Forest of Dean Archaeological Survey Stage 3B

Survey for management of lidar-detected earthworks in Forestry Commission woodland

Project Number 5291 REC

Phase 2: Field evaluation of selected lidar-detected earthworks and characterisation of archaeology in Forestry Commission woodland

Project Report Volume 1: Methodology, Results and Discussion

Version 0.3

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Project details

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Summary

The following document is a report on the field evaluation of selected lidar-detected earthworks in the Forest of Dean, and on the rapid characterisation of the heritage resource in Forestry Commission woodland. The fieldwork took place between February and June 2011, and the characterisation was undertaken in March and August 2011. Both these operations were undertaken as Phase 2 of Stage 3B of the Forest of Dean Archaeological Survey (Project Number 5291 REC); a survey for management of lidar-detected earthworks in Forestry Commission woodland in the Forest of Dean, Gloucestershire.

The following elements of Phase 2 of the survey have been completed and are reported on in this report:

- *Field evaluation of selected lidar-detected earthworks within Forestry Commission woodland.*
- *Rapid characterisation of the heritage resource in Forestry Commission woodland to inform management strategies for woodland landscapes.*

The final element of Phase 2 of the project consists of the production of a project design which will sets out proposals for and scoping of Stage 4 (reporting and dissemination) of the Forest of Dean Archaeological Survey. This comprises:

- *Proposals and costs for the finalisation of the Stage 3B, Phase 2 of the Forest of Dean archaeological survey.*
- *An outline and costs for a monograph which will summarise the results of all stages of the Forest of Dean Archaeological Survey, including NMP to be undertaken as part of Stage 4 of the Forest of Dean Archaeological Survey.*
- *Proposals and costs for, and the scoping of, a sub-regional research agenda and strategy for the Forest of Dean to be undertaken as part of Stage 4 of the Forest of Dean Archaeological Survey.*

The updated project design is a separate document which was submitted to English Heritage in January 2012.

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1 Introduction

The following document is a report on the field validation of selected lidar-detected earthworks in the Forest of Dean and the rapid characterisation of the heritage resource in Forestry Commission woodland, undertaken as Phase 2 of Stage 3B of the Forest of Dean Archaeological Survey (Project Number 5291 REC).

The project was undertaken in accordance with the specifications set out in the updated project design (Hoyle 2011a) and the variation to the project set out in the variation request submitted to English Heritage in March 2011 (Hoyle 2011b). This consisted of:

- Field evaluation of selected lidar-detected features which had been identified by the 2006 lidar survey of the woodland in the Forest of Dean and rapidly surveyed as part of Stage 3B, Phase 1 of the Forest of Dean Archaeological Survey.
- Additional palaeoenvironmental and geoarchaeological sampling within Forestry Commission woodland in the valley of the Cannop Brook.
- Rapid characterisation of the heritage resource in Forestry Commission woodland to inform management strategies for woodland landscapes.
- The production of this report summarising the results of this phase of the survey.

The project was jointly funded by*:*

- English Heritage's Historic Environment Enabling Programme (HEEP)/the National Heritage Protection Commissions Programme (NHPP).
- The Forestry Commission.
- Gloucestershire County Council.

Full details of the financial and non-financial contributions made by these bodies are contained in the project design to Phase 2 of the survey (Hoyle 2011, section 15).

1.1 Scope of the project

1.1.1 Field evaluation

One of the objectives of Phase 2 of the project was identified as '*To undertake more intensive fieldwork on a sub-set of selected features to determine their status, date range, archaeological significance and degree of preservation*.' (Hoyle 2011a, 2.2, Objective1). This was achieved through more intensive field work to investigate a small selection of those lidar-detected earthworks investigated during Phase 1 of the project (rapid field survey) to provide information on their status, date and degree of preservation. Four features were investigated using a combination of the following techniques:

- Small-scale exploratory excavation.
- Geophysical survey.
- Metrical topographical survey.

The following features were investigated:

Table 1: Lidar-detected earthworks investigated as part of Phase 2

Lidar: Feature type	Lidar: Feature number	Glos HER: Feature number	Glos HER: Investigation event number	Techniques used
Earthwork system	so6013/26	Earthworks – Glos HER 43407 Bloomery waste - Glos HER 43408	Glos HER 37920	Geophysical survey Exploratory excavation
Earthwork system	so6013/04	Glos HER 43406	Glos HER 37921	Exploratory excavation
Subrectangular enclosure	so6316/07	Glos HER 43409	Glos HER 37923	Exploratory excavation

Lidar: Feature type	Lidar: Feature number	Glos HER: Feature number	Glos HER: Investigation event number	Techniques used
Subcircular enclosure	so5500/05	Glos HER 43410	Glos HER 37924	Geophysical survey Topographical survey Exploratory excavation

The reasons for selecting these features for further investigation is set out in the Updated Project Design (UPD) for Phase 2 of the project (Hoyle 2011a, sections 4.22, 4.2.3, 4.2.4). Details of exploratory techniques are set out in the reports on the investigation of each earthwork (see 2 below).

1.1.2 Additional programme of palaeoenvironmental sampling

Additional palaeoenvironmental sampling was undertaken in valley of the River Lyd/Cannop Brook, the principal aim of which was to produce an assessment of the research potential of samples to identify the sequence of deposits with palaeoenvironmental potential and establish their significance. This had the potential to:

- Provide data on the processes which may have contributed to the formation of the earthwork systems investigated by the project by providing a coherent local environmental context within which they could be better understood.
- Contribute to an understanding of the wider environmental history of the Forest of Dean. Provide information on the environmental potential of the valleys in the central part of the Forest of Dean's woodland.

The results of this programme are reproduced as Appendix A and discussed in section 2 below.

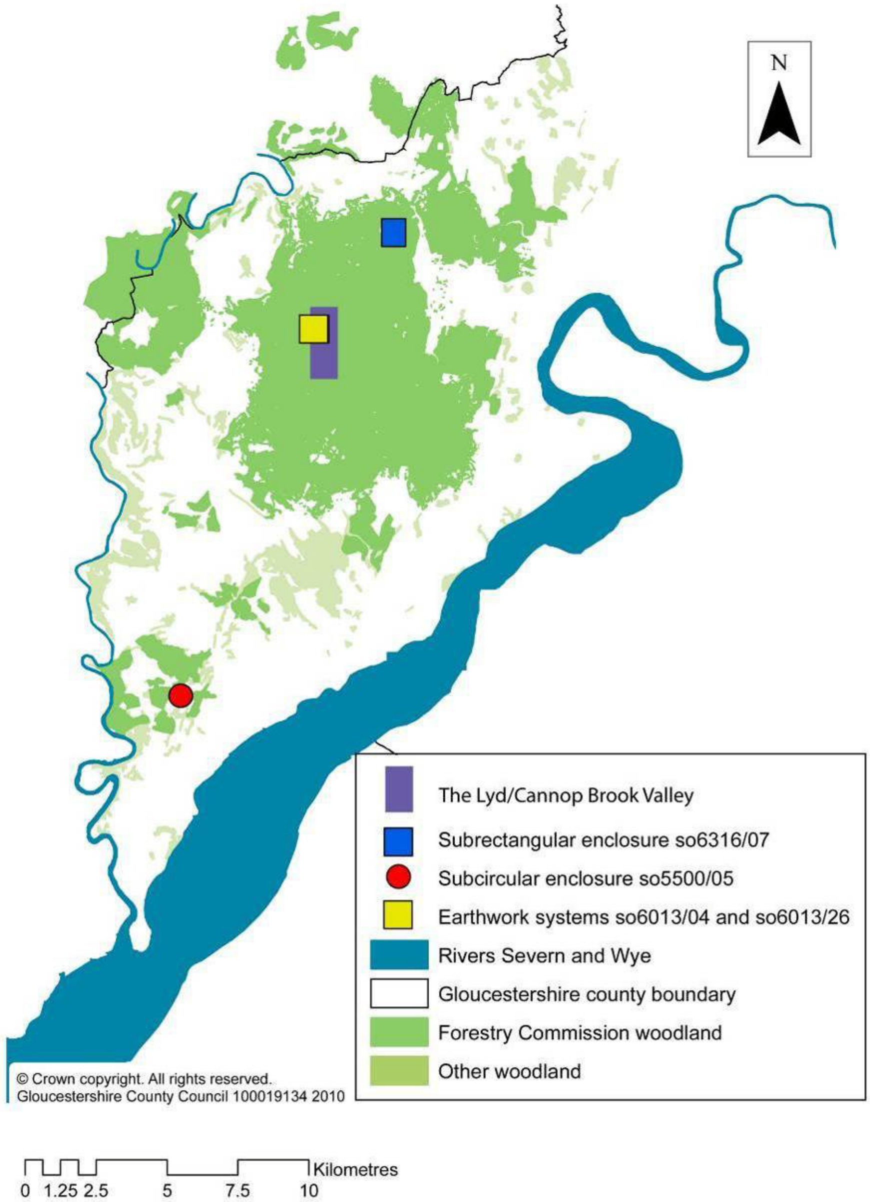

Figure 1: Location of fieldwork undertaken in 2011 as part of Phase 2

1.1.3 Characterisation of heritage assets in Forestry Commission woodland

Following the scoping analysis of the characterisation of the heritage resource within Forestry Commission woodland undertaken as part of Phase 1 of the project (Hoyle 2011c, section 4) and establishment of a suitable methodology for this (Hoyle 2011c, Appendix H). Characterisation of the heritage resource was undertaken for all Forestry Commission woodland with the Forest of Dean Archaeological Survey area, an area of *c.* 9809ha.

The characterisation contributed to the principal aim of this phase of the project which is ***'to inform and improve the management of the archaeological resource within the woodland of the Forest of Dean.'*** (Hoyle 2011a, section 2.1.1), and the SHAPE primary driver is Corporate Objective 3A: '*Promote better legislation, policies, guidance and good practice to improve the system of protection*.' (Hoyle 2011a, section 3.1.1).

The characterisation is discussed in 1 below and details of the characterisation process are set out in Appendix O.

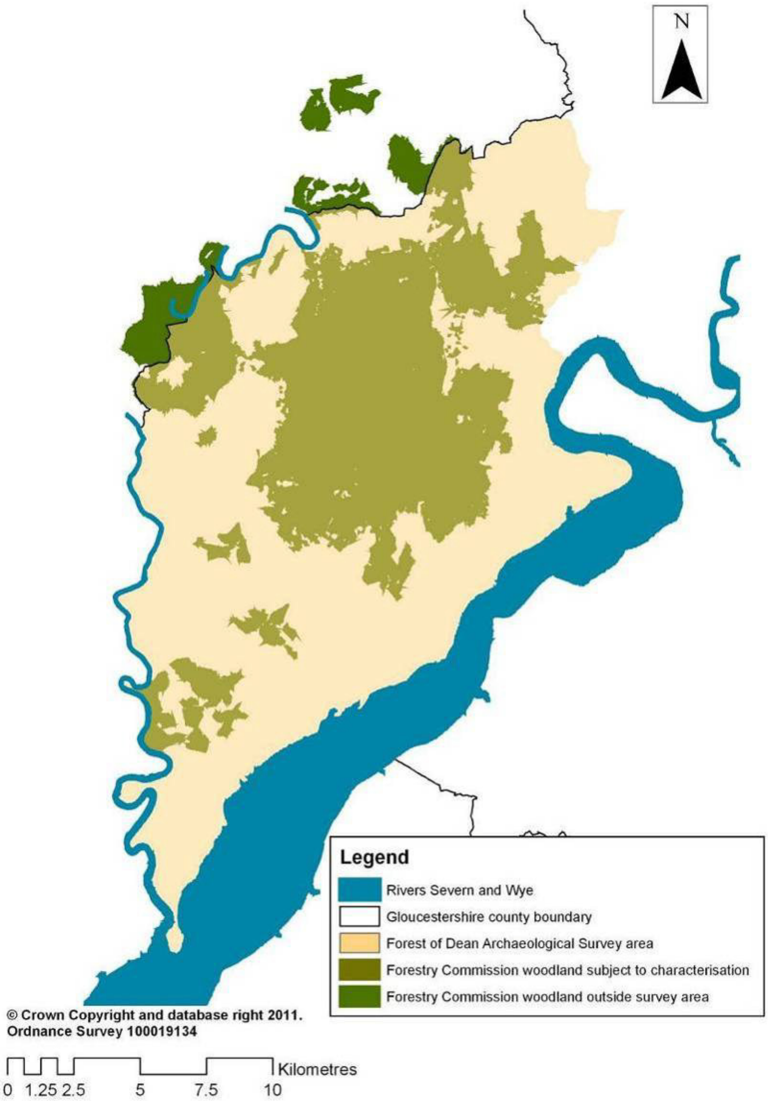

Figure 2: Area of Forestry Commission woodland in which characterisation took place

2 Excavation of subrectangular enclosure so6316/07
(Activity reference Glos HER 37923, Feature reference Glos HER 43409)

2.1 Introduction

Subrectangular enclosure so6316/07 (NGR 363673 216412, Glos HER 43409) is situated within Drybrook Parish *c.* 400m to the southwest of the settlement of Ruardean Hill (Figure 1 and Figure 3) within Forestry Commission woodland. In 2011 the northern part of the site was in an area of fairly open mixed woodland consisting largely of mature standards, although the southern part was in dense young conifer plantation. The interior of the earthwork was under mixed woodland with fairly dense undergrowth, although the northern and eastern ramparts were relatively open. The site overlies a solid geology of the Coleford member of the Pennant Sandstone formation (B.G.S. 2004) at a height of *c.* 255m AOD. The site is centrally placed on the southeastern side of a hill which rises to *c.* 285m AOD *c.* 300m to the northeast. The ground drops away relatively gently (on a slope of *c.* 6^{o}) to the southeast, although steep valleys are found *c.* 500m to the northeast and *c.* 800m to the southwest and the site would have commanded views over a southerly aspect from the northeast (*c.* 65^{o}) to the west (*c.* 270^{o}) (Figure 4).

Figure 3: Location of subrectangular enclosure so6316/07

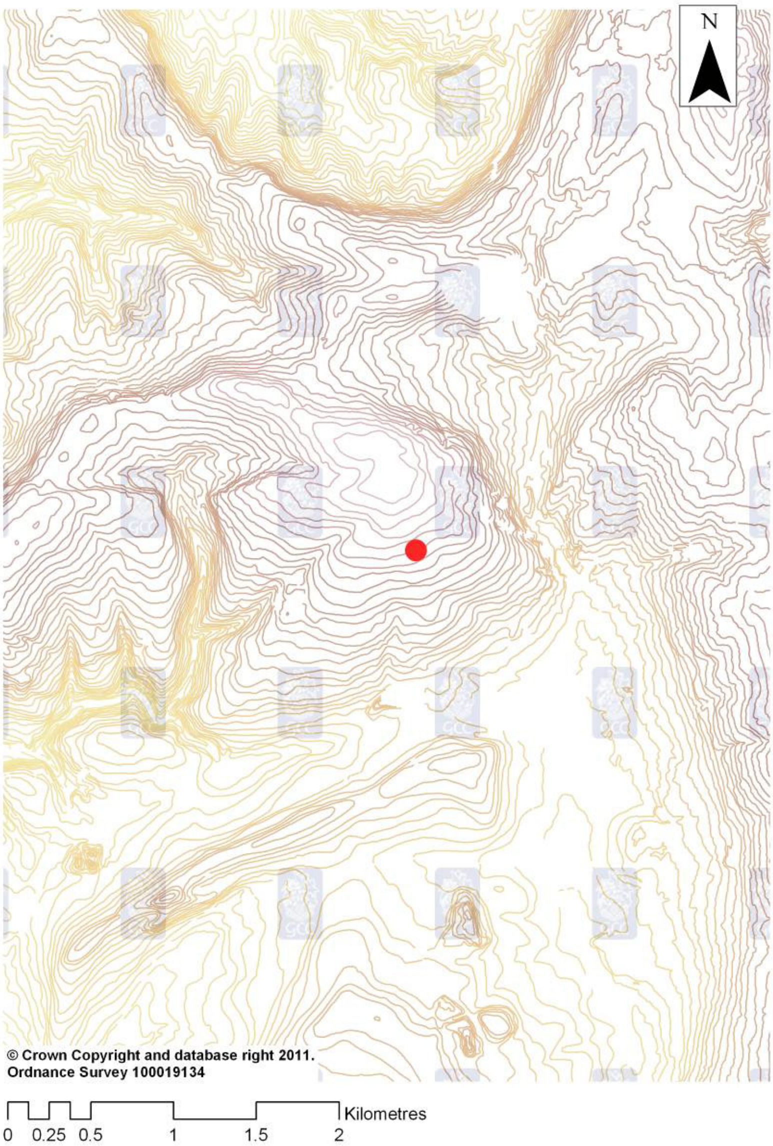

Figure 4: Topographical location of subrectangular enclosure so6316/07. Contours at 5m intervals, darker contours indicate higher ground

2.2 Research questions

The research questions for this excavation were set out in the UPD for this phase of the project (Hoyle 2011a, section 4.2.3) and can be summarised as follows:

- What is the status/date of the enclosure?
- Does the bank contain any structural features?
- What is the form of the ditches, and can their infilling sequence tell us anything about the enclosure?
- Does the bank or ditch contain or seal any datable or environmentally significant material?
- Does the infill of the ditch provide information on the environmental history of the enclosure or its immediate surroundings?
- Are there any visible features in the immediate vicinity which may relate to this feature?
- To what extent has the survival of these features been compromised by the long-term woodland cover on the site and what are the management priorities associated with this landuse?

2.3 Methodology

Sample excavation (Glos HER 37923) consisted of a single trench cross the bank and ditch. This originally measured 12.30m x 1m (Figure 5). When excavated, the depth of the ditch necessitated the widening of the northeasterly 4.40m of the trench by a further 1m to meet health and safety requirements. For this reason the excavation of the lower fills of the ditch was also stepped in two stages below a depth of *c.* 1.20m below the present ground surface. Below this depth the excavation narrowed to 1m and finally to 0.80m for the lowest 0.50m. With a few exceptions (outlined in 2.4 below) the trench was excavated to the surface of the undisturbed natural subsoil.

Two small test pits, each measuring 0.25m x 0.25m, were excavated to the north and east of the main excavated trench to test subsoil conditions (Figure 5).

A 40l. bulk sample of the basal fill of the ditch (917) was recovered for palaeoenvironmental assessment. The report on this assessment is found in Appendix A, 4.4.2.

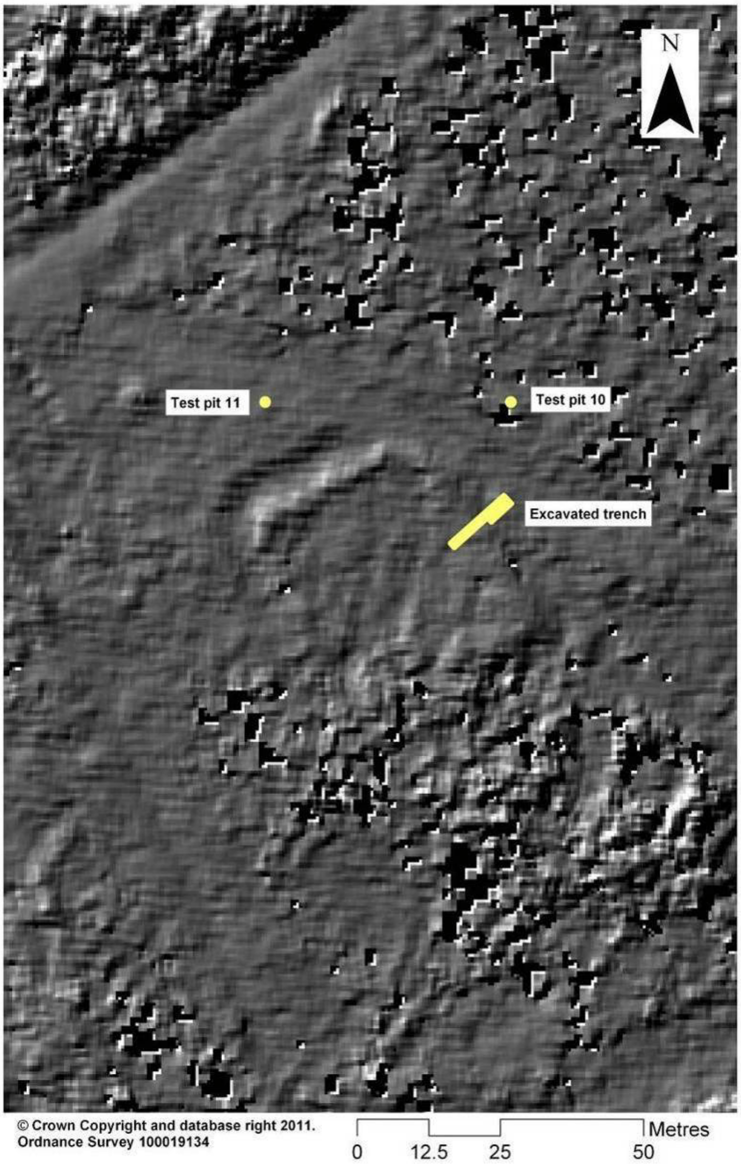

Figure 5: so6316/07 location of excavated trench and test pits (Glos HER 37923)
Lidar image © Forest Research

2.4 Results

2.4.1 Evaluation trench

The recorded trench section is reproduced as Figure 6.

The latest deposit encountered was a thin (generally *c.* 0.04m) dark brown humic silty clay topsoil (900). This layer produced a single sherd of glazed pottery, the precise date of which is uncertain (Appendix E).

The bank and interior

In the central part of the trench this sealed a deposit of medium sandstone rubble in a matrix of light brown sandy silt (909). This deposit, which contained no finds, was interpreted as the remains of the bank. It sealed a light greyish brown sandy silt (910) which produced two sherds of early Severn Valley ware and six sherds of Malvernian limestone-tempered ware suggesting a 1st -century AD date (Appendix E).There was no visible buried soil horizon sealed by the bank and following advice from Vanessa Straker and Matt Canti of English Heritage, both of whom visited the site, (910) was interpreted as a de-turfed subsoil. Accordingly (910) was not sampled. In its present form the bank (where excavated) produced no indication of its method of construction, and, in particular, no evidence for the use of turves (Vanessa Straker and Matt Canti, English Heritage pers. comm.). However, the size of the bank (only *c.* 0.35m high) appears inconsistent with a corresponding ditch 1.80m in depth (see below), and it would seem likely that the bank has been considerably reduced since it was first constructed and only its base survives.

To the southwest, towards the interior of the enclosure, (910) merged into a mid brown sandy silt (911) which was sealed by the topsoil (900). Although there was a colour distinction between (910) and (911) there was no clearly defined division between the two layers. (911) was interpreted as a continuation of the subsoil (910) which, without the protection of the overlying bank, had been subjected to different post-depositional impacts such as increased root and worm action. (911) produced three sherds of probable 1st century AD pottery (Appendix E) and five fragments of bloomery iron slag.

At the extreme southwestern end of the trench (914) appeared to be cut by a feature [912] filled with small to medium sandstone rubble in a matrix of greyish light brown sandy silt (913). Only a section of this feature, measuring *c.* 3m x 1m, was exposed, representing part of its northern and eastern edges. Excavation of the easternmost 1.5m of [912] suggest that it may have been part of a steep-sided feature *c.* 0.65m deep with a flattish bottom, although its fill (913), which produced no finds, was not, in places, clearly distinct from the natural sandstone (911) suggesting that [912]/(913) may not be archaeological in origin but, perhaps, the result of tree throw.

Both (910) and (911) directly overlay the undisturbed sandstone bedrock (914) which consisted of small to medium fragments of sandstone in a yellow/orange silty sand matrix.

To the northeast of the bank the topsoil directly overlay an area of greyish brown silty clay (918) interpreted as root or animal disturbance, which, in turn, overlay the western continuation of the subsoil (901), which consisted of a mid brown sandy silt. As with (911) (see above), although this material could be distinguished from the subsoil below the bank (910), there was no clearly defined division between the two deposits. Although (901) directly overlay the undisturbed sandstone bedrock (914), it also overlay the fill of the ditch [908] (see below) and its status must be that of a subsoil which has become so mixed by root and worm action that stratigraphic divisions are no longer clearly defined. (901) produced a single fragment of charcoal and nine sherds of probable Roman pottery (Appendix E).

The ditch

The ditch [908], which cut the undisturbed sandstone bedrock (914) below subsoil (901), was 1.60m deep and 3m wide at its lip. Its sides sloped down at an angle of *c.* 40-45^{o} towards a flat bottom *c.* 0.50m wide. Its earliest fill (917) consisted of soft mid reddish brown sandy silt with some small fragments of sandstone, which filled the bottom and southwestern side of the ditch and was up to

0.30m thick. (917) is interpreted as the primary silting of the ditch, derived from weathering of the relatively friable sandstone (914) through which it was cut, and was identical to (916) which overlay the northwestern edge of the ditch. Although the connection between the two contexts was obscured by the layer above (907), (916) can be interpreted as primary weathering derived from the northeastern side of the ditch. No finds were recovered form contexts (917) and (916) during excavation, although the base of (917) was sampled for environmental remains (Sample No. 7). This sample produced small fragments of iron slag, burnt clay (possibly the remains of iron smelting furnaces), burnt stone, charred grassy material and charcoal thought likely to be oak (Appendix A, 4.4.2). A single small sherd of pottery was also recovered from this sample. This has very tentatively been identified as a possible beaker fragment, although this identification is far from clear (Appendix E.ii.i).

Both (917) and (916) were sealed by a thick (up to 0.70m) deposit of loose sandstone rubble in a matrix of light brown sandy silt (905/907). Although these contexts appeared to represent a single deposit, they were assigned separate numbers to represent the excavation of this layer both above and below the step in the section (see above). (905/907) was very similar to the surviving bank (909), and produced the bulk of the pottery assemblage (699 sherds) recovered from the excavation. This included nine sherds of 1st century AD Severn Valley ware, 266 sherds from a number of 1st century AD handmade Malvernian limestone-tempered jars and 421 sherds from a very large handmade, oxidised, grog-tempered vessel of indeterminate date, which was recovered from the base of (907). Three sherds of 2nd century AD Black Burnished ware were also retrieved although these were all from the higher part of this deposit (905) (Appendix E). The lower part of this deposit (907) also produced 43 fragments of animal bone (mostly probable cattle teeth and the remains of a single cattle jaw bone), one fragment of bloomery slag and 15 charcoal fragments, whilst a further three fragments of bloomery slag were recovered from (905). (905/907) was sealed by a deposit of relatively stone free light orangey brown sandy silt. This material was up to 0.60m thick, and appeared to contain a number of lenses whose disposition suggested that it was derived from the southwestern (bank) side of the ditch. No finds were recovered from this deposit.

(905/907) was almost identical to the surviving bank material (909) and, although this deposit appeared to have derived from the northeastern (i.e. outer) side of the ditch, it is temping to interpret it as bank make-up which has been re-deposited in the ditch, perhaps representing a deliberate backfilling episode in which bank material was propelled against the opposing face of the ditch. (906) may also represent re-deposited bank material, although if this were the case it would suggest that the bank was originally constructed using discrete deposits of stony and relatively stone-free material. The lack of surviving turves within this material is puzzling (Matt Canti, English Heritage pers. comm.) as these may be expected, particularly as the original surface beneath the bank appears to have been de-turfed prior to its construction. The clear distinction between the relatively finds-rich stony deposits (905) and (907), which produced 699 sherds of pottery, and the stone–free (906), which produced no finds, is also difficult to explain. Given that the vast majority of the pottery (94%) was recovered from (907), the lower of the two contexts, it may be that (905/907) and (906) actually represent a more complex arrangement of stony and relatively stone-free layers (derived from the make-up of the bank) than the recorded section would suggest, the subtleties of which were obscured by the need to step the section and the poor light conditions produced by the woodland cover which was in full leaf at the time of excavation.

Above this was a layer of light yellowish brown fairly stone-free sandy silt (904) which varied in thickness from *c.* 0.10-0.20m in thickness, and produced eight fragments of bloomery slag, a single fragment of charcoal and 92 sherds of pottery. The majority of the pottery was 1st century AD Severn Valley ware, although there were also six sherds from an imported Central Gaulish colour-coated roughcast beaker which although possibly dating to the pre-Flavian period (before AD 69) is more likely to date to the Flavian-Trajanic period of the late first/early 2nd century AD (Appendix E.i.i). This was sealed by a 0.10-0.15m thick deposit of dark greyish brown sandy silt (903) which contained a number of fragments of sandstone, at least one of which was burnt and a higher proportion of charcoal/organic material than other layers. This layer also produced 25 fragments of iron slag, 12 retained charcoal fragments and eight iron fragments (comprising lumps, small rod fragments and two small hobnails). This layer also produced 205 sherds of pottery including 153 sherds of 2nd – 3rd century AD Severn Valley Ware, 29 sherds of 2nd -3rd Century AD Black Burnished ware and 17 sherds of the same Central Gaulish colour-coated roughcast beaker that had been recovered from (904) (Appendix E.i.i).

The latest fill of the ditch was a thick (up to 0.25m) deposit of light orange-brown sandy silt with occasional small fragments of sandstone (902). This contained 19 fragments of bloomery slag, seven retained charcoal fragments and 11 iron objects (mostly nondescript lumps or nails, although there is one L-shaped fitting and two fragments of the blade of a bow saw). It also included a small sandstone fragment, worn on two sides, which appeared to have been used as a whetstone (Appendix H.ii.i) and 89 sherds of pottery including 44 sherds of 2nd – 3rd century AD Severn Valley Ware, 39 sherds of 2nd - 3rd Century AD Black Burnished ware and six sherds of handmade Malvernian ware of 1st century AD date (Appendix E.i).

(904) and (902) can be interpreted as representing a period of stabilisation in which the infilling of the ditch was slowly completed largely through natural weathering processes. The precise status of (903), the layer between these deposits which had a significantly higher charcoal/organic content, is less clear. The disposition of the charcoal/organic deposits within (903) could be consistent with re-deposited turves, although this was not a clear cut interpretation (Matt Canti, English Heritage pers. comm.) and, given the presence of at least one burnt fragment of sandstone, may simply be indicative of a dump of occupation debris, or waste from iron smelting activity in the already largely filled-in ditch during this process.

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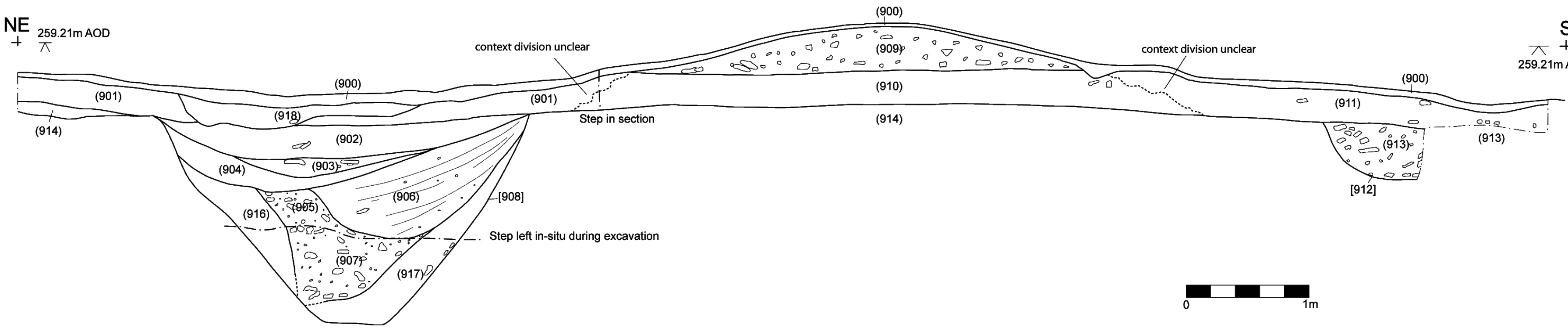


Figure 6: Section across so6316/07 (Glos HER 37923)

2.4.2 Test pits

Two test pits were excavated to the north and northwest of the excavation trench to record the soil sequence in the areas in the. Test pit 10 measured 0.25m x 0.25m and was excavated to a depth of 0.40m, Test pit 11 measured 0.25m x 0.25m and was excavated to a depth of 0.60m. Both these test pits confirmed that the sequence of thin forest topsoil, overlying sandy silt subsoil which, in turn, sealed the brashy undisturbed bedrock of sandstone fragments in a sandy matrix, was the typical soil profile for this area. Records of the soil sequence recorded in the test pits are found in Appendix N.

2.5 Discussion

Prior to the 2011 fieldwork it was thought possible that subrectangular enclosure so6316/07 may represent a medieval hunting lodge, similar to examples recorded in the New Forest, Hampshire (Smith 1999, Fig 4; Hoyle 201, 3.3.30). The bulk of the pottery assemblage from the infill of the ditch, however, dates to the 1st to 3rd centuries AD, or is consistent with that date (Appendix E), suggesting that the enclosure is Roman in date.

The basal fill of the ditch (917), produced a single sherd of prehistoric pottery of indeterminate date whilst the deposits interpreted as deliberate backfilling of the ditch, contexts (906) and (905/907), and also the material sealed by the bank (910), contained no pottery later that the 2nd century AD (Appendix E.ii) suggesting that the enclosure was constructed in the 1st century and deliberately slighted sometime in the 2nd century.

The small quantity of bloomery slag (four fragments) was recovered from these deposits, and also from the basal fill of the ditch (917) along with some tiny fragments of possible burn furnace material. This suggests that iron smelting was taking place in the area during this period (a possibility supported by the fragments of probable oak charcoal from the lower fill of the ditch) but is insufficient to suggest that this activity was the site's main function. These fragments of slag were also noticeably worn suggesting that they may have been already residual when incorporated into the bank material from which this deposit was derived (Appendix F). Few clues about the structure of the bank were recovered, and what survived of the bank appeared to simply represent dumped material derived from the ditch. The de-turfing of the ground prior to construction would suggest that turves may have been used in the bank's construction, but their absence in the infill of the ditch is puzzling. It would seem likely that when originally constructed the bank was *c.* 1.50-2m high and commensurate in size to the depth of the ditch.

The form of enclosure so6316/07, which is subrectangular with rounded corners and has an internal measurement of *c.* 26m x 23m, is consistent with a small Roman military fortlet (Adkins & Adkins 1982) and comparable examples are known at Barburgh Mill, Dumfriesshire (which has an internal measurement of *c.* 29.5m x 28.5; Martinhoe, Devon, with an internal measurement of *c.* 25 x 24m, and also German examples of this type of site, Breeze 1974, Table IV). The size of the ditch (1.60m deep and 3m wide at its lip) is also comparable with excavated examples of this type of monument, although it is lacking a cleaning slot at its base (Breeze 1974, Fig 4, English Heritage 1988, 4).Some aspects of the pottery assemblage are analogous with assemblages from excavations at Dymock Sewage Treatment Works *c.* 15km to the northeast, where a pre-Flavian or early Flavian 'official', although not necessarily military, presence is suggested (Catchpole 2007, 216-217, Appendix E.ii.i). Central Gaulish colour-coated roughcast beakers have also been found at 1st Century AD military sites such as Usk and Kingsholm and need not be associated with the sites original use.

Although known examples of Roman fortlets are most common in the north of England or Scotland, where they are associated with the northern frontiers of Roman Britain, examples are known in other parts of England, and Wales although they are rare to the south of the Severn-Trent line (English Heritage 1988, 4-5). Fortlets were constructed throughout the Roman occupation to house small detachments of troops fulfilling specific tasks such as guarding river or road crossings or providing surveillance over particular areas (Breeze 1994, 42), and fortlets of similar size to so6316/07, such as Martinhoe and Barburgh Mill, contained timber buildings sufficient for a garrison of a single century of 80 men plus an officer (Breeze 1982, 101; 1994, 43). The length of time fortlets of this type were occupied was variable depending on military requirements at the time and could range from a year or two to considerably longer (English Heritage 1988, 3).

The interpretation of so6317/07 as a military fortlet is not absolutely clear, but, if correct, its first century date would suggest that it represents evidence of early Roman military expansion and consolidation during the earliest periods of Roman occupation of the Forest of Dean from the mid 1st century AD. The purpose of a fortlet here is not clear, although so6317/07 is broadly similar to three other subrectangular earthworks identified in the 2006 lidar survey (so6407/01 - Glos HER 43385, so5812/02 – Glos HER 43366 and the slightly smaller so6519/18 – Glos HER 43391) and also, perhaps a slightly larger (*c.* 53m x 53m) undated subrectangular enclosure with less rounded corners (Glos HER 4353) which was known before the 2006 lidar survey (Hoyle 2010, 3.3.3) (Figure 9). These may indicate contemporary fortlets associated with so6317/07 and part of a unified system of early Roman surveillance.

A sixth possible subrectangular enclosure of similar dimensions (so6115/04, component 07 – Glos HER 43379) was identified within an earthwork system during Stage 3B Phase 1 of the survey (Hoyle 2011, 3.3.2.2, Fig 13). The status of this feature, is however far from clear as it may have been 'created' by trackways and quarrying in the area, and is not included in this discussion.

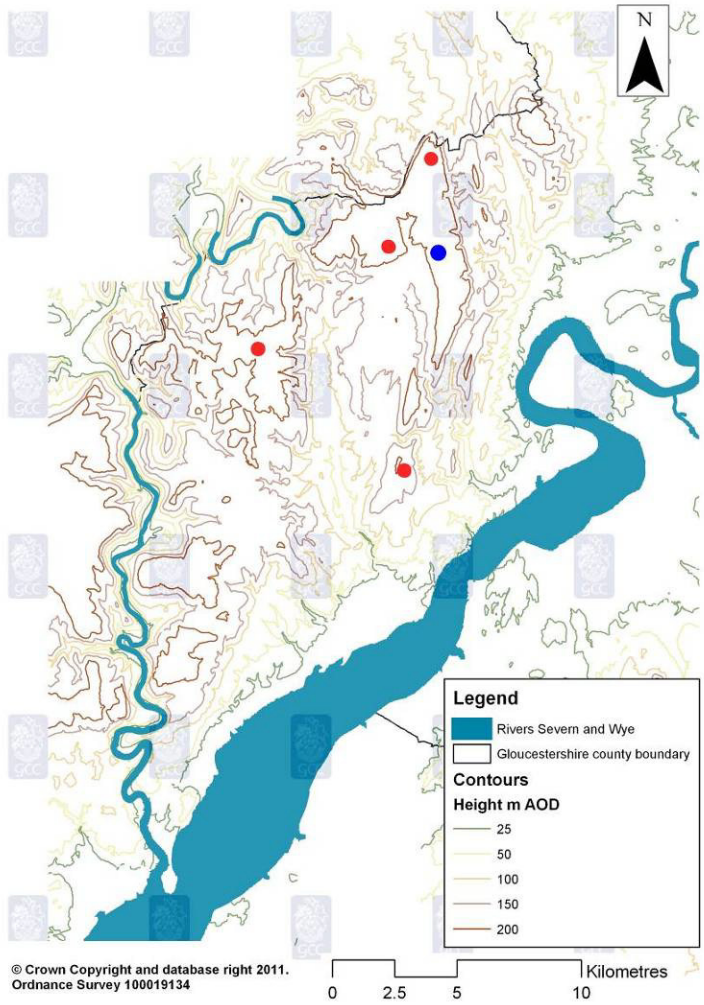


Figure 7: Lidar-detected subrectangular enclosures (red), Glos HER 4353 (blue) and topography

All these enclosures occupied positions (often above or just below 200m AOD) which would have commanded views over the surrounding countryside, although none were at the highest point in their area and none would have had a 360° field of view (Figure 7). These fortlets could have been constructed simply to meet short-term needs in the consolidation of Roman control west of the River Severn and support for the advance westwards into Wales in the later part of the 1st century AD. All were, however, sited close to scowles, the surface expression of iron ore-rich cave systems in the Crease Limestones which ring the Forest of Dean and which have been used as a source of iron ore since at least the Iron Age (Hoyle *et al* 2007, 4.1.6.1; Figure 8). Some, or all, of these fortlets may have had the more explicit function of guarding, monitoring or overseeing iron ore production during the early years of the Roman conquest.

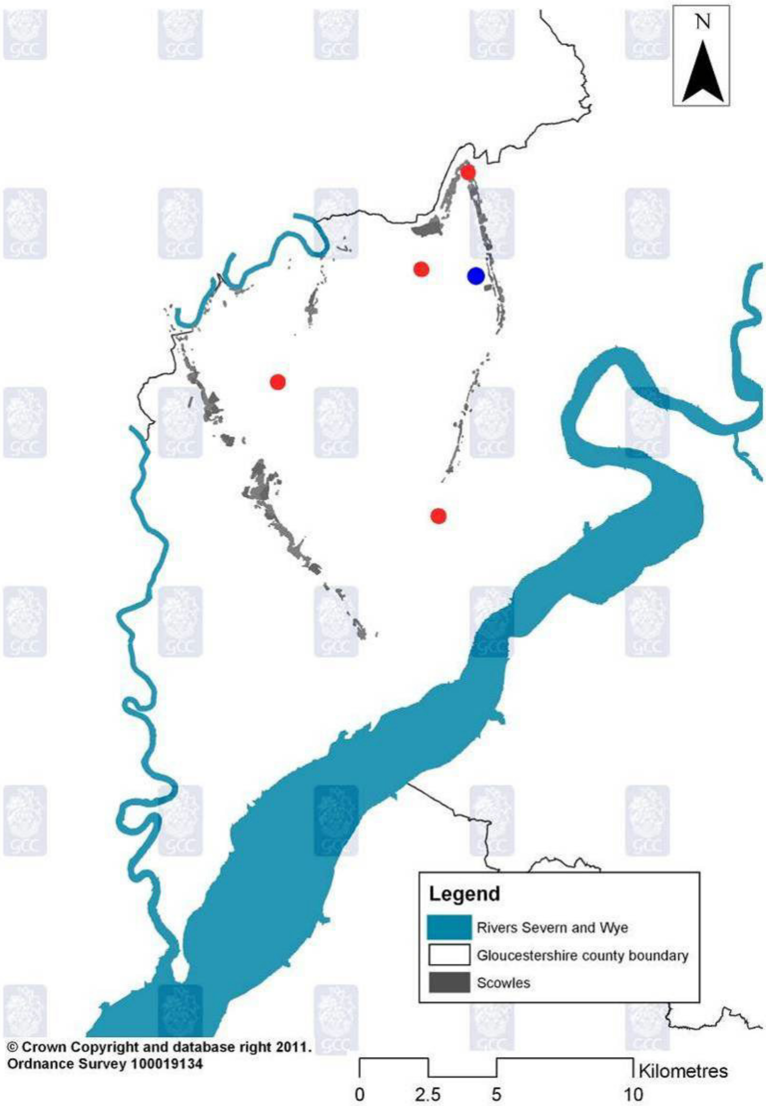


Figure 8: Lidar-detected subrectangular enclosures (red), Glos HER 4353 (blue) and scowles

The precise status of the Forest of Dean iron industry during the Roman period is unclear, and although there is an assumption that it was a major producer of iron ore throughout this period (Cleere and Crossley 1985; LUAU 1998, 9; Sim and Ridge 2002), hard evidence for this industry, particularly for the earlier Roman period is often elusive (Hoyle *et al* 2007, 4.2.4). The only undisputed field evidence for Roman iron mining in Dean is the 3rd century mine at Lydney Park excavated in 1929 (Wheeler and Wheeler 1932).

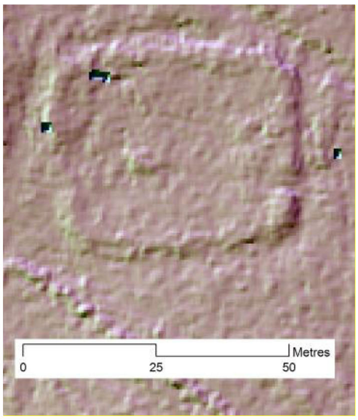
Increasingly, however, scientific analysis of dated artefacts, or smelting residues has begun to confirm Roman iron ore extraction from scowles in the Forest of Dean. Slags from 2nd and 3rd century contexts at Ariconium, and Roman deposits at Frocester villa, used ore from the eastern scowles (Young in Jackson 2012, 191), whilst slags from Roman deposits at both Usk and Caerleon, to the west of the Forest of Dean, used ores from the western scowles (Tim Young pers. comm.).

There is a generally accepted belief that significant mineral resources were owned by the state during the early Roman Empire (Cleere & Crossley 1985, 66), and a convincing case has been made for imperial control of Roman iron industry in the Weald in Kent (Cleere & Crossley 1985, 60-61,66-67, 69; Salway 1993, 442-443). The degree of imperial control of mineral resources does, however, appear to have varied across the empire (Cleere and Cossley 1985, 66). The assumption that the Forest of Dean was an imperial estate dedicated to the extraction of iron ore during the Roman period, and that the area was under the direct control of the Roman military during the 1st and 2nd centuries AD (Sindrey 1990; Walters 1992) has been questioned in recent years (Hoyle *et al* 5.2.2.1), and a recent review of the evidence of the iron industry at *Ariconium* has cast doubt on the evidence for direct military control of smelting operations at that site (Jackson 2012).

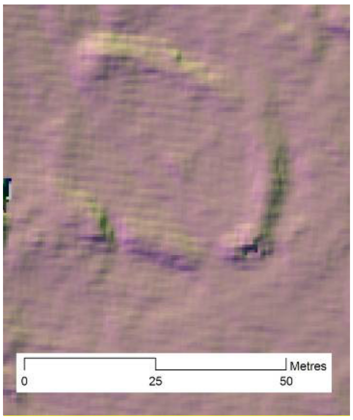
Although there is no clear evidence for military control of the iron industry in the Forest of Dean during the early Roman period (Hoyle *et al* 2007, 5.2.2.1), it would be counter intuitive to argue that the Forest of Dean's iron industry would not have been of interest to the Roman authorities in the early years of conquest, and it would seem reasonable to suggest that so6316/07 and the other 'fortlet' sites were established in the early years of the Roman conquest to provide some form of official control, or, at least, monitoring of this industry. This does not necessarily imply direct imperial or military involvement in mining or smelting operations as suggested by some authorities (Sindrey 1990; Walters 1992), but does acknowledge that an occupying force would have felt the need to secure control over an valuable mineral resource, particularly during the early years of conquest when this resource was at the frontier of Roman influence (Salway 1993, 94).

The abandonment of the site in the 2nd century AD may simply indicate that a military presence was no longer required as the Forest of Dean ceased to be a contentious frontier zone in Roman Britain, but could also suggest some reorganisation in imperial control of the iron industry at that time.

