CMB - 1 sherd (15g): 1 small fragment glassy slag.
26310	SO24356360	Med - 1 sherd (4g): CMR - 6 sherds (73g): CMB - 3 sherds (43g), 1 molded dish rim with slip decoration: HRE - 1 sherd (28g), 1 bowl rim: BW - 2 sherds (14g), 1 rim and handle.
26312	SO24346155	HRE - 1 sherd (23g).
26313	SO20106040	Med - 1 sherd (4g), glazed with rouletted decoration, jug: CMB - 6 sherds (73g): HRE - 20 sherds (132g): BW - 1 sherd (6g), base.
26314	SO19605893	CMR - 5 sherds (41g): CMB - 1 sherd (22g): CMB - ?tile 2 sherds (121g), one fragment L shaped: HRE - 2 sherds (38g).

26315	SO25056380	CMR - 24 sherds (216g): CMB - 11 sherds (237g), 2 bowl rims & 1 slip decorated molded dish rim: HRE - 12 sherds (170g), 2 bowl & 1 jar rim: BW - 1 sherd (5g), handle: Ridge Tile (HRE) 1 sherd (13g): 2 daub/brick frags and 1 lime mortar frag: Fragment of clay pipe bowl and stem with spur. Med. 6 shs. 48g. Includes 3 glazed sherds and ?jug base: Post-med ridge tile (Unglazed HRE) 6 sherds (379g): Post-med tile (CMB- high fired), 2 sherds (130g), unglazed, flat, ?ridge tile fragments: HRE - 43 sherds (574g), includes 2 bowl rims, a couple of sherds appear to be from 16th or early 17th century pancheons: CMB - 17 sherds (192g), includes 1 rim from molded dish with slip decoration: CMR - 11 sherds (199g), 1 bowl or jar rim: 1 frag. ?daub or unfired clay: 1 fragment brick/tile with glassy slag on surface: 1 fragment of lime mortar: 2 small frags of clay pipe bowl and stem fragment.
26316	SO21976055	Four clay pipe bowl frags, three have surviving heels with stamps, the 4th has a horizontal spur above the missing stem; 1 - star-shaped design; 2 - TH(O)/MA(S)/IONE(S); 3 - CM. Bowl No2 is complete, burnished, and rouletted below the rim. It is a Brosely/Hrefordshire style pipe of *c.*1660-80: CMB - 7 sherds (176g), 1 bowl rim and 1 rim from slip decorated molded dish, also 2 body sherds from molded dishes with slip: CMR - 4 sherds (52g), HRE - 5 sherds (22g): BW - 1 sherd (4g), handle: Daub/Brick 1 frag.
26317	SO19405870	CMR - 4 sherds (87g): HRE - 1 sherd (4g): Daub or brick 1 frag.
26318	SO24006264	Med - 1sherd (13g), one glazed jug sherd with rouletted decoration: CMR - 4 sherds (27g): CMB - 3 sherds (13g): BW - 1 sherd (6g), handle: HRE - 8 sherds (56g), 1 bowl rim, 1 piece of light glassy slag.
26319	SO24676179	1 fragment of clay pipe stem with spur at base of bowl: Med - 1 sherd (10g), glazed.
26321	SO18895830	CMB - 6 sherds (87g), 1 sherd from molded dish: CMR - 8 sherds (79g), 1 rim, ?jar: BW - 1 sherd, rim (tiny frag): HRE - 6 sherds (55g): CMR - 1 sherd (35g), slip decorated molded dish.
26322	SO27736110	CMB - 1 sherd (17g).
26323	SO18805815	Fragment of clay pipe bowl
26324	SO20006000	CMR - 1 sherd (5g).
26325	SO22966250	Med - 10 sherds (104g), includes 2 glazed sherds, one ?bowl rim and internally glazed rim of uncertain form. These are likely to be late Medieval in date. At least two sherds appear to be from reduced cooking pots: HRE - 197 sherds (2.402 Kg), 20 bowl/jar rims, also 1 handle (probably from jug or other drinking vessel) and two sherds from bottles in relatively high fired fabrics: BW - 9 sherds (88g), drinking vessels. I rim and a base probably from 16th C forms, rest probably 17th C: CMR - 5 sherds (92g), 1 bowl rim and 2 slip

		decorated sherds one from molded dish and one from prob. bowl: Daub - 2 frags.
26333	SO23526493	HRE - 2 sherds (25g).

Table 7.15: Medieval & Post-Medieval Ceramics recovered from field walking.

8 THE SLAG FROM HINDWELL I (Mark Walters)

A total of 245g of slag was recovered from context 501, the uppermost fill, of the ditch terminal at Hindwell I. They comprise ferrous secondary smithing slags and are generally black or grey-black in colour, light and vesicular, and with a high silica content probably derived from the melting of hearth wall clays. Some fragments have occasional traces of grey clay hearth lining adhering to them. One fragment has a plano-convex base with traces of remnant charcoal fuel ash.

PART 8

SCIENTIFIC ANALYSES OF THE FINDS FROM UPPER NINEPENCE

1 MICROWEAR ANALYSIS OF FLINT ARTEFACTS FROM UPPER NINEPENCE (Randolph E. Donahue).

1.1 Introduction

The poor preservation of faunal and floral remains at a prehistoric site, such as occurs at Upper Ninepence, can seriously impede an archaeologist's ability to make economic inferences. The application of lithic microwear analysis, when the quality and condition of the lithic material is appropriate, can compensate, in part, for such limitations. The recovery of lithic artefacts from pits associated with specific wares at the culturally mixed Neolithic site of Upper Ninepence provides an opportunity not only to reconstruct economic activities at a prehistoric site, but to examine similarities and differences between the site economies of the inhabitants who used Peterborough Ware pottery and those who used Grooved Ware pottery some centuries later.

1.2 Background

Lithic microwear analysis is the microscopic examination of surface wear and fracture scars that form along the edges of fine-grain siliceous stone such as flint and chert. Experimental studies demonstrate that microscopic wear and fracture scar characteristics result from tool use and vary systematically according to the worked material (e.g. hide, wood, meat, bone) and to the applied forces and motions (e.g. cutting, scraping, wedging, etc.). The development of principles regarding these relationships permits microwear analysts to infer the past use or uses of lithic artefacts with a greater degree of precision and accuracy than through reliance on either macroscopic attribute analysis or ethnographic analogues of tool form. Natural processes also produce systematic microwear features which can often make inferences about tool use more difficult (Keeley 1980; Levi-Sala 1986a; 1986b), but can aid in the understanding of site formation processes (Donahue 1994).

1.3 Method

The entire assemblage of lithic artefacts collected from Upper Ninepence was made available for microwear analysis. Artefacts were sampled from pits and other features that were securely associated with an occupational period, although by accident a few artefacts were studied which could not be culturally affiliated with one particular period. All lithic artefacts from the appropriate contexts were visually examined for possible selection. The sample included all retouched artefacts, and all non-patinated artefacts larger than 20mm in length with at least one 'usable' edge. Because the Peterborough Ware sample was small, a few artefacts less than 20mm in length were included to enlarge the sample. The sample includes 35 artefacts from Peterborough Ware contexts, 74 from Grooved Ware contexts, and five from unaffiliated contexts for a total sample size of 114 artefacts. This is not a random sample, yet, given that the smallest artefacts analysed appear unused, virtually all used artefacts from the selected contexts have been sampled. Importantly, it is not known the degree to which the artefacts in the pits are representative of the entire site.

The sampled artefacts were bathed for 10 minutes in a 10% solution of HCl, and thoroughly rinsed and bathed in water for 20 minutes. The artefacts were viewed with an Olympus KL-BHM metallurgical microscope principally at 200x magnification. Microwear characteristics were recorded, categorised following Donahue (1994), and interpreted.

1.4 Results

Of the 114 artefacts examined, 28 have microscopic wear on their edges that can be attributed to some category of use, and 30 artefacts are interpreted as unused. The microwear analysis did not provide adequate information to infer use of the remaining 56 artefacts as a result of one or more confounding factors. Table 8.2 lists those artefacts which have one or more identifiable uses and table 8.1 summarises the results for all artefacts examined.

Hide working is the most common form of tool use evident at the site with 13 artefacts (44.8% of identified uses) displaying such wear patterns (see section 1.7 below for brief descriptions of wear characteristics from use). Most of these artefacts were used for scraping dry hides, but also evident are the cutting of dry hide and possibly the working of fresh hide. Meat cutting or butchering is evident on seven artefacts (24.1%). This use often occurs on both lateral edges of blades, and on flakes and side scrapers. Many of these flakes are broken or fragments.

Often one finds numerous tools used for cutting siliceous grasses and cereals at Neolithic sites. And although gloss is reported on a number of artefacts, only one artefact from the site has microwear indicative of such use. The artefact, L172, is a large and relatively ovate flake, and clearly not the kind of flake one normally associates with sickle blades. The edge is well rounded and the surfaces near the edge are extremely smooth and bright. The surface is not brilliantly polished as one expects with sickle gloss; it appears that the surface texture has been slightly roughened by post-depositional processes as to reduce the typical brightness. The surface contains numerous small pits of which many are comet-shape; a feature noted only of plant use and results from the direction of rubbing against the plant silica. There are numerous striations parallel to the edge and indicate a slicing motion. It should be noted that sickle blades usually have striations oblique to the edge, and this may suggest a different use of the tool or a different way of manipulating it; however, there is no doubt that it was used intensively on soft siliceous plant fibre.

Five artefacts were used for working wood, principally with a whittling or shaving motion, The wear is often found in a notch or along a concave edge. Wear from wood is similar to that of plant fibre, but limited to the edge and its immediate adjoining surfaces.

The working of bone is another use observed just once, on the flake L173. The wear is very limited in its distribution and severe fracture damage might explain, in part, the limited amount of wear suggesting that it was used for drilling The edge was not stable but fractured away continually under the applied force. This flake was also the only tool to be identified as having been independently used on two materials; bone and meat, the latter along a lateral edge. As a result this tool is listed twice in the tables.

The only other tool uses identified are those which have impact damage. Two tools are identified as having impact damage that is unlikely to have resulted from bipolar knapping (uncertain in other examples). Of these two tools one is a chisel arrowhead and the fracture damage on its transverse end would support the hypothesis that this is a projectile point (see Fischer 1989; Fischer *et al.* 1984; Odell & Cowan 1986). The other artefact is a flake and its impact damage is more typical of wedging where numerous blows are struck on one edge while the opposite edge receives much less damage. It was not possible to identify the material which was being wedged.

Many flakes show no evidence of use, and are categorised as unused. Some may have some wear or damage that results from post-depositional processes, but never so much as to obliterate evidence of use if it had been there. The remaining 56 artefacts display a variety of different kinds of wear that result from non-use processes, and have the potential to remove traces of use or modify use-wear such that one cannot differentiate the kind of use. All such artefacts are categorised as 'undetermined'. These artefacts and the modifications associated with them can contribute to our understanding of the site.

1.4.1 Microscopic Surface Modifications not Related to Use

Artefacts with post-depositional modification have generally been omitted from use-wear analysis as unable to provide useful information. Research by Donahue (e.g. 1994) shows that such wear can provide valuable insights into the formation of archaeological sites and should not be simply ignored. With this in mind there follows a brief discussion of the post-depositional surface modifications observed on the artefacts, what processes may have produced them, and the degree to which they may have influenced the use-wear interpretations. Six different wear and fracture damage patterns have been identified that are not related to tool use. They are presented in no particular order.

Metal residue. Observed occasionally on protruding surfaces of the flint are very small, extremely bright, silver-colour patches that correspond to contact with metal (most likely steel) according to experimental studies. The metal residue is likely produced during excavation when contact with trowels or other digging equipment occurs, or as a result of contact with metal calipers when being measured in the laboratory. The limited size of these residue patches and their distinctive characteristics mean that they have little affect on the interpretation of tool use.

Plastic deformation. This form of surface modification is characterised by a flat and bright surface. Often the surface will have deep or shallow abrasion tracks of various widths running across the surface. It occurs as patches on the flint surface, often near an edge. The patches can occur well over 5.0mm in diameter and be observed without magnification as an area of 'gloss'. As such it is sometimes confused with 'gloss' observed on flints used for cutting opal-rich (siliceous) soft plant fibre. This form of surface modification results from pressure applied onto the artefact surface by an object of greater hardness. Plastic deformation rarely impedes ones ability to interpret use-wear, but when observed on an artefact it requires substantial caution in the interpretation of tool use because other kinds of surface wear and particularly edge fracture damage have likely resulted from associated post-depositional processes.

Silica edge polishing. This form of wear is very common in this particular assemblage. It consists of a brightly polished surface that tends to be extremely localised to protruding surfaces, and is often observed as a bright line of surface polishing located directly on the edge of an artefact. It is very smooth and is occasionally associated with narrow striations that are almost always aligned perpendicular to the edge or ridge. It is very similar to wear produced during the early stage of wood working, and virtually duplicates the brightly polished edge one sometimes observes associated with wear produced by meat cutting and butchering when it results from incidental contact with flint or other hard material. It develops from rubbing against flint particles that are derived from the flint surface itself. In all these cases the principal mechanism is the same, contact with small silica particulate or mild, incidental contact with larger pieces of flint. Within the assemblage many of the artefacts not originally bagged separately display some of the more extensive examples of this wear, but many artefacts known to have been bagged separately at the excavation also display it. Because of its similarities with wear produced by tool use, extreme caution is required when this pattern of wear is encountered. As a result, some artefacts with possible use-wear from wood working or butchering may have been categorised as undetermined.

Non-polishing edge rounding. This form of surface modification proves to be the most common, most extensive, and most problematic for use interpretation at the site. It generally mimics the wear produced by dry hide, but produces a greater surface sheen with a much more rough rather than matt texture. The other major distinction is that it lacks the wide striations and linear depressions typical of working dry hide. Interestingly, and not fully understood, this form of wear can occur with no striations or with a multitude of narrow, multiple-direction striations. This suggests that there may be two mechanisms involved in the production of this kind of wear (and explains the vagueness of the labeling). It probably results from movement within the sediment matrix, but it may also include some form of chemical dissolution. Experimental research is currently investigating the underlying mechanisms that produce this wear. Because of its aggressive nature, it is thought that it can remove virtually all traces of any form of wear produced from tool use with the possible exception of wear from intensive siliceous plant cutting. Because it mimics hide working, extreme caution has been exercised when considering such interpretations.

The potential impact of this form of post-depositional wear meant that it would prove useful if its impact on individual artefacts could be recovered. One cannot measure edge rounding directly since tools that were used will also have rounded edges. Instead, a technique has been applied that permitted measurement of the rounding of dorsal ridges. This variable is a measure of the width of intense light reflected back during observation of a section of the dorsal ridge at a magnification of 200x. With no rounding the intersecting surfaces produce such a sharp ridgeline that it is almost invisible, often with no measurable width of bright light being reflected. The minimum measurable level is approximately 0.1 units (about 7.1μm). Experimental research in progress is indicating that dorsal ridge rounding measuring as low as 0.5 units is already impacting upon use-wear. It is suggested that artefacts with ridge rounding of 1.0 units and greater must have very clear evidence of use-wear and one must be capable of explaining why such wear has survived (figs 8.2-3). For example, the knife L182F, with ridge rounding measuring 2.0 units, maintains evidence of having worked wood because the use-wear is located in a relatively protective notch. With this in mind it is interesting to note that ridge rounding has been measured up to 11.0 units (an extreme example that was affected by thermal alteration, patina formation, and post-depositional wear. As can be seen from this last example, dorsal ridge rounding, is affected by other factors besides soil abrasion.

Fire (thermal alteration) and its effects. Numerous artefacts were severely damaged by thermal alteration. This can be a direct effect such as with heat spalls (potlids) and thermal surface cracking, but it also can be indirect as in promoting much more rapid formation of white patina on an artefact surface. While thermal alteration may not obliterate use-wear patterns, the early stage development of white patina will cloud the artefact surface making it difficult to identify use-wear characteristics. In later stages, it leads to complete loss of the original surface characteristics.

Other post-depositional processes. Many artefacts have fracture scars along their edges that, to various degrees, mimic fracture scars produced by tool use and can even mimic retouch. In addition, and rather surprisingly, I commonly observed large snap fractures on thin edges, but also on relatively large and thick flakes. In a few cases virtually all original edges are snapped. Such fracture damage results from sudden high load forces applied to the artefacts approximately perpendicular to the ventral surface plane. It is thought that this may have occurred when the flint artefacts were deposited in the pits. Alternatively, this damage may result from trampling following the original discard and prior to discard into the pits. This issue will be considered later.

6.3.5 Discussion

1.5.1 The Relationship between Artefact Use and Type

Because of the expense of microwear analysis, sample sizes tend to be relatively small. For this reason, it becomes a very valuable exercise to determine if there are any specific relationships between tool types and use. Such associations can then be used to generalise more widely about economic activities at the site. Some types do appear to be associated with certain kinds of use (e.g. notched/concave edges with wood shaving), but the low number of interpreted artefacts does not warrant conclusions to be drawn. The one tool form that does conform to use expectations in adequate numbers is the end scraper. Some 21 end scrapers were examined. Of these, nine display wear characteristics of hide scraping while the remainder are not interpretable. No other use is associated with the end scraper fronts. This relationship will be very important for understanding economic differences of the two cultural units that occupied the site of Upper Ninepence.

1.5.2 The Association between Pits (Contexts) and Artefact Use

The sample size taken from each pit limits the investigation into the spatial organisation or contextual associations of activities at the site. For example, from pit 12 (Context 13) two of the three artefacts microscopically examined were interpreted as having worked wood. Some pits do have adequate sample sizes and produced interesting results. The results for pit 10 (Context 11) indicate use on a variety of materials, and it would appear very much that it contained debris from a domestic setting where maintenance as well as food processing activities had occurred. However, pits 22 and 154 (Contexts 23 and 155, respectively), show very strong associations with hide working activities (fig. 8.2). Within context 23, of 21 artefacts examined, all five with use identified were used for scraping hide. In addition, of the 16 artefacts with use not identified, five are end scrapers. The same pattern occurs in context 155 where of the 18 artefacts examined, hide working is identified on all four interpreted artefacts. One uninterpreted end scraper occurs here also. These two pits seem to contain lithic artefacts primarily coming from special activity (hide working) areas. It is suggested that there is reason to think that, although rather specialised sub-assemblages, they still represent domestic (household) deposits.

1.5.3 Economic Differences between Grooved Ware and Peterborough Ware Contexts

Comparison of the microwear results between the two cultural units shows that there is a significant difference in economic activities (fig. 8.1). Hide working is much more evident (62.5% of tool uses) during the Grooved Ware occupation phase than during the earlier Peterborough Ware occupation phase (18.2% of tool uses). In addition, it is observed that while there is a broad spectrum of activities well represented during the Peterborough Ware phase, one gets the impression of a much more specialised economy during the Grooved Ware phase. The frequency distribution of end scrapers reported from the two sub-assemblages supports this hypothesis. A total of 16 end scrapers are identified from the culturally identifiable pits. Fourteen end scrapers representing 28.6% of retouched tools are associated with Grooved Ware contexts while only two end scrapers (18.2% of retouched tools) are associated with Peterborough Ware contexts. This interpretation assumes that the tools from these pits are representative of the activities performed during each phase at the site, and that they have been redeposited in the pits from similar contexts.

1.5.4 Association of contexts with particular post-depositional processes

As previously mentioned, the microscopically examined artefacts display wear and fracture scars identified as having resulted from various post-depositional processes. Further study of these post-depositional modifications, particularly their intensity, interaction, sequence of formation, and context can provide valuable additional information regarding site formation processes. It should be understood from the outset that the strengths of the interpretations that follow are limited because non-random samples of artefacts from the pits were examined.

Among the post-depositional processes that have affected the artefacts found within the pits, non-polishing edge rounding occurs most often and alters surfaces more than any other form of wear. The intensity of this form of wear needs explaining. Of great importance is the need to determine if this wear formed principally while the artefacts were in the pits, or if it occurred prior to deposition. One way to test this is to examine the relationship of the intensity of this wear, as measured by dorsal ridge rounding, and the context of the artefacts (fig. 8.3). If the variability of ridge rounding within each pit is high then we would expect that the principal cause of modification occurred prior to deposition, whereas if the within pit variation is low and there is much variation between pits, then we would expect that the wear is principally caused by mechanisms within each pit. Examination of the results of the analysis (see table 8.4) indicate that there is substantial variation in dorsal ridge rounding within and between pits. This leads us to conclude that a major part of this wear is caused by processes prior to deposition in the pits.

The internal variability of artefact modification produced by post-depositional processes can best be explained as resulting principally during processes that preceded deposition in the pits. I suggest that this wear results from soil abrasion during trampling. Such a situation is most likely to occur in the areas of domestic activities, such as around hearths within, and possibly in front of, dwellings. The scenario suggested is that some artefacts used in domestic and maintenance activities in this locality would be discarded or lost there, or possibly tossed in the hearth. Other stone artefacts, as part of compound tools, would be returned to the domestic work area for repair or replacement, would also be discarded here. Some of these artefacts would undergo burning and develop thermal fractures or even heat spalls. Other artefacts would be trampled causing edge fracturing, snapping, plastic deformation and soil abrasion. The degree of damage would vary because the position where they are discarded would be differentially susceptible to trampling. Many artefacts can be expected to receive little modification. At various times the domestic area would be swept and along with ashes and other hearth debris the lithic artefacts would be discarded away from the occupation or, if available, tossed into a nearby disused pit. Ethnoarchaeological studdies suggest that large pits such as these would be used for storage, and would normally be emptied during winter or early spring. This would suggest that such pits were used for dumping domestic debris during late winter or spring. The pits probably contained much organic material that decomposed and caused long term settling. One could also expect quite different geochemical conditions in the pits. Such conditions may have accelerated modification of the artefact surfaces, and led to increased rounding of edges and ridges.

Because the pit contents are derived from domestic settings, one would expect artefacts to represent domestic and tool maintenance activities. One would not expect to find a large proportion of flint debris since the occupants would want to limit the amount of sharp flint flakes around the domestic area. When such debris is produced, much of it is likely to be discarded into the hearth. Most of the pits, when adequate artefact numbers are represented, have a variety of activities indicated by use-wear (e.g., Pit 10). The two pits mentioned earlier do not display such a pattern, but instead indicate a single principal activity of hide working. This could be the result of sampling error or disposal of hide working materials from the domestic area. Although possible, it is unlikely to result from the direct discard from a hide working area because the burnt flints, including a thermal fractured end scraper, a refitted, heat-spalled end scraper, and a broken refitted end scraper from these pits are left unexplained in such a model.

1.6 A Brief Description of Wear Characteristics

Wear caused by dry hide is characteristically matt in texture and relatively dull in appearance. The edges are generally very rounded, particularly when used for scraping when a sharp edge is not required for a functional tool. Fracture scars tend to relative scarce while striations tend to be common and consist of various forms including narrow, wide and what Keeley (1981) describes as linear depressions, all of which will be aligned parallel to the direction the tool was used. Along the edge there will occur occasionally large circular pits of about 50μm diameter. These pits appear like small heat spall scars, and it has been suggested that they may be the result of localised high temperatures produced during use on dry hide which has a very high friction coefficient (Keeley 1981).

