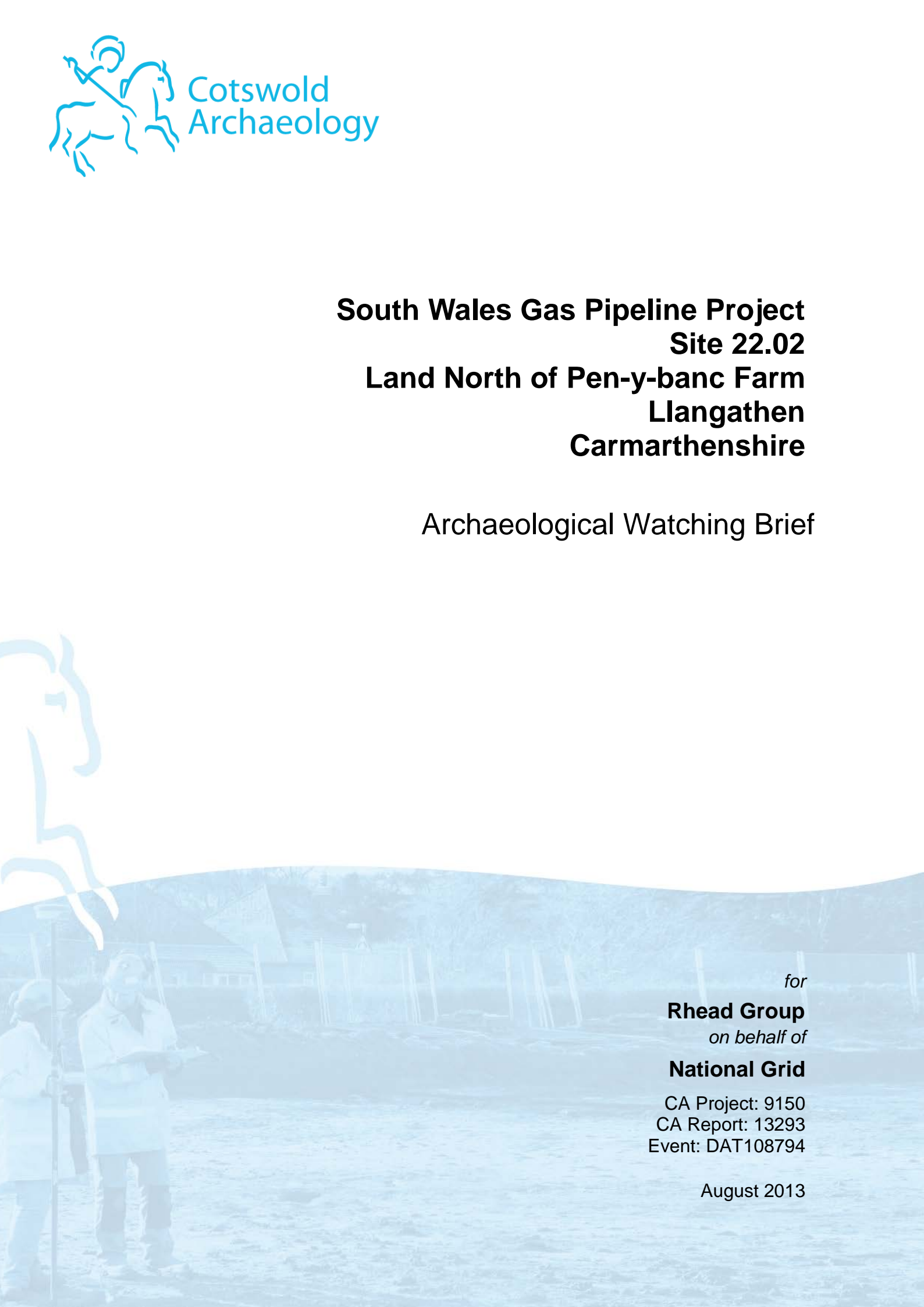


**South Wales Gas Pipeline Project  
Sites 269, 285, 517 and 518  
Canaston Wood  
Llawhaden  
Pembrokeshire**

**Archaeological Excavation and Watching Brief**



*for*  
**Rhead Group**  
*on behalf of*  
**National Grid**

CA Project: 9150  
CA Report: 13215  
Event: DAT108862

February 2014

# South Wales Gas Pipeline Project

## Sites 269, 285, 517 and 518

### Archaeological Excavation and Watching Brief

CA Project: 9150  
CA Report: 13215  
Event: DAT102846

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## **GLOSSARY**

CA – Cotswold Archaeology

CAP – Cambrian Archaeological Projects

CPAT – Clwyd Powys Archaeological Trust

DAT – Dyfed Archaeological Trust

GGAT - Glamorgan Gwent Archaeological Trust

FTP – Felindre to Brecon gas pipeline

HER – Historic Environment Record

MHA – Milford Haven to Aberdulais gas pipeline

NAL – Network Archaeology Ltd

NLMJV – Nacap Land & Marine Joint Venture



## SUMMARY

|                             |   |
|-----------------------------|---|
| <b>Project Name:</b>        | South Wales Gas Pipeline Project  |
| <b>Location:</b>            | Sites 269, 285, 517 and 518, Canaston Wood, Llawhaden, Pembrokeshire  |
| <b>NGR:</b>                 | Centred on SN 0840 1400   |
| <b>Type:</b>                | Excavation and Watching Brief   |
| <b>Date:</b>                | 17 July–9 September 2006  |
| <b>Location of Archive:</b> | To be deposited with RCAHMMW (original paper archive) and Scolton Manor Museum (digital copy of paper archive; accession number 2008.1) |
| <b>Site Code:</b>           | MHA06   |

An archaeological excavation and watching brief were undertaken by Cotswold Archaeology and Cambrian Archaeological Projects during groundworks associated with construction of gas pipelines (part of the South Wales high pressure gas pipeline scheme) between Milford Haven and Aberdulais, and Felindre and Brecon, which were conducted between 2005 and 2007.

The sites are located within Canaston Wood, an area of woodland dominated by modern conifers which preserves the shape and boundaries of medieval woods. A range of features was found, including four burnt mounds, one of which was dated to the Late Bronze Age. Two parallel ditches located close to a possible Iron Age 'banjo enclosure', previously recorded as a cropmark, returned an early medieval date (the enclosure itself was off the easement and was not investigated).

Evidence for medieval and post-medieval charcoal production in the wood included saw pits, charcoal-burning platforms and hollow ways. Undated features were also present, including several small bowl-shaped pits with scorched edges, probably the remains of hearths or ovens.



## 1. INTRODUCTION

- 1.1 NACAP Land and Marine Joint Venture (NLMJV), on behalf of National Grid, commissioned RSK Environment (part of the RSK Group) to manage the archaeological works (non-invasive surveys, desk based assessment, evaluation, watching brief, and open area excavation) on a 216km-long section of pipeline from Milford Haven (Pembrokeshire) to Brecon (in Powys). The high pressure gas pipeline (part of the 316km-long pipeline route from Milford Haven to Tirley in Gloucestershire) was required to reinforce the gas transmission network. The archaeological work performed in advance of this pipeline was undertaken in a number of sections by a number of archaeological companies. The westernmost section of 122km, from Milford Haven to Aberdulais, was investigated by CA (then Cotswold Archaeological Trust) during 2005–2007 with some additional excavation work carried out by CAP. The section of 89km, from Felindre to Brecon was investigated by CA during 2006–2007 and CAP during 2007. Assessment reports on the works were completed in January 2012 (NLM 2012a, 2012b) and the current reporting stage was commissioned in February 2013.
- 1.2 Between July and September 2006 CA and CAP carried out an archaeological excavation and watching brief at Sites 269, 285, 517 and 518, Canaston Wood, Llawhaden, Pembrokeshire (centred on SN 0840 1400; Fig. 1). The objective of the work was to record all archaeological remains exposed within the sites during the pipeline construction.
- 1.3 The archaeological recording was carried out in accordance with professional codes, standards and guidance documents (EH 1991; IfA 1999a, 1999b, 2001a, 2001b, 2001c and IfA Wales 2008). The methodologies were laid out in an *Archaeological Management Plan* (AMP) (RSK 2006) and associated *Written Statements of Investigation* (WSIs) and *Method Statements*.

### ***The site***

- 1.4 The sites lie within Canaston Wood, an area of largely coniferous woodland stretching eastwards from the Eastern Cleddau (Fig 1). The wood occupies undulating terrain, varying between 10m AOD close to the river to 110m AOD in the south-eastern part of the wood, and is bisected by several small tributaries of the Eastern Cleddau arising from springs within or adjacent to the wood.

- 1.5 The underlying solid geology of Canaston Wood is the Milford Haven Group (Interbedded Argillaceous Rocks and Sandstone and Conglomerate) of the Devonian and Silurian periods; no superficial deposits are recorded (BGS 2013).

### ***Archaeological background***

- 1.6 Canaston Wood is the location of known archaeological sites dating to the prehistoric, medieval and post-medieval periods. These were recorded during the preliminary *Archaeology and Heritage Survey* (CA 2005). This *Survey* report should be consulted for a detailed summary of the archaeological background of Canaston Wood, and what is presented here is a summary of the heritage assets significant to the findings made during the pipeline work. Key sites referred to below are depicted on Fig. 1.
- 1.7 The earliest remains known within the woods prior to the archaeological recording undertaken along the pipeline were those of Canaston Wood Camp, an Iron Age enclosure which survives as an earthwork within the north-eastern part of the wood (PRN3614; Scheduled Monument PE413). Immediately south of the wood are two further enclosures, Newhouse Bridge Defended Enclosure (PRN34439) and Molleston Back Enclosure, both of which are believed to date to the Iron Age. A possible Iron Age 'banjo enclosure' was recorded as a cropmark feature within the north-western part of the wood during the *Archaeology and Heritage Survey* (CA 2005, Ref. ID S10; Fig. 2) but is located beyond the easement of the pipeline and was not investigated during the groundworks.
- 1.8 Canaston Wood is enclosed by a woodbank, which survives as an earthwork bank and ditch and may be of medieval date (CA 2005, Ref. ID S4). Similar woodbank earthworks are present within the woods (CA 2005, Ref. IDs S5, S6). A document assessing the significance of these woodbanks includes an outline history of the woods (Hudson 2003). This document concluded that the woodland, although largely conifer since the 1950s, retains the shape in plan of a medieval woodland and that the woodbanks are likely to date to this period. The report also noted that numerous tracks, lanes and paths within the wood are likely to have been associated with its history, including the Knight's Way, which is thought to have led to the 12th-century Knights Hospitaller Commandery at Slebech Hall, 2km to the west. What is now Canaston Wood probably formed part of Narberth Forest, which is mentioned in the medieval Mabinogion text and thereafter into the post-medieval period (*ibid.*).

- 1.9 A blast furnace, Blackpool Iron Furnace, was formerly present within the western part of Canaston Wood (Hudson 2003). This used charcoal for iron smelting and operated from at least 1639 until 1709 (Hudson 2003).
- 1.10 Castell Goch (PRN3616), located immediately south of Canaston Wood, is a medieval moated manor house, recorded in 1313; Mouton Chapel (PRN3625; 46840) is a medieval establishment located within a clearing in Canaston Wood (Hudson 2003). Both probably relate to the creation of a new manor and the foundation of Newton North as a parish, and involved some modification of the wood's southern extent (*ibid.*). A Second World War auxiliary hide also lies within the woodland (PRN 30136).
- 1.11 Excavations to the east of Canaston Wood carried out during the pipeline construction recorded a Bronze Age burnt mound at Site 516 (CA 2014a) and undated (although probably prehistoric) pits containing burnt material and charred hazelnut shells at Sites 244 and 292 (CA 2014b and 2014c). Further burnt mounds were recorded along the length of the pipeline (Hart *et al.* forthcoming).

### ***Archaeological objectives***

- 1.12 The objectives of the archaeological works were:-
- to monitor groundworks, and to identify, investigate and record all significant buried archaeological deposits revealed on the site during the course of the development groundworks; and
  - at the conclusion of the project, to produce an integrated archive for the project work and a report setting out the results of the project and the archaeological conclusions that can be drawn from the recorded data.

### ***Methodology***

- 1.13 The fieldwork followed the methodology set out within the *WSI* (NLM 2006). An archaeologist was present during intrusive groundworks comprising tree clearance and topsoil removal (Fig. 1). The natural substrate was not always exposed and not all of the archaeological features exposed lay within areas that were to be subsequently trenched. Where features lay outside areas to be trenched, they were recorded in plan but not excavated. Sites 269 and 285 were watching briefs whilst Sites 517 and 518 comprised the excavation of significant remains found during the watching briefs.



- 1.14 The post-excavation work was undertaken following the production of the UPD (GA 2012) and included re-examination of the original site records. Finds and environmental evidence was taken from the assessment reports (NLM 2012a) except where the UPD recommended further work, in which case the updated reports were used. The archaeological background to the site was assessed using the following resources:-
- the *Archaeology and Heritage Survey* which was undertaken in advance of the pipeline construction and which examined a 1km-wide corridor centred on the pipeline centre line, including the then existing HER record (CA 2005);
  - Dyfed Archaeological Trust HER data (received May 2014) ); and
  - other online resources, such as Google Earth and Ordnance Survey maps available at <http://www.old-maps.co.uk/index.html>.

All monuments thus identified that were relevant to the site were taken into account when considering the results of the fieldwork.

- 1.15 The archive from the archaeological recording is currently held by CA at their offices in Kemble and will be deposited with the RCAHMW. Subject to the agreement of the legal landowner, the artefacts will be deposited with Scolton Manor Museum, along with a digital copy of the paper archive (accession number 2008.1).