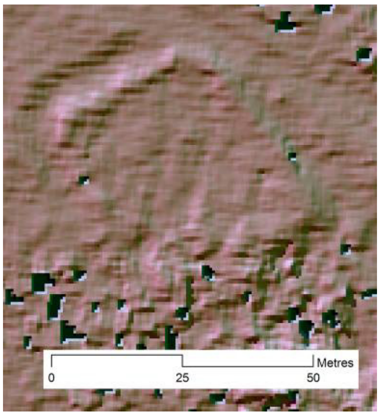
There was further activity at the site in the 3rd century AD, although it can be assumed that the slighting of the earthworks in the 2nd century represented a change in use and the interval between the two activities is not clear. Approximately one third of the pottery recovered from the site (32% by weight and 34% by sherd count) dates to this later phase (represented by contexts (902), (903) and (904)), which would suggest a phase of domestic occupation within the enclosure's much diminished, but still-visible, earthworks. The deposits representing this phase also contained an increased amount of bloomery slag (52 fragments), along with other burnt material, three fragments of iron ore and two fragments of an iron bow saw blade. These may suggests that the new inhabitants were engaged in iron smelting and associated woodland management/charcoal production, although it is not clear if this occurred within the enclosure or in its immediate vicinity. Some of the slag fragments may be indicative of smithing rather than smelting, although this could not be clarified without further analysis of the slag (Appendix F, 2-3). The presence of sherds of the late 1st/early 2nd century AD Central Gaulish colour-coated roughcast beaker in from contexts (903) and (904) is intriguing, but it may represent a residual find from an earlier period of the site which had eroded into the ditch along with the material from which it was derived or possibly represents a prized pottery item which remained in use for a considerable period after it was manufactured



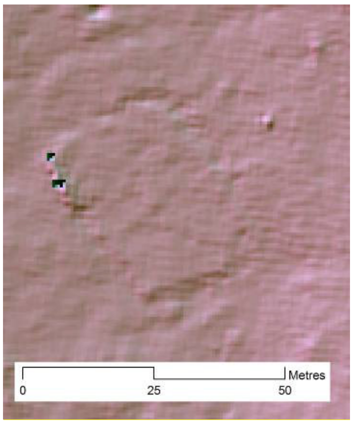
so5812/02 (HER 43366)



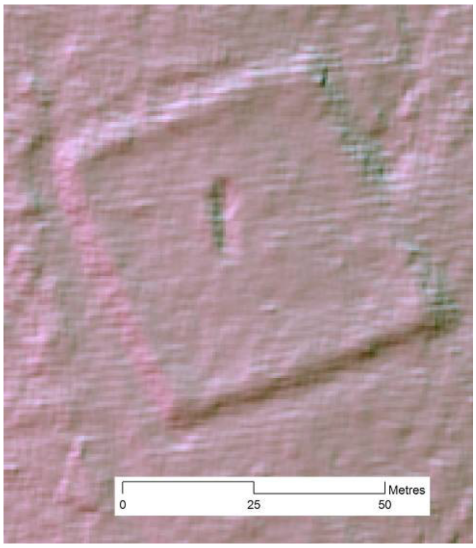
so6407/01 (HER 43385)



so6316/07 (HER 43409)



so6519/18 (HER 43391)



HER 4353

Figure 9: Comparative lidar images of selected subrectangular enclosures identified in 2006 HER 4353

Lidar image © Forest Research

3 Excavation of earthwork systems so6013/04 and so6013/26
(Activity reference Glos HER 37920 and 37921, Feature reference Glos HER 43406 and 43407)

3.1 Introduction

Earthwork systems so6013/04 (NGR 360809 213209, Glos HER 43406) and so6013/26 (NGR 360433 212957, Glos HER 43407) are situated in West Dean parish on the western side of the Lyd/Cannop Brook valley (Figure 10). In 2011 both earthwork systems lay within the Sallowvallets area of Forestry Commission land within an area of fairly open mixed woodland consisting largely of mature standards. In the immediate vicinity of the excavation trenches woodland was generally deciduous and undergrowth cover was light. Both earthwork systems overlie a solid geology of the Coleford member of the Pennant Sandstone formation (B.G.S. 2004). Earthwork system so6013/04 is situated on an east facing slope rising from *c.* 100m AOD to *c.* 135m AOD, and consists of a rectilinear pattern of terraces which both follow and cross the natural contours of the valley side (Figure 11). Earthwork system so6013/26, to its west, is situated on an east-southeast facing slope of *c.* 7^{o} at heights of between *c.* 120 and 145m AOD. The ground in this area also slopes down slightly (c. 3^{o}) from north to south (Figure 11). The earthworks in this system consist of a series of parallel linear terraces which run from east to west up the predominant natural slope, but across the gentler slope and did not conform to any known earthworks relating to Forestry Activity (Ben Lennon, Forestry Commission pers. comm.).

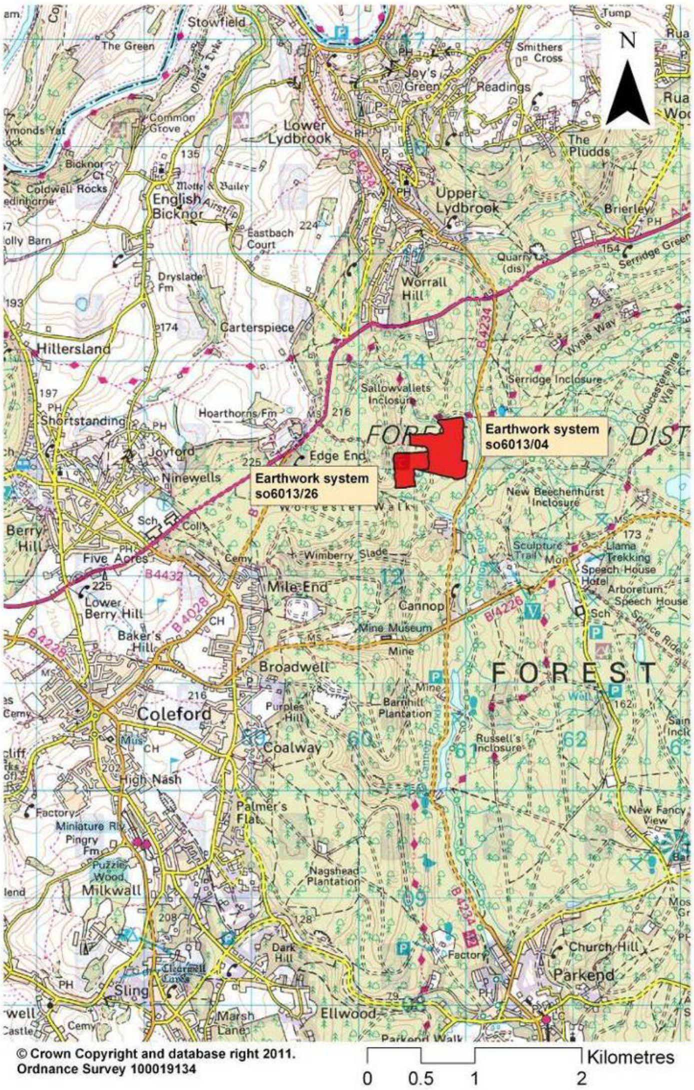


Figure 10: Location of earthwork systems so6013/04 and so6013/26.

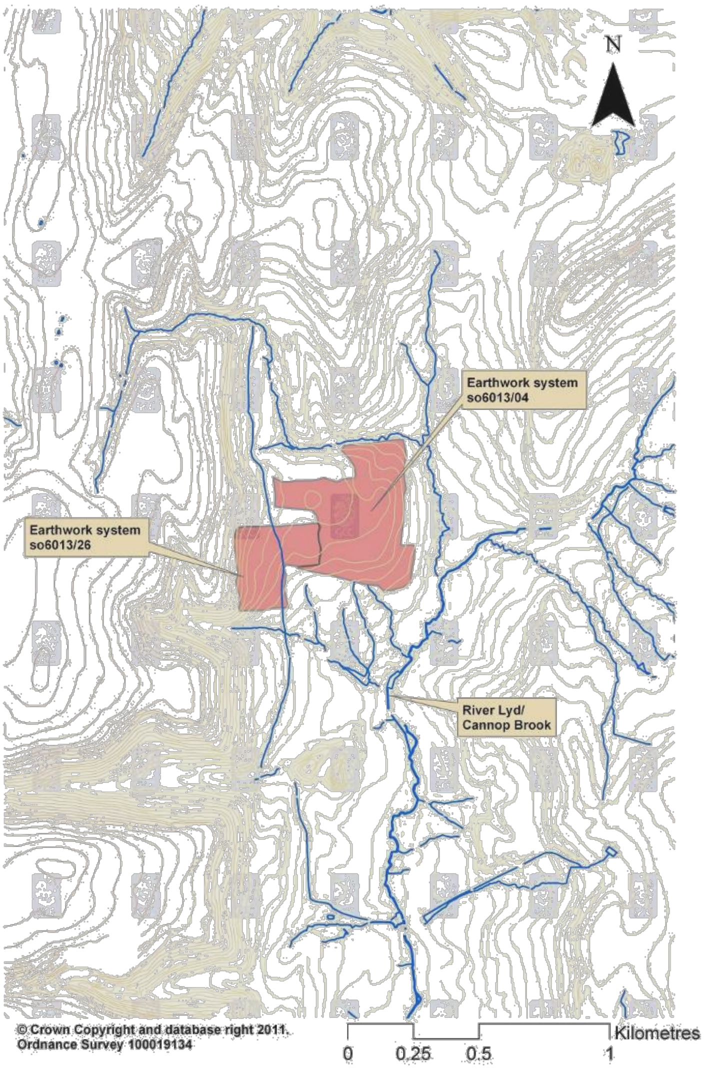


Figure 11: Topographical location of earthwork systems so6013/04 and so6013/26. Contours at 5m intervals, darker contours indicate higher ground

3.2 Research questions

The research questions for this excavation were set out in the UPD for this phase of the project (Hoyle 2011a, section 4.2.4) and can be summarised as follows:

- What is the date of the features?
- Are they constructed boundary features?
- Have they been created by colluvium?
- Are they associated with buried features such as ditches?
- What were they used for?
  - Have their interiors ever been cultivated?
  - Are they small coppice enclosures?
  - Are they associated with industrial processes such as iron smelting or charcoal production?
- Is there a clear difference in date or function between the two forms of earthwork system?
- To what extent has the survival of these features been compromised by the long-term woodland cover on the site and what are the management priorities associated with this landuse?

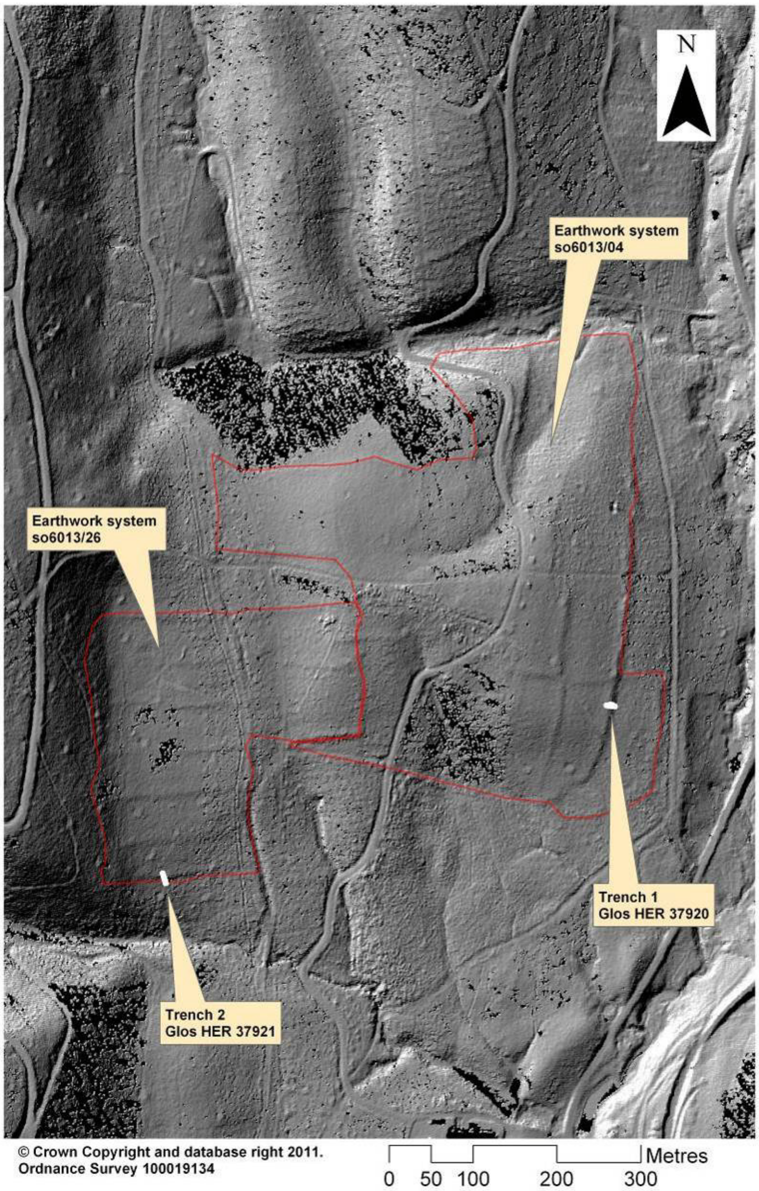


Figure 12: Earthwork systems so6013/04 and so6013/26: Location of excavated trenches

Lidar image © Forest Research

3.3 so6013/04 (Trench 1, Glos HER 37920)

3.3.1 Methodology

Sample excavation consisted of a single trench (Trench 1, Glos HER 37920) across one of the terraces which approximately followed the contours of the natural slope in the southeastern part of the system (Figure 12). The trench was centred at NGR 360952 213032 and originally measured 9m x 1m. Within this area the whole of the trench was excavated to the surface of deposits which have been interpreted as colluvium (see 3.3.2.1 below), whilst approximately half (longitudinally) was hand-excavated excavated to the surface of the undisturbed sandstone bedrock. Subsequently the trench was later extended by 1.65 m in length, and a 3.9m section of its northern side was extended by 1.5m in width. These sections were hand excavated to the surface of deposits which have been interpreted as colluvium (see 3.3.2.1 below).

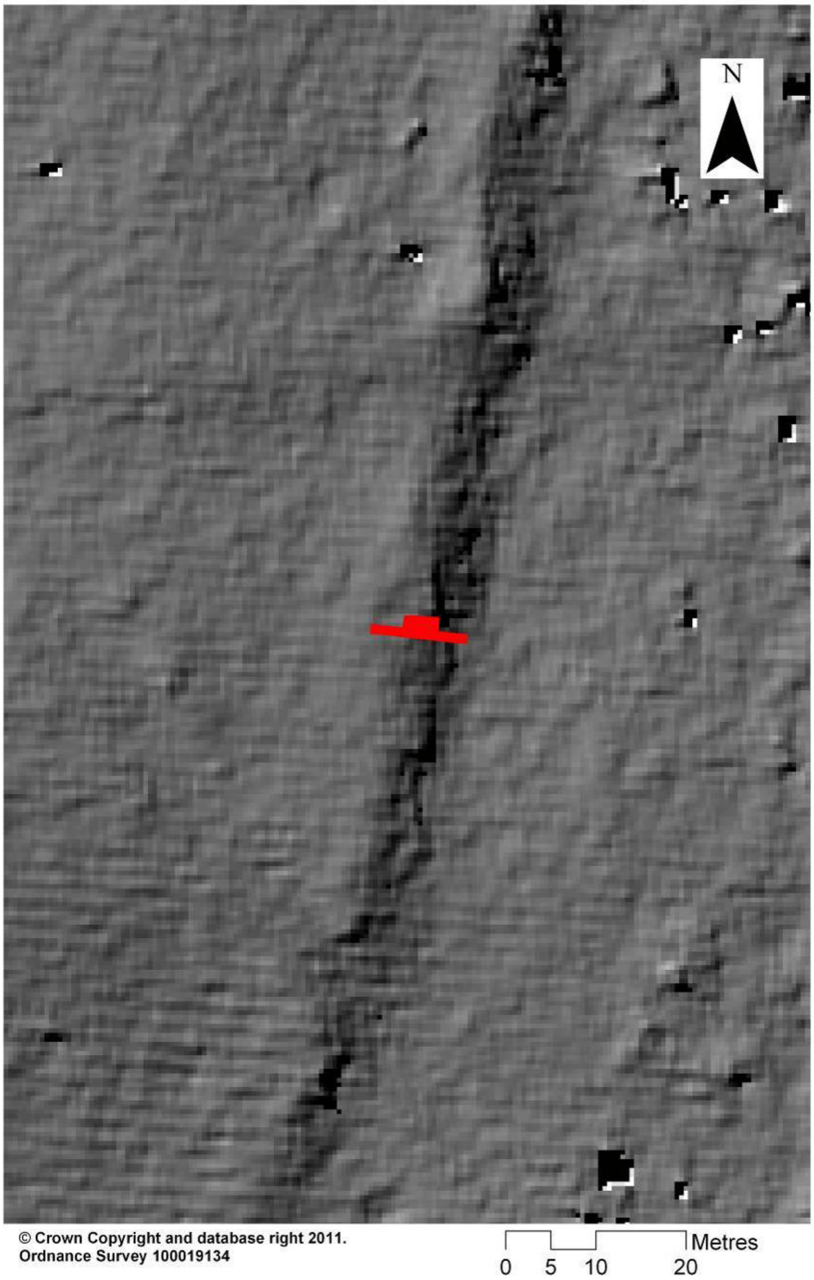


Figure 13: so6013/04: Location of excavation trench (Glos HER 37920) and lidar
Lidar image © Forest Research

The following field work tasks were undertaken in addition to the excavation:

- The profile of the natural slope was recorded for a distance of 9m to the east and west of the excavated trench.
- Auger samples were taken on the western (uphill) side of the trench at intervals of 3m and 4m from the trench's western edge.
- A rapid magnetic susceptibility scanning survey was undertaken in the area to the west and north of Trench 1 and a more systematic magnetic susceptibility survey was undertaken over an area of 29 x 24.5m (710.5m^2) centred on Trench 1.
- Two samples were taken from colluvial deposits (103) and (107) for Optically Stimulated Luminescence (OSL) dating (Figure 14).

3.3.2 Results

3.3.2.1 Excavation

The recorded trench section is reproduced as Figure 14.

The highest deposit encountered on excavation was the dark brown humic topsoil (100) which was *c.* 0.10m thick across the whole of the trench. This deposit contained 76 fragments (4000g) of bloomery slag and a further 12 fragments (586g) were recovered from the interface between this layer and the layer below (101) at the top of the terrace.

(101) was a layer of mid brown silty clay, 0.20-0.25m thick. Where the trench was extended to the west (see 3.3.1 above) this material was subdivided into a number of contexts. Deposits (115) and (116) comprised a slightly lighter and darker version of (101) respectively, whilst a layer with a higher charcoal content (114) may have been the fill of a linear feature [113], but was thought most likely to simply represent a variation or tip line within this deposit. At the top of the terrace a small, discrete, deposit of dark greyish brown sandy silt (102), only recognised in section, appeared to fill a slight depression in the base of (101). To the west, on the face and at the base of the terrace, (101) merged with a deposit of slightly greyish brown sandy silt between 0.15 and 0.45m thick (105). This material could not be distinguished from (101) and was assigned a separate context number to allow any finds assemblages to be differentiated. Together these deposits contained over 1000 fragments (109,700g) of bloomery slag, 15 fragments (255g) of ceramic material interpreted as furnace lining and a number of fragments of iron ore and corroding iron. The assemblage has been interpreted as the residue of iron smelting activity (Glos HER 43408) which had taken place in the vicinity of the excavation trench (Appendix F, 3). (102) also contained two sherds from a handmade Severn Valley ware storage jar, probably dating to the 1st or 2nd centuries AD (Appendix E.i). A 40l. bulk sample of context (116) was taken and processed. This sample contained abundant fragments of bloomery slag and also occasional small fragments charcoal predominantly identified as oak, but with some hazel and probable alder (Appendix A, 4.4.2). Two fragments of roundwood charcoal (one oak and one alder) from this sample was submitted to English Heritage's Ancient Monuments Laboratory for radiocarbon dating. The oak sample (which was estimated to have had c. 10 years of growth) produced a calibrated date (with 95% confidence) of 50 cal BC–cal AD 90, whilst the alder sample produced a date (with 95% confidence) of cal AD 20-140 (Appendix D, Table 1).

These deposits sealed a layer of pale yellow/light orange brown silty sand with frequent small sandstone fragments (103) and (109). These overlay a deposit of mid greyish brown silty sand with frequent small sandstone fragments (107). The interface between (107) (103) and (109) was not clear and they can be interpreted as essentially a single thick (0.70m) deposit of colluvium (Appendix A, 4.4.1; Matt Canti, English Heritage pers. comm.). No finds were recovered from these deposits during excavation, although a 40l. bulk sample of (107) was taken which produced occasional small fragments of poorly preserved bloomery slag, occasional fragments of predominantly alder and hazel charcoal and a small fragment of burnt clay (Appendix A, 4.4.2). Two fragments of hazel charcoal were submitted to English Heritage's Ancient Monuments Laboratory for radiocarbon dating. These produced calibrated dates (with 95% confidence) of 410-380 cal BC and 400-210 cal BC (Appendix D, Table 1). Two samples (Samples FOD01 and FOD02) were also taken from the colluvium (103) and (107) for OSL dating. These appeared to suggest that the colluvium had formed sometime between 1010BC and AD133 (Appendix C, Table 1), although the higher of these samples (FOD 02) produced the earlier date suggesting that this result may have been an anomaly (Appendix D, 5.2) . Baysean chronological modelling, combining the results of the radiocarbon and OSL dating with the recorded stratigraphic sequence suggested that the earthwork system had been laid out in the mid 1st millenium BC during the Iron Age (Appendix D, 6).

The eastern edge of (107)/(103)/(109) abutted a compact deposit of pale brown sandy clay with some fragments of sandstone. The interface between (104) and the more sandy deposits to the west was not always clear, and (104) only appeared to be visible in the southern section of the trench. When the trench was extended to the north, however, (see 3.3.1 above) similar deposits of compact clay (110) and (111) were exposed indicating that (104) did extend into this area. (104) can be interpreted as a bank of relatively compact material which has retained the downhill movement of colluvial deposits (107), (110) and (111). No finds were derived from (104).

The lowest excavated deposit, (105) and (107), which extended across the whole of the trench underlying (104) was a 0.10m thick layer of mid orange brown silty clay with some sandstone fragments (106). This material was also encountered in the northern extension of the trench (see 3.3.1 above) where it was designated as (112), and was interpreted as the surface of the undisturbed sandstone bedrock, the clay content having washed down from the overlying deposits (Appendix A, 4.4.1). It directly overlay the undisturbed sandstone bedrock (108) which consisted of small to medium fragments of sandstone in a pale yellowish grey silty sand matrix which represented the limit of excavation.

Palaeoenvironmental sampling

40l. bulk samples were taken from contexts (107) and (116) and processed (see above and Appendix A, 3.4).

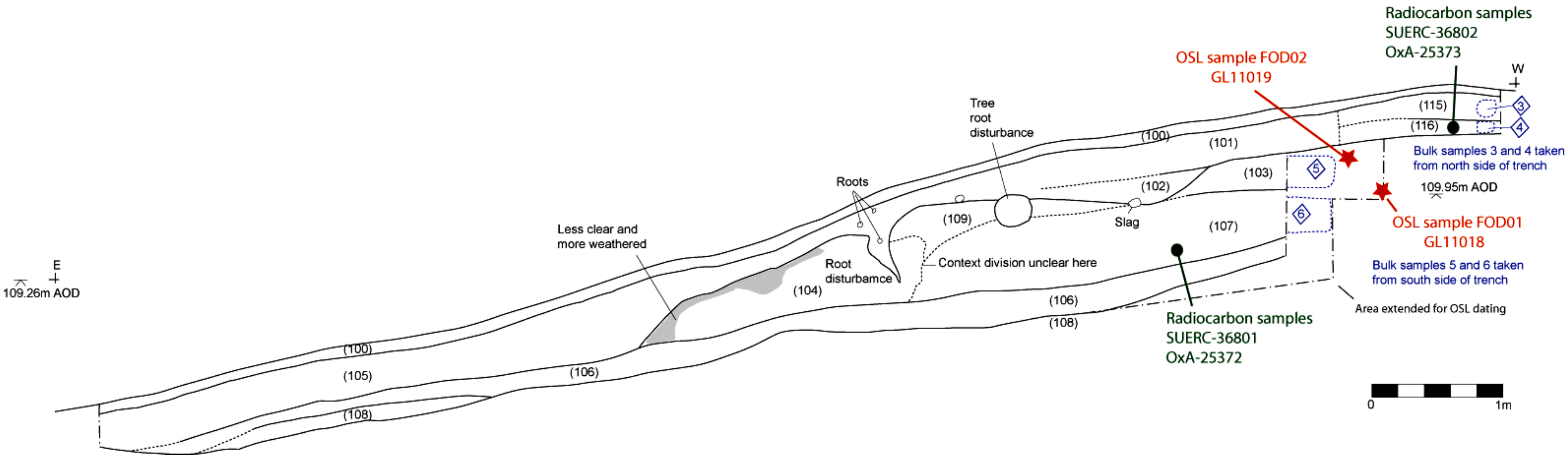


Figure 14: so6013/04: Trench section (Glos HER 37920)

3.3.3 Auger transect

An attempt was made to establish the soil profile and angle of the natural slope on the up-hill side of the trench by means of an auger transect. Two auger samples, using a hand-driven Dutch auger, were taken on the western (uphill) side of the trench at intervals of 3m and 4m from the trench's western edge (Appendix N.iii).

The results of this may suggest that the natural slope of the undisturbed sandstone rises towards the ground surface in this area, although they could equally be interpreted that the slope of the bedrock approximately mirrors that of the current ground surface. As the results of these auger samples were inconclusive, combined with the fact that the auger was not really suitable for the extremely dry ground conditions at the time of the survey, no further auger samples were taken in 2011.

3.3.4 Magnetic susceptibility survey

A rapid magnetic susceptibility survey (using a Bartington MS 2 with dimensionless SI units x $10^{\wedge}$-5) was undertaken in the vicinity of the excavation trench to define the area in which high quantities of magnetic bloomery slag were present. This consisted of a relatively systematic survey of an area of 29 x 24.5m centred on Trench 1, generally with readings at 3m intervals (Figure 15), and a more general scan undertaken principally along the top of the terrace to the north of the area of systematic survey (Figure 17).

The systematic survey indicated that an area measuring *c.* 18m x 16m, which straddled the face of the terrace, produced relatively high magnetic susceptibility readings against a general back ground reading for the area in the range of 0-30 (Figure 15).The excavation trench was at the southern edge of this area and particularly high readings (up to 345) were found in a small area at the lip of the terrace approximately 3m to the north of the trench, with other high readings of 237 and 262 *c.* 9m to the north of the trench on the face of the terrace and at its base respectively (Figure 15, Figure 16).

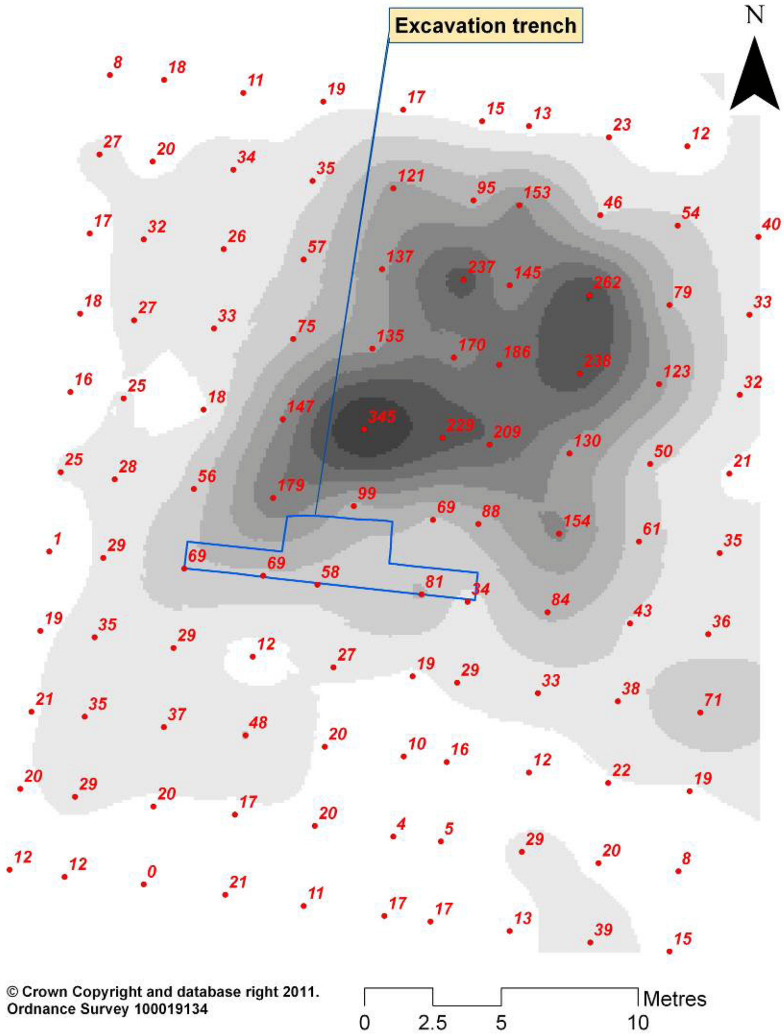


Figure 15: so6013/04: Magnetic susceptibility survey (readings at dimensionless SI units x 10^-5)

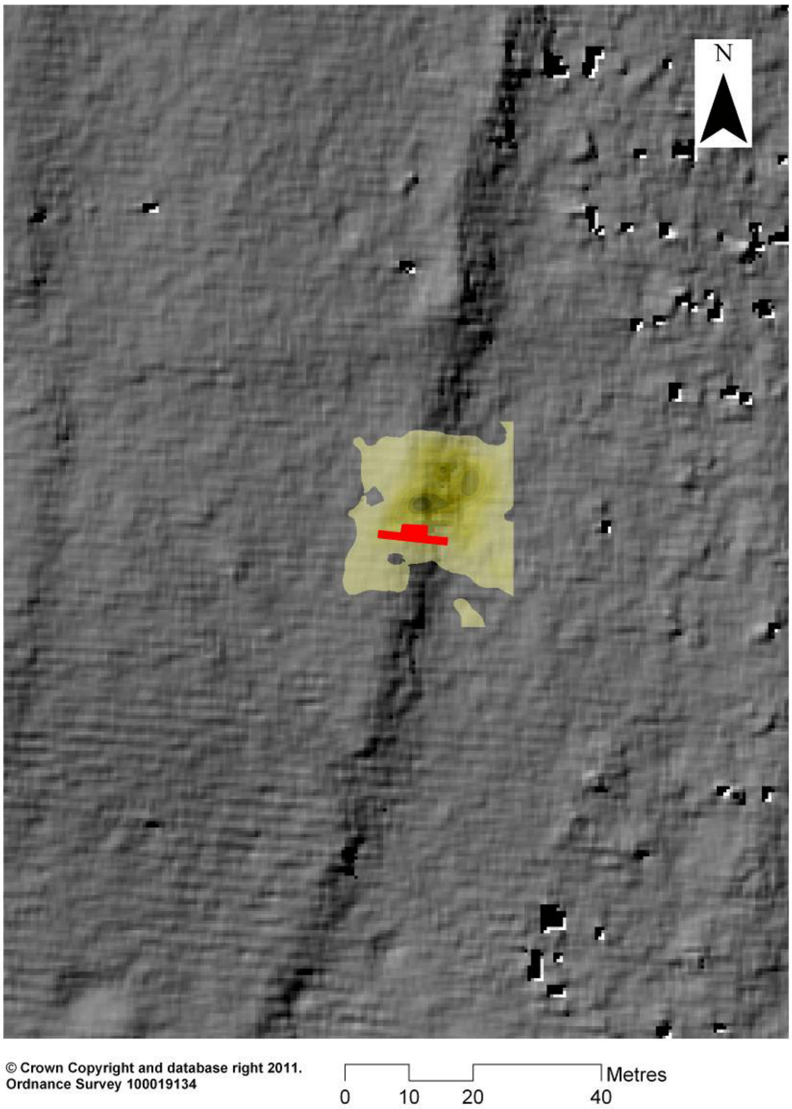


Figure 16: so6013/04: Magnetic susceptibility survey and lidar. Excavation trench shown red.

Lidar image © Forest Research

More general magnetic susceptibility scanning was undertaken mainly along the top of the terrace. No readings comparable to the highest readings of the systematic survey were recorded outside of that area, and the majority of these conformed to a general background reading of 0-30, although readings of 42, 49, 57, and 78 may have been associated with charcoal burning platforms. A cluster of readings in the range of 166 and 180 were found at the lip of the terrace *c.* 38m to the north of the excavation trench and *c.* 25m to the north of the concentration of high readings from the systematic survey (Figure 17).

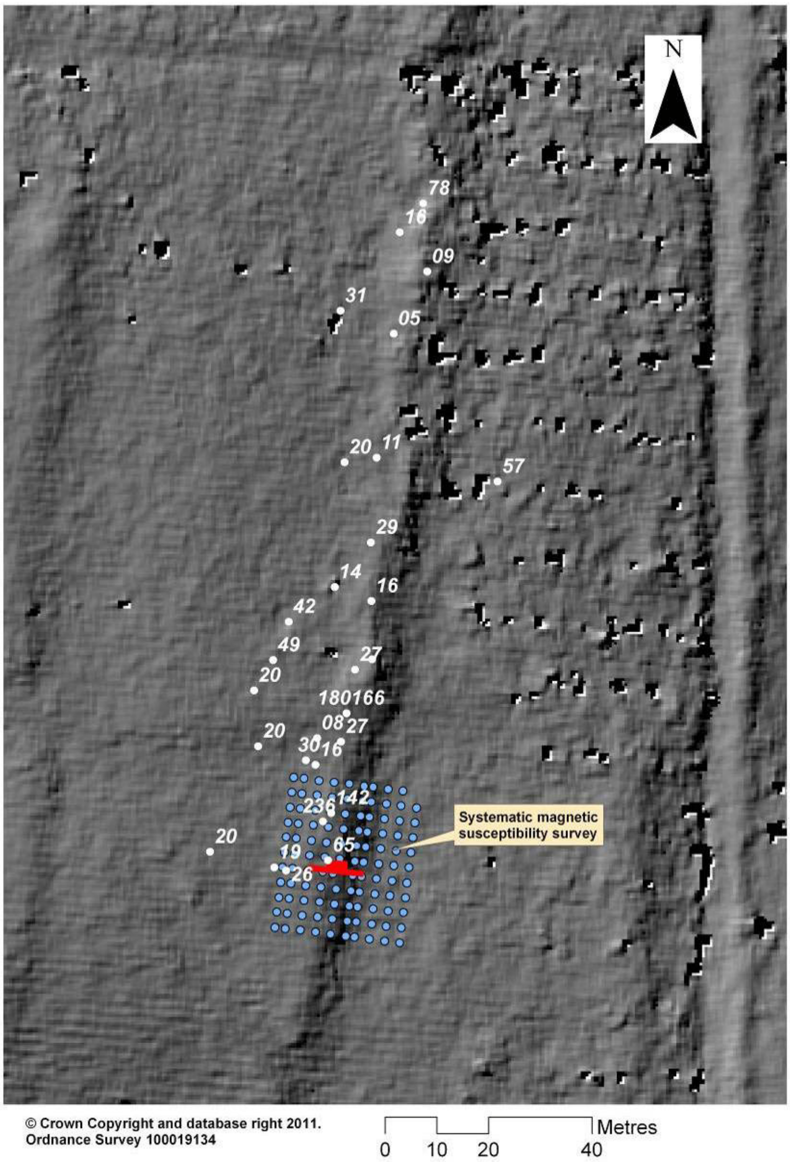


Figure 17: so6013/04: Magnetic susceptibility scanning survey. Excavation trench shown red.
Lidar image © Forest Research

3.3.5 Discussion

3.3.5.1 Iron smelting waste (Glos HER 43408)

Although so6013/04 was excavated to investigate the origin of the lidar-detected terraces, the highest deposits encountered were a series of layers containing abundant charcoal fragments, bloomery slag, and burnt ceramic material identified as bloomery furnace lining material (105/101/114/115/116), an assemblage consistent with waste from bloomery iron smelting which had taken place in the near vicinity to the excavation trench (Appendix F.i). The magnetic susceptibility survey (see 3.3.4 above) identified an area of high magnetic response measuring *c.* 18m x 16m, indicating the main focus of this activity. Smelting may have taken place at the lip of the terrace approximately 3m to the north of the trench, and also on the face of the terrace and at its base *c.* 9m to the north (Figure 15, Figure 16).

The smelting activity appears (on the basis of the magnetic susceptibility survey) to be largely restricted to a discrete area, consistent with medieval smelting in which small-scale itinerant smelting operations migrated around areas of woodland following coppicing cycles to take advantage of the charcoal resource (Appendix F.i; Hoyle *et al* 2007, 5.2.4.2). The two sherds of early Severn Valley Ware from this material however suggest a 1st or 2nd century AD date (Appendix E.i), a date supported by the radio carbon dates which suggest the smelting took place in the early Roman period, during the late 1st or early 2nd century AD (see 3.3.2 above; Appendix D, 6 and Table 1).

The economics of bloomery smelting suggest that it is generally more advantageous to site smelting close to the source of charcoal rather than the source of ore (Hoyle *et al* 2007, 4.2.2.2). This area is *c.* 2.5km to the south of the nearest outcrops of carboniferous limestones (the principal source of iron ore in the Forest of Dean (see Figure 8)), where there is evidence (currently undated) for extraction (Glos HER 23008, 23455, 23593) and iron ore is also known in the upper carboniferous sandstones at Minetrain Quarry, Bixslade c. 2.9km to the southwest (Glos HER 10720). Smelting at this distance from an ore source would suggest that a ready source of charcoal would have been available in the near vicinity, implying that coppiced woodland was a feature of the landscape when the smelting took place (Appendix F.i).

Although it is probably premature to draw too many conclusions from the evidence of the partial excavation and sampling of the late 1st-/early 2nd-century AD smelting debris form Cannop, analysis of the assemblage (Appendix F) has identified some emerging trends which will inform future discussion of the Roman iron industry in the Forest of Dean.

The slag assemblage was dominated by dense massive flowed slags typical of tapped slags from tapping bloomery furnaces, but also had some features, such as a basal zone of chaotic prills which suggest slag flowing downwards into a an underlying charcoal bed and resemble slags from non-tapping slag pit furnaces (Appendix F.i). Roundwood fragments were also present in some of the flowed slags, again a feature with parallels in non tapping slag pit furnaces, in which the slag descends into a pit filled with organic material (Appendix F.i).

These slags, with their predominance of dense massive slags, roundwood inclusions and also the presence of ore fragments, have similarities with assemblages from Roman smelting sites in South Wales at Cardiff Castle and Caergwanaf. These appear to differ from Roman slag assemblages from small civilian rural sites such as *Ariconium* (the modern Western-under-Penyard *c.* 8km to the north), Caerwent in south Wales and Frocester Court, c. 11km to the south of Gloucester on the eastern side of the River Severn, where assemblages are more conventional tapslags, similar to medieval smelting residues from the same area (T Young pers. comm.). This raises the possibility of two types of furnace technology in use in the area during the Roman period with conventional slag tapping furnaces (which were known in Britain from the late Iron Age to the medieval periods (English Heritage 2011c, 3)) used in some areas, whilst at other sites, such as HER 37920 at Cannop, and also at Cardiff Castle and Caergwanaf (both of which have military/official associations) smelting took place in another type of furnace. These furnaces may have combined elements of slag tapping furnaces with those of earlier slag pit type (which were more common in the Iron Age and Saxon periods (English Heritage 2011c, 3)), perhaps with slag flowing through organic packing in the lower part of the furnace before being tapped into an external pit (T Young pers. comm.; Appendix F.iii).

Analysis of the ore from the slag assemblage suggested that this was likely (but not certainly) to have been derived from the western outcrops of the Carboniferous Limestones in the Forest of Dean, although it did not closely match the chemical signature of known ore samples from those outcrops, being chemically most similar to a fragment or ore found within smelting debris re-used as make-up for the construction of the early 2nd Century AD *forum-basilica* at Caerwent suggesting that both sites were supplied form the same source, perhaps indicating that ore form the western outcrops in the Forest of Dean was exported westwards into Wales from the latter part of the 1st century AD (Appendix F.iii).

3.3.5.2 Colluvial deposits and field system (Glos HER 43407).

The iron smelting waste sealed a thick deposit of colluvium (103/107/109), which appeared to be revetted by a low bank (104), suggesting the laying out of a boundary system followed by a period in which soil up slope was loosened and accumulated against the back of the bank.

The agency which loosened the soil upslope from the bank is not clear and colluvium can be the product of any landuse change, such as deforestation, agricultural cultivation or over grazing, which creates ground disturbance, loosening soil and allowing it to migrate down hill.

The colluvium clearly pre-dated the late 1st /early 2nd century AD iron smelting (see 3.3.5.1 above) and Baysean chronological modelling, combining the results of the radiocarbon and OSL dating with the recorded stratigraphic sequence suggested that the colluvium acccumulated from the mid 1st millenium BC (see 3.3.2.1 above, Appendix D, 6) indicating that the earthwork system was laid out in the early to mid Iron Age.

3.4 so6013/26, Trench 2 (Glos HER 37921)

3.4.1 Methodology

Sample excavation consisted of a single trench (Trench 2, Glos HER 37921) across one of the terraces which ran across the contours of the natural slope in the southern part of the system centred at NGR 360418 212825 (Figure 12). The trench originally measured 9.95m x 1m, although its northern section was extended by 1.65m (Figure 18). Within this area the southernmost 2.25m of the trench and the remaining eastern half (longitudinally) was hand-excavated to the surface of the undisturbed sandstone bedrock. The remaining western half of the northernmost 9.35m of the trench was excavated to the surface of deposits which have been interpreted as colluvium (see 3.4.2 below).

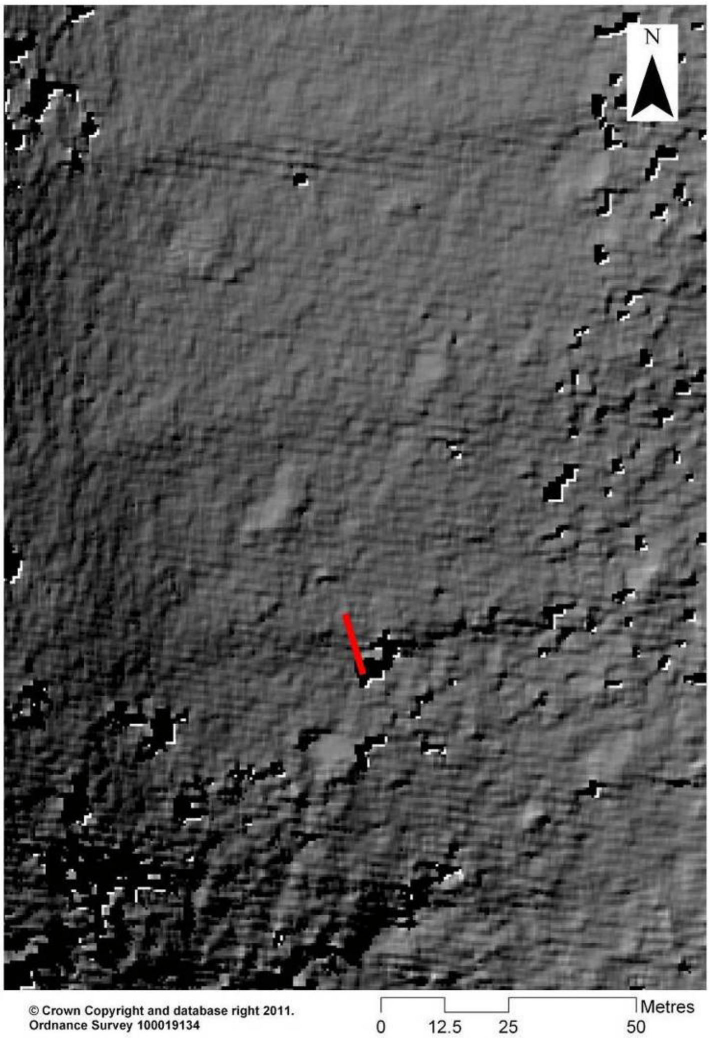


Figure 18: so6013/26 (Glos HER 37921): Location of excavation trench and lidar
Lidar image © Forest Research

The following field work tasks were undertaken in addition to the excavation:

- The profile of the natural slope was recorded for a distance of 11.4m to the north and 13m to the south of the excavated trench.
- A single auger sample was taken on the northern (uphill) side of the trench 2m to the north of the trench's northern edge.
- Two samples (FOD03 and FOD04) were taken from colluvial deposit (201) for OSL dating (Figure 19).

3.4.2 Results

3.4.2.1 Excavation

The recorded trench section is reproduced as Figure 19.

The highest deposit encountered on excavation was a thin (generally *c.* 0.08m) dark brown humic topsoil (200). A single flint flake from the topsoil had retouch along one edge and is probably of early neolithic date (Kurt Adams, Gloucestershire and Avon FLO pers. comm.; Appendix H).

The topsoil immediately overlay a deposit of mid-light yellow brown silty clay sand (201). This material, which was found throughout the trench, ranged in thickness from 0.45-0.60m and produced 16 fragments (959g) of bloomery iron smelting slag (Appendix F, 3) and 26 sherds (64g) of abraded and fragmentary Severn Valley Ware which could not be dated more closely than the Roman period (Appendix E.i.i.) This deposit was interpreted as a layer of colluvium (Appendix A, 4.4.1; Matt Canti, English Heritage pers. comm.).

Over much of the trench (201) overlay a deposit of light grey/red silty clay sand (202) above a layer of sandstone fragments in a matrix of reddish grey silty clay (203), the surface of which was the limit of excavation. Neither of these deposits produced any finds and they were interpreted as the undisturbed sandstone bedrock in this area.

In the central part of the trench an irregular hollow (204) was recorded in the surface of the bedrock. This hollow measured *c.* 1.6m wide and 0.25m deep, and was filled with a material (205) described as a mixture of (201) and (202). A single fragment of bloomery slag (165g) was recovered from the upper part of (205). The status of this feature is not clear, although its lack of clear edges would suggest that it was not archaeological in origin and may be the either a natural hollow in the surface of the bedrock or a feature such as a tree-throw hollow.

Two samples (Samples FOD03 and FOD04) were taken from the colluvium (201) for OSL dating the results of which appeared to suggest that the colluvium had formed sometime between 304BC and AD342 (Appendix C, Table 1). Baysean chronological modelling, combining the results of the OSL dating with the recorded stratigraphic sequence suggested that the earthwork system had been laid out in, or after the latter part of the 1st millenium BC (Appendix D, 6).

Palaeoenvironmental sampling

Following advice from Liz Pearson of the Worcestershire Historic Environment and Archaeology Service, and Vanessa Straker of English Heritage, no bulk samples were taken of the deposits within this trench.

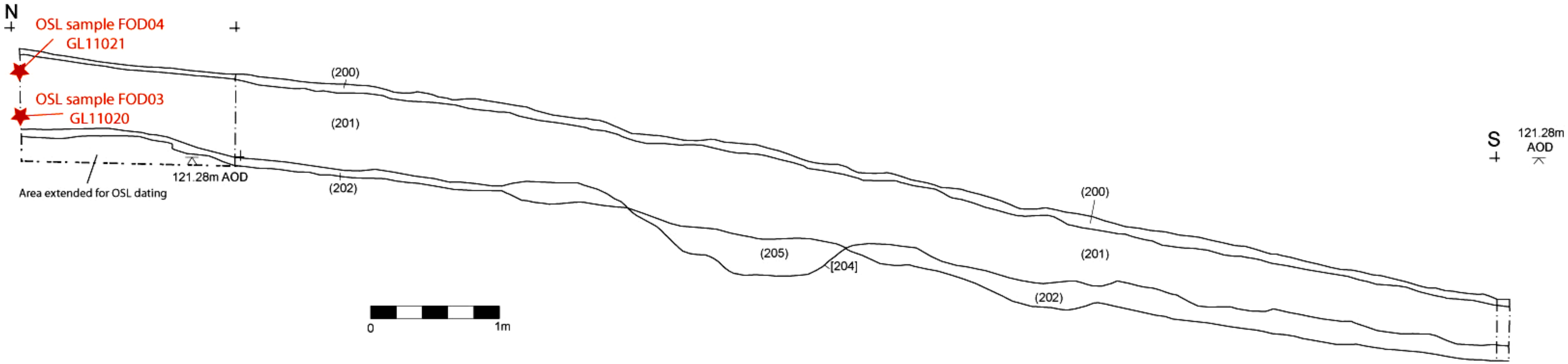


Figure 19: so6013/26 (Glos HER 37921), Trench section

3.4.3 Auger sample

An attempt was made to establish the soil profile and angle of the natural slope on the uphill side of the trench by means of an auger transect, and an auger sample, using a hand-driven Dutch auger, was taken on the northern (uphill) side of the trench 2m from the northern edge (Appendix 0). The results of this may suggest that the natural slope of the undisturbed sandstone rises towards the ground surface in this area, although, as the auger was not really suitable for the extremely dry ground conditions at the time of the survey, it was not clear whether the stony material actually represented the surface of the bedrock or not. No further auger samples were taken in 2011.

3.4.4 Discussion

The origin of colluvium (102) is not clear and it could be the product of any landuse change, such as deforestation, agricultural cultivation or over grazing, which had created ground disturbance, loosening soil and allowing it to migrate down hill. The precise date of origin or timescale over which the colluvium accumulated is also not clear, although it contained very abraded sherds of Roman pottery, which could not be dated with any greater precision (Appendix E.i.i). The two OSL samples (FOD03 and FOD04) suggested that the earthwork system had been laid out, and the colluvium began to accumulate in, or after the latter part of the 1st millenium BC (Appendix D, 6). Given these dates, the colluvium can be interpreted as evidence for Roman activity, perhaps cultivation, which may have had it origins in the latter part of the Iron Age.