Tools used for cutting meat will have a very distinctive sheen along the faces near the edge and may have a rough texture, often with a bright line of surface polishing directly on the edge. Edge rounding is minimal. Fracture scars consist of point initiations and feather terminations, and are often slightly oblique rather than perpendicular to the edge. Striations are rare, but will be parallel or oblique to the edge.

Microwear characteristics of working siliceous soft plant fibre includes a well rounded edge and extremely smooth and very bright surfaces near the edge. The one artefact with sickle gloss at the site is not brilliantly polished as would be expected. It appears that the surface texture has been slightly roughened, probably by post-depositional processes, which is the cause for the reduced brightness. The surface contains numerous small pits of which many are comet-shape; a feature noted only of plant use and results from the direction of rubbing against the plant silica. There are also numerous striations that are run parallel to the motion the tool was used.

Wear from wood is similar to that of plant fibre, but limited to the edge and its immediate adjoining surfaces. The polished surface does not lead to a leveling of the surface through abrasion but tends to abrade the higher surfaces such that one observes brightly polished mounds. The size of these mounds will vary according to the amount of use and the original topography and texture of the surface. Fracture scars are mostly point initiation and feather termination. Striations are infrequent. They are generally narrow and can be deep or very shallow. The working of bone produces wear that is bright, but very limited in its distribution with many small pits and a few narrow striations. There is a clear division between the polished surface and the unmodified surface.

ARTEFACT	TYPE	EDGE	USE-CODE	MATERIAL	ACTION	RIDGE	COMMENTS	CONTEXT	PERIOD	NOTE
L013F	PIERCER	TIP & LAT	U			1.0	HOS*HOS?	2	U	
L014F	END SCRAPER	FRONT	H1S	DRY HIDE	SCRAPING	1.5		72	U	
L033	MSC RET FLAKE	L	R1U	HARD; WOOD?	SHAVING		CONCAVE; PDM?	13	P	
L042	SER. FLAKE?	L	U			0.1	PDM	17	P	
L044F	END SCRAPER	FRONT	U			4.0	H1S?	23	G	
L045F	END SCRAPER	FRONT	H0S	HIDE	SCRAPING	1.0	DISC	23	G	
L046	END SCRAPER	FRONT	U				HT SPLLD FRONT	23	G	REFIT R924
L048	END SCRAPER	FRONT & L	H0S	HIDE	SCRAPING	0.4	POOR QUALITY	23	G	
L049	END SCRAPER	FRONT & L	U			4.0	H1S?	23	G	
L050	END SCRAPER	FRONT	U			0.2	PDM	23	G	
L051	END SCRAPER	FRONT	U				H1S; MUCH PDM	23	G	
L052F	CHISL ARRWHD	TRANSVRS	U			2.5	MUCH ROUNDING	23	G	
L053F	LEV. CORE	ALL	N	UNUSED		0.6	PROB. UNUSED	23	G	
L054	HEAT SPALL	ALL	U				PDM	23	G	
L065	ENDSCRAPER	FRONT	H1S	DRY HIDE	SCRAPING	0.1	BROKEN	155	G	
L066	ENDSCRAPER	FRONT	H1U	DRY HIDE	UNCERTAIN	0.1		155	G	
L067F	DBL TRUNCATN	R&L	H1M	DRY HIDE	WORKING	1.0	SIDE SCRAPER	155	G	
L073F	FABRICATOR?	L&R	U			1.5	TOO BATTERED!	133	G	
L076	END SCRAPER	FRONT	H1S	DRY HIDE	SCRAPING	0.1	R&L UNUSED?	133	G	
L080F	END SCRAPER	FRONT	H1S	DRY HIDE	SCRAPING	2.0	ALSO PDM	23	G	REFIT L190
L082	FLAKE	LEFT	U			1.0	PDM LIKELY	155	G	
L083	END SCRAPER	FRONT	H2S	FRESH HIDE	SCRAPING	0.1		155	G	
L086F	SIDE SCRAPER		U				POOR QUALITY	155	G	
L088	BURIN*SIDESCR	ALL	N	UNUSED				133	G	
L105F	SIDE SCRAPER	R	U			4.0	PDM	2	U	
L111F	CORE		N	UNUSED			ABRASN TRACKS	2	U	
L132	FLAKE	ALL	N	UNUSED			THIN RET. FLAKE	9	G	
L133	FLAKE FRAG	R&L	Y1M+R1P	MEAT?	BUTCHERING	0.1	NATURAL?	289	G	
L137	BLADE FRAG	R&L	U				PD WEAR?	9	G	
L138	BROKEN FLAKE	R	U			0.4	PD WEAR	298	G	
L142	END SCRAPER	FRONT	H1S	DRY HIDE	SCRAPING	0.6	ALL EDGES; PD?	291	G	

L143	SIDE SCRAPER	ALL	U				FIRE	291	G	
L147	SIDE SCRAPER	R&L	M1P	MEAT/HIDE	BUTCHERING	0.2		199	G	
L148F	SIDE SCRAPER	L&R	U			0.2	PDM?	289	G	
L149	BLADE	R	M2U	MEAT	CUTTING	0.1	UNCERTAIN	292	U	
L157	BROKEN FLAKE	L&R	N	UNUSED		0.1		502	P	
L160	FLAKE FRAG	R	U				THIN	201	P	
L164F	BLADE/FLAKE	R&L(DISTL)	W0S	WOOD	SHAVING	2.0		291	G	
L171	BLADE	R&L	U			0.2	PD WEAR	298	G	
L172	FLAKE	L	P1P	SIL. PLANT	SLICING	0.2	RT.-UNDET.	11	P	
L173	BURIN	L	M1U+R1M	MEAT	BUTCHERING	0.1	1 OF 2 USES	11	P	
L173	BURIN	BIT	B1S	BONE	GRAVING	0.1	2 OF 2 USES	11	P	
L174	BLADE	L&R	U			1.0	PDM	11	P	
L175	FLAKE	L&R	N	UNUSED			THIN	11	P	
L176	MSC RET FLAKE	DISTAL END	R1U	HARD; WOOD?	SHAVING	0.1	CONCAVE	11	P	
L177	BROKEN FLAKE	R	N	UNUSED		0.1		11	P	
L178	NOTCH FLAKE	NOTCH					STONE; PDM	11	P	
L179	FLAKE	R	N	UNUSED		0.1	THIN	11	P	
L180	FLAKE FRAG	L&R	N	UNUSED			THIN	11	P	
L181	FLAKE FRAG	ALL	N	UNUSED		0.1	SMALL&THIN	11	P	
L182F	KNIFE?	RT NOTCH	W1S	WOOD	SHAVING	2.0	R: PDM OR H1P	13	P	
L183	DENTICULATE	L&R	H1M	DRY HIDE	WORKING	0.3		17	P	
L184	BLADE		U			0.3	FIRE	17	P	
L185	PIERCER		N	UNUSED			LITTLE WEAR	17	P	
L186	FLAKE	L	U			0.1	PDM	17	P	
L187	FLAKE		N	UNUSED				17	P	
L188	FLAKE MIDSECT	LAT	M1U	MEAT/HIDE	BUTCHERING	0.1	L OR R?	21	P	
L189	FLAKE FRAG		U				FIRE	21	P	
L190	BROKEN FLAKE	R&L	U			3.0	HIDE/MEAT? PD	23	G	REFIT L080
L191	FLAKE	R	U			1.2	PDM	23	G	
L193	BROKEN FLAKE	ALL	U			5.0	EDGES LOST	23	G	
L194	FLAKE	L/DISTAL	N	UNUSED				23	G	
L196	BLADE/FLAKE	ALL	U			0.1	NOT VISIBLE	23	G	

L197	BLADE	R&L	N	UNUSED		0.1	MINIMAL USE Y1P?	23	G	
L198	FLAKE	L	U			0.2	PD WEAR; FIRE	23	G	
L201	FLAKE	R & DISTAL	N	UNUSED		0.1		133	G	
L202	FLAKE MIDSECT	R&L	Y1U+R1M	MEAT?	BUTCHERING	0.1	SERRATED? PD?	133	G	
L204	FLAKE	ALL	N	UNUSED				133	G	
L207	FLAKE FRAG	R	N	UNUSED		0.3		133	G	
L219	FLAKE FRAG	ALL	U				POOR QUALITY	155	G	
L221	BROKEN FLAKE	ALL	N	UNUSED		0.3		155	G	
L222	FLAKE	ALL	U			0.2	PD WEAR	155	G	
L223	FLAKE FRAG	BIT	N	UNUSED		0.5	UNUSED	155	G	
L229	FLAKE	DISTAL	N	UNUSED		0.1		155	G	
L234	BLADE/FLAKE	R&L	U			0.4	PD WEAR	199	G	
L235	FLAKE FRAG	ALL	U				ALL SNAPPED	199	G	
L236	BLADE	L&R	W0S	WOOD	WHITTLING	0.1		199	G	
L239	BLADE	R & L	N	UNUSED		0.1	SMALL	199	G	
L241	SIDE SCRAPER	R&L	H1M&R1M	DRY HIDE?	WORKING	0.2	PD ABRASIVE?	289	G	
L242	FLAKE	R	U				THIN EDGE; PD	294	G	
L246	BROKEN FLAKE	R	N	UNUSED				294	G	
L247	FLAKE FRAG	R&L	U			0.8	PD WEAR	294	G	
L248	BIPOLAR CORE		N	UNUSED		0.4	THOUGHT WEDGE	294	G	
L252	FLAKE FRAG	ALL	N	UNUSED				298	G	
L254	FLAKE	R&L	U				PD WEAR	502	P	
L257F	END SCRAPER	L&FRONT	U			2.5	H1S LIKELY	11	P	
L258	FLAKE	R&L	U			0.3		11	P	
L259F	CHISL ARRWHD	TRANSVRS	U0I	UNKNOWN	IMPACT	0.2	PROJECTILE PT?	11	P	
L260F	END SCRAPER	FRONT	U			11.0	PDM & FIRE	11	P	
L272	FLAKE FRAG	L	U			2.0	PD WEAR? FIRE	23	G	
L273	HEAT SPALL	ALL	N	UNUSED			NO ORIG. EDGE	23	G	
L401F	CORE		U				POOR QUALITY	11	P	
R902	FLAKE MIDSECT	L	H1S	DRY HIDE	SCRAPING	0.1	VISIBLE @10X	11	P	
R903	BROKEN FLAKE	R	U			0.1		201	P	
R904	BLADE MIDSECT	L&R	M1C	MEAT/HIDE	BUTCHERING	0.1	HEAT AFFECTED?	11	P	

R905	PIERCER	TRNSVRSE	HOU?	HIDE	HAFT?		POINT UNDET.	11	P	
R906	FLAKE FRAG	L&R	U				FIRE & FRESH	21	P	
R907	BROKEN FLAKE	R	N	UNUSED			FIRE	11	P	
R908	BURIN SPALL?	ALL	N	UNUSED				13	P	
R909/	BROKEN BLADE	L&R	N	UNUSED		0.1	MAYBE SOME USE	133	G	
R910	FLAKE	L & DISTAL	U				PDM	155	G	
R911	FLAKE FRAG	ALL	U				PDM; SNAPPED	155	G	
R912/L079	SPLNTER FLAKE	R	UOI	UNKNOWN	IMPACT	0.8	MUCH PD WEAR	155	G	
R913	BLADE; MRF?	R	U			0.1	PDM	155	G	
R914	END SCRAPER	FRONT	U			5.0	PDM; BROKEN	155	G	
R915	FLAKE FRAG	A	U				ALL SNAPPED	155	G	
R916	MRF FRAG	RET EDGE	U			0.8	PDM	155	G	
R917	FLAKE FRAG	L	U			0.3	PDM	9	G	
R918	FLAKE, SRRTD?	R	U			0.2	POOR QUALITY	9	G	
R919	BROKEN FLAKE	L	U				PDM	9	G	
R920	MRF	L	U			0.1	R UNUSED	9	G	
R921	FLAKE	ALL	N	UNUSED			RETOUCH FLAKE	9	G	
R922	BROKEN BLADE	L	U				PDM; POOR QUAL.	9	G	
R923	FLAKE	DISTAL	N	UNUSED		0.2		9	G	
R924	HEAT SPALL	FRONT	U				PDM;DEFORMATN	23	G	REFIT L046

Table 8.1: Catalogue of Artefacts Examined for Lithic Microwear Analysis

1.7 Conclusion

The lithic microwear analysis of the Upper Ninepence Neolithic site led to the interpretation of tool-use for only a few artefacts. Nonetheless, a number of tentative conclusions about the site can be drawn. It would appear that the pits were filled principally with domestic debris. There is no need to suggest ritual roles for the pits or that they were used for disposing the debris from special activity areas. Although an extremely small sample, the Peterborough Ware results would indicate a relatively balanced set of domestic and maintenance activities were being performed. The Grooved Ware sample would indicate that a more specialised set of activities were performed that centred around the processing of hides. This may relate to a more pastoral economy, seasonal differences of deposition (hide working would likely be an important indoor activity during winter) or one of many other explanations.

ARTEFACT	PERIOD	CONTEXT	TYPE	EDGE	MATERIAL	ACTION
L014F	Undated	2	END SCRAPER	FRONT	DRY HIDE	SCRAPING
L172	Peterborough	11	FLAKE	L	SIL. PLANT	SLICING
L173	Peterborough	11	BURIN	L	MEAT	BUTCHERING
L173	Peterborough	11	BURIN	BIT	BONE	GRAVING
L176	Peterborough	11	MSC RET FLAKE	DISTAL END	HARD (WOOD?)	SHAVING
L259F	Peterborough	11	CHISL ARRWHD	TRANSVRS	UNKNOWN	IMPACT
R902	Peterborough	11	FLAKE MIDSECT	L	DRY HIDE	SCRAPING
R904	Peterborough	11	BLADE MIDSECT	L&R	MEAT/HIDE	BUTCHERING
R905	Peterborough	11	PIERCER	TRNSVRSE	HIDE	HAFT?
L033	Peterborough	13	MSC RET FLAKE	L	HARD (WOOD?)	SHAVING
L182F	Peterborough	13	KNIFE?	RT NOTCH	WOOD	SHAVING
L183	Peterborough	17	DENTICULATE	L&R	DRY HIDE	WORKING
L188	Peterborough	21	FLAKE MIDSECT	LAT	MEAT/HIDE	BUTCHERING
L045F	Grooved Wr	23	END SCRAPER	FRONT	HIDE	SCRAPING
L048	Grooved Wr	23	END SCRAPER	FRONT & L	HIDE	SCRAPING
L080F	Grooved Wr	23	END SCRAPER	FRONT	DRY HIDE	SCRAPING
L076	Grooved Wr	133	END SCRAPER	FRONT	DRY HIDE	SCRAPING
L202	Grooved Wr	133	FLAKE MIDSECT	R&L	MEAT?	BUTCHERING
L065	Grooved Wr	155	END SCRAPER	FRONT	DRY HIDE	SCRAPING
L066	Grooved Wr	155	END SCRAPER	FRONT	DRY HIDE	UNCERTAIN
L067F	Grooved Wr	155	DBL TRUNCATN	R&L	DRY HIDE	WORKING
L083	Grooved Wr	155	END SCRAPER	FRONT	FRESH HIDE	SCRAPING
R912/L079	Grooved Wr	155	SPLNTER FLAKE	R	UNKNOWN	IMPACT
L147	Grooved Wr	199	SIDE SCRAPER	R&L	MEAT/HIDE	BUTCHERING
L236	Grooved Wr	199	BLADE	L&R	WOOD	WHITTLING
L133	Grooved Wr	289	FLAKE FRAG	L&R	MEAT?	BUTCHERING
L241	Grooved Wr	289	SIDE SCRAPER	R&L	DRY HIDE?	WORKING
L142	Grooved Wr	291	END SCRAPER	FRONT	DRY HIDE	SCRAPING
L164F	Grooved Wr	291	BLADE/FLAKE	R&L(DISTL)	WOOD	SHAVING
L149	Undated	292	BLADE	R	MEAT	CUTTING

Table 8.2: Artefacts with Identifiable Use.

CATEGORY	% PETER-BOROUGH	% GROOVED	PETER-BOROUGH	GROOVED WARE	UNKNOWN	TOTAL	% ALL	% USE
HIDE	18.2	62.5	2	10	1	13	11.3	44.8
MEAT	27.3	18.8	3	3	1	7	6.1	24.1
PLANT	9.1	0	1	0		1	0.9	3.4
WOOD	27.3	12.5	3	2		5	4.3	17.2
BONE	9.1	0	1	0		1	0.9	3.4
IMPACT	9.1	6.3	1	1		2	1.7	6.9
UNUSED			10	19	1	30	26.1	
UNDET.			15	39	2	56	48.7	
TOTAL	100.1	100.1	36	74	5	115	100.0	99.8

Table 8.3: Association between Tool Use and Occupational Periods.

CONTEXT	MEAN RIDGE ROUNDING	ST. DEV. RIDGE ROUNDING	COUNT
2	2.5	2.12	2
9	0.2	0.1	4
11	0.4	0.7	12
13	2.0		1
17	0.2	0.1	4
21	0.1		1
23	1.8	1.6	15
72	1.5		1
133	0.4	0.6	6
155	0.8	1.3	13
199	0.2	0.1	4
201	0.1		1
289	0.2	0.1	3
291	1.3	1.0	2
292	0.1		1
294	0.6	0.3	2
298	0.3	0.1	2
502	0.1		1

Table 8.4: Summary Statistics for Dorsal Ridge Rounding of Artefacts for each Context (Pit).

2 THE ORGANIC RESIDUE ANALYSIS OF THE NEOLITHIC POTTERY FROM UPPER NINEPENCE. (Stephanie N. Dudd & Richard P. Evershed)

2.1 Aims

The overall aim of the study was to determine the presence or absence of organic residues in the Walton sherds and to identify the nature of the lipid moieties observed. Conclusions will be drawn based on comparisons with reference materials and data accumulated from investigations carried out on other assemblages in the Bristol laboratory. The objective is ultimately to suggest modes of vessel use and dietary habits, information which it is not possible to gain solely by making observations of vessel form and burial context etc. Furthermore, a new analytical approach will be used to study degraded animal fats, namely stable carbon isotope ratios, which will be recorded for individual fatty acids and used to provide additional information concerning the origins of the fats.

2.2 Introduction

The study of amorphous organic residues is a relatively recent approach to pottery analysis in archaeology and is becoming increasingly incorporated into post excavation schemes. Organic residues occur in two forms, as surface deposits, occurring relatively infrequently, and organic matter absorbed into the vessel wall during use. While proteinaceous components have been detected in archaeological ceramics (Evershed & Tuross. 1996), the study of lipids, i.e. fats and waxes, is a significantly more developed area. Preservation of lipids, and indeed any other organic components, is facilitated by their entrapment in the clay matrix of the vessel. The hydrophobic nature of lipids further enhances their chances of survival, however in soils of high pH, extreme conditions (cycles of wetting and drying), etc., the potential for chemical degradation and dissolution is expected to be enhanced.

The study of the lipid components of organic residues has been enhanced by the development of modern analytical techniques including gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The use of high-temperature gas chromatography (HT-GC) in particular allows complex lipid extracts to be studied with only the minimum of wet chemical treatments, with the use of immobilised apolar stationary phases enabling very detailed compositional information to be obtained in a single analytical run (Evershed *et al.* 1990). The identification of foodstuffs, or other material likely to have come into contact with the ancient vessels during their use, relies on matching the chemical compositions of the organic residues with those of contemporary plant or animal products likely to have been exploited in antiquity.

Commodities which have been identified from analyses of lipid components of potsherds, include *Brassica* vegetables (Evershed *et al.* 1991), beeswax (Charters *et al.* 1995), and numerous fatty residues including dairy products, adipose fats and tallow (Evershed *et al.* 1992a). In addition, the study of an adhesive used to repair an Ecton ware jar recovered from the Roman sediments of the river Nene provided the first unambiguous identification of birch bark tar from an archaeological site in the UK. (Charters *et al.* 1993a). However identification of specific commodities is not straightforward since autoxidation, hydrolysis, etc., alter the original composition of the lipid 'fingerprints' during use, and diagenetically during burial. As techniques develop, then so may residues be re-analysed. Residue analysis is, therefore, a repeatable procedure.

A further major area of investigation is concerned with the determination of vessel use based on organic residue data. Progress has been made in classifying vessel use by the identification of sites of accumulation of lipid in specific parts of vessels, e.g. base, body and rim (Charters *et al.* 1993b). Interpretations drawn from chemical analyses of the archaeological ceramics are currently being tested in experimental simulations of vessel use, e.g. cooking, using replica vessels, followed by parallel organic residue analyses. Sherds from these replica vessels are being used in experiments to examine the effects of decay on the organic residue content (Evershed & Charters 1995).

Animal fats, although appearing to be quite severely degraded in ancient buried materials or artefacts, are relatively easily recognised by their characteristic distribution of mono-, di-, triacylglycerols and free fatty acids dominated by a high abundance of saturated C_{16} and C_{18} moieties. Animal fats are the most common residues which we encounter and hence the ability to obtain more detailed information, concerning in particular the species of animal from which the fats originated would be invaluable, particularly where direct information from bone evidence is unavailable. Previous workers (Matter *et al.* 1989; Matter 1992;

Thornton *et al.* 1970) have considered the distributions of saturated, monounsaturated and branched chain fatty acids, however, this approach is not well suited to the analysis of ancient fats which may have been exposed to chemical and/or microbial alteration during burial over millennia.

However, recent work by Lawrence (1994) showed that distinctions could be drawn between degraded fat extracts from medieval lamps and dripping dishes on the basis of the positional isomers of the monounsaturated fatty acids. Further work by Mottram (1995) has shown that the natural variation in $^{13}C/^{12}C$ isotope ratios of animal fat components can been utilised to differentiate between fats, allowing distinctions to be made between a marine or terrestrial source, and further, to identify a ruminant or non-ruminant origin for the fat. DeNiro & Epstein (1978) reported that the isotopic composition of the whole body of an animal reflects the isotopic composition of its diet, but that the animals studied were on average enriched in $d^{13}C$ by about 1 ‰ relative to the diet. Variation in the isotopic composition of animals is also thought to be determined by the isotopic fractionation which occurs during metabolism (Nier & Gulbransen 1939). To date, however, limited isotopic work has been carried out which considers how species, sex and age of the animal affect the isotopic composition of fat and fundamental differences in the diet of different species of animals.

2.3 Samples

The sample set supplied by the Clwyd-Powys Archaeological Trust comprised 17 sherds from Walton. Carbonised residues were found on 7 sherds from the assemblage, namely, P1, P21, P28, P33, P38, P39 and P68. The residues were removed by gentle scraping with a scalpel and analysed separately from the absorbed residues.

2.4 Method

2.4.1 Solvent extraction of archaeological potsherds. Lipid analyses have been performed using our established protocol whereby approximately 2g samples were taken and their surfaces cleaned using a modeling drill to remove any contaminants (e.g. soil or finger lipids due to handling). The samples were then ground to a fine powder, accurately weighed and a known amount (20mg) of internal standard (*n*-tetratriacontane) added. The lipids were extracted with a mixture of chloroform and methanol (2:1v/v). Following separation from the ground potsherd solvent was evaporated to obtain the total lipid extract (TLE).