## 2. RESULTS (FIGS 2–7)

- 2.1 This section provides an overview of the watching brief and excavation results; detailed summaries of the recorded contexts, finds, environmental samples (palaeoenvironmental evidence) and radiocarbon dates are to be found in Appendices A, B, C and D. Full, original version of specialist reports are available within the site digital archive. The results from all the sites are described below collectively, by period. Where exposed, the natural substrate comprised yellow sandstone to sandy clay.

### *Prehistoric*

- 2.2 Burnt mounds 285001 and 517003 were found towards the western end of the Wood, on a slight ridge between two extant streams (Fig. 2). Burnt mound 285001 was irregular in plan and consisted of a single 0.3m-thick layer of charcoal and burnt stone up to 9m long and 6m wide (Fig. 3). Fuelwood charcoal from this mound was

dominated by oak, with lesser amounts of hazel also present. Burnt mound 517003 survived as three layers of burnt clay, charcoal and burnt stone (layers 517003–517005; Fig. 4) forming an oval mound 6.5m in diameter.

- 2.3 Burnt mounds 269034 and 518032 were found 1km south-east of burnt mounds 285001 and 517003. Burnt mound 269034 was not excavated but comprised a 7m-diameter layer of charcoal and burnt stone located 6m south of a palaeochannel. Burnt mound 518032 was found on a slight slope and consisted of crescent-shaped layers of charcoal and burnt stone (518032 and 518033) collectively 6m long, 3.5m wide and 0.35m deep (Fig. 5). Charcoal from layer 518032 returned a Late Bronze Age date range of 900–790 cal. BC (Beta-249351).

#### *Early medieval*

- 2.4 Two parallel north/south aligned ditches were present within the western half of the wood (Figs 2 and 7). Both had broad, u-shaped profiles. The easternmost ditch, 518043, was 1m–3.2m wide and 0.4m–0.8m deep whilst the westernmost ditch, 518042, was 1m–1.8m wide and 0.35m–0.5m deep. Both ditches contained a sequence of fills derived from the natural substrate, although quantities of sandstone rubble in some of the fills possibly derived from an associated bank or banks and one small lens of charcoal was also present. Ditch 518042 had been re-cut in at least one place (cut 518067) and this re-cut contained a stony fill, again potentially material from an associated bank. Radiocarbon dating on material from the upper fill of ditch 518052 returned a date range of cal. AD 640–1000 (Beta-249357), although it is not known whether the ditch cut at this point was part of an early phase of the ditch or had been entirely re-cut.
- 2.5 A large sub-rectangular pit, 518006 (not illustrated) was also present, although the location of this is unclear. This had vertical sides and a flat base and was at least 3.8m long, 1m wide and 0.25m deep. It was filled by an alternating sequence of thin charcoal and silty sand fills. Two pieces of oak charcoal from fills 518007 and 518010 returned radiocarbon dates of cal. AD 660–890 (SUERC-56068) and cal. AD 650–870 (SUERC-56069). The dates are statistically consistent and could be of the same actual age (Appendix D). The pit's function was not clear and there was no evidence that the charcoal derived from burning within the pit itself.

*Medieval to post-medieval*

- 2.6 Features likely to date to the medieval to post-medieval periods were found throughout Canaston Wood and included routeways, charcoal-burning platforms and saw pits. In addition, a 19th-century iron shackle, possibly used for hauling logs, was recovered from the topsoil, along with a small number of other metal items and medieval and post-medieval pottery (Appendix B).
- 2.7 In total, 19 charcoal-burning platforms were identified, most of which were recorded in plan only. An additional charcoal-burning platform, 518060, was present, but its location was not recorded. Platform 269004 was excavated and proved to comprise a sub-rectangular platform, at least 9m long and 13m wide, most of which lay off-easement. The platform was a 0.3m-deep flat-based terrace into the natural slope, with a drop-off at the downslope end, and was filled with charcoal. A sample of the charcoal yielded a rich assemblage roundwood fragments, almost all from coppiced oak; one of these was radiocarbon dated to cal. AD 1310–1450 and another to cal. AD 1660–1950 (SUERC-56051 and -55503; 95% confidence). Other excavated platforms within the woods proved to be of comparable size and typically comprised oval-shaped cuts terraced into the natural slope, and had flat bases with a back ‘wall’ (the upslope terrace edge) and a downslope drop off (Fig. 6, section CC). All contained charcoal-rich fills, samples from which were also dominated by oak roundwood. The unexcavated platforms were almost all similar in morphology and size to the excavated examples, with the exception of platforms 269030 and 269044 which were on flat ground and took the form of artificially-raised clay platforms.
- 2.8 Towards the western edge of the wood, large oval pit 269005 was found. It was 2.8m long, 1.8m wide and 1m deep (Fig. 6, section DD). It had steep sides and a flat base that lead to a deeper central hollow, and had been partially terraced into the natural slope. It may have been a saw pit, with the central hollow acting as a sump, and contained an iron axe head, probably of medieval date. An adjacent posthole, 269007, may have been associated with this saw pit, for example to support one end of a log rest, although no corresponding posthole was found on the far side of the pit. A second, unexcavated, possible saw pit (269033) was found towards the eastern end of the wood, adjacent to a mound of upcast spoil derived from its original excavation.
- 2.9 Several hollow way segments were present towards the eastern end of the wood. Of these, hollow way 269032 had a charcoal-rich fill and seems likely to have been

associated with the charcoal-burning activities. An adjacent unexcavated pit, 269040, was also possibly associated with these activities as it had a charcoal-rich upper fill. Other charcoal dumps, 518037 and 269039, were found adjacent to an existing trackway. Hollow way 518025 was east/west aligned and was 2.2m wide and 0.6m deep with a broad u-shaped profile. Hollow way 518035 was north-east/south-west aligned and was similar in profile to hollow way 518025, although marginally wider. Collectively, these hollow ways may have linked to the Knight's Way, the primary east/west route through Canaston Wood (Fig. 2).

### *Undated*

- 2.10 A number of features could not be dated on the basis of artefactual evidence, morphology or relationships to dated features.
- 2.11 Five small bowl-shaped pits were found as isolated features: pits 269009, 269013, 269017, 269020 and 518038 (the locations of pit 269020 was not georeferenced and it is not depicted on the figures accompanying this report). These were 0.7m to 1.45m in diameter and 0.2m to 0.4m deep and the surrounding substrate had been scorched. All contained dark silty clay fills with frequent charcoal flecks, and fill 269010 (pit 269009) also included burnt sandstone fragments. Samples from pit 518038 yielded alder/hazel, ash and ash/oak charcoal. The location of another pit may have been marked by a small patch of scorched substrate (269015), although no actual cut survived. Three unexcavated pits were also found, all adjacent to one another and all containing burnt material (group number 269036).

### *Discussion*

- 2.12 Burnt Mound 518032 returned a Bronze Age radiocarbon date; the other mounds within the woods were undated but most dated examples found along the pipeline have proved to be Bronze Age, although Neolithic and Iron Age examples were also recorded (Hart *et al.* forthcoming). Burnt mounds are typically found adjacent to streams, and the numerous water courses in the vicinity would have provided suitable locations. The examples found within the woods were relatively ephemeral, and no examples of troughs or hearths were recorded, although this could reflect truncation or the limits of the excavations.
- 2.13 During the fieldwork, it was observed that parallel ditches 518043 and 518042 extended southwards from the pipeline easement towards the possible Iron Age banjo enclosure cropmark site as two earthwork ditches separated by an internal

bank and flanked by external banks. While the early medieval radiocarbon date from ditch 518043 was from an upper fill, and therefore can only tentatively be used to date the features, the location and alignment of the ditches (Fig. 2) may suggest that they were unrelated to the banjo enclosure and are perhaps more likely to be another of the wood's medieval or later routeways, perhaps linking to the Knight's Way to the south.

- 2.14 The most extensive remains found relate to the history of Canaston Wood's use as an economic resource during the medieval and post-medieval periods. Of the two possible saw pits, one contained a probably late medieval axe head and potentially relates to the management and use of timber during this period (although there is the possibility that the axe head was an heirloom item used in the post-medieval
- 2.15 At least some of the charcoal-burning platforms potentially relate to the former Blackpool blast furnace which was in operation within the western part of the wood during the early post-medieval period. However, platform 269004 returned both medieval and post-medieval radiocarbon dates and it is possible that charcoal production occurred during the medieval period as well. The potential that early medieval charcoal-production occurred within the woods is raised by the early medieval radiocarbon date from a pit which contained wood charcoal, but this pit was not geolocated. The charcoal from the charcoal-burning platforms was, as might be expected, sourced from managed woodland, where coppiced oak was selected for transformation into charcoal. The iron shackle would seem to post-date the furnace and instead probably relates to hauling timber.
- 2.16 The small bowl-shaped pits found as occasional features throughout the woods all remained undated. Most exhibited scorching of the underlying substrate and were probably the remains of hearths or ovens. However, in the absence of dating material, or further evidence of function, no further interpretation is possible.

### **3. PROJECT TEAM**

Fieldwork was undertaken by Cotswold Archaeology (Sites 269 and 285) and Cambrian Archaeological Projects (Sites 517 and 518). Matt Nichols (CA) undertook an extensive watching brief throughout the woods and made the initial identifications of most of the sites and isolated finds. This report was written by Jonathan Hart with illustrations prepared by Daniel Bashford. The archive has been compiled by Jonathan Hart and prepared for deposition by Hazel O' Neill. The fieldwork was managed for CA by Clifford Bateman and for CAP by Kevin Blockley, and the post-excavation was managed for CA by Karen Walker.



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## APPENDIX A: CONTEXT DESCRIPTIONS

## Site 269

| Context No. | Type  | Fill of | Context interpretation    | Description   | W (m) | Thickness (m) | Spot date     |
|-------------|-------|---------|---------------------------|---|-------|---------------|---------------|
| 269000      | Layer |         | Layer                     | Leaf litter   |       | 0.05          |               |
| 269001      | Layer |         | Topsoil                   | Mid brown clay silt   |       | 0.05          | LC19/2        |
| 269002      | Layer |         | Subsoil                   | Light orange-brown sandy silt   |       | 0.1-          |               |
| 269003      | Layer |         | Natural                   | Yellow sandstone  |       |               |               |
| 269004      | Cut   |         | Charcoal-burning platform | charcoal-burning platform, extended beyond LOE; terraced into slope, with dip at end                              | 13.0  | 0.3           |               |
| 269005      | Cut   |         | Saw pit                   | Oval in plan with steep sides flat base with central hollow and raised lip; partially terraced into natural slope | 1.8   | 1.0           |               |
| 269006      | Fill  | 269005  | Fill of saw pit           | Dark brown clay silt  | 1.8   | 1.0           | Late Medieval |
| 269007      | Cut   |         | Posthole                  | Posthole associated with 269005: circular in plan with concave base and gently sloping sides                      | 0.65  | 0.05          |               |
| 269008      |       |         |                           | Context not used  |       |               |               |
| 269009      | Cut   |         | Pit                       | Circular in plan with bowl-shaped profile; underlying substrate was scorched                                      | 1.45  | 0.3           |               |
| 269010      | Fill  | 269009  | Pit fill                  | Lower fill: dark brown silty clay with frequent charcoal flecks and burnt sandstone                               | 1.45  | 0.2           |               |
| 269011      |       |         |                           | Context not used  |       |               |               |
| 269012      | Fill  | 269009  | Pit fill                  | Orange-brown silty clay   | 0.65  | 0.1           |               |
| 269013      | Cut   |         | Pit                       | Circular in plan with bowl-shaped profile; underlying substrate was scorched                                      | 0.7   | 0.2           |               |
| 269014      | Fill  | 269013  | Pit fill                  | Dark brown silty clay with frequent charcoal flecks   | 0.7   | 0.2           |               |
| 269015      | Layer |         | Layer                     | Circular scorched part of subsoil   | 0.3   | 0.03          |               |
| 269016      |       |         |                           | Context not used  |       |               |               |
| 269017      | Cut   |         | Pit                       | Circular in plan with bowl-shaped profile; underlying substrate was scorched                                      | 1.05  | 0.15          |               |
| 269018      | Fill  | 269017  | Pit fill                  | Lower fill: dark grey-black silty clay with frequent charcoal flecks  | 1.05  | 0.05          |               |
| 269019      | Fill  | 269017  | Pit fill                  | Upper fill: mid orange-brown silty clay   | 1.05  | 0.1           |               |
| 269020      | Cut   |         | Pit                       | Circular in plan with bowl-shaped profile; underlying substrate was scorched                                      | 0.9   | 0.4           |               |
| 269021      | Fill  | 269020  | Pit fill                  | Mid orange-brown silty clay   | 0.9   | 0.4           |               |
| 269022      | Cut   |         | Ditch                     | N/S aligned with steep, u-shaped profile  | 0.33  | 0.1           |               |
| 269023      | Fill  | 269022  | Ditch fill                | Mid grey-brown silty clay   | 0.33  | 0.1           |               |
| 269024      | cut   |         | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end   | 12.0  | 0.3           |               |
| 269025      | cut   |         | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end   | 12.0  | 0.3           |               |

|        |       |  |                           |  |      |     |  |
|--------|-------|--|---------------------------|--|------|-----|--|
| 269026 | cut   |  | Charcoal-burning platform | charcoal-burning platform, extended beyond LOE; terraced into slope, with dip at end | 9.0  | 0.3 |  |
| 269027 | cut   |  | Charcoal-burning platform | charcoal-burning platform, extended beyond LOE; terraced into slope, with dip at end | 12.0 | 0.3 |  |
| 269028 | cut   |  | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end                      | 12.0 | 0.3 |  |
| 269029 | cut   |  | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end                      | 10.0 | 0.3 |  |
| 269030 | cut   |  | Charcoal-burning platform | charcoal-burning platform, on flat ground, with dip at edges                         |      |     |  |
| 269031 |       |  |                           | Context not used   |      |     |  |
| 269032 | cut   |  | Hollow way                | NW/SE aligned; unexcavated but with charcoal fill                                    | 12.0 | 1.0 |  |
| 269033 | cut   |  | Saw pit                   | Sub-rectangular pit with adjacent upcast mound; dimensions are for pit               | 2.0  | 0.3 |  |
| 269034 | Layer |  | Burnt mound               | Charcoal and burnt stone; unexcavated but 6m south of a palaeochannel                | 7.0  |     |  |
| 269035 | Cuts  |  | Postholes                 | Two postholes 3m apart; unexcavated  | 0.25 |     |  |
| 269036 | Cuts  |  | Pits                      | three adjacent pits containing burnt material; unexcavated                           |      |     |  |
| 269037 | Cut   |  | Pit                       | Pit; unexcavated   | 1.5  |     |  |
| 269038 | Cut   |  | Pit                       | Pit containing charcoal; unexcavated   | 0.4  |     |  |
| 269039 | Layer |  | Layer                     | Charcoal layer adjacent to Holloway 269033; unexcavated                              | 3.0  |     |  |
| 269040 | Cut   |  | Pit                       | Pit containing charcoal; unexcavated   | 0.5  |     |  |
| 269041 | Cut   |  | Pit                       | Pit containing charcoal; unexcavated   | 0.7  |     |  |
| 269042 | cut   |  | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end                      | 11.0 |     |  |
| 269043 | Cut   |  | Pit                       | Pit containing charcoal; unexcavated   | 0.9  |     |  |
| 269044 | cut   |  | Charcoal-burning platform | charcoal-burning platform, raised square platform                                    | 4.0  |     |  |
| 269045 | cut   |  | Charcoal-burning platform | charcoal-burning platform, terraced into slope, with dip at end                      | 11.0 |     |  |
| 269046 | cut   |  | Ditch                     | Unexcavated  |      |     |  |
| 269047 | Cut   |  | Pit                       | Unexcavated  |      |     |  |