Unlike the colluvium in so6013/04 (Glos HER 37920) (see 3.3.2.1 above) there was no clear bank or other obstruction against which the colluvium had accumulated. The reasons for this are not clear although this material could have accumulated against a barrier, such as a hedge, which has left no trace in the archaeological record (Matt Canti, English Heritage pers. comm.). Continual cultivation along the same alignment, would, over time, maintain and reinforce the terrace affect even if the boundary itself had ceased be a physical barrier.

Another feature of this trench was the shallowness of the topsoil (200) and the complete absence of a subsoil horizon between this and the colluvium. This would suggest that the ground surface in this location has been recently disturbed, leaving insufficient time for a stable soil horizon to develop (Appendix A, 4.4.1). The reasons for this are not clear, although the oak woodland on the site was planted in 1948 (Forestry Commission 2004), suggesting that earlier woodland may have been felled to supply timber during the Second World War, perhaps causing significant soil loss in this area at that time.

3.5 Discussion of earthwork systems so6013/04 and earthwork system so6013/26

The excavation has demonstrated that the two earthwork systems appear quite different in form, not only in terms of their surface morphology, but also in terms of the evidence recovered for their formation.

The subrectangular enclosure system represented by so6013/04 appears to represent colluvium accumulated against an earth bank, suggesting that this system (and possibly by implication other earthwork systems of this type in Dean) represents a deliberately constructed boundary system. In the case of so6013/04 (and, again, possibly by implication other earthwork systems of this type in Dean) the system was laid out during the early to mid iron Age from around 500BC. The late 1st / early 2nd century date for the iron smelting activity overlying the colluvium in this area would suggest that by the Roman period the landuse in the area may have changed to become coppiced woodland (see 3.3.2.1 above; Appendix F, 3).

The possibility that these earthworks were constructed to protect areas of coppice from browsing animals should be considered, although the areas enclosed are considerably smaller than known areas of medieval coppicing (see discussion in Hoyle 2011c, 3.4.5), and this interpretation would be hard to reconcile with the considerable accumulation of colluvium here. The fact that the smelting activity appears to be taking place across the line of the terrace, suggesting it was not seen as a boundary at that time (see 3.3.4 above), would also support the view that the terrace does not represent the boundary of a contemporary coppice enclosure.

It may be more reasonable to interpret so6013/04 as representing an earlier pattern of landuse which pre-dated the smelting activity and its associated coppiced woodland. An earthwork system at Welshbury Hill (Glos HER 5161) *c.* 7km to the east has been interpreted as late Bronze Age or Early Iron Age as it appears to predate the outer ramparts of Welshbury hillfort (McOmish and Smith 1996). This system, like so6013/04, consists of a series of rectilinear enclosure defined by terraces and enclosing areas of *c.* 1ha. Accordingly so6013/04 would seem consistent with a prehistoric field system, suggesting a non wooded landscape of small cultivated or pasture fields in this area of the Forest of Dean at that time.

Boundary patterns of this type have similarities with prehistoric field systems identified in other areas of the British Isles. These have been interpreted as the result of increased levels of landscape organisation and control from the middle Bronze Age (c. 1300 – *c.* 900 BC) perhaps indicative of changes in the social order at that period (Cunliffe 1995, 36). They generally survive in areas of high or marginal land where agriculture was subsequently abandoned (Fowler 1983, 119-128, Figures 45-47), perhaps in response to land pressure brought about by climatic deterioration (Darvill 1987, 124), and where subsequent landuse has not obliterated all traces of them.

Earthworks system so6013/26 (Glos HER 37921) does not appear to be the result of the same process. Like a number of other earthwork systems identified by lidar in the Forest of Dean (see Hoyle 2041c, 3.4.1.2) it consisted, not of rectilinear enclosures, but as a series of parallel linear terraces, *c.* 40-50m apart, and the terrace excavated at so6013/26 did not appear to have originated with a constructed field bank (see 3.4.2.1 above).

The date of this earthwork system is less clear, but its form has some parallels with coaxial Roman field systems consisting of long parallel boundaries sometimes, but not always, segmented by shorter perpendicular boundaries (Dark and Dark 1997, 96; Esmonde Cleary 1999, Fig 9.6; Riley 1980, Map 10) and also with elongated terraced fields, found throughout the later prehistoric and Roman periods (English Heritage 2011b). A Roman date is supported by the ‘in, or after, the latter part of the part of the 1st millenium cal BC’ date suggested by the OSL dates (Appendix D, 6) and the abraded sherds of Roman pottery recovered from the colluvium (Appendix E.i.i). The small assemblage of bloomery slag, similar in type to that found at so6013/04 to the east (Appendix F, 2-3) suggest iron smelting in the area, but not necessarily in the immediate vicinity.

This earthwork system is adjacent to the rectilinear system represented by so 6316/04 (Figure 12) which may suggest that they are not contemporary, although the relationship between the two systems was not absolutely clear, and as they did not appear to overlap in anyway they may have co-existed side by side for a period. So6013/26 certainly appears to have been in use well into the Roman period, by which time so6013/04 had already fallen out of use. These Roman fields may have been contemporary with the smelting activity found at so6013/04 to the east, and represent cultivation of an area of cleared ground within what was, by that time, an essentially wooded landscape.

4 Fieldwork at subcircular enclosure so5500/05

(Activity reference Glos HER 37924, Feature reference Glos HER 43410)

4.1 Introduction

Subcircular enclosure so5500/05 (NGR 355946 200155, Glos HER 43410) is situated within the northern part of Tidenham Parish *c.* 2km to the south of the settlement of Hewlesfield (Figure 20) within Forestry Commission woodland, which, in 2011 consisted largely of widely spaced mature beech standards. The site overlies a solid geology of the Hunts Bay sub-group of the Carboniferous limestone series (B.G.S. 2004) at a height of *c.* 195m AOD. The geology in this area is, however, complex and the site is within *c.* 300m of a recorded solid geology of the Cromhall Sandstone formation within the Carboniferous limestone series (B.G.S. 2004). The site is on a gentle eastern facing slope on the eastern side of the rounded plateau between the steep sides of the Wye Valley *c.* 1.8km to the west and the Severn Valley *c.* 900 to the east (Figure 21). It lies at the head of a dry valley (which would have flowed towards the River Severn) less than 1km to the east of the watershed towards the River Wye.

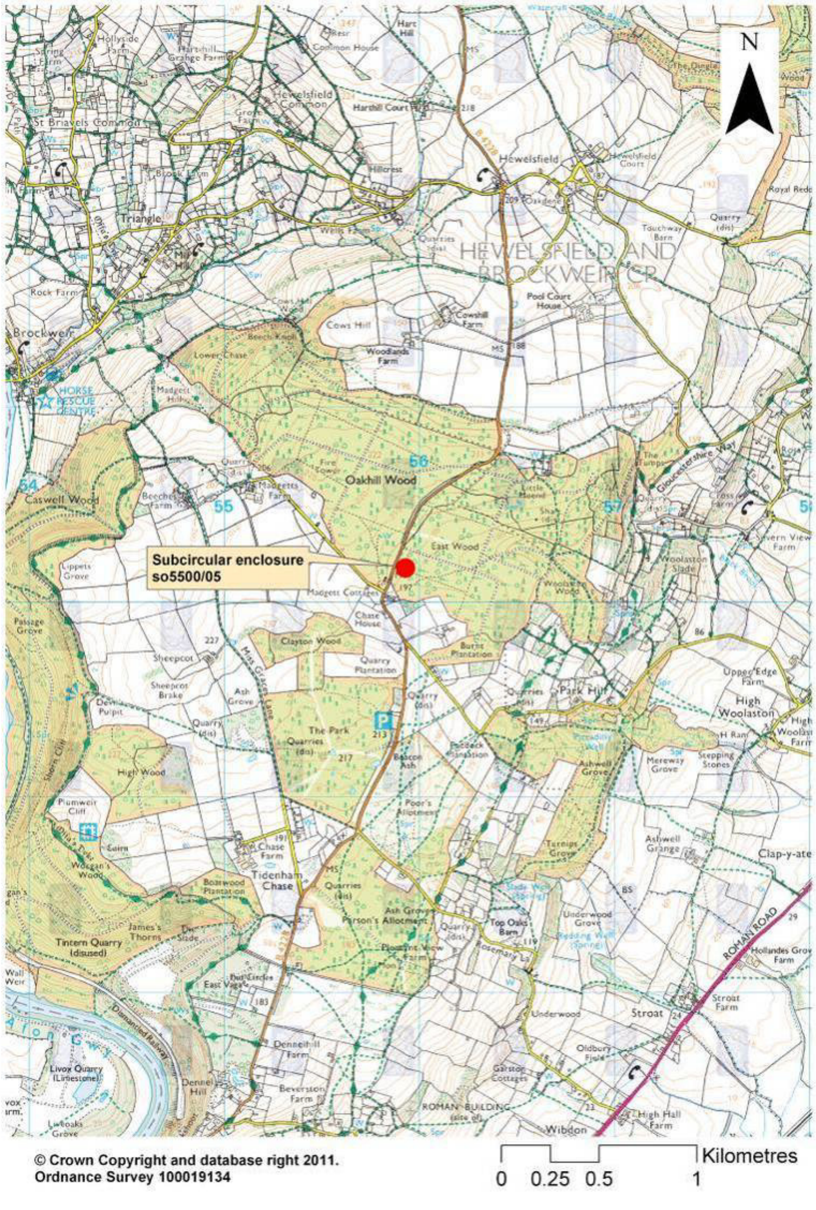


Figure 20: Location of subcircular enclosure so5500/05 (Glos HER 37924)

Figure 21: Topographical location of subcircular earthwork so5500/05. Contours at 5m intervals, darker contours indicate higher ground

4.2 Research questions

The site was visited in 2010 as part of Phase 1 of Stage 3B of the Forest of Dean Archaeological Survey (Hoyle 2011c, 3.2.2.2) at which time it was interpreted as a possible Bronze Age ritual monument consisting of a subcircular enclosure defined by a low, rounded bank much of which appeared to be made up of stone rubble. This had an internal diameter of *c.* 21m, although there were no visible signs of a ditch (either internal or external) or an entrance. Ten possible small standing stones were recorded in the surface of the bank, although the central mound visible on the lidar hillshaded images was not evident and was thought to have been formed by a pile of forestry detritus (Hoyle 2011c, 3.2.2.2).

The research questions for this excavation were set out in the UPD for this phase of the project (Hoyle 2011a, section 4.2.2) and can be summarised as follows:

- What is the status/date of the enclosure?
- Does the bank largely comprise rubble?

- Does the bank have associated ditches?
- Are there any entrances?
- What is the status of the possible standing stones on the bank?
- What is the status of the central mound visible on the lidar hillshaded images? Does this survive as a low mound concealed beneath forestry detritus?
- Does the enclosure contain any internal features?
- Are there any visible features in the immediate vicinity which may relate to this feature?
- To what extent has the survival of these features been compromised by the long-term woodland cover on the site and what are the management priorities associated with this landuse?

4.3 Methodology

Unlike the other sites investigated during this phase of the project it was not the intention to undertake significant intrusive excavation of so5500/05, as, unlike the enclosure and earthwork features which had been selected for further excavation, this site was thought more likely to contain very sensitive deposits, such as human remains or artefacts, which would require levels of excavation, analysis and long-term curation beyond the scope of this project. Accordingly the fieldwork at this site (Glos HER 37924) consisted of a number of non-intrusive techniques. These are set out in detail in the project design (Hoyle 2011a, 4.2.2.1) and can be summarised as follows:

- Clearance of the site of undergrowth and forestry detritus in anticipation of fieldwork.
- Topographical survey of the earthwork itself, including detailed recording of any standing stone.
- Topographical survey of the earthwork's surroundings.
- Geophysical survey of the earthwork and its interior.
- A rapid exploratory excavation to investigate an area where the bank has already been damaged by forestry tracks. This was limited to the removal of any modern or unsorted overburden within the areas of modern vehicle damage against one face of the bank.

4.3.1 Site clearance

It had originally been the intention to clear the site of undergrowth and forestry detritus by making use of the Dean Green Team, a group of conservation volunteers working under the aegis of the Forestry Commission (Hoyle 2011a, 6.3.1). Between the production of the project design and the commencement of the project this group disbanded and the Forestry Commission supplied two members of their own staff to undertake the site clearance. These worked under the direction of the direction of the Beat Forester (David Sykes) who had been briefed on the specifications for clearance.

An area encompassing all visible earthworks and with a buffer of at least 5m was demarcated by Archaeology Service staff using road pins and hazard tape. Within this area the Forestry Commission cleared the site in the following way:

- All loose forestry detritus, such as branches, cut logs or leaves, were removed by hand and stacked at least 5m from the demarcated area.
- Undergrowth, such as bracken or brambles, shrubs, holly bushes and saplings with trunk diameters of less than *c.* 0.05m were cut off at ground level, removed from the area by hand and stacked at least 5m from the demarcated area.
- All stumps and root systems were left in the ground and no grubbing up of stumps or root systems took place.
- Particular care was taken not to dislodge any rubble or stonework during this operation, or to disturb the ground surface and, accordingly, fallen leaves were left on the ground rather than risk damage to the surface by heavy raking.
- Particular care was also taken not to damage any of the possible standing stones.

Figure 22: so5500/05 before the site was cleared by the Forestry Commission

Figure 23: so5500/05 after the site was cleared by the Forestry Commission

4.3.2 Topographical survey

The topographical survey was undertaken under the supervision of Mark Bowden and Nicki Smith of English Heritage's Survey and Investigation team and was combined with survey training for four staff members of Gloucestershire County Council Archaeology Service. The survey was divided into a number of separate elements.

4.3.2.1 Plane table survey

A large-scale earthwork survey focussed on enclosure so5500/05 (recorded as Feature 1) and was undertaken by plane table at a scale of 1:250 as recommended by Mark Bowden of English Heritage. The bank was mapped as hachures and all possible standing stones were also recorded and numbered 1-12 (Figure 24). An additional possible standing stone (Stone 13) was exposed during the small-scale exploratory excavation (see 4.3.5 below).

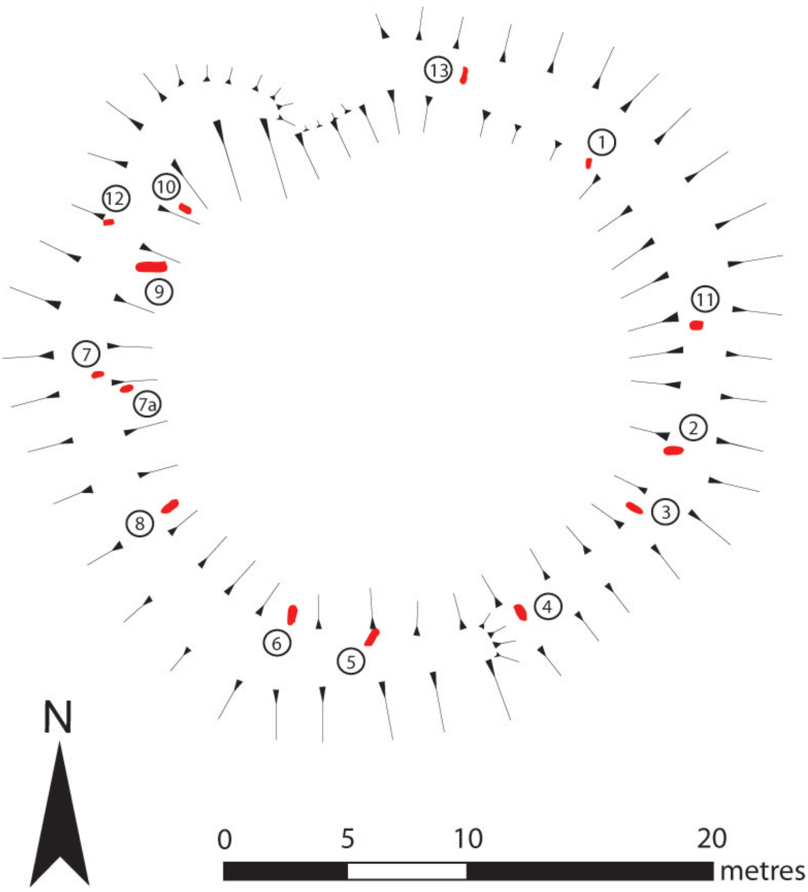


Figure 24: Plane table survey of so5500/05 showing all possible standing stones (red)

This survey also recorded a selection of the larger stones which were found on the bank and a spread of rubble on the northern side of the bank. A rubble mound (Feature 2) *c.* 28m to the southeast of the subcircular enclosure was also included in the plane table survey.

A second mound (Feature 3) *c.* 50m to the southeast of so5500/05 and two charcoal platforms *c.* 94m to the northwest of so5500/05 were also surveyed at 1:250 using tape and offset.

4.3.2.2 Total station survey

In addition to the relatively large-scale survey of the enclosure a total station survey was made of all recognised features in the vicinity of so5500/05, This survey encompassed an area bounded by the main road *c.* 66m to the west of the enclosure and the forestry track *c.* 105m to its north. The southern boundary of the woodland (c. 90-120m to the south and southwest of so5500/05) was the limit of survey in this area and to the east it was bounded by an area of dense young plantation *c.* 140m to its east (Figure 25).

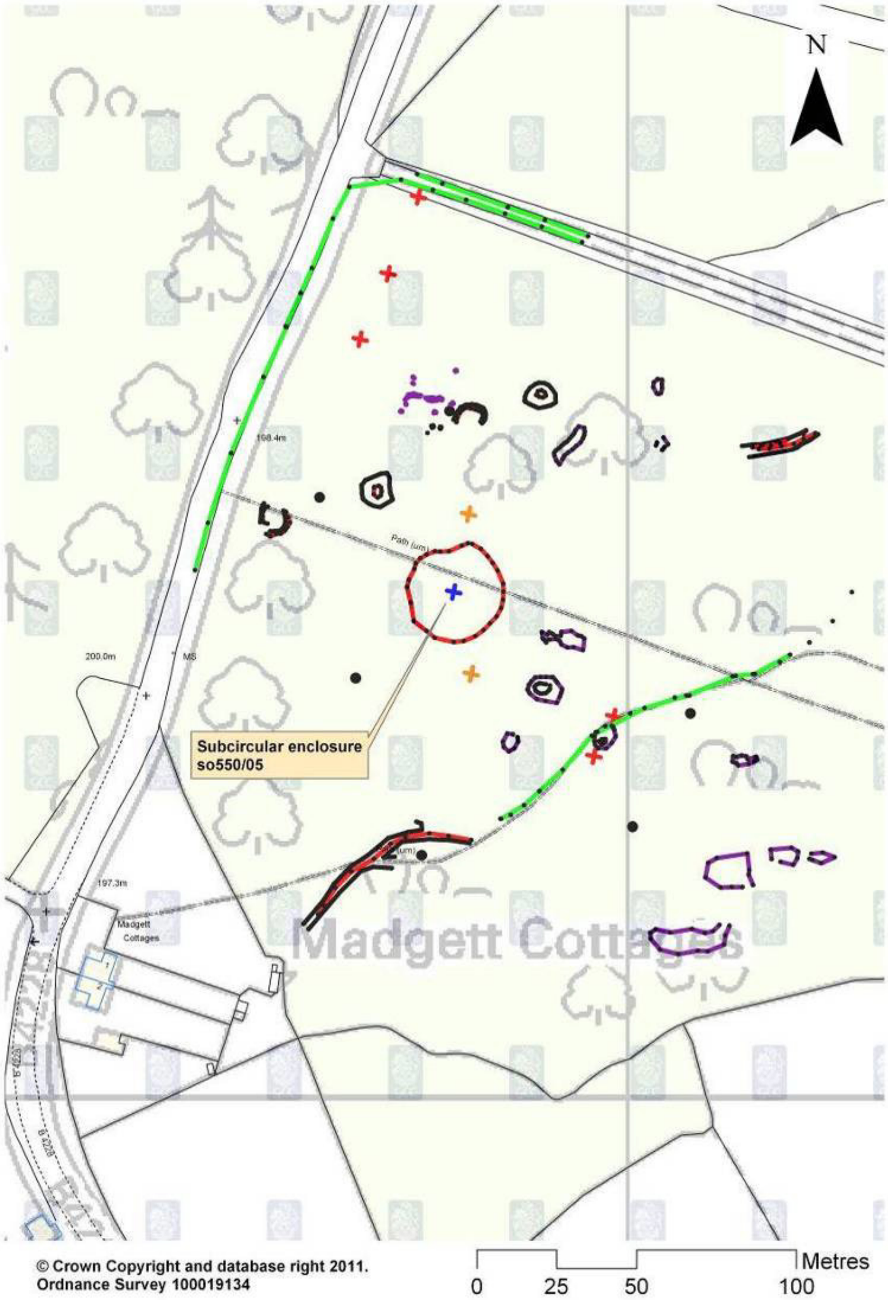


Figure 25: Total station survey of vicinity of so5500/05 showing all recorded features

The total station survey recorded visible features such as quarry pits, charcoal platforms and trackways and also recorded the position of enclosure 5500/05 and Features 2 and 3, which had also been surveyed manually (see 4.3.2.1 above). In addition this survey recorded the position of the grid pegs which had been used in more detailed survey and also a number of surface scatters of sandstone and limestone, the significance of which is discussed more fully below.

4.3.2.3 Other field survey

Following the total station survey some additional recording and descriptions of recorded features was made using the Magellan Mobile Mapper GX with Digiterra recording software and the database for rapid field survey which had been developed for Phase 1 of this stage of the Forest of Dean Archaeological Survey (Hoyle 2011c, 2.4.1.2, Appendix B).

4.3.2.4 Profiles

It had originally been the intention to undertake a contour survey of the whole of the interior of enclosure so5500/05 (Hoyle 2011a, 4.2.2.1) principally with the intention of identifying any minor topographical variation which could indicate the site of the central visible on the lidar hillshaded images but not apparent on the ground. Following advice from Mark Bowden of English Heritage, this strategy was modified to the recording of a number of profiles across the banks and interior of the monument and five profiles were recorded across enclosure so5500/05. Two of these were recorded using a hand-level under the instruction of Mark Bowden of English Heritage as part of the survey training and recorded profiles approximately along the sites north/south and east/west axes. The remaining three were recorded using a dumpy level. Two of these recorded the north/south and east/west axes, whilst the third crossed the centre of the mound visible on the lidar hillshaded imagery (Figure 26).

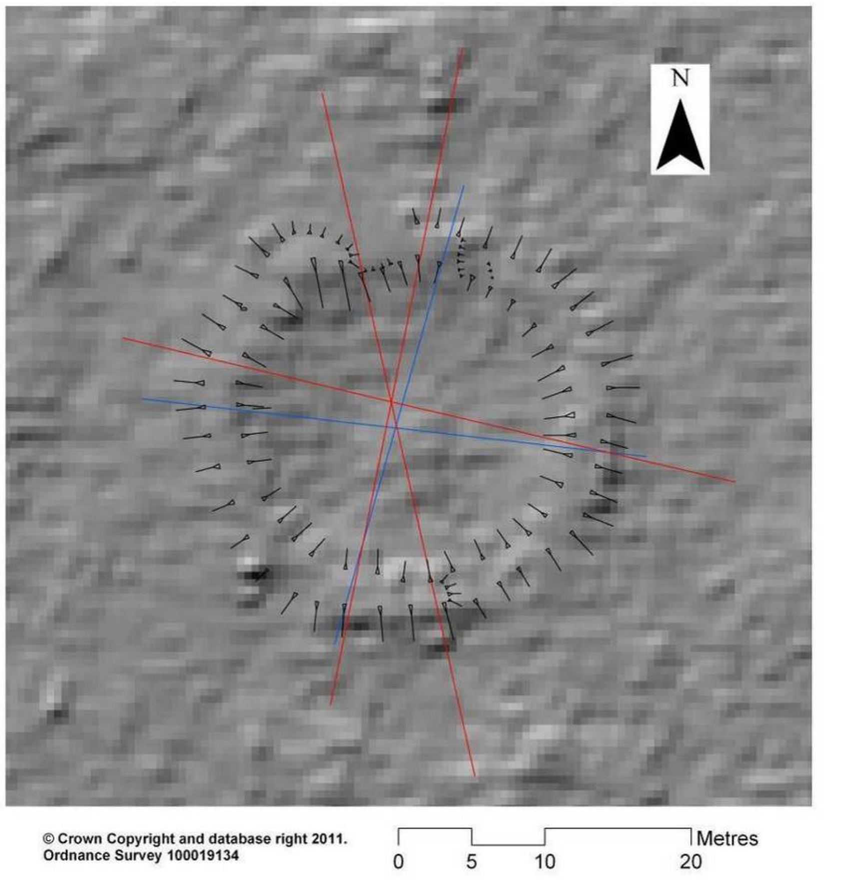


Figure 26: Profiles across Subcircular enclosure so5500/05 and lidar
Blue lines indicate profiles drawn using hand-held level, red lines indicate profiles drawn using dumpy level
Lidar image © Forest Research

All profiles are reproduced in Appendix L.

4.3.3 Detailed records of standing stones

A written description of each of the standing stones recognised prior to the trial excavation (stones 1-12) was made and each stone was photographed (both monochrome print and digital) from four directions and from above. A profile of the earthwork bank which included the possible standing stones was also drawn (Appendix K). The remaining possible standing stone (Stone 13) was uncovered during the small-scale excavation and was recorded as part of that process (see 4.3.5 below).

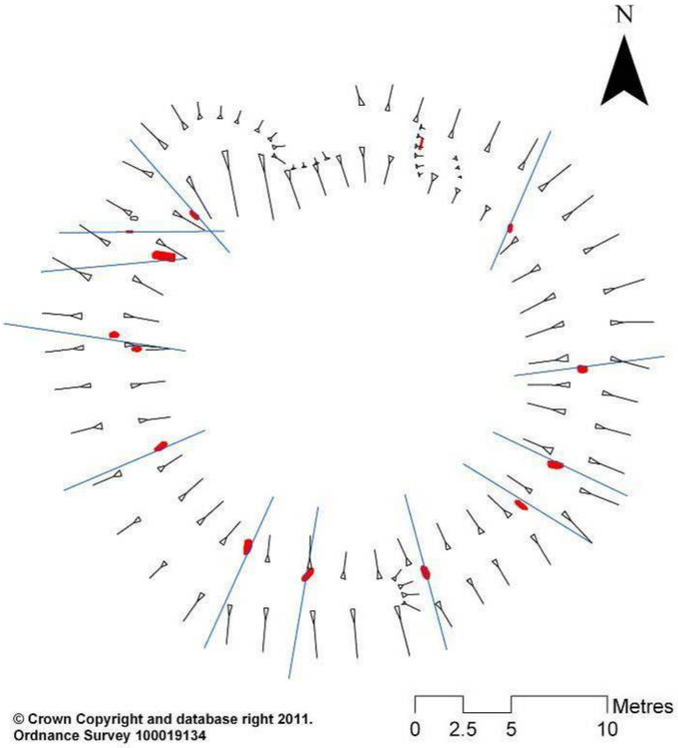


Figure 27: so5500/05, location of profiles across recorded standing stones

4.3.4 Geophysical survey

Geophysical survey (magnetic gradiometer and resistance) was undertaken over an area measuring 50m x 50m, centred on enclosure so5500/05, to identify and attempt to characterise buried archaeological features associated with the site (Figure 28). The geophysical survey was undertaken by Ross Dean of Substrata who had undertaken geophysical surveys as part of Stage 2 of the Forest of Dean Archaeological Survey (Hoyle 2008b, 6, Appendix Q). The Substrata report on the geophysical survey is reproduced as Appendix B.

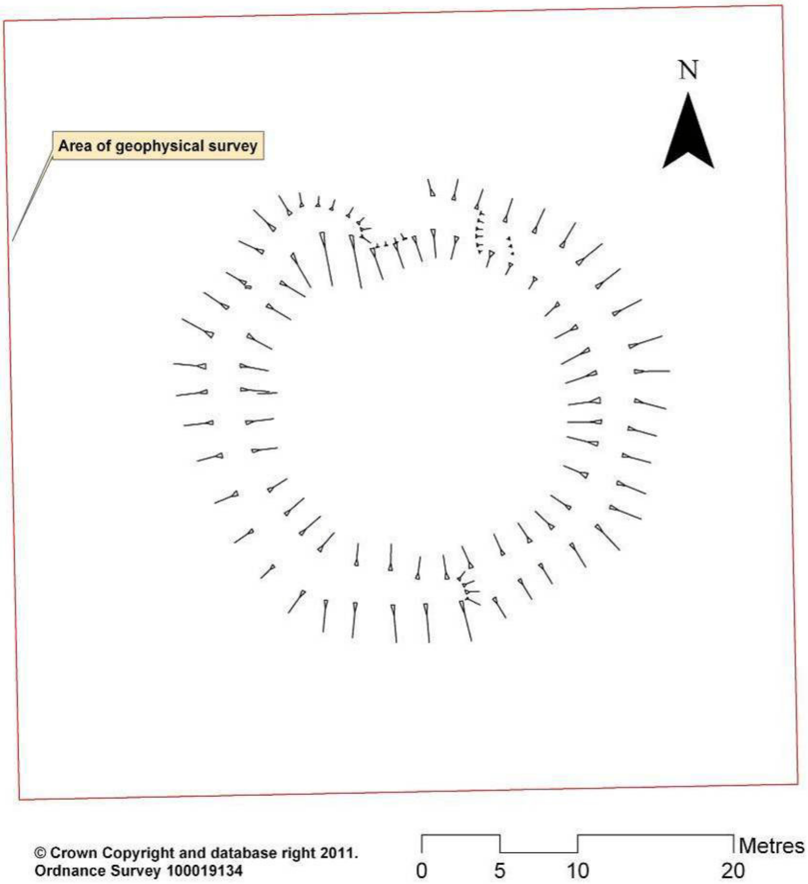


Figure 28: so5500/05, geophysical survey area

4.3.5 Small-scale exploratory excavation

A small trench (measuring 11.50m x 1.40m) was excavated across the northern part of the bank of subcircular enclosure so5500/05 in an area where it appeared to have been crossed by a trackway and perhaps damaged by forestry vehicles (Figure 29). In accordance with the specification set out in the project design (Hoyle 2011a, 4.2.2.1), excavation was limited to the removal of leaf litter and any clearly modern overburden to expose the fabric of the bank within the area of damage.

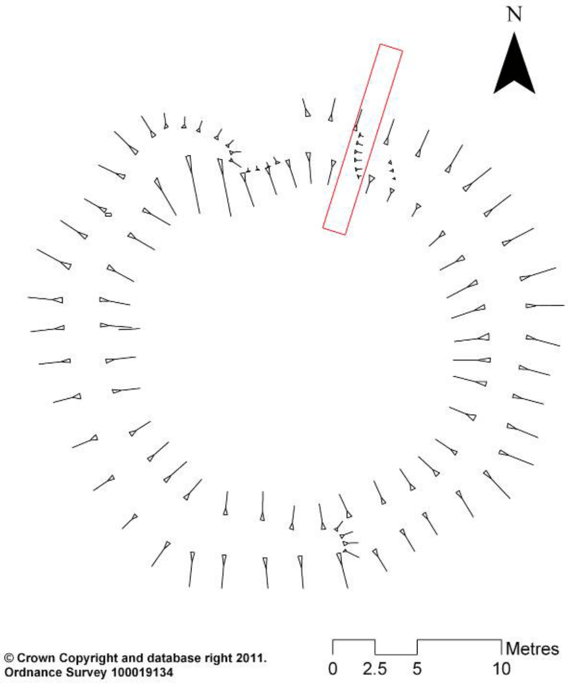


Figure 29: so5500/05, location of excavated trench

4.3.6 Test pits

In addition to the small exploratory excavation (see 4.3.5 above) four test pits (Test pits 4-7) were excavated in the vicinity of enclosure so5500/05 (Figure 30). Each test pit measured 0.25m x 0.25m and they were excavated to test the nature of the underlying geology in this area. A small area of animal disturbance (measuring *c.* 0.30m x 0.30m) in the centre of enclosure so5500/05 (Test pit 8) was also cleaned and the soil profile visible in its sides recorded. As this was sited within the interior of the enclosure, it was not excavated further.

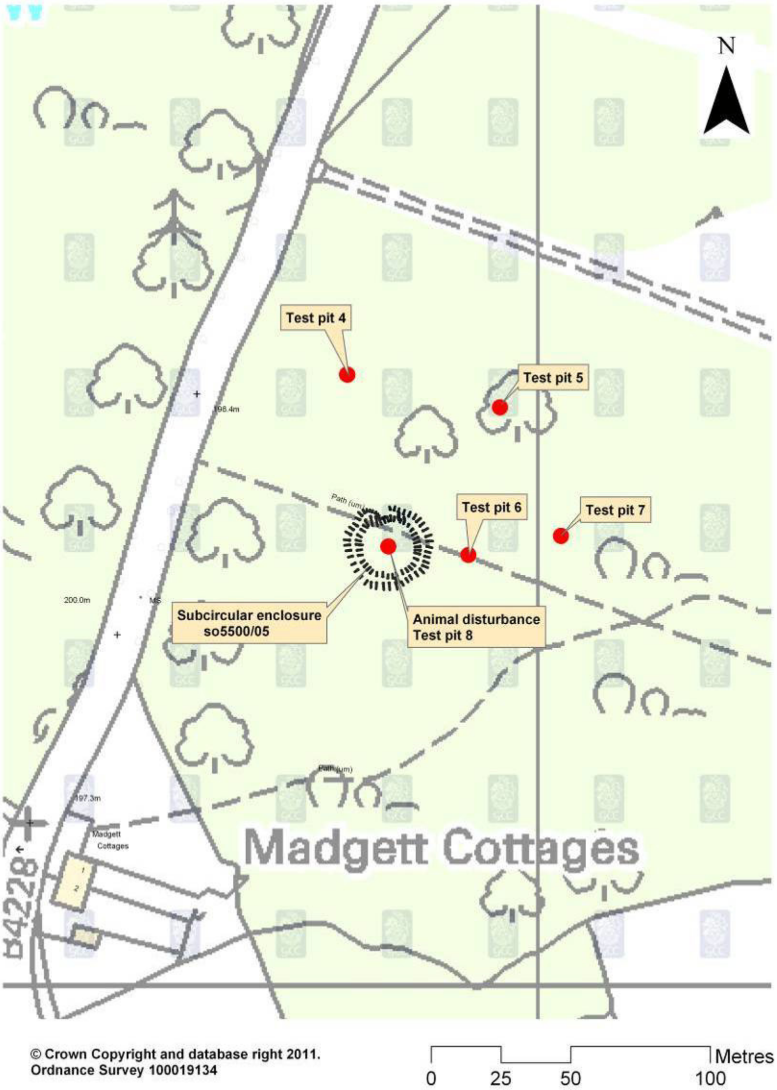


Figure 30: so5500/05, location of test pits

4.4 Results

4.4.1 Subcircular enclosure so5500/05

4.4.1.1 The bank

Subcircular enclosure so5500/05 survived as a low spread bank generally *c.* 7-8m wide at the base and *c.* 0.50m high. The bank had an internal diameter of *c.* 21m and enclosed an area of *c.* 288m^2. Over much of its surface, particularly on its western and eastern sides, the bank appeared to be made up of mixed rubble comprising both white limestone and reddish brown sandstone. Rubble fragments were generally between 0.20m and 0.50m is size, although in places larger fragments of reddish brown sandstone (up to *c.* 1.40m x 60m) were found, often (but not exclusively) around the outer edge of the bank. In some areas, particularly where the bank was crossed by tracks or vehicle tracks, some rubble had spread outwards from the bank. Although the bank was clearly lower in a number of places, these appeared to coincide with existing paths or vehicle tracks and these apparent breaches have been interpreted as the result of pedestrian or vehicle erosion rather than evidence for entrances into the enclosure. Figure 31 shows the four main areas where the bank appears to have been damaged by tracks, the lines of which, converging on the enclosure, are visible on the lidar hillshaded images.

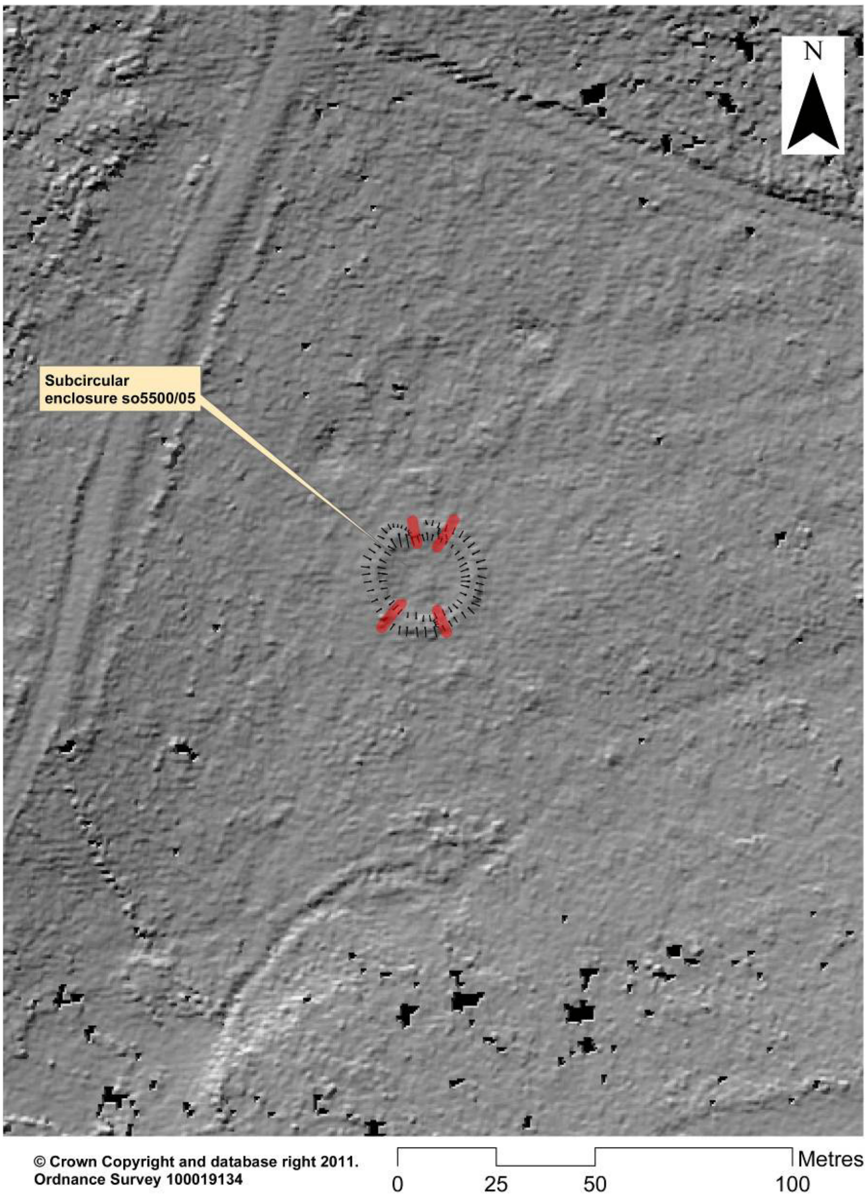


Figure 31: so5500/05, main areas where the bank had been damaged by tracks or vehicles

Lidar image © Forest Research

4.4.1.2 Trial excavation of the bank

Small scale exploratory excavation targeted one of these areas in accordance with the specification set out in the project design (see 4.3.5 above). The targeted area consisted of a linear hollow *c.* 2.5m wide and *c.* 0.30m deep. The excavation encompassed the western part of this hollow and exposed the fabric of the bank both within the hollow and for a short (c. 0.30m) section to its west.

The leaf litter and loose topsoil (300) overlying the bank produced a single struck flint flake (SF1,) identified as debitage, but with possible use wear along its edges (Kurt Adams, Gloucestershire and Avon FLO pers. Comm.) (Appendix H.i.ii).

Immediately to the south of the bank the leaf litter (here numbered (306)) filled small ruts created by the tread of a large tyre (305), presumably from a vehicle used in earlier forestry operations. The hollow in which the excavation was undertaken appeared to have been caused by a long-term trackway/footpath which had been used by forestry vehicles when crossing the bank here, and was not directly the result of vehicle damage.

On its northern (outer) side the rubble of the bank was interspersed with a matrix of mid to light brown sandy silt (301) and (303). This surface of this material was lightly excavated to expose more stones and establish whether it was a layer post-dating the stonework of the bank. A small (0.15g) fragment of burnt bone was recovered from (303) although it was not clear whether this was human or animal.

These sandy silt deposits were very similar to (and effectively merged with) the sandy silt subsoil (304) which was exposed in the northern part of the trench, on the outer side of the enclosure. A small (23g) fragment of iron ore was recovered from the surface of (304).

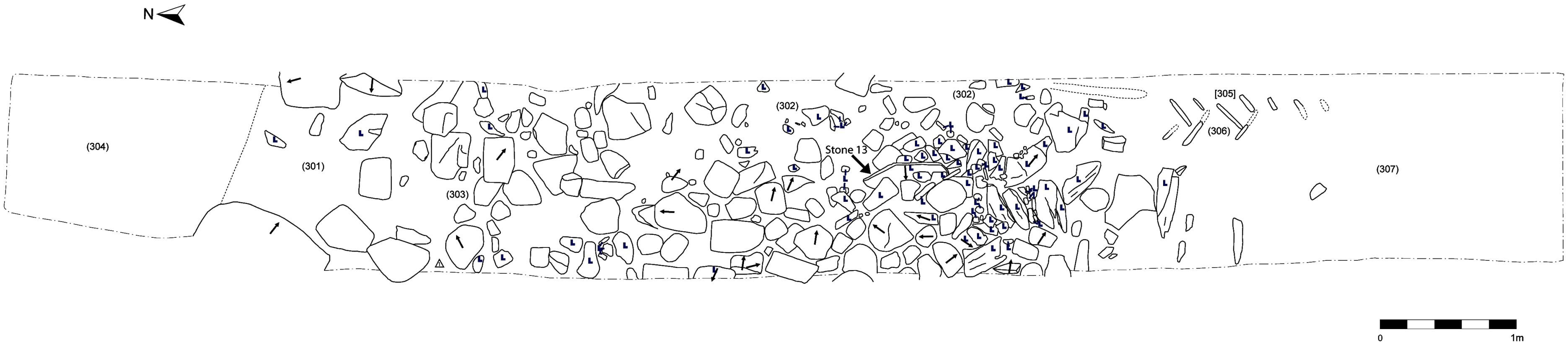
On the western side of the trench the central and southern section of the rubble bank material was exposed immediately below the leaf litter and loose soil (300), although in the eastern part of the trench (i.e. within the hollow which crossed the bank at this point) the exposed surface was much less stony and consisted of a firm light brown sandy clay containing less frequent rubble fragments (302). This material was exposed and cleaned but not excavated further as it was thought likely to represents an integral part of the make-up of the bank and it was thought unwise to attempt to establish this within the limited confines of the trench and within the limited remit of this stage of the project. The exposed surface in the interior of the enclosure consisted of a firm mid brown silty clay (307), which, apart from the fact that this was relatively stone-free, was very similar to (302).

Where exposed the bank itself (308) appeared to be predominantly made up of blocks of limestone and sandstone rubble. These were generally in the 0.20 - 0.40m size range but some larger (up to 1m x 0.40m x 0.5m) sandstone blocks were evident, particularly in the northern part of the trench at the bank's outer edge. The rubble fragments appeared to be within a variable matrix of light brown sandy silt (301) and (303) or sandy clay (302) (see above), although the limited nature of the excavation did not allow this relationship to be fully explored. Where exposed, the bulk of the rubble was laid more or less horizontally, although some stones, mainly limestone, were in an upright position. One of these, positioned centrally at the inner face of the bank, was a larger slab of limestone, measuring *c.* 0.62 x 0.10 m, which was *c.* 0.20m high and pitched upright at an angle of c.65^{o}. the size and position of this stone suggested that it may have been a standing stone set within the fabric of the bank, similar to the stones recorded in the general survey of the monument, although this stone was not noticed prior to excavation and did not protrude significantly above the general rubble surface of the bank. This stone was designated Stone 13 and is discussed more fully in relation to the standing stones (see 4.4.1.3 below).

There was no clear evidence of any structural elements, although the following was observed:

- Although found throughout the bank, there was a tendency for limestone fragments to be positioned on the inner face of the bank.
- Some of the limestone fragments exposed in the excavation were steeply pitched. These tended to be positioned on the inner face of the bank, and, apart from Stone 13 which was radial to the bank and has been interpreted as a possible standing stone, these were generally orientated parallel to the bank, perhaps suggesting that they originally had some form of retaining function.
- Larger sandstone fragments were found on the outer edge of the bank (Figure 33). This reflected a general tendency observed across the monument as a whole, particularly its southwestern side, although it was certainly not the case that large fragments of sandstone were restricted to the outer edges of the bank.

Figure 32: so5500/05, excavated trench looking northwest (left) and southwest (right): 1m scale with 0.50m divisions



Key
L: Limestone

Figure 33: so5500/05, plan of excavated trench

4.4.1.3 The stones

In all 13 possible standing stones were identified on the bank (Figure 24). Detailed records of these stones can be found in Appendix K, although all were vertically pitched slabs of white limestone ranging in size from 0.74m x 0.23m x 0.35m high to 0.23m x 0.17m x 0.12m high (Appendix K.i). All were positioned with their long axes pointing inwards towards the interior of the enclosure and the majority were either on the crest of the bank, or on its internal face, generally at or just below its lip (Figure 25; Appendix K).

Stones 1, 2, 3, 4, 5, 6, 8, 9 and 10 have been interpreted as small standing stones deliberately placed to protrude above the surface of the crest or the inner face of the bank.

Stones 7 and 7a are positioned closely together (Figure 24) making it hard to interpret them both as deliberate standing stones. Of the two, Stone 7, which is positioned on the inner crest of the bank, was the most substantial, although this stone was tilted at an angle of *c.* 60^{o} to the south and, although it protruded from the surface of the bank was in an area where a number of other stones, which appeared to be part of the fabric of the bank, attained similar heights (Figure 34). Stone 7a, on the other hand, although much less substantial (measuring only 0.05-0.06m wide), was pitched vertically and was positioned on the inner face of the bank, in a more consistent position in relation to the Stones 8 and 9 to either side, and appeared more distinctly separate from the general fabric of the bank.

Figure 34: Stone 7 and surrounding stones. 1m scale at 0.5m intervals

Stone 11 survived as a small stump (only c, 0.23 x 0.17m) and protruded *c.* 0.10 – 0.12m above the surface of the bank. This was recorded as possibly the stump of a standing stone on account of its position, but its status is unclear.

Stone 12, which was positioned at the top of the enclosure bank towards its outer edge, was the only stone which was not firmly embedded into the surface of the bank and could easily be rocked from side to side. The validity of this stone as a deliberately placed standing stone is unclear.

Stone 13 which was positioned centrally at the inner face of the bank, was recorded as a possible standing stone on account of its the size and position in relation to other stones. This stone was not noticed prior to excavation and did not protrude above the general rubble surface of the bank to its west (Figure 35). Accordingly its status is unclear.

Figure 35: Stone 13 and surrounding stones. 1m scale at 0.5m intervals

4.4.1.4 Geophysical survey

The following is a summary of the results of the geophysical survey (magnetic gradiometer and resistance) which was undertaken over an area measuring 50m x 50m, centred on enclosure so5500/05 (see 4.3.4 above) . The full report on the geophysical survey is included as Appendix B of this report.

Geophysical anomalies of unclear archaeological significance

The geophysical survey identified a number of features, of unclear archaeological significance, but which may represent activity post-dating subcircular earthwork so550/050 (but see 4.5.2 below). These included:

- Five anomalies (Anomalies 17/18, 3/5, 7, 13/14/15/31/32 and 30) which have been interpreted as indicative of possible charcoal production. Two of these (Anomalies 3/5 and 7) were sited over the enclosure bank, whilst the remaining three (Anomalies 17/18, 13/14/15/31/32 and 30) were outside of the enclosure to its west and east (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3). None of these had been identified as visible surface features and it is possible that some of these anomalies represent charcoal spreads associated with the monument (see 4.5.2 below) .
- Four anomalies (Anomalies 22, 23, 24 and 25) with a high ferrous response perhaps indicative of buried metal objects which need not be of archaeological significance. Only one of these (Anomaly 25) was within the enclosure sited on the bank. (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3).