2.4.2 Preparation of trimethylsilyl derivatives. Portions of the total lipid extract were derivatised using *N,O*-bis(trimethylsilyl) trifluoroacetamide (20µl; 60°C; 20 mins) and analysed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS).

2.4.3 Preparation of fatty acid methyl esters (FAME). Selected total lipid extracts (TLE) have been saponified to break the ester linkages in the acylglycerols releasing the fatty carboxylic acids. Methanolic sodium hydroxide (5%v/v) was added to the TLE and heated at 70°C for 1 hour. After neutralisation lipids were extracted into diethyl ether and the solvent reduced by rotary evaporation. FAME were prepared by reaction with BF_3-methanol (14% w/v; 2 ml) at 70°C for 1 hour. The methyl esters were extracted with diethyl ether and the solvent removed under nitrogen. The FAME were redissolved into hexane for analysis by GC and gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS).

2.4.4 High-temperature gas chromatography (HTGC). The GC analyses were performed on a Hewlett Packard 5890 gas chromatograph, coupled to an Opus V PC using HP Chemstation software, which provided instrument control, data acquisition and post-run data processing facilities. Samples were introduced by on-column injection into a 15 m x 0.32 mm i.d. fused silica capillary, coated with

HP1 stationary phase (immobilised dimethyl polysiloxane, 0.1 μm film thickness). The temperature programme consisted of a 2 minute isothermal hold at 50°C followed by a ramp from 50 to 350°C at 10°C min^{-1}. The temperature was then held at 350°C for 10 mins; hydrogen was used as carrier gas. Flame ionisation detection was used to monitor the column effluent.

2.4.5 Gas chromatography-mass spectrometry (GC-MS). GC/MS analyses were performed using a Finnigan 4500 quadrupole mass spectrometer directly coupled to a Carlo Erba 5160 Mega series gas chromatograph with on-column injection. Operating conditions were as follows: ion source, 170°C; emission current, 400 mA and electron energy, 70 eV. The GC-MS interface was maintained at a temperature of 350°C. Spectra were recorded over the range *m/z* 50-750 every 1.5 s. Data were acquired and processed using an INCOS data system. The GC operating conditions were the same as those described above except that helium was used as carrier gas.

2.4.6 Gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS). Analyses were carried out using a Varian 3400 gas chromatograph attached to a Finnigan MAT Delta-S isotope ratio monitoring mass spectrometer *via* a modified Finnigan MAT combustion interface. The GC column used was a 25 m x 0.32 mm i.d. WCOT fused silica capillary, coated with CP-Wax-52 CB stationary phase (polar polyethylene glycol, 0.2 μm film thickness). The temperature programme consisted of three ramps from 40 to 150°C at 15C min^{-1}, from 15 to 220°C at 4°C min^{-1} and from 220 to 240°C at 15°C min^{-1} remaining at 240°C for 15 min and helium was used as carrier gas. The Cu/Ni/Pt reactor temperature was maintained at 860°C and the mass spectrometer source pressure was $6x10^{-6}$ mbar. Samples were injected via a septum equipped temperature programmable injector (SPI). Carbon isotope ratios were expressed relative to the PDB standard (*Belemnitella americana*), $d^{13}C$ (‰) = 1000 [(R_{sample} - $R_{standard}$)/$R_{standard}$], where R is $^{13}C/^{12}C$.

2.5 Results

GC analyses were performed for all samples. Preliminary observations have been made by reference to the GC profiles and identifications of individual lipids have been made on the basis of their retention times. Four samples were submitted to combined gas chromatography-mass spectrometry (GC-MS) for identification of components not recognised by GC alone. In addition eight extracts were submitted to analysis by GC-C-IRMS. The quantitative and qualitative data for all the sampled studied are summarised in table 8.5.

2.5.1 GC and GC-MS analyses.

The total lipid extract of the fabric of P39 contained traces of palmitic ($C_{16:0}$) and stearic ($C_{18:0}$) acids, mono-, di- and triacylglycerols, together amounting to no more than 7 mg g^{-1} of lipid. The carbonised residue scraped from the surface of P39 contained 669 mg g^{-1} of lipid, which comprised a distinctive series of triacylglycerols ranging from C_{40} to C_{54} (denotes the total number of carbon atoms comprising the acyl groups in the acylglycerol). Diacylglycerols ranged in carbon number from C_{30} to C_{36}, monoacylglycerols ranged in carbon number from C_{14} to C_{18} and free fatty carboxylic acids were present in the range $C_{14:0}$ to $C_{26:0}$, including odd carbon number ($C_{15:0}$ and $C_{17:0}$), monounsaturated C_{18} and branched chain components. This distribution of lipid components is consistent with the presence of degraded animal fats. The free fatty carboxylic acids, mono- and diacylglycerols are produced as a result of the hydrolysis of intact triacylglycerols either during use or burial. The extract from P33 and the associated carbonised residue contained 13 mg g^{-1} and 434 mg g^{-1} of lipid respectively, consisting of palmitic and stearic acids and di- and triacylglycerols. The analysis yielded a similar lipid distribution as seen in the carbonised residue of P39, however, the triacylglycerols appear less well preserved with only C_{44}-C_{52} components being identified. P3 contained 338 mg g^{-1} of degraded animal fat with analogous characteristics as seen in extracts from P39 and P33.

Pot no./ context	Analysts Description	Pot ID	Sample Weight (g)	Lipid Content (µg g^{-1})	Lipid components
P1(a)/13	Potsherd 5	P	2.17	120	FA ($C_{18:0}$ predominates over $C_{16:0}$; odd carbon number and branched chain moieties), mid-chain ketones, TAGs degraded
P1/13	Carbonised residue 5	P	0.08	Trace	
P1(b)/13	Potsherd 10	P	2.05	104	FFA ($C_{18:0}$ predominates over $C_{16:0}$; odd carbon number and branched chain moieties), mid-chain ketones, MAG, DAG, well preserved TAGs (C_{44}-C_{52})
P3/2	Potsherd 4	P	2.04	338	FFA (odd carbon number and branched chain moieties), MAG, DAG, TAG (C_{44}-C_{54})
P5/17	Potsherd 6	P	2.04	210	FA ($C_{18:0}$ predominates over $C_{16:0}$), mid-chain ketones, TAGs degraded
P10/7	Potsherd 11	P	2.00	13	FFA, DAG, TAG (C_{48}-C_{50})
P21/289	Potsherd 13	GW	2.19	Trace	
P21/289	Carbonised residue 13	GW	0.10	Trace	
P28/199	Potsherd 14	GW	2.57	0	
P28/199	Carbonised residue 14	GW	0.16	0	
P33/155	Potsherd 2	GW	2.09	13	MAG, DAG, TAG
P33/155	Carbonised residue 2	GW	0.27	434	FFA, MAG, DAG, TAG(C_{42}-C_{54}), TAGs well preserved
P34/155	Potsherd 7	GW	1.92	0	
P37/199/289 /291	Potsherd 15	GW	2.56	Trace	
P38/155	Potsherd 16	GW	2.39	12	FFA, MAG, DAG, TAG (C_{44}-C_{54})
P38/155	Carbonised residue 16	GW	0.23	314	FFA (odd carbon number and branched chain moieties), MAG, DAG, TAG (C_{42}-C_{54})
P39/155	Potsherd 1	GW	2.05	7	Free fatty acids (FFA), diacylglycerols (DAG), triacylglycerols (TAG)
P39/155	Carbonised residue 1	GW	0.28	669	FFA (odd carbon number and branched chain moieties), monoacylglycerols (MAG), DAG, TAG (C_{40}-C_{52})
P48/199/289	Potsherd 17	GW	1.64	Trace	
P62/87	Potsherd 9	GW	0.71	Trace	Unresolved complex mixture (UCM), odd MAG
P65/294	Potsherd 8	GW	2.04	Trace	
P66/133	Potsherd 12	GW	2.00	118	FFA (odd carbon number and branched chain moieties), MAG, DAG, TAG (C_{48}-C_{54})
P68/133	Potsherd 3	GW	2.08	247	FFA (odd carbon number and branched chain moieties), DAG, TAG, (C_{48}-C_{54})
P68/133	Carbonised residue 3	GW	0.10	279	FFA, DAG, TAG (C_{48}-C_{54})

Table 8.5: Results of organic residue analyses on the Walton vessels.

P68 yielded 247mg g^{-1} of lipid exhibiting a somewhat different lipid distribution to that seen above. The distributions of di- and triacylglycerols displayed narrower carbon number ranges, with only C_{32} to C_{36} diacylglycerols and C_{48} to C_{54} triacylglycerols being present. An analogous distribution of lipid components was found in the carbonised residue associated with P68, although the lipid was less well preserved than the other carbonised residues examined.

Lipid extracted from P1(a) appeared significantly more degraded than the residues discussed above. Although free fatty acids were detected, the residue lacked mono-, di- and triacylglycerols. The presence of a series of mid-chain ketones (also found in trace amounts in the carbonised residue associated with P1(a)) are indicative of high temperatures, probably greater than 400°C, being achieved during the use of the vessel in processing animal products. The degraded animal fat of P1(b) (fig. 8.4) has the same characteristics as residues P39, P33 and P3 discussed previously. Again the presence of mid-chain ketones may indicate high heating during vessel use. Vessel P5 yielded 210 mg g^{-1} of lipid comprising free fatty acids and trace amounts of the same mid-chain ketones. The free fatty acids comprised $C_{16:0}$, $C_{17:0}$ and $C_{18:0}$ homologues with the latter being the most predominant component.

P10 and P66 contain 13 mg g^{-1} and 118 mg g^{-1} respectively, of degraded animal fat residues containing C_{32} to C_{36} diacylglycerols and C_{48} to C_{54} triacylglycerols, with a distribution analogous to that obtained from P68. The lipid extracts of the fabric from P38 and the carbonised residue from the same vessel contain 12 mg g^{-1} and 314 mg g^{-1} respectively, comprising C_{40} to C_{54} triacylglycerols, C_{30} to C_{36} diacylglycerols and $C_{14:0}$, $C_{16:0}$, $C_{17:0}$, $C_{18:1}$ and $C_{18:0}$ free fatty acids. The distributions are characteristic of degraded animal fats and analogous to those seen in P1, P3, P33 and P39.

There was no detectable lipid associated with P21 and only trace amounts of free fatty acids revealed in the carbonised residue scraped from this sample. P28, the carbonised residue from P28 and P34, P37, P48, P62 and P65 all contained negligible amounts of lipid.

2.5.2 Stable isotope studies

Results of GC-C-IRMS analyses of individual fatty acids from the lipid extracts are plotted in fig. 8.5. The modern reference fats separate into two distinct clusters which correspond to ruminant and non-ruminant animals. The carbon isotope ratios of reference pig adipose fats fall within -25.59 ± 0.17 for $d^{13}C_{16:0}$ (‰) and -24.28 ± 0.15 for $d^{13}C_{18:0}$ (‰). In contrast, the isotope values for both cattle and lamb fat are significantly more depleted in ^{13}C. Hence, this criteria alone is not sufficient to distinguish unambiguously between fats from different species of ruminant animals, although the separation of the ruminant and non-ruminant animals is significant.

Extracts from five potsherds and two carbonised residues were selected for GC-C-IRMS analysis, since these extracts contained the quantities of lipid required for stable isotope analysis. The results showed that a clear distinction could be drawn between the extracts from P66 and P68 and those of P1(b), P3 and P5. The values obtained for extracts from P66 and P68 indicate a non-ruminant origin, e.g. pig, while those for P3, P5 and P1(b), appear to derive from ruminant animals, tending to plot closer to the reference lamb fat and cattle fat. The values obtained for the carbonised residues are somewhat more depleted in ^{13}C compared with the absorbed lipids from the same vessels (table 8.6). One explanation for this is that lipid components of the carbonised residues adhered to the exterior of the vessel are more susceptible to microbial degradation and/or alteration than lipid which has been entrapped in the porous microstructure of the pot wall.

It is interesting to note that P66 and P68, containing degraded lipids which are isotopically similar to those of the non-ruminant animals, both originate from the same site context (113) and exhibit very similar distributions of triacylglycerol components. Furthermore, extracts from P1(b), P3 and P5, which are isotopically similar to the ruminant fats, differ from P66 and P68 in their triacylglycerol distributions (fig. 8.6). The wider carbon number envelope they exhibit derives from the presence of the shorter chain $C_{14:0}$ acyl moiety and is analogous to that seen in the intact triacylglycerols of ruminant fats. The extracts of P39, P33, P34 and P38, all from context 155, exhibit analogous characteristics to the reference ruminant fats. Hence, the distributional data supports the evidence obtained from the isotopic analyses.

2.6 Discussion

Lipid residues were recovered from ten of the seventeen potsherds examined. All the lipids were identified as degraded animal fats, characterised by the occurrence of acyl lipids, including free fatty acids, mono-, di- and triacylglycerols. The extent of degradation of the original animal fat differed between sherds. The extracts of P1(a) and P5 appeared to be the most severely degraded where free fatty acids predominate and intact acyl lipids were lacking. In contrast, triacylglycerols were relatively well preserved in P1(b), P3 and P68.

Saturated long-chain ketones with carbon numbers ranging from 31 to 35 were identified in extracts from three of the potsherds, P1(a), P1(b) and P5. The origin of long-chain ketones in organic residues has recently been assigned to a condensation reaction involving long-chain carboxylic acids from animal fats (Evershed, R.P. *et al.* 1995). The reaction is catalysed by minerals in the pot fabric and occurs at temperatures in excess of 300°C. Thus the ketones are probably formed in the pot wall during heating either while cooking or through catastrophic failure of vessels.

The presence of carbonised residues associated with P21 and P28 would suggest that at some stage these vessels had been used for food preparation, however the absence of lipid components in both the carbonised residues and pot walls indicates that either the commodities being processed contained little lipid or the burial conditions were not conducive to their survival. Since there are no carbonised residues associated with P65 and P37 and negligible absorbed residues in the sherds analysed, these pots may have had uses other than for cooking, e.g. as storage containers for grain, water, etc.

P1(a) and P1(b) were analysed separately and subsequently found to have originated from the same vessel. The isotopic data is similar for extracts from the two sherds (-27.7 ‰ and -29.3 ‰ for $C_{16:0}$ and -31.8 ‰ and -33.0 ‰ for $C_{18:0}$, for P1(a) and P1(b) respectively) however, the distribution of lipid components is different. P1(a) contains no intact triacylglycerols, compared to P1(b) which contains an homologous series of triacylglycerols, and other acylglycerols, characteristic of degraded animal fat. It is not completely clear from which point on the vessel profile the two sherds originate. However, the state of preservation of the lipid in the two sherds may be significant in this respect. For instance, the extract from P1(a) contains only free fatty acids and mid-chain ketones, which appear to be characteristic of residues extracted from sherds that have experienced high heating, leading to thermal degradation of lipid. Intuitively we would expect sherds in the region of the vessel in direct contact with a fire to be most likely to exhibit evidence of thermally altered lipids. The presence of mid-chain ketones in these sherds is specific evidence for the vessel having been subjected to high temperatures (>400°C).

Substantial amounts of lipid absorbed in several of the Walton potsherds, including particularly P68, P4 and P1(b) (>210 mg g^{-1}) is direct evidence to suggest their use as cooking pots since the action of heat is especially conducive to the adsorption of lipid into the pot wall compared with the use of vessels to store dry foodstuffs.

2.7 Conclusions

The preservation of organic material is remarkable considering the age of the vessels.

The measurement of $^{12}C/^{13}C$ isotope ratios for individual components for the first time in prehistoric pottery has been shown to be a particularly robust means of distinguishing between ruminant and non-ruminant fats. The isotopic data are supported by the corresponding triacylglycerol compositions of the remnant fats.

The results indicate that probably both pigs and sheep and/or cattle constituted the major part of the diet and no evidence was obtained to suggest that leafy vegetables had been processed in the vessels. The lack of leaf wax components is unlikely to result from their preferential degradation during burial since they are relatively much more resistant to degradation than acyl lipid such as the triacylglycerols that comprise animal fats.

There is little to suggest mixing of animal fats from ruminant and non-ruminant sources in the Walton vessels (fig. 8.5).

Sample	**$d^{13}C_{16:0}$ (‰)**	**$d^{13}C_{18:0}$ (‰)**
Standard animal fats		
Cow (i)	-28.24	-30.63
Cow (ii)	-27.49	-30.23
Cow (iii)	-27.96	-30.61
Lamb (i)	-30.23	-31.85
Lamb (ii)	-29.72	-31.99
Ewe	-29.01	-30.76
Pig (i)	-25.43	-24.13
Pig (ii)	-25.74	-24.45
Pig (iii)	-25.60	-24.26
Ancient fats from potsherds		
Carbonised residue 1 (P39)	-30.18	-35.98
Carbonised residue 16 (P38)	-28.83	-33.82
Potsherd 3 (P68)	-27.42	-26.41
Potsherd 4 (P3)	-29.14	-32.99
Potsherd 5 (P1)	-27.38	-31.52
Potsherd 6 (P5)	-30.47	-31.20
Potsherd 10 (P1)	-28.98	-32.70
Potsherd 12 (P66)	-27.11	-25.62

Table 8.6: Listing of $d^{13}C$ measurements (corrected) for both modern and ancient animal fats.

3 THIN SECTION ANALYSIS OF THE POTTERY FROM UPPER NINEPENCE (David Jenkins & John Williams)

3.1 Introduction

Thirteen pottery sherds and one soil sediment from the Walton Basin were received for petrographic examination. The analysis of these samples aims to characterise the fabric and mineralogical composition of the sherds, to establish the petrography of the coarse sand fraction in the sediment sample and to consider the results in terms of both grouping evident amongst the sherds, and also of provenance of the materials used in fabricating the pottery.

3.2 Methodology - preparation and analysis of thin sections

Thin sections of pottery sherds were prepared using the standard procedures developed at the University of Wales, Bangor. The size and colour of the selected sherds (*c.* 25x20mm) were recorded, and the samples then halved, and one half ignited overnight at 500°C. The two halves were then impregnated side-by-side with a polystyrene resin system (Crystic + 1.25% Q17447 catalyst) diluted 1:1 with acetone to facilitate penetration. A slice (*c.* 5mm thick) was cut from the impregnated block, and one side polished with 6-1μm diamond paste, and bonded to a glass slide. Excess sherd material (*i.e.* >1mm) was removed using a Logitech CS10 saw and the sample ground to 30μm thickness using a Logitech LP3 Lapping machine. This was again polished with diamond paste on a Kent polisher, and a cover slip attached with Epotek resin to provide adjacent thin-sections of the sherd both in its original and re-oxidised condition. The former preserved organic components in the sherd, whilst the latter clarified any dark/opaque unoxidised cores. It was found that such controlled re-oxidation greatly facilitates the identification of matrix components and, in particular, of grog.

Reference samples were also prepared from a local sediment (W296). The 2.0-0.6mm fraction was impregnated with resin and thin-sectioned to provide an indication of the petrography of 'clast' material that would have been available locally. Similarly, the 'heavy mineral' fraction (*i.e.* SG>2.95) of the fine sand (200-63m) was separated by centrifugation in tetrabromoethane and analysed to indicate which of the 'grains' identified in the sherds could be accounted for locally.

The composition (vol.%) of the pottery sections was established quantitatively in terms of matrix, grains, grog, voids and clasts, using a Swift Automatic Point Counter. The distinction between matrix, grains and clasts tends to be arbitrary but the guidelines used were <0.06mm for the matrix (*i.e.* silt + clay), 0.06-0.2mm (*i.e.* fine sand) for the grains, and >0.2mm for the clasts which were further subdivided by their petrology. A visual assessment of matrix texture, orientation, grain mineralogy and the presence of bioliths was also recorded. These data form the basis for the quantitative assessments which lead to the classification and interpretation of the pottery fabrics.

3.3 Analytical results.

3.3.1 Matrix

Matrix texture is dependent on the particle size distribution in the clay body and was assessed visually: degree of clay mineral orientation is also manifested in 'aggregate birefringence' which has been assessed as 'absent' (**0**), 'weak' (**1**), moderate' (**2**), strong (**3**), or very strong (**4**). Three matrices are evident -

a: A silt-rich matrix is characterised by abundant quartz and felspar, occasional muscovite and rare biotite. In the re-oxidized fabrics the clay fraction shows a moderately strong aggregate birefringence whilst this is masked in the original unoxidised samples. Weakly variegated textural bands are present in P48 only.

b: A clay-rich matrix in which the birefringence of the clay minerals is very strong, parts remarkably producing first order interference colours (P1). Sparse detrital silt-sized quartz/felspar and rare muscovite/biotite are present.

c: A matrix characterised by its voids (P62, *see below*).

3.3.2 Grains.

Although a silt fraction is common to abundant in most of the fabrics examined fine sand grains (>60-<200μm) are sparse. In 10 fabrics such grains account for less than 5.5% of the total volumetric constituents, whilst in the remaining 3 fabrics (P11, P37, P76) they vary between 7.6% to 8.6%. The grains replicate the mineralogy of the silt fraction and consist of angular/sub-angular quartz/felspar and muscovite/biotite flakes. Less common minerals include angular plagioclase, clinopyroxene, amphibole, clinozoisite, and garnet. The last four heavy minerals were also recorded in the sediment sample (W296) together with zircon, tourmaline, rutile and (?) anatase.

3.3.3 Voids

Many voids are byproducts of manufacture but others represent original components lost from the matrix. Voids may also be artefacts of slide preparation and where such cases can be identified the resultant voids have not been included in the analytical data. In the fabrics examined, with the one exception, the void contents vary from 2.8-12.4% (fig. 8.7,1). Inclusions are consistently margined by a void whilst small amorphous cavities with sharply defined outlines may occur in the matrix. Such features may reflect the poor wedging and preparation of the raw materials, and shrinkage strain caused by dehydration during firing.

In contrast the high void count of 35.8% in P62 has resulted from the removal of a constituent from the matrix. The voids have distinctive shapes, some being long and narrow (0.1-2.0mm), but most are angular, oblate forms (0.5-0.8mm wide) with straight and/or and stepped edges: the former are consistent with shell fragments and the latter with calcite cleavage fragments. This very high void content results in a highly porous fabric with a distinctive vesicular ('corky') appearance.

3.3.4 Grog

Grog is especially revealing in that it mirrors the range of redundant pottery fabrics that were re-used. However, it does not have the same sensitivity as rock clasts for defining potential provenace. Grog particles are present in all the fabrics examined occurring as a minor component (0.8-5.0%) in 3 fabrics (P26,P37,P62), as a common component ((5-12%) in 6 fabrics, and as an abundant component (>20%) in 4 fabrics (P1, P10, P22, P48). Particles can generally be identified by their angularity and vary in size from <0.5mm to 2mm. Most contrast with their host fabrics by colour, texture and birefringence, but some tend to merge leading to their underestimation. Two (e.g. P20), and rarely, three generations of grog may be identified within a single section. One grog particle in P20 contains an inclusion that may represent a sliver of burnt bone. Grog particles with the following matrix characteristics can be identified :-

a: a silt-rich matrix of similar composition to that of the host sherd.

b: a clay-rich fabric forming light orange to reddish brown grog particles. The fabric is slightly vesicular due to small (20μm) linear voids, and has not been encountered in the vessels analysed.

c: vesicular grog showing the same void outlines as in sherd P62 (2.3 above, *i.e.* P10).

d: a dark brown fabric not identified in the sherd samples which is characterised by sharply defined textural zones and dark/light banding. There are abundant triangular and elongated rectangular voids, many containing dark carbonaceous matter, suggesting removal of an organic component at the time of firing of the original vessel.

e: a vesicular grog characterised by regular circular voids in a dark coloured matrix. This type is again not present in the sherds studied (P20 & P34).