## Site 285

| Context No. | Type  | Fill of | Context interpretation | Description  | W (m) | Thickness (m) |
|-------------|-------|---------|------------------------|--|-------|---------------|
| 285001      | Layer |         | burnt mound            | Charcoal and fire-cracked stone in a dark clay silt matrix | 6.2   | 0.3           |
| 285002      |       |         |                        | Context not used   |       |               |
| 285003      | Layer |         | Natural                | Mid brown orange sandy clay with common sub angular stones |       |               |

## Site 517

| Context No. | Type  | Fill of | Context interpretation | Description                                    | W (m) | Thickness (m) |
|-------------|-------|---------|------------------------|--|-------|---------------|
| 517001      | Cut   |         | Tree-throw pit         | Irregular in plan and profile                  | 0.75  | 0.2           |
| 517002      | Fill  | 517001  | Tree-throw pit fill    | Clay silt                                      | 0.75  | 0.2           |
| 517003      | Layer |         | Burnt mound            | Charcoal and burnt stone                       | 0.2   | 0.2           |
| 517004      | Layer |         | Burnt mound            | Charcoal and burnt stone                       | 0.25  | 0.35          |
| 517005      | Layer |         | Burnt mound            | Burnt clay                                     | 0.1   | 0.25          |
| 517006      | Layer |         | Alluvium               | Overlying burnt mound: orange-brown silty clay | 0.25  | 0.1           |

## Site 518

| Context No. | Type  | Fill of | Context interpretation    | Description   | L (m) | W (m) | Thickness (m) |
|-------------|-------|---------|---------------------------|---|-------|-------|---------------|
| 518001      | Fill  | 518013  | Charcoal fill             | Charcoal fill of charcoal-burning platform  | 9.45  | 7.2   | 0.15          |
| 518002      | Fill  |         | Charcoal-Burning platform | Charcoal-rich silty clay fill of charcoal-burning platform (no cut recorded as unexcavated) | 9.1   | 9.1   |               |
| 518003      | Fill  | 518011  | Charcoal fill             | Upper Charcoal-rich silty clay fill of charcoal-burning platform                            | 12.5  | 9.0   | 0.25          |
| 518004      | Fill  | 518011  | Charcoal fill             | Lower Charcoal-rich silty clay fill of charcoal-burning platform                            | 4.65  | 1.7   | 0.1           |
| 518005      |       |         |                           | Context not used  |       |       |               |
| 518006      | Cut   |         | Pit                       | Sub-rectangular in plan with vertical sides and flat base; partly beyond LOE in plan        | >3.8  | 1.0   | 0.25          |
| 518007      | Fill  | 518006  | Pit fill                  | = 3rd fill: charcoal  | 2.0   | 0.65  | 0.05          |
| 518008      | Fill  | 518006  | Pit fill                  | 4th fill: orange-yellow silty sand  | 1.65  | 0.4   | 0.15          |
| 518009      | Fill  | 518006  | Pit fill                  | 2nd fill: orange-yellow silty sand  | >3.8  | 1.0   | 0.15          |
| 518010      | Fill  | 518006  | Pit fill                  | 1st fill: charcoal  | >3.8  | 1.0   | 0.1           |
| 518011      | Cut   |         | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base  | 12.5  | 9.0   | 0.25          |
| 518012      | Fill  | 518006  | Pit fill                  | = 3rd fill: orange-yellow silty sand  | 1.65  | 0.4   | 0.15          |
| 518013      | Cut   |         | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base  | 9.45  | 7.2   | 0.35          |
| 518014      | Layer |         | Charcoal fill             | Charcoal layer downslope of 518011  | 0.5   | 0.5   | 0.05          |
| 518015      | Fill  | 518013  | Fill                      | = 2nd fill: Grey-black sandy silt charcoal-rich fill  | 3.0   | 1.0   | 0.15          |
| 518016      | Fill  | 518013  | Fill                      | 1st fill: orange-brown silty clay charcoal-rich fill  | 9.45  | 7.2   | 0.2           |
| 518017      | Fill  | 518013  | Fill                      | = 2nd fill: charcoal-rich fill  | 1.1   | 1.0   | 0.1           |
| 518018      | Fill  | 518013  | Fill                      | = 3rd fill: Grey clay   | 1.5   | 1.0   | 0.2           |
| 518019      | Fill  | 518013  | Fill                      | = 3rd fill: Grey-black silty clay charcoal-rich fill  | 1.0   | 0.75  | 0.1           |
| 518020      | Fill  | 518013  | Fill                      | = 2nd fill: Grey clay   | 1.75  | 1.0   | 0.1           |
| 518021      | Cut   |         | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base  | 13.5  | 12.0  | 0.3           |
| 518022      | Fill  | 518021  | Fill                      | Brown-black silty clay, charcoal-rich   | 13.5  | 12.0  | 0.3           |
| 518023      | Cut   |         | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base  |       | 14.0  | 0.5           |
| 518024      | Fill  | 518021  | Fill                      | Charcoal  |       | 14.0  | 0.5           |
| 518025      | Cut   |         | Hollow way                | Broad, u-shaped profile; survived as earthwork  |       | 2.2   | 0.6           |

|        |       |        |                           |   |      |      |      |
|--------|-------|--------|---------------------------|---|------|------|------|
| 518026 | Fill  | 518025 | Hollow way fill           | 3rd fill: light brown clay silt   |      | 2.0  | 0.05 |
| 518027 | Fill  | 518025 | Hollow way fill           | 2nd fill: black organic (leaf litter) with occasional large charcoal fragments    |      | 0.6  | 0.1  |
| 518028 | Fill  | 518025 | Hollow way fill           | Lower fill: dark brown clay   |      | 0.9  | 0.15 |
| 518029 | Fill  | 518025 | Hollow way fill           | Upper fill: orange sandy silt   |      | 2.2  | 0.3  |
| 518030 | Layer |        | Layer                     | Colluvium: pink clay seen throughout Canaston woods                               |      |      | 0.15 |
| 518031 |       |        |                           | Context not used  |      |      |      |
| 518032 | Layer |        | Burnt mound layer         | Lowest layer: black with burnt stone  | 4.0  | 1.0  | 0.2  |
| 518033 | Layer |        | Burnt mound layer         | Upper layer: dark brown sandy silt with burnt stone                               | 2.1  | 1.0  | 0.15 |
| 518034 | Fill  | 518041 | Fill                      | Charcoal  |      | 13.0 | 0.15 |
| 518035 | Cut   |        | Hollow way                | Broad, u-shaped profile   |      | 3.0  | 0.4  |
| 518036 | Fill  | 518035 | Hollow way fill           | Orange sandy clay   |      | 3.0  | 0.4  |
| 518037 | Layer |        | Layer                     | Charcoal layer adjacent to hollow way, probably a dump                            | 8.2  | 5.3  | 0.12 |
| 518038 | Cut   |        | Pit                       | Circular in plan, steep sides, flat base  |      | 0.5  | 0.15 |
| 518039 | Fill  | 518038 | Fill                      | Lower fill: charcoal  |      | 0.5  | 0.05 |
| 518040 | Fill  | 518038 | Fill                      | Upper fill: orange silty sand   |      | 0.5  | 0.15 |
| 518041 | Cut   |        | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base                                |      | 13.0 | 0.15 |
| 518042 | Cut   |        | Ditch                     | N/S aligned with broad u-shaped profile. Parallel to ditch 518043                 |      | 1.8  | 0.35 |
| 518043 | Cut   |        | Ditch                     | N/S aligned with broad u-shaped profile. Parallel to ditch 518042                 |      | 3.2  | 0.4  |
| 518044 | Fill  | 518042 | Fill                      | Upper fill: red silty clay  |      | 1.8  | 0.35 |
| 518045 | Fill  | 518042 | Fill                      | Lower fill: red silty clay with gravel  |      | 1.2  | 0.05 |
| 518046 | Fill  | 518043 | Fill                      | 2nd fill: red clay  |      | 2.3  | 0.2  |
| 518047 | Fill  | 518043 | Fill                      | Lower fill: sandstone fragments in a pink clay matrix                             |      | 2.15 | 0.3  |
| 518048 | Fill  | 518043 | Fill                      | Upper fill: pink clay   |      | 1.3  | 0.15 |
| 518049 | Fill  | 518041 | Fill                      | Charcoal layer on brush-off edge of platform                                      | 1.5  | 2.0  | 0.1  |
| 518050 | Layer |        | Charcoal-Burning platform | Charcoal layer: probably part of a charcoal-burning platform extending beyond LOE | 6.15 | 2.7  | 0.2  |
| 518051 | Cut   |        | Ditch                     | = 518043  |      | 1.0  | 0.6  |
| 518052 | Cut   |        | Ditch                     | = 518042  |      | 1.0  | 0.5  |
| 518053 | Fill  | 518052 | Fill                      | Upper fill: red-brown silty clay with charcoal                                    |      | 1.0  | 0.05 |
| 518054 | Fill  | 518052 | Fill                      | Lower fill: red silty clay with gravel  |      | 1.0  | 0.05 |
| 518055 | Fill  | 518052 | Fill                      | 2nd fill: red clay  |      | 2.3  | 0.2  |
| 518056 | Cut   |        | Palaeo channel            | Irregular linear with irregular profile   |      | 1.0  | 0.15 |
| 518057 | Fill  | 518056 | Fill                      | Orange-red sandy clay   |      | 1.0  | 0.15 |
| 518058 | Fill  | 518051 | Fill                      | Upper fill: red-brown silty clay  |      | 1.0  | 0.5  |
| 518059 | Fill  | 518051 | Fill                      | Lower fill: orange sandy clay   |      | 1.0  | 0.1  |
| 518060 | Cut   |        | Charcoal-Burning platform | Oval-shaped terrace into existing slope, flat base                                |      | 13.7 | 0.45 |
| 518061 | Fill  | 518060 | Fill                      | Charcoal fill of charcoal-burning platform  |      | 13.7 | 0.45 |
| 518062 | Cut   |        | Ditch                     | = 518043  |      | 1.0  | 0.8  |
| 518063 | Fill  | 518062 | Fill                      | Lower fill: red silty clay with gravel  |      | 0.7  | 0.15 |
| 518064 | Fill  | 518062 | Fill                      | Upper fill: brown silty clay  |      | 1.0  | 0.65 |

|        |      |        |                |   |  |     |      |
|--------|------|--------|----------------|---|--|-----|------|
| 518065 | Cut  |        | Tree-throw pit | Irregular in plan and profile           |  | 0.4 | 0.35 |
| 518066 | Fill | 518065 | Fill           | Dark brown clay                         |  | 0.4 | 0.35 |
| 518067 | Cut  |        | Ditch          | Re-cut of ditch 518069                  |  | 1.2 | 0.4  |
| 518068 | Fill | 518067 | Fill           | Sandstone in an orange-red sandy matrix |  | 1.2 | 0.4  |
| 518069 | Cut  |        | Ditch          | = 518042                                |  | 4.2 | 1.0  |
| 518070 | Fill | 518069 | Fill           | Main fill: red-brown silty clay         |  | 4.2 | 1.0  |
| 518071 | Fill | 518069 | Fill           | Charcoal lens                           |  | 0.8 | 0.1  |

## APPENDIX B: THE FINDS

### **Metal Objects: Site 269** (Leahy 2009)

#### *Context 269001: Strip of iron*

7.0mm thick with a 24.0mm wide 'C' shaped section. This has been bent around to form something more than a half-ring, the ends of which narrow and are folded around to form loops. Through one of these is threaded an oval, iron link, 57.0mm x 25.0mm. Dimensions: Length 96.0mm, Width 116mm, Depth 24.0mm. Mass: 194.9g. Condition: Poor, corroded and exfoliating. Identification: Iron shackle, while it could have been used for restraint it might be better seen as being used to attach ropes used in traction. Dating: Probably 19th century

#### *Context 269002: wrought iron bar*

Square section, bent, at one point, to 30 degrees. Dimensions: Length 200.0mm, Width 15.6mm, Thickness 15.2mm. Mass: 387.4g. Condition: Poor, corroded and exfoliating. Identification: Not known, it may have been some sort of retaining pin. Dating: Not datable.