- Five anomalies (Anomalies 4, 6, 11, 12 and 16) were interpreted as possible tree-throw hollows or other natural subsoil features, but may represent archaeologically significant features relating to the monument (see 4.5.2 below). Two of these were within the enclosure. One (Anomaly 4) was sited at the inner edge on the bank, the other (Anomaly 6) was within the interior of the enclosure. (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3).

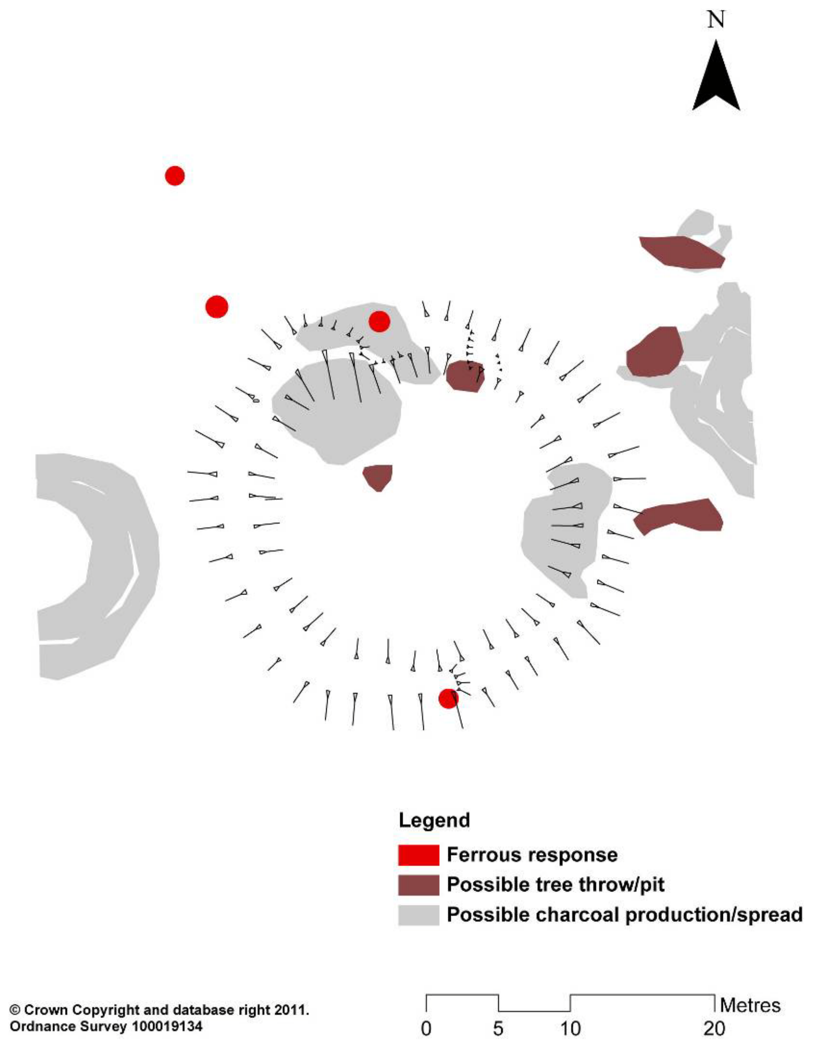


Figure 36: Geophysical anomalies of unclear archaeological significance

Geophysical anomalies of potential archaeological significance outside the enclosure

Two possible archaeological features were identified outside of the enclosure (Figure 37).

One of these (Anomalies 19/33/34), sited *c.* 4-5m to the southeast of the enclosure, may indicate a subcircular pit or fill within an archaeological structure, c.6m in diameter, whilst the second (Anomaly 20/21) could be interpreted as the remains of a linear boundary comprising an apparently segmented ditch and surviving footings of a stone wall or similar structure (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3). This feature did not correspond to any boundaries recorded on 19th century and later maps (OS 1880, 1925; Gwatkin 1995).

Geophysical anomalies of potential archaeological significance inside the enclosure

Two potential archaeological features, identified within the enclosure, may relate to the function of the enclosure (Figure 37).

One of these (Anomaly 8) was sited in the southeastern part of the interior *c.* 2m from the inner face of the bank and may indicate an area of *in-situ* burning *c.* 3m in diameter. The second (Anomaly 29) was sited centrally within the interior, approximately corresponding to the position of the apparent mound visible within the enclosure on the lidar imagery (see 4.2 above). The anomaly was subcircular, with a diameter of *c.* 9-10m and was consistent with an earthen surface, or perhaps a large pit (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3).

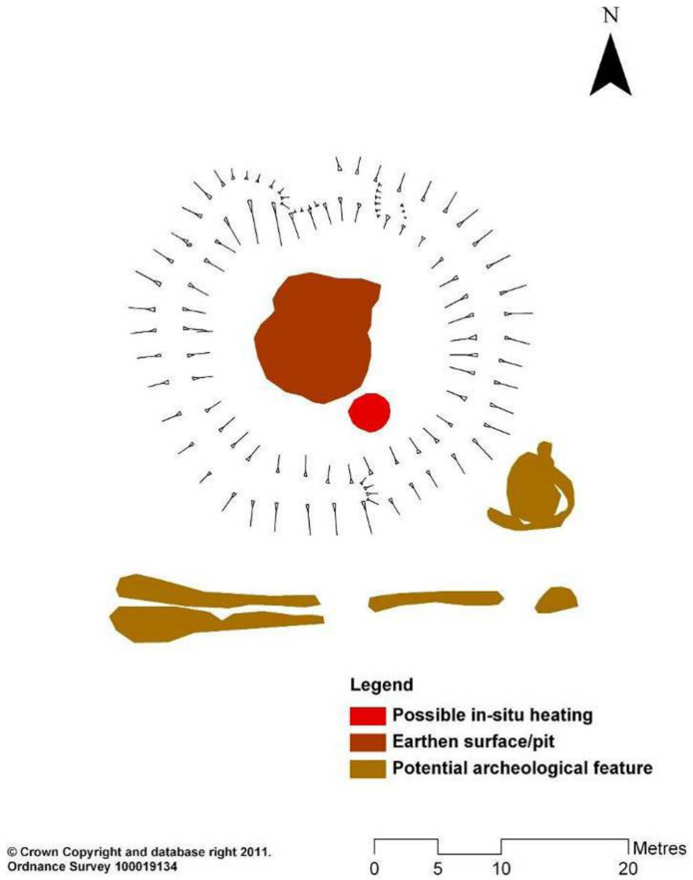


Figure 37: Possible archaeological features

Geophysical anomalies relating to the bank

Seven anomalies were identified which either related to the structure of the bank or were indicative of features associated with the boundary of the enclosure (Figure 38).

Two of these (Anomalies 10 and 27) were consistent with stony deposits and corresponded to the bank itself. The remaining five (Anomalies 1, 2, 9, 26 and 28) were found on both the inner and outer faces of the bank (Appendix B, Tables 3, 4 and 5, Figs 1, 2 and 3). The interpretation of these anomalies was unclear and they were consistent with one of the following:

- The remains of a ditch.
- A ring of closely set pits or post holes
- Accumulated deposits at the base of the rubble bank.
- The remains of an earthen bank enclosing an inner fill of rubble.

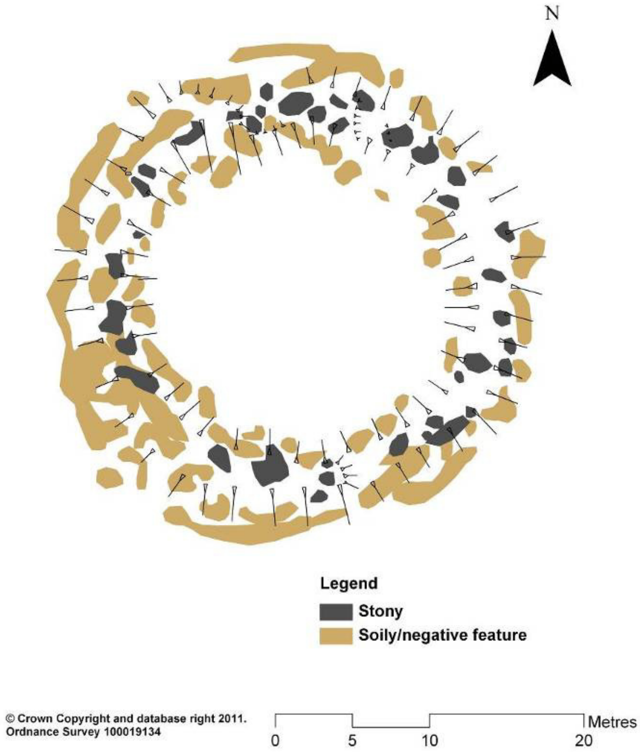


Figure 38: Geophysical anomalies relating to the bank

4.4.1.5 The interior

With the exception of the trial excavation (see 4.4.1.2 above) no further excavation was undertaken within the enclosure with the exception of the cleaning and recording of a small area of animal disturbance (measuring *c.* 0.30m x 0.30m) in its centre (Test pit 8) (Figure 30), and within the northeastern part of geophysical anomaly 29, interpreted as a possible earthen surface or pit (See 4.4.1.4 above; Appendix B; Figure 40)

The test pit was only 0.37m in depth and its profile comprised dark brown silt clay, 0.14m thick, below the leaf litter, which overlay a 0.14m thick deposit of dark reddish brown clay silt above a layer of light reddish brown clay silt (Appendix N.i).

Figure 39: Test pit 8. 1m scale with 0.5m divisions

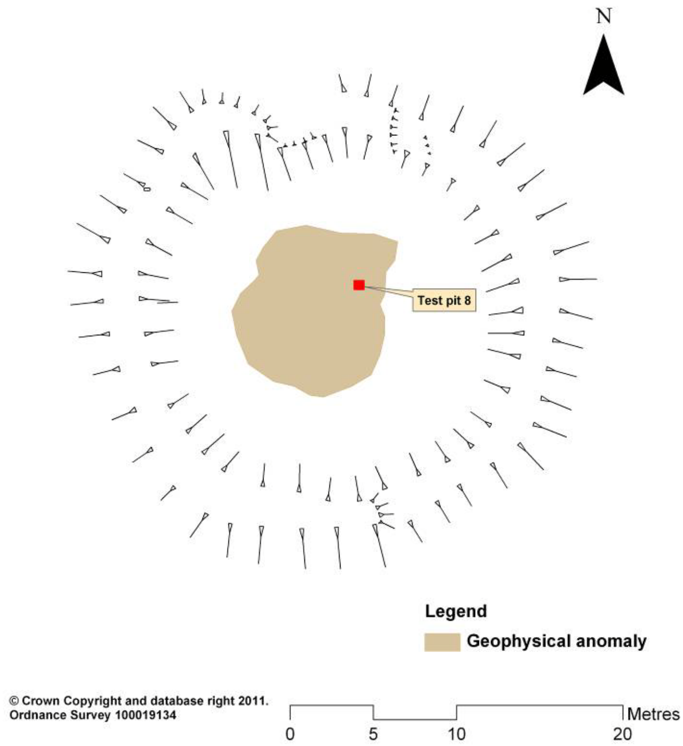


Figure 40: Location of test pit 8 and central geophysical anomaly

None of the profiles recorded across the interior of the earthwork (see Appendix L) recorded any variation on the surface of the interior which corresponded either to geophysical anomaly 29 or the apparent central mound visible on the hillshaded lidar images (see Figure 26).

4.4.1.6 Discussion of subcircular enclosure so5500/05 and its vicinity

4.4.2 Survey of vicinity of so5500/05

The field survey of the vicinity of so5500/05 recorded a number of archaeological and natural features in the vicinity of so5500/05 (see Figure 25).

4.4.2.1 Features of limited archaeological potential

A number of features, e.g. evidence for small-scale quarries and charcoal production were recorded which, although of potential significance in terms of the landscape history of the area, may be relatively recent in origin, and, therefore of little relevance to any discussion of enclosure so5500/05 (Figure 41).

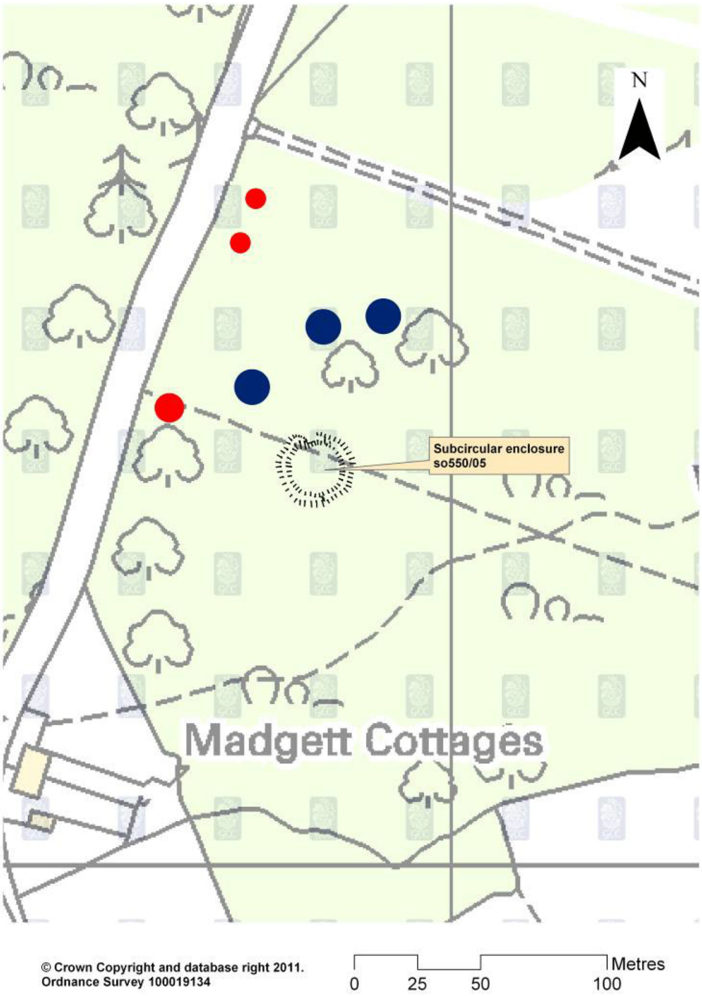


Figure 41: Charcoal platforms (red) and small-scale quarries (blue) recorded during the total station survey

4.4.2.2 Surface geology

The survey recorded a number of features which have been interpreted as probably geological in origin (Figure 47).

Limestone pavement

To the east of enclosure so5500/05 were a number of discrete areas of horizontally laid limestone slabs or pavement. Although, in places, these appeared to consist partly of limestone blocks of variable sizes, the general appearance of these areas was that of natural limestone pavement with blocks separated by weathered fault lines (Figure 42).


Figure 42: Surface limestone to the southeast of so5500/05. Scale 2m

The East Wood Nature Reserve, a designated area of natural limestone pavement, is only 150m to the east of so5500/05 (see 4.4.2.2 above, Figure 47) which would support the view that the limestone areas recorded immediately to the east of the enclosure are weathered outliers of a natural geological formation. Two test pits (6 and 7, Figure 30) were excavated in the vicinity of these areas to test the underlying bedrock. Both of these pits exposed the limestone bedrock at a depth of between 0.25m (Test Pit 7) and 0.47m (Test Pit 6) below the present ground surface (Appendix N).

Sandstone boulders

Sandstone boulders were recorded on the surface to the north of so5500/05 (see 4.4.2.2 above, Figure 47). These appeared to represent randomly placed, generally rounded and irregular blocks of sandstone ranging in size from 0.20m x 0.30m to 0.70m x 120m and positioned either individually or in groups. The largest group formed a linear spread *c.* 17m x 4m, although other groups were either more dispersed, or covered a much smaller area (the smallest group measured *c.* 1.5m x 1.5m). Most of these sandstone boulders appear to be firmly embedded in the ground, and other blocks appeared to be just below the ground surface. In places some stones appeared to be standing upright and at least one stone appears to have been deliberately shaped as if it were a quern stone rough-out.


Figure 43: Possible quern stone rough out. Scale 1m

Figure 44: Linear spread of sandstone boulders. Scale 2m

Figure 45: Group of sandstone boulders including an upright stone. Scale 1m.

The status of the sandstone boulders is not clear. Although the disposition of some of the boulders hinted at deliberate placement, other stones appeared to be randomly positioned with no clear patterning.

The solid geology of the area is recorded as Limestone of the Hunt's Bay Oolitic Limestone and the nearest recorded sandstone solid geology (which underlies the limestone) is the Cromhall Sandstone recorded *c.* 200m to the north, *c.* 300m to the south and *c.* 500m to the west (BGS 2004, Figure 46). Sandstone boulders were not, however, limited to the immediate vicinity of enclosure so5500/05, and similar spreads were noted (but not recorded in detail) in the areas of woodland to the north and west. It may also be significant that, where recorded in detail, these boulders were found in the vicinity of surface hollows interpreted as small-scale quarrying (compare Figure 47 and Figure 41). Test pits 4 and 5, excavated in the vicinity of the sandstone boulders to the north of enclosure so5500/05 (Figure 30) did not (unlike test pits 6 and 7, see above) reach limestone bedrock but encountered sandier deposits containing small fragments of sandstone (Appendix N), suggesting that the solid geology is more complex than that suggested by the geological record (BGS 2004, Figure 46). In this area, at least, the upper layer of Hunts Bay Limestone may be absent and the underlying solid geology is

Cromhall Sandstone. Given this, the sandstone boulders could be interpreted as a combination of natural outcropping and upcast from small-scale quarrying activity, although the possibility that some of the more linear spreads may represent the remains of linear boundary features cannot be discounted.

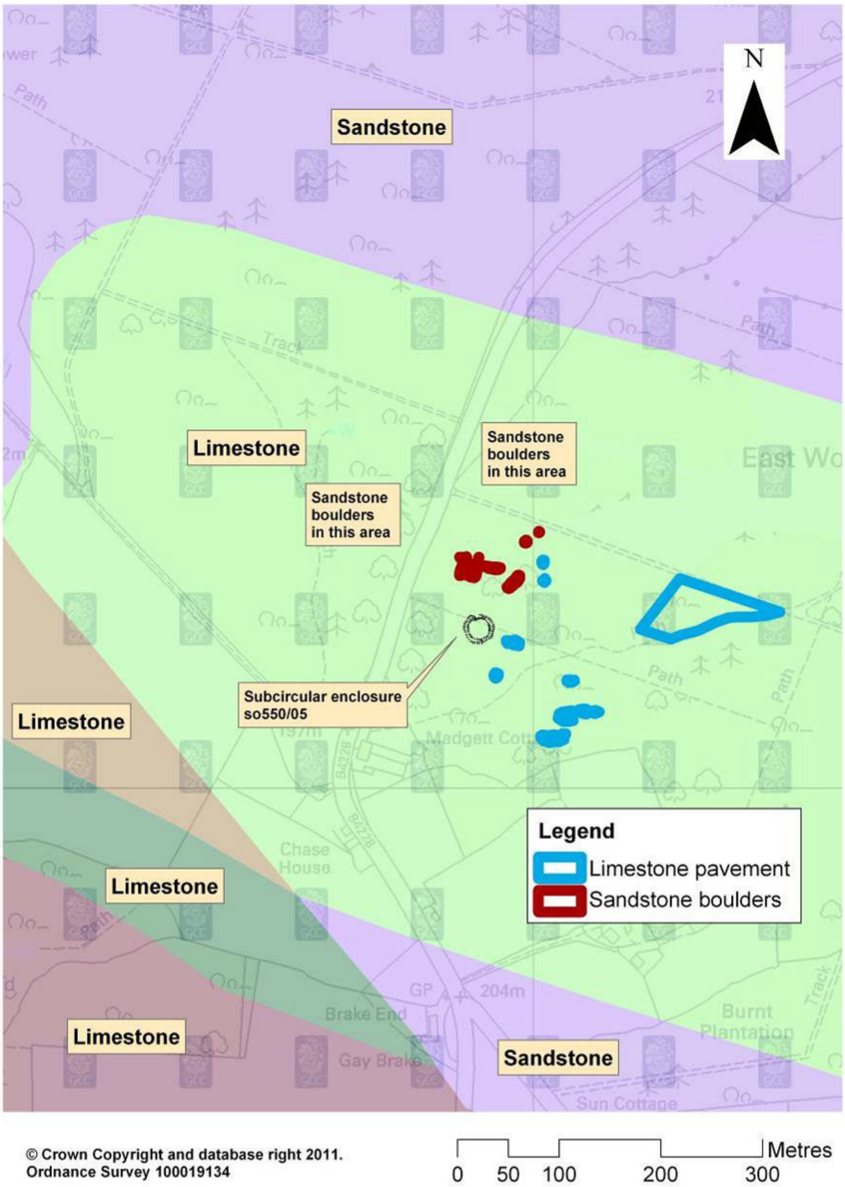


Figure 46: Simplified geology in the vicinity of so5500/05
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Significance of the surface geology

Although all the small standing stones recorded at subcircular enclosure so5500/05 were of white Oolitic limestone, the enclosure bank itself was made up of a mixture of limestone and sandstone fragments. Although there is a suggestion that these types of stone may have been used differently in some elements of the bank's construction (see 4.4.1.2 above), much of the bank appeared to consist of mixed limestone and sandstone rubble with no obvious differentiation, suggesting that both stone types were readily available at the site, and that the enclosure was built on, or close to the boundary between the two solid geologies.

The evidence of the limestone pavement, and also the surface sandstone boulders recorded in the vicinity of so5500/05, may also suggest that this geological boundary was a clearly visible landscape feature when the enclosure was constructed and that it may have been deliberately sited at this boundary (Figure 47).

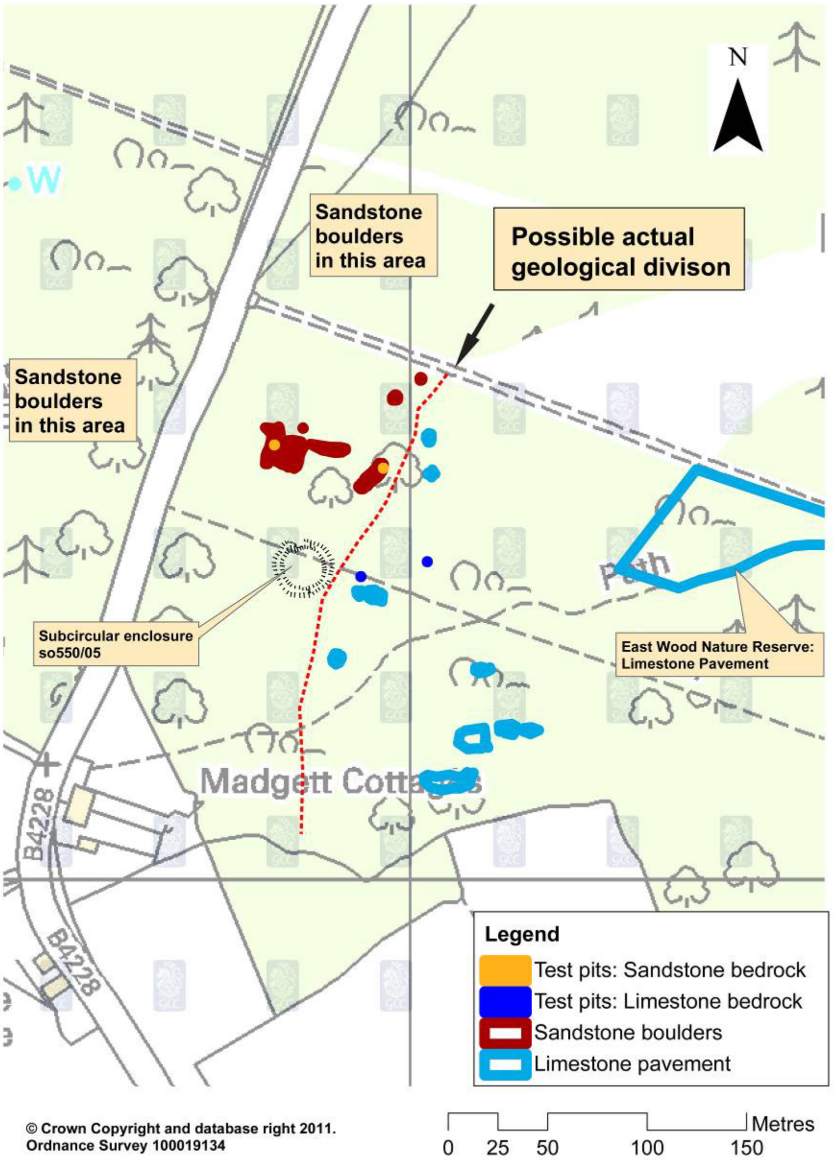


Figure 47: Surface geology in vicinity of subcircular enclosure so5500/05 and test pits to explore geology

4.4.2.3 Other possible archaeological features in the immediate vicinity

Two features were identified to the southeast of the enclosure (Figure 48). Both these features are discernable on the lidar imagery, but they could not be confidently distinguished from the surrounding ‘background noise’ of undergrowth on the hillshaded images of this area. Consequently neither had been recorded in the rapid transcription of the 2006 lidar survey (Hoyle 2007).

Feature 2 (Glos HER 43361)

Feature 2 (Glos HER 43361) was sited *c.* 25m to the southwest of so5500/05 (NGR 355973 200125) and consisted of an irregular, but generally subcircular mound *c.* 10m x 8m in area and *c.* 0.60m high (Appendix M.i). The mound was very overgrown but appeared to be made up large blocks of white limestone measuring from *c.* 0.50m x 0.30m to *c.* 1.80m x 0.60m x 0.35m. This differed from the limestone pavement in the area (see 4.4.2.2 above) in that some of the limestone fragments were clearly steeply pitched or upright, and the features had the distinct appearance of a discrete mound rather than a spread of stones.

Feature 3 (Glos HER 43362)

Feature 3 (Glos HER 43362) was sited *c.* 52 m to the southeast of the subcircular enclosure, and *c.* 23m to the southeast of Feature 2 (NGR 355991 200112). It was also subcircular in shape, measuring *c.* 5.5m x 7.5m in area and was *c.* 0.5m in height (Appendix M.ii). It was largely covered in vegetation, but seemed to be made up of fragments of white limestone ranging from *c.* 0.25m x 0.110m to *c.* 0.90m x 0.60m, some of which were vertically pitched. In addition to these the make up of the mound also included some fragments of reddish sandstone ranging in size from *c.* 0.10m x 0.10, to 0.20m x 0.20m

Discussion

The status of neither of these features could be discerned with any confidence on the basis of the field survey, but neither appears to simply represent a natural configuration of stones, particularly Feature 3 which, like enclosure so5500/05, appears to comprise both limestone and sandstone in its fabric.

Enclosure so5500/05 has been interpreted as a ring cairn, an early to middle Bronze Age ritual monument which may have been associated with funerary ritual (see 4.5.1 below; English Heritage 1989, 5). Both these features are commensurate in size and shape with small round barrows (English Heritage 2011a, 3), and a number of confirmed or possible barrow sites are known in the area (see 4.5 below; Figure 49). Rings cairns can be found in association with other classes of Bronze Age ritual monuments, including bowl barrows, and these mounds may represent small barrows within an area of Bronze Age ritual significance.

These features also appear to be aligned with geophysical anomaly 19/33/34, a feature which may be of archaeological significance (see 4.4.1.4 above and Figure 37) perhaps suggesting that they represent a discrete group of ritual features whose positions relate both to the ring cairn and to each other (Figure 48).

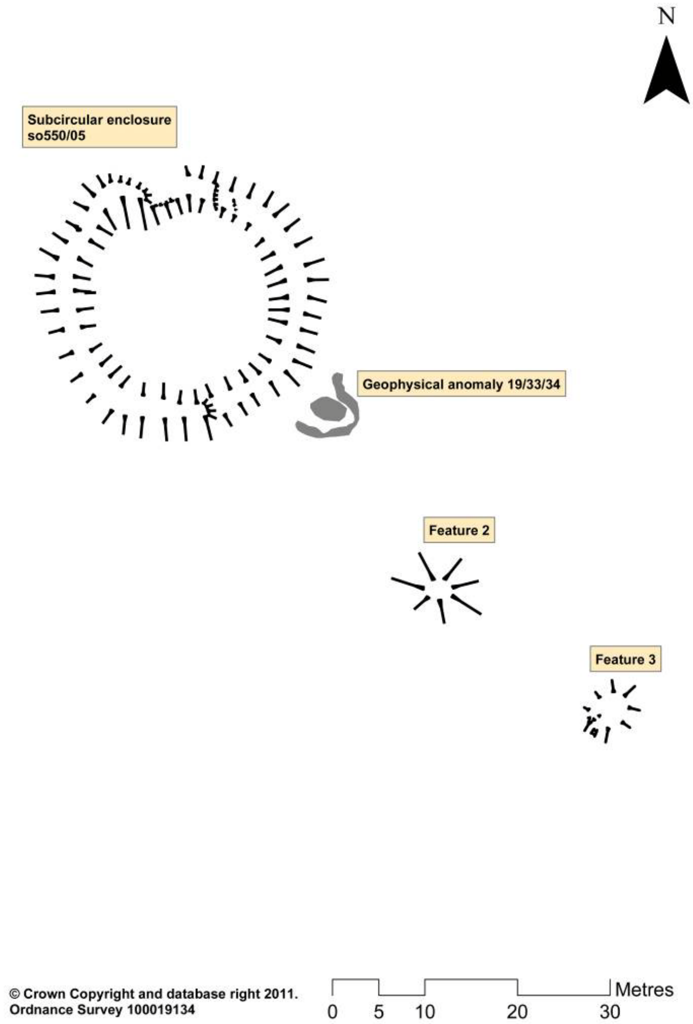


Figure 48: Subcircular enclosure so5500/05, Features 2 and 3 and geophysical anomaly 19/33/34

4.5 Discussion of so5500/05

4.5.1 Interpretation of the monument

The suggested interpretation of so5500/05 as a Bronze Age ritual monument (Hoyle 2010, 3.2.2.2) was confirmed by the 2011 fieldwork which demonstrated that this monument can be classified as a ring cairn.

The apparently continuous low bank of unordered rubble defining a circular enclosure without a visible entrance is consistent with a ring cairn of early or middle Bronze Age date (English Heritage 1989, 4, Lynch 1979a, 2) and the relatively narrow bank with large central space is comparable with Welsh examples of this type of monument (Lynch 1979a, 9). No central mound was visible on the ground (but see below) and the earthwork is consistent with Lynch's Type Ia of an unrevetted ring cairn without a central mound (Lynch 1979b, Fig 1, English Heritage 1988, Fig 1). Its diameter of *c.* 25m is large for a ring cairn, but not excessive (English Heritage 1989, 4). Ring cairns of similar dimensions are known at Morlais Hill, Pebyll and Cwm Cadlan in Glamorgan and Gwent, South Wales (Evans and Lewis 2003, 15), and at Brenig, Denbighshire (Lynch 1979a, Fig 1).

The standing stones on the bank do not fit easily into Lynch's typology, although his Type IVa does feature upright slabs within the core of the ring bank, in conjunction with an inner and outer stone kerb. The majority of the stones at so5500/05 (with the exception of Stones 7, 12 and 13 which are of unclear status – see 4.4.1.3 above) are on the inner face of the bank, suggesting parallels with embanked stone circles found in the Wales, the Derbyshire Peak District, or further north (English Heritage 1990, Figs 1 and 2, Lynch 1979a, Figs 2 and 4), although both the bank and stones of these tend to be on a more massive scale (Lynch 1979a, 2). Ring cairns and other ritual sites need not be single phase monuments, but the end product of a lengthy history during which they may have undergone a series of changes in form (Bradley 1998, 134), and the standing stones are not necessarily an original feature of the ring cairn, but could have been added at a later date.

4.5.2 Elements of the monument

Geophysical anomalies hint at refinements to the bank, such as a ditch, or a ring of closely set pits or post holes both within and outside the bank (Appendix B, Table 4, Figure 38). Although posts set around the bank are a feature of some ring cairns (English Heritage 1988,5) ditches are not recorded, and no evidence for these features was recorded during the excavation at so5500/05 (see 4.4.1.2 above). Although the excavation trench encompassed these anomalies, the limited nature of the excavation (see 4.3.5 above) may have inhibited their identification. An alternative interpretation is that these represent soily elements with the structure of the bank itself, a possibility suggested by the trial excavation (4.4.1.2 above), although soil inclusions in the bank of ring cairns, whilst not unknown are rare (English Heritage 1988, 5).

Ring cairns may have been associated with rituals involving burning and charcoal (English Heritage 1988, 6) and Anomaly 8 may indicate a hearth or area of *in situ* burning within the interior (see 4.4.1.4 above, Figure 37). Spreads of ash and charcoal have also been found at some ring cairns (Lelong and Pollard, 115, Lynch 1979a, 9), and those geophysical anomalies interpreted as possible charcoal burning, particularly Anomalies 5/24 and 7 which were on the bank, (see 4.4.1.4 above, Figure 36) may indicate similar spreads at this site.

Two of the features inside the enclosure, Anomalies 4 and 6, which have been interpreted as possible tree-throw hollows (see 4.4.1.4 above, Figure 36) could represent pits, the most common feature found within ring cairns (English Heritage 1988. 5). Another possibility is that they represent secondary burials or cremations, also a features of some ring cairns (English Heritage 1988, 5, Lelong and Pollard, 113), a possibility supported by the tiny fragment of burnt bone found during the excavation (see 4.4.1.2 above).

The large central geophysical anomaly (Anomaly 29) may also be an archaeological feature (see 4.4.1.4 above, Figure 37) and was described as indicative of 'an earthen surface or pit' (Appendix B, Table 4). The precise status of this feature is not clear, and the 0.30m deep animal burrow recorded in the northeastern part of this feature (Test pit 8, see Figure 39, Appendix N.i.) did not provide any significant information to aid its interpretation. A backfilled 'shallow scoop' (3m in diameter and only 0.10m deep) was recorded in the centre of the ring cairn at Cloburn Quarry, Lanarkshire (Lelong and Pollard 1998, 110) and Anomaly 29 may be indicative of a similar feature, perhaps filled with a more clayey material than the surrounding subsoil. .

This anomaly, however, is in the same position as the apparent central mound visible on the lidar imagery (Hoyle 2010, 3.2.2.2, see also Figure 26). In 2010, this central mound was interpreted as the product of forestry detritus, although it was acknowledged that these may have masked a slight earthwork (Hoyle 2010, 3.2.2.2). In 2011 there was no sign of a central mound on the ground, and none could be discerned from the profiles recorded across the earthwork, even when the vertical scale is exaggerated (see Appendix L). However 'low mounds of earth or stone, generally up to 4m across and rarely more than 0.30m high' are found in the centre of a number of ring cairns (English Heritage 1988, 5), and the coincidence of the lidar feature with the geophysical anomaly may be significant.

Features visible on lidar hillshaded images, but not discernable on the ground have been identified by members of the Gloucestershire Society for Industrial Archaeology who have been investigating surface/shallow coal workings identified by lidar in the Forest of Dean. During this project they investigated Oaken Hill Wood where a feature which appeared to be a linear bank on the lidar hillshaded image (GSIA 2007, feature 101) was not visible. The validity of this feature was however confirmed as it was visible on an aerial photograph taken in December 1946 (NMR 1946), and also recorded on the Forest of Dean National Mapping Programme (Glos HER 2010) suggesting that the lidar was able to detect very slight variations in the ground surface which could not be discerned on the ground. Trevor Pearson of English Heritage's Survey and Investigations team has also noted the phenomenon of lidar identifying genuine features which are too faint for the naked eye to discern on the ground in areas of pasture in the Mendip region (Trevor Pearson, pers. comm.).

Consequently Anomaly 29 may indicate a spread of material from a central earth mound, although this interpretation is far from clear on the basis of available evidence.

4.5.3 Context of the monument

Ring cairns are found mainly in upland areas and are most common in the Derbyshire Peak District and Devon with no known examples in Gloucestershire or neighbouring English counties (English Heritage 1988, Fig 2). They are, however, fairly common in the uplands of Glamorgan and Gwent in south Wales (Evans and Lewis 2003, Fig 4), and so5500/05 could be regarded as an eastern outlier of this group.

Ring cairns are 'frequently situated on hill-slopes, or on a high moorland plateau around the head of descending stream' (English Heritage 1988, 6). Sited on a slight slope at the eastern edge of a rounded plateau at the head of a dry valley, so5500/05 is typically positioned for a ring cairn.

Its position may be of significance in other ways as prehistoric ritual monuments were often associated with distinctive topographical or natural features (Jones 2006, 356). It is positioned between the steep sides of the Wye Valley *c.* 1.8km to the west and the Severn Valley *c.* 900 to the east (Figure 21), in an area where the Severn and Wye are beginning to converge towards their confluence *c.* 8km to the south and at which there is a clear appreciation of being between the two rivers. In addition it is sited at the edge of a clearly visible geological exposure in the form of limestone pavement (see Figure 47) where a change in the in the underlying solid geology may have been evident on the surface (see 4.4.2.2 above).

In addition to Features 2 and 3 (Glos HER 43361 and 43362), which may represent Bronze Age barrow sites (see 4.4.2.3 above), ring cairn so5500/05 is positioned in an area where Bronze Age ritual activity has been confirmed, and a number of other possible sites have been identified. The Soldiers Tump Round Barrow (Glos HER 5012) excavated in the 1950s, and the unexcavated, but scheduled, barrow west of Tump Farm Tidenham (Glos HER 5006) are sited only 2km to the southwest and numerous mounds which have tentatively been interpreted as barrow sites (Glos HER 29844, 29844, 42931, 21592, 43364, 43400) have been identified within *c.* 2km of so5500/05 mainly around the edges of the high ground of Tidenham Chase (Figure 49), and there is also documentary evidence suggesting the sites of former barrows (Glos HER 5017, 5018, 5019, 5024, 5063, 25340, 27762) in the area

In addition so5500/05 is only c. 108m to the east of a small subcircular feature of unknown date which may represent the remains of a small hengiform monument (Glos HER 29845), and c. 2km to the north of two small circular stone structures of unknown date (Glos HER 5041 and 5042) which have variously been interpreted as the remains of round barrows or prehistoric hut circles (Hoyle 2008a, 4.6.1) but which may be the remains of bronze Age ritual sites.

The identification of the ring cairn at East Wood Tidenham is another component of the, as yet not fully understood, Bronze Age ritual landscape of Tidenham Chase in the southern part of the Forest of Dean.

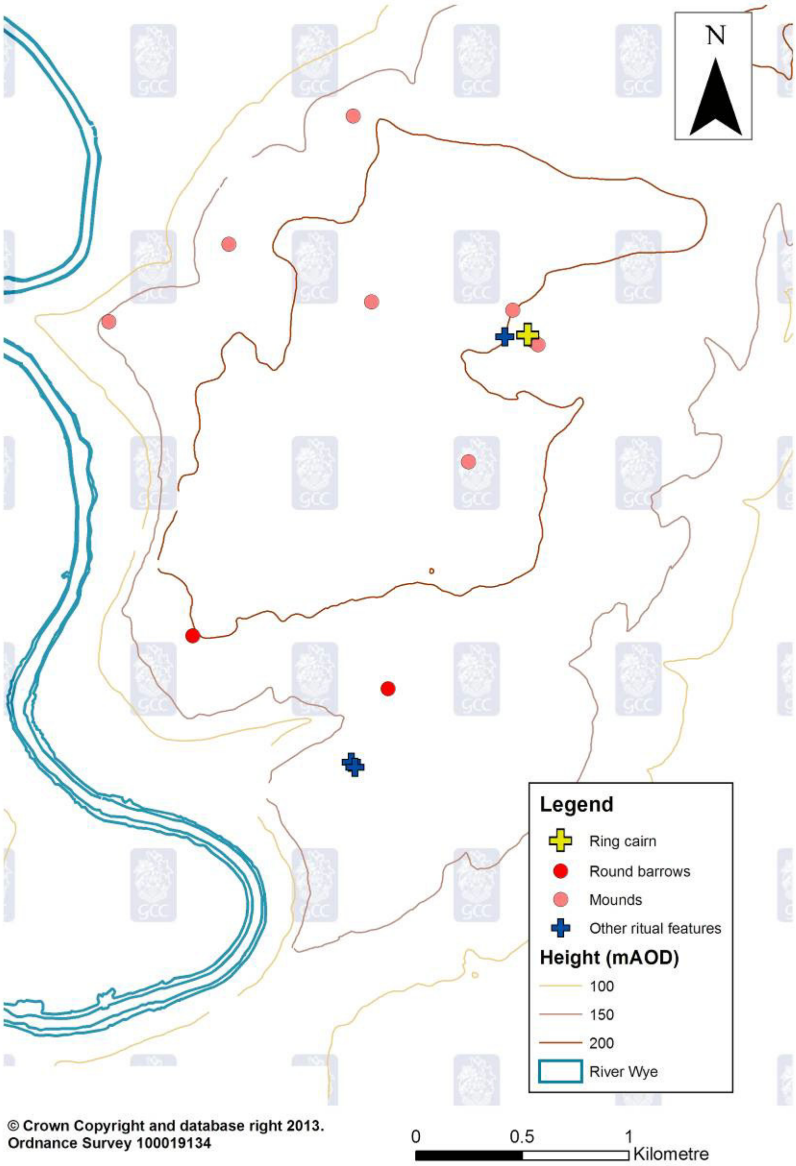


Figure 49: Selected known and possible Bronze Age ritual monuments and undated mounds on Tidenham Chase.

5 Palaeoenvironmental assessment of the Lyd/Cannop Brook valley
(Activity reference Glos HER 37922)

In addition to palaeoenvironmental sampling at the excavations of earthwork systems so6013/04 (Glos HER 37920) and 6013/26 (Glos HER 37921) (see 3.3.2.1 and 3.4.2.1 above) and of subrectangular enclosure so6316/07 (Glos HER 37923) (see 2.4.1 above) a palaeoenvironmental and geoarchaeological assessment was made of the Lyd/Cannop Brook valley (see Figure 1). The assessment was undertaken by the palaeoenvironmental team of Worcestershire Historic Environment and Archaeology Service, headed by Liz Pearson in conjunction with Keith Wilkinson of ARCA, Winchester University. The full report on the assessment can be found in Appendix A and the following is a summary of the results.

5.1 Reasons for the assessment

The valley of the River Lyd/Cannop Brook had been identified as a site with the potential to produce organic or alluvial sequences suitable for palaeoenvironmental sampling as part of Stage 2 of the Forest of Dean Survey (Hoyle 2008b, section 5.1). The potential of palaeoenvironmental sampling in valley bottoms was demonstrated during Stage 2 of the survey where a sample in Flaxley Valley, in the northeastern part of the survey area at the edge of modern woodland, had provided data which appeared to suggest an increase in woodland cover from the early medieval period in that area (Hoyle 2008b, 5.2.2.1, Appendix P). It was felt that further samplings from the valley of the Lyd/Cannop Brook, in the central part of the Forest could be compared with those already derived from the Flaxley Valley to establish the extent to which the landscape history suggested at Flaxley was typical of the wider Forest of Dean. It was also felt that, as this valley is close to the excavations at earthwork systems so6013/04 (Glos HER 37920) and 6013/26 (Glos HER 37921), the results could inform the processes which may have contributed to the formation of the earthwork systems and provide a coherent local environmental context within which they could be better understood.

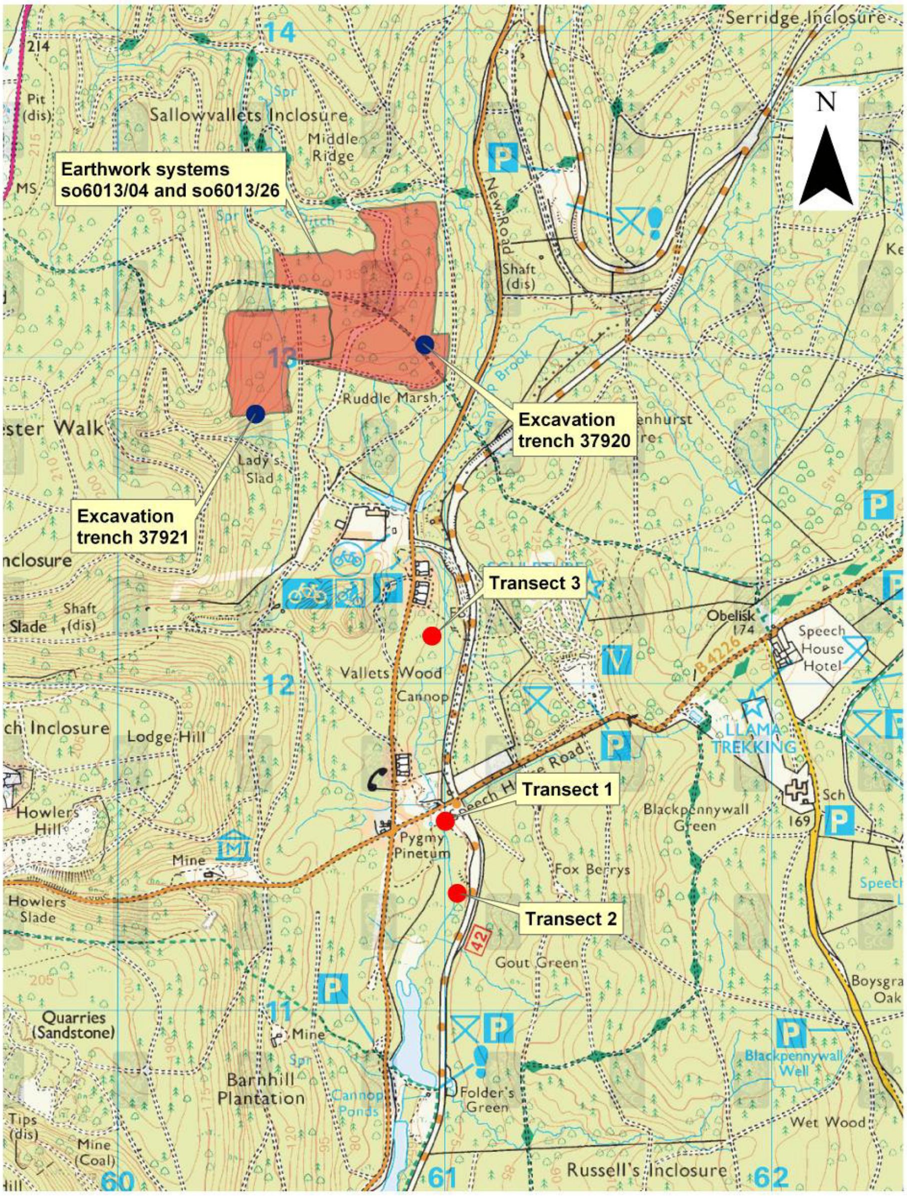
5.2 Methodology

The assessment consisted of the following elements

- Mapping - The distribution of potential organic deposits within the area of the Cannop Valley was mapped. This process focussed on suitable features identified on the 1st Edition OS map and subsequent comparison with the modern OS maps. HER data for the area, supplied by Gloucestershire County Council Archaeology Service, was also consulted at this stage (Appendix A, 3.1.3). A desk-top assessment of the geoarchaeological potential of the area was also undertaken at this time. Although 65 features with the potential for organic remains were identified, only three were assigned a high potential, only six were considered to be of medium potential whilst the remaining 56 (86%) were considered to be of low potential (Appendix A, 4.3, Figs 5 and 6; Appendix 1, Table 2).
- Field validation – The field validation recorded ground conditions at the sites with potential for organic deposits, and identified three sites which were suitable for auguring for both palaeoenvironmental and geoarchaeological samples (Appendix A, 3.2, Fig 3 and Appendix 1).
- Auger sampling – Three auger transects were sampled using a hand held auger (Appendix A, 3.3., Fig 3). These were:
    - Transect 1: Profile across a cut-off meander.
    - Transect 2: Profile across marshy deposits.
    - Transect 3:Single core in the centre of a small bog within a meander loop.

  Transect 1 produced no organic material and no samples were processed. Fragments of iron slag/clinker and coal were, however, recorded in the lower fill of the feature (Appendix A, 4.6; and Auger hole records).