3.3.5 Rock clast fragments.

Clasts of identifiable rocks are present in all the fabrics, with the exception of the vesicular vessel P62 where the original clast constituent has been lost. Content varies from very low (0.8%- 5.0%), to moderate (5.0%-10%) to abundant (10%-22%). The majority of clasts are characterised by their angularity and the freshness of fracture, and in some fabrics very large (>2mm) clasts are present at the expense of smaller fragments and detached mineral grains giving rise to a low grain content. The size of the larger fragments raises the question of representativity in quantitative analysis.

The rock types identified fall into sedimentary, metamorphic and igneous groups:

Sedimentary rock clasts include the following types:

a: a micaceous quartzose siltstone, occasionally showing foliation. Clasts vary from sub-angular to sub-rounded, and some are heavily masked with iron oxide.

b: sub-angular clasts of a fine textured argillite.

c: a distinctive coarse lithic sandstone (e.g. P1) consisting of rounded/sub-angular sand grains of monocrystalline and polycrystalline quartz, often displaying undulose extinction, altered orthoclase and plagioclase, and lithic clasts including a pseudomorphed mafic igneous rock(?), rhyolite and rhyolitic tuff (e.g. P1) quartz/muscovite schist, and a quartz siltstone with a birefringent matrix. There is an unidentified opaque cement associated with granular sphene(?).

d: an even textured arenite composed of well sorted, rounded quartz grains.

Metamorphic rock clasts comprising angular fragments of a quartzite/mica schist.

Igneous rock clasts include the following types:

a: a highly altered, coarse mafic igneous rock consisting of fibrous amphibole pseudomorphs of pyroxene phenocrysts, slightly pleochroic (dark green to greenish yellow), and chloritised felspar (plagioclase?).

b: an ill-defined mafic igneous rock (dolerite?) represented by only two small clasts, one of which contains small granular olivine crystals showing slight marginal alteration and surrounded by fresh felspar, the second containing a pseudo-morphed pyroxene(?) crystal in direct association with epidotised felspar.

c: a felted dolerite.

3.4 Discussion

Although the various fabrics recognised are individually distinctive, it is difficult to define groups since, with one notable exception, they belong to a continuum of clast/grog constituents and also by common matrix characteristics. Four principal clast/grog constituents are recognised - grog, siltstone, lithic sandstone and mafic igneous rock fragments. Individually, grog-dominated (P26,P34,P37,P76), clast-dominated (P1,P10,P22,P48) and mixed assemblage (P11,P20,P68,P74) fabrics occur, but the variable distribution of the lithic constituents within these fabrics may reflect individual choice by the potter or alternatively may reflect poor reproducibility where large clast fragments occur in the thin sections. Although poorly distinguishable, the thin-sections will be discussed under these headings.

3.4.1 Grog dominated fabrics

Grog has been identified in all the fabrics examined but its contribution varies from <1.0 to four sherds (P26,P34, P37,P76) where it is >15%. In P26 all the particles are of similar composition to the host fabric but in P37 and P76 the fragments are more heterogeneous in matrix composition, although in the latter two banding and textural gradations in the matrix makes it difficult to record grog quantitatively and so the values may be mis-represented. Particles containing more than one generation of grog are common in all the sections. Rare small clasts of a fine siltstone are also present and one such clast is contained in a grog fragment, and mafic igneous clasts are present in P34.

3.4.2 Clast dominated fabrics

These fabrics contain a clast component >15% whilst grog is of secondary importance, varying from insignificant (P1 0.8%) to common (P10 - 8.4%). Four sherds are involved but each have differing clast petrologies:

Siltstone Rich (P48) - abundant large (1-4mm) angular clasts of siltstone; common large (4mm) angular fragments of lithic sandstone, and rare small (0.9mm) angular gabbro clasts.

Gabbro Rich (P10) - the same rock types appear but in reverse order of frequency. abundant large (1-5mm) clasts of gabbro, common smaller (0.5-2.0mm) subangular/sub-rounded fragments of siltstone but only rare small (0.5-1.5mm) angular clasts of lithic sandstone. Clasts belonging to two other rock types can be identified, angular fragments of quartzite/mica schist, and medium-sized (2-3mm) angular fragments of a fine grained, intergranular, amphibolitised dolerite.

Gabbro dominated fabric (P22) - abundant fragments (0.2-3.0mm) of gabbro and derived angular fragments, together with rare, small (0.4mm), sub-rounded clasts of siltstone.

Gabbro/Lithic Sandstone dominated fabric (P1) - angular clasts of lithic sandstone are abundant but the section is dominated by a single large (6mm) gabbro fragment. The lithic sandstone clasts contain siltstone and possibly also orthoquartzite clasts. Angular clasts of quartzite/mica schist (and rhyolite ?) might also derive from the lithic sandstone although their relatively large size (2mm) could also imply a primary origin.

3.4.3 Mixed Assemblage Fabrics.

These (P20, P68) comprise fabrics with the most varied grog types present, and the most varied assemblage of rock clasts - detached quartz/felspar mono/poly-minerallic clasts (P20), mafic igneous fragments (P68), argillite/siltstone (P74), lithic sandstone (P11).

3.4.4 Vesicular Fabric

This unique fabric type is represented by a single example (P62). It has been noted previously that in its original condition the fabric would have contained a calcite/shell filler that has been totally removed by dissolution subsequent to the burial of the pot. Only one small rock clast <0.25mm can be identified and this belongs to the siltstone group.

3.5 Conclusion.

The results of this petrographic analysis of 13 sherds from Walton can be interpreted in terms of both the provenance of the materials used in their manufacture and also in terms of affinities as a group and in relation to their suggested typology.

3.5.1 Provenance

The clasts recognised have been described in section 3.3.5 and include argillites, lithic sandstone, dolerite/gabbro and rare schists. Of these the argillite is local to the Walton Basin (Silurian/Ludlovian) as is evident from its dominance in the 2-0.6mm fraction of the sediment sample (W296). There are also potential sources nearby for the mafic igneous rocks (dolerite/gabbro) in the Ordovician inlier some 10km to the west at Llandrindod, and also in the Old Radnor inlier a few kilometres to the south-east (Pocock & Whitehead, 1953). Material from the former might have been transported to the site by glacial action, as suggested by traces in the sediment sample, but that from the latter would not have been available on site. It is possible that the lithic sandstone could also derive from the Longmyndian rocks exposed at Old Radnor, but there are no immediate sources for the schistose rocks, the nearest possible being the Precambrian of the Wrekin, Malverns or Rushton, (Malvernian/Uriconian), unless, as suggested above, they were originally components of the secondary lithic sandstone.

In contrast, the analytical data relating to the matrix does not give any indication of sources other than the local material, and the absence of bioliths implies a sterile source deposit, such as glacial till or periglacial head, rather than a biologically active soil or fluvial/lacustrine sediment.

It is therefore concluded that the dominant clast materials used in the manufacture of the pots examined probably were derived from nearby sources (<10km); however, sources for the schist (P1, P10 & ?P20) lie farther afield (*c*.50km) unless present (together with rhyolites) in secondary rocks such as the lithic sandstone. The material for the matrices could be accounted for locally. With a detailed comparative study of the local petrography (Old Radnor, Llandrindod) it might be possible to identify the sources for the distinctive gabbro and lithic sandstone with greater precision.

3.5.2 Grouping

Sherds may be grouped by their fabric and by their clast petrography, or other microscopic features, as well as by their 'macro' typology. The fabric of the 13 sherds can be presented in general terms through the proportions of matrix (including grains), filler (*i.e.* clasts + grog) and voids (fig. 8.7) to reflect the mode of manufacture. From this it can be seen that 11 of the sherds form a coherent group of 'moderately tempered' material (Kidder & Shepard 1936) which is also moderately porous. The two exceptions are P20, which is slightly denser and sparse in filler, and in particular P62 which is distinctively 'corky' due to the dissolution of calcite material. Otherwise the sherds show similar silt/clay-rich fabrics, but with the exception of P1 whose matrix displays a remarkably strong aggregate birefringence. The data on clast composition can be presented in various combinations. Fig. 8.7,2a, for example, shows the proportions of grog, argillite/siltstone (*i.e.* local), and lithic sandstone/mafic igneous (*i.e.* 'foreign') clasts: fig. 8.7,2b shows the proportions of argillites/siltstones, lithic sandstones and mafic igneous clasts where P11, rich in lithic sandstone, now stands apart. Alternatively, all the data can be considered through Principal Component Analysis, for which a plot of the first two components is presented in fig. 8.8.

As pointed out in the earlier discussion, however, no obvious groupings are evident, since all the components are present together in varying proportions in certain sherds. It is therefore concluded that this is a relatively coherent group of sherds in terms of fabric and composition which could have been manufactured from material to be found within 10-50km of Walton. Some variations are evident, in particular in the 'corky fabric' of P62, but this still shows compositional affinities with the remaining sherds.

4 THE SCIENTIFIC ANALYSIS OF A GLASS BEAD FROM HINDWELL ASH AND ITS ARCHAEOLOGICAL INTERPRETATION (Julian Henderson)

4.1 Introduction

The glass bead (fig. 7.1,3) measures 7mm in diameter overall with a near-central perforation 2.5mm in diameter. The bead is circular with a slightly flattened section up to 4mm thick. There are traces of wear on both sides indicating that the bead has been strung as one of a group. The glass is a uniform royal blue in colour and the surfaces appear slightly pitted with small ?air bubbles.

Scientific analysis of glass and beads can provide a range of technological and archaeological information. It can provide the basis for inferring the kinds of raw materials used, including the primary raw materials and added colourants. Sometimes it is also possible to infer when the glass was made because the chemical composition of ancient glass changed in distinct ways over time. This can be due to changes both in the primary raw materials used, such as sand and alkalies, and also in the colourants and opacifiers with their associated trace impurities. Quite why these changes in glass technology occurred is extremely interesting and several possible reasons for the changes can be suggested but will not detain us here.

4.2 Technique of analysis

The translucent blue Hindwell Ash bead was chemically analysed using electron probe microanalysis. This involved the removal of a 1mm sample from the bead which was mounted in a block of epoxy resin, polished and coated with a thin carbon film to avoid deflection and distortion of the electron beam. The system was calibrated using Corning and National Science Foundation glass standards and chemically analysed using a Cambridge M9 electron microprobe with two wavelength dispersive spectrometers and a defocused electron beam of 80 microns. The results were corrected using a ZAF program. The relative analytical accuracy of the system under the conditions employed was: 4% for soda, 1% for silica, 3% for potassium oxide, 5% for calcium oxide and 2% for lead oxide. For minor elements the levels of accuracy was also acceptable: 2% for magnesia, 1% for aluminia, 3% for phosphorus pentoxide, 10% for ferric oxide and 20% for cupric oxide. A fuller description on the analytical conditions employed is published elsewhere (Henderson 1988).

4.3 **Analytical results** (see table 8.7)

The glass bead is of a soda (Na_2O) - lime (CaO)- silica (SiO_2) composition, with 16.4% soda, 9.2% calcium oxide ('lime') and 66.8% silica. It also contains low levels of magnesia (MgO) and potassium oxide (K_2O_0 both of which are indicators of the kind of alkali used. The bead also contains 3.4% lead oxide (PbO) and a significant impurity (0.7%) of antimony trioxide. The glass is coloured by 0.06% cobalt oxide which was probably originally associated mineralogically with part of the 1.0% ferric oxide (Fe_2O_3) and 0.2% cupric oxide detected in the glass. The antimony oxide detected may also partly have been introduced as a cobalt mineral impurity (Henderson 1985); no manganese oxide was detected. Levels of aluminia (Al_2O_3) at 2.0%, phosphorus pentoxide (P_2O_5) at 0.1% , sulphur trioxide (SO_3) at 0.2% and chlorine (Cl) at 1.3% normally found in soda-lime glass were detected.

4.4 Technological inferences

Soda-lime-silica glass was some of the earliest made by man, dating back to the mid 3rd millennium BC. However, during various periods the source of the soda changed, leading to a corresponding change in the associated impurity patterns in the glass, so it becomes possible to infer a period of production from this alone (Henderson 1995). The Hindwell Ash bead contains low magnesia and potassium oxide levels which suggests that a mineral (as opposed to plant ash) source of alkali was used in its manufacture. The most likely candidate for this is a mineral evaporate called natron, a sodium sesquicarbonate. This is thought to have derived from the Wadi el-Natrun in Egypt (Turner 1956; Henderson 1985), though it is surprising that that there is little evidence for any other archaeological links with Egypt during the Bronze and Iron Ages in Europe when the kind of glass thought to have been made using natron predominated. Ultimately, it may be necessary to look to the Classical world to provide a primary point of contact for the exploitation of natron sources in Egypt which was then incorporated in the fused glass used in Europe. Given the consistent levels and types of impurities detected in ancient glasses which are associated with natron, the only, less likely, interpretation is that another alkali source with the same impurities was used.

The source of silica in the Hindwell Ash bead is likely to have been sand. This can be suggested on the basis of the level of aluminium oxide (Al_2O_3) of 2.0% which was probably introduced in the sand as an impurity (Henderson 1985, 271). The other oxide which was probably introduced with the sand is lime (CaO) as shell fragments. Although the level in the bead is slightly higher than normally detected in soda-lime glass, it is unlikely that dolomite, for example, would have been used as an alternative calcium oxide source in this instance. The composition of beach sand is so variable and constantly changing, that it is impossible to suggest where it would have derived from.

The blue colour of the glass is due to 0.06% cobalt oxide in the presence of 1.0% ferric oxide and 0.2% cupric oxide, both oxides which can potentially colour glass independently given the appropriate chemical environments. Cobalt oxide is the most powerful transition metal colourant and the level detected is typical for a soda-lime glass, producing a marked cobalt blue colour. The technologically interesting thing about the use of cobalt oxide in ancient glasses is that it is possible to suggest the type of cobalt-bearing mineral used in the glass by using the impurities associated with cobalt (Henderson 1985, 278-81). In this case the impurities are iron, copper and antimony (some of the iron may have been introduced in the sand). It is possible therefore that the cobalt was of the triantite ore type was a possible source (Henderson 1985, 280). Another common cobalt mineral type is rich manganese and/ or arsenic and neither of these were detected.

A further interesting point can be adduced from the electron probe results about colour, or in this case potentially a lack of it. Significantly, no manganese oxide was detected in the bead. This suggests that the glass used to make the bead was manufactured before a change in glass technology which occurred in the 2nd century BC when manganese oxide was first introduced in order to decolourise a base glass. The appearance of the glass could then be modified with the addition of colourants and opacifiers. From *c.* 6th century BC antimony oxide was used for decolourising glass, a compound which was largely replaced as a decolouriser by manganese oxide in the second century BC. Although we have suggested that the antimony trioxide was associated with the cobalt used as a colourant, a second and more likely explanation for its presence at rather high levels is that it was used as a decolouriser in the glass to which a cobalt-rich colourant was added.

4.5 Archaeological results

Given that globular glass beads are difficult to date according to their shape and technique of manufacture, chemical analysis of a sample of the glass was carried out in order to attempt to place it in a technological tradition. The most diagnostic chemical characteristics of the glass bead in terms of a possible date is the lack of manganese oxide detected and the presence of a relatively high level of antimony trioxide. These chemical characteristics suggest that the glass dates to some time before the 2nd century BC (Henderson & Warren 1983; Henderson 1989), and quite possibly after the 6th century BC. Glass found in Europe which dates to between *c.* 1000 BC and the 7th century BC generally has a distinctly different chemical composition (Braun 1983; Henderson 1989) so we can be fairly confident here that an early to middle iron age date for the bead is appropriate.

Na_2O	16.4
MgO	0.6
Al_2O_3	2.0
SiO_2	66.8
P_2O_5	0.1
SO_3	0.2
Cl	1.3
K_2O	0.5
CaO	9.2
TiO_2	ND
Cr_2O_3	ND
MnO	ND
Fe_2O_3	1.0
CoO	0.06
NiO	ND
CuO	0.2
ZnO	ND
As_2O_3	ND
SnO_2	ND
Sb_2O_3	0.7
BaO	0.1
PbO	3.4

Table 8.9: Electron probe microanalysis of the Hindwell Ash glass bead (results are expressed as weight percent of the oxide) 1. ND= Not Detected, 2. Typical levels of detection in p.p.m. (95.5% probability level) are: Na_2O (760), K_2O (250), CaO (170), Fe_2O_3 (640), CuO (1200), PbO (200).

PART 9

PALAEOENVIRONMENTAL REPORTS

1 PHOSPHATE AND MAGNETIC SUSCEPTIBILITY STUDIES OF BURIED SOILS AND DITCH SEDIMENTS FROM THE UPPER NINEPENCE EXCAVATION, WALTON BASIN, POWYS (John Crowther)

1.1 Introduction

Phosphate and magnetic susceptibility studies were undertaken on the buried palaeosol beneath the Bronze Age barrow in hope of gaining additional insight into the nature and pattern of human activity on the old land surface. Investigations were also made of the fill of the ditch (Context 8) beneath the barrow; the fill of the Upper Ninepence enclosure ditch to the south; and, for comparative purposes, the A and B horizons of a nearby modern soil. Both properties are widely used in archaeological prospection. Phosphate enrichment derives from inputs of organic matter (e.g. plant material, excreta, urine and, especially, bone) and is typically associated with features such as midden deposits, animal enclosures, burials, etc. (see reviews by Proudfoot 1976; Hamond 1983). Magnetic susceptibility of soils and sediments is particularly enhanced by burning (Clark 1990; Scollar *et al.* 1991). In the present study conventional low frequency mass-specific magnetic susceptibility (χ) measurements have been complemented by determinations of fractional conversion (χ_{conv}). The latter is a measure of percentage of the maximum potential magnetic susceptibility (χ_{max}) that has been achieved within individual samples, and is more readily interpreted than raw χ data since it takes into account underlying variations attributable to geological and pedogenic factors (Tite 1972; Crowther & Barker 1995). In addition, the organic matter concentration of each sample was estimated by loss-on-ignition (LOI) to check the consistency of the soil horizons/depths sampled, and pH and particle size were determined for selected samples.

1.2 Methods

Phosphate-P (total phosphate) was determined by alkaline oxidation with NaOBr using the method described by Dick & Tabatabai (1977); LOI by ignition at 375°C for 16 hrs (Ball 1964); and magnetic susceptibility using a Bartington MS1 meter. χ_{max} was achieved by heating samples at 650°C in reducing, followed by oxidising conditions. The method used broadly follows that of Tite & Mullins (1971), except that household flour was mixed with the soils and lids placed on the crucibles to create the reducing environment (after Graham & Scollar 1976; Crowther & Barker 1995). The percentage χ_{conv} is then calculated as: $(\chi/\chi_{max}) \times 100.0$ (Tite 1972; Scollar *et al.* 1990). The pH and particle size were determined using standard analytical methods (Avery & Bascomb 1974).

Depth (mm)	LOI (%)	pH (1:2.5, water)	Phosphate-P (mg g^{-1})	χ (10^{-8} SI kg^{-1})	χ max (10^{-8} SI kg^{-1})	χ conv (%)
MODERN SOIL						
A (0-150)	6.91	5.5	1.48	89.2	1450	6.17
A (150-300)	5.87	5.5	1.31	93.0	1400	6.64
B (150-400)	2.99	6.3	0.816	42.4	1280	3.32
SECTION THROUGH BARROW AND PALAEOSOL*						
Barrow	3.32	5.7	2.65	31.8	736	4.32
Fe panning†	6.07	nd	7.32	55.0	6850	0.80
Buried soil$						
0-20	3.06	5.7	2.62	54.2	1110	4.88
20-40	3.05	5.6	2.37	57.5	1140	5.06
40-60	3.06	5.7	2.39	79.9	1160	6.90
60-80	3.09	5.6	2.51	71.0	983	7.22
80-100	3.16	5.6	2.36	55.4	888	6.24
100-120	2.83	5.5	2.12	47.5	875	5.43
120-170	2.18	5.4	1.92	24.9	826	3.02

Table 9.1: Data on chemical and magnetic properties of samples from modern A and B horizons, the barrow and buried palaeosol.

** This section is located alongside thin section MM2 (see below) : † This includes thin (4mm) Mn-impregnated Ah horizon: $ Depth (mm) below base of iron-panning (effectively from the top of the Eb1 horizon identified in thin section).*

1.3 Results and Discussion

1.3.1 General character of modern soils

The soils at Walton are developed on drift derived largely from local Silurian sandstones, siltstones and shales. Modern soils in the vicinity of the site are mostly brown earths of the East Keswick 1 association, although locally there is some gleying where the subsoils are less permeable (Rudeforth *et al.*, 1984). Analytical data for a profile adjacent to the barrow (tables 9.1 and 9.2) reveal the modern ploughed topsoil to be an acidic (pH, 5.5), organic-rich (LOI at 0-15 cm, 6.91%), clay loam. The predominance of silts (64.7%) in the <2mm fraction reflects the high proportion of siltstones in the parent material (see Part 9.2), and the vulnerability of sand-sized siltstone grains to mechanical disintegration. As would be anticipated, phosphate-P, χ, and χ conv are higher in the topsoil than the subsoil.

1.3.2 Vertical section through buried palaeosol and base of barrow

Concentrations of organic matter within the buried Ah and AEb horizons of the soil are relatively low, with LOI values of 3.06 and 3.05% in samples taken from the topmost 40mm (i.e. the AEb1 and top of AEb2 horizon covered by thin section MM2; Part 9.2). Significant amounts of organic matter will undoubtedly have been lost through decomposition following burial, and therefore the LOI data poorly reflect the absolute concentrations of organic matter that were originally present. However, the relative values are likely to be broadly representative. In this respect the high LOI (6.07%) recorded in the overlying pan is significant in that it suggests the presence of an organic-rich surface layer (cf. thin section evidence). The LOI results also suggest that the AEb horizons of the buried soil extended only to a depth of *c.*120mm. The modern soil by comparison has a much thicker and more evenly mixed A horizon, which probably to a large extent reflects the effects of ploughing.