#### *Context 269003: wrought iron horse-shoe, calkins and toe clip present, shape obscured by corrosion*

Mass: 375.9g. Condition: Poor, heavily corroded and exfoliating. Identification: Horse-shoe. Dating: Not datable.

#### *Context 269004: wrought iron shackle*

Consisting of a bar with a 16.8mm x 10.3mm section the top of which shows signs of intensive wear. The ends of the loop were flattened to form two 63.0mm x 50mm oval plates. These are c 4mm thick, perhaps tapering towards their edges. They were not perforated and between them are traces of an unidentified organic material which is soft, off-white and lamellar. Dimensions: Length 121.0mm, Width 50.0mm, Thickness 40.8mm. Mass: 211.9g. Condition: Poor, heavily corroded and exfoliating. Identification: Fitting from a vehicle or bucket? Dating: Not datable.



Context 269005: wrought iron axe head



Iron axe head of Goodall's Type 5, typified by its 'bearded' blade with a pointed heel set, below the base of the eye or socket (Goodall, 2011, 31, 22, figs. 3.1, 3.3, Nos. B19-21), although, unlike the axes figured by Goodall, this example is a 'side-axe' with the blade off-set to one side of the eye (socket) and its sharpening bevel placed on one side of the blade. These features raise the craftsman's hand allowing him to apply the axe to a flat surface. A feature shared by this tool and other axes of Type 5 are the lugs projecting on either side of the eye and the flattened 'poll' behind the socket which would allow it to be used as a hammer. On this example the poll is slightly expanded showing that it has indeed been used as a hammer.

This object is elegantly shaped and was clearly a fine object. One face of the blade is flat, while the other is slightly thickened along the line of the sharpening bevel. The surface of the metal has the fibrous appearance associated with corroded wrought iron and due to the presence of slag 'stringers' within the iron. There is no sign of a steeled cutting edge on the axe ray but differences in the pattern of corrosion in this area might point to the existence of a steel edge. The eye is wedge-shaped with a rounded end and corners; it is filled with corrosion products which do not appear to represent the remains of a wooden handle. Through the socket is an iron object which the x ray suggests passes through the eye at an angle. It is difficult to determine its form but it appears to consist of a triangular head, stepped on one, or both, of its sides and set on a narrow, 70mm long shank.

None of the axes quoted by Goodall came from a secure context although it is likely the tool from Deganwy Castle, Gwynedd dated to c. 1245-63 (Goodall, 2011, 30, B19). Excavations at Milk Street, London yielded what was described as a side-axe but the identification was based on a surviving, curved handle, and not, as in this case, on the asymmetry of the head (Pritchard, 1991, 135-7, Fig. 3.14). The Milk Street axe was dated to the 11th-12th century and, interestingly, the head was secured by means of a strip of iron inserted down the side of the eye, which may have been the role of the iron object associated with the example discussed here. A tool shaped, and sharpened as a side-axe was found in the 11th century Nazeing hoard (Morris, 1983, 27-39). A further parallel can be seen in the axe found at Fisherton Mill, Salisbury (Schuster *et. al.* 2012, 144, Fig. 38 No. 6.) This axe is bearded and has the asymmetry of a side axe. It was dated to the late medieval period but it is felt



that it is likely to be later than the tool described here. Dimensions: length 199.5mm, blade width 127.0mm, butt/pol 52.0 x 38.5mm, blade thickness, 8.8mm, mass 1120.6g.

### **Pottery** (Courtney and McSloy 2013)

#### *Medieval*

One sherd of medieval pottery (34g) was recorded from Site 517 as an unstratified find. The fabric was identified as type DGTU (Dyfed Gravel-tempered). The form is a jar/cooking pot with everted rim. Pottery of this type is broadly dateable across the late 12th to 15th centuries.

#### *Post-medieval*

A total of 3 sherds (102g) of post-medieval and early modern pottery was recovered, all from the topsoil on Site 269. Two bodysherds (16g) in post-medieval types NDGT (North Devon Gravel-Tempered) and LGRE (Lead-Glazed Red Earthenware) were identified. Both are broadly dateable in the 16th to 18th centuries range.

#### *Early Modern*

A base sherd (86g) from a bottle in fabric LESW (Late English Stoneware) was recorded from the topsoil on Site 269. Late Stonewares such as this typically date after c. 1830/50, their use continuing well into the 20th century.



## APPENDIX C: PALAEOENVIRONMENTAL EVIDENCE BY JAMES RACKHAM

The excavations and watching brief investigations in Canaston Woods were given several site numbers. Although sampled material was recovered from all these, the samples from Site 517 were never processed (see below). No animal or human bones were recovered from any of these sites, either by excavation or from the soil samples. The sampled sites are treated individually below.

### Site 269

#### Environmental soil samples

From platform 269004 at Site 269 a single bulk sample was recovered (Table 1). A possible saw-pit some 300m west of the platform has been assigned a late medieval date and a charcoal concentration at Site 518 has been dated to the post-medieval period (see below). The archaeological consultant requested sampling of the platform with the primary objective of establishing a date for the feature, although it has been argued since that radiocarbon dating of the later medieval and post-medieval period fails to produce results of sufficient resolution to be useful. Two pieces of oak roundwood from the sample were submitted for dating in the hope that they would adequately date the feature. One returned a late medieval date and the second a post-medieval date (Table 1).

**Table 1.** Bulk environmental sample from Site 269

| sample no | context no | description                       | processed wt kg | processed vol l | date (C14 dates at 95% probability)                         |
|-----------|------------|-----------------------------------|-----------------|-----------------|---|
| 269000    | 269004     | Fill of charcoal burning platform | 43              | 40              | 1310-1445 cal AD (oak r'w'd)<br>1660-1950 cal AD (oak r'wd) |

The sample was processed in the manner described in the assessment report (Giorgi and Martin 2009). The residue was found to be so rich that refloating was undertaken in preference to sorting the whole sample and this flot amalgamated with the first. Subsequently the dried residue of <2mm was refloated during post-excavation and is indicated in Table 2 as '2nd flot'. The second flot was checked for identifiable charred plant remains

**Table 2.** Data for the environmental sample from Site 269

| sample no | context no | processed vol l | 1st flot vol ml | 2nd flot vol ml | residue wt g | pottery | burnt clay | burnt stone | coal | flint | magnetic | burnt bone | comments |
|-----------|------------|-----------------|-----------------|-----------------|--------------|---------|------------|-------------|------|-------|----------|------------|----------|
| 269000    | 269004     | 40              | 2450            | 750             |              |         |            |             |      |       | A        |            |          |

\* abundance rating – E= 1-10 items; D=11-50, C=51-100, B=101-200, A=>200; nd – no data

The only find from the samples other than the charcoal was a magnetic component probably reflecting a burnt mineral element in the deposits. A single seed of dock (cf *Rumex* sp.) was the only identifiable charred macrofossil noted although the flot was so large that only a proportion was sorted. The uncharred remains, including seeds, veined leaf skeletons, bark, stems and buds, are reported in the assessment (Giorgi and Martin 2009) but are presumed to be intrusive, although this need not necessarily be the case for some of the robust seeds (eg *Rubus* sp.– bramble) if the deposit is post-medieval. A single shell of the snail *Discus rotundatus* was recovered. As with the uncharred plant remains this is thought to be intrusive, but as a taxa characteristic of woodland habitats it could also be contemporary.

The large charcoal assemblage includes frequent medium and small roundwood so the deposit was selected for study of the charcoal. Owing to an error during post-excavation two charcoal assemblages from the same sample were independently studied and are reported below.

### Charcoal (Dana Challinor and Dawn Elise Mooney)

Charcoal was extremely abundant, with thousands of fragments preserved. It was, however, clear that the sample exhibited low diversity and consequently 30 fragments were considered adequate for analysis although a second sample series was studied. The fragments were randomly selected and identified following standard procedures. A single taxon was identified from one of the sub-samples; *Quercus* sp. (oak), while two taxa were recorded in the second sub-sample, *Quercus* sp. (oak) and *Maloideae* family (Table 3).

**Table 3.** Site 269 - Charcoal identifications from sample 269000

|                    | Feature type                  | Charcoal platform | Charcoal platform |
|--------------------|-------------------------------|-------------------|-------------------|
|                    | Context number                | 269004            | 269004            |
|                    | Sample number                 | 269000            | 269000            |
| <i>Quercus</i> sp. | oak                           | 29rs (h)          | 39                |
| <i>Maloideae</i>   | hawthorn, rowan, apple family |                   | 1                 |
| Indeterminate      | bark                          | 1                 |                   |

s=sapwood; h=heartwood; r=roundwood; (brackets denotes presence in some fragments only)

The large charcoal assemblage recovered from the sample contained a significant number of large fragments >25mm in size. Roundwood fragments, including those with bark present, were common, and the radius, rate of growth, and growth ring count of such pieces have been recorded. All of the charcoal exhibited strong ring curvature, with pith and/or bark surviving. Roundwood analysis was undertaken on (more or less) complete roundwood fragments where bark or cambial edge and pith or proximity to pith (on the basis of extreme ring curvature) was observed (Table 4). Fragments with exactly the same measurements have been excluded as they may have derived from the same branch. There are other difficulties in determining accurate ring counts and absolute diameter measurements in fragments of charcoal, but the dataset serves to illustrate several trends.

**Table 4.** Roundwood analysis on oak charcoal fragments from 269004; all pieces had evidence for pith and bark and/or cambial layer surviving.

| Radius (mm) | Ring count | ARW |
|-------------|------------|-----|
| 12          | 8          | 1.5 |
| 5           | 12         | 0.4 |
| 5.5         | 9          | 0.6 |
| 4.5         | 11         | 0.4 |
| 9           | 7          | 1.3 |
| 9           | 8          | 1.1 |
| 11          | 6          | 1.8 |
| 8           | 7          | 1.1 |
| 8           | 7          | 1.1 |
| 9           | 14         | 0.6 |
| 11.5        | 14         | 0.8 |
| 12.5        | 12         | 1.0 |
| 12          | 14         | 0.9 |
| 4           | 9          | 0.4 |
| 14          | 14         | 1.0 |
| 12          | 14         | 0.9 |
| 12          | 14         | 0.9 |
| 7           | 13         | 0.5 |
| 4.5         | 6          | 0.8 |
| 7           | 9          | 0.8 |
| 8           | 8          | 1.0 |
| 5.5         | 8          | 0.7 |
| 4           | 8          | 0.5 |
| 5           | 4          | 1.3 |

ARW – average ring width

It is clear that there is variation in size (from 8mm to 28mm) and age (from 4 to 14 years). There was also an incomplete (and therefore unmeasured) roundwood fragment of >21 years, and one fragment in which the earlier

rings had laid down tyloses, suggesting that a branch/stem of some maturity was represented. Growth rates were also variable, with average ring widths (ARW) ranging from 0.4 to 1.8mm. Several fragments were recorded with narrow early rings and wider later rings. It should be noted that charring causes significant shrinkage and pre-charring stems would have been c. 40% larger in diameter.

The charcoal assemblage was dominated by oak (*Quercus* sp.) charcoal, with both roundwood and mature heartwood noted. A single fragment of roundwood of the Maloideae family, which includes hawthorn (*Crataegus monogyna*), rowan, service and whitebeam (*Sorbus* sp.), apple (*Malus* sp.) and pear (*Pyrus* sp.) was also noted.

The dominance of oak indicates that this taxon was specifically selected for charcoal production. The dominance of roundwood stems in the assemblage suggests that the charcoal being produced came from immature branches, mostly <15 years in age when cut, with rare evidence for older wood being utilised. This indicates that if coppicing were being practiced, cutting was taking place on a relatively short cycle of 12-15 years, rather than maintaining oak as a standard tree with coppice. However, the evidence for management is inconclusive as there is variability in growth rates. Comparable data from other charcoal burning platforms are required to aid interpretation of the way the wood was managed.

Oak is known to make excellent charcoal: it was commonly used for this purpose across Britain (Taylor 1981), and also dominated the charcoal assemblage at another excavated charcoal-burning platform at Llanelen, Gower (Groves 2001). The presence of a single fragment of Maloideae roundwood may suggest that other woody taxa were also used for charcoal production, or alternatively may indicate the utilisation of woodland margin or hedgerow taxa as kindling. As the assemblage derives from wood selected for charcoal production, it is of limited value in determining the taxonomic composition of woodland local to the site, although oak is likely to have formed a significant component of these woodlands.

### Discussion

As the site was identified as a charcoal burning platform the abundance of charcoal and the absence of any other environmental or archaeological remains is unsurprising. One would not expect food or cultural debris at such a site. These platforms are normally located within the woodland or on its margins and are not believed to be closely associated with occupation sites. The concentration of oak roundwood and mature heartwood is also typical of charcoal production sites, reflecting the selection of oak wood, probably in this case from woodland with a high oak component. Charcoal production sites are often associated with local industries such as iron smelting. The radiocarbon results are problematic. With both a late medieval date and a post-medieval date from the feature there is an implication that this platform functioned at two different periods, and the results therefore represent an amalgam of these two periods. The dominance of oak indicates that the species focus had not changed but the ring width counts which have a 6-9 and 11-14 range focus could reflect a change in coppicing strategy or not!