  Five 2cm^3 samples (1 from Transect 3 and four from Transect 2) were, however, processed and the pollen analysed.



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Ordnance Survey 100019134

0 0.25 0.5 1 Kilometres

Figure 50: Cannop Valley, location of palaeoenvironmental assessment auger transects

5.2.1 Discussion

The pollens from Transects 2 and 3 were consistent with a landscape of mixed oak and lime woodland with some areas of open grassland with wet grassland and alder/willow carr on the wetter ground adjacent to the river floodplain, i.e. a landscape similar to that present in 2011. The pollen from Transects 2 and 3 was not accompanied by any datable material, although the pollen from Transect 2 was in a very good condition suggesting that it was of relatively recent origin. In addition the samples from Transect 2 contained very high quantities of microcharcoal which is likely to have originated in the intensive industrial activities such as charcoal burning, iron working and coal mining which are well attested in that part of the Forest of Dean. Transect 3 also produced pollen possibly from the martagon lily (*L. martagon*), a native from central Europe eastwards to northern Asia, Mongolia and Korea (Wikipedia 2011) which was introduced to British gardens by 1596 and first recorded in the wild in 1782. The palaeoenvironmental sampling, therefore would suggest that the sedimentary sequence within the Cannop Valley was largely the result of relatively recent (post-medieval) industrial activity which had produced increased erosion due to woodland clearance and hydrological changes due to water management such as damming (Appendix A 4.3.1).

Accordingly other areas of organic potential identified within the Lyd/Cannop Brook Valley (see 5.2 above) should be considered to be of low potential to produce palaeoenvironmental data contemporary with sites pre-dating the post-medieval period (Appendix A, 6).

The floodplain of the Lyd/Cannop Brook Valley contained sediments which may have some geoarchaeological potential, although, in general, these tended to be less than 1m in thickness which may support the view that they are of relatively recent origin and the result of post-medieval industrial processes. (Appendix A, 5.1)

The assessment concludes that although the valley of the River Lyd/Cannop Brook has low geoarchaeological or palaeoenvironmental potential, this need not indicate that the whole of the Forest of Dean is also of low potential. Although further research of this nature would only be recommended in areas where stream or river valleys have a wider floodplain than that of the River Lyd/Cannop Brook and where the area is less dominated by the remains of post-medieval industry (Appendix A, 6).

6 Characterisation of the heritage resource within Forestry Commission woodland

6.1 Characterisation

Characterisation of the heritage resource within Forestry Commission woodland within the Forest of Dean Archaeological Survey area was undertaken in accordance with the specifications set out in Appendix K in this report. The objective of this task was to review Gloucestershire HER data for heritage assets within Forestry Commission woodland and within 0.25km of its boundaries, sorting it into meaningful categories to inform an overview of that resource and complement the condensed HER data and summary management guidance already supplied to them during earlier stages of the project (Hoyle 2008a, 1.2.1; Appendix B). This data was not intended to be a detailed map of the individual heritage assets, but was intended to provide generalised information which was meaningful at scale of 1:10,000 or above (Hoyle 2010, 4.2).

The following is a summary account of the identified heritage resource in Forestry Commission woodland followed by a brief statement of its management requirements.

6.1.1 Distribution of heritage assets

The distribution of known prehistoric, Roman and medieval heritage assets within Forestry Commission woodland is limited (Figure 51) and the majority are found either just outside the area of woodland, or close to its edges, with few assets identified in the central wooded area. Many ‘sites’ from this period represent scatters of artefacts found in areas of cultivated land adjacent to woodland. These have few implications regarding the management of those areas of woodland, but do indicate areas where archaeological remains from these periods may survive as buried remains within woodland.

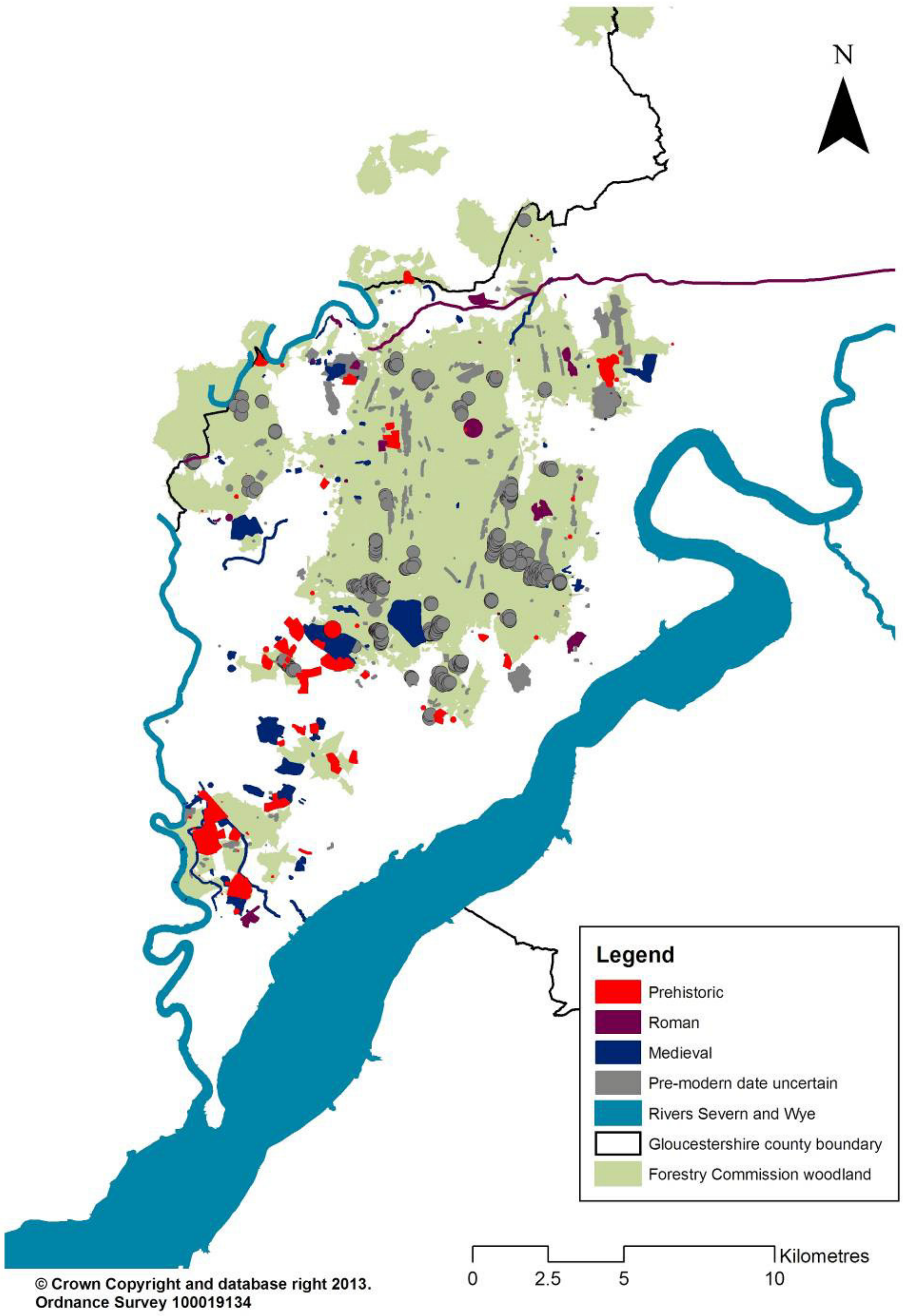

Figure 51: Prehistoric, Roman, medieval and undated pre-modern heritage assets in Forestry Commission land

Remaining dated assets tend to consist of discrete earthwork features of known date, such as the enclosures identified as Roman or prehistoric during the 2011 fieldwork (see above and 4.5 above), or sites, such as Welshbury or Symonds Yat Iron Age hillforts or Offa's Dyke which have been dated on the basis of their form. In addition to the dated earthworks sites, however, a considerable number of undated earthworks have been identified within Forest Commission woodland, which do not relate to any known industrial processes and have the potential to represent significant remains of prehistoric, Roman or medieval date (Figure 51).

The vast majority of heritage assets in Forestry Commission woodland consist of surviving evidence for post-medieval industries, mainly relating to mineral extraction (Figure 52), and undated industrial sites, including extensive areas of surface mining remains and charcoal platforms, which are probably broadly medieval or early post medieval in date (Hoyle 2008a, 4.10.4.2 and 4.10.4.4) (Figure 53). This category also includes scowles, the surface expression of iron ore-rich cave systems in the Crease

Limestones which ring the central Forest of Dean and which have been used as a source of iron ore since at least the Iron Age (Hoyle *et al* 2007, 4.1.6.1; see also Figure 8). The extent to which these can be classified as industrial or natural geomorphological features, or the date at which individual scowles may have been exploited, is not clear, and has been discussed at length in the report on the Scowles and Associated Iron Industry survey which was undertaken as an earlier stage of the Forest of Dean Archaeological Survey (Hoyle *et al* 2007, 4.1).

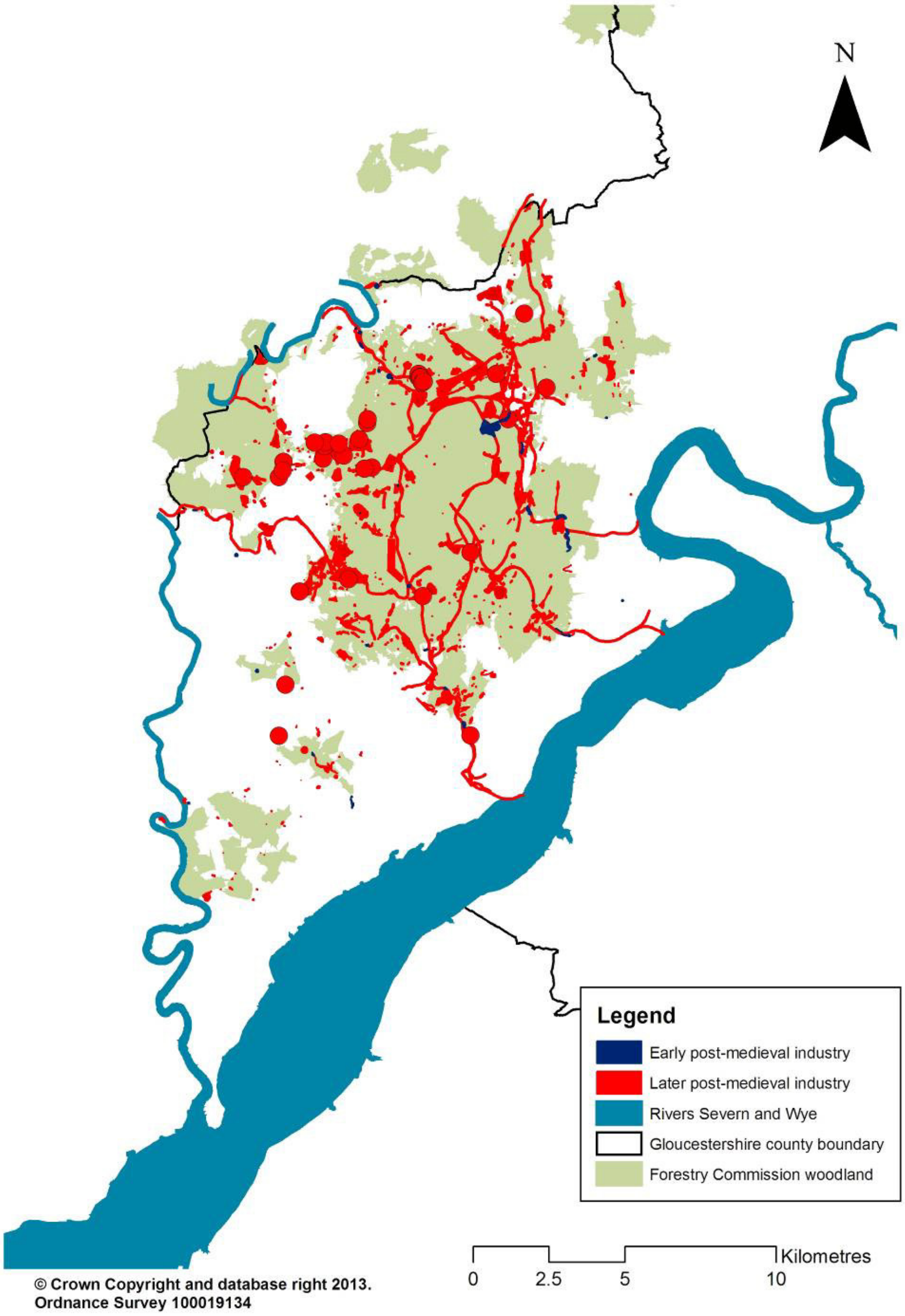

Figure 52: Post-medieval industrial sites in Forestry Commission woodland

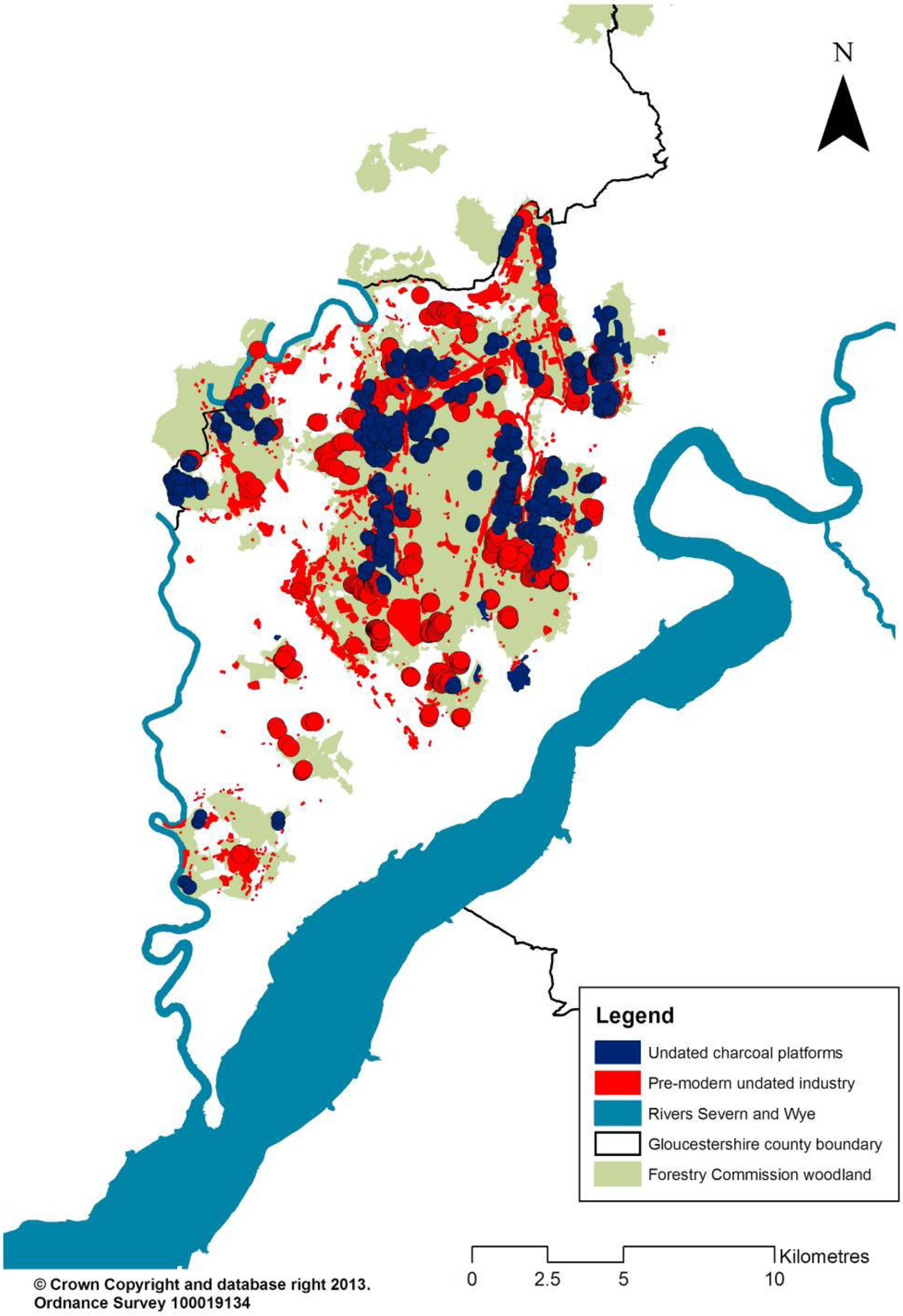

Figure 53: Undated pre-modern industrial heritage assets in Forestry Commission woodland

Industrial heritage assets are found throughout Forestry Commission woodland in Dean and it may not be productive to attempt to categorise these in terms of their distribution. However certain generalised patterns do emerge.

- Few industrial sites within Forestry Commission woodland are known to date to the early post-medieval period (Figure 53), reflecting:
  - The siting of significant dated early post-medieval industrial sites, such as charcoal burning blast furnaces, outside areas of Crown woodland.
  - The fact that the majority of the heritage assets which are likely to be the product of early post-medieval industry, such as the extensive surface remains of shallow mineral extraction, many of which have been identified by lidar (Hoyle *et al* 2007, 2.1.8), remain undated.
- Fewer industrial heritage assets, particularly those known to be of post-medieval date, are recorded in woodland to the southern part of the survey area. This may reflect the actual

distribution as the principal mineral resources exploited during this period, as coal and iron and also sandstone, are found mainly in the central part of the Forest of Dean.

- There are fewer post-medieval and undated industrial sites right in the centre of the main block of woodland which forms the largest area of Forestry Commission woodland, reflecting the location of the principal mineral resources which were exploited at these times.

6.1.2 General guidance for management

6.1.2.1 Identification of management category

The management needs of the heritage assets identified in Forestry Commission woodland are too diverse for all but the most general guidance to be submitted in this report.

All heritage assets have been divided into generalised management categories (Figure 54). These are based on those developed during Stage 1 of the Forest of Dean Archaeological Survey to assist the Forestry Commission with the management of individual heritage assets in their woodland (Hoyle 2008a, 1.2.1; Appendix B).

These are:

- Management category A: this category includes heritage assets of national importance and their settings. Generally these have statutory protection as scheduled monuments or listed buildings (or wider areas which contain these elements) although this category also includes some other archaeological sites, buildings or structures of significant regional importance that may not have statutory protection, including:-
    - Surface evidence of undated iron ore extraction (scowles).
    - Some sections of the monument recorded as Offa’s Dyke, most of which is scheduled.
    - Historic buildings or structures sometimes in isolated locations which may meet the criteria for statutory listing and would be included on local lists of significant buildings.
- Management category B: Heritage assets in this category are not currently considered to be of national importance, but may be characteristic of the local area and be primary evidence for the archaeology and history of the Forest of Dean. This category includes:
    - All structural remains, earthworks or other significant evidence of sites associated with any aspect of the pre-industrial revolution iron or coal industries (with the exception of scowles – see above).
    - Structural remains, earthworks or other evidence of sites dating to the prehistoric, Roman or medieval periods, and sites with a strong likelihood of below ground remains from these periods.
    - Surface evidence of pre-20th century communication routes.
    - Structural remains, earthworks or other significant evidence of sites forming part of post-medieval industrial complexes and sites with a strong likelihood of below ground remains.
    - Historic buildings or structures in isolated locations which may meet the criteria for statutory listing, but which have been missed in the review of listed buildings carried out by central government.
- Management category C: Sites in this category collectively contribute to the historic landscape of the Forest of Dean. Although they have an intrinsic importance, they are individually less significant and are currently thought unlikely to contain significant archaeological remains. These include:
    - Undated or post-medieval stone quarries.
    - Undated or post-medieval mineshafts.
    - Undated or post-medieval lime kilns
    - Undated or post-medieval wells.
    - Undated or post-medieval charcoal burning platforms.
    - Other undated or post-medieval features associated with pre 20th century woodland management (e.g. 19th century Crown Enclosure banks, undated sawpits).
    - Undated or post-medieval marker stones.
    - Undated sites of unknown origin known only from aerial photographic or lidar evidence.
    - Probable sites of pre-20th century communication routes where no surface evidence remains.
- Management category D. This category consists of heritage assets of undetermined significance, although they have the potential to indicate undiscovered remains of archaeological significance. These include:

- Isolated findspots of archaeological material.
- Areas in which archaeological material has been recovered (generally as surface finds), although the precise location or spread of this material is not known.
- Documented sites of any period that cannot be located precisely.
- Place names which may indicate the site of archaeological features.

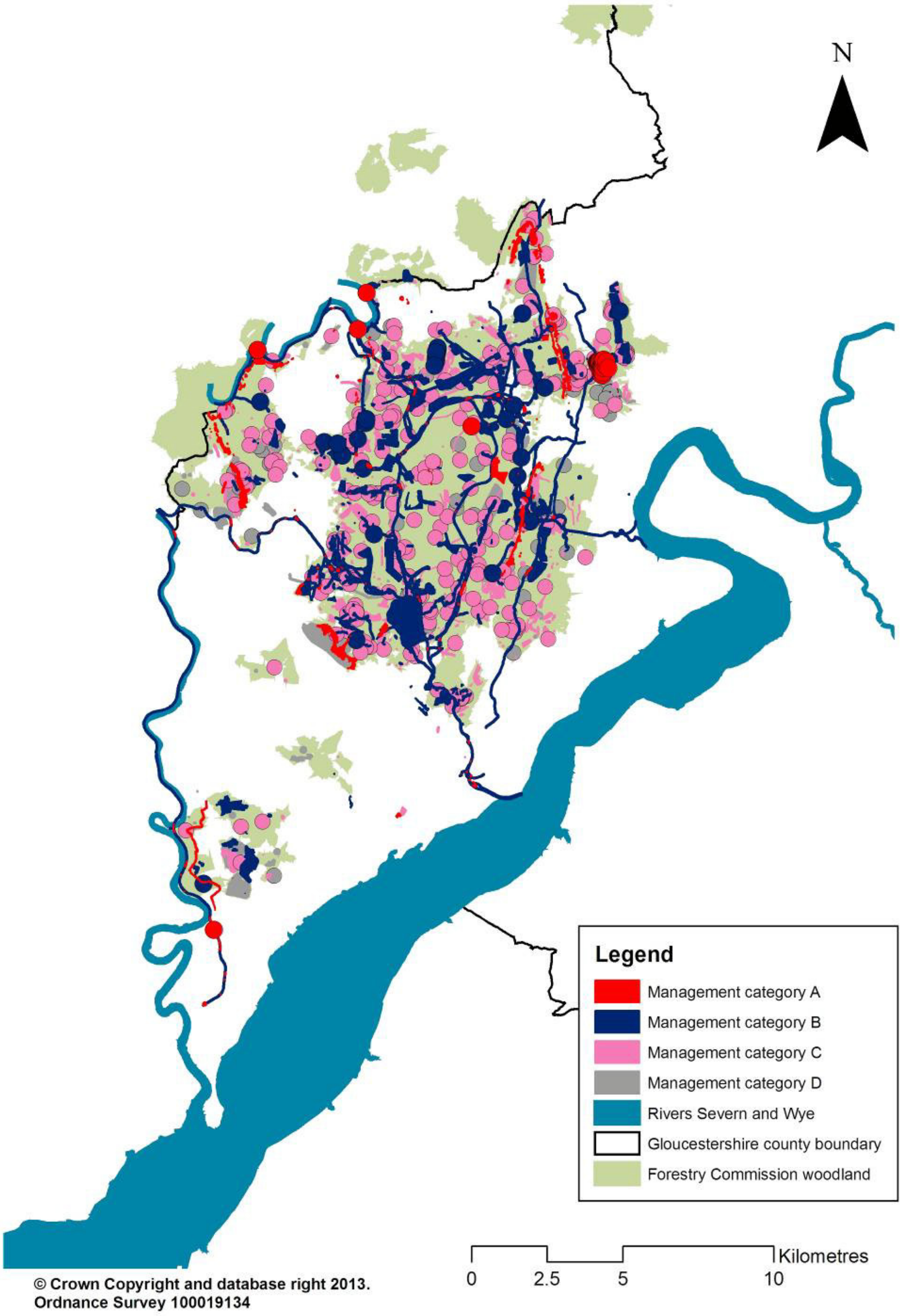

Figure 54: Generalised distribution of heritage assets in Forestry Commission woodland by management category

6.1.2.2 Management guidance by management category

Management category A

There is a presumption against any forestry operations, such as earth moving, clearfelling or new planting, which would damage archaeological sites, buildings or structures in this category.

Scheduled Monument Consent will need to be obtained in advance of any management operations affecting Scheduled Monuments, and Listed Building Consent may be required for works which affect any listed building or structure (or non-listed buildings within their curtilage). All Scheduled monuments in Forestry Commission land are currently covered by a management plan prepared by Gloucestershire County Council Archaeology Service and the management recommendations in these should be followed. English Heritage should also be contacted before any management operations are undertaken on Scheduled Monuments.

Forest of Dean District Council does not currently have a Conservation Officer, so all enquiries about management of these heritage assets should be directed to Gloucestershire County Council in the first instance. Where buildings are listed either Grade I or II* English Heritage should also be consulted.

This management category also includes some other archaeological sites, buildings or structures of national importance that may not have statutory protection (see 6.1.2.1 above). In these instances it is recommended that no management operations should be undertaken without prior consultation with the Gloucestershire County Council Archaeology Service.

Management category B

There is a presumption that heritage assets in this category should be maintained in a stable condition, and protected from potentially damaging operations, although it is recognised that this may not be appropriate in all cases. Gloucestershire County Council Archaeology Service should be consulted where potentially damaging forestry operations cannot be avoided. Some sites in this category may warrant more detailed management statements to inform future management operations.

Management category C

Forestry operations affecting heritage assets in this management category should as far as is reasonably possible be carried out with regard to retaining these features in their present form. Gloucestershire County Council Archaeology Service should be consulted in advance of any management operations which will have a significant impact on heritage assets in this category

Management category D

No restrictions to forestry operations can be applied to areas containing heritage assets in this management category, although Gloucestershire County Council Archaeology Service should be notified if structures, deposits or artefacts are encountered in these areas as a result of any forestry management operations.

Areas with no designated management category

It should be recognised that any inventory of heritage assets can only be an interim statement reflecting the state of knowledge at the time the information is produced.

Areas between known heritage assets should not be regarded as archaeologically sterile, and Gloucestershire County Council Archaeology Service should be notified in the event of any structures, deposits or artefacts being encountered as a result of any forestry management operations.

7 References

Adkins, L. and Adkins, R.A., 1982. *The Handbook of British Archaeology*, Bath.

Barber, A.J. and Holbrook, N., 2000, A Roman Iron-smelting Site at Blakeney, Gloucestershire, Excavations at Millend Lane 1997, *Transactions of the Bristol and Gloucestershire Archaeological Society* 118, 33-6.

B.G.S., 2004, Digital geological data (both Solid and Drift) supplied by the British Geological Survey and incorporated as layers on the Gloucestershire county council GIS.

Bradley, R., 1998, *The significance of monuments, On the shaping of human experience in Neolithic and Bronze Age Europe,* London.

Breeze, D.J., 1974, The Roman Fortlet at Barburgh Mill, Dumfriesshire, *Brittania* 5, 130-162.

Breeze, D.J., 1994. *Roman Forts in Britain*, Shire Archaeology, Haverfordwest.

Breeze, D.J., 1982. *The Northern Frontiers of Roman Britain*, London.

Catchpole, T.C., 2007, Excavations at the Sewage Teatment Works, Dymock, 1995 *Transactions of the Bristol and Gloucestershire Archaeological Society* 125, 137-219.

Cleere, H. and Crossley, D., 1985. *The Iron Industry of the Weald.* Leicester University Press.

Cunliffe, B., 1995, *English Heritage book of Iron Age Britain*, London.

DAG, 2000 A geophysical survey at Rodmore Farm, Dean Archaeology 15, 15-17.

Dark, K., and Dark, P., 1997, *The Landscape of Roman Britain,* Stroud.

Darvill, T., 1987, *Prehistoric Gloucestershire,* Gloucester.

English Heritage, 1988. Monuments Protection Programme Single Monument Class Description: Roman Fortlets: English Heritage, Release June 1988.

English Heritage, 1989. Monuments Protection Programme Single Monument Class Description: Ring Cairns: English Heritage, Release October 1989.

English Heritage, 1990. Monuments Protection Programme Single Monument Class Description: Small Stone Circles: English Heritage, Release February 1990.

English Heritage, 2011a. Prehistoric Barrows and Burial Monuments, Introduction to Heritage Assets, English Heritage May 2011.

English Heritage, 2011b. Field systems, Introduction to Heritage Assets, English Heritage May 2011.

English Heritage, 2011c. Pre-industrial ironworks, Introduction to Heritage Assets, English Heritage May 2011.

Esmonde Cleary, S., 1999, Roman Britain , Civil and Rural Society in Hunter, J., and Ralston, I. (eds.) *The Archaeology of Britain, an introduction from the Upper Palaeolithic to the Industrial Revolution,* London, 157-175.

Evan, E. and Lewis, R., 2003, The Prehistoric Funerary and Ritual Monument Survey of Glamorgan and Gwent: Overviews, Glamorgan and Gwent report for Cadw, GGAT report no. 2003/068, Pdf copy downloaded from http://www.ggat.org.uk/cadw/cadw_reports/pdfs/GGAT%2072%20Overviews.pdf .

Fitchet, M., 1986, Excavation as at Park Farm, Lydney, *The New Regard of the Forest of Dean* 2, 24-28.

Forestry Commission, 2004, Digital information of Forestry Commission woodland cover, received from the Forestry Commission January 2004 and forming a layer within the Gloucestershire County Council Geographic Information System.

Fowler, P.J., 1983 *The Farming of Prehistoric Britain,* 2nd edition, Cambridge.

Fulford, M.G. and Allen, J.R.L., 1992. Iron-making at the Chesters Villa, Woolaston, Gloucestershire. Survey and Excavation 1987-91.*Britannia*, XXIII, 159-215.

Glos HER, 2010. National Mapping Programme information curated by Gloucestershire county Council Archaeology service as digital GIS data as part of the Gloucestershire Historic Environment Record.

GSIA, 2007. Lidar at Oaken Hill, Dean Forest Glos HER 18493, Unpublished note of field visit and lidar validation undertaken by Gloucestershire Society for Industrial Archaeology. Note in GCCAS site file HER 18493.

Gwatkin, G., 1995. Rectified copy of Tidenham Tithe Map (1845) including Lancaut (1839) at scale 1:10,560 (Map no: 82).

Hoyle, J.P., 2007. The Forest of Dean, Gloucestershire, Lidar survey of selected areas of woodland and the Aggregates Resource Area: Forest of Dean Archaeological Survey Stage 3A. Unpublished draft report for English Heritage, March 2007.

Hoyle, J.P., 2008a. The Forest of Dean, Gloucestershire, Stage 1: Desk-based data collection, Project Number 2727, Unpublished report for English Heritage, November 2008.

Hoyle, J.P., 2008. The Forest of Dean, Gloucestershire, Stage 2: Pilot Field Survey, Project Number 2727, Unpublished report for English Heritage, November 2008.

Hoyle, J.P., 2010. The Forest of Dean, Gloucestershire, Forest of Dean Archaeological Survey Stage 3B, Phase 1: Rapid field validation and scoping analysis for characterisation of archaeology in woodland, Project Number 5291 SURV, Unpublished report for English Heritage, August 2010.

Hoyle, J.P., 2011a. The Forest of Dean, Gloucestershire, Stage 3B, Phase 2: Survey for management of lidar-detected earthworks in Forestry Commission woodland: Updated Project Design for Phase 2 (v 03), Project Number 5291 SURV, Unpublished project design for English Heritage, January 2011.

Hoyle, J.P., 2011b. The Forest of Dean, Gloucestershire, Stage 3B, Phase 2: Survey for management of lidar-detected earthworks in Forestry Commission woodland, Project Number 5291REC, Proposal for project variation (v 01) submitted to English Heritage, March 2011.

Hoyle, J.P., 2011c. The Forest of Dean, Gloucestershire, Stage 3B, Phase 2: Survey for management of lidar-detected earthworks in Forestry Commission woodland, Project Number 5291SURV, Project Report Volume 1: Methodology, Results, and Discussion (v 02), Unpublished project report for English Heritage, January 2011.

Hoyle, J.P., Butler L., Tait G., and Wootton D., 2007. The Forest of Dean Gloucestershire, The Scowles and Associated Iron Industry Survey: Project Number 3342, Unpublished report for English Heritage, March 2007.

Jackson, R., 2012, *Ariconium, Herefordshire an Iron Age settlement and Romano-British "small town",* Oxbow, Oxford.

Jones, E.M., 2006, Monuments and memories Set in Stone; a Cornish Bronze Age Ceremonial Complex in its Landscape (on Stanton Down). *Proceedings of the Prehistoric Society*, 72, 341-365.

Lelong, O., and Pollard, T., 1998, Excavation of a bronze Age Ring Cairn at Cloburn Quarry, Cairngryffe, Lanarkshire, *Proceedings of the Society of Antiquaries Scotland,* 128, 105-142.

L.U.A.U., 1998. M.P.P. Iron and Steel Industries Step 3. Introduction to site assessments. Unpublished report for English Heritage Monuments Protection Programme. October 1998.

Lynch, F., 1979a, Ring Cairns of Britain and Ireland: their design and purpose*, Ulster Journal of Archaeology,* Vol 42, 1-19.

Lynch, F., 1979b, Ring Cairns and related monuments in Wales*, Scottish Archaeological Forum*, 4, 61-80.

McOmish, D.S., and Smith, N.A., 1996, Welshbury Hillfort: A new survey by the Royal Commission on the Historical Monuments of England, *Transactions of the Bristol and Gloucestershire Archaeological Society 94, 55-64.*

OS, 1880. Digital facsimile of Ordnance Survey 1st Series 25" map dated to *c.* 1880 and forming a layer within the Gloucestershire County Council Geographic Information System.

OS, 1925. Digital facsimile of Ordnance Survey 3rd Series 25" map dated to *c.* 1925 and forming a layer within the Gloucestershire County Council Geographic Information System.

Riley, D.N., 1980, *Early Landscapes from the Air, Studies in Crop marks in south Yorkshire & North Nottinghamshire,* University of Sheffield.

Scott-Garret, C., 1956, Romano-British sites at Chestnuts Hill and Popes' Hill, *Transactions of the Bristol and Gloucestershire Archaeological Society* 75, 199-202.

Sim, D. and Ridge, I., 2002. *Iron for the Eagles.* The iron industry of Roman Britain. Stroud.

Sindrey, G., 1990, Roman Dean, The Forest of Dean in the Roman Period, Dean Archaeological Group Occasional Paper No. 1.

Salway, P., 1993, *The Oxford illustrated history of Roman Britain,* QPD edition, Oxford University Press.

Smith, N., 1999. The earthwork remains of enclosure in the New Forest, *Proceedings of the Hampshire Field Club Archaeological Society* 54, 1-56.

Walters, B., 1987, Excavation of Romano-British iron-smelting shaft furnace at Barnfield, Eastbach Court, SO5939515161, Easter 1987, *The New Regard of the Forest of D*ean, 3, 50-53.

Walters, B., 1992, *The Forest of Dean Iron Industry*, Dean Archaeological Group Occasional Publication No.4.

Wheeler, R.E.M. and Wheeler, T.V., 1932, Report on the Excavation of the Prehistoric, Roman, and post-Roman Site in Lydney Park, Gloucestershire. Reports of the Research Committee of the Society of Antiquities in London IX Oxford.

Wikipedia, 2011, *Lilium martagon* in Wikipedia web-based encyclopedia 17/09/2011, http://en.wikipedia.org/wiki/Lilium_martagon.

Young T., pers. comm. Email correspondence between J Hoyle of Gloucestershire County Council Archaeology Service and Dr T Young of Geoarch consultancy.

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9 Abbreviations used in the text

AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AP	Aerial Photograph
BGS	British Geological Survey
C14	Carbon 14
cm	Centimetre
DAG	Dean Archaeology Group
DSM	Digital surface model
DTM	Digital terrain model
EH	English Heritage
EDM	Electronic Distance Measurer
EN	English Nature
GCC	Gloucestershire County Council
GCCAS	Gloucestershire County Council, Archaeology Service
GCRO	Gloucestershire County Records Office
GIS	Geographic Information System
Glos HER	Gloucestershire County Council, Historic Environment Record
GSIA	Gloucestershire Society for Industrial Archaeology
GPS	Global Positioning System
GWT	Gloucestershire Wildlife Trust
Ha	Hectare
HEEP	Historic Environment Enabling Programme
km	Kilometre
Lidar	Light Detection and Ranging
m	Metre
NHPP	National Heritage Protection Programme

NMP	National Mapping Programme
OS	Ordnance Survey
OSL	Optically Stimulated Luminescence
PRO	Public Record Office
RCZA	Rapid Coastal Zone Assessment
SM	Scheduled Monument
SMC	Scheduled Monument Consent
HER	Historic Environment Record (Gloucestershire)
SSSI	Site of Special; Scientific Interest
TBGAS	Transactions of the Bristol and Gloucestershire Archaeological Society

Forest of Dean Archaeological Survey Stage 3B

Survey for management of lidar-detected earthworks in Forestry Commission woodland

Project Number 5291 REC

Phase 2: Field evaluation of selected lidar-detected earthworks and characterisation of archaeology in Forestry Commission woodland

Project Report Volume 2: Appendices A - D

Jon Hoyle
Gloucestershire County Council
Archaeology Service

June 2013

Appendix A **Palaeoenvironmental report**

PALAEOENVIRONMENTAL ASSESSMENT OF CANNOP BROOK, FOREST OF DEAN

Elizabeth Pearson, Nick Daffern and Keith Wilkinson

15 June 2012

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Palaeoenvironmental assessment of Cannop Brook, Forest of Dean

Elizabeth Pearson, Nick Daffern and Keith Wilkinson

1 Introduction

A palaeoenvironmental assessment of an area centred on the Cannop Brook valley (NGR SO 6096112456) in the Forest of Dean, Gloucestershire, was undertaken by Worcestershire Archaeology (WA) on behalf of the Archaeology Service of Gloucestershire County Council (GCC). The focus of the assessment was to determine the potential of the project area for palaeoenvironmental study of organic deposits which can provide evidence of historic land-use.

Archaeological projects frequently include an analysis of organic remains from waterlogged deposits where they are encountered in order to recover information on past environments. For example, these deposits typically include layers of peat or organic clays which are relict marsh deposits, pond or palaeochannel fills. Some of these features are visible on maps, aerial photographs and lidar images. GIS mapping of features in which these deposits may survive was, therefore, undertaken for an area centred on the Cannop Brook valley (Phase 1a; Fig 1). This information was intended to enhance the Historic Environment Record (HER) for Gloucestershire, as the mapping of the widespread distribution of such features across large areas can be used as an aid to designing palaeoenvironmental research projects, and also as a tool to aid management of the archaeological resource, in addition to more piecemeal recovery through excavation. A geoarchaeological assessment was also undertaken as part of this phase. The mapping was followed by validation of selected mapped features by walk-over survey (Phase 1b) and by augering in association with pollen analysis (Phase 1c).

As an additional piece of work Worcestershire Archaeology was asked to assess bulk samples taken from trenches excavated by GCC across linear and rectilinear boundaries identified through lidar mapping in the Sallowvallets area, and an enclosure ditch in the Ruardean Woodside area (Phase 2).

2 Objectives

In particular the assessment had the following objectives:

- the mapping of the distribution of potentially organic deposits using map based GIS survey
- the assessment of the potential of each deposit (potential for good preservation of organics and accessibility) through the GIS survey
- the validation of the mapping by walk-over survey of a small selected area and the testing of the preservation of organic remains from selected deposits using augering
- the analysis of samples from excavation trenches in order to contribute towards interpretation of earthworks identified through lidar mapping.

3 Methods

3.1 Phase 1a GIS Mapping and geoarchaeological assessment

3.1.1 Documentary search

Prior to work commencing a search was made of the Historic Environment Record (HER). Data was used in the form of GIS layers, provided by the client, who also kindly supplied a HER report.

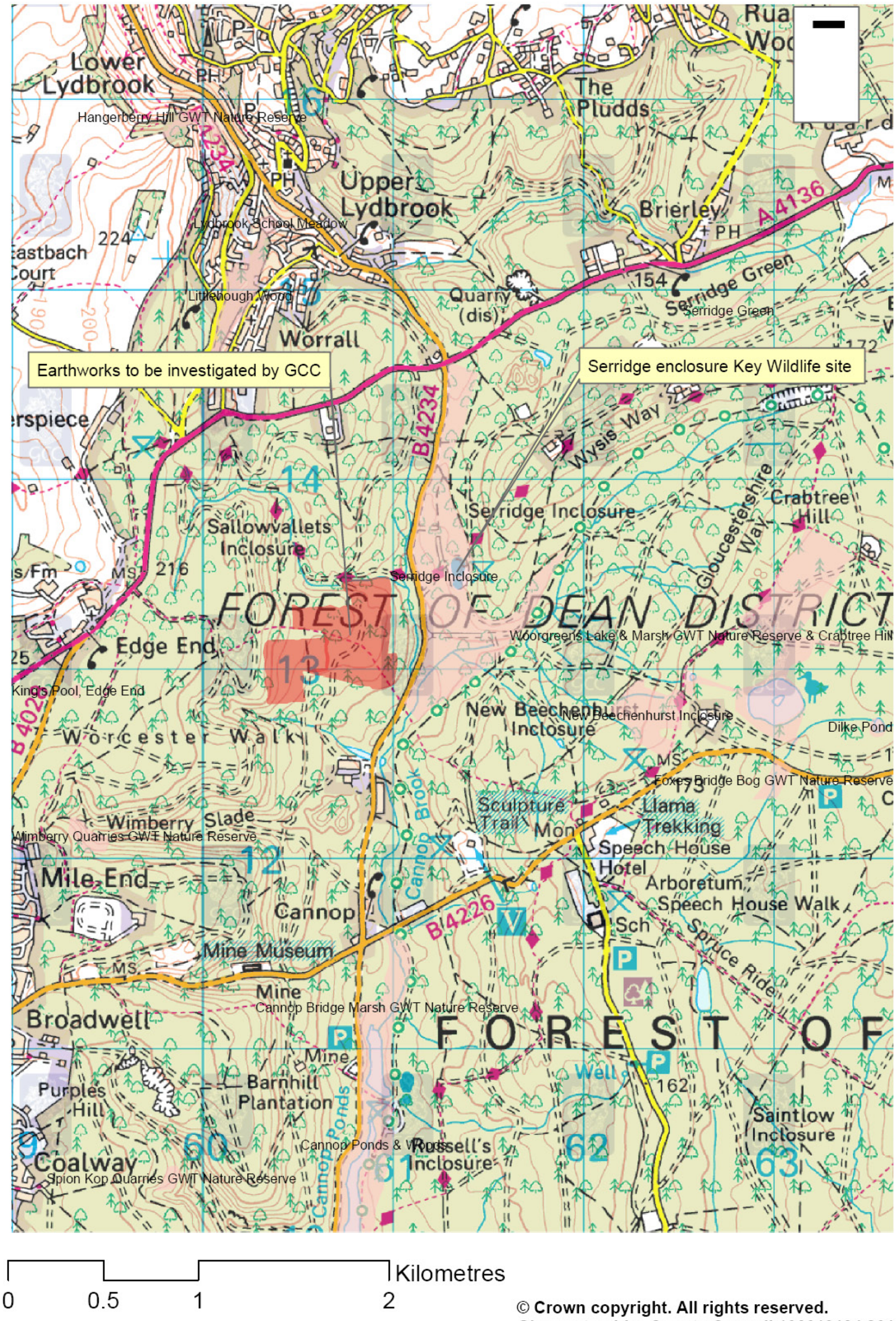

Figure 1 Project area

3.1.2 Geoarchaeology

WA supplied ARCA (University of Winchester) with Ordnance Survey mapping and processed lidar data in the form of geo-referenced raster interpolations (in jpeg format). These data were used as the basis for a GIS project within the software package ArcGIS 9.3. Topographic data were used together with geological data available from the British Geological Survey website (BGS 2011; Fig 2) to provide an initial interpretation of the geoarchaeological potential of the study area and to walk a sample section of the Cannop Brook to search for potential coring locations. Subsequently WA provided ARCA with the results of their gouge and Russian auger survey conducted at three locations within the Cannop valley (Fig 3). This report has been prepared using data from the initial desktop study, the visit to the study area, and the results of the WA borehole study.

3.1.3 Mapping

Methodology was based upon map-based approaches developed by the WA environmental team on three study areas within Worcestershire (Appendix 1).

The focus of this work lay in identifying features visible on 1st edition OS maps which may contain organic deposits and have potential for palaeoenvironmental reconstruction. Aerial photographs also provided additional information.

The following were digitally mapped as a separate layer within the GIS:

- peat bog, reed swamp;
- osier beds;
- ponds;
- meander loop (a pronounced stream or river meander)
- meander movement (where a meander appears to have moved potentially leaving behind relict marsh deposits)
- visible former channel alignments (on aerial photographs).

Palaeochannel features were re-mapped following assessment (Pearson *et al* 2012) to discount features mapped where a distinct watercourse of over 5m width was not visible on lidar and hence may not be a significant feature.

An assessment was also made of the potential of these deposits for organic survival based upon estimated size on the 1st Edition OS map and any apparent change in the waterlogged state of the feature on modern OS maps, such as drying out or silting up. Secondly, accessibility was scored, based upon the extent to which the feature was presently covered by development such as buildings, tarmac or trees. Features were 'flagged' where there was archaeological or historical information available through the HER, which was of direct relevance. This did not, however, affect the scoring as this was intended to be a first stage of assessment, irrespective of the likely date of the features. See Appendix 1 for further detail on assessment methods.

3.2 Phase 1b Validation of mapped features by walk-over survey

Fieldwork strategy

Preliminary validation of mapped features consisted of a walk-over to view features in an area approximately centrally placed within the project area, from the excavation trenches at the County Council Cannop Depot to the marsh at Cannop Ponds. Notes were made at each site on a validation recording sheet (AS47). The validation data recorded on forms has been transferred to a Microsoft Access database. Based on these data, sites with potential for validation by augering were then selected.

3.3 Phase 1c Auger sampling and pollen analysis

3.3.1 Sampling strategy

Following preliminary validation the following auger sampling was undertaken (see Fig 3):

- Transect 1: a profile across a feature thought to be a cut-off meander was undertaken using a Dutch auger
- Transect 2: a profile across marshy deposits within the Cannop Brook valley using a Russian auger
- Transect 3: a singe core was taken using a gouge auger in the centre of a small bog feature within a large meander loop

3.3.2 Palynological remains

Eight 2cm^3 samples in total were recovered for assessment and full analysis of palynological remains (Appendix 2, Table 1). The first was from Borehole 1 of Transect 3 whilst the remaining seven were from Borehole 6 from Transect 2. The samples were submitted to the laboratories of the Department of Geography and Environment at the University of Aberdeen for chemical preparation following standard procedures as described by Barber (1976) and Moore *et al* (1991). The full methodology is described in Appendix 2.

Where preservation allowed, pollen grains were counted to a total of 150 total land pollen grains (TLP) for assessment purposes, and 300 TLP grains for full analysis, using a GS binocular polarising microscope at x400 magnification. Full analysis, with counts up to 300 grains, could only be carried out from Transect 2, Borehole 6 from depths 2.65m and 2.78m, where pollen concentrations where sufficient. Identification was aided by using the pollen reference slide collection maintained by the WA, and the pollen reference manual by Moore *et al* (1991). Nomenclature for pollen follows Stace (2010) and Bennett (1994).

3.4 Phase 2 Assessment of samples from excavation trenches

3.4.1 Fieldwork and sampling strategy

During the project the Service was also asked to advise on the sampling of excavation trenches, excavated by GCC at the County Council Depot near Wimberry Bottom (Fig 1, where area blocked in red).

Trench GHER 37921 – no deposits were considered suitable for environmental sampling.