Depth (cm)	Coarse sand (0.6-2.0mm)	Medium sand (0.2-0.6mm)	Fine sand (0.06-0.2mm)	Silt (2-60mm)	Clay (<2mm)	Texture class*
Modern soil						
A (0-15)	8.1	2.6	2.7	64.7	21.9	CL
Buried soil						
6-8	17.3	5.1	3.6	58.1	15.9	SyZL

Table 9.2: Particle size data for A horizon of the modern soil and buried palaeosol.
** Texture classes: SyZL = sandy silt loam; CL = clay loam.*

The pH of the buried soil may well have been affected by post-burial weathering and leaching processes, and therefore needs to be interpreted with caution. The data do however suggest a slightly-moderately acidic, quite heavily leached soil – as is suggested by the thin sections (see below). Variations in phosphate-P down the profile are complicated by the panning. In acid soils such as these, phosphate tends to become fixed by the formation of insoluble compounds with Fe. As a consequence, more phosphate-P will tend to be retained within horizons that are impregnated with Fe, and any phosphates leached from overlying layers (in this case from the barrow) will tend to accumulate here. Even so, the concentration of 7.32 mg g^{-1} recorded within the pan is very high and certainly tends to suggest some degree of phosphate enrichment at the surface of the buried soil. Interestingly, too, the phosphate-P concentrations of the underlying A horizons of the buried soil (range, 2.12-2.62 mg g^{-1}) and also of the barrow (2.65 mg g^{-1}) are high compared with the modern Ap horizon (1.48 mg g^{-1} at 0-150mm). These findings may be indicative of quite high levels of human activity prior to barrow construction.

Unfortunately, the magnetic properties of the top of the buried soil have also been affected by the panning. The very high χ_{max} value (6850 x 10^{-8} SI kg^{-1}) recorded in the pan is clearly a direct reflection Fe accumulation, and the effects of Fe migration will almost certainly have affected the properties of the uppermost layers of the buried soil. The highest χ (79.9 x 10^{-8} SI kg^{-1}) and χ_{conv} (7.22%) values were recorded at between 40 and 80mm, and these are similar to the figures recorded in the A horizon of the modern soil.

1.3.3 Spatial survey of the buried palaeosol

Sampling of the topsoil and subsoil of the buried palaeosol was undertaken on regular grids. Unfortunately, quite extensive areas of the palaeosol, particularly in the western half of the site, have been disturbed by rabbit burrowing. At each location a sample was therefore taken of what appeared to be the least disturbed soil within a 1 by 1m grid square. The topsoil survey (at 1m intervals) was confined to the NE and SW quadrants, with samples being taken from the top of the palaeosol, or just beneath the iron-pan where this was present. In the case of the subsoil, samples were taken from the top of the B horizon (avoiding identifiable features such as pit fill, hearths, etc.) at intervals of 5m across the whole area and of 2m over the building to the south and the supposed enclosure to the north.

Despite the sampling strategy adopted, it is apparent from the LOI data that some of the subsoil samples contain higher than normal concentrations of organic matter (those with LOI >3.0% are certainly suspect). Since disturbance is the most likely cause, these samples (*n*=11) have been excluded from subsequent analysis. As would be anticipated, LOI, phosphate-P and χ_{conv} (table 9.3) are all significantly higher in the topsoil than the subsoil (Mann-Whitney, $p<0.001$) – the mean values for phosphate-P and *c*, for example, being 2.43 mg g^{-1} and 65.1 x 10^{-8} SI kg^{-1}, respectively, in the topsoil compared with 1.47 mg g^{-1} and 32.2 x 10^{-8} SI kg^{-1} in the subsoil. There is also a significant difference in χ_{max} (Mann-Whitney, $p<0.001$), but in this case the difference in means between the topsoil (1200 x 10^{-8} SI kg^{-1}) and subsoil (1080 x 10^{-8} SI kg^{-1}) is relatively small, and is somewhat difficult to explain.

	Mean	Minimum	Maximum	Standard deviation
Topsoil (n=148)				
LOI (%)	3.42	2.68	4.19	0.328
Phosphate-P (mg g^{-1})	2.43	1.04	4.62	0.541
c (10^{-8} SI kg^{-1})	65.1	32.1	154	19.7
χ_{max} (10^{-8} SI kg^{-1})	1200	826	1650	155.3
χ_{conv} (%)	5.45	2.21	11.8	1.437
Topsoil (n=148)				
LOI (%)	2.34	1.55	2.99	0.314
Phosphate-P (mg g^{-1})	1.47	0.524	2.83	0.445
χ (10^{-8} SI kg^{-1})	32.2	10.9	71.3	13.03
χ_{max} (10^{-8} SI kg^{-1})	1080	526	1560	231.6
χ_{conv} (%)	2.99	1.06	6.21	1.102

*Table 9.3: Summary of analytical data from the survey of the buried palaeosol. * Excludes 11 samples with LOI³3.00 (see text).*

Although the topsoil and subsoil sampling was undertaken on different grids, 23 of the sampling points did in fact coincide and these enable the relationship between the two data sets to be investigated. At the time of barrow construction it might be anticipated that there would be a broad relationship between the chemical and magnetic properties of the topsoil and underlying subsoil. Unfortunately, in the present survey no significant correlation was found between the topsoil and subsoil data for phosphate-P, χ or χ_{conv}, which suggests that the properties of the soils have been affected by post-burial changes. Clearly, the buried topsoil is more likely to have been disturbed than the subsoil, simply by virtue of its closer proximity to the surface and the greater ease with which it might be burrowed, and the results of the topsoil survey seem to confirm this.

1.3.4 Survey of palaeosol topsoil (NE and SW quadrants)

The results of the various surveys are presented in table 9.4 and figs 9.1-5. Of the two quadrants, the SW was found to have been much more affected by rabbit burrowing, and this was reflected for example in the very fragmentary nature of the iron-panning present (cf. substantial and fairly continuous pan in the NE). LOI is significantly higher in the SW quadrant than the NE (Mann-Whitney $p<0.001$). Whilst the observed difference might be attributable to faecal input from rabbits, the fact that there is no significant difference in phosphate-P between the two quadrants, and no correlation overall between phosphate-P and LOI, suggests that this is not the case. The reason for the contrast in LOI is unclear, and in any case the difference is relatively small (mean values 3.52 and 3.32%, respectively). More striking contrasts are evident in the magnetic susceptibility results. χ, χ_{max} and χ_{conv} all stand out as having generally higher values in the SW than the NE quadrant, and in each case the difference in mean values (table 9.4) is statistically significant (Mann-Whitney $p<0.001$). In view of the topographic setting of the site, the nature of the soil parent material, and the size of area under consideration, the difference in χ_{max} seems unlikely to be attributable to natural variations in geology or in pedogenic processes within the original soil. The development of an iron pan across the top of the buried soil, and its subsequent break-up by rabbit burrowing in the SW quadrant provides the most likely explanation. Mobilisation and movement of iron from the buried topsoil to the developing pan will have led to a reduction of both χ_{max} and χ within the bulk of the topsoil, and a corresponding increase in χ_{max} and, possibly, χ within the pan itself. Samples taken from the topsoil immediately beneath such a pan (as in the NE quadrant) will therefore tend to have lower χ_{max} and χ values than in the SW quadrant where burrowing has broken the pan, thereby reincorporating much of the original iron within the topsoil. Unfortunately, even χ_{conv} is unlikely to provide a reliable indication of the original level of magnetic susceptibility enhancement within the topsoil in this case, since this will depend on the rate of mobilisation of the magnetic minerals relative to the rest of the iron in the soil. In these circumstances, the topsoil survey data must be regarded with extreme caution.

	Mean	Minimum	Maximum	Standard deviation
SW quadrant (n=69)				
LOI (%)	3.52	2.68	4.19	0.361
Phosphate-P (mg g^{-1})	2.49	1.74	4.62	0.550
χ (10^{-8} SI kg^{-1})	75.6	42.1	154	19.42
χ_{max} (10^{-8} SI kg^{-1})	1240	951	1650	149.0
χ_{conv} (%)	6.09	3.57	11.8	1.422
NE quadrant (n=79)				
LOI (%)	3.32	2.72	3.88	0.267
Phosphate-P (mg g^{-1})	2.38	1.04	4.07	0.531
χ (10^{-8} SI kg^{-1})	56.0	32.1	116	14.86
χ_{max} (10^{-8} SI kg^{-1})	1150	826	1490	149.7
χ_{conv} (%)	4.89	2.21	9.13	1.203

Table 9.4: Summary of analytical data from the survey of the buried palaeosol.

1.3.5 Survey of palaeosol subsoil.

By comparison with the topsoils, the subsoils are less likely to have been affected by post-burial pedogenic processes and animal burrowing. Moreover, where appreciable disturbance has occurred then this seems to be reflected in anomalously high LOI values, and the 11 samples that appear to have been affected in this way have been eliminated from the present analysis. In this respect it is should be noted that there are no significant differences in LOI, phosphate-P and χ_{conv} between the more disturbed western half of the site and the eastern half. The absence of a significant correlation between phosphate-P and LOI suggests that the phosphate survey data (fig. 9.7) largely reflect variations in inorganic phosphate (i.e. there is no evidence of the effects of recent faecal inputs). The key magnetic property, χ_{conv}, is correlated with LOI (r_S=0.300, p<0.05), though the amount of variation explained by the latter is only 6% (based on determination of r^2). Again, therefore, post-burial disturbance would appear to be of minor importance. Thus, the results the phosphate-P (fig. 9.7) and χ_{conv} (fig. 9.10) surveys seem likely to reflect the properties of the subsoil at the time of burial. Both phosphate-P (range, 0.524-2.83 mg g^{-1}) and χ_{conv} (1.06-6.21%) exhibit quite marked variability, and interestingly there is a significant, albeit weak, correlation (r_S=0.267, p<0.05) between the two. These findings suggest that traces of phosphate enrichment and magnetic susceptibility enhancement in the original soil may well be present. Certainly those areas with phosphate-P concentrations of ³2.00 mg g^{-1} and χ_{conv} values of ³4.0% merit specific consideration in relation to the archaeological evidence. Attention in particular should be drawn to two areas. First, there is a clear grouping of samples with high phosphate-P concentrations at the SE corner of the supposed enclosure (fig. 9.7). (Is it possible that there was some form of animal pen or midden deposit here?). Secondly, there is a cluster of high χ_{conv} values (including one of 6.21%) in the northern half of the building (in this respect it is unfortunate that the burnt subsoil associated with the hearth was not sampled as a control).

1.3.6 Ditch deposits

Samples were taken from the natural at the base of each ditch (Upper Ninepence and Upper Ninepence enclosure) and at 5cm intervals up through the sequence of deposits. Both ditches are cut deeply into the underlying subsoil ('natural'), which is characterised by its low LOI, phosphate-P, χ and χ_{conv} (table 9.5). The ditch fills are almost identical in terms of organic matter concentration and χ_{max}, which suggests that they are derived from very similar sources.

	Mean	Minimum	Maximum	Standard deviation
Ditch (Ctxt 8) at Upper Ninepence				
LOI (%)	2.81	2.02	3.29	0.369
Phosphate-P (mg g^{-1})	1.74	1.15	2.09	0.270
χ (10^{-8} SI kg^{-1})	47.7	29.6	56.8	7.52
χ_{max} (10^{-8} SI kg^{-1})	1020	824	1260	105.3
χ_{conv} (%)	4.72	3.57	5.80	0.778
Neolithic enclosure ditch (U9d94-II)				
LOI (%)	2.71	1.58	3.87	0.650
Phosphate-P (mg g^{-1})	0.529	0.383	0.626	0.062
χ (10^{-8} SI kg^{-1})	13.8	7.84	26.9	5.04
χ_{max} (10^{-8} SI kg^{-1})	1012	663	1560	205
χ_{conv} (%)	1.36	0.71	2.05	0.384

Table 9.5: Summary of analytical data from the two sequences of ditch deposits.

The fact that the LOI figures are so low, with means of 2.81 and 2.71%, respectively, indicates that a substantial proportion of the fills was derived from subsoil, and that the ditches probably remained relatively dry as accumulation took place. Interestingly, despite these close similarities, the fills of the ditch (Context 8) at Upper Ninepence have significantly higher (Mann-Whitney, $p<0.001$) concentrations of phosphate-P (mean, 1.74 mg g^{-1}), and higher χ (47.7 x 10^{-8} SI kg^{-1}) and χ_{conv} (4.72%) values than those of ditch of the Upper Ninepence enclosure. This finding suggests a much greater anthropogenic influence upon the sediments that accumulated in the former than the latter.

2 REPORT ON SOIL THIN SECTIONS FROM THE UPPER NINEPENCE EXCAVATION, WALTON BASIN, POWYS (John Crowther)

2.1 Introduction

Four soil thin sections were examined. Two (MM2 andmm5) were taken from the interface between the basal part of the barrow and the top of the buried soil in the hope that they might provide insight into the nature of the soil and vegetation cover immediately prior to barrow construction, and into the character and origins of the material used to make the barrow. The remaining thin sections are from specific contexts of potential archaeological interest: a hearth (hearth 28) deposit (MM7) and a pit fill sequence (pit 188) containing charcoal-rich deposits (MM8). Analytical data relating tomm2 are contained in the report on phosphate and magnetic susceptibility (see PART 9.1).

2.2 Methods

The samples were taken in Kubiena boxes, approximately 75 by 50 by 40mm in size. Samplemm2 was taken by the author, whereas the remainder were taken by the excavator. Samples were acetone-dried, prior to impregnation with resin and thin section manufacture (Guilloré, 1985; Murphy 1986) – the work being undertaken at the University of Stirling. The thin sections have been described according to Bullock *et al.* (1985).

2.3 Results and Interpretation

Descriptions of the key features of key features of the thin sections are presented in tables 9.6-10. A coarse/fine limit of 10mm is used for both the mineral and organic components.

2.3.1 MM2: Interface between base of barrow and top of buried soil

Buried soil The precise location of the interface between the barrow and palaeosol is somewhat uncertain because of the extent of Fe (and Mn) panning, impregnation and pseudomorphic replacement of organic matter that has occurred in this zone (table 9.6). Fe mobilisation and redeposition of this magnitude is common in buried organic/A horizons, especially where water movement and retention has been affected by a marked discontinuity in the character of adjacent materials – in this case between the largely minerogenic material of the barrow and the buried topsoil). The layer (4mm thick) immediately beneath the panning clearly appears to be part of a very thin Ah horizon, the upper part of which is probably impregnated by the panning. It varies from brown to pale grey/yellowish brown in colour (PPL). It is quite porous (13% void space), which suggests that it has retained much of its original structure and has not been significantly affected by compaction, and has moderately-strongly developed fine crumbs. Fine amorphous organic matter is very abundant and Mn impregnation, which appears to have occurred in association with the organic matter, is abundant. These features all indicate an organic-rich horizon that was very actively worked by soil fauna, and this seems likely to be the actual surface horizon of the buried soil. Although the presence of only rare pseudomorphic plant tissues within the overlying panning (cf. within base of barrow) might reflect the presence of only a sparse vegetation cover, it should be noted that post-burial decomposition processes, combined with the intensity of ferruginisation, may give a misleading impression of the extent of the original plant cover.

The Ah horizon overlies AEb horizons. These are distinguished from the Ah horizon by their speckled pale grey/yellowish brown colour (PPL), which is typical of leached, clay-depleted horizons; and their much lower concentration of organic matter (only rare coarse and occasional fine organic matter is present) and rare-occasional impregnative Mn nodules. Despite being less organic, these horizons contain abundant ultrafine granules (presumably largely of excremental origin), which clearly indicate high levels of biological activity, including earthworms. Indeed, the presence of a very thin, but distinct, stony layer (AEb1) immediately beneath the Ah horizon is probably attributable to earthworm sorting. Fine and coarse charcoal fragments are rare-occasional down through the buried soil, with the higher concentrations tending to occur at greater depth. This again is indicative of active mixing by earthworms. Thus, whilst the soil appears to have been quite heavily leached, it was not sufficiently acidic as to completely inhibit earthworm activity. The fact that there is such clear horizon differentiation in the top 40mm, with much of the organic matter confined to a thin surface Ah horizon, suggests that this soil had not been subject to significant physical disturbance by human activity (e.g. ploughing). The presence of small amounts of charcoal, well distributed through the topsoil, suggests a significant period of human activity prior to burial. However, the high porosity of the Ah horizon suggests that this particular location had not been subject to excessive trampling and compaction, as might be associated with the floor of a building or yard area.

Barrow In the thin section studied the bottom of the barrow comprises a very thin (20mm) layer of turves. The surfaces of the individual turves are picked out by impregnative Fe panning, within which there are very abundant pseudomorphic plant tissues. Compared with the buried soil, the turves do not have such a clearly identifiable Ah horizon, which suggests that the ground surface from which they were taken was of a different character from the buried soil – possibly from an area where much of the 'natural' Ah horizon had previously been eroded. The overlying matrix largely comprises Eb horizon material, which is speckled pale grey/yellowish brown in colour (PPL). About one-third of this contains relatively little clay, whereas the rest (presumably derived from deeper in the soil profile from which it was taken) has a rather more pale yellow coloured (PPL) clay. Only rare (amorphous) organic matter is present in these microfabrics. Rare coarse and occasional fine charcoal (some of which is only partially charred) and rare reddened mineral grains in stones confirm the occurrence of burning prior to barrow construction. The lower part of the barrow above the basal turves also includes about 5% of material, occurring in the form of speckled dark brown and brown (PPL) weakly developed fine granules, that appears to be derived from a former Ah horizon. This contains very abundant coarse and fine organic matter, much of a pellety form, together with rare phytoliths and rare-occasional charcoal. The relatively low charcoal concentrations suggest the material to be derived from a location where there had previously been only a low intensity of human activity. The other notable feature of the barrow is the presence of layered, microlaminated yellow clay fills and crescentic coatings within vughs within the matrix, particularly towards the base. These, along with the vughs in which they occur, are clearly products of disturbance and local collapse following barrow construction. Clay movement probably occurred fairly soon after barrow construction. It certainly pre-dates much of the panning, since appreciable amounts of clay were washed down into the Ah horizon of the buried soil.

2.3.2 MM5: Interface between base of barrow and top of buried soil (W. Section)

The sequence revealed in this section of the barrow (details in table 9.7) is broadly similar to that recorded in MM2 (above). It does, however, differ in four significant respects. First, the boundary between the barrow and the old ground surface is less sharp because of post-burial mixing by earthworms. Secondly, whilst the buried soil has been actively worked by soil organisms, no clear stone line is present. Thirdly, although there has been considerable Fe impregnation and pseudomorphic replacement of organic matter, there is only a very limited amount of panning. Finally, the turves themselves appear to be derived from a location where there was a more substantial Ah horizon present. There is thus evidence from the two thin sections (MM2 andmm5) of contrasts in the character of the ground surface in the immediate vicinity of the barrow at the time of construction.

2.3.3 MM7: Charcoal-rich layer (context 29) over burnt subsoil (69) associated with hearth (28)

The part of context 29 included within the thin section (details in table 9.8) has been significantly affected by burrowing, and may actually have collapsed into a small animal burrow. About 80% is speckled dark yellowish brown/brown (PPL) soil from Ah and Eb horizons, whereas the remaining 20% comprises fragments of this microfabric mixed with lighter coloured fragments of subsoil. Although the darker soil now has a predominantly subangular blocky structure, there are traces of crumb-like features associated with earthworm activity. The soil itself exhibits little sign of burning, but contains abundant charcoal, presumably derived from an adjacent hearth. There is no evidence of burnt cereal. The charcoal is moderately broken up and has been thoroughly incorporated into the soil by biological activity. Only about 5% of this part of the context is not significantly charcoal-enriched, and this generally originated from a former Eb horizon. The absence of traces of ash within the context suggests that the hearth debris was subject to weathering and leaching prior to burial by the barrow. Indeed, as is commonly the case, the release of salts from the weathered ash may have served to mobilise clays within the matrix, thereby accounting for the dusty clay coatings recorded within 5% of the vughs. Unlike in the previous two buried soils, there is no evidence in this case of clay movement down from the overlying barrow – presumably the dense floor layer has prevented this.

The underlying subsoil is very stony, with 70% smooth subangular siltstones, up to 30mm in size. The stones are only slightly rubified, which suggests that they were quite deep in the subsoil. Unfortunately, the subsoil appears to have been badly disturbed during sampling, and therefore the structure and porosity cannot be meaningfully assessed. What is interesting, however, is the presence of many silty cappings on the stones. These are mostly charcoal free (i.e. appear to pre-date anthropogenic activity), and are almost certainly of periglacial origin.

2.3.4 MM8: Fills of pit (188)

In view of the abundant fine amorphous organic matter present in the main (upper) fill of the pit (details in table 9.9), this appears to comprise extremely charcoal-rich Ah horizon material – as might arise where charcoal from a hearth had spread out over the adjacent ground surface and had then been scraped together, incorporating topsoil. There is a particularly charcoal-rich layer at the base of the main fill. The charcoal is mostly of woody material, and there is no evidence of phytoliths or fragments of cereals within the deposit. Any ash that may have been present has been completely weathered, and the fill as a whole has been subject to considerable biological reworking – as reflected in the high proportion of ultrafine and fine granules present within the matrix. The main fill overlies a thin (10mm) lower fill, which is distinguished by its very high sand content and much lower concentrations of organic matter and charcoal. Indeed, the sands and small stones within this layer give rise to an enaulic structure. This layer clearly appears to have been laid down as a separate fill at the base of the pit, but its origin is uncertain. The fill of the pit has been disturbed by burrowing, presumably by small mammals, and the effects of this activity appear to extend down into the top of the underlying natural.

The pit seems to have been cut down into the lower Eb horizon of the original soil. This contains only rare quantities of organic matter and coarse charcoal fragments, but, as with the pit fill, its structure is dominated by biologically-derived ultrafine to fine granules. One puzzling feature of the pit is the presence of a clear band of small stones, 15mm thick, at the top of the Eb horizon. The fact that the finer material which partially fills the interstices between the stones is almost identical in character to the underlying Eb horizon suggests that it might be the result of disturbance caused during the digging of the pit.

2.4 SUMMARY OF PALAEOSOIL EVIDENCE

2.4.1 Pre-barrow soils

The soils are developed on glacial drift derived from local sandstones, siltstones and shales (predominantly siltstones in the thin sections studied). The presence of dusty coatings on stones in the subsoils is indicative of former periglacial conditions.

The soils appear to have been slightly to moderately acidic leached brown earths, with a very thin humic topsoil (Ah horizon), iron- and clay-depleted AEb horizons, and a more clay-rich B horizon.

2.4.2 Human activity on the pre-barrow surface

The buried soils studied do not appear to have been subject to physical mixing (e.g. by ploughing).

There is, however, substantial evidence of human activity prior to barrow construction. Certain obvious features were found during the excavation, including hearths (e.g.mm7), pits (e.g.mm8), post holes, ditches and possible compacted floor surfaces. No traces of cereal remains were identified within the thin sections studied.

The properties and features of the buried soil provide additional insight. For example, charcoal is present and well distributed through the buried topsoil horizons, and there is evidence of phosphate enrichment.

In addition, there appear to have been quite marked local variations in the nature of the topsoil. In places (e.g. as reflected in the turves within the barrow in MM2) the Ah horizon may have been completely eroded or only very thin, whereas elsewhere there may have been a rather more substantial Ah horizon (e.g. turves in MM5). Such local variability seems likely to be attributable to human activity.