## Site 285

### Environmental soil samples

A burnt mound, 285001, was identified at this site infilling a hollow or cut 285002, and a single bulk environmental sample collected. The sample was taken from a slot excavated through the central axis of the mound. The deposit is technically undated but a number of other burnt mounds along the pipeline have been dated to the Bronze Age.

**Table 5.** Bulk environmental sample from Site 285

| sample no | context no | feature | description       | processed wt kg | processed vol l | date |
|-----------|------------|---------|-------------------|-----------------|-----------------|------|
| 285001    | 285001     | 285002  | Burnt mound layer | 56              | 40              | BA?  |

The sample was processed in the manner described in the assessment report (Giorgi and Martin 2009) with the additional refloating of the dried <2mm sample residue whose flot volume is indicated in Table 6 as '2nd flot'. The unsorted fraction of the 1st flot and the 2nd flot were then sorted for charred macrofossils and the residue re-dried and checked with a magnet to recover any further magnetic material, none was found.

**Table 6.** Data for the environmental sample from Site 285

| sample no | context no | processed vol l | 1st flot vol ml | 2nd flot vol | residue wt g | pottery | burnt clay | stone | coal | flint | magnetic | burnt bone | comments |
|-----------|------------|-----------------|-----------------|--------------|--------------|---------|------------|-------|------|-------|----------|------------|----------|
| 285001    | 285001     | 40              | 500             |              |              |         |            | 16 kg |      |       | B        |            |          |

\* abundance rating – E= 1-10 items; D=11-50, C=51-100, B=101-200, A=>200; nd – no data

The deposit contained abundant stone. The CA processing record notes the retention of 16kg of stone, but does not indicate whether this was burnt or not. The residue produced a magnetic component perhaps indicating some local burning of the soils or the introduction of burnt mineral material into the deposit. The flots are completely dominated by charcoal, with just a few charred buds, although much of this is composed of small fragments <4mm, but also include abundant recent root material, degraded bark and leaf fragments, moss, buds and uncharred seeds of bramble and sedges (Giorgi and Martin 2009) indicating a significant degree of modern disturbance or bioturbation. Despite this disturbance there is nothing to suggest that the charcoal assemblage itself might be contaminated, and there is no evidence for later woodland activities at this site. A single sample from burnt mound deposit 285001 was submitted for charcoal analysis. The assemblage contained ample charcoal, but the fragments were quite small in size, with only two >8mm and most <4mm. Thirty fragments were randomly selected and identified following standard procedures. Two taxa were positively identified; *Quercus* sp. (oak) and *Corylus avellana* (hazel) (Table 7).

**Table 7.** Charcoal from the burnt mound feature at Site 285

|                            | Site           | 285         |
|----------------------------|----------------|-------------|
|                            | Feature type   | burnt mound |
|                            | Context number | 285001      |
|                            | Sample number  | 285001      |
| <i>Quercus</i> sp.         | oak            | 23 (h)      |
| <i>Corylus avellana</i> L. | hazel          | 6 (r)       |
| <i>Alnus/Corylus</i>       | alder/hazel    | 1           |

s=sapwood; h=heartwood; r=roundwood; (brackets denotes presence in some fragments only)

The condition of the charcoal was variable, with some oak fragments exhibiting 'clinkery' type characteristics—friable, brittle and with numerous radial cracks. Some of the oak was very slow grown, with mostly early wood

pores and little late wood observed. Tyloses were recorded in several pieces. Evidence for roundwood was scarce, with only one hazel fragment exhibiting moderate ring curvature, although the evidence was limited by the small size of the fragments. The use of oak and hazel for fuelling the activities associated with the burnt mound feature is indicative of the oak-hazel woodland which dominated the landscape of South Wales in the Bronze Age.

### *Discussion*

The sample lacks any food remains, charred seeds or charred herbaceous material and is completely dominated by charcoal, composed mainly of oak heartwood, but with some hazel. This is a pattern similar to several of the other burnt mounds along the pipeline. The occurrence of largely oak heartwood suggests substantial branchwood and trunk wood being utilised. Such wood is most likely to have been felled, cut and stacked well in advance of its use. On the basis of a very crude calculation based upon the charcoal volume from the 40 litre sample and the approximate total surviving volume of the burnt mound some 200 litres of charcoal may have survived in the burnt mound deposits weighing approximately 42kg, the equivalent in uncarbonised wood of just over a quarter of a tonne. Assuming even a fairly low efficiency of burn several tonnes of wood must have been burnt to ash at this site during its period of use. The area of the burnt mound is approximately 27 sq. metres. Unfortunately there is no section drawing of the mound so we cannot calculate its average thickness. The context sheets record a thickness of 0.3m which suggests a maximum average thickness of perhaps 0.15m. The single sample has an approximate weight of stone of 0.56kg per litre of deposit which would indicate a ball park figure of 2.3 tonnes of stone in the whole of the burnt mound. These estimates are crude owing to a lack of section and only one sample but they give an acceptable guesstimate of the total stone. Such quantities of stone and wood use can only be envisaged as long term, perhaps very long term— decades or even centuries, accumulations.

These are crude ball-park estimates but they indicate that the site is likely to represent a long term build-up of debris from oft repeated activities that used only a small fraction of these resources on each occasion. It is difficult to envisage any activity in the Bronze Age, other than cremation pyres, that might use this sort of quantity of woodfuel on a single occasion. Even bronze manufacture and casting would only need such quantities when carried out on an industrial scale, and these would probably use already carbonised wood as the fuel.

### **Site 517**

Site 517 was represented by a burnt mound and a tree-throw pit at the western end of the Canaston Wood stretch of the pipeline. Although four samples are recorded (see Table 8 below) as having been taken from the burnt mound, 517004, these were not assessed, the sample sheets have not been found and there is no record that they were ever processed. They are presumed to have been lost. There is no record of any other environmental finds being recovered from this site.

### **Site 518**

#### *Environmental soil samples*

Twenty two samples were collected from a range of features at Site 518. This site extended across the whole length of Canaston Wood nearly 1.5 kilometres and rather than a single site comprised a scatter of features or individual sites of various dates through the wood, many of which have some direct relationship to the historic wood, such as the charcoal burning platforms and a saw pit. The majority of the samples collected were taken from charcoal burning platforms assigned to the medieval or post-medieval period (Table 8), but a few were taken from undated pits and a ditch along the pipe route. A sample from the upper fill of one of the double ditches excavated (see Table 8) has been radiocarbon dated to the post-medieval-modern period. Although considered a modern contaminant in the assessment report (NLM 2012a) the sample came from a charcoal concentration in

the upper fill of the ditch, and could be associated with post-medieval activities within the woodland. It even raises the possibility that the ditch may have been associated with a medieval or later woodbank rather than an earlier feature. Two samples of oak roundwood from large sub-rectangular pit 518006 from the primary and tertiary fills were submitted for radiocarbon dating and indicate an early medieval date, 7th–9th century AD (Table 8). One of the charcoal burning platforms, 518013, was sampled in three spits through the charcoal rich deposit, 518001. A single prehistoric feature, a burnt mound, was excavated and sampled towards the eastern end of the wood. A radiocarbon date on alder/hazel roundwood charcoal from this deposit has given a Late Bronze date for this mound. This latter feature was sampled in four spits of approximately 5cm in a 0.5m square column through the lowest burnt mound deposit, 518032 (Table 8), the date being obtained from the second spit.

**Table 8.** Bulk environmental samples from Sites 517 and 518

| sample no | context no | feature | description                                    | processed wt kg | processed vol l | date                                     |
|-----------|------------|---------|--|-----------------|-----------------|--|
| 517001    | 517004     |         | Burnt mound sample pit                         | nd              | nd              | BA                                       |
| 517002    | 517004     |         | Burnt mound sample pit                         | nd              | nd              | BA                                       |
| 517003    | 517004     |         | Burnt mound sample pit                         | nd              | nd              | BA                                       |
| 517004    | 517004     |         | Burnt mound sample pit                         | nd              | nd              | BA                                       |
| 518001    | 518001     | 518013  | Charcoal burning platform 0-5cm                | 19              | 15              | Med/pmed                                 |
| 518002    | 518001     | 518013  | Charcoal burning platform 5-10cm               | 20              | 15              | Med/pmed                                 |
| 518003    | 518001     | 518013  | Charcoal burning platform 10-15cm              | 18              | 12              | Med/pmed                                 |
| 518004    | 518003     | 518011  | Charcoal burning platform                      | 17              | 10              | Med/pmed                                 |
| 518005    | 518003/04? | 518011  | Charcoal burning platform                      | 6               | 10              | Med/pmed                                 |
| 518006    | 518007     | 518006  | 3 <sup>rd</sup> pit fill                       | 5               | 8               | 666-875 cal AD<br>(oak r'wd)             |
| 518007    | 518010     | 518006  | 1 <sup>st</sup> pit fill                       | 5               | 10              | 657-865 cal AD<br>(oak r'wd)             |
| 518008    | 518018     | 518013  | 3 <sup>rd</sup> fill charcoal burning platform | 8               | 8               | Med/pmed                                 |
| 518009    | 518020     | 518013  | 2 <sup>nd</sup> fill charcoal burning platform | 11              | 10              | Med/pmed                                 |
| 518010    | 518015     | 518013  | 2 <sup>nd</sup> fill charcoal burning platform | 6               | 8               | Med/pmed                                 |
| 518011    | 518024     | 518021  | Fill charcoal burning platform                 | nd              | 15              | Med/pmed                                 |
| 518012    | 518022     | 518021  | Fill charcoal burning platform                 | 6               | 5               | Med/pmed                                 |
| 518013    | 518034     | 518041  | Fill charcoal burning platform                 | 6               | nd              | Med/pmed                                 |
| 518014    | 518037     |         | Charcoal layer adjacent to hollow way          | 7               | 15              | Med-pmed                                 |
| 518015    | 518039     | 518038  | Pit fill                                       | 2               | 2               | undated                                  |
| 518016    | 518050     |         | Probable charcoal burning platform             | 4               | 5               | Med/pmed                                 |
| 518017    | 518053     | 518052  | Upper fill of ditch (052=042)                  | 9               | 8               | 1690-1930 cal AD                         |
| 518018    | 518032     |         | Burnt mound layer, lowest                      | 9               | 7               | BA                                       |
| 518019    | 518032     |         | Burnt mound layer, lowest                      | 12              | 7               | 900-790 cal BC<br>(alder/hazel charcoal) |
| 518020    | 518032     |         | Burnt mound layer, lowest                      | 10              | 7               | BA                                       |
| 518021    | 518032     |         | Burnt mound layer, lowest                      | 14              | 7               | BA                                       |
| 518022    | 518001     | 518013  | Fill charcoal burning platform 15-20cm         | 12              | 5               | Med/pmed                                 |

The samples were processed in the manner described in the assessment report (Giorgi and Martin 2009). The residues from the samples were dried and reloaded, sorted for archaeological finds and checked with a magnetic to recover the magnetic fraction. The 2nd flot from this re-processing and the unsorted parts of the 1st flot were checked for identifiable plant macrofossils. For those samples where the residue was not seen during the post-excavation analysis the finds data presented in Table 9 is missing (columns marked with 'nd' in Table 9).

**Table 9.** Data for the environmental samples from Site 518

| sample no                            | context no | processed wt kg | 1st flot vol ml | 2nd flot vol | residue wt g | pottery | burnt clay | burnt stone | coal | flint | magnetic g. | burnt bone |
|--------------------------------------|------------|-----------------|-----------------|--------------|--------------|---------|------------|-------------|------|-------|-------------|------------|
| Platform 518013                      |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518001                               | 518001     | 19              | 427             | 80           | 8323         |         |            | 6925        |      |       | 66          |            |
| 518002                               | 518001     | 20              | 464             | 47           | 8246         |         |            | 6043        |      |       | 70          |            |
| 518003                               | 518001     | 18              | 606             | 7            | 6887         |         | 74g        | 4272        |      |       | 27          |            |
| 518008                               | 518018     | 8               | 27              | 36           | 787          |         |            |             |      |       | 9.4         |            |
| 518009                               | 518020     | 11              | 54              | 227          | 1642         |         |            |             |      |       | 41.6        |            |
| 518010                               | 518015     | 6               | 416             | 64           | 116          |         |            |             |      |       | 53.8        |            |
| 518022                               | 518001     | 12              | 17              | nd           | 5500         | nd      | nd         | nd          |      |       | nd          |            |
| Platform 518011                      |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518004                               | 518003     | 17              | 1985            | 43           | 2865         |         |            | 1559        |      |       | 36          |            |
| 518005                               | 518003/04? | 6               | 280             | 128          | 773          |         |            |             |      |       | 88          |            |
| Platform 518021                      |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518011                               | 518024     | nd              |                 | nd           |              | nd      | nd         | nd          |      |       | nd          |            |
| 518012                               | 518022     | 6               | 112             | 20           | 314          |         |            |             |      |       | 9.8         |            |
| Platform 518041                      |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518013                               | 518034     | 6               | 735             | 148          | 503          |         |            |             |      |       | nd          |            |
| Platform 518050                      |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518016                               | 518050     | 4               | 70              | 140          | 416          |         |            |             |      |       | 32.6        |            |
| ?Platform 518037                     |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518014                               | 518037     | 7               | 118             | 234          | 1000         |         |            |             |      |       | 0           |            |
| Early medieval pit                   |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518006                               | 518007     | 5               | 96              | 23           | 544          |         |            |             |      |       | 0.4         |            |
| 518007                               | 518010     | 5               | 1050            | 78           | 342          |         |            |             |      |       | 4.2         |            |
| Undated pit                          |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518015                               | 518039     | 2               | 47              | 11           | 322          | nd      | nd         | nd          |      |       | nd          |            |
| Ditch with post-med radiocarbon date |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518017                               | 518053     | 9               | 75              | 71           | 1175         |         |            |             |      |       | 0           |            |
| Late Bronze Age Burnt Mound          |            |                 |                 |              |              |         |            |             |      |       |             |            |
| 518018                               | 518032     | 9               | 19              | none         | 6086         |         |            | 5725        |      |       | 0           |            |
| 518019                               | 518032     | 12              | 80              | 11           | 8533         |         |            | 8951        |      |       | 0.1         |            |
| 518020                               | 518032     | 10              | 76              | none         | 7150         |         |            | 6756        |      |       | 0.1         |            |
| 518021                               | 518032     | 14              | 31              | none         | 9212         |         |            | 8951        |      |       | 0           |            |

\* abundance rating – E= 1-10 items; D=11-50, C=51=100, B=101-200, A=>200; nd – no data

The burnt mound deposits are characteristically dominated by burnt stone, but produced very little or no magnetic fraction suggesting no *in situ* burning on the mound. Perhaps surprisingly the charcoal content of this mound is fairly low, but whether this reflects the material being dumped or subsequent weathering of the mound during which the charcoal was washed out we cannot say. Pannet (2008) records the site as 'extremely denuded' and impacted on by forestry activities and the stripping, and this could account for a loss of charcoal from the deposits.