Trench GHER 37920 – Samples of 40 litres were taken from fills of possible bloomery slag associated with Roman pottery in order to recover slag waste. Potential for environmental analysis was expected to be limited as it was not visibly charcoal-rich during excavation, although any charcoal recovered suitable for radiocarbon dating and other identifiable charred plant remains was retained. Radiocarbon dating of charcoal associated with this iron-working activity (Jon Hoyle, pers comm) is probably most reliably dated by the later of the two fragments of charcoal incorporated within context (116), dating to cal AD 20–135 (95% probability), and to cal AD 60–120 (68% probability); OxA-25373. A further 40 litre sample was taken from the underlying colluvium for comparison to determine if industrial residues were widely distributed in the soils in this area prior to the dumping of possible bloomery slag. Baysian analysis of luminescence and radiocarbon dating results suggests that the earthwork system was laid out in 940–260 cal BC (95% probability), and in 580–385 cal BC (68% probability). Two samples were selected for analysis: from GHER 37920 context 116 (a fill containing possible bloomery slag), and context 107.

An analysis of environmental remains was also undertaken from an archaeological excavation undertaken at Ruardean Woodside, Forest of Dean, Gloucestershire (NGR 363673 216412; GHER 37923) to investigate an archaeological feature identified through lidar survey. This revealed a sub-rectangular enclosure, the upper fills of which were dated by pottery (which included briquetage). The upper layers are likely to represent backfilling, the fill possibly including re-deposited bank material and turves. One sample of 40 litres was taken from the basal fill (917) which appeared to represent primary silting, and this was fully investigated for the presence of macrofossil and artefactual remains. Provisional interpretation is that the enclosure was a 1st century AD Roman military installation (Jon Hoyle, pers comm).

3.4.2 Geoarchaeological assessment

The stratigraphy of two trenches excavated through field system boundaries (Fig 1) by GCC were also examined by Liz Pearson (WA).

3.4.3 Method of analysis

All three samples of 40 litres were processed by flotation using a Siraf tank. The flot was collected on a 300µm sieve and the residue retained on a 1mm mesh. This allows for the recovery of items such as small animal bones, molluscs and seeds.

The residues were fully sorted by eye for industrial residues, other artefacts and charcoal to >4mm size, and the abundance of each category of artefactual remains estimated. The flots were fully sorted using a low power MEIJI stereo light microscope and plant remains identified using modern reference collections maintained by WA, and a seed identification manual (Cappers *et al* 2006). Nomenclature for the plant remains follows the *New Flora of the British Isles*, 3rd edition (Stace 2010). A magnet was used to test for the presence of hammerscale.

The cell structure of up to 100 charcoal fragments (>4mm size) per sample was examined in three planes under a high power microscope, and identifications were carried out using reference texts (Schweingruber 1978; Brazier and Franklin 1961; and Hather 2000), and reference slides housed at the WA office.

4 Results

4.1 Phase 1a GIS Mapping and geoarchaeological assessment

4.1.1 Introduction

A desktop survey was carried out to determine the geoarchaeological potential of a study area of the Cannop stream valley in the Forest of Dean, Gloucestershire. The geoarchaeological works were commissioned by WA on behalf of GCC, and this part of the project was funded as part of a Historic Environment Enabling Programme (HEEP) grant from English Heritage. The purpose of the desktop survey was to locate areas of high geoarchaeological potential within the study area.

4.1.2 Geography and geology of the study area

The study area is a 4.8km (north-south) by 2.0km section of the upper Cannop Valley in the central Forest of Dean (centred on NGR SO 6096112456; Fig 1). The central part of the study area is occupied by the north–south flowing Cannop Brook, a second order north bank tributary of the River Severn. First order streams feeding the Cannop Brook rise within the study area, both within the Sallowvallets inclosure (e.g. the Ropehouse Ditch) and 400m to the south of the A4136-B4234 junction (Fig 1). The Cannop Brook sits within a single sinuous channel in a 100m deep valley that has been cut in the surrounding Carboniferous rock. The floodplain is of *c* 20m width over the majority of the study area transect, although the construction of weirs at Folder's

Green and Upper Whitlea Green has flooded the entire floodplain to form the Cannop Ponds (Fig 1).

The British Geological Survey (BGS) maps four bedrock units within the study area (Fig 2) as follows:

- the Cinderford Member of the Grovesend Formation outcropping across most of the eastern part of the study area, i.e. the eastern flanks of the Cannop valley and the high ground to the east;
- the Coleford Member of the Pennant Sandstone Formation outcropping west of the Cannop river and found over most of the western part of the study area;
- the Trenchard Formation as isolated outcrops in the western part of the study area, and;
- the Cromhall Sandstone Formation in the extreme north-west corner of the study area.

The BGS *Lexicon of named rock units* (BGS 2011) states that all four bedrock units within the study area were deposited during the Carboniferous period, and all except parts of the Cromhall Sandstone Formation are terriginous. The Cinderford and Coleford Members, and the Trenchard Formation formed during the Stephanian-Westphalian D interval (290.0-308.5 my BP) and the Cromhall Sandstone Formation during the Arundian and Brigantian (327.0-340.6my BP). Nevertheless the rocks become progressively older from east to west. The Cromhall Sandstone Formation is comprised of cycles of grey and red coarse-grained sandstones, mudstones and limestones, and is unconformably overlain by the Trenchard Formation. The latter is a grey and pink quartzitic sandstone with beds of conglomerate. The Coleford Member lies conformably above the Trenchard Formation and is comprised of grey sandstones interbedded with grey and green mudstones and coal. The Cinderford Member is the youngest Carboniferous unit both in the study area and the Forest of Dean as a whole. It conformably overlies the Coleford Member and comprises grey mudstone and siltstones with occasional lenses of sandstone and coal, its thickest outcrop occurring in the Forest of Dean where 300m of deposits have been recorded.

Two Quaternary units are mapped in the study area, namely alluvium and head, both of which outcrop within the Cannop valley itself (Fig 2). ‘Alluvium’ is a catch-all term including all Holocene deposits forming as a result of fluvial processes, but in the case of the present study area ‘alluvium’ has formed in the channel and floodplain zones of the Cannop Brook south of Wimberry Bottom. ‘Head’ is used by the BGS to define deposits forming as a result of colluvial processes during the Quaternary. In the present case colluvium is likely to have resulted from periglacial solifluction (freeze thaw), and from soil erosion as the result of cultivation. Head deposits outcrop in tributary valleys of the Cannop Brook and on the slopes of Cannop Brook itself.

All rocks within the Cannop Brook watershed are neutral to acidic, and, despite being predominantly sandstone, the bedrock is not overly porous.

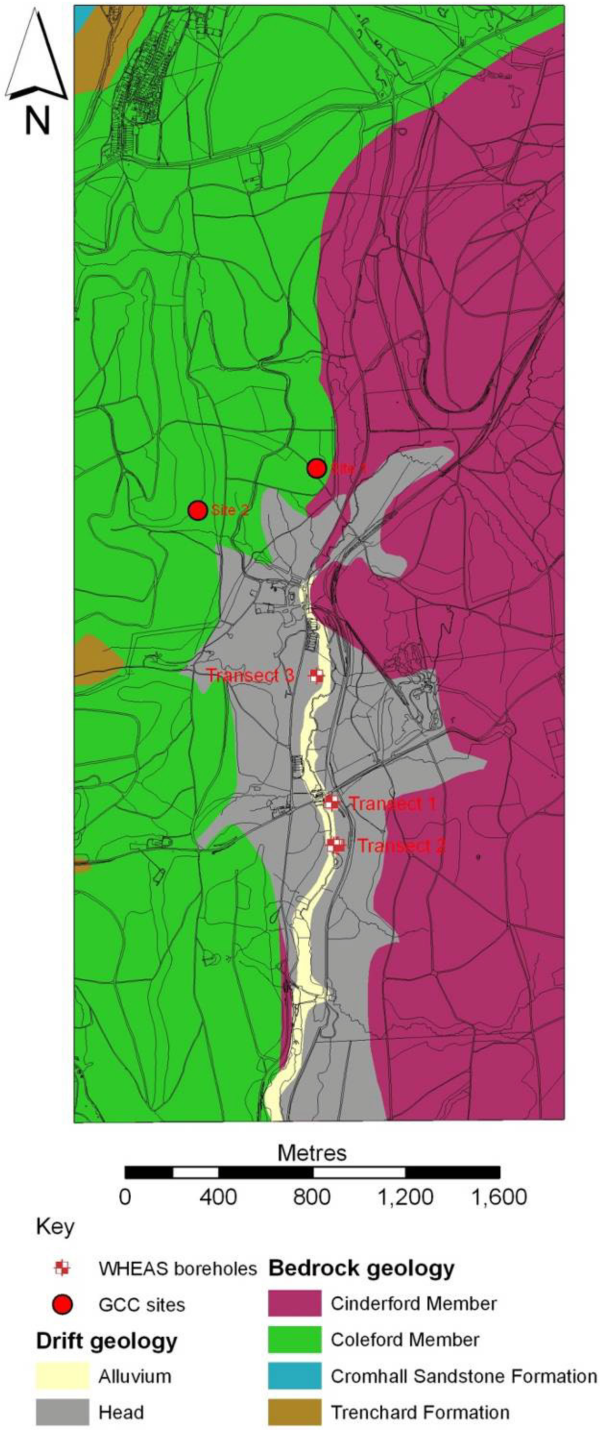

Figure 2: Geological map of the Cannop valley study area plotted from BGS mapping

4.1.3 Survey and borehole studies

The walk-over survey of 23 February 2011 focussed on the Cannop Brook floodplain between Wimberry Bottom and Folders Green. As previously noted a sinuous *c* 5m wide channel winds its way through the *c* 20m wide floodplain north of Cannop Bridge, but south of that location the floodplain expands to a width of *c* 75m. The wider floodplain south of Cannop Bridge is almost certainly a direct result of flooding caused by the construction of the weirs at Folder's Green and Upper Whitlea Green, and may, therefore, be a relatively recent phenomenon. North of Cannop Bridge the floodplain contains relict and semi-relict features such as oxbow lakes and chute channels, but south of the bridge Cannop Ponds obscure any such features that may have once existed.

WA drilled a single borehole through a small bog feature 140m south-east of Cannop Villas (Transect 3), and recovered *c* 0.65m of predominantly mineral silt/clay overlying impenetrable strata (Figs 2 and 3).

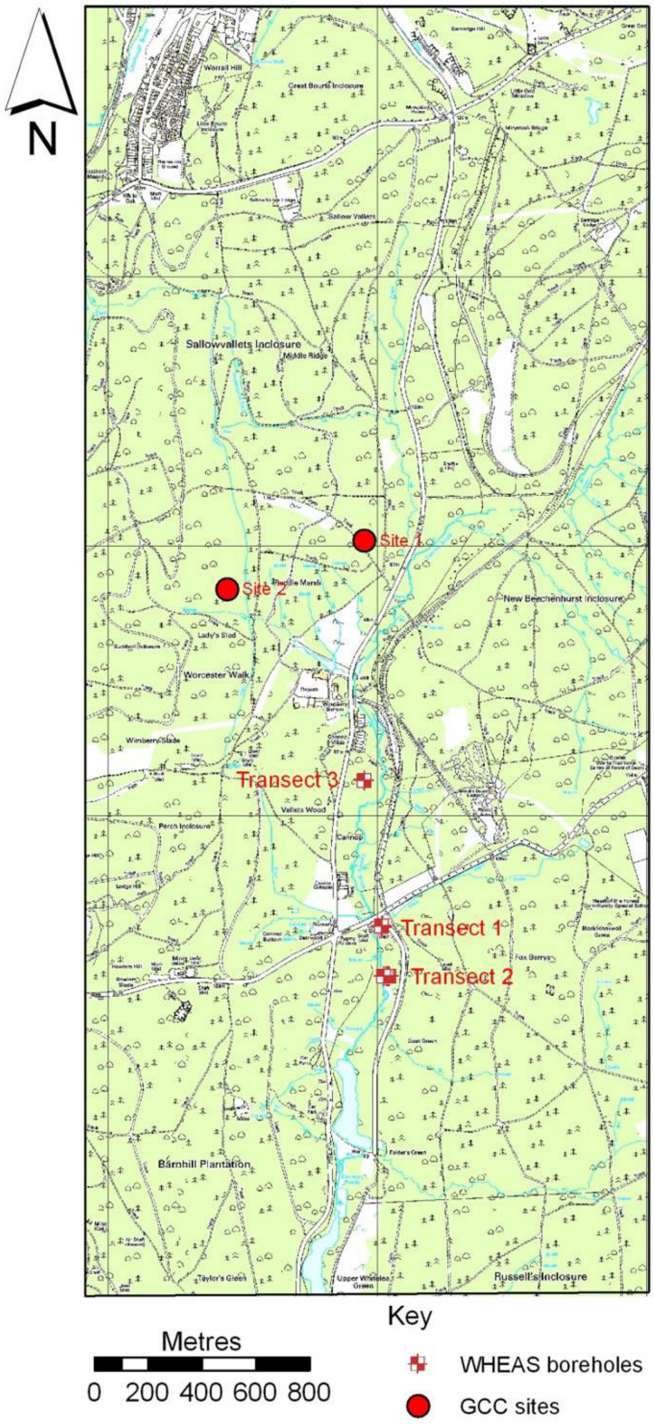

Figure 3: The Cannop valley study area plotted against the Ordnance Survey 1:10,000 map and showing the location of GCC trenches and WA boreholes

WA drilled two further borehole transects south of Cannop Bridge (Figs 2–3). Transect 1 was focussed on a channel-like feature originally thought to be a possible Pleistocene/Early Holocene palaeochannel, but which was later identified to be part of disused railway line! Transect 2 comprised six boreholes drilled across the eastern part of the Cannop Brook floodplain approximately 200m south of Cannop Bridge (Fig 4). Stratigraphy identified in these boreholes demonstrates that the thickness of sediment above the Cinderford Member bedrock increases from 0.05m in easternmost borehole (BH1) to 2.95m in the westernmost (BH6; Fig 4). In the latter location units of bedded silts and sands containing variable quantities of organic material were recovered. Palynological samples from these deposits are currently being studied by WA.

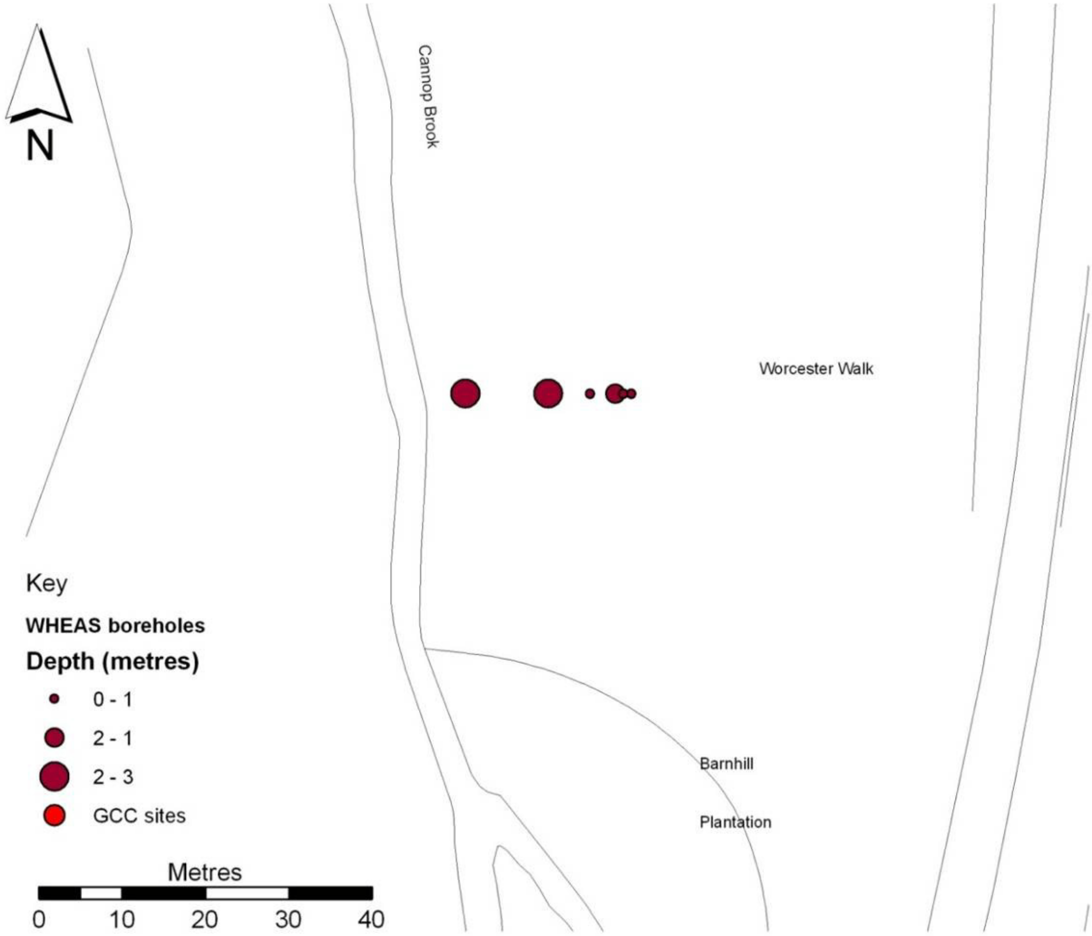

Figure 4: Location of boreholes in Transect 2 (200m south of Cannop Bridge) plotted against OS mapping

4.1.4 Documentary evidence

The valley has been much affected by the building of the Howler's Slade Tramroad Branch of the Severn and Wye Railway (5701/40-49), begun in 1811, particularly around Cannop village where it served a chemical works (GHER 19834). There are also many old coal workings, mainly of 19th century date, which may have created some of the pond features mapped (Section 5.2).

Cannop Ponds, which are large features mapped as being of high potential for palaeoenvironmental work, were created to supply Parkend Furnace (GHER 5839) in the 19th century. Marshy deposits surround the northern pond on the north and south sides. Before validation and augering it was assumed that the creation of the ponds would have resulted in a build-up of these marsh deposits, but it was uncertain whether earlier relict marsh deposits may survive in the valley at depth and at the base of the ponds.

A total of 19 charcoal burning platforms have been identified (GHER Area 28155). These are currently undated but could be of medieval or post-medieval date. As previous sampling of one of these platforms has shown survival of identifiable charcoal (Jon Hoyle, pers comm), sampling of this type of feature may provide information on the timber resources used for charcoal production, as well as provide charcoal for radiocarbon dating.

4.1.5 GIS Mapping

A total of 44 features of potential for palaeoenvironmental study were mapped (Appendix 1, Table 2).

High potential features

Only three features of high potential (Features 41, 43 and 45) were mapped which included two large ponds and an area of marsh. The ponds, known as Cannop Ponds (Fig 5; Plate 1), were formed in the 19th century to supply Park End Furnace and may have been created in a previously marshy valley. Feature 43 is an area of valley marsh (Fig 6; Plate 2), and its potential was recorded as high on account of the large size of the features and because they are open and accessible. A possible modern date has been noted on the GIS attribute table for all three features but this has not affected the scoring of potential, as this is intended to be irrespective of date.

Medium potential features

Six features of medium potential included three ponds (Features 29, 32 and 42), a long palaeochannel leading into Cannop Ponds (Feature 47), an osier bed (Feature 50) and a pronounced meander loop (Feature 60). These were medium-sized, open and accessible features, with the exception of the osier and the meander loop. The osier bed was of large surface area, but is located on private land within a nursery; the extent of its survival today is unmapped. It is most likely previously to have been made up of reeds or willow (which in the past would have been harvested for various uses), and hence any organic deposits that built up would be affected by root vegetation. The meander loop was also of large size but mostly wooded.

Low potential features

The majority of features fell into the category of low potential, mostly on account of their small surface area, and, in many cases, because they are located within wooded areas and appear from the OS mapping and aerial photographs to have been affected by tree growth. Many were stream channels (palaeochannels) which are visible on 1st edition OS maps (but not on modern maps), and where there has been movement and abandonment of watercourse meanders, within which organic deposits may survive.

4.2 Phase 1b Validation of mapped features by walk-over survey

Walk-over (for a summary of results see Table 1)

A walk-over was conducted on 23 February 2011 to view features and terrain close to the road leading from the Gloucestershire County Council Cannop Highways Depot south towards the marsh in the centre of Cannop Ponds (Feature 43). Forestry Commission woodland extends all along both sides of the road (B4234) from the Cannop Highways depot, near Wimberry Bottom, to Cannop village (Fig 6). Where mapped features were scored as being of high and medium potential, validation generally corroborated this assessment, where the probability of well preserved organic deposits surviving was concerned. The effect that date may have on their potential is discussed in Section 5 below.

Many of the features are scored as being of low potential on account of their small size and low certainty that organic deposits would be present. This is particularly the case for palaeochannel features which are mostly present as streams on 1st edition OS maps but not on modern OS mapping in this project area. These features have been mapped for other areas in Worcestershire because active but small watercourses have sometimes been found where excavation has revealed beneath a deep, buried palaeochannel sequence of some antiquity. However, in this environment the watercourses are narrow and the likelihood of such sequences being present is very low. For this reason palaeochannel features have been re-assessed and some removed from the GIS (i.e. smaller features which are not very marked on lidar images). Although not shown on modern OS maps validation showed that some palaeochannels were still active streams, and this was the case for Feature 25 (Plate 4), although boggy areas were noted along its length (Plate 5) which lie within a large mapped meander loop (Feature 60). Features 33 and 37 were thought not to be active at the time of validation (respectively; a channel leading into pond at Cannop Bottom (Plate 6) and a channel leading into Feature 50, an osier bed).

The extensive tree-cover makes it difficult to assess 'coverage' at the initial stage of mapping. Features can appear to be totally tree-covered on aerial photographs, which is rarely the case, so, where they are located in wooded areas, an assumption has been made they are likely to be partially covered by woodland vegetation. This has generally been borne out by the validation.

A large area around Cannop village and north of Cannop Ponds was marked as rough grassland on the 1st Edition map. Only discreet waterlogged organic deposits were assumed to exist here at the mapping stage but validation showed the presence of dark peaty soils; on the approach to Cannop Ponds, where damp grassland appears to have developed on previously boggy ground (Plate 7).

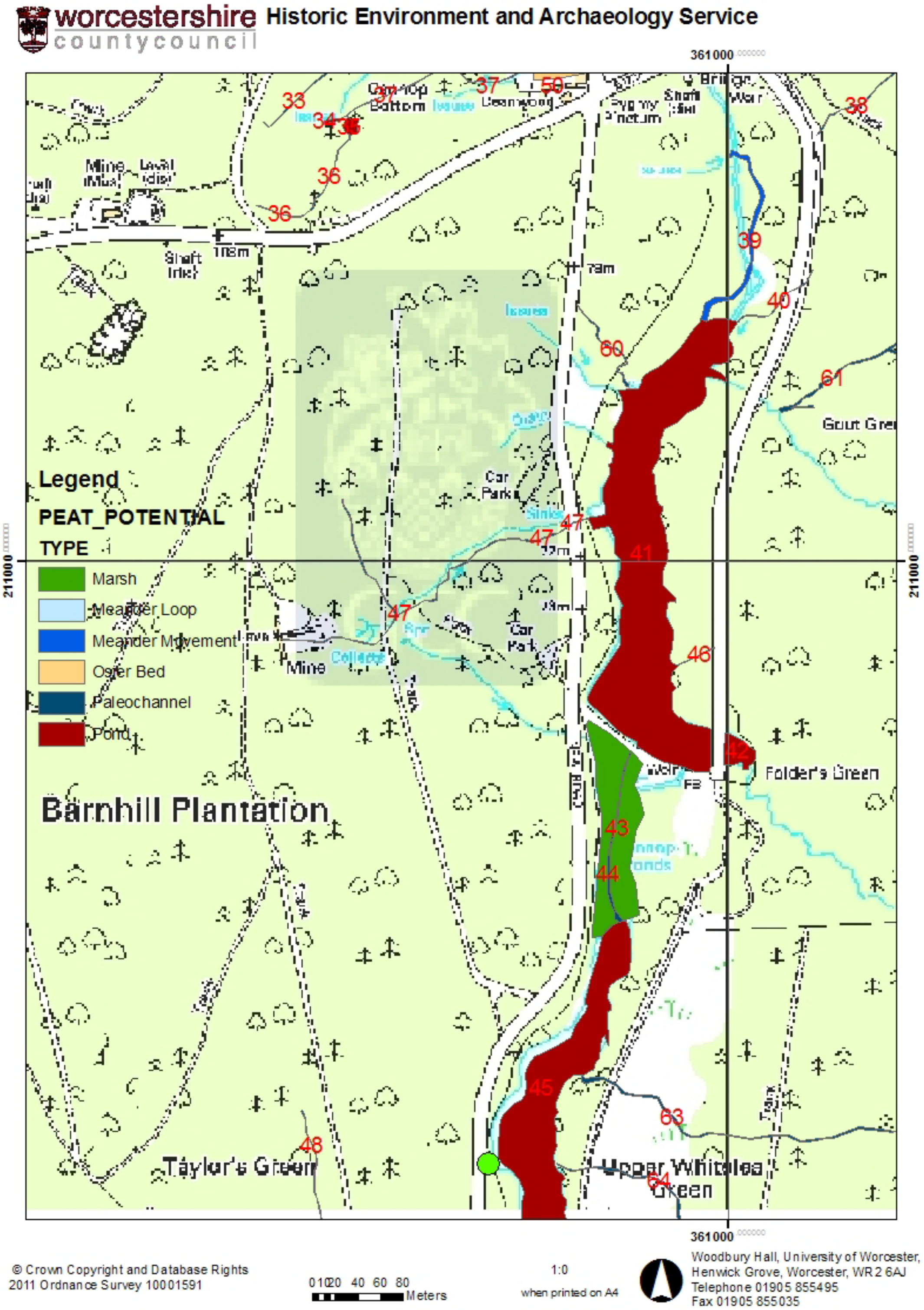

Figure 5 Cannop Ponds: features of potential plotted against modern OS mapping (feature numbers shown in red, and geotechnical boreholes as green circle).

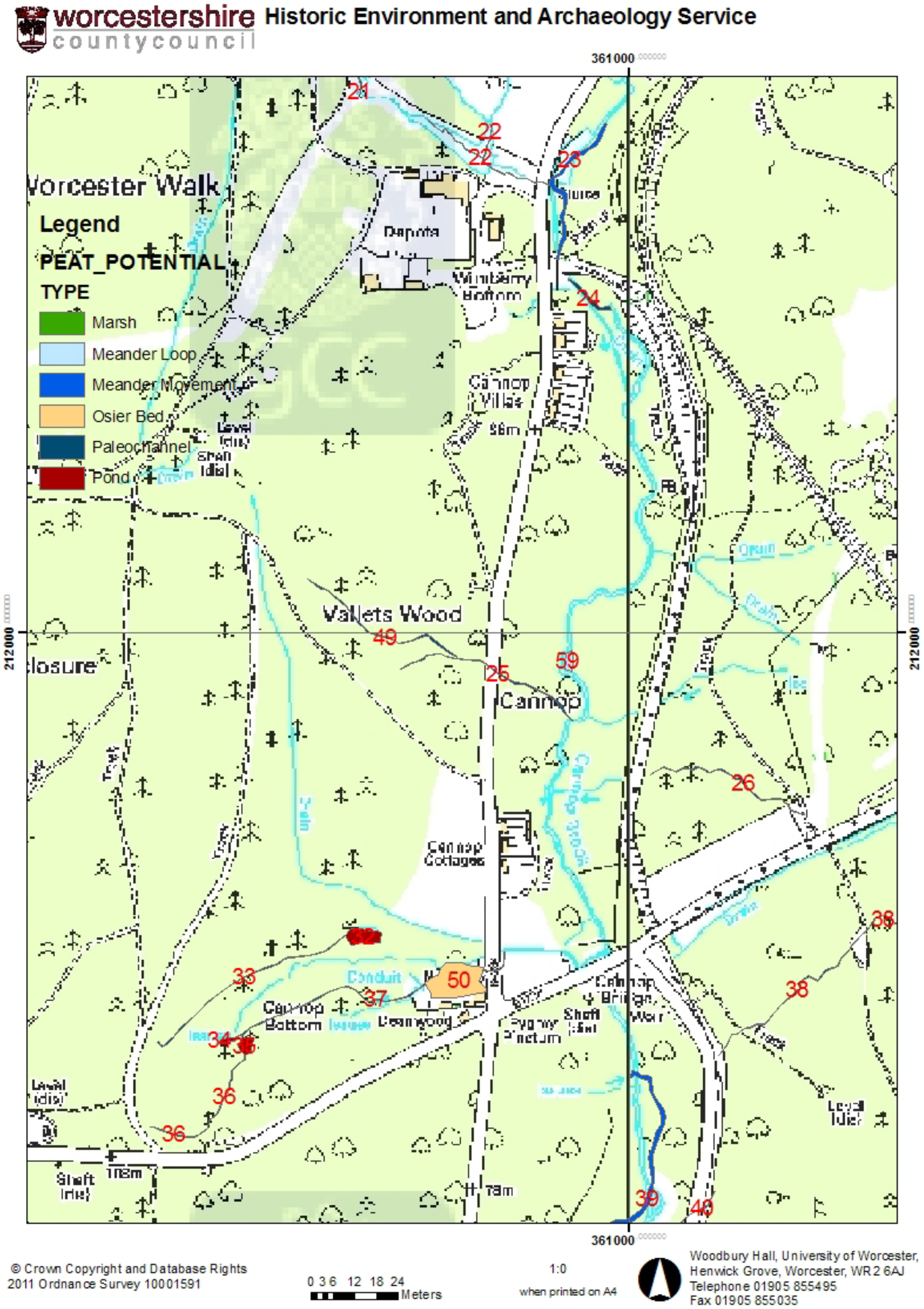

Figure 6 Cannop Depot to Cannop village: features of potential plotted against modern OS mapping (feature numbers shown in red).

Feature number	Feature and site name	Mapped potential	Overgrown vegetation	Marshy ground	Steep slopes	Stock grazing	Fences/obstructions	Other	Site condition	Augering conditions	Area of water	Notes on water	Notes(other)	Updated potential
25	Palaeochannel leading to Feature 60	Low	Yes	No	No	No	No	No		N/A	Larger	Mostly active stream channel, but leads into small boggy areas		Low
32	Pond at Cannop Bottom	Medium	Yes	Yes	Yes	No	Yes	No	Overgrown vegetation on approach, two small samplings in pond	Boots/wellies	Smaller	Now silted up, marsh vegetation	In wooded area. Some small saplings in pond, but pond generally open and accessible	Medium
39	Meander movement at Cannop Brook	Low	No	Yes	No	No	No	Yes	Some steep ground	Boots/wellies	Larger	None previously mapped	Marked as rough grassland on 1st Ed OS map but is a damp grassland developed on peaty soils	High
41	Cannop Ponds	High	No	No	Yes	No	No	Yes	Deep water	Boat needed	Same	Would need to auger from a boat	19th century pond, but earlier valley marsh deposits may survive at base of	High

Feature number	Feature and site name	Mapped potential	Overgrown vegetation	Marshy ground	Steep slopes	Stock grazing	Fences/obstructions	Other	Site condition	Augering conditions	Area of water	Notes on water	Notes(other)	Updated potential
													pond?	
43	Cannop Ponds (marsh)	High	No	Yes	No	No	No	No	Some marshy ground, mostly braided streams and gravel islands	Wellies	Same	Boggy areas		High
50	Osier bed at Cannop crossroads (3)	Medium	No	No	No	No	No	No	Presently garden	Boots	Same	None mapped and none visible	Viewed from road only as is on private land. Is now garden area. Organic deposits may survive?	Medium
60	Meander loop near Cannop Cottages	Medium	Yes	Yes	No	No	No	Yes	Narrow stream channel to cross	Waders	Larger	Standing water not mapped, only large meander loop within which it is situated	Small bog deposits within large meander loop	Medium
N/A	Cannop Bridge Weir	N\A	Yes	No	No	No	No	Yes	Slightly steep slope	Boots	N/A	Not previously mapped	Not mapped. Thought to be raised cut-off meander, now evidently old irregular coal	None

Feature number	Feature and site name	Mapped potential	Overgrown vegetation	Marshy ground	Steep slopes	Stock grazing	Fences/obstructions	Other	Site condition	Augering conditions	Area of water	Notes on water	Notes(other)	Updated potential
													working level	

Table 1: Summary of results from validation (walk-over survey)

4.3 Phase 1c Auger sampling and pollen analysis

The augering was carried out on 19 April 2011, and auger records are included in Appendix 3. Geotechnical borehole logs produced by Geotechnical Engineering Ltd for Gloucestershire Highways for a site at Cannop Ponds (Fig 6) were available, but it was not possible to include an assessment of these within the scope of this project.

4.3.1 Palynological remains, by Nick Daffern

The environmental evidence recovered is summarised in Appendix 2 (Table 1, and Fig 1).

Transect 2 (Fig 7)

Preservation of pollen from the seven samples was moderate to good, although the concentrations were variable with samples from Zone SZ1, the upper margins of the sequence, being very low to low resulting in a full assessment count not being achieved. This upper zone is not a true reflection of the vegetation or landscape and is a product of the taphonomy and preservation of palynological remains.

The sole feature of note from this zone was the possible identification of a solitary cf. *Lilium martagon* (martagon lily) grain, an introduced/naturalised species from the upper sample, 1.10m.

Samples retrieved from 2.65m and below (Zone SZ2) had similar moderate to good preservation but also had pollen preserved in moderate to good concentrations allowing a complete assessment count and subsequent full analysis counts to occur. This lower part of the sequence, Zone SZ2, is typified by the equality in contributions by arboreal and herbaceous species, although both were dominated by individual species. In the case of tree and shrub pollen, *Alnus glutinosa* (alder) was dominant contributing 37–45% TLP with contributions of less than 5% TLP being made by *Betula* (birch), *Fagus sylvatica* (beech), *Fraxinus excelsior* (ash), *Pinus sylvestris* (pine), *Quercus* (oak), *Tilia cordata* (small-leaved lime), *Corylus avellana*-type (hazel), *Ilex aquifolium* (holly), *Ligustrum vulgare* (wild privet), *Ribes rubrum* (red currant) and *Salix* (willow). The dominant herbaceous pollen was that of Poaceae indet (grasses) (25–33% TLP) with contributions of less than 5% TLP being made by *Cerealia* indet (indeterminable cereal), Cyperaceae undiff (sedges), Rosaceae (rose family), *Urtica dioica* (stinging nettle), Caryophyllaceae (pink family), *Ranunculus acris*-type (meadow buttercup), Amaranthaceae (goosefoot family), *Cichorium intybus*-type (dandelions/ chicory), *Solidago virgaurea*-type (daisies/goldenrods) and *Primula veris*-type (cowslip/primrose). Aquatics were represented by grains of *Sparganium erectum*-type (branched bur-reed), *Typha latifolia* (bulrush), *Potamogeton natans*-type (broad-leaved pondweed) and Lemnaceae (duckweeds) whilst spore producing species were represented by *Polypodium* (polypody), *Pteridium aquilinum* (bracken) and *Pteropsida* (mono) indet (ferns).

Radiocarbon dating could not be carried out on the basal deposits (SZ2), as sufficient material (identifiable plant remains or humic matter) was not available following sampling for pollen.

Discussion

Zone SZ1

The poor concentration of palynological remains in the upper parts of the sequence represented by Zone SZ1 is a product of taphonomy probably caused by a change in the sedimentation and/or hydrology of the catchment. This is reflected in the lithology of the sequence (Appendix 2: Figure 1; Appendix 3: Transect 2 - BH6) whereby

Context 8, the basal deposit of the sequence was the sole productive location for pollen preservation.

The presence of a possible martagon lily pollen grain from the upper sample from Borehole 6 (1.10m) is a possible indicator of date for the upper margins of the sequence. *L. martagon* was introduced into British gardens by 1596 and was first recorded in the wild in 1782, although not until 1883 in the Wye Valley where it was once considered to be native in ancient woodland (Preston *et al* 2002, 812).

Ribes (currant) was recorded in this zone. Although cultivated varieties of red and white currants were becoming popular during the early post-medieval period (and to a lesser extent blackcurrants), there are red and white currant species native to the British Isles (Stace 2010, 124), hence, they cannot be considered to be a reliable indicator of date.

Zone SZ2

The environment indicated by Zone SZ2 is one that is not dissimilar to the present environment consisting of a damp/wet grass, sedge and herbaceous riparian vegetation flanking the stream channel(s), which is in turn are bordered (and in places invaded) by trees and shrubs with a preference for damper conditions, before giving way to drier woodland conditions on the valley sides. The presence of possible cereal grains should not be taken at face value, as, given the overlaps between cultivated and wild grasses, the grains identified may derive from a wild *Glyceria* species rather than being cultivated *Hordeum vulgare*.

A possible indictor that the sequence is relatively recent was the quality of preservation of many of the grains in the basal zone SZ2. The structure of the exine (wall of pollen grain) was well preserved with detail that would not be expected on grains of great antiquity and would more often be identified on recent 'fresh' material. Overall it would tend to indicate that the majority of the sequence (zone SZ1) has formed relatively recently with much of the sedimentation associated with the industrial activities occurring within the valley, that is, due to increased erosion linked to woodland clearance, and/or changes in the hydrological regime of the valley area linked to channel management, such as damming during the 19th century.

All samples from Transect 2 contained high to very high quantities of microcharcoal, often dominating the sample and occasionally obscuring grains. It is possible that this microcharcoal originated from the intensive industrial activities such as charcoal production, iron working and coal mining which are well attested in this area from the medieval through to today, although this cannot be confirmed without definitive dating of the sequence.

Dating

Overall, with the lack of material available for radiocarbon dating the basal deposits, it was difficult to determine whether the base of the sequence represents the valley environment before damming for industrial activities during the 1800s. Moreover, the microcharcoal present may originate from industrial activity of medieval or later date, although the quantity of microcharcoal is suggestive of more modern industrial activity.

Transect 3 (Fig 7)

Pollen remains from this sample were in a moderate to good state of preservation, and in a moderate concentration allowing a full assessment count to be achieved, but further work was not carried out. Herbaceous pollen dominated this sample (82% TLP) with Poaceae indet contributing the majority of this figure (59% TLP). Lesser contributions were made by Cyperaceae undiff (8% TLP), *Urtica dioica*, *Cichorium intybus*-type, Amaranthaceae, Caryophyllaceae, *Anagallis tenella*-type (bog pimpernel/ chaffweed) and *Silene* sp (campions/catchflys) (all <5% TLP). Tree and shrub species contributed 18% TLP with *Alnus glutinosa* comprising the majority of this figure (9% TLP), although lesser contributions (<5% TLP) were made by *Salix*, *Quercus*, *Tilia cordata* and *Corylus avellana*-type. Aquatics were well represented by Lemnaceae, *Sparganium erectum*-type and *Typha latifolia*, as were the spores of *Polypodium*, *Pteridium aquilinum* and *Pteropsida* (mono) indet.

Discussion

Given the singular nature of the sample from Transect 3 and the absence of indicator species or datable material, it is difficult to draw any conclusions about this sequence aside from the statement that palynological remains are preserved within this deposit.

4.3.2 Artefactual and wood evidence, by Nick Daffern

During the sub-sampling of Augerhole 6 from Transect 2, three fragments of vitrified clay or ceramic and a possible fragment of hearth or furnace lining were recovered from between 2.68m and 2.83m below ground surface (within zone SZ2), though, due to the small size and undiagnostic nature of the fragments, no dating was possible (Laura Griffin and Derek Hurst; pers comm). A large fragment of coal was retrieved from 2.63–2.65m and several smaller flecks of coal were retrieved from 2.59m.

A fragment of unidentified wood was also retrieved during the sampling from the same level as the coal fragment, 2.63–2.65m (within zone SZ1), and just above the fragment of possible hearth or furnace lining. The preservation of the wood was generally very good, with little or no evidence for chemical, biological or mechanical decay, and no mineralization of the sample was apparent. The wood structure itself was still fibrous indicating that little or no degradation of the tissues had occurred, and so it may be relatively modern.

4.3.3 Other evidence

No organic deposits were found as a result of augering Transect 1, but fragments of iron slag were noted at the base of the feature.

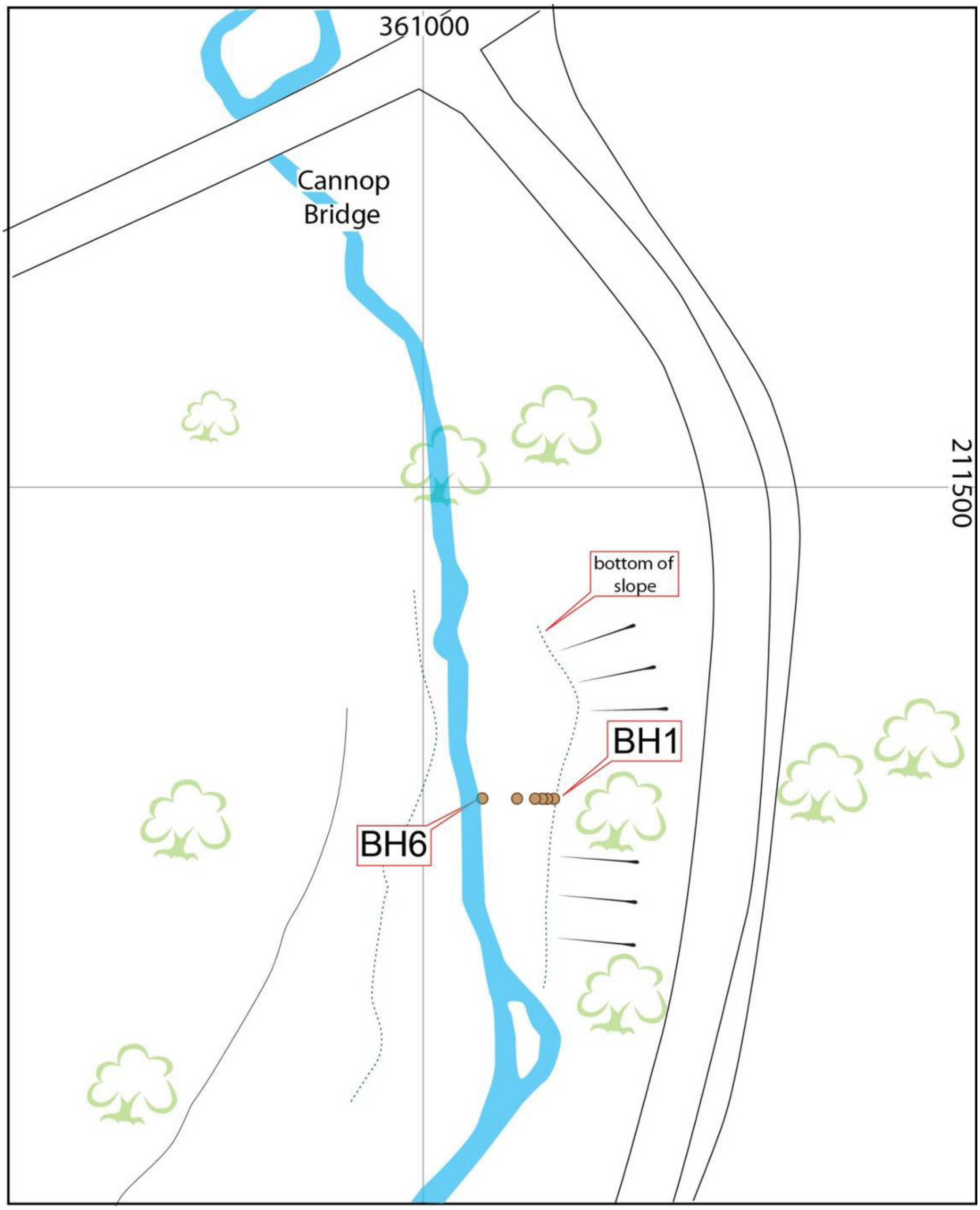

Figure 7 Transect 2 borehole locations

4.4 Phase 2 Assessment of samples from excavation trenches

4.4.1 Geoarchaeological assessment

The two GCC archaeological trenches examined during the 23 February 2011 field visit both cut across earthwork features identified in the lidar imagery. The sequence exposed in Site 1 (HER 37920) comprised approximately 1.2m of deposits (Tables 2–3).

The deposits of Site 1 lacked carbonates and are unfossiliferous (excepting occasional charcoal fragments). Units 2 and 3 would appear to be colluvial deposits derived from the Coleford Member bedrock (both units) and unconsolidated sediment/soil further upslope (Unit 2). Unit 2 also includes slag which is likely to have been produced by iron working further upslope (possibly on the platform behind the bank). Unit 4 might be the bank behind which Unit 3 has accumulated, but given that at the time of the field visit Unit 4 was only visible in one of the trench sections, this interpretation is tentative. Unit 5 is the weathered surface of the Coleford Member bedrock, which also contains clay particles that have washed through the overlying sediments by eluvial processes associated with pedogenesis.

Site 2 (HER 37921) was examined in lesser detail. The sequence comprised 0.5–0.6m of strata consisting of a 0.5m-thick O Horizon – as in the top part of Unit 1 on Site 1 – and 0.45–0.55m of colluvium, with properties similar to Unit 3 on Site 1. The absence of an A or B horizon suggests that the ground surface at this location has been recently disturbed (i.e. there has not been a sufficient length of time with stable ground conditions for a soil to develop).

Unit	Max. thick.	Description	Interpretation
1	0.08m	10 YR 2/1 Black humic silt/fine sand grading into 10 YR 3/1 Very dark grey organic silt. Diffuse boundary to:	O and A Horizons
2	0.60m	10 YR 4/4 Dark yellowish brown silt/clay with moderate pebble to cobble-sixed sandstone clasts and occasional pebble and cobble-sized slag fragments. Frequent 10mm diameter roots. Poorly sorted. Sharp boundary to Units 3.	Pedogenically worked colluvium (B Horizon)
3	0.8m	10 YR 5/4 Yellowish brown fine diamict of frequent granular to pebble-sized sub-angular sandstone clasts in a medium to fine (sandstone-derived) sand matrix. Moderate 10mm diameter roots. Diffuse boundary to Unit 5.	Colluvium derived from Coleford Member bedrock
4	0.5m	10 YR 5/4 Yellowish brown compact clay containing frequent pebble and cobble-sized sub-angular limestone clasts. Poorly sorted.	?Bank
5.	>0.2m	10 YR 5/6 Yellowish brown clay forming around sub-angular sandstone cobbles.	Illuvial clay and weathered Coleford Member bedrock

Table 2 Stratigraphy exposed in Site 1 (HER 37920)

4.4.2 Analysis of bulk samples

site Code	context	sample	charcoal quantity	comment
37920	107	6	moderate	occ Fe slag, pot
37920	116	4	abundant	abt Fe slag, occ burnt clay, burnt stone
37923	917	7	moderate	occ pot, Fe slag, hammerscale

Table 3 Summary of remains from bulk samples

GHER 37920 Sallowvallets context 107; underlying colluvium

Only occasional fragments of poorly preserved slag, iron concretions, and a small quantity of charcoal fragments were identified (Table 3). The charcoal assemblage was small so the relative proportion of the species recovered can only be interpreted with caution (Table 4). Alder (*Alnus* sp) and hazel (*Corylus avellana*) charcoal was marginally dominant, with occasional fragments of oak (*Quercus robur/petraea*), apple/pear/whitebeam/hawthorn (Maloideae sp), and guelder rose/wayfaring tree (*Viburnum* sp). Wayfaring tree was most likely to have been growing on calcareous soils found in the local area.

GHER 37920 Sallowvallets context 116, deposit of iron smelting waste

The assemblage of charcoal recovered was considerably larger, being dominated by oak (Quercus sp), and either possible oak (cf. Quercus sp) or sweet chestnut (Castanea sativa), identification of the latter remaining uncertain on account of the lack of multiseriate rays. However, as there were abundant securely identified oak fragments the fragments of less certain identification were considered most likely to be oak which have either fractured between the multiseriate rays, or derive from immature wood in which the multiseriate rays have not developed or are rare. Occasional fragments of hazel (Corylus avellana) and alder/hazel (Alnus/Corylus sp) were also identified. Most of the ?oak was identified as roundwood, while the securely dated oak was a mix of roundwood, branchwood and possible heartwood. Abundant smelting slag (Derek Hurst, pers comm) was also identified (Table 3).

GHER 37923 Ruardean woodside, context 917

Occasional charred plant remains were recovered including burnt grassy material, alongside the burnt stone found in the residue (Table 4). Such material may have been added to a fire (perhaps as tinder), or derive from turf burnt in situ. However, as the plant remains were very small (1mm in size or less), and there was a significant amount of root-like material present, there is some possibility of these remains being intrusive from overlying layers.