2.4.3 Materials used in barrow construction

The soil used in constructing the barrow appears to have been derived from an area (presumably nearby) that had a some degree of vegetation/turf cover. Thin turves are evident in both thin sections from the base of the barrow. The bulk of the barrow appears made up largely of Eb horizon material, mixed with some more organic-rich granules and clay-rich material, presumed to be derived from the former topsoil and B horizons, respectively – though it should be noted that turves were identified within the barrow during excavation (A. Gibson, pers. comm.).

Considerable movement of clay has taken place within the barrow, producing distinctive fills and coatings in many vughs. This probably occurred quite soon after construction, and certainly pre-dates the panning associated with the turves and old ground surface.

Table 9.6 (follows below): Key features of thin section MM2: Interface between barrow and buried soil

Barrow

This comprises five principal microfabrics:

<u>Microfabric A</u> – very dominant (50% overall, and 70% of upper part of section)
Interpreted as being derived from former Eb horizon.

Microfabric

<u>Colour</u>: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).
<u>Peds</u>: weakly developed very fine-fine subangular blocky peds.
<u>Voids</u>: Total void space 13%, comprising planar voids and vughs; planar voids (70% of void space, volume probably exaggerated by disturbance during sampling) – curved, randomly-oriented, not referred, mesoplanes; vughs (30%) – spherical, mesovughs.

Basic mineral components

c/f limit at 10mm; ratio 60:40.
<u>Coarse fraction</u>: silt dominant, but includes frequent sand, comprising fragments of siltstone, and very few 2-20mm smooth, subangular stones (siltstones). Overall stone content 5%. Occasional stones contain rare reddened mineral grains (OIL).
<u>Fine fraction</u>: fine silts and clay, yellowish brown (PPL); low birefringence (XPL); pale brown (OIL).

Organic components

<u>Organic coarse material</u> (>10mm): rare coarse amorphous organic matter; rare charcoal, some partially charred.
<u>Organic fine material</u> (<10mm): rare fine amorphous organic matter; occasional charcoal, some partially charred.

Pedofeatures

Layered, microlaminated yellow clay, with a sharp extinction zone completely fills 25% of the vughs, and forms crescentic coatings within 50% of vughs.

<u>Microfabric B</u> – frequent (25%)
Interpreted as being derived from former Eb horizon
As Microfabric A, but less yellow clay is evident.

<u>Microfabric C</u> – very few (5%)
Interpreted as being derived from former Ah horizon

Microfabric

<u>Colour</u>: Dark brown and brown (PPL); very low birefringence in fine fraction with crystallic silt grains (XPL); brown brown (OIL).
<u>Peds</u>: weakly developed fine granules.
<u>Voids</u>: Void space within granules 3%.

Basic mineral components

c/f limit at 10mm; ratio 50:50.
<u>Coarse fraction</u>: silt very dominant.
<u>Fine fraction</u>: fine silts and clay, yellowish brown (PPL); low birefringence (XPL); pale brown (OIL).

Organic components

<u>Organic coarse material</u> (>10mm): occasional coarse amorphous organic matter; rare charcoal; rare phytoliths.

Organic fine material (<10mm): very abundant fine amorphous organic matter, including very abundant pellety organic material; rare-occasional charcoal.

Pedofeatures
No pedofeatures within the peds.

Microfabric D – 10% overall, but dominant in lowermost 20mm of barrow deposit.
Interpreted as having same origin as A, with post-deposition iron staining.
As Microfabric A, except that the colour is speckled pale grey/yellowish brown/orange (PPL), the orange being due to iron staining, chiefly within the clay fraction.

Microfabric E – 10% overall, but dominant in lowermost 20mm of barrow deposit, where it forms bands, up to 5mm thick.
Interpreted as being impregnative Fe/Mn panning associated with turves within barrow.
Microfabric
Colour: orange/brown, with many black inclusions of manganese particularly in lowermost band (PPL); no birefringence (XPL); orange/bright brown, with many black inclusions particularly in lower most band (OIL).
Peds: traces of former crumbs are evident, but now completely impregnated with Fe and Mn.
Voids: Total void space 3%: mostly planar voids , comprising planar voids and vughs; planar voids (75% of void space – volume probably exaggerated by disturbance during sampling); vughs (25%) – spherical, mesovughs.

Basic mineral components
c/f limit at 10mm; ratio 60:40.
Coarse fraction: silt dominant, but includes frequent sand, comprising fragments of siltstone and quartzite, and very few 2-20mm smooth, subangular stones (siltstone and quartzite)
Fine fraction: fine silts, clay and amorphous iron compounds; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): many, and locally very abundant, pseudomorphic plant tissues in which cell walls are marked by ferruginisation; many coarse amorphous organic matter, much of a pellety form; rare charcoal.
Organic fine material (<10mm): abundant fine amorphous organic matter; rare charcoal.

Pedofeatures
Layered, microlaminated orange (iron-stained) clay completely fills 50% of the vughs, and forms crescentic coatings within 25% of vughs.

Buried soil

This comprises four principal microfabrics:

Microfabric F – forms layer 3mm thick across supposed old ground surface.
Interpreted as being impregnative Fe/Mn panning associated with litter/turf layer of old ground surface (but could be bottom turf of barrow).
As Microfabric E, except that there are only rare pseudomorphic plant tissues in the coarse organic fraction.

Microfabric G – forms layer 4mm thick beneath the pan associated with microfabric F
Interpreted as being the Ah horizon of the buried soil.
Microfabric

Colour: brown and pale grey/yellowish brown, with very abundant black inclusions of Mn (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown, with dark grey inclusions of Mn (OIL).
Peds: moderately-strongly developed fine crumbs.
Voids: Total void space 13%: 90% compound packing voids and 10% spherical mesovughs.

Basic mineral components
c/f limit at 10mm; ratio 60:40.
Coarse fraction: silt dominant, but includes frequent sand, comprising fragments of siltstone, and few 2-20mm smooth, subangular stones (siltstone).
Fine fraction: fine silts, clay and amorphous Fe and Mn compounds; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): occasional coarse amorphous organic matter, much of a pellety form; rare charcoal.
Organic fine material (<10mm): very abundant fine amorphous organic matter; rare charcoal.

Pedofeatures
Layered, microlaminated yellow clay with a sharp extinction zone forms crescentic coatings within 50% of vughs, and occasional coatings on compound packing voids; abundant impregnative Mn, which appears to be associated with organic matter.

Microfabric H – forms layer 20mm thick beneath the supposed Ah horizon associated with microfabric G.
Interpreted as being a stony upper AEb horizon (AEb1) of the buried soil.

Microfabric
Colour: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).
Peds: weakly-moderately developed fine-medium crumbs, with abundant ultrafine granules.
Voids: Total void space 10%: 90% compound packing voids and 10% spherical mesovughs, most of the latter being in the topmost 10mm.

Basic mineral components
c/f limit at 10mm; ratio 80:20.
Coarse fraction: common-dominant 2-20mm smooth, subangular stones (siltstone, with occasional quartzite); silt dominant in the fine earth fraction, but includes frequent sand, comprising fragments of siltstone.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse amorphous organic matter, much of a pellety form; rare charcoal.
Organic fine material (<10mm): occasional fine amorphous organic matter; rare charcoal.

Pedofeatures
Layered, microlaminated yellow clay with a sharp extinction zone forms crescentic coatings within 50% of vughs in the uppermost 10mm of the horizon; rare-occasional impregnative Mn nodules, mostly pseudomorphically replacing organic matter.

Microfabric I – extends 20+mm beneath the stony AEb1 horizon associated with Fabric G
Interpreted as being a lower AEb horizon (AEb2) of the buried soil.

Microfabric

Colour: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).

Peds: complex: 70% moderately developed very fine-fine subangular peds; 30% ultrafine-fine granules.

Voids: Total void space 10%: 60% compound packing voids, 35% planar voids and 5% vughs.

Basic mineral components

c/f limit at 10mm; ratio 65:35.

Coarse fraction: silt dominant in the fine earth fraction, but includes frequent sand, comprising fragments of siltstone; few-frequent 2-20mm smooth, subangular stones (siltstone, with occasional quartzite); .

Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components

Organic coarse material (>10mm): rare coarse amorphous organic matter; rare-occasional charcoal.

Organic fine material (<10mm): occasional fine amorphous organic matter; rare-occasional charcoal.

Pedofeatures

Layered, microlaminated yellow clay with a sharp extinction zone forms crescentic coatings within 10% of vughs; occasional impregnative Mn nodules, mostly associated with organic matter.

Table 9.7 (follows below): Key features of thin section MM5: Interface between barrow and buried soil (W Section).

Barrow

This comprises three principal microfabrics:

Microfabric A – very dominant (85% overall)
Interpreted as being derived from former Eb horizon.

Microfabric

Colour: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).
Peds: complex: 80% very fine-fine weakly developed subangular blocky peds; 20% ultrafine-fine granules.
Voids: Total void space 12%, comprising planar voids, compound packing voids and vughs; planar voids (50% of void space, volume probably exaggerated by disturbance during sampling) – curved, randomly-oriented, not referred, mesoplanes; compound packing voids (30%); spherical, mesovughs (20%).

Basic mineral components

c/f limit at 10mm; ratio 60:40.
Coarse fraction: silt dominant, but with few sand grains comprising fragments of siltstone, and very few 2-20mm smooth, subangular stones (siltstones). Overall stone content 5%.
Fine fraction: fine silts and clay, yellowish brown (PPL); low birefringence (XPL); pale brown (OIL).

Organic components

Organic coarse material (>10mm): rare coarse organic matter (fragments of plant remains); rare charcoal.
Organic fine material (<10mm): rare fine amorphous organic matter; rare charcoal.

Pedofeatures

Layered, microlaminated yellow clay, with a sharp extinction zone completely fills 5% of the vughs, forms crescentic coatings within 40% of vughs, and forms rare coatings along planar voids.

Microfabric B – few (10%)
Interpreted as being derived from former Ah horizon.

Microfabric

Colour: Speckled dark brown and brown (PPL); very low birefringence in fine fraction (XPL); brown brown (OIL).
Peds: weakly developed fine granules.
Voids: Void space within granules 3%.

Basic mineral components

c/f limit at 10mm; ratio 50:50.
Coarse fraction: silt very dominant.
Fine fraction: fine silts and clay, yellowish brown (PPL); low birefringence (XPL); pale brown (OIL).

Organic components

Organic coarse material (>10mm): occasional coarse organic matter (plant tissue); rare-occasional charcoal.
Organic fine material (<10mm): very abundant fine amorphous organic matter; rare charcoal.

Pedofeatures
Few of the granules contain impregnative Mn nodules.

<u>**Microfabric C**</u> – 5% overall, but very dominant in 5mm band at base of barrow.
Interpreted as comprising turves (with Ah horizon) forming basal layer of barrow. Boundary with surface of buried soil is blurred by mixing by earthworms.

Microfabric
<u>Colour</u>: Dark brown and brown (PPL); very low birefringence in fine fraction (XPL); yellowish brown and dark brown (OIL).
<u>Peds</u>: moderately-strongly developed fine crumbs.
<u>Voids</u>: Total void space 10%: 80% compound packing voids and 20% spherical mesovughs.

Basic mineral components
c/f limit at 10mm; ratio 70:30.
<u>Coarse fraction</u>: silt very dominant, with few sand grains, mostly siltstone fragments; abundant (12%) subangular 2-6mm stones, mostly siltstones.
<u>Fine fraction</u>: fine silts and clay, yellowish brown (PPL); low birefringence (XPL); pale brown (OIL).

Organic components
<u>Organic coarse material</u> (>10mm): locally very abundant remains of plant tissue pseudomorphically replaced by Fe; mostly occurs in a single band (*representing top of turves within barrow*), 1mm in thickness and including individual intact pieces up to 5mm in length; along 50% of the band the plant tissue has been broken up and fragments are incorporated within adjacent soil. Rare charcoal.
<u>Organic fine material</u> (<10mm): very abundant fine amorphous organic matter, 30% of a pellety form; rare charcoal.

Pedofeatures
Ferruginised band (see Organic coarse material); occasional impregnative Mn nodules, up to 2mm in diameter; layered, microlaminated yellow clay, with a sharp extinction zone completely fills 20% of the vughs, forms crescentic coatings within 50% of vughs, and forms rare coatings on crumb surfaces.

Buried soil

This comprises three microfabrics.

<u>**Microfabric D**</u> – forms layer 5mm thick at top of buried soil.
Interpreted as comprising turf layer (litter and Ah horizon) of old ground surface. Boundary between barrow and old ground surface of buried soil is blurred by mixing by earthworms.

As Microfabric C except that the band of pseudomorphically-replaced organic coarse material (*representing the turf line*) is less continuous and more disturbed.

<u>**Microfabric E**</u> – forms 10mm thick layer beneath Microfabric D.
Interpreted as being AEb horizon.

Microfabric
<u>Colour</u>: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).
<u>Peds</u>: moderately developed fine-medium crumbs with abundant ultrafine granules.
<u>Voids</u>: Total void space 8% of which: 80% compound packing voids, 15% planar voids and 5% vughs.

Basic mineral components
c/f limit at 10mm; ratio 60:40.

Coarse fraction: silt dominant in the fine earth fraction, but includes few sand grains, comprising fragments of siltstone; stone-free.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic matter; rare charcoal, though locally occasional in areas where there has been more active biological working of the soil.
Organic fine material (<10mm): very abundant fine amorphous organic matter; rare charcoal.

Pedofeatures
Layered, microlaminated yellow clay with a sharp extinction zone forms crescentic coatings within 5% of vughs and rare coatings on crumbs; occasional impregnative Mn nodules, mostly associated with organic matter.

Microfabric F – beneath Microfabric E.
Interpreted as being Eb horizon.

Microfabric
Colour: Speckled pale grey/yellowish brown (PPL); low birefringence with crystallic silt grains (XPL); grey/pale brown (OIL).
Peds: complex: 80% moderately developed very fine subangular blocky peds; 20% ultrafine-fine granules.
Voids: Total void space 8% of which: 65% compound packing voids, 20% planar voids and 15% vughs.

Basic mineral components
c/f limit at 10mm; ratio 70:30.
Coarse fraction: silt dominant in the fine earth fraction, but includes few sand grains, comprising fragments of siltstone; very abundant stones, up to 15mm and mostly subangular siltstones, in uppermost 15mm of this horizon.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic matter; rare charcoal.
Organic fine material (<10mm): occasional fine amorphous organic matter, though locally very abundant where crumbs from Ah horizon are incorporated; rare charcoal.

Pedofeatures
Layered, microlaminated yellow clay with a sharp extinction zone fills 20% of vughs, and forms crescentic coatings within 50% of vughs and many coatings on crumbs; occasional impregnative Mn nodules, mostly associated with organic matter.

Table 9.8 (follows below): Key features of thin section MM7: Hearth (context 28) – Charcoal rich layer (29) over burnt subsoil (69).

Charcoal rich layer (context 29) (top 40mm of thin section).

This context, which appears to have been disturbed by burrowing, comprises two microfabrics:

Microfabric A – 80% of context.
Interpreted as comprising mixed charcoal and soil – initially worked by earthworms that appears to have fallen into a small burrow, and has subsequently developed a subangular blocky structure.

Microfabric
Colour: 95% speckled dark yellowish brown/dark brown (PPL); low birefringence with crystallic silt grains (XPL). 5% speckled light grey/light yellowish brown (PPL); low birefringence with crystallic silt grains (XPL).
Peds: Strongly developed very fine to fine subangular blocky peds.
Voids: Void space appears to have been exaggerated by sampling; curved, planar unreferred cracks between blocky peds; spherical meso vughs within the peds.

Basic mineral components
c/f limit at 10mm; ratio 65:35.
Coarse fraction: silt dominant in the fine earth fraction, but includes few sand grains, comprising fragments of siltstone; 5% stones – smooth subangular siltstones, up to 20mm.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): Darker part of soil matrix (95% of microfabric) – rare, partially ferruginised plant tissue (up to 200mm); abundant charcoal, including 5% partially charred organic remains (moderately broken up, fragments up to 3mm, and well mixed within the soil). Lighter coloured part (5%) – rare organic matter and occasional charcoal.
Organic fine material (<10mm): Darker part of soil matrix – many fine amorphous organic matter; abundant charcoal. Lighter coloured part – occasional fine amorphous organic matter; rare charcoal.

Pedofeatures
Layered, microlaminated brownish yellow (PPL) dusty clay with a sharp extinction zone forms crescentic coatings within 5% of vughs.

Microfabric B – confined to a 10mm wide pocket within the context (20% of overall context)
Interpreted as comprising fragments of microfabric A (see above) *and the underlying subsoil* (see below), *probably resulting from burrowing activity.*

Burnt subsoil (context 69) (lower 40mm of thin section).
N.B. This part of the soil, which is very stony, appears to have been badly disturbed during sampling, and much of the original structure has been lost.

Microfabric
Colour: speckled light grey/light yellowish brown/brown (PPL); low birefringence with crystallic silt grains (XPL).
Peds/voids: uncertain because of damage during sampling.

Basic mineral components
c/f limit at 10mm; ratio 90:10.

Coarse fraction: silt dominant in the fine earth fraction, but includes many sand grains, comprising fragments of siltstone; 70% stones – smooth subangular siltstones, up to 30mm, slightly rubified.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare charcoal (up to 600mm).
Organic fine material (<10mm): rare amorphous organic matter; rare charcoal.

Pedofeatures
Many silty cappings (up to 500mm thick) on stones; mostly charcoal free.

Table 9.9 (follows below): Key features of thin section MM8: Fills of pit (context 188).

N.B. It is difficult to relate the thin section to the various contexts identified in the section drawing supplied.

Upper fill (top 45mm of thin section)

Comprises two microfabrics:

Microfabric A: (85% of fill)
Interpreted as deposit of charcoal-rich Ah horizon material.

Microfabric
Colour: speckled light yellowish brown/dark brown/black (PPL); low birefringence with crystallic silt grains (XPL).
Peds: complex: 50% vughy microstructure and 50% ultra-fine granules.
Voids: total void space 4%; spherical meso vughs and compound packing voids.

Basic mineral components
c/f limit at 10mm; ratio 80:20.
Coarse fraction: silt dominant in the fine earth fraction, but includes abundant sand grains, comprising fragments of siltstone and sandstone; 25% stones – smooth subangular siltstones and angular sandstones, up to 20mm.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic material; very abundant coarse charcoal (up to 15mm).
Organic fine material (<10mm): abundant amorphous organic matter; very abundant fine charcoal.

Microfabric B: (15% of fill)
Interpreted as fill of animal burrow.

Microfabric
Colour: speckled light brown/brown/black (PPL); low birefringence with crystallic silt grains (XPL).
Peds: complex: 50% vughy microstructure; 50% ultra-fine granules.
Voids: total void space 6%; spherical meso vughs and compound packing voids.

Basic mineral components
c/f limit at 10mm; ratio 75:25.
Coarse fraction: silt dominant in the fine earth fraction, but includes abundant sand grains, comprising fragments of siltstone and sandstone; 15% stones – smooth subangular siltstones and angular sandstones, up to 5mm.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic material; many coarse charcoal fragments (up to 4mm).
Organic fine material (<10mm): occasional amorphous organic matter; many fine charcoal fragments.

Lower fill (layer between 45 and 55mm down thin section)

Microfabric
Colour: speckled light grey/brown (PPL); low birefringence with crystallic silt grains (XPL).
Peds: enaulic structure, with skeleton of stones and sands.

Voids: total void space 6%; complex packing voids.

Basic mineral components
c/f limit at 10mm; ratio 95:5.
Coarse fraction: sand, mostly quartz, dominant in the fine earth fraction; 15% stones – smooth subangular siltstones and angular sandstones, up to 6mm.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic material; many coarse charcoal fragments (up to 5mm), with very high concentrations in bottom 10mm of this fill.
Organic fine material (<10mm): occasional amorphous organic matter; many fine charcoal fragments.

?Natural soil beneath pit
This appears to have been disturbed by burrowing, with two possible burrows containing microfabric B extending down through the natural (to bottom of thin section). The supposed natural largely comprises microfabric C, but is overlain by a very stony layer (microfabric D)

Microfabric C:
Interpreted as lower Eb horizon (possibly upper B horizon) of soil in which the pit was dug.
Microfabric
Colour: speckled yellowish brown (PPL); low birefringence with crystallic silt grains (XPL).
Peds: ultrafine to fine granules.
Voids: total void space 8%; compound packing voids.

Basic mineral components
c/f limit at 10mm; ratio 60:40.
Coarse fraction: silt dominant in the fine earth fraction, but with many sand grains; 10% stones – smooth subangular siltstones and angular sandstones, up to 4mm.
Fine fraction: fine silts and clay; very low birefringence (XPL).

Organic components
Organic coarse material (>10mm): rare coarse organic material; rare coarse charcoal fragments (up to 1.2mm).
Organic fine material (<10mm): occasional amorphous organic matter; rare fine charcoal.

Microfabric D: (*c* .15mm thick stony layer overlying microfabric C)
Provisionally interpreted as being a result of disturbance during pit construction.
This comprises 80% stones (up to 8mm), mostly smooth subangular siltstones, giving rise to an enaulic structure in which 50% of the space between the stones is occupied by microfabric C and the remainder is void space.

3 HINDWELL ASH CHARCOALS (Graham Morgan)

All contexts at Hindwell Ash were sampled for palaeoenvironmental data and submitted to Leicester University for identification. The following species were identified.

Context	Species	Diam. (mm)	Rings	Est. Present Age	Growth rate/ Comments
F5	Hazel	15	8	8	
		20	15	15	
		35	20	25	
	Ash	50+	15	20+	
		25	15	15	
	Oak	50+	8	15+	
		10	5	5	
		10	14	14	slow
F6	Hazel	35+	3	5+	
	Elm	15	10	10	one piece only
	Oak	10	3	5	
		30+	8	10+	fast
		50+	5	10+	fast
F10	Oak	40+			fragments
F11	Elm	30+	4	6+	
	Poplar type	30+			fragments
	Hawthorn type	30+			fragments
	Hazel	30+			fragments
F12	Oak	30+			fragments
F20	Blackthorn	10	3	3	
	Hazel	10	3	3	

Table 9.10: The Charcoals from Hindwell Ash. Species present: Oak - *Quercus* spec., Hazel - *Corylus avellana* (or possibly alder), Ash - *Fraxinus excelsior*, Elm - *Ulmus* spec., Hawthorn - *Crataegus* spec., Poplar - *Populus* spec. (or possibly willow), Blackthorn - *Prunus spinosa*.

4 THE CHARRED PLANT REMAINS FROM WALTON (Astrid E. Caseldine & Catherine J. Barrow)

4.1 Introduction

An extensive sampling programme was undertaken to recover charred plant remains. The main site sampled was Upper Ninepence but samples were also taken from Hindwell I and II, Rough Close and Knapp Farm. Samples were taken from a range of features and in all 183 samples were examined.

4.2 Methods

The samples were processed by Clwyd-Powys Archaeological Trust using a flotation machine. The minimum mesh size of the sieves used was 250 microns. The samples were sorted and identified at University of Wales, Lampeter, using a Wild M5 stereomicroscope. Identification was by comparison with modern reference material and standard identification texts. The results from samples which contained plant remains other than wood charcoal are presented in tables 9.11-20.