There is some variation between the charcoal burning platforms. Platform 518013 is characterised by a fairly high burnt stone content, a significant magnetic mineral fraction, composed of grey and pink heat affected mudstone suggesting burning *in situ*, and an average charcoal content (2–3%). One of the samples from platform 518011 is similar (Table 9) but with a much larger charcoal component, while most of the other platforms had little or no burnt stone in the much smaller residues. The fairly large magnetic fraction in these samples would suggest, as would be expected, *in situ* burning, but none was recovered from 518037, which is described as a charcoal dump or store adjacent to hollow way 518036, perhaps confirming a dump rather than another platform, although this could merely reflect the part of the deposit sampled.



No identifiable charred plant remains were noted in the samples during the assessment, although uncharred seeds of *Rubus* sp. (bramble/raspberry), *Craetagus* sp. (hawthorn) and *Potentilla* sp. (cinquefoil, tormentil and silverweed) were present in sufficient numbers to perhaps suggest the survival of these robust seeds in some contexts (Giorgi and Martin 2009). However without the actual radiocarbon dating of the seeds their age cannot be guaranteed so these remains were not taken further. The second flots produced further uncharred seeds, including uncharred hazel nutshell and a Rosaceae thorn (sample 518017), with charred buds, twigs and occasional tubers, while the presence of occasional snail shells and insect elytra tends to suggest the uncharred material is intrusive. No identifiable charred plant macrofossils were recorded from any of the burnt mound or charcoal platform samples (1st or 2nd flots) or other features at the site.

Early medieval pit 518006 produced a small magnetic fraction but no finds and no identifiable environmental material other than charcoal.

The charcoal assessment (Schmidl *et al* 2009) studied samples from platforms 518013 and 518041, the charcoal layer by the hollow way, 518037, undated 'firepit?' 518039 and the upper fill of ditch 518052 which has been dated to the post-medieval period. These produced ash and oak, with a few roundwood fragments of poplar/willow and *Viburnum*. The 'firepit' produced alder/hazel, ash and ash/oak. Three of the charcoal platforms were selected for study to produce a representative selection of the charcoal production, and the third charcoal rich fill of undated pit 518006 was also studied. This latter feature was a large rectangular pit with alternating silty sand and charcoal rich fills and stones but no evidence for burning *in situ* from which samples were initially extracted for radiocarbon dating, to support their study, but not in the end submitted.

#### Charcoal (Dana Challinor)

Charcoal assemblages from pit 518006, and charcoal platforms 518011, 518013 and 518041 were analysed (Table 10). The burnt mound assemblages produced too little material to merit analysis. Standard methodological procedures were followed, with 30 fragments analysed from each sample, but preference was given to the larger fractions of the charcoal platform samples in order to record roundwood data.

**Table 10** Charcoal from Site 518

|                      | Date           | Med/post-Med?      |         |          | eMed.   |
|----------------------|----------------|--------------------|---------|----------|---------|
|                      | Feature type   | charcoal platforms |         |          | pit     |
|                      | Feature number | 518011             | 518013  | 518041   | 518006  |
|                      | Context number | 518003             | 518001  | 518034   | 518007  |
|                      | Sample number  | 518004             | 518003  | 518013   | 518006  |
| <i>Quercus</i> sp.   | oak            | 30 (hsr)           | 23 (sr) | 30 (hsr) | 28 (sr) |
| <i>Betula</i> sp.    | birch          |                    | 6 (r)   |          |         |
| cf. <i>Maloideae</i> |                |                    | 1       |          |         |
| Indeterminate        | bark           |                    |         |          | 2       |
| <b>Total</b>         |                | 30                 | 30      | 30       | 30      |

h=heartwood; s=sapwood; r=roundwood; (brackets denotes presence in some frags only)

Three taxa were positively distinguished; *Quercus* sp. (oak), *Betula* sp. (birch) and cf. *Maloideae* (hawthorn, apple, rowan etc.). The latter fragment was too small to confirm the necessary longitudinal features, but exhibited the appropriate diffuse porous pattern in transverse section. Condition was generally good, with large, firm fragments, especially in sample 518004, which produced very large pieces (up to 40mm in length). Roundwood fragments were a significant component of the assemblages, especially in the charcoal platform samples, and roundwood data was recorded where possible (Table 11). Some of the oak exhibited the fast growth and/or wider early rings, followed by narrow late rings, consistent with growth ring patterns produced by coppicing.

**Table 11** Roundwood data from Site 518 (all fragments *Quercus* sp.)

| Sample number | Pith | Bark | Radius (mm) | Ring count | ARW |
|---------------|------|------|-------------|------------|-----|
| 518003        | Y    | Y    | 6           | 9          | 0.7 |
| 518003        | Y    | Y    | 6           | 16         | 0.4 |
| 518003        | Y    | Y    | 10          | 12         | 0.8 |
| 518003        |      |      | 22          | 20         | 1.1 |
| 518003        | Y    | Y    | 11          | 10         | 1.1 |
| 518003        |      |      | 9           | 14         | 0.6 |
| 518003        |      |      | 12          | 9          | 1.3 |
| 518003        |      |      | 14          | 12         | 1.2 |
| 518004        | Y    | Y    | 6.5         | 8          | 0.8 |
| 518004        | Y    | Y    | 7.5         | 9          | 0.8 |
| 518004        | Y    | Y    | 8           | 13         | 0.6 |
| 518004        | Y    | Y    | 8           | 9          | 0.9 |
| 518004        | Y    | Y    | 8.5         | 9          | 0.9 |
| 518004        | Y    | Y    | 8.5         | 16         | 0.5 |
| 518004        | Y    |      | 9.5         | 12         | 0.8 |
| 518004        | Y    | Y    | 13          | 15         | 0.9 |
| 518004        | Y    | Y    | 12          | 17         | 0.7 |
| 518004        | Y    | Y    | 8           | 12         | 0.7 |
| 518004        |      | Y    | 10          | 24         | 0.4 |
| 518004        |      |      | 7           | 13         | 0.5 |
| 518004        |      | Y    | 15          | 17         | 0.9 |
| 518004        |      |      | 5           | 7          | 0.7 |
| 518013        | Y    |      | 7.5         | 10         | 0.8 |
| 518013        | Y    | Y    | 9.5         | 13         | 0.7 |
| 518013        |      | Y    | 11          | 27         | 0.4 |
| 518013        |      |      | 10          | 13         | 0.8 |
| 518013        |      |      | 13          | 17         | 0.8 |
| 518013        |      | Y    | 10          | 22         | 0.5 |
| 518013        |      | Y    | 16          | 21         | 0.8 |
| 518013        |      | Y    | 8           | 17         | 0.5 |
| 518013        | Y    |      | 7           | 11         | 0.6 |
| 518013        | Y    | Y    | 10          | 11         | 0.9 |
| 518013        |      |      | 5           | 10         | 0.5 |
| 518013        |      |      | 8           | 10         | 0.8 |
| 518013        |      |      | 7           | 9          | 0.8 |
| 518013        |      | Y    | 13          | 31         | 0.4 |
| 518013        | Y    | Y    | 7           | 13         | 0.5 |

In common with the other Canaston Wood sites, the charcoal from Site 518 exhibited low diversity, with oak dominating the assemblages. The charcoal from the burning platforms was comparable to the assemblage from Site 269, comprising mainly oak roundwood. The charcoal assemblage from Pit 518006 was also composed of oak and it is possible that this represents a dump of material from charcoal-burning, but the charcoal was more fragmented and in lesser quantity.

In the medieval period, charcoal was traditionally made from roundwood of 6cm to 25cm in diameter, sawn into lengths of about 1m, which were then seasoned, prior to burning in a domed stack covered over with turf (Bond 2007, 280–290). The wood was usually sourced from coppiced stems, or perhaps the off-cuts from timber trees

(*ibid*). Coppicing cycles varied according to region and requirement, but for charcoal was usually taken from underwood of up to 12 years (Rackham 2006, 205).

This method suggests a range of species would be represented in the charcoal product, but this is not the case in the charcoal platforms at Site 518, where oak was used, apparently exclusively. The rare fragments of birch and other taxa are likely to represent kindling used in the charcoal stack (or perhaps remnants from other firings). The age ranges mostly fall within the 9-13 year range, but the presence of heartwood and older specimens (20-30+ years) indicates that some more mature wood was also utilised. The original width of the stems is difficult to estimate since charring causes up to 40% shrinkage, but the analysis suggests that the original stems at Site 518 would have been on the lower scale of general roundwood (c.3-6cm in diameter). The calculations of average ring width indicate relatively slow growth, with a maximum of 1.3mm/year. The variation in the material may indicate that off-cuts from timber trees had been used at these charcoal burning platforms, but since oak also dominates other excavated charcoal platforms, it may also reflect local practice.

### Discussion

Site 518 represents an extended area across the whole of the pipeline route through the northern section of Canaston Wood. Although containing extensive coniferous plantations this is a historic wood, formerly dominated by oak prior to the introduction of conifer plantations in the post war years and with a known history as part of Narberth Forest back to the 12th century (<http://www.dyfedarchaeology.org.uk/HLC/milford/area/330.htm>). The 7th–9th century dates obtained from the charcoal rich fills of pit 518006 might suggest its history extends even further back. Hassel in 1794 recorded that the woods were ‘managed for charcoal production and bark for tanning’ (op. cit.). The 1st edition OS maps (1889) show it as a broadleaved wood with a number of old quarries and gravel pits in the north-west part. At Blackpool at the west end of the wood a licence to set up a smelting works was granted to George Mynne in 1635 with the rights to timber from the local woods. That this is not entirely an ancient forest is indicated by the Iron Age camp that lies within its modern bounds in the north-east sector and other prehistoric features, such as ditches and a possible ‘banjo enclosure’. This indicates at least that it is unlikely that the whole area was wooded in the later 1st millennium BC. The four burnt mounds recorded in the wood at Sites 269, 285, 517 and 518 are further testament to the prehistoric use of the area, although whether these were located in a wooded landscape or an already cleared landscape we do not know.

The burnt mound at Site 518, dated to the Late Bronze Age, had an approximate stripped area of 15.9 sq metres and an average surviving thickness of 0.11m, giving a total volume for the excavated and recorded surviving mound deposits of 1.75 cubic metres. With an average burnt stone content of 1.085kg/litre in the four bulk samples the total weight of burnt stone in the recorded mound can be estimated at 1.9 tonnes. This is one of the smaller mounds in terms of the stone collected and burnt that has survived but the preliminary report (Pannet 2008) describes the site as extremely denuded so we must assume much of it has been heavily truncated and it may have been two or three times the size originally. Unfortunately the flots from the samples were small and the charcoal very fragmented so it was not studied and we have no data on the wood used to fuel the fires at the site. The location of this mound appears to be some distance from existing water channels, there is a stream 230m to the east, but the assessment report (NLM 2012a) notes a palaeochannel adjacent to the mound although the contours of this area give no indication of a former stream or dry valley of any scale.

The large (3.8m long) sub-rectangular pit, 518006, composed of ‘alternating thin charcoal and silty sand layers’ has been dated to the early medieval period (Table 8). The precise location of this pit has not been recorded but in the absence of all but charcoal in the samples, exclusively oak in the sub-sample studied, it may have been related to charcoal production.

The upper fill, a 0.05cm layer (518053), of one of the undated ditches, 518043 and 518042 (=518052), originally considered as possibly part of a banjo enclosure has produced a post-medieval date (Table 8). Given the shallowness of the surviving ditch deposits, 0.5m in the sampled ditch section 518052, and after the stripping of some 0.4m of deposit from above the dated layer it seems unlikely that this ditch could be prehistoric in age. An association with the medieval wood, perhaps part of the bank and ditch system within the wood or a former routeway through the wood, seems more likely.