Charcoal fragments were small, but occasional fragments of possible oak (cf. Quercus sp, hazel (Corylus avellana), alder (Alnus sp), alder/hazel (Alnus/Corylus sp) and birch (Betula sp) were recorded. The basis of identification for the ?oak was the same as for context 116 above. The charcoal in this context is of interest as iron-smelting slag was identified in the upper fill of the enclosure ditch (Jon Hoyle, pers comm.) and there is evidence of smelting in the area during the Roman period. It is likely, therefore, that in this context the charcoal represents debris from an earlier phase of charcoal burning or iron smelting. And in addition to burnt stone, other remains included occasional burnt clay, presumably from a smelting kiln (Table 3).

Latin name	Family	Common name	Habitat	107	116	917
Quercus robur/petraea	Fagaceae	oak	C	2	37	
cf. *Quercus* sp	Fagaceae	oak	C	2	38	4
Betula sp	Betulaceae	silver birch	C			1
Alnus sp	Betulaceae	alder	CE	9		1
Corylus avellana	Betulaceae	hazel	C	5	6	6
Alnus/Corylus sp	Betulaceae	alder/hazel	C	3	2	1
Maloideae sp	Rosaceae	pear/apple/whitebeam/hawthorn	C	1		
cf. Maloideae sp	Rosaceae	pear/apple/whitebeam/hawthorn	C	1		
Viburnum sp	Caprifoliaceae	guelder rose/wayfaring tree	C	3		

Table 4 Charcoal remains from bulk samples

5 Synthesis

5.1 Geoarchaeological assessment

The desk-top and walk-over surveys, the field visit and the boreholes demonstrate that the Cannop valley study area has a generally low geoarchaeological potential. Thick sediment sequences only exist on the Cannop valley floodplain. On the surrounding slopes the only Holocene deposits comprise decalcified and unfossiliferous colluvium retained behind field system banks. The alluvial sequences of the Cannop floodplain may prove to have some geoarchaeological potential, but the nature of this potential will depend upon the age of the sediments. It is perhaps telling in this regard that only in recently flooded areas to the south of Cannop Bridge does the thickness of the alluvial sequence exceed 1m. It is, therefore, possible that most of the alluvial deposits noted in boreholes of Transect 2 date from the last two centuries (palynological work currently being undertaken by WA may shed further light on the antiquity of the alluvial sequence in Transect 2). However, should the alluvial sequence in the area of Cannop Ponds prove to be of greater antiquity, the deposits would have a high geoarchaeological potential given that they are likely to provide a proxy record of metal working in the Cannop Valley that could be investigated using geochemical and other techniques.

5.2 GIS mapping

GIS mapping identified a small number of features of medium to high potential for preservation of accessible organic deposits (*albeit* undated), in the central to southern part of the project area. Many other features were mapped, but were considered to be of low potential. Those of medium to high potential included the highly visible and well-known Cannop Ponds and marsh, a small number of other ponds, a palaeochannel and an osier bed. Validation by a walk-over survey and selective augering of organic deposits showed that sizeable areas of organic deposits had built up in the Cannop valley in the central to southern part of the project survey area, as indicated by the mapping, and close to Cannop Ponds to a depth of 3m. HER data indicated that these deposits may have built up as a result of relatively recent (19th century) industrial activity, particularly the damming of the valley to create Cannop Ponds. Augering and pollen assessment appeared to confirm this, and did not indicate any earlier valley marsh deposits pre-dating the 19th century industrial activity.

Other features mapped as being of potential for preservation of organic deposits (for example, ponds at Cannop Bottom and north of Blackpennywell Green and an osier bed) remained untested, but given the extensive remodelling of the area by 19th century industry, these may also prove to be of recent date. Three ponds at Cannop Bottom are situated where an old furnace and disused coal level known from the 1820s (SMR 19826) are shown on the 1st edition OS map, and may have been formed as a result of these workings, particularly the most northerly pond which is marked with a sluice.

Overall, therefore, the potential for obtaining palaeoenvironmental data contemporary with pre-modern archaeological sites (such as the area excavated at Cannop Depot) is low. There may be some value, nevertheless, in the recent marsh deposits and other deposits of recent formation in that pollen taphonomy, sedimentation rates and pollen influx rates could be tested. The augering also demonstrates the rapidity with which extensive marsh deposits have built up in relatively modern times. This type of work is of interest more for palynological research than for its archaeological outcome. The assessment also demonstrated that the methodology was cogent in that the initial assessment of 'potential for survival of accessible organic deposits' based on a GIS mapping stage, when used in conjunction with HER data, was confirmed as giving a good indication of potential as a starting point, with the subsequent methodology then resulting in improved GIS mapping and so finally providing data towards HER enhancement.

5.3 Excavation trenches

Analysis of bulk samples from the excavation trenches shows evidence of dumping of smelting slag in association with pottery of early Romano-British date (confirmed by radiocarbon dating), suggesting metalworking in the vicinity at this time. Associated charcoal was almost exclusively oak (an excellent fuel and would have been an appropriate fuel for metal smelting; Taylor 1981), hazel (also a reasonable fuel), and alder (good for charcoal). Because both the latter can be coppiced, a good supply can be maintained (Taylor 1981). The oak, hazel and alder charcoal is likely to be fuel residue from the smelting process.

The underlying colluvium derives from the Coleford Member bedrock and soil movement from further up-slope (Section 4.2.4) and is interpreted as having built up after the earthwork was formed, around 940–260 cal BC (95% probability), and probably mostly in 580–385 cal BC (68% probability). Small quantities of poorly preserved slag and charcoal fragments were recovered from this deposit, but this material could be considered as intrusive from the overlying dump of smelting slag, though the combination of this with a charcoal assemblage of different composition (mostly non-oak) suggests a different phase of activity which has resulted in some reworking of the colluvium or movement of soil downslope and is nevertheless of interest. Woodland clearance for cultivation or industrial activity may have contributed to the colluviation.

The material from Ruardean woodside indicated the deposition of some iron-smelting debris with which a small amount of hazel or alder, birch and possible oak charcoal was associated, these probably being used as fuel for the smelting. The presence of alder in the colluvium indicates wet woodland growing along stream valleys at the time of deposition.

6 Research frameworks

Little archaeological excavation has been undertaken in the Forest of Dean and only occasionally has there been associated palaeoenvironmental work; hence there is only scarce mention of this type of work for the area in research frameworks for the region, for example the South-West regional frameworks for archaeology (Webster, 2008).

Nevertheless, key features of the Forest of Dean area are the iron smelting and charcoal production industries which are known, in the case of iron smelting, from the Roman period until relatively recently, and in the case of charcoal production chiefly from the medieval period until about the 1960s. These industries would have had a significant impact on the environment, particularly on woodland as a result of woodland management and clearance. Palaeoenvironmental data from organic, alluvial and colluvial deposits could potentially provide information on environmental change associated with these industries. The assessment, however, has indicated only low potential for organic deposits of pre-modern date to survive in the project area, and low potential for geoarchaeological and palaeoenvironmental work overall. A similar method of assessment may be more productive in other areas of the Forest of Dean where stream or river valleys have a wider floodplain, and/or where there has been less modification of the environment by modern industry. This methodology has been applied to a similar environment to the Forest of Dean in the Wyre Forest (Worcestershire) and in a wider area than the current study, and this has produced useful results (Pearson and Daffern 2012).

There may be some potential for recovering information on the timber resources used in the charcoal burning industry within the project area by sampling and analysing charcoal from charcoal burning platforms. Identifiable charcoal has been recovered from one platform which remains undated (Jon Hoyle, pers comm). Charcoal could be used for dating episodes of use where non-oak or oak roundwood charcoal is present, and it may be possible to detect felling cycles from well preserved roundwood fragments from which woodland management techniques could be inferred. Basal layers of these features are most likely to be productive for recovering data on more ancient (for example, medieval) production, as many could have had long lives and been used into the 20th century. Some initial assessment of these features would be useful to determine the potential for analysis of this nature.

In summary, key areas for future research are as follows:

- assessing the potential for survival of well preserved and accessible organic deposits (using the methodology adopted in this assessment) from other areas of the Forest of Dean, focussing on wider valley floodplains, and particularly where modification of the environment by 19th century industry is limited
- trial sampling, analysis and radiocarbon dating of charcoal from charcoal burning platforms

Otherwise, bulk sampling for recovery of environmental and artefactual remains should be considered as standard practice where archaeological excavation is undertaken, and the advice of a relevant specialist sought, including, in the first instance, in the formulation of appropriate archaeological responses to development.

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8 Personnel

The fieldwork and report preparation was led by Elizabeth Pearson. The project manager responsible for the quality of the project was Derek Hurst. Fieldwork and environmental analysis was undertaken by Elizabeth Pearson and Nick Daffern (pollen) (Worcestershire Archaeology), and geoarchaeological assessment by Keith Wilkinson (ARCA, University of Winchester).

9 The archive

The archive consists of:

8	Validation record sheets AS47
2	Flot records AS21
5	Pollen score sheet AS35
5	Vials containing pollen samples
11	Auger record sheets AS26
1	Box of sorted remains from residues
2	Boxes of flots (small boxes)

1 CD-Rom/DVDs holding data for 2 Arcview 9.3 GIS layers and Microsoft Access database

10 Bibliography

* indicates reports that are ordinarily expected to be available on-line at www.worcestershire.gov.uk/archaeology/library

Barber, K E, 1976 History of vegetation, in S Chapman (ed) *Methods in plant ecology*. Oxford: Blackwell Scientific Publications, 49–52

Bennett, K D, 1994 *Annotated catalogue of pollen and pteridophyte spore types of the British Isles*, unpublished report, Department of Plant Sciences, University of Cambridge

BGS 2011 *The BGS Lexicon of named rock units*. http://www.bgs.ac.uk/Lexicon/. Accessed 17 May 2011

Brazier, J D, and Franklin, G L, 1961 *Identification of hardwoods: a microscope key*, Dept of Scientific and industrial research, Forest Products Research Bulletin, **46**. London: Her Majesty's Stationery Office

Cappers, T R J, Bekker, R M, and Jans, J E A, 2006 *Digitale Zadenatlas van Nederland: Digital seed atlas of the Netherlands*, Groningen Archaeological Studies, **4**, Barkhuis Publishing and Groningen University Library: Groningen

Hather, J G, 2000 *The identification of the Northern European hardwoods: a guide for archaeologists and conservators*, Archetype Publications Ltd

Moore, P D, Webb, J A, and Collinson, M E, 1991 *Pollen analysis*, 2 ed. Oxford: Blackwell Scientific Publications

*Pearson, E, and Daffern, N, 2012 *Palaeoenvironmental assessment of the Wyre Forest, Worcestershire and Shropshire for the 'Grow with Wyre' project*, Worcestershire Historic Environment and Archaeology Service internal rep **1880**

Pearson, E, Daffern, N, and Wilkinson, K, 2012 *Palaeoenvironmental assessment of Cannop Brook, Forest of Dean*, Worcestershire Historic Environment and Archaeology Service internal rep **1853**

Preston, C D, Pearman, D A and Dines, T D, (eds) 2002 *New Atlas of the British and Irish Flora: An Atlas of the Vascular Plants of Britain, Ireland, The Isle of Man and the Channel islands*. Oxford: Oxford University Press

Schweingruber, F H, 1978 *Microscopic wood anatomy: structural variability of stems and twigs in recent and subfossil woods from Central Europe*, Swiss Federal Institute of Forestry Research

Stace, C, 2010 *New flora of the British Isles*, 3 ed. Cambridge: Cambridge University Press

Taylor, M, 1981 *Wood in archaeology*. Princes Risborough: Shire Archaeology

Webster, C J, (ed) 2008 *The archaeology of South West England: South West archaeological research framework resource assessment and research agenda*, Somerset County Council

Plates

Plate 1 Feature 41 - Cannop Ponds (northern pond) viewed from the south

Plate 2 Feature 43 - marsh at Cannop Ponds (boggy area)

Plate 3 Feature 43 - marsh at Cannop Ponds (gravel centre)

Plate 4 'Palaeochannel' 25 viewed from the west

Plate 5 Boggy area alongside palaeochannel (feature 25), within meander loop (feature 60)

Plate 6 Pond (feature 32) at Cannop Bottom viewed from the west

Plate 7 Marsh north of Cannop Ponds viewed from the south

Appendix 1 Mapping and assessment of features with potential for organic survival using historic and OS mapping

Mapping of features of interest for palaeoenvironmental study was undertaken using GIS ArcMap (Version 9.3). The aim of this was to highlight features or areas in the Cannop Brook area where organic deposits may have formed which can be used to research past landscape and human activity (palaeoenvironmental study). This tool enables sites that are potentially rich in organic remains to be identified for research purposes and for management of the archaeological resource. This method of mapping allows for the plotting of the following features (attributes):

- Fishponds
- Marsh
- Meander loop (pronounced stream/river meander)
- Meander movement (where a meander appears to have moved leaving behind relict marsh deposits)
- Moat
- Osier bed
- Palaeochannel
- Pond
- Reed swamp
- Other

These features have been chosen because they are potentially waterlogged and organic remains may survive today. Waterlogging is important as it creates anaerobic conditions which prevent decay of organic remains such as pollen, larger plant remains and insects which can be used to reconstruct past vegetation and flora.

The features were identified on a separate layer using the 1st Edition OS map as a basemap. The GIS layers used during the process were as follows:

- Gloucestershire HER mapping (linears and polygons)
- Historical mapping 1st edition
- Current OS 1:10,000 colour
- Lidar (non-hillshaded)

Polygons were traced over each feature type and relevant information on each feature added in an attribute table.

During the mapping phase features were scored according to their potential for organic deposits to survive and for their accessibility. This is a basic level of scoring intended to be used as a first stage of assessment of the mapped features (and is irrespective of the date of the feature). Table 1 shows the questions that were applied to each feature to facilitate the scoring of potential and the source referred to. The scores were weighted to take account of how important these aspects are in assessing the potential.

	Questions	**LOW**		**HIGH**
A	To what level is the feature accessible/covered? (Assessed from modern map)	Fully Covered **1**	Semi/Partially Covered **3**	Open **5**
B	What scale/size is the feature? (Info taken from attribute table)	Small (<500m^2) **1**	Medium (501-1999m^2) **3**	Large (2000> m^2) **6**

C	Has there been any change in the extent of waterlogging? (1st Ed OS, modern maps and AP's compared)	Major Change (No longer mapped) **1**	Minor Change (A decrease but still there) **2**	No Change or a 'Positive' Change **3**
	Is there any associated information with or related to the feature? (Take from HER layer)	No **Leave blank**		Yes **Add comment**

Table 1: Scoring potential and accessibility

The size of the feature is particularly important as the larger the feature the greater the potential for organic deposits to survive. Larger volumes of organic material are less prone to wetting and drying and consequently decay. The potential for recovering a sequence which represents a long time span and several phases of environmental change is also greater. For this work only surface area can be recorded as volume (the ideal measurement) is unknown.

The extent to which there have been changes in waterlogging of the features has also been used to assess the potential for organic deposits to survive. This was estimated by comparing the extent of waterlogging indicated on both first Edition OS and the modern OS maps (also by referring to any aerial photographs available). Any major drying out may have caused decay of organic deposits.

The accessibility of the mapped features was determined by categorising these as 'open' 'semi-open' or 'covered' according the modern OS map and any aerial photographs available. The extent to which cover will have damaged the deposits and the likelihood of this cover being removed may vary with the type of cover (trees, buildings or hard surfaces for example). For this reason the type of cover was noted in the GIS attributes table as an aid to assessing potential.

In addition, where information on the history or archaeology of a feature was available on the HER it was added to the attribute table and was flagged on the GIS map. This information was not used in scoring potential as, for instance, availability of documentary evidence on a medieval moat may improve the potential of this feature for projects focussing on medieval landscape but not for those focussing on prehistoric landscape: potential needs to be considered in a more general form.

The overall potential of the features was categorised as high, medium and low based on the scores detailed above as follows high (green) = 10 - 14, medium = 8 - 9 and low = up to 7.

Feature Id	AREA	COVERAGE	WATER-LOGGING	TYPE	AREA SCORE	POTENTIAL SCORE	POTENTIAL	Comments
0	44	1	1	Pond	1	3	Low	Now under buildings
1	25	1	1	Pond	1	3	Low	Now under buildings
2	77	3	1	Pond	1	5	Low	Within area of possible post-med coal working
3	204	3	1	Pond	1	5	Low	Within area of possible post-med coal working
4	528	3	1	Pond	3	7	Low	In wooded area
5	21	3	1	Paleochannel	1	5	Low	In wooded area
6	532	1	1	Paleochannel	3	5	Low	Now partly under a road
7	39	3	2	Meander Movement	1	4	Low	In wooded area
8	159	3	1	Paleochannel	1	5	Low	In wooded area
9	37	3	2	Meander Movement	1	6	Low	Possibly straightened
11	202	3	1	Pond	1	5	Low	In wooded area
12	155	3	2	Pond	1	6	Low	In wooded area
13	327	3	2	Meander Movement	1	6	Low	Possibly straightened
14	208	3	2	Meander Movement	1	6	Low	Possibly straightened
15	161	3	2	Meander Movement	1	6	Low	In wooded area
17	57	3	1	Paleochannel	1	5	Low	In wooded area
18	44	3	2	Meander Movement	1	6	Low	In wooded area
20	400	1	1	Paleochannel	1	3	Low	Now partly under a pond

Feature Id	AREA	COVERAGE	WATER-LOGGING	TYPE	AREA SCORE	POTENTIAL SCORE	POTENTIAL	Comments
21	39	3	2	Paleochannel	1	6	Low	Probably underground
22	151	1	3	Paleochannel	1	5	Low	Now part of a large pond
23	762	1	3	Meander Movement	3	7	Low	Straightened and formed into a pond. Adjacent to Cannop Colliery, sunk 1906/07
24	214	1	2	Paleochannel	1	4	Low	Probably part of a drain now
25	301	3	1	Paleochannel	1	5	Low	
26	234	3	1	Paleochannel	1	5	Low	In wooded area
27	70	1	1	Pond	1	3	Low	Now partly under a road. Within area of colliery opened 1841
28	79	3	1	Pond	1	5	Low	Now partly under a road. Within area of colliery opened 1841
29	758	3	3	Pond	3	9	Medium	Appears infilled on aerial photographs
32	590	3	2	Pond	3	11	Medium	Validated - silted up, with marsh vegetation. Adjacent to Old Furnace Coal working known from 1820s
34	70	3	1	Pond	1	5	Low	In area of old coal workings on 1st ED OS. Within Old Furnace Coal working area known from 1820s
35	257	3	1	Pond	1	5	Low	In area of old coal workings on 1st ED OS. Within Old Furnace Coal working area known from 1820s
36	169	3	1	Paleochannel	1	5	Low	In wooded area
41	37423	3	2	Pond	6	11	High	19th century pond on HER
42	1072	3	2	Pond	3	8	Medium	In wooded area. 19th century pond on HER
43	10729	3	1	Marsh	6	10	High	Validation suggests 19th century formation
45	30077	3	2	Pond	6	11	High	19th century pond on HER
47	688	3	2	Paleochannel	3	8	Medium	
48	376	3	1	Paleochannel	1	5	Low	
50	2130	1	1	Osier Bed	6	8	Medium	Now under a nursery

Feature Id	AREA	COVERAGE	WATER-LOGGING	TYPE	AREA SCORE	POTENTIAL SCORE	POTENTIAL	Comments
51	228	3	3	Meander Loop	1	7	Low	In wooded area
52	109	3	1	Paleochannel	1	3	Low	In wooded area
59	181	3	3	Meander Loop	1	7	Low	In wooded area
60	0	3	3	Meander Loop	3	9	Medium	Validated - bog areas, ?modern
62	660	3	1	Paleochannel	3	7	Low	In wooded area
63	586	3	1	Paleochannel	3	7	Low	In wooded area
64	879	3	1	Paleochannel	3	7	Low	In wooded area

Table 2: Mapped features of palaeoenvironmental potential

Appendix 2 - Pollen processing methodology (Tim Mighall, Department of Geography and Environment, University of Aberdeen) and Table of palynological results

ABSOLUTE POLLEN ANALYSIS: PREPARATION SCHEDULE

PRECAUTIONARY NOTES: All procedures, up to stage 25, should take place in the fume cupboard. Read precautionary notices on fume cupboard before starting. Ascertain whereabouts of First Aid equipment NOW. Please wear laboratory coat, gloves and goggles when dealing with all chemicals. Please organize fume cupboard carefully to maximize workspace. Use the containment trays provided. Always keep the fume cupboard door down as far as practically possible. Make sure the fume cupboard is switched on and functioning correctly.

A) SOLUTION OF HUMIC COMPOUNDS

1) Switch on hotplate to heat water bath. Prepare 12 to 16 samples concurrently.

HCl. is an irritant and can cause burns. Wear gloves. Wash with water if spilt on your skin.

Using a clean spatula, place a known volume or weight of sediment (c. 2cm^3) and one spore tablet in each 50ml centrifuge tube. Add a few cm^3 of distilled water (enough to cover the pellet and tablets) and a few drops of 2M HCl. Wait until effervescence ceases, then half fill tubes with 10% KOH; place in a boiling water bath for 15 minutes. Stir to break up sediment with clean glass rod. Return HCl and KOH bottles to the chemical cabinet.

2) Centrifuge at 3,000 rpm for 5-6 minutes, ensuring first that tubes are filled to the same level. This applies throughout the schedule (Mark 7 on centrifuge).

3) Carefully decant, i.e. pour away liquid from tube, retaining residue. Do it in one smooth action.

4) Disturb pellet using vortex mixer; add distilled water, centrifuge and decant.

5) Using a little distilled water, wash residue through a fine (180 micron) sieve sitting in filter funnel over a beaker. NB Be especially careful in keeping sieves, beakers and all tubes in correct number order. Wash residue on sieve mesh into petri dish and label the lid. If beaker contains mineral material, stir contents, wait four seconds, then decant into clean beaker, leaving larger mineral particles behind. Repeat if necessary. Clean centrifuge tube and refill with contents of beaker.

6) Centrifuge the tubes and decant.

B) HYDROFLUORIC ACID DIGESTION

(Only required *if mineral material clearly still present. Otherwise, go to stage 13)*

NB Hydrofluoric acid is extremely corrosive and toxic; it can cause serious harm on contact with eyes and skin. Rubber gloves and mask/ goggles MUST be worn up to and including stage 11. Please fill sink with H_20; have $CaCo_3$ gel tablets ready. Place pollen tube rack into tray filled with sodium bicarbonate.

7) Disturb pellet with vortex mixer. Add one cm^3 of 2M HCl.

8) With the fume cupboard sash lowered between face and sample tubes, very carefully one-third fill tubes with concentrated HF (40%). Place tubes in water bath and simmer for 20 minutes.

9) Remove tubes from water bath, centrifuge and decant down fume cupboard sink, flushing copiously with water.

10) Add 8cm^3 2H HCl to each tube. Place in water bath for 5 minutes. Do not boil HCl.

11) Remove tubes, centrifuge while still hot, and decant.

12) Disturb pellet, add distilled water, centrifuge and decant.

C) ACETYLATION

NB Acetic acid is highly corrosive and harmful on contact with skin. Wash with H_20 if spilt on skin.

13) Disturb pellet, add 10cm^3 glacial acetic acid, and centrifuge. Decant into fume cupboard sink with water running during and after.

14) Acetic Anhydride is anhydrous. Avoid contact with water. The acetylation mixture can cause severe burns if spilt on skin. Wash with water.

15) Make up 60cm^3 of acetylation mixture, just before it is required. Using a measuring cylinder; mix acetic anhydride and concentrated sulphuric acid in proportions 9:1 by volume. Measure out 54cm^3 acetic anhydride first, then add (dropwise) 6cm^3 concentrated H_2S0_4 carefully, stirring to prevent heat build—up. Stir again just before adding mixture to each tube.

Disturb pellet; then add 7cm^3 of the mixture to each sample.

16) Put in boiling water bath for 1-2 minutes. (Stirring is unnecessary—never leave glass rods in tubes as steam condenses on the rods and runs down into the mixture reacting violently). One minute is usually adequate; longer acetylation makes grains opaque. Switch off hot plate.

17) Centrifuge and decant all tubes into large (1,000ml) beaker of water in fume cupboard. Decant contents of beaker down fume cupboard sink.

18) Disturb pellet, add 10cm^3 glacial acetic acid, centrifuge and decant.

19) Disturb pellet, add distilled water and a few drops of 95% ethanol centrifuge and decant carefully.

D) DEHYDRATION, EXTRACTION AND MOUNTING IN SILICONE FLUID

20) Disturb pellet; add 10cm^3 95% ethanol, centrifuge and decant.

21) Disturb pellet; add 10cm^3 ethanol (Absolute alcohol), centrifuge and decant. Repeat.

22) Toluene is an irritant. Avoid fumes.

Disturb pellet; add about 8cm^3 toluene, centrifuge and decant carefully into 'WASTE TOLUENE' beaker in fume cupboard (leave beaker contents to evaporate overnight).

23) Disturb pellet; then using as little toluene as possible, pour into labelled specimen tube.

24) Add a few drops of silicone fluid - enough to cover sediment.

25) Leave in fume cupboard overnight, uncorked, with fan switched on. Write a note on the fume cupboard *'Leave fan on overnight - toluene evaporation',* and date it. Collect specimen tubes next morning and cork them. Turn off fan.

26) Using a cocktail stick, stir Contents and transfer one drop of material onto a clean glass slide and cover with a cover slip (22mm x 22mm). Label the slide.

27) Wash and clean everything you have used. Wipe down the fume cupboard worktop. Remove water bath from fume cupboard if not needed by the next user. Refill bottles and replace them in chemical cabinets.

			Transect 2							Transect 3
	Family	Common Name(s)	BH6 1.10m	BH6 1.76m	BH6 2.24m	BH6 2.65m	BH6 2.78m	BH6 2.82m	BH6 2.90m	BH1 0.45m
Pinus sylvestris	Pinaceae	Scot's pine		1	6			1	1	
Ribes rubrum -type	Grossulariaceae	red current						1		
Fagus sylvatica	Fagaceae	beech						1		
Quercus	Fagaceae	oak	1	2	4	11	8	11	10	4
Betula	Betulaceae	birch	1	3		1	4	5	6	
Alnus glutinosa	Betulaceae	alder		3	4	130	120	152	118	14
Corylus avellana -type	Betulaceae	hazel				5	8	7	2	2
Salix	Salicaceae	willow			1	3	10	7	4	5
Tilia cordata	Malvaceae	small-leaved lime					3			4
Fraxinus excelsior	Oleaceae	ash					2			
Ligustrum vulgare	Oleaceae	wild privet						1		
Ilex aquifolium	Aquifoliaceae	holly				2		1	1	
Calluna vulgaris	Ericaceae	heather							1	
Ranunculus acris -type	Ranunculaceae	meadow buttercup		10	2	4	2	5	2	1
Saxifraga granulata -type	Saxifragaceae	meadow saxifrage						2		1
Trifolium -type	Fabaceae	clovers							1	
Rosaceae	Rosaceae	rose family			1	2	1	2	2	1
Filipendula	Rosaceae	meadowsweet				2	1			
Potentilla -type	Rosaceae	cinquefoils						1		
Sanguisorba officinalis	Rosaceae	great burnet					1			
Urtica dioica	Urticaceae	stinging nettle			4	8	3	6	4	6
cf Euphorbia	Euphorbiaceae	spurges			1					
Brassicaceae	Brassicaceae	cabbage family				2			1	
Rumex acetosa	Polygonaceae	common sorrel			1		2		3	
Rumex obtusifolius -type	Polygonaceae	broad-leaved dock					2	1		
Caryophyllaceae	Caryophyllaceae	pink family			2	9	3	3	4	4
Cerastium -type	Caryophyllaceae	mouse-ears / stitchworts				3				
Amaranthaceae	Amaranthaceae	goosefoot family				2	5	2		3
Primula veris -type	Primulaceae	cowslip/ primrose						5	1	
Anagallis tenella -type	Primulaceae	bog pimpernel								1
Rubiaceae	Rubiaceae	bedstraw family					1			
Plantago lanceolata	Plantaginaceae	ribwort plantain		1		5		2	3	1
Stachys -type	Lamiaceae	woundworts/ dead-nettles						1		
Cichorium intybus -type	Asteraceae	chicory/ dandelion			4	12	10	4	12	4
Solidago virgaurea -type	Asteraceae	daisies/ goldenrods			2	2	7	2	3	1
Cirsium -type	Asteraceae	thistles			1			1		1
Apiaceae	Apiaceae	carrot family		1	1	1				
cf *Lilium martagon*	Liliaceae	martagon lily	1							
Cyperaceae undiff	Poaceae	sedge			8	19	19	21	29	13
Poaceae undiff	Poaceae	grass	8	22	32	76	92	91	106	95
Cerealia indet	Poaceae	indeterminable cereal				4	3	3	4	
		TLP Grains counted	**11**	**43**	**74**	**303**	**307**	**339**	**318**	**161**
Lemnaceae	Lemnaceae	duckweeds								4
Potamogeton natans -type	Potamogetonaceae	broad-leaved pondweed				1	3	3		
Sparganium erectum	Typhaceae	branched bur-reed			2					7
Typha latifolia	Typhaceae	bulrush			1			1	1	2
Pteridium aquilinum	Dennstaedtiaceae	bracken		4	9	8	15	10	7	8
Polypodium	Polypodiaceae	polypody			1	6	4	4	8	1
Pteropsida (mono) indet		ferns		2	8	17	12	12	7	24

Table 1 Palynological results

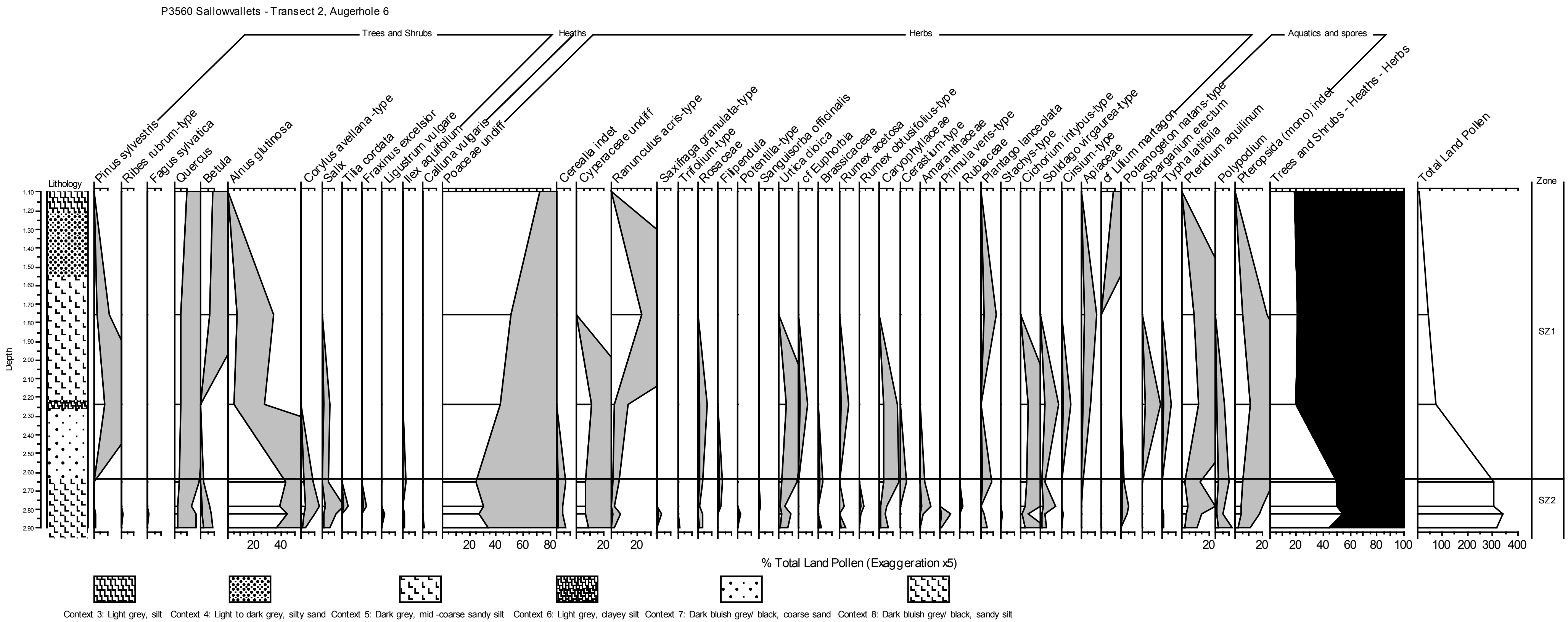

Figure 55 Pollen diagram for Sallowvallets BH6

Appendix B Geophysical survey report

Substrata
Archaeological Geophysical Surveyors

An archaeological gradiometer and earth resistance survey

Site so5500/05
East Wood, Tidenham
Forest of Dean, Gloucestershire

NGR 355947 200158

Report: 110718
Ross Dean BSc MSc MA MIfA

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Archaeological Geophysical Surveyors
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Email: geophysics@substrata.co.uk

Client:
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Senior Project Officer
Archaeology Service
Environment Directorate
Gloucestershire County Council
Shire Hall
Gloucester GL1 2TN

Appendix C **Report on OSL dating**

University of Gloucestershire

Geochronology Laboratories

Optical dating of sediments, Forest of Dean Archaeological Survey

to

J. Hoyle, Gloucestershire County Council

Prepared by Dr P.S. Toms, 22 December 2011

Appendix D **Scientific dating of earthwork systems**

This appendix is included as a separate pdf document

RESEARCH REPORT SERIES no. 53-2012

FOREST OF DEAN ARCHAEOLOGICAL SURVEY
SCIENTIFIC DATING OF EARTHWORK SYSTEMS SO6013/04 AND SO6013/26

SCIENTIFIC DATING REPORT

Phillip Toms, Gordon Cook, Christopher Bronk Ramsey and Alex Bayliss

INTERVENTION
AND ANALYSIS

ENGLISH HERITAGE

Forest of Dean Archaeological Survey Stage 3B

Survey for management of lidar-detected earthworks in Forestry Commission woodland

Project Number 5291 REC

Phase 2: Field evaluation of selected lidar-detected earthworks and characterisation of archaeology in Forestry Commission woodland

Project Report Volume 3: Appendices E - O

Jon Hoyle
Gloucestershire County Council
Archaeology Service

June 2013

Appendix E Pottery Analysis

E.i Assessment report

E.i.i Report

For: Gloucestershire County Council Archaeological Service
Site: GHER 37920; GHER 37921; GHER 37923
Site: Forest of Dean, Glos
Status: spot date/ assessment
Date: July 2011
Author: Jane Timby

Introduction

The archaeological work from the three phases of work resulted in an assemblage of 1127 sherds weighing 10,492 g and seven fragments of fired clay.

Where it can be dated the pottery seems to date exclusively to the Roman period. Some 421 sherds come from the base of a single, very friable large handmade vessel from context (907). Excluding this vessel the condition of the pottery sherds is variable with some quite fragmented sherds and other large pieces. This is reflected in an overall average sherd size of just 8.4 g which is quite low.

For the purposes of this assessment the pottery assemblage was scanned macroscopically and sorted into fabrics which were quantified by sherd count and weight. Table 1 summarises the data for each site and context.

GHER 37920

The investigation of lidar-detected terrace features resulted in the recovery of two sherds from a deposit of bloomery smelting waste. Both sherds are from a handmade Severn Valley ware storage jar. The vessel probably dates to the earlier Roman period but the form is a common one made throughout the Roman period.

GHER 37921

The investigation of lidar-detected terrace features at this location resulted in the recovery of 25 sherds from the colluvial deposit (201) and two very small unstratified crumbs.

All the sherds from (201) are Severn Valley wares but in very fragmented condition with an overall weight of just 64 g. There are no featured sherds present so the group can only be dated as Roman.

GHER 37923

The small rectangular earthwork produced a total 1098 sherds from 10 contexts.

The topsoil (900) produced a single abraded burnt sherd with traces of a red internal slip/glaze. The date of this piece is uncertain. The material sealed by the bank, context (910) produced nine sherds which includes two sherds of early Severn Valley ware and six sherds of Malvernian limestone-tempered ware suggesting a 1st -century AD date.

Most of the recovered assemblage came from the ditch fill (contexts 901-5; 907 and 911). As an assemblage from a single feature the group is slightly enigmatic and appears to contain wares of different date. The latest datable material is the Dorset/ South-west black burnished ware of which there are 68 sherds but all from horizons 902 and 903. These include plain, slightly curved wall dishes, flat rim dishes, a jug and jars. One of the jar bodysherds has a just oblique burnished-line lattice and one of the rims is quite well-everted indicating a date from the later 2nd or 3rd centuries. Accompanying the BB1 are 97 sherds of SVW OX with storage jar, flared rim jar, hooked rim jar, tankard and flanged beaded rim bowl which support such a date. Also present however are six sherds of handmade Malvernian ware and 17 small sherds from an imported Central Gaulish colour-coated roughcast beaker (Tomber and Dore 1998, 53, CNG CC2). These wares although made in the pre-Flavian period were more popular in the Flavian-Trajanic period. Further sherds of what must be the same beaker came from layer (904). Also from layer (904) are 81 sherds of SVW OX none of which are featured. However, layer (905) also produced a mixture of Malvernian limestone jars, SVW OX and BB1. The latter suggests a 2nd century date. The largest assemblage of pottery came from (907) with 1365 sherds. Most of these, some 421 sherds came from a very large handmade, oxidised, grog-tempered vessel. The sherds all came from the base of the vessel and some pieces had internal finger depressions. The walls of the vessel are very thick (40-50 mm) and the fabric is poorly fired making it extremely friable. Two options present themselves: this is either a very large early Roman storage vessel when the grog-tempering tradition was still used or it is the base of a prehistoric urn. The presence of other wares likely to be contemporary with a 1st -century grog-tempered tradition make this the most likely unless the earthwork is the disturbed remains of a Bronze Age burial mound. The same layer produced 229 sherds from several handmade Malvernian limestone-tempered jars and just seven sherds of SVW OX. Layers (910) and (911) produced nine and two sherds respectively also probably of 1st-century date. A single very small sherd of possible Beaker was recovered from a palaeoenvironmnetal sample of the lower fill of the ditch (917).

The test pit in the vicinity of the earthwork contained seven very small crumbs of pottery which are not datable.

Potential and further work

The pottery assemblage from GHER 37923 is quite an interesting one from the Forest of Dean and the group is difficult to interpret. It would be worth a short report if publication is envisaged accompanied by illustrations. The other recovered material is too degraded to contribute much to our understanding of the localities although clear Roman activity is present at GHER 37921.

E.i.ii Catalogue

	Context	SVW	MALV	BB1	CNG CC2	Other	Tot No	Wt	Fc	Date
GHER 37921	201	25	0	0	0	0	25	64	1	Roman
	N end	0	0	0	0	2	2	0.25		no date
Sub total		**25**	**0**	**0**	**0**	**2**	**27**	**64.25**	1	
GHER 37923	900	0	0	0	0	1	1	5		Date?
	901	0	0	0	0	4	4	6	5	Roman
	902	44	6	39	0	0	89	357		C3
	903	153	0	29	17	6	205	2171		C3
	904	81	0	0	6	1	88	820		C1
	905	2	37	3	0	0	42	413	1	C2
	907	7	229	0	0	421	657	6534	6	C1
	910	2	7	0	0	0	9	39		C1
	911	0	0	0	0	3	3	40		C1
	917	0	0	0	0	0	1	1		BA?
	1002	0	0	0	0	0	0	0	3	no date
Sub total		**289**	**279**	**71**	**23**	**436**	**1099**	**10386**		
GHER 37920	102	2	0	0	0	0	2	43		C1/C2
Sub total		**2**	**0**	**0**	**0**	**0**	**2**	**43**		

E.ii Report on pottery from so6316/07, Glos HER 37923

E.ii.i Report

For: Gloucestershire County Council Archaeological Service
Site: GHER 37923
Site: Ruardean, Woodside, Forest of Dean, Glos
Status: publication note
Date: July 2011 (revised October 2012)
Author: Jane Timby

Pottery (GHER 37923)

The small rectangular earthwork at Ruardean (GHER 37923) produced a total 1098 sherds from 10 contexts. The assemblage was sorted into fabric groups based on the principal inclusions present combined with the size and frequency of these. Named traded wares were coded following the national Roman fabric reference series (Tomber and Dore 1998). The sorted sherds were quantified by count and weight for each recorded context. A summary of the pottery from the site can be found in Appendix E.ii.ii below.

The topsoil (900) produced a single abraded burnt sherd with traces of a red internal slip/glaze. The date of this piece is uncertain. The horizon sealed by the bank, context (910), produced nine sherds which includes two sherds of early Severn Valley ware and six sherds of Malvernian limestone-tempered ware suggesting a 1st-century AD date.

Most of the recovered assemblage came from the ditch fill (contexts 901-5; 907 and 911). As an assemblage from a single feature the group is slightly enigmatic and appears to comprise wares of different date. The latest datable material is Dorset / South-west black burnished ware (DOR BB1 / SOW BB1) of which there are 68 sherds but all from horizons 902 and 903. These include plain, slightly curved-wall dishes (Figure 56, 2) flat-rim dishes (Figure 56, 7) a jug and jars. One of the jar bodysherds has a just-oblique burnished-line lattice and one of the rims is quite well-everted indicating a date from the later 2nd or 3rd centuries. Accompanying the BB1 are 97 sherds of SVW OX with storage jar, flared rim jar, hooked rim jar, tankard (Figure 56, 1, 3-6) and a flanged beaded-rim bowl which support such a date. Also present, however, are six sherds of handmade Malvernian ware and 17 small sherds from an imported Central Gaulish colour-coated roughcast beaker (Tomber and Dore 1998, 53, CNG CC2). These wares although made in the pre-Flavian period were more popular in the Flavian-Trajanic period. Further sherds of what must be the same beaker came from layer (904). Also from layer (904) are 81 sherds of SVW OX none of which are featured. The Central Gaulish beaker is the most datable item but could be a redeposited vessel. However, layer (905) also produced a mixture of Malvernian limestone jars, SVW OX and BB1 (Figure 56, 7). The latter suggests a 2nd century date; the former are a late survival. The largest assemblage of pottery came from (907) with 1365 sherds. Most of these, some 436 sherds came from a very large handmade, oxidised, grog-tempered vessel. The sherds all came from the base of the vessel and some pieces had internal finger depressions. The walls of the vessel are very thick (40-50 mm) and the fabric is poorly fired making it extremely friable. Two options present themselves: this is either a very large early Roman storage vessel when the grog-tempering tradition was still used or it is the base of a prehistoric urn. The presence of other wares likely to be contemporary with a 1st -century grog-tempered tradition make this the most likely unless the earthwork is the disturbed remains of a Bronze Age burial mound. The same layer produced 229 sherds from several handmade Malvernian limestone-tempered jars (Figure 56, 8-11) and just seven sherds of SVW OX all from a everted rim jar (Figure 56, 12). Layers (910) and (911) produced nine and two sherds respectively also probably of 1st-century date.

A single small potsherd was recovered from a palaeoenvironmnetal sample form the basal fill of the ditch (context 917). The sherd weighs 1g and comes from the body of a moderately thin-walled (4 mm) handmade vessel. The surfaces are red-brown with a grey core and the fabric is soft with a smooth, slightly waxy, feel. The paste appears to contain sparse sub-rounded grog / clay pellets and friable black inclusions, possibly charcoal. Given the size of the sherd and the lack of any other associated material identification can only be slightly speculative. The character of the paste, the firing pattern and the thin vessel walls suggest this may be Beaker dating to the earlier part of the second millennium BC. Such vessels are found in both domestic and funerary contexts and are often highly decorated.

The slightly enigmatic nature of the assemblage reflects other pottery groups recently studied from Dymock (Timby 2007) where a small amount of early South Gaulish samian, amphorae and imported mortaria would strongly suggest some form of official presence in the area. Whilst the coarse wares from Ruardean, have a strongly local indigenous feel with a high percentage of Seven Valley ware and native wares, the Central Gaulish colour-coated beaker is an unexpected find. Such vessels have been found on pre-Flavian military sites such as Usk and Kingsholm (Greene 1979, 47) but show a wider distribution across Britain in the Flavian-Trajanic period. It may be connected with some form of official presence, possibly tied in with the iron industry, with access to a modest supply of imported fine ware pottery and imported commodities, perhaps via Sea Mills or Gloucester, but generally relying on the local industries for everyday pottery needs or it may be a one-off personal possession.

References

Greene, K, 1979, Report on the excavations at Usk 1965-1976. The Pre-Flavian fine wares, University of Wales, Cardiff

Timby, J, 2007, Pottery, 155-71, in T. Catchpole, Excavations at the Sewage Treatment Works, Dymock, 1995, *TBGAS* **125**, 137-219

Tomber, R, and Dore, J, 1998 *The National Roman fabric reference collection: a handbook*, Museum of London / English Heritage/ British Museum

E.ii.ii Catalogue of pottery from GHER 37923

	Fabric	**Description**	**No**	**Wt (g)**
Imports	CNG CC2	Central Gaulish colour-coated	23	35
Regional	DOR BB1	Dorset black burnished	66	183
	SOW BB1	South-west black burnished	5	74
Native	GROG	hm thick-walled grog-tempered	436	4700
	GRLI	hm grog and limestone-tempered	7	31
	MAL REA	Malvernian rock-tempered	8	39
	MAL RE B	Malvernian-type limestone-tempered	271	1920
Local	SVW OX	Severn Valley ware	289	3364
	ESVW	early Severn Valley ware	2	18
Unknown	BW	black sandy ware	2	5
	GYMIC	grey micaceous sandy	3	12
	GY	grey sandy	1	5
	OXID	miscellaneous oxidised	2	3
	WSOXID	white-slipped oxidised	3	6
		Beaker?	**1**	**1**
TOTAL			**1116**	**10396**

E.ii.iii Illustrations

Catalogue of illustrated sherds

1. Flared rim jar. Fabric: SVW OX. (903).
2. Curved wall dish. Fabric: DOR BB1. (903).
3. Wide-mouthed, pendant rim jar. Fabric: SVW OX. (903).
4. Pendant rim jar. Fabric: SVW OX. (903).
5. Flared rim, wide-mouthed jar. Fabric: SVW OX. (903).
6. Tankard. Fabric: SVW OX. (903).
7. Flat-rim dish. Fabric: DOR BB1. Context (905).
8. Handmade jar with a thickened rim. Decorated with spaced vertical burnished lines. Fabric: MAL RE B. (907).
9. Handmade, everted rim jar. Fabric: MAL RE B. (907).

10. Handmade, beaded rim jar. Burnished exterior. Fabric: MAL RE B. (907).
11. Handmade, everted rim jar. Fabric: MAL RE B. (907).
12. Wheelmade everted rim jar. Fabric: SVW OX. (907).