4.3 Discussion

The majority of the samples were associated with Neolithic activity prior to establishment of the barrow at Upper Ninepence. Plant remains apart from wood charcoal and hazelnut fragments, notably cereals and weed seeds, were scarce, but the results should be set against the paucity of evidence for this period in Wales (Caseldine 1990). Many of the samples were from undated features but a number could be assigned to one of the phases or three structures recognised, thereby allowing some limited observations to be made.

The sample which produced the greatest number of hazelnut fragments from the site was from Pit 10, assigned to the Peterborough phase and first main phase of activity at the site. The only weed seed present in the sample was fat-hen (*Chenopodium album*), a plant associated with disturbed ground and cultivation. Two other samples (pits 12 and 200), again comparatively rich in hazelnut fragments, provided firmer evidence for cereal cultivation during this phase. Both samples contained a few glume bases, rachis fragments and spikelet forks of wheat (*Triticum*). Most of the remains were poorly preserved and therefore could not be identified to species level but those that were identifiable further appeared to be probably mainly emmer (*T. dicoccum*), although there was also possibly rachis of bread wheat (*T.* cf. *aestivum)*. Two grains of emmer occurred in pit 12. This evidence for the dominance of emmer wheat is in keeping with that from other Neolithic sites in Wales (Caseldine 1990). Weed seeds were scarce but included docks (*Rumex*), possible violet (cf. *Viola*), selfheal (*Prunella vulgaris*), possible ribwort plantain (*Plantago lanceolata*) and a Caryophyllaceae. Most of these could indicate grassland or disturbed ground but docks and violets can be associated with cultivation. The presence of chaff and weed seeds suggests the samples may represent waste from crop processing but the evidence is too slight to suggest anything more. The other samples from features assigned to the Peterborough phase also contained hazelnuts, but little else. The deliberate collection of hazelnuts as a food resource during the Neolithic is widely recognised but as hazel is frequent in the charcoal assemblage (see below) it is possible that some of the hazelnuts are present simply because they were collected along with branches of hazel used for fuel. The few charred grass remains in these and later samples could be from grass which became burnt where the fire took place or from grass used as tinder. Overall the evidence suggests a grassland environment with hazel scrub nearby and perhaps some limited cultivation.

Although the evidence for cereal cultivation is slight during the Peterborough phase, the evidence for cereals from the Grooved Ware phase is even less. Only one wheat glume base was recovered from one stakehole (57) from structure 1, a structure attributed to the earlier or middle part of the Grooved Ware phase. Similarly, only one pit (33) containing Grooved Ware pottery produced a spikelet fork of wheat and only one possible cereal grain was recovered from structure 2, which is also assigned to the Grooved Ware phase. Whether this almost complete absence of cereal remains represents a real difference in the economy and diet of the two phases and a greater emphasis on animals rather than cereals is difficult to say when the evidence is so limited, but it is perhaps worth noting. There is some evidence for a change in diet between the two phases as lipid analysis (See Part 8.2) suggests pig rather than ruminant was the main cooked meat during the Grooved Ware phase. Perhaps consistent with the apparent increased importance in pig is the presence of two fragments of acorn kernel in one of the Grooved Ware pits and cupule fragments in another. Oak is also more frequent in the charcoal record (see below). The presence of alder (*Alnus glutinosa*) is indicated by a catkin. Hazelnut fragments are again widely represented but even these are sparse in a number of samples, particularly from structures 1 and 2. Shrubby species are indicated by remains of bramble (*Rubus*) and rose (*Rosa*) Weed species are again scarce but sheep's sorrel (*Rumex acetosella*), docks (*Rumex*), ribwort plantain (*Plantago lanceolata*), bird's foot trefoil (*Lotus* type), bedstraws (*Galium* spp.), all taxa that can be found in grassland, are present. Essentially, the environment seems to be similar to that during the Peterborough phase but perhaps with more woodland and shrubby species present locally, or different resources being exploited.

Cereal evidence from structure 3, attributed to the late Neolithic or early Bronze Age, also indicates the presence of wheat, including possible bread wheat (*T.* cf *aestivum*). Other remains, including hazelnut fragments, are relatively few.

Samples from the old ground surface produced little apart from a few hazelnut fragments and grass rhizomes. Most of the remaining samples were from undated pits, stakeholes and postholes or animal disturbance. Only three samples produced any cereal evidence but hazelnut fragments were present in most. Occasional weed seeds occurred, including corn spurrey (*Spergula arvensis*) a weed of cultivation. Blackthorn (*Prunus spinosa*) was recorded from two samples.

The sample from context 2 of the mound, considered to be constructed during the early Bronze Age, contained no cereal remains but grass rhizomes were frequent and the weed seeds again included a seed of corn spurrey.

The final three samples from Upper Ninepence were from late features. Two samples were from undated pits in the top of the mound and contained few remains apart from hazelnut fragments and grass rhizomes. The final sample was from hearth 195 dated to 1640±70 BP (SWAN-115). This was the richest sample from the site in terms of charred cereal remains and weed seeds. Much of the grain was indeterminate but wheat, including bread wheat (*Triticum aestivum*) and spelt wheat (*T. spelta*), and hulled barley (*Hordeum*) were present. The bread wheat was confirmed by the presence of chaff. Twisted as well as straight grains of barley indicated six-row as opposed to two-row barley, but the latter may be present. There is evidence both for the presence of wild and cultivated oat (*Avena*) from the presence of floret bases. One floret base had the appearance of cultivated oat (*A. strigosa/sativa*) whilst another had the typical suckermouth base of wild-oat (*A. fatua*). Docks were the most abundant weed seeds but Chenopodiaceae were relatively frequent and occasional seeds of redshank (*Persicaria maculosa*), pale persicaria (*P. lapathifolia*) and black bindweed (*Fallopia convolvulus*) also occurred. Hazelnut fragments, as in earlier periods, were again quite frequent and gorse (*Ulex*) spines were present. Since the sample is from a hearth it is possible the grain was from a processed crop either deliberately or accidentally charred. The weed seeds may represent waste from crop processing deliberately used as fuel. The low incidence of chaff in the sample may be because the rachis of free-threshing cereals tends to survive charring less well (Boardman & Jones 1990) and the poor state of preservation of the grain would support this. Spelt (*T. spelta*) is generally more common in Wales during the Romano-British period yet large quantities of bread/club wheat were recorded in Romano-British samples from Collfryn (Jones & Milles 1989) and from two corn-dryers at Biglis (Parkhouse 1988). Hulled barley also occurs on a number of sites of Romano-British date (Caseldine 1990).

The remaining samples were from the other sites. The samples from Hindwell I and II produced very little apart from grass rhizomes and stems. Hazelnuts were absent but bramble, blackthorn and a possible fragment of acorn kernel were present. No remains other than wood charcoal were recovered from Rough Close and Knapp Farm samples.

4.4 Conclusions

Charred plant remains were generally scarce. Evidence for cereal growing during the Neolithic was very limited but there was marginally more for the Peterbororough rather than the Grooved Ware Phase. There was some evidence for both emmer and possibly bread wheat being grown. Hazelnuts were widely represented, if in low amounts, and may have been collected deliberately as a food resource. Alternatively, their presence may have been due to the collection of hazel for fuel. A predominantly grassland environment in the immediate area of the site is indicated but with some hazel scrubland nearby and perhaps more woodland closer to the site during the Grooved Ware Phase, although the evidence could just reflect a difference in areas exploited rather than a change in environment.

The sample from the Romano-British hearth was dominated by free-threshing cereals, bread wheat and barley. The evidence from the site is consistent with that from other parts of Wales.

		Pits							**Stakeholes**
Feature		**6**	**10**	**12**	**16**	**37**	**200**	**500**	**325**
Context		**7**	**11**	**13**	**17**	**38**	**201**	**502**	**326**
Taxa									
Cereals									
Triticum dicoccum	grain	-	-	2	-	-	-	-	-
(emmer wheat)	gl. bases	-	-	3cf3	-	-	cf2	-	-
	spklt. fks.	-	-	-	-	-	cf2	-	-
	rachis	-	-	-	-	-	cf1	-	-
T. dicoccum/T. spelta	gl. bases	-	-	1	-	-	-	-	-
(emmer/spelt wheat)	spklt. fks.	-	-	1	-	-	-	-	-
	rachis	-	-	-	-	-	2	-	-
T. cf. *aestivum* s.l. (bread wheat)	rachis node	-	-	1	-	-	-	-	-
Triticum sp.	grain	-	-	1	-	-	-	-	-
(wheat)	gl. bases	-	-	2	-	-	-	-	-
	spklt. fks.	-	-	1	-	-	-	-	-
	rachis	-	-	3	-	-	-	-	-
Cerealia indet.	grain	-	-	1	-	-	-	-	-
Other plants									
cf. *Quercus* sp. (oak) cupule		-	1	-	-	-	-	-	-
Corylus avellana L. (hazel) nut frags.		10	983	114	186	6	292	23	2
Chenopodium album L. (fat-hen)		-	1	-	-	-	-	-	-
Caryophyllaceae (pinks)		-	-	1	-	-	-	-	-
Rumex sp. (docks)		-	-	1	-	-	3	-	-
cf. *Viola* sp. (violets)		-	-	1	-	-	-	-	-
cf. *Trifolium* sp. (clovers)		-	-	1	-	-	-	-	-
Prunella vulgaris L. (selfheal)		-	-	-	-	-	1	-	-
cf. *Plantago lanceolata* L. (ribwort plantain)		-	-	-	1	-	-	-	-
Poaceae (grasses) rhizomes		1	4	2	-	-	-	-	-
Indet. organic		-	6	11	2	-	5	-	-

Table 9.11: Charred plant remains from the Peterborough Phase.

	Stakeholes						Postholes	
Feature	**24**	**26**	**57**	**96**	**124**	**279**	**281**	**92**
Context	**25**	**27**	**58**	**97**	**125**	**280**	**282**	**93**
Taxa								
Cereals								
Triticum dicoccum/ *T. spelta* (emmer/spelt) gl. bases	1	-	-	-	-	-	-	-
Other plants								
cf *Urtica dioica* L. (common nettle)	-	-	1	-	-	-	-	-
Corylus avellana L. (hazel) nut frags.	-	2	2	77	2	8	4	1
Rubus sp. (bramble) frags	1	-	-	-	-	-	-	-
Stachys type (woundworts)	-	-	1	-	-	-	-	-
Poaceae (grasses)	-	1	-	-	-	-	-	-
Poaceae rhizomes	-	-	1	-	1	-	1	1
Organic indet.	-	-	+	-	-	+	-	-

Table 9.12: Charred plant remains from Structure 1 (Grooved Ware Phase).

	Pits															Stakeholes				Ditch	Hearth	
Feature	**22**	**33**	**35**	**43**	**55**	**85**	**132**	**136**	**146**	**152**	**154**	**198**	**198**	**198**	**293**	**299**	**277**	**297**	**448**	**478**	**8**	**28**
Context	**23**	**34**	**36**	**44**	**56**	**86**	**133**	**137**	**147**	**153**	**155**	**199**	**289**	**291**	**294**	**300**	**278**	**298**	**449**	**479**	**9**	**29**
Taxa																						
Cereals																						
Triticum dicoccum/ spklt. fks. *T. spelta* (emmer/spelt)		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other plants																						
Quercus sp. (oak)kernel	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Quercus sp. cupule frags.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alnus glutinosa (L.) Gaertner (alder)catkin			-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Corylus avellana L. (hazel) nut frags.		53	115	2	6	7	513	44	1	207	35	33	23	21	1	79	15	66	14	1	3	8
Rumex acetosella (sheep'sorrel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Rumex sp. (docks)	-	2	-	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Rubus frags (brambles)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Rosa sp. (roses)	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Lotus type (bird's foot trefoil)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Plantago lanceolata L. (ribwort plantain)	-	-	-	-	4	-	-	-	cf1	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium verum/ *saxatile* type (lady's/heath bedstraw)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Galium mollugo type (hedge bedstraw)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Galium aparine L. (cleavers)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Poaceae (grasses)	-	-	-	-	6	-	-	cf1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poaceae rhizomes	3	-	-	-	25	-	1	1	4	-	-	-	-	-	-	1	-	-	-	-	7	-
Leaf bud	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorn	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Organic indet.	+	-	+	-	-	+	+	-	+	+	+	+	+	+	+	+	+	+	-	-	-	+

Table 9.13: Charred plant remains from features containing Grooved Ware pottery.

	Postholes								Stakeholes
	(?2)	(?2)	(?2)						
Feature	**420**	**424**	**438**	**440**	**442**	**452**	**484**	**488**	**505**
Context	**421**	**425**	**439**	**441**	**443**	**453**	**485**	**489**	**506**
Taxa									
cf Cerealia indet. (cereal)	-	-	-	-	1	-	-	-	-
Corylus avellana L. (hazel) nut frags.	-	2	2	6	-	14	2	5	3
cf. Rosaceae (rose)	1	-	-	-	-	-	-	-	-
Poaceae (grass) rhizomes	-	-	-	1	1	-	-	-	-

Table 9.14: Charred plant remains from Structure 2 (Grooved Ware Phase).

		Stakeholes									Pits		
		(?3)	??	(?3)								(?3)	(?3)
Feature		**249**	**253**	**255**	**321**	**323**	**329**	**333**	**346**	**348**	**398**	**41**	**61**
Context		**250**	**254**	**256**	**322**	**324**	**330**	**334**	**347**	**349**	**399**	**42**	**62**
Taxa													
Cereals													
Triticum monococcum/ T. dicoccum (einkorn/emmer)	spklt fks	-	-	1	-	-	-	-	-	-	-	-	-
T. cf *aestivum* s.l.. (bread wheat)	rachis node		1	-	-	-	-	-	-	-	-	-	- -
Triticum sp. (wheat)	gl bases	1	-	-	-	-	-	-	-	-	-	-	-
Other plants													
Corylus avellana L. (hazel) nut frags		18	4	1	5	4	9	1	8	-	3	7	6
Rumex sp. (docks)		-	-	-	-	-	-	-	-	-	-	1	1
Rubus (bramble) frags.		-	-	-	-	-	-	-	-	1	-	-	-
cf *Crataegus* sp. (hawthorn) fruit		-	1	-	-	-	-	-	-	-	-	-	-
Vicia sp. (vetches)		-	-	-	-	-	2	-	-	-	-	-	-
Poaceae (grasses)		-	-	-	-	-	-	-	-	-	-	1	-
Poaceae rhizome		-	-	-	-	-	-	-	1	-	-	-	-

Table 9.15: Charred plant remains from Structure 3 (late Neolithic/ early Bronze Age)

	Postholes				OGS					Mound
Feature	**376**	**416**	**418**	**490**	**1020/ 1020**	**1025/ 1020**	**1025/ 1025**	**2025/ 2025**		
Context	**377**	**417**	**419**	**491**	**72**	**72**	**72**	**72**	**72**	**2**
Taxa										
Corlyus avellana L. (hazel) nut frags	10	5	1	9	5	6	3	7	10	62
Atriplex sp. (oraches)	-	-	-	-	-	-	-	-	-	1
Trifolium type (clovers)	-	-	-	-	-	-	-	-	1	2
Spergula arvensis L. (corn spurrey)	-	-	-	-	-	-	-	-	-	1
Lamiaceae (deadnettles)	-	-	-	-	-	-	-	-	-	1
Plantago lanceolata L. (ribwort plantain)	-	-	-	-	-	-	-	-	-	3
Poaceae (grasses)	-	-	-	-	-	-	-	-	-	6
Poaceae large rhizomes	-	-	-	-	-	-	-	-	-	4
Poaceae (grasses) rhizomes	-	1	-	-	2	5	7	1	11	142
Tree bud	-	-	-	-	-	-	-	-	1	-
Flowerheads	-	-	-	-	-	-	-	-	-	6

Table 9.16: Charred plant remains from undated postholes, old ground surface and mound

	Pits																			Animal disturba	
Feature	**14**	**39**	**63**	**77**	**81**	**150**	**164**	**166**	**241**	**259**	**275**	**287**	**295**	**344**	**350**	**370**	**414**	**492**	**503**	**51**	**53**
Context	**15**	**40**	**64**	**78**	**82**	**151**	**165**	**167**	**242**	**260**	**276**	**288**	**296**	**345**	**351**	**371**	**415**	**493**	**504**	**52**	**54**
Taxa																					
Cereals																					
Triticum dicoccum/ gl. bases *T. spelta* (emmer/spelt)	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Other plants																					
cf. *Quercus* sp. (oak) cupule frags.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Corylus avellana L. (hazel) nut frags.		4	1	13	1	7	14	6	1	42	5	34	-	2	3	3	2	1	4	2	9
Rumex sp. (docks)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla/*Fragaria* (cinquefoils/strawberries)	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
cf. *Prunus spinosa* L. (blackthorn)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Trifolium sp. (clovers)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Stachys type (woundworts)	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Plantago lanceolata L. (ribwort plantain)	-	-	-	-	-	-	-	2		-	-	-	-	-	-	-	-	-	-	-	-
cf. Cyperaceae (sedges)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Large Poaceae/Cereal (grass/cereal)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poaceae (grasses)	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Poaceae large rhizomes	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Poaceae rhizomes	-	1	-	-	-	1	2	-	21	-	-	-	1	4	-	-	2	-	1	-	-
Fruitstone frag. indet.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flower	-	-	-	-	-	-	-	-1	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Organic indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-

Table 9.17: Charred plant remains from undated pits and animal disturbance

	Stakeholes																				
Feature	**88**	**111**	**122**	**126**	**142**	**168**	**170**	**174**	**176**	**211**	**219**	**239**	**257**	**263**	**301**	**307**	**309**	**315**	**317**	**331**	**494**
Context	**89**	**112**	**123**	**127**	**143**	**169**	**171**	**175**	**177**	**212**	**220**	**240**	**258**	**264**	**302**	**308**	**310**	**316**	**318**	**332**	**495**
Taxa																					
Cereals																					
Triticum sp. gl. bases (wheat)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Hordeum sp. hulled indet. grain (barley)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Other plants																					
Corylus avellana L. (hazel) nut frags.	5	-	2	6	2	9	2	1	5	1	1	12	-	5	7	3	6	1	6	-	-
Spergula arvensis L. (corn spurrey)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Persicaria maculosa Gray (redshank)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rumex sp. (docks)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prunus spinosa L. (blackthorn) frags.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vicia cf *tetrasperma* (L.) Schreber (smooth tare)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trifolium sp. (clovers)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plantago lanceolata L. (ribwort plantain)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
Poaceae (grasses)	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poaceae large rhizome	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Poaceae rhizomes	-	1	-	4	2	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	1
Flowerhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Leaf scar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Organic indet.	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-

Table 9.18: Charred plant remains from undated stakeholes

		Hearth	Pits	
Feature		**194**	**182**	**186**
Context		**195**	**183**	**187**
Taxa				
Cereals				
Triticum spelta	grain	3	-	-
T. spelta/T. aestivum	grain	3	-	-
Triticum aestivum	grain	5cf5	-	-
	rachis nodes	1cf1	-	-
Triticum sp.	grain	19	-	-
	rachis	1	-	-
Hordeum sp. hulled grain				
	straight	40	-	-
	twisted	21	-	-
	indet.	45	-	-
	rachis	1	-	-
Avena strigosa/ A. sativa				
	floret base	1	-	-
(bristle oat/oat)				
Cereal indet.	grain	97	-	-
Other plants				
Corylus avellana L (hazel) nut frags.	.	103	10	75
Chenopodium album L. (fat-hen)		21	-	-
Atriplex sp. (oraches)		8	-	-
Chenopodiaceae (goosefoots)		20	-	-
Caryophyllaceae (pinks)		1	-	-
Persicaria maculosa Gray (redshank)		4	-	-
Persicaria lapathifolia (L.) Gray (pale persicaria)		1	-	-
Persicaria sp. (knotweeds)		1	-	-
Fallopia convolvulus (L.) A Love (black bindweed)		2	-	-
Rumex sp. (docks)		144	-	-
Prunus spinosa L. (blackthorn) frags.		8	-	-
Trifolium sp. (clovers)		-	1	-
Ulex sp. (gorse) spines		3	-	-
Lapsana communis L. (nipplewort)		10	-	-
Tripleurospermum inodorum (L.) Schultz-Bip (scentless mayweed)		3	-	-
Avena fatua L. (wild-oat) floret-base		1	-	-
Avena sp.		3	-	-

(oats)			
Avena/Large Poaceae	2		
Large Poaceae	5	-	-
(grasses)			
Small Poaceae	-	3	-
Poaceae	-	-	2
large rhizomes			
Poaceae	-	23	5
stems/rhizomes			
Thorns	9	-	-
Pteridium aquilinum (L.) Kuhn	3	-	-
(bracken) leaf frags.			

Table 9.19: Charred plant remains from later features .

	I	?I/II	II							
Feature	**PH2**	**PH1**	**PH1**	**PH1**	**PH1**	**PH2**	**PH2**	**PH3**	**PH3**	**PH4**
Spit	**SP4**	**SP1**	**SP1**	**SP3**	**SP4**	**SP2**	**SP3**	**SP3**	**SP4**	**SP2**
Taxa										
cf *Quercus* sp. (oak) kernel	-	-	-	-	1	-	-	-	-	-
Rubus sp. (brambles) frags.	-	-	-	-	-	-	-	1	-	-
Prunus spinosa L. (blackthorn)	-	-	-	-	-	-	-	-	-	2
Plantago lanceolata L. (ribwort plantain)	-	-	1	-	-	-	-	-	-	-
Galium saxatile type (heath bedstraw)	-	-	1	-	-	-	-	-	-	-
Sambucus nigra L. (elder)	-	-	1	-	-	-	-	-	-	-
Large Poaceae (grasses)	1	6	-	-	-	-	-	-	-	-
Small Poaceae	-	7	-	-	1	-	-	1	1	-
Poaceae rhizome/stem frags.	8	245	117	18	34	2	5	49	7	-
Tree leaf buds	-	-	3	-	-	-	-	-	-	-
Organic indet.	-	-	+	-	-	-	-	-	-	-

Table 9.20: Charred plant remains from postholes at Hindwell I and II.

5 WALTON COMPLEX CHARCOAL IDENTIFICATIONS (Su Johnson)

5.1 Introduction

Charcoal samples for identification were received from five sites in the Walton complex. The number of samples and the quantity and quality of the charcoal in them varied considerably.

Sub-samples of between 10 and 70 fragments were taken for identification, depending on the size of the sample. These sub-samples contained a representative sample of all the fragment sizes present, down to a minimum transverse section of 2mm. The fragments were snapped to expose clean surfaces in 3 planes which were then examined under a high-power microscope.

5.2 Upper Ninepence Barrow

A total of 27 samples from this site were examined, making this the largest charcoal assemblage from the Walton complex.

Five samples from the Peterborough Ware phase were analysed (table 9.21) 50 fragments were identified from pit 10 and 30 each from the rest

The samples were similar in composition, all were mainly hazel (*Corylus avellana*) and Pomoideae (probably hawthorn) and all samples contained a few fragments of blackthorn (*Prunus spinosa*). Pit 12 produced a single fragment of willow/poplar (*Salix/Populus* spp.) and pit 200 a single oak (*Quercus* spp.) fragment.