Most of the sampled features can be associated with the production of charcoal and have been broadly assigned to the medieval and post-medieval periods. The three deposits that have been radiocarbon dated, a large early medieval pit 518006, a charcoal burning platform at Site 269 and the upper fill of ditch 518052 indicate both medieval and post-medieval activity. The dates from the platform at Site 269 suggest that it was used at two different periods. This indicates that the bulk of the charcoal production sites need not have been geared to supplying fuel for the early blast furnace operating in Blackpool and other industrial uses. It also suggests that there may have been medieval industrial demands for charcoal, perhaps for a local bloomery smelting industry. The use of charcoal as a fuel for the smelting industry diminishes, with its gradual replacement by coke in the late 17th and early 18th centuries and the charcoal production in the woods may have ceased as the Welsh coal industry expanded in the early 19th century. The charcoal evidence indicates that oak was the principal wood used for charcoal production, and probably would have been the primary focus of production for industrial use. Occasional birch and other species may have been the tinder for the charcoal clamp fires. Hassell's (op. cit) comment that the bark was collected for tanning would suggest a later and post-medieval woodland management where coppiced oak stems broadly within a coppice cycle of perhaps 7-13 years were being harvested for charcoal with their bark stripped for the tanning industry prior to clamping. The occurrence of heartwood and more mature oak indicates that more substantial timbers, perhaps the unused wood from felling for structural timbers, was also used in the production. The roundwood component in the platforms from Site 518 differs slightly from that at Site 269 where the ring counts indicate a slightly younger profile (6-9 with an additional peak at 14 years as against 9-13 with a small group at 16 and 17 years for 518). This suggests perhaps a different coppice cycle, perhaps related to the date of the platform or the location/ownership in this part of the wood but also an absence of the maturer wood of 20+ rings that occurs at 518. The probable mixed date material at Site 269, composed of a 6-8 and 11-14 ring count range might argue in favour of the older range being associated with the post-medieval period. However such differences could be management practices reflecting different times, different ownership, or the functional use for the charcoal end product. The similarity of the charcoal assemblage from pit 518006 to those from the charcoal platforms suggests that this feature may also have been associated with the industry.

No domestic material has found its way into any of these deposits so we might perhaps assume that the charcoal burners did not occupy the sites but just worked them.



## APPENDIX D: RADIOCARBON DATING BY SEREN GRIFFITHS

### Introduction

For the analysis, radiocarbon measurements were produced on short-life, single entity (Ashmore 1999), charred plant remains. Samples with the 'SUERC-' laboratory code were pretreated using an acid-base-acid process (cf. Mook and Waterbolk 1985). Samples are combusted as described by Van deputte *et al.* (1996) and (Freeman *et al.* 2010). Following combustion, the samples are graphitized using methods described by Slota *et al.* (1987), and dated by Accelerator Mass Spectrometry (AMS; Xu *et al.* 2004; Freeman *et al.* 2010). The results are conventional radiocarbon ages (Stuiver and Polach 1977), quoted according to the international standard set at the Trondheim Convention (Stuiver and Kra 1986). The results have been calibrated using IntCal13 (Reimer *et al.* 2013), and OxCal v4.2 (Bronk Ramsey 1995; 1998; 2001; 2009). The date ranges in the tables have been calculated using the maximum intercept method (Stuiver and Reimer 1986), and have the endpoints rounded outward to 10 years. The probability distributions shown in the figures were obtained by the probability method (Stuiver and Reimer 1993). Bayesian modelling has been applied using OxCal v4.2. All Bayesian models pass the acceptable agreement indices, the models are defined by the OxCal command query language 2 keywords (Bronk Ramsey 2009).

### Site 269

**Table 1.** Radiocarbon results from Site 269

| Context | Feature | Sampled material                         | Laboratory ref           | Measured age | δ13C  | Radiocarbon date (95%) |
|---------|---------|--|--------------------------|--------------|-------|------------------------|
| 269004  | 269004  | <i>Quercus</i> sp.<br>roundwood charcoal | SUERC-55503<br>(GU35192) | 131 +/-31    | -25.4 | Cal AD 1660–1950       |
| 269004  | 269004  | <i>Quercus</i> sp.<br>roundwood charcoal | SUERC-56051<br>(GU35192) | 531 ± 40     | -25.9 | Cal AD 1310–1450       |

### Site 518

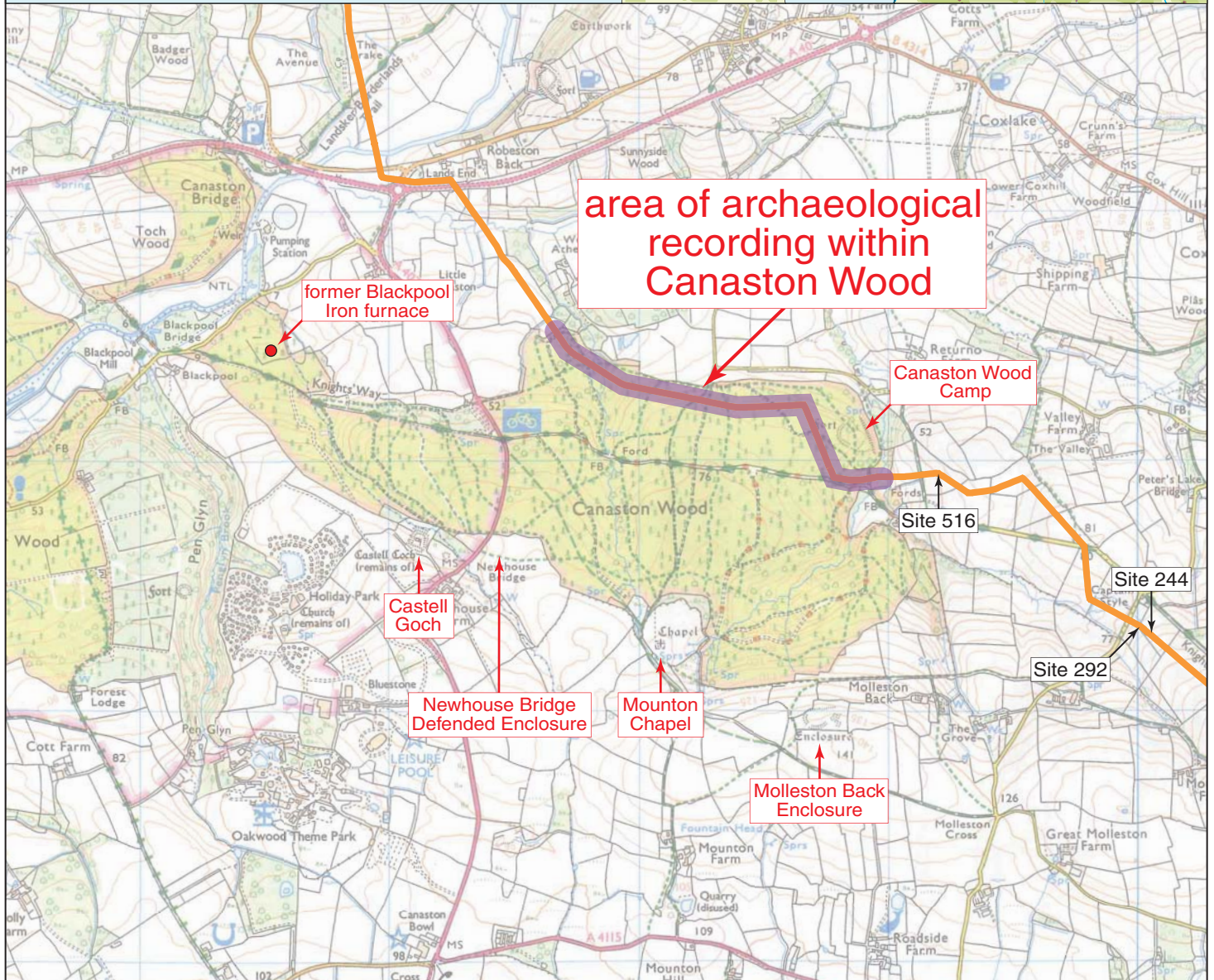
Two radiocarbon results produced on shortlife samples from contexts from pit fills from site 518 were statistically consistent ( $T'=0.1$ ;  $T'5\%=3.8$ ;  $df=1$ ; Ward and Wilson 1978), and could be of the same actual age. If these results represented a single 'archaeological event', a weighted mean taken prior to calibration might suggest they represent activity in second half of the first millennium cal BC.

**Table 2.** Radiocarbon results from Site 518

| Context | Feature | Sampled material                         | Laboratory ref           | Measured age | δ13C    | Radiocarbon date (95%) |
|---------|---------|--|--------------------------|--------------|---------|------------------------|
| 518032  | 518032  |  | Beta-249351              | 2670 +/-40   |         | 900–790 cal BC         |
| 518053  | 518052  |  | Beta-249357              | 120.4 +/-0.4 |         | Cal AD 640–1000        |
| 518007  | 518006  | <i>Quercus</i> sp.<br>roundwood charcoal | SUERC-56068<br>(GU35423) | 1260 +/-40   | -25.2 ‰ | cal AD 660-890         |
| 518010  | 518006  | <i>Quercus</i> sp.<br>roundwood charcoal | SUERC-56069<br>(GU35424) | 1279 +/-40   | -25.0 ‰ | cal AD 650-870         |

Dating undertaken by Beta Analytic, Miami and Scottish Universities Environmental Research Centre





- Milford Haven to Aberdulais pipeline
- Felindre to Brecon pipeline
- 0-75m contour
- 75m contour
- 200m contour
- 400m contour
- 600m contour

area covered by Sites  
269, 285, 517 and 518

0 1km

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#### PROJECT TITLE

South Wales Pipeline. Site 269, 285, 517 and 518  
Canaston Wood, Llawhaden, Pembrokeshire

#### FIGURE TITLE

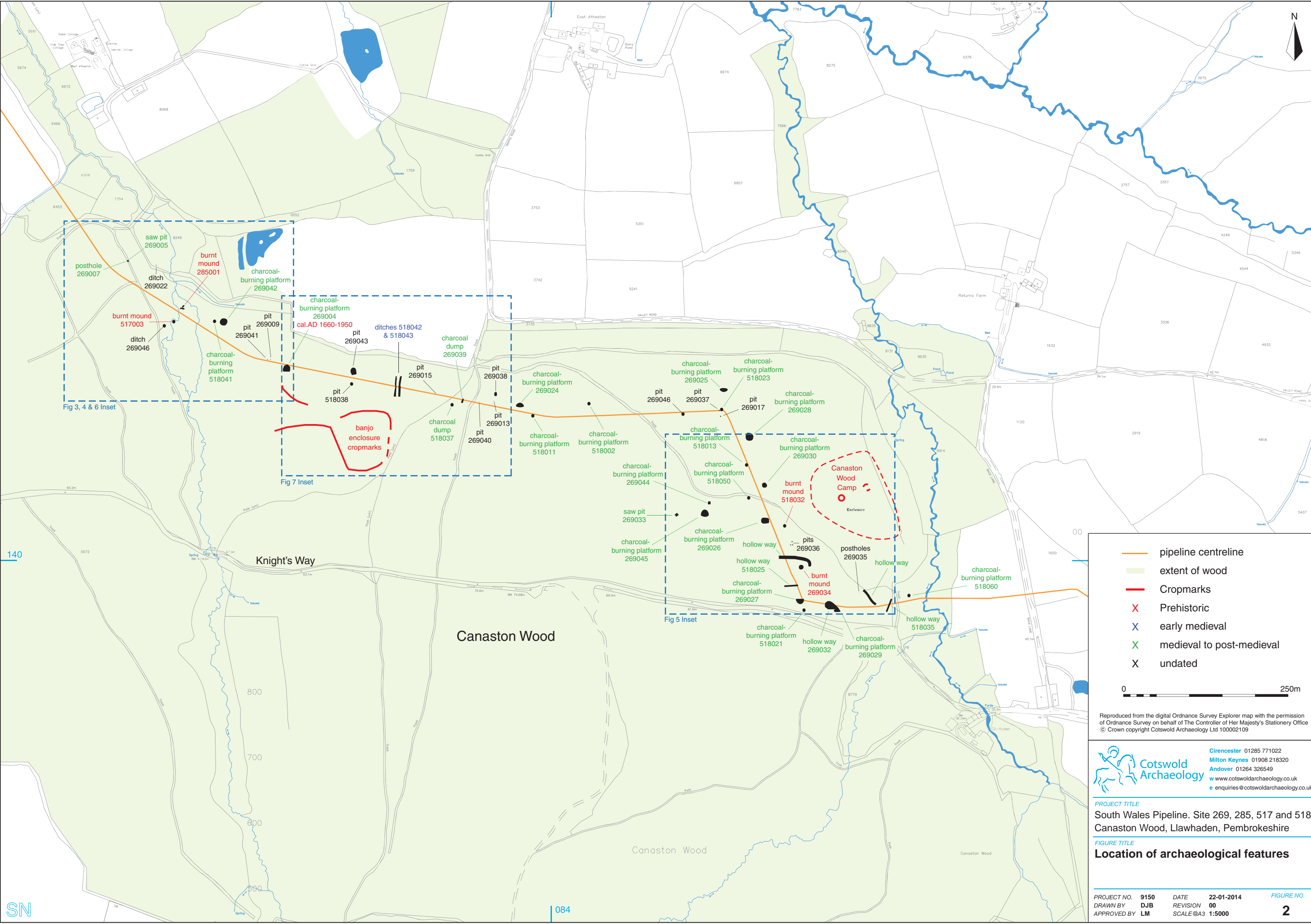
**Site location plan**

PROJECT NO. 9150 DATE 22-01-2013  
DRAWN BY DJB REVISION 00  
APPROVED BY LM SCALE@A4 1:25,000

FIGURE NO.

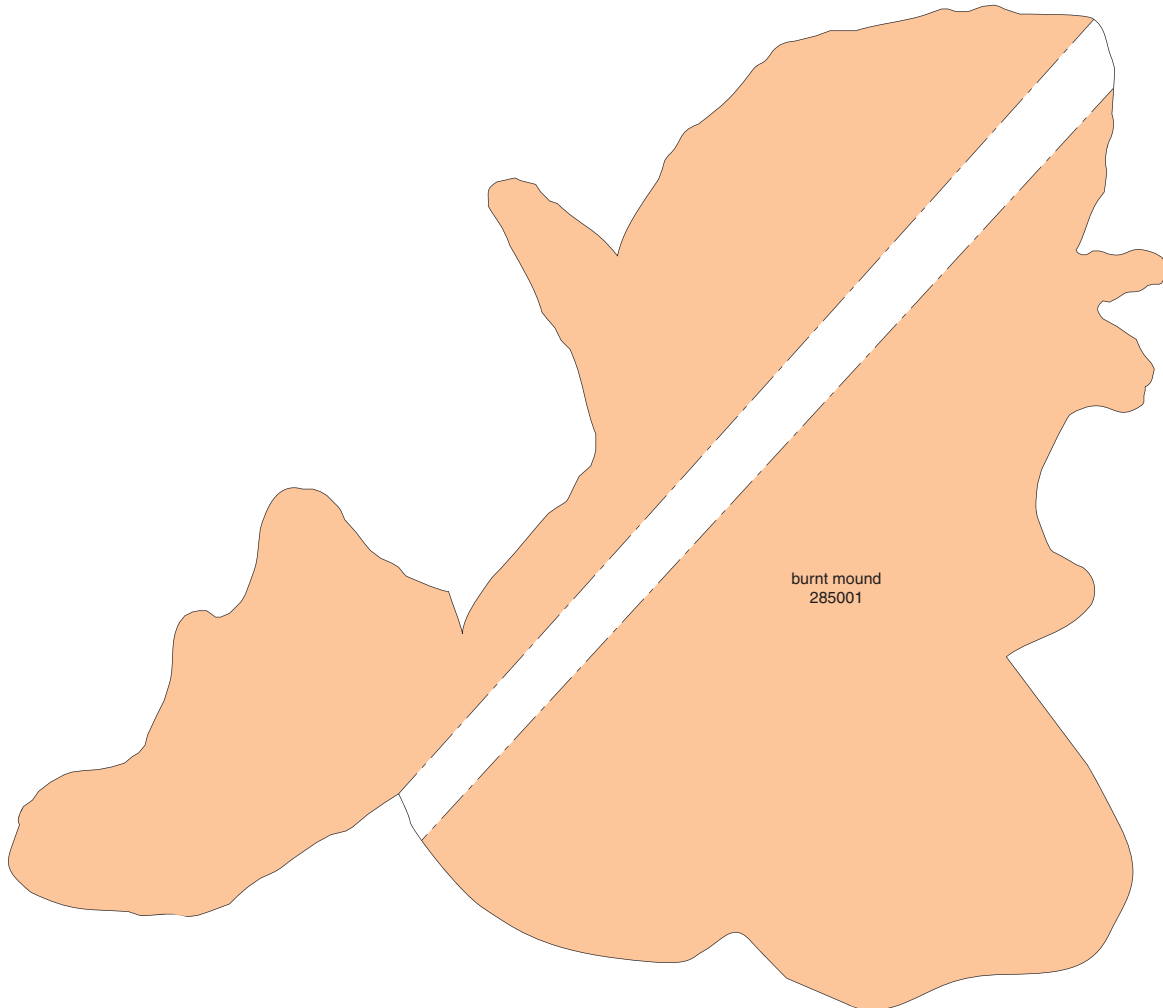
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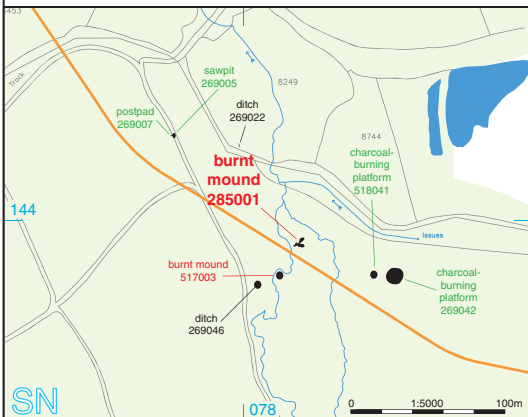




SN  
07835  
+  
14390



0 2.5m



- pipeline centreline
- burnt mound
- X prehistoric
- X medieval to post-medieval
- X undated

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FIGURE TITLE

**Plan of burnt mound 285001**

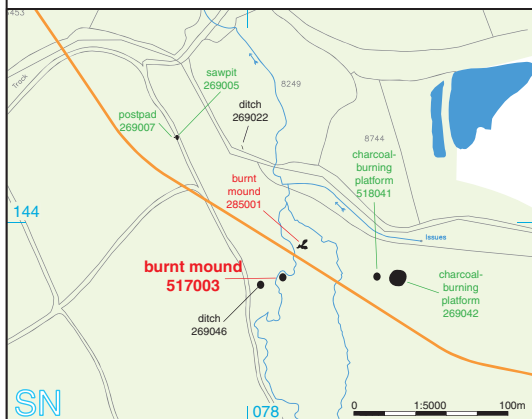
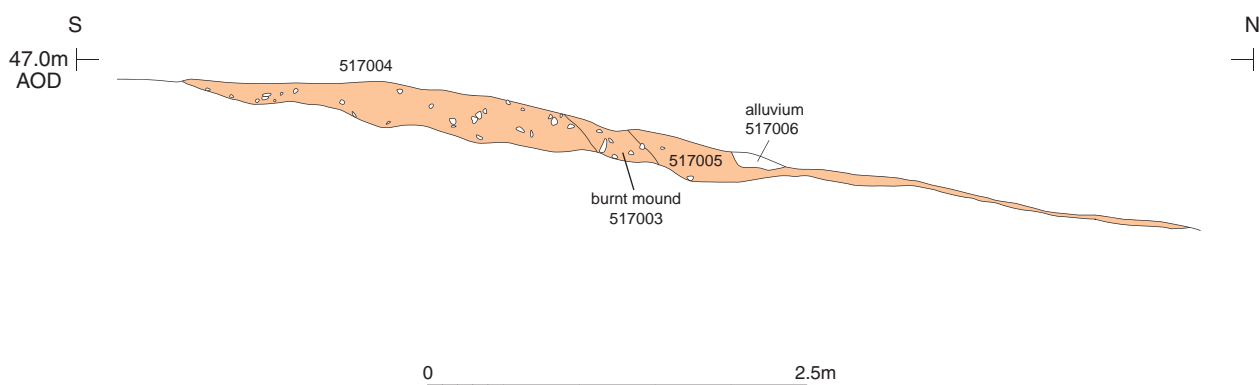
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FIGURE NO.

**3**



## Section AA



- pipeline centreline
- burnt mound
- X prehistoric
- X medieval to post-medieval
- X undated

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### PROJECT TITLE

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### FIGURE TITLE

**Section of burnt mound 517003**

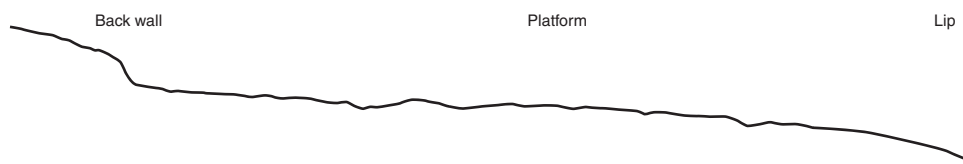
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FIGURE NO.

**4**



## Section CC

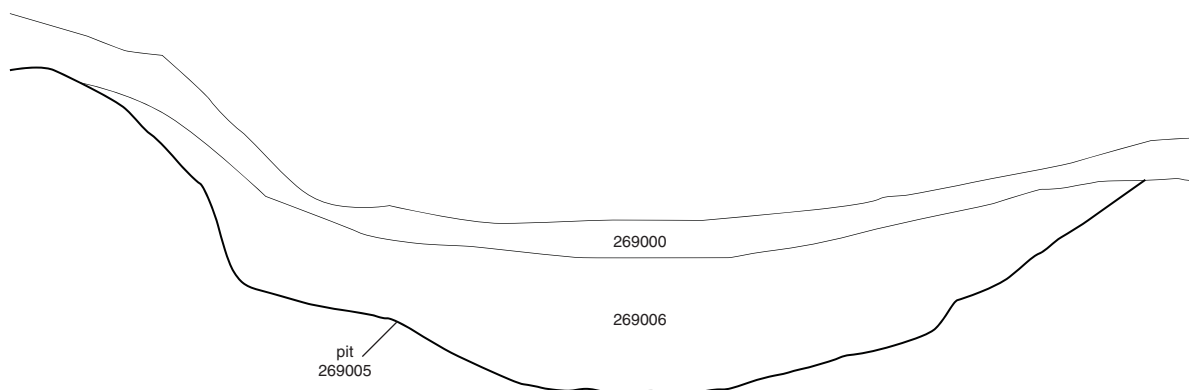


0 5m

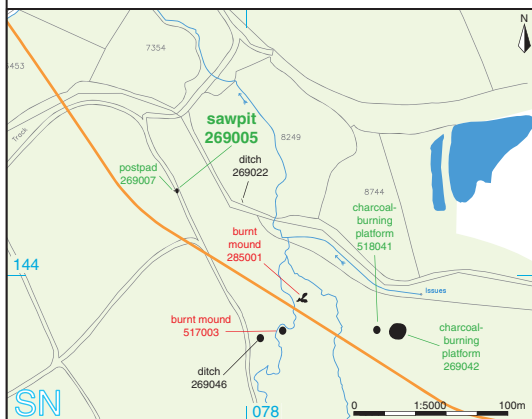
## Section DD

W  
33.0m  
AOD

E



0 1m



- pipeline centreline
- X Prehistoric
- X medieval to post-medieval
- X undated

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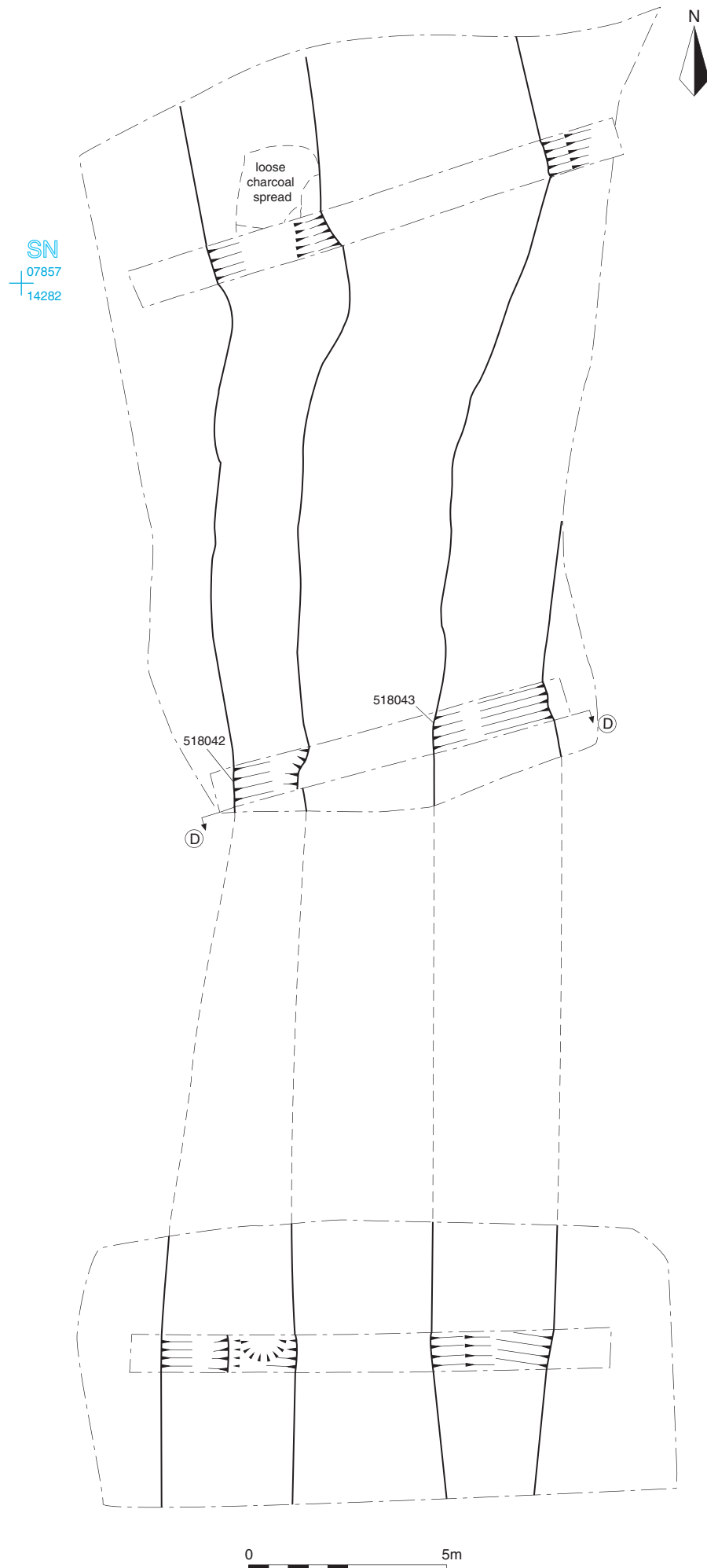
### FIGURE TITLE

**Example profile of charcoal-burning platform and section of saw pit 269005**

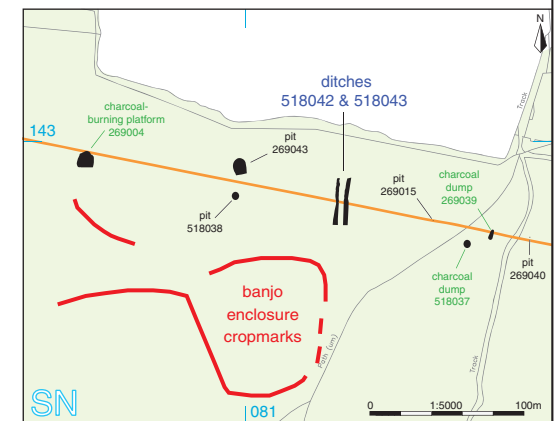