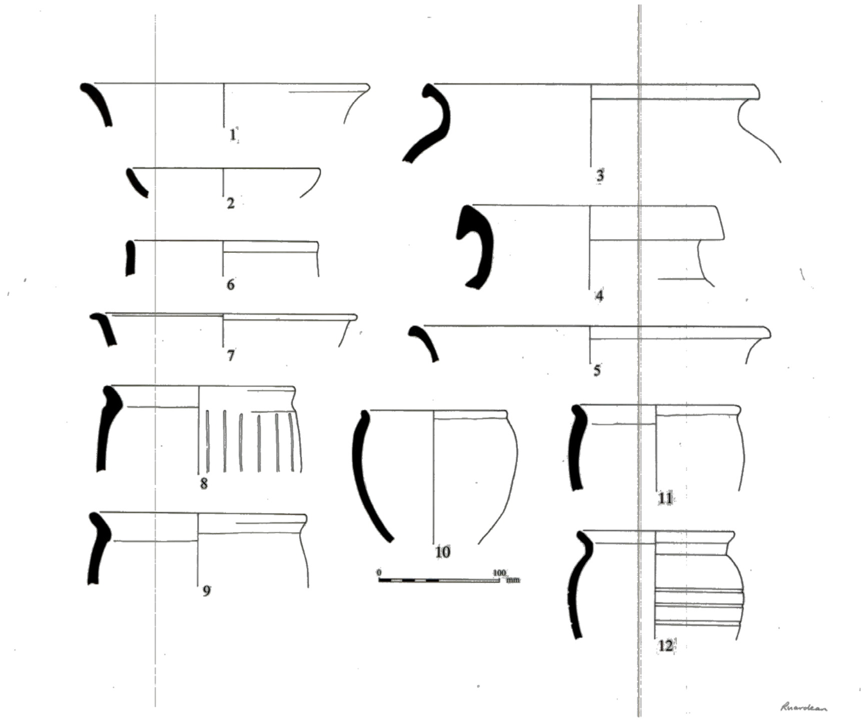


Figure 56: Selected illustrations of pottery from so6319/07

Appendix F Archaeometallurgical residues

F.i Evaluation of archaeometallurgical residues

GeoArch

Report 2011/32

Evaluation of archaemetallurgical Residues from the Forest of Dean Archaeological Survey, Stage 3B phase 2 (37920/37921/37923/37934)

Dr Tim Young

24th September 2011

F.ii Investigation of bloom from Glos HER 37920

GeoArch

Report 2012/21

Investigation of a bloom fragment from
Cannop, Forest of Dean
(Glos HER 37920)

Dr Tim Young
17th July 2012

F.iii Analysis of archaeometallurgical residues from Glos HER 37920

GeoArch

Report 2013/05

Analysis of archaeometallurgical
Residues, Cannop, Glos.
(Glos HER 37920)

Dr Tim Young
14th March 2013

Appendix G Saw fragment from subrectangular enclosure so6316/07

Report submitted to Archaeology Service Gloucester CC by HEM Cool, April 2012

In the Roman period fragments from saws are not uncommon. Both hand- and bow-saws normally had the back parallel to the toothed edge, and the blades of hand-saws can be quite narrow. This can make it difficult to decide which type small fragments such as the fragment from Ruardean come from. Various features of this fragment, however, suggest it came from a bow-saw. The teeth are not set and appear fairly symmetrical. This would be more appropriate for a bow-saw where both ends are fixed and so the blade is kept under tension. Given that Roman iron was soft, there was always the danger of the blade buckling during use, and for this reason Roman saw blades often have teeth that slope backwards (Manning 1974, 162 nos. 356-60, fig. 70). This would have been especially important in the case of a hand-saw, so approximately symmetrical teeth are more likely on a bow-saw. Four teeth to the centimetre as here is a common count on Roman saws and does not suggest any particularly specialised use for the piece.

The unusual handle attachment arrangements would also point to this being a long bow-saw rather than being from a hand-saw as those tend to be relatively short. The split lower edge which currently retains a mineralised deposit, seems to have been designed to be set into a handle. This would certainly have made the seating of the blade more secure than the normal handle attachment. That usually consists of perforations for one or two rivets that held the blade between the two parts of the handle. An example can be seen on one from Irby on the Wirral, where the mineralization has preserved parts of the wooden handle *in situ* (Cool 2010, 157 no. 298, fig. 14.17). Equally though, to be effective the handle block would have had to have projected below the toothed edge. This would not have interfered with the function of a bow-saw but would have impeded a short hand-saw.

Saws of either type tend to be recovered as relatively small blade fragments and so less is known about the hafting of them, and whether there were any functional, regional or chronological differences. This fragment was associated with second to third century pottery, and it is interesting to note that one from a later third century pit fill at Silchester is described as having a thickened terminal (Crummy 2011, 118, fig. 60 no. 69). This suggests that within the region there may have been some variety in hafting techniques by the third century.

Catalogue

Saw blade; iron; two joining fragments. Back and saw edge parallel, expanding very slightly in depth over handle attachment. Four teeth per centimetre, not set and approximately symmetrical; larger V-shaped notch sloping back behind teeth at junction with terminal. Terminal split along lower edge and encloses remains of wooden handle, broken across centrally placed circular perforation that would have been at the upper edge of the wooden insert. Small additional wedge of iron and mineralised products on one side of blade at back and above the large notch. Present length 61mm, depth (blade) 15mm, (terminal) 18mm, thicknees (blade) 2mm, (terminal) 9mm. (903).

Bibliography

Cool, H.E.M. 2010. 'The metal objects', in Philpott, R.A. and Adams, M.H. *Irby, Wirral. Excavations on a Late Prehistoric, Romano-British and Medieval Site, 1987-96* (Liverpool), 154-62

Crummy, N. 2011. 'The small finds', in Fulford, M. and Clarke, A. *Silchester: City in Transition*, Britannia Monograph 25 (London), 100-32.

Manning, W.H. 1974. 'Objects of iron', in Neal, D.S. *The Excavation of the Roman Villa in Gadebridge Park Hemel Hempstead 1963-8,* RRCSAL 31, 157-87.

Figure 57: Saw blade from so6316/07 (Glos HER 37923), context (902): Scale mm

Appendix H Selected artefacts

H.i Flint

H.i.i Flint flake from so6013/26 (Glos HER 37921), context (200)

Scale (mm)

H.i.ii Flint flake from so5500/05 (Glos HER 37924), context (300)

Scale (mm)

H.ii Stone objects

H.ii.i Whet stone from context (902)

Scale (mm)

Appendix I Finds catalogue

I.i Earthwork system so6013/04 (Glos HER 37920)

Context	Bloomery Slag No	Bloomery Slag Wt (g)	Furnace Lining (No)	Furnace Lining Wt (g)	RB Pot (No)	RB Pot Wt (g)	Charcoal (No)
100	76	4000					
100/101	12	580					
101	634	45200					
102	18	3000			2	43	
103							
104							
105	277	24000					
106							
107	occasional in sample						
108							
109							
110							
111							
112							
113							
114	435	13414	11	214			3
115							
115/116	58	6500					
116	420	5000	25	139			1

I.ii Earthwork system so6013/26 (Glos HER 37921)

Context	Bloomery Slag (No)	Bloomery Slag Wt (g)	RB Pot (No)	RB Pot Wt (g)	Flint (No)	Flint Wt (g)
200	2	57			1	9
201	16	956	26	64		
202						
203						
204						
205	1	165				

I.iii Subcircular enclosure so5500/05 (Glos HER 37923)

Context	Bone (No)	Bone (Wt)	Flint (No)	Flint Wt (g)	Bloomery Slag (No)	Bloomery Slag Wt (g)
300			1	2		
301						
302						
303	1 (burnt)	0.15				
304					1 (ore)	23
305						
306						
307						
308						

I.iv Subrectangular enclosure so6316/07 (Glos HER 37924)

Context	Bloomery Slag (No)	Bloomery Slag Wt (g)	Pot (No)	Pot Wt (g)	Pot Date	Charcoal (No)	Charcoal Wt (g)	Fe (No)	Fe Wt (g)	Bone (No)	Bone Wt (g)	Other (No)	Other Wt (g)
900			1	5	PM								
901			9	22	RB	1	3						
902	19	700	95	365	C3	7	9	11	190			1 (whetstone) 1 (pebble)	137 19
903	25	1930	214	2178	C3	12	70	8	39			2 (pebble)	189
904	8	2500	92	824	C1	1	1						
905	3	743	44	433	C2								
906													
907	1	237	394	6779	C1	15	12			43 (cattle? teeth and jaw)	87		
908													
909													
910			9	41	C1								
911	5	139	3	40	C1								
912													
913													
914													
915													
916													
917			1	1	BA?								
918													
1002			7	4	undatable								

Appendix J Context information

J.i Earthwork system so6013/04 (Glos HER 37920)

Context	Below	Above	Same As	Type	Interpretation
100		101, 105, 114		Layer	Topsoil
100/101		N/A		Layer	Interface between topsoil and layer containing smelting waste
101	100	102, 104, 111	115, 105?	Layer	Deposit of smelting waste at top of slope
102	101	103, 108		Fill/layer?	Tree throw/deposit of smelting waste at top of slope
103	102, 116	107	109	Layer	Colluvium
104	101, 105, 107	106		Structure?	Bank retaining colluvium?
105	100	104	101?	Layer	Deposit of smelting waste at bottom of slope
106	104	108		Layer	Undisturbed natural subsoil
107	103, 108	104		Layer	Colluvium
108	106			Layer	Undisturbed surface of natural sandstone
109	102	107	103	Layer	Colluvium?
110	101		104	Structure?	Remains of bank retaining colluvium in northern extension of trench
111	101	110		Structure?	Remains of bank retaining colluvium in northern extension of trench? Softer material may be more weathered
112	110		106	Layer	Undisturbed natural subsoil in northern extension of trench
113	114	115		Cut?	Possible cut but may be division between layers within 114/115
114	100	113		Fill/layer?	Possible fill of 131, but may be tip line within deposit of bloomery waste in western extension of trench
115	113	116		Layer	Deposit of smelting waste at top of slope - western extension
115/116	N/A			Fins no	Finds no for slag from 115 and 116 retained together
116	115	103		Layer	Deposit of smelting waste at top of slope - western extension

J.ii Earthwork system so6013/26 (Glos HER 37921)

Context	Below	Above	Type	Interpretation
200		201	Layer	Topsoil
201	200	205	Layer	Colluvium
202	204	203	Layer	Undisturbed subsoil?
203	202		Layer	Undisturbed bedrock surface
204	205	202	Cut	Tree throw hollow
205	201	204	Fill	Fill of tree throw 204

J.iii Subcircular enclosure so5500/05 (Glos HER 37923)

No	Below	Above	Same as	Type	Interpretation
300		301, 302, 303,304, 307		Layer	Topsoil/leaf litter
301	300	308		Layer	Subsoil-interspersed with rubble bank material
302	300	308		Layer	Soil matrix within rubble bank material/subsoil-interspersed with rubble bank
303	300	308		Layer	Subsoil-interspersed with/sealing with rubble bank material
304	300	308		Layer	Subsoil
305	306	301, 302, 303,304, 307		Cut	Tyre tracks
306		305	300	Fill	Topsoil/leaf litter filling tyre tracks 305

No	Below	Above	Same as	Type	Interpretation
307		308	301, 302, 303,304	Layer	Subsoil below leaf litter beyond inner face of bank
308	301, 302, 303,304, 307			Structure	Rubble bank material

J.iv Subrectangular enclosure so6316/07 (Glos HER 37924)

No	Below	Above	Same as	Within	Fill of	Filled by	Type	Interpretation
900		918, 909, 911	900, 1100					Topsoil/leaf litter
901	918	902	911					Subsoil ne of bank
902	901	903			908		Fill	Upper fill of 908
903	902	904			908		Fill	Fill of 908
904	903	906			908		Fill	Fill of 908
905	906	916	907		908		Fill	Redeposited stony bank material filling 908
906	904	905, 907			908		Fill	Redeposited less stony bank material filling 908
907	906	917	905		908		Fill	Redeposited stony bank material filling 908
908	916, 917	914				902, 903, 904, 905, 906, 907, 916, 917	Cut	Ditch
909	900	910					Structure	Bank
910	909	914					Layer	De-turfed subsoil below bank
911	900	913					Layer	Subsoil to west of bank
912	913	914				913	Cut	Feature in western part of trench - possible tree throw/archaeological?
913	911	912				912	Fill	Sandstone rubble fill
914	908, 910, 912						Layer	Natural undisturbed sandstone
915								Number not used?
916	905	908	917		908		Layer	Primary silting of 908 on inner face
917	907	908	916		908		Layer	Primary silting of 908 on outer face
918	900	901		901			Layer	Area of disturbance within 901 - recent tree disturbance?
Test pit 10								
1000		1001	900, 1100				Layer	Topsoil
1001	1000	1002					Layer	Subsoil
1002	1001	1003					Layer	Subsoil
1003	1002						Layer	Natural undisturbed sandstone
Test pit 11								
1100		1101	900, 1100				Layer	Topsoil
1101	1100	1102					Layer	Subsoil
1102	1101						Layer	Natural undisturbed sandstone

Appendix K Detailed records of standing stones

K.i Details of standing stones

Stone	Stone no. in 2010	Length at base (cm)	Width at base (cm)	Max. Height (cm)	Angle	Comments	Status
1	*1*	34	12	28	Vertical	Considerable weathering of bedding planes in limestone, an much lichen coverage	Standing stone
2	*2*	52	17	40	Slight lean to N	Very weathered. Width varies but average around 17cm	Standing stone
3	*3*	31	12	33	80° to N	Less weathered than other stones. Considerable lichen cover	Standing stone
4	*4*	50	27	50	60° to N	Width tapers to 15-20cm at top. Fairly weathered, lichen on N and W sides	Standing stone
5	*5*	62	17	38	65° to W	S end of base tapers to 12cm. Much lichen on all sides. Fragment recently broken from the W side of top (found adjacent)	Standing stone
6	*6*	51	13	27	Vertical	Fairly weathered with weathering to joints. Lichen particularly on E side.	Standing stone
7	*Not rec.*	36	20	20	80° to N	Lichen cover on top and S side	Unclear
7a	*8*	31	5-6	17	Vertical	Fairly thin, but position suggests genuine standing stone. Fairly weathered, lichen on E side	Standing Stone?
8	*7*	46	5-6	23	Vertical	Fairly thin Fairly thin, but position suggests genuine standing stone. Fairly weathered, lichen on E side	Standing stone
9	*9*	74	20-23	35	Vertical	Largest stone, some weathering in joints, severe weathering on S face.	Standing stone
10	*10*	51	11-18	16	70° to NE	Heavily weathered in joints. 2 types of lichen mainly on E side	Standing stone
11	*Not rec.*	23	15-17	12	Vertical	Stump only – mostly *c.* 10cm high. Considerable weathering in joints, much lichen and possible recent split	Standing stone?
12	*Not rec.*	44	16	26	Vertical	Not on inner face of bank and not securely embedded in bank. Fairly weathered in joints and some lichen cover on top	Unclear
13	*Not rec.*	62	10	20	65° to W	Discovered on excavation, did not protrude above surface of bank pre excavation and was no higher than stones in fabric of bank to W	Unclear

K.ii Photographs of standing stones

Stone 1: Scale at 1m with 0.5m divisions


View direction: West


View direction: South

Stone 2: Scale at 1m with 0.5m divisions


View direction: North


View direction: East

Stone 3: Scale at 1m with 0.5m divisions


View direction: North


View direction: West

Stone 4: Scale at 1m with 0.5m divisions


View direction: North


View direction: East

Stone 5: Scale at 1m with 0.5m divisions


View direction: East


View direction: South

Stone 6: Scale at 1m with 0.5m divisions


View direction: East


View direction: South

Stone 7: Scale at 1m with 0.5m divisions


View direction: East


View direction: South

Stone 7a: Scale at 1m with 0.5m divisions


View direction: South


View direction: West

Stone 8: Scale at 1m with 0.5m divisions


View direction: Southeast


View direction: Southwest

Stone 9: Scale at 1m with 0.5m divisions

View direction: South

View direction: East

Stone 10: Scale at 1m with 0.5m divisions

View direction: Northeast

View direction: Northwest

Stone 11: Scale at 1m with 0.5m divisions

View direction: North

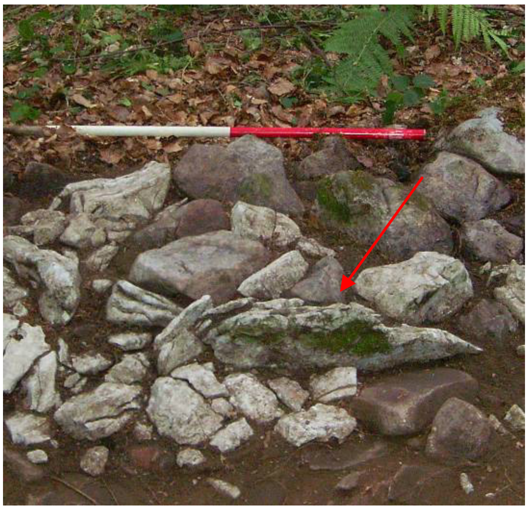
View direction: East

Stone 12: Scale at 1m with 0.5m divisions

View direction: South

View direction: East

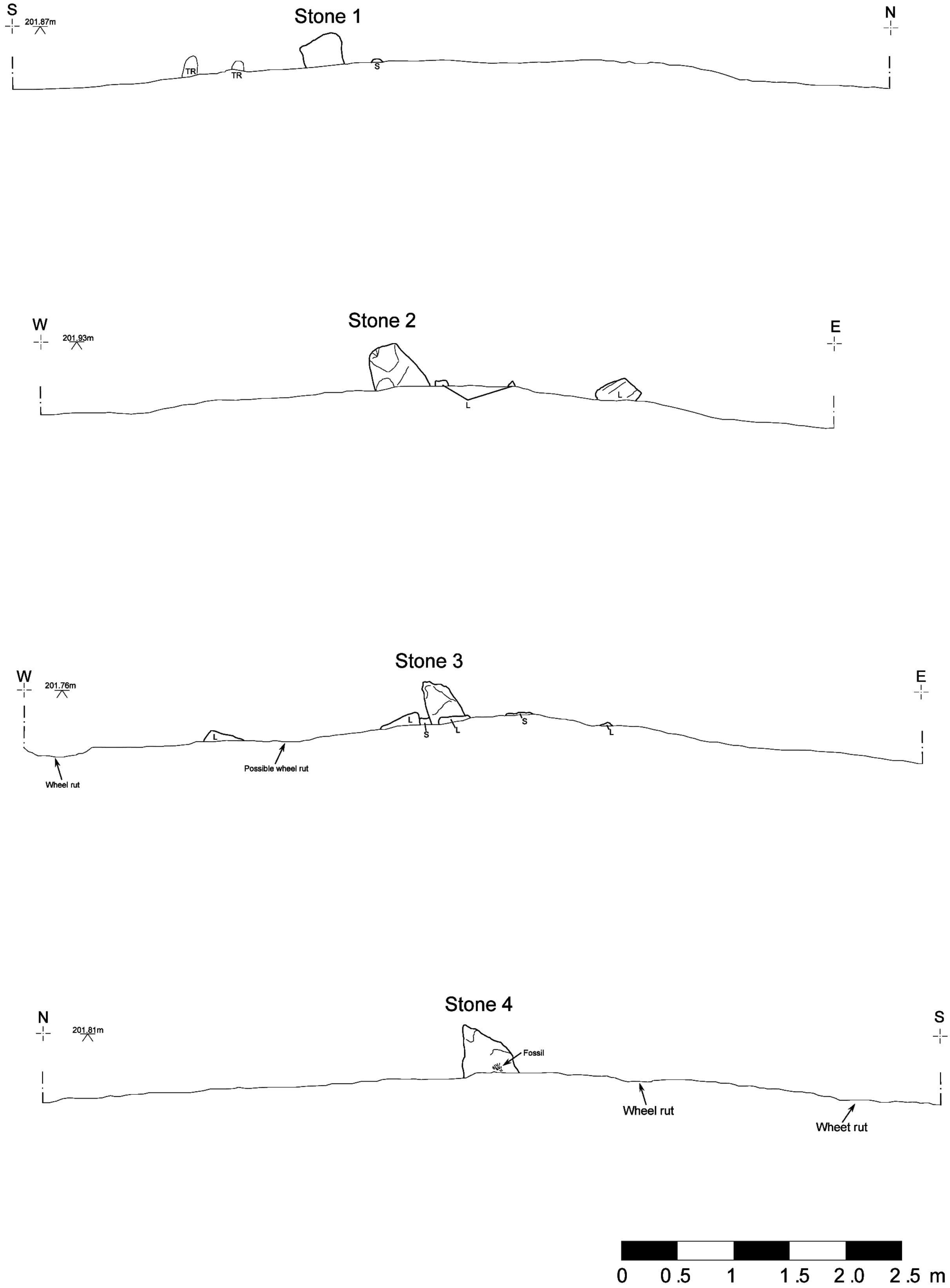
Stone 13: Scale at 1m with 0.5m divisions

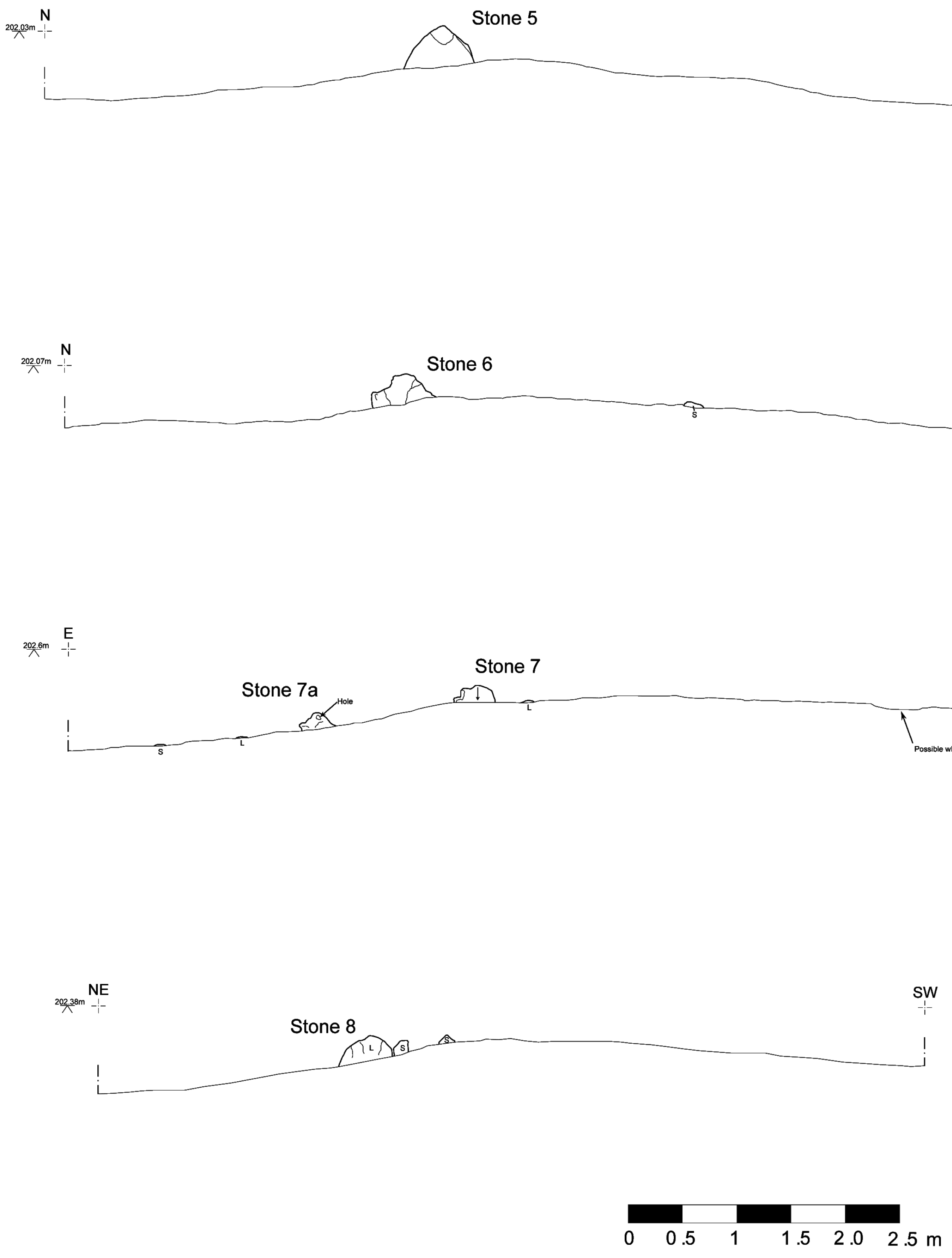


View direction: West

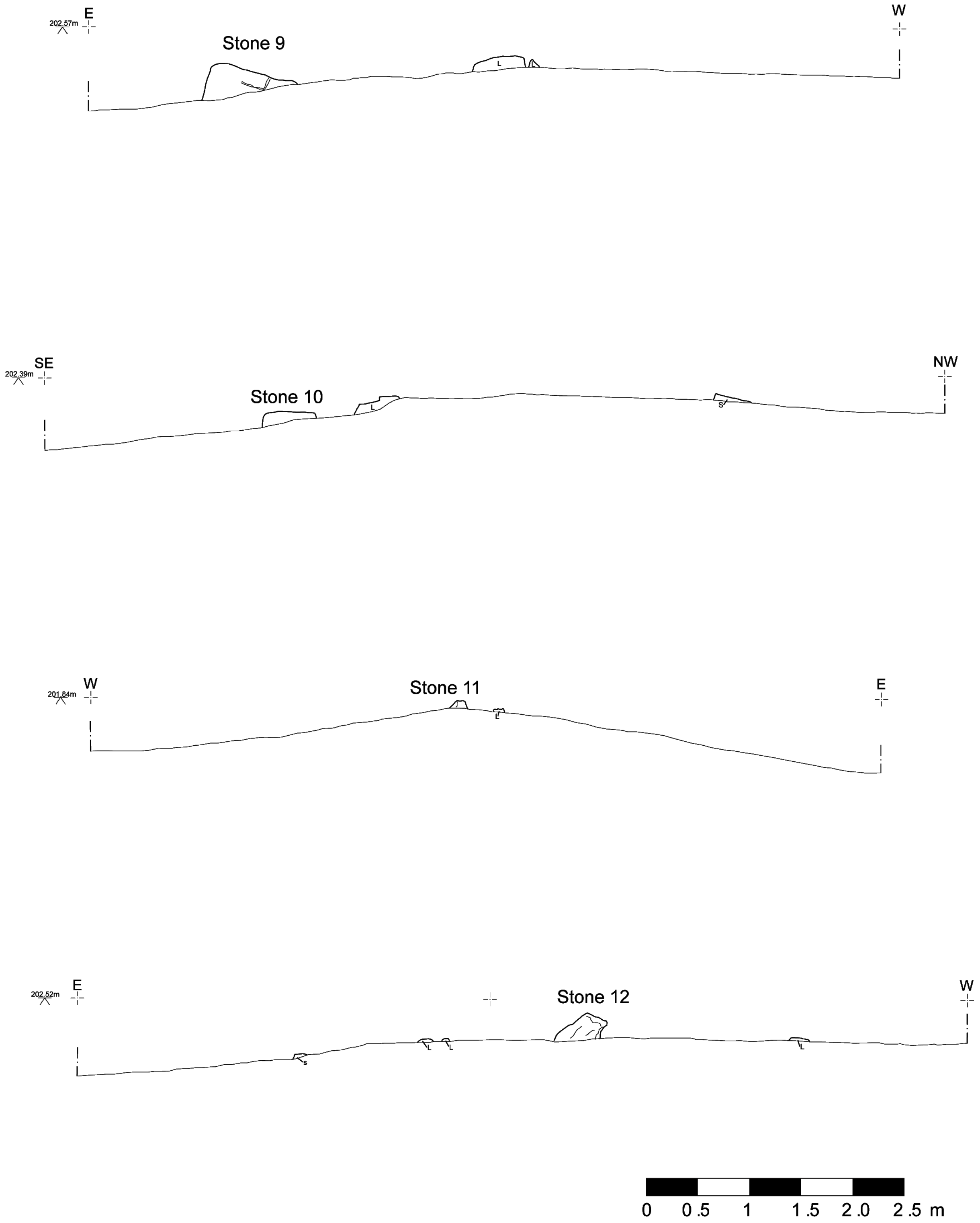
View direction: North

K.iii Profiles of standing stones



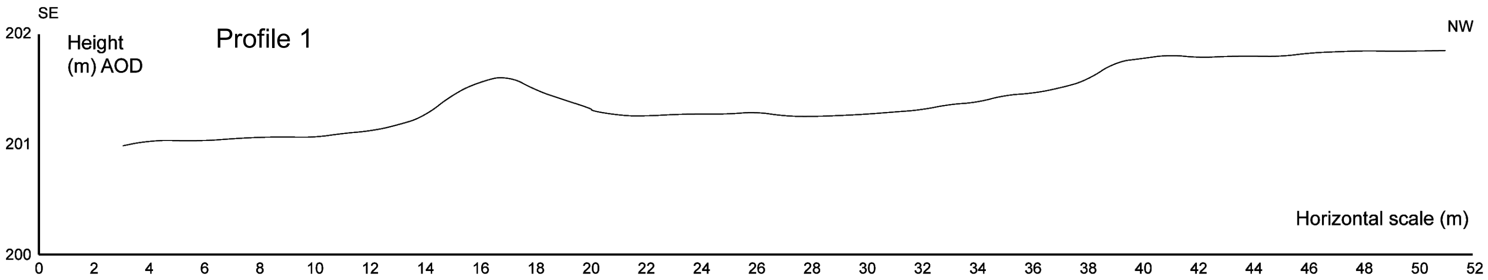


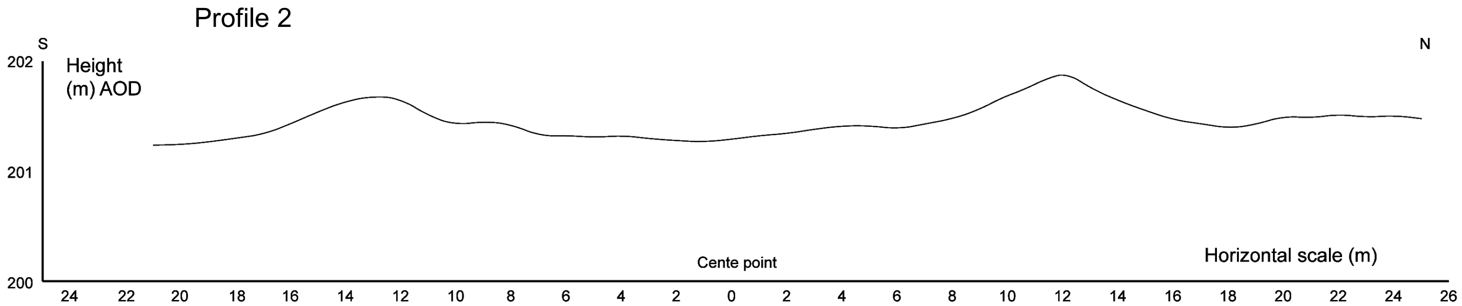
Stone 5
202.03m
N
S
Stone 6
202.07m
N
S
Stone 7a
Stone 7
202.6m
E
W
Hole
Possible wheel rut
L
S
Stone 8
202.38m
NE
SW
0 0.5 1 1.5 2.0 2.5 m

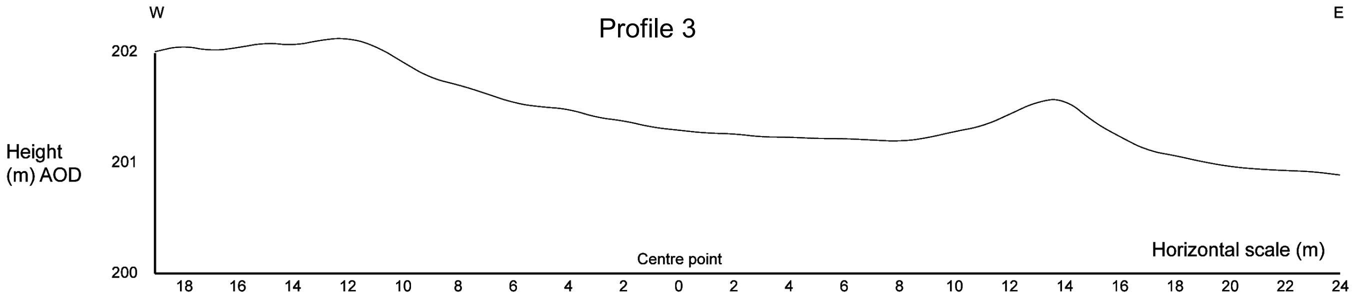

202.57m
E
Stone 9
W
202.39m
SE
Stone 10
NW
201.84m
W
Stone 11
E
202.52m
E
Stone 12
W
0
0.5
1
1.5
2.0
2.5 m

Appendix L Profiles across subcircular enclosure so5500/05

L.i Profiles recorded using dumpy level. Vertical scale exaggerated by ration of 4:1







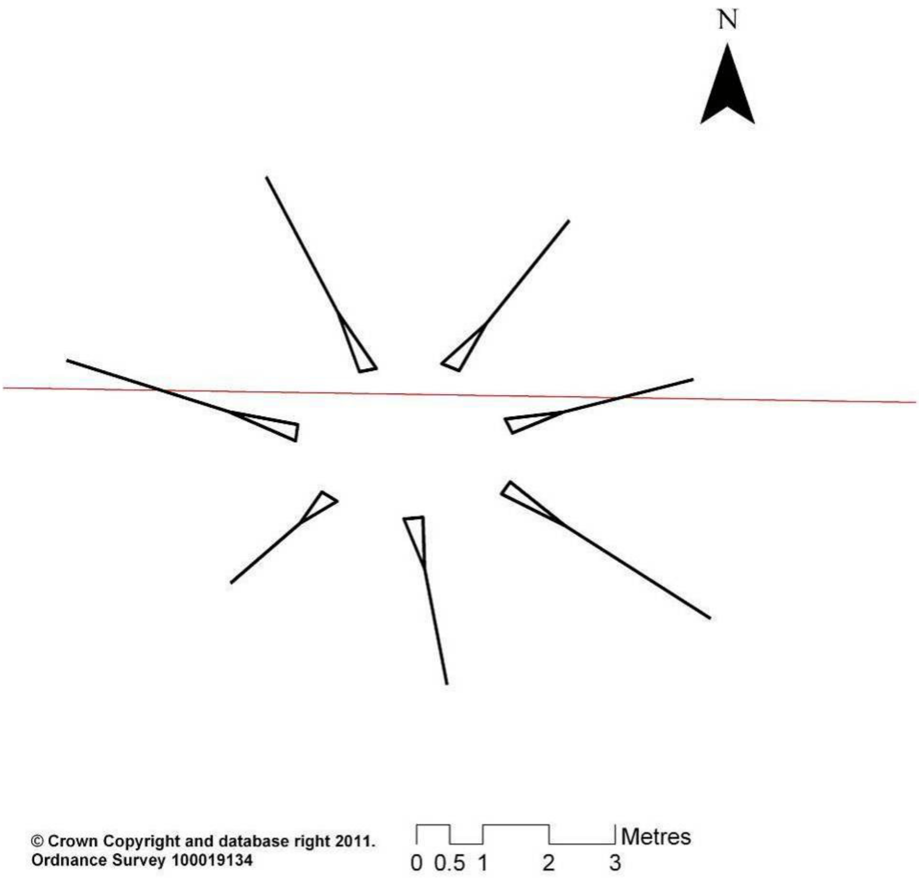
L.ii Profiles recorded using hand-held level. Vertical scale exaggerated by ration of 2:1

Profile 4

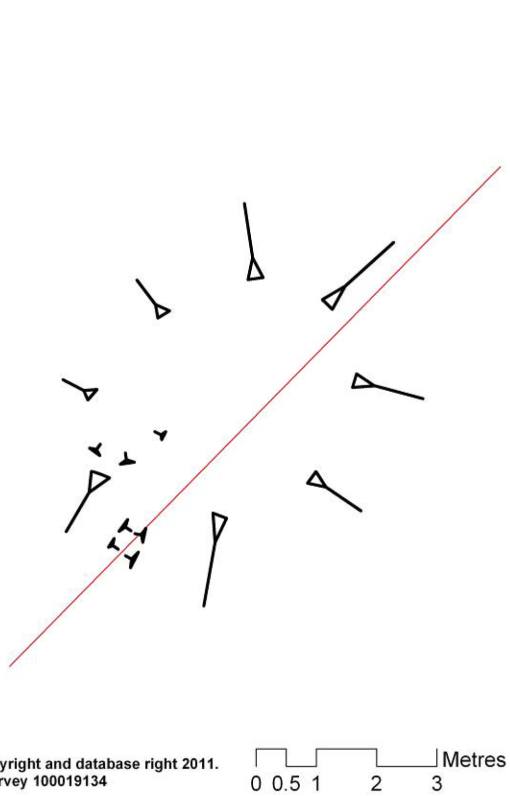
Profile 5

Appendix M So5500/05: Features 2 and 3: Plans and profiles

M.i Feature 2



M.ii Feature 3



Appendix N Test Pits and auger samples

N.i Subcircular enclosure so5500/05, Glos HER 37924

Test pit 4

Context No	Description	Depth below surface (m)	Interpretation
400	Humic layer	0.00-0.02	Leaf litter
401	Dark brown silt	0.02-0.07	Topsoil
402	Light yellowish brown silt	0.07-0.09	Subsoil
403	Mid reddish clayey silt with some small sandstone fragments.	0.09-0.96	Subsoil

Test pit 5

Context No	Description	Depth below surface (m)	Interpretation
500	Humic layer	0.00-0.06	Leaf litter
501	Dark brown silty clay	0.06-0.13	Topsoil
502	Red brown sandy silt some small sandstone fragments increasing in concentration towards base.	0.13-0.0.70	Subsoil

Test pit 6

Context No	Description	Depth below surface (m)	Interpretation
600	Humic layer	0.00-0.01	Leaf litter
601	Mid brown silt	0.01-0.09	Topsoil
602	Mid reddish brown clay silt becoming increasingly clayey towards base.	0.09-0.47 to 0.75	Subsoil
603	Dark brown clay	0.47 to 0.75-0.47 to 0.76	Subsoil
604	White limestone.	0.47 to 0.76 limit of excavation	Bedrock

Test pit 7

Context No	Description	Depth below surface (m)	Interpretation
700	Humic layer	0.00-0.01	Leaf litter
701	Mid brown silt with loose fragments of subangular limestone.	0.01-0.25	Topsoil
702	White limestone	0.25 limit of excavation	Bedrock

Test pit 8

Context	Description	Depth below surface (m)	Interpretation
800	No description	0.00 - 0.02	Topsoil/leaf litter
801	Dark brown silt clay	0.02 – 0.18	Subsoil with much root disturbance-
802	Dark reddish brown clay silt with no inclusions.	0.18 – 0.32	Subsoil below root disturbance
803	Light reddish brown clay silt with no inclusions.	0.32 - 0.37	subsoil

N.ii Subrectangular enclosure so6316/07, Glos HER 37923

Test pit 10

Context No	Description	Depth below surface (m)	Interpretation
1000	Dark brown humic soil with roots	0.00 - 0.05	Topsoil
1001	Dark greyish brown sandy silt	0.05 – 0.12	Subsoil
1002	Light greyish yellow silt with some stones (sandstone). This deposit contained 7 small fragments of undatable pottery.	0.12 – 0.32	Subsoil
1003	Sandstone fragments in matrix of yellow sandy silt	0.32 – 0.40	Undisturbed sandstone bedrock

Test pit 11

Context No	Description	Depth below surface (m)	Interpretation
1100	Dark brown humic soil with roots	0.00 - 0.08	Topsoil
1101	Light brown sandy silt with occasional small sandstone fragments	0.08 – 0.53	Subsoil
1102	Sandstone fragments in matrix of light brown sandy silt	0.53 – 0.61	Undisturbed sandstone bedrock

N.iii Earthwork system so6013/04, Glos HER 37920

Auger core 1 – 3m to west of trench

Depth below surface (m)	Description	Interpretation
0.00 - 0.09	No description	Topsoil
0.09 – 0.44	Same as (115)	Slag-rich soil above colluvium
0.44 – 0.64	Pale yellowish brown clay silt with small angular sandstone fragments.	Colluvium
0.64-0.95	Very light brown silty clay with frequent sandstone fragments	Surface of the undisturbed sandstone bedrock?
0.95 (limit of sample)	Very stony	Undisturbed sandstone bedrock

Auger core 2 – 4m to west of trench

Depth below surface (m)	Description	Interpretation
0.00 - 0.14	No description	Topsoil
0.14 – 0.22	No description	Soil above colluvium
0.22-0.46	Core void	
0.46-0.54	Mid brown friable silt clay with some sandstone fragments and charcoal	Colluvium
0.54-0.65	Core void	
0.65-0.76	Light brown clay silt with small sandstone fragments and possible small charcoal flecks	Colluvium? / Surface of the undisturbed sandstone bedrock?
0.76-0.95	Very light silty clay with sandstone fragments	Surface of the undisturbed sandstone bedrock
0.95-1.00	Similar to (106)	Surface of the undisturbed sandstone bedrock
1.00 (limit of sample)	Stone	Undisturbed sandstone bedrock

N.iv Earthwork system so6013/26, Glos HER 37921

Auger core 3 – 2m to north of trench

Depth below surface (m)	Description	Interpretation
0.00 - 0.04	No description	Topsoil/leaf litter
0.04 – 0.12	Mid greyish brown clay silt	Topsoil
0.12 – 0.44	Light yellow brown clay silt with occasional sandstone fragments.	Colluvium
0.44 (limit of sample)	Very stony	Undisturbed sandstone bedrock?

Appendix O Woodland Historic Landscape characterisation: methodology

O.i Methodology for Step 1: Dividing HER records into information for Heritage Character Components

Action 1: Extracting data from HER

Select polygon of area of woodland being characterised and create a shapefile

Compare with HER applying a buffer of 0.25km

Export data from the HER as an excel table

Action 2: Identifying required HER fields

Keep the following headings in the excel spreadsheet

- AREA NUMBER
- SITE NUMBER
- GENERAL TYPE
- SPECIFIC TYPE
- GENERAL PERIOD
- SPECIFIC PERIOD
- CONSTRUCTION DESCRIPTION
- GRID REFERENCE
- DESCRIPTION

Delete other fields
Apply the filter tool to the spreadsheet (Data tab → Filter button)

SAVE THIS EXCEL FILE – CALL IT *location tag/data exported from HER*

Action 3: Sorting by category

Create copy of /data exported from HER file – call it ***location tag/processed HER data.*** All future work should be in this file

Copy and paste the GENERAL TYPE column to create a new column called AMALGAMATED TYPE.

Retain the original GENERAL TYPE column, but divide/combine/edit the AMALGAMATED TYPE column in the following way

HER GENERAL TYPE	Action
AGRICULTURE AND SUBSISTENCE	Retain if clearly agricultural and rename as AGRICULTURAL – If these are associated with sites in other categories re-assign to those categories – e.g. industrial banks → INDUSTRY. Woodbanks/linear earthworks with no specific association should be reassigned as EARTHWORK. NB agricultural sites which are contiguous with contemporary settlement sites should be classed as SETTLEMENT
CIVIL	Combine with SETTLEMENT

HER GENERAL TYPE	Action
COMMEMORATIVE	Retain, but delete place names or small scale discrete features e.g. Named Trees. **NB** class any COMMEMORATIVE sites which are whether contiguous with or within contemporary settlement as SETTLMENT
COMMERCIAL	Combine with SETTLEMENT or INDUSTRIAL as appropriate
COMMUNICATIONS	Retain unless these are mineral tramways or railways - in which case combine with INDUSTRIAL. If they are associated with sites in other categories re-assign to those categories
DEFENCE	Retain but rename as MILITARY. Re-assign any sites (e.g. Iron Age hillforts) where this designation is not appropriate
DOMESTIC	Rename as SETTLEMENT
EVENT	DELETE
EDUCATION	Combine with SETTLEMENT
GARDENS PARKS AND URBAN SPACES	Combine with SETTLEMENT
HEALTH AND WELFARE	Combine with SETTLEMENT
INDUSTRIAL	Separate charcoal platforms into new category: CHARCOAL PLATFORM
MARITIME	Retain
MONUMENT <BY FORM>	Combine with other types if appropriate. Search the SPECIFIC TYPE column and separate undated Earthworks into a new AMALGAMATED TYPE called EARTHWORK – if these are associated with sites in other categories (e.g. INDUSTRIAL sites) re-assign to that category Separate FINDSPOTs into new AMALGAMATED TYPE called FINDSPOT check the DESCRIPTION column to ascertain the date of the finds – where finds are within (and part of) in another category (e.g. prehistoric finds from a prehistoric site) delete them. Combine Lidar sites with other categories if appropriate. Retain discrete features like STONES to see if they conform to Step 2 criteria for inclusion as Archaeological Zones.
RECREATIONAL	Retain unless either contiguous with or within contemporary settlement, in which case class as SETTLMENT?
RELIGIOUS RITUAL AND FUNERARY	Retain? But rename as RITUAL
TRANSPORT	Combine with COMMUNICATION unless these are mineral tramways or railways - in which case combine with INDUSTRIAL. If they are associated with site in other categories re-assign to those categories
UNASSIGNED	Combine with other categories as appropriate Lidar Hollows → INDUSTRIAL Delete Lidar Features. Delete Placenames
WATER SUPPLY AND DRAINAGE	Combine with other categories as appropriate e.g. Wells → SETTLEMENT, Ponds/Drainage → INDUSTRIAL unless clearly AGRICULTURAL.

NB check entries are correctly categorised and re-assign as appropriate

SAVE THE EXCEL FILE AT THIS POINT!

Action 4

Action 4 should be undertaken in the following way:

Copy and paste the GENERAL PERIOD column to create a new column called AMALGAMATED PERIOD. For multi-period sites a separate AMALGAMATED PERIOD column should be used for each general period represented.

Retain the original GENERAL PERIOD column, but divide/combine/edit the AMALGAMATED PERIOD column in the following way

HER GENERAL PERIOD	Action
PREHISTORIC (500,00BC – AD43)	Retain
ROMAN (AD43 – 410)	Retain but rename ROMANO-BRITISH
EARLY MEDIEVAL (410 – 1066)	Retain
MEDIEVAL (1066 – 1540	Retain
POST MEDIEVAL (1540 – 1901)	Separate data by SPECIFIC PERIOD. Assign entries up to and including (COMPONENT 17) to EARLY POST MEDIEVAL. Combine entries which include COMPONENT 18 or later to LATE POST MEDIEVAL unless description clearly indicates they are EARLY POST MEDIEVAL. Where specific date is not recorded see UNKNOWN
MODERN (1901 – PRESENT)	Combine with LATE POST MEDIEVAL
UNKNOWN	Retain but rename PRE-MODERN DATE UNCERTAIN unless description indicates period e.g. Forestry Enclosures, clearly post 18th century industrial sites such as Foundries, deep mining sites or associated spoil heaps, Targets, Shooting ranges → LATE POST MEDIEVAL

SAVE THE EXCEL FILE AT THIS POINT!

Action 5: Removal of duplicate HER records

Remove any duplicates in each category

- Using the filter tool select the different categories e.g. Historic Agriculture
- Check Area Numbers column for duplicates and delete as appropriate

O.ii Methodology for Step 2: Creating Heritage Character Component maps

Action 6: Creation of maps from sorted HER data

Once sites have been separated out as above it will be necessary to produce maps showing the separate categories. This can be achieved using comma separated files can then be used in the HER to extract data. The data can then be displayed in ArcMap

IN EXCEL

- Using the filter tool select the different categories e.g. Historic Agriculture
- Copy the Area Numbers column
- Open a new blank spreadsheet

- Paste the Area Numbers onto this using the Paste Special tool with the Transpose box ticked (so the Area Numbers appear in a row rather than a column)
- Save as a CSV (comma delimited) file. Repeat for each category.
- Open CSV files in Notepad
- Copy the row of Area Numbers

  IN SMR:
- Paste into HER Area Icon list box (minimise displayed records before doing this – button with hands)
- Select Display on Cogis button (open Woodland characterisation mxd to do this)

  IN ARCMAP:
- Tick FEATURES SENT FROM SMR SEARCH.lyr
- Save as shape file (NB this has to be done for each HER layer but do not export ones which contain no data – check attribute table if unsure). Right click on each HER layer and select Data → Export Data. Save as appropriate.
- Add the new shape files for each category (e.g. Historic Agriculture) and group together. Save the group as a layer file e.g. Historic_agriculture.lyr

  IN ARCCATALOG
- Save a new (polygon) shapefile with _area added to file name e.g. Historic_agriculture_area.shp

Action 7: Creation of mapped Heritage Characterisation Component maps

IN ARCMAP

- Use professional judgement to determine whether the shapefiles created during action 6 require further modification.
- If appropriate Use this shapefiles created as part of Action 6 to draw around points, lines and polygons of the layer file to create Heritage Character Component maps.
- Discrete points, lines or polygons within *c.* 500m of others and which share the same heritage characteristics can be amalgamated into a single polygon.
- Discrete point features or features less than 1ha in extent which are in excess of *c.* 500m from others which share the same heritage characteristics should not be excluded from this process at this stage, although professional judgement should be applied to determine whether they contribute in any meaningful way to the Heritage Character Area maps compiled during Step 3 of the process.