Hazel was much more common than Pomoideae and blackthorn in pits 10 and 500, but less common in pit 16 whereas the number of fragments from the two groups was more balanced in pits 12 and 200.

	Context	Quercus spp.	Corylus avellana	Pomoideae	Prunus spinosa	Prunus spp.	Salix/ Populus	Euonymus europaeus	Ulex europaeus	Unident. distorted	Bark	TOTAL
<u>Peterbro' Ware</u>												
Pits	10. (11)		47	2	1							50
	12. (13)		11	15	2		1			1		30
	16 (17)		6	18	5					1		30
	200 (201)	1	17	10	2							30
	500 (502)		27	1	1	1						30
<u>Grooved Ware</u>												
Pits	22 (23)		19							1*		20
	35 (36)	7	2	1								10
	85 (86)	6	11	2							1	20
	132 (133)	2	22	2	1		3					30
	136 (137)	16	1	2	1							20
	146 (147)		42	6	1			1				50
	152 (153)	5	5									10
	154 (155)	19	18	11	2							50
	198 (199)	5	14	11								30
	198 (289)	11	9	9						1		30
	198 (291)	3	40	5	2							50
	293 (292)	20	6	1	1		1			1		30
Stakehole	277 (278)			19						1		20
<u>Structure 1</u>												
Hearth	28 (28)	3		7								10
Stakeholes	26 (27)	3	17									20
	57 (57)	16	4									20
<u>Later features</u>												
Pits	184 (185)	20										20
	186 (187)		6	4								10
Hearth	195	8	2	38	10	1			8	2	1	70
<u>Undated pre-barrow</u>												
Pits	150 (151)	1	9									10
	275 (276)	2	15	3								20
	370 (371)		2	18								20

Table 9.21: Charcoal from Upper Ninepence. (Fill numbers shown in brackets after feature numbers).

The largest group of samples from the site was from the Grooved Ware phase, 12 from pits, 3 from structure 1 and 1 from a stakehole. Between 10 and 50 fragments per sample were identified.

Again the range of species in the samples is similar, hazel, Pomoideae and blackthorn, but with the addition (in most samples) of oak. There were also a few occurrences of willow/poplar and in pit 146 a single fragment of spindle (*Euonymus europaeus*).

Most of the pits form this phase contained a range of species, but apart from an unidentified fragment, the fragments from pit 22 were exclusively hazel. The fragments from stakehole 277 were again (with the exception of an unidentified fragment) all hazel, and here it is tempting to see this as the remains of a hazel stake.

The samples from features associated with structure 1 do not show any significant differences to those from the rest of this phase.

Three samples from undated pre-barrow features were examined. As with the samples above, these contained hazel and Pomoideae and 2 also produced a few oak fragments.

Samples from later features were also analysed, 2 from undated pits and one from the Romano - British hearth 194. Pit 184 contained only oak,and pit 186 hazel and Pomoideae. The sample from hearth 194 was the largest examined and over half the fragments were Pomoideae with roughly equal numbers of oak, blackthorn and gorse (*Ulex* spp.) with a few hazel and unidentifiable fragments.

It is very difficult to make comments about the composition of local woodland on the basis of charcoal. This is because even a large quantity of charcoal may be the remains of only a few branches. There is also the probability that particular species were selected for different purposes, for example the use of small brushwood from shrubby species for fuel rather than larger wood from timber trees, and this would obviously bias the sample. However, given the quantity of hazel, Pomoideae and to a lesser extent, blackthorn, it is likely that there was open woodland and/or scrub in the vicinity. The lack of oak in the samples from the Peterborough Ware phase may indicate that there was not much oak easily available in the area at that time. Possibly it had not yet regenerated after clearance whereas the other species present may regrow faster. However, without supporting evidence, this should be regarded as highly speculative since other factors, such as the use of different species for fuel and for structural purposes, could account for this lack of oak. It should also be borne in mind that these points are being made on the strength of the contents of only five pits, which is a relatively small sample.

The presence of gorse, presumably used for fuel, in the Romano-British sample suggests open grassland or open woodland type vegetation nearby.

5.3 Hindwell 1

A total of 50 fragments from 3 samples from the ditch of the enclosure .were examined.The species composition of the samples was similar, mostly hazel, with a few fragments of Pomoideae, blackthorn, alder (*Alnus glutinosa*) and gorse and one fragment each of willow/poplar and birch (*Betula* spp.)

Context	Corylus avellana	Pomoi -deae	Prunus spinosa	Alnus glutinosa	Salix/ Populus	Ulex europeus	Betula spp.	Bark	TOTAL
4222/I/401	5	2	1			2			10
4222/I/501	15	1	2	1			1		20
4222/I/502	10	2	1	3	1	2		1	20

Table 9.22: Charcoal from Hindwell I.

5.4 Hindwell II

Ten samples, all from postholes, were examined. All the fragments identified were oak, and the unidentified fragments from all the samples had the angular appearance typical of this species. It is extremely likely that each sample represented the remains of a single, large piece of wood and that what we have here are the remains of the oak posts from the postholes.

Context	Quercus spp.	TOTAL
PR1 SP2	30	30
PH2 SP3	20	20
PR3 SP2	10	10
PH1 SP4	50	50
PH3 SP3	30	30
PH3 SP4	30	30
PH1 SP3	30	30
PH4 SP1	30	30
PH1 SP1	20	20
Post 2 Spit 4	50	50

Table 9.23: Charcoal from Hindwell II.

5.5 Rough Close

Two samples from this site were analysed, one was a very small sample, containing only a few fragments of hazel, Pomoideae ands blackthorn. The second was from a pit and contained mostly oak, with one hazel fragment and 5 gorse fragments.

Context	Quercus spp.	Corylus avellana	Pomoideae	Prunus spinosa	Ulex europeus	TOTAL
701		3	1	1		5
301	24	1			5	30

Table 9.24: Charcoal from Rough Close.

5.6 Knapp Farm

A single small sample was analysed. It contained a few fragments of hazel and Pomoideae and one fragment each of alder and ash (*Fraxinus excelsior*).

Context	Corylus avellana	Pomoideae	Alnus glutinosa	Fraxinus excelsior	TOTAL
3664/101	3	5	1	1	10

Table 9.25: Charcoal from Knapp Farm.

6 PALYNOLOGICAL INVESTIGATIONS IN THE WALTON BASIN (Astrid E Caseldine)

6.1 The Pollen Evidence from Upper Ninepence, Hindwell

Samples were prepared and examined for pollen from the ditch and palaeosol at Upper Ninepence. Pollen was virtually non-existent in the ditch samples and only a trace survived in the palaeosol samples, precluding a full analysis. Pollen taxa noted included *Alnus*, *Corylus*, Poaceae, Caryophyllaceae, Lactuceae and *Plantago lanceolata*. This evidence, although extremely limited, does suggest the presence of grassland at the site with perhaps some hazel scrub and alder woodland in the vicinity. It is also basically in agreement with the plant macrofossil evidence (see Parts 9.4 and 9.5). However, even these limited results must be treated with caution because of the high level of animal disturbance at the site.

6.2 The Pollen Evidence from Burfa Nature Reserve

6.2.1 Introduction

Various sites were visited in the Walton Basin with the aim of recovering a pollen core which would provide a long environmental record for the area. Unfortunately most of these proved unsuitable. The most promising site was the nature reserve at Burfa (NGR SO276610) on the north side of Knobley Brook, but even here it was evident that the site had been subject to human interference in the past. Within the nature reserve was a motte, Bogs Mount Castle, a barrow and a platform of unknown date. The most suitable area for sampling was in an area of alder carr. The stratigraphy at the site was as follows:

0-33cm	Humified peat with monocotyledonous remains and wood remains.
33-74cm	Very fibrous peat with monocotyledonous remains.
74-111cm	Less fibrous peat with monocotyledonous remains and occasional wood. Clay *c*. 94cm. Increasingly humified downwards.
111-117cm	Organic clay.
117-146cm	Clay wih monocotyledonous remains
146-150cm	Lighter clay with less monocotyledonous remains.

6.2.2 Methods

Samples were taken in the field using a Russian borer. Sub-samples were removed in the laboratory and prepared following standard procedures. These included digestion in 10% NaOH, treatment with HF and micro-sieving to remove minerogenic material, and acetolysis (Moore *et al*. 1991). *Lycopodium* tablets were added to allow pollen concentrations to be calculated. Residues were mounted in silicone oil and analysed using a Leitz Laborlux microscope. Identification was by reference to modern type slides and pollen keys (e.g. Moore *et al*. 1991). Nomenclature was based on Bennett (1994) and Bennett *et al*. (1994). Pollen counts were a minimum of 300 total land pollens or 300 *Lycopodium* spores where the concentration was poor. The diagram (fig. 9.11) was prepared using Tilia and Tilia-Graph (Grimm 1991).

6.2.3 Results and zonation

Pollen failed to survive in the samples from the peats and counting was confined to samples from the underlying clays, and even in these pollen concentrations were low in certain samples. One local pollen assemblage zone can be recognised with three sub-zones.

BNR1.1:	Poaceae-Lactuceae-Cerealia type
BNR1.2:	Poaceae-Cerealia type
BNR1.3:	Lactuceae-Poaceae

6.2.4 Discussion

The pollen record is restricted to the clays and, although limited, does provide some evidence for the development of the landscape of the Walton Basin. The pollen assemblage is dominated by Poaceae and herbaceous pollen with tree pollen very poorly represented throughout the diagram, indicating a very open landscape. The slight peak in sub-zone BNR1.2 of *Alnus* is attributable to a concentration of pollen grains, probably from part of an anther. Otherwise values for tree pollen pollen are very low, demonstrating that by the period covered by the diagram extensive clearance had taken place in the area. Evidence for arable activity is strong with high counts of Cerealia type pollen in sub-zones BNR1.1 and BNR1.2 clearly indicating cultivation close to the site. Further evidence for this is provided by the presence of herb pollen of the type derived from weeds frequently associated with cultivation, including *Anthemis* type, *Artemisia*, Chenopodiaceae, *Sinapis* type, Papaveraceae, *Spergula* type and *Solanum nigrum*. High counts of Poaceae and taxa such as *Plantago lanceolata*, *Centaurea nigra*, *Potentilla* type, Fabaceae and *Succisa* are indicative of grassland. A number of the weed taxa may also reflect waste or disturbed ground in the area. Given the archaeological evidence from the immmediate vicinity it seems most likely that the pollen record is medieval in date, although it could be earlier or later. The higher values for Lactuceae pollen in sub-zones BNR1.1 and BNR1.3 coincide wth lower pollen concentrations and may reflect differences in pollen preservation, Lactuceae pollen being relatively resistant to decay, rather than environmental differences. However, the increase in Lactuceae pollen in sub-zone BNR1.3 coincides with a reduction in Cerealia type pollen and a stratigraphic change to a more organic deposit prior to peat development. These changes do suggest a change in land-use away from arable and perhaps towards less intensive farming activity, at least in the adjacent area, and hydrological changes which led to peat growth at the site and ultimately the establishment of carr woodland.

6.2.5 Conclusions

From the pollen assemblage present it seems most likely that the record reflects the landscape in medieval times or later, although it could be earlier. A very open landscape is indicated with evidence both for cereal cultivation and pastoralism.

PART 10

DISCUSSION AND ANALYSIS

1 INTRODUCTION

This section deals in general terms with the survival and vulnerability of the archaeological monuments in the Walton Basin. Discussions of particular sites have already appeared above and the comments here are general.

Recommendations for the better management and statutory protection of individual archaeological sites are made in the catalogue in Part 11.

2 MESOLITHIC AND NEOLITHIC

2.1 Flint Scatters

Flint scatters in the Basin are numerous and represent the already truncated remains of former activity. Excavation at Rough Close, in an area of apparently localised Mesolithic activity, indicate that buried features do still remain though not necessarily densely. Some of the more dense scatters, doubtless representing areas of potentially intense prehistoric settlement may well benefit from geophysical survey and rescue excavation.

2.2 Cursus Monuments

One and possibly two cursus monuments are situated I the Basin. The Walton cursus (PRN 5134) is the more definite of the two an is known over virtually its entire length. It is focused on a round barrow off its western terminal and intersects with three rectilinear enclosures. Orientated WSW-ENE, the cursus lies roughly parallel with the brook in the valley of which it lies and is thus in a typical cursus situation. The monument survives as a cropmark only, with no earthwork features. While it is in a stable condition, subsoil-busting over the E terminal, discovered during the excavation, must have had a serious effect on survival this part of the site. No part of the monument has statutory protection and the shallowness of the ploughsoil over the lateral ditches means that ploughing must be a continual threat to the upper ditch silts.

The second site, the Four Stones cursus (PRN 33109), is a possible identification only and either excavation or remote sensing techniques would be needed to locate terminals and thus prove the site. The regularity of the ditches argues in favour of a cursus identification, but similarly aligned ditches 800 and 1600m to the NE may suggest that a relict field system is represented.

2.3 Enclosures

The palisaded enclosure at Walton (PRN 4255) is presumed to be mid-late Neolithic in date by analogy with other sites elsewhere (Gibson forthcoming b). The site survives purely as a cropmark. and geophysical survey has failed to add further information as to the extent of the monument. Continued ploughing over this site is presumed to be having a degrading effect on the survival of buried features but it has not been possible to quantify this degradation in the current project. The enclosure receives some statutory protection by virtue of its coincidence with the scheduled marching camps, but parts of it, notably its southern extent, remain unprotected.

Hindwell II (PRN 19376) is without doubt the most significant discovery of the project. This site, dating to 2700 Cal BC, occupying some 35Ha and with a perimeter of 2.3km is probably the largest of its kind in Britain, if not W Europe (Gibson forthcoming b). Over 73% of the perimeter of the enclosure is now known as a result of geophysical survey and aerial monitoring during the project. Two barrows within the enclosure are scheduled (PRN 309 & 314) but the site is otherwise unprotected. While modern ploughing is unlikely to be having a serious effect on the perimeter, comprising postholes 2m deep, nevertheless less substantial internal features may well be at risk. Geophysical survey is urgently needed on this site to try and identify internal features and to locate the remaining 27% of the circumference, as well as the positions of entrances. Trial excavation of any features discovered by geophysical survey would also shed light on the survival of the internal features as well as confirming their association with the enclosure.

2.4 Hengiform (Walton)

The large circular hengiform monument at Walton, also possibly interpreted as a Roman *gyrus*, measures *c.* 100m across. The ditch shows as a narrow cropmark, and there are no traces, cropmark or otherwise of a bank. Nor are there detectable entrances. The true nature of this site must remain uncertain, but a possible parallel may be found at Bryn Marfydd, Conwy (PRN 106066). This site, visible as a cropmark on aerial photographs, is also perfectly circular, *c.* 100m across, and defined by a regular narrow ditch. It is described as and Iron Age hillfort on the SMR but its perfect circularity argues against this. A hengiform interpretation may also be proposed here. A stone macehead with hour-glass perforation (PRN 100468) was found near to the Bryn Marfydd site in 1953, though it may well have been accidentally imported to the site in material for road metalling.

3 BRONZE AGE

3.1 The Round Barrows

It is clear that a number of barrows, particularly in the basin itself, are affected by regular ploughing and are becoming lower and more spread, their ultimate fate being perhaps shown by the presence of the six ring-ditch cropmarks. Once ploughed down the possibility of recognising modification and phasing of the barrow mounds is made more difficult. Buried soils are also likely to be disturbed, with the destruction of environmental evidence as well as physical evidence such as stake rings. It should also be remembered that any settlement evidence, which in adjacent areas will have been largely eradicated by ploughing, may be preserved and protected below later barrows. The wealth of information that these sites may provide is amply demonstrated by the excavations at Trelystan in north Powys (Britnell 1982) or in the present project at Upper Ninepence (Part 6). Continued ploughing must therefore be seen as a real and immediate threat to these monuments, even though the visible effects from one year to the next may appear to be minimal.

Excavations carried out by CPAT at Four Crosses in north Powys, have shown that even when a site is only visible as a cropmark, small amounts of structure, barrow mound and buried soil may still survive. In the Walton basin, cropmark sites are also under a regular threat from ploughing and are therefore suffering continued erosion. All the ring-ditch cropmark sites in the basin are regularly ploughed as are the other cropmark complexes, particularly around Walton village. It is most likely that these sites are being seriously damaged.

Only four of the upstanding basin sites area scheduled: PRN 358 and 1081 near Knapp Farm are perhaps the best preserved, both have mature trees on them and PRN 309 and 314 are regularly ploughed. Of the non-scheduled barrows, PRN 296, 300, 303, 305, 307, 310 (part), 369, and 1078 are regularly ploughed and 296, 303, 310, 369, and 1078 were ploughed or cereal-covered at the time of the present survey. PRN 310 lying partly within the Ditchyeld Nature Reserve survives as a substantial mound within the Reserve but is dramatically truncated at the field boundary where the landuse changes to arable.

A further threat to the archaeological resource, particularly mounds such as barrows composed of soft loamy material, is that caused by burrowing animals. Much of the mound and surrounding ditch at Upper Ninepence (PRN 305) was completely riddled with rabbit burrows (see above section 5.4) and Hindwell South (PRN 314) is the site of an active warren offered protection by the tree and briar cover over half of the site. The barrow within the Ditchyeld Nature Reserve (PRN 310) is also the site of an active badger colony. The depressions formed by the collapse of disused setts are also visible on the mound surface.

3.2 Enclosures

Few enclosures can, with certainty, be dated to this period. The Upper Ninepence enclosure (PRN 50187) has been tested by excavation and has provided a Bronze Age date from a large, well-stratified carbon deposit in the basal silts (see above Part 5). The unreliability of single dates is, nevertheless, acknowledged. The slight, flat-bottomed and angular ditch profile, resembles more that of the Welsh cursus ditches (Gibson forthcoming a) than it does the later enclosures which may argue in favour of the correctness of the date. The shallowness of the ditch, and therefore the slightness of any bank derived from its spoil, and its hillslope setting must also argue against a defensive function.

A combination of remote sensing and excavation would be needed to further elaborate on nature of this site, its unequivocal dating and its internal arrangements. An intersection with a small ring ditch on the NE arc of the enclosure would provide relative dating as well as a possibility for material from which to obtain absolute dates.

3.3 Standing Stones and Stone Circles

The Four Stones stone circle is one of only a few four-posters outside the English/Scottish borders. It is currently overgrown and, while generally kept out of arable, it is gradually losing its context being sited on a slight knoll resulting from agricultural degradation of the surrounding field. Flint artefacts from this field attest the destruction of buried features.

The *in situ* standing stones described above (Part 2) are generally stable but some do suffer from a degree of animal poaching at their bases. Their antiquity may only be assumed. Their distribution in two distinct converging linear groups is noteworthy (above Part 2) but since this pattern also pertains to both barrows and medieval settlements, it does little to illuminate the antiquity of the stones.

None of the *in situ* stones have statutory protection and they are, therefore, subject to the same risk that has befallen the other stones in the Basin.

4 IRON AGE

4.1 Hillforts

There are two hillforts within the study area, Burfa Bank (PRN 312) and Pen Offa (PRN 297). Both are univallate hillforts, though Burfa has an additional line of defence at the NW end in the area of the entrance. Both sites are scheduled but lie within areas of forestry and the banks (and presumably therefore the ditches) of both monuments are home to active warrens and animal burrows.

4.2 Enclosures

The twenty-two recorded enclosures in the Walton Basin are generally assumed to date from this period and there are a further three undated sites. None are scheduled. The two which were subject to trial excavation were generally uninformative though both had internal banks, V-profiled ditches and Hindwell I was dated to the 4th-2nd centuries BC. All the enclosures, which are generally rectilinear, are known as cropmarks only attesting their vulnerability to arable agriculture. While they are now to be regarded as generally stable, continued regular ploughing may still be degrading the upper ditch silts and any traces of remnant bank that may survive.

4.3 Field Systems

Though untested by excavation, many of the field (or ditch) systems, recorded through aerial photography may well date to this period. Only glimpses of the extent of the possible field system(s) may be gleaned from an aerial photographic palimpsest of sites within the arable areas. The true extent cannot yet be estimated.

5 ROMAN

5.1 Fort

The pre-Flavian Roman fort at Hindwell survives as a low earthwork. Previous excavation (Pye 1979) has demonstrated at least two phases to the site both of which are early in the history of the Roman occupation of Britain. Lying in pasture, this site is relatively stable though there are some slight areas of animal poaching on the E rampart. The pasture is, however, regularly (if infrequently) ploughed as part of a rotational regime and this is likely to have a detrimental effect on the slight earthworks. The site is scheduled.

While a bath-house is recorded to the S of the fort and which may benefit from geophysical survey, there is no evidence for the presence of a *vicus* attached to this fort and no traces of an extramural settlement were detected during the geophysical survey of the Hindwell palisaded enclosure in Berry Meadow, immediately to the N of the fort. The brief occupation of the fort may, however, have been too short-lived to have attracted a civilian settlement.

5.2 Marching camps

Marching camps have been recorded at Walton and at Hindwell. Those at Walton enjoy statutory protection but are still subjected to annual (or even twice-yearly) ploughing which is likely to be degrading the ditch silts.

The Hindwell marching camp (PRN 313) occupies 17.4Ha and lies in part arable and part pasture farmland. The aerial photographs occasionally reveal an internal line of pits running just inside and parallel with the camp ditch. This clearly indicates the survival potential of internal features at this site and it suggests a better degree of preservation than at Walton. By virtue of its unusual size and its good condition, this site is worthy of statutory protection.

5.3 Roads

The Roman roads in the Basin are principally those emanating from the E and W gates of Hindwell fort. Both sections of road survive as slight earthworks, the western section complete with flanking ditches and with a junction which appears to connect with a road running to the S of the camp. Both sections are in fairly permanent pasture and are regarded as stable.

5.4 Signal station

The possible signal station (PRN 34055) discovered from the air as part of this project is a tentative identification and would benefit from trial excavation to prove its identity. There are no earthworks surviving at this site but the buried ditches are still regularly ploughed.

6 MEDIEVAL

6.1 Mottes & Mottes and Baileys

There are five mottes (PRN 298, 301, 302, 311, 1071) and three motte and baileys (PRN 304, 317, 360) in the study area. Three mottes are scheduled (PRN 301, 311, 1071) as are two of the motte and baileys (PRN 317, 360). While generally stable, with the exception of animal damage, statutory protection should be extended to all sites and their conditions monitored.

6.2 Field Systems

As outlined above (Part 2), medieval field systems as represented by ridge and furrow cultivation cluster around the extant mottes. Most are known from aerial photographs and have been largely ploughed out. They are probably not worthy of scheduling. The hollow way between Hindwell and Hymns Farm (PRN3665), however is extremely well-preserved and an excellent example. It may be worthy of statutory protection.

6.3 Platforms & Settlements

There are 27 recorded platforms in the area, none of which are scheduled. While most are stable and in pasture, those occurring as parts of a complex may be regarded as worthy of statutory protection in view of their clustering and association. In particular those connected with the Kinnerton and Old Radnor shrunken settlements represent potentially important earthwork evidence.

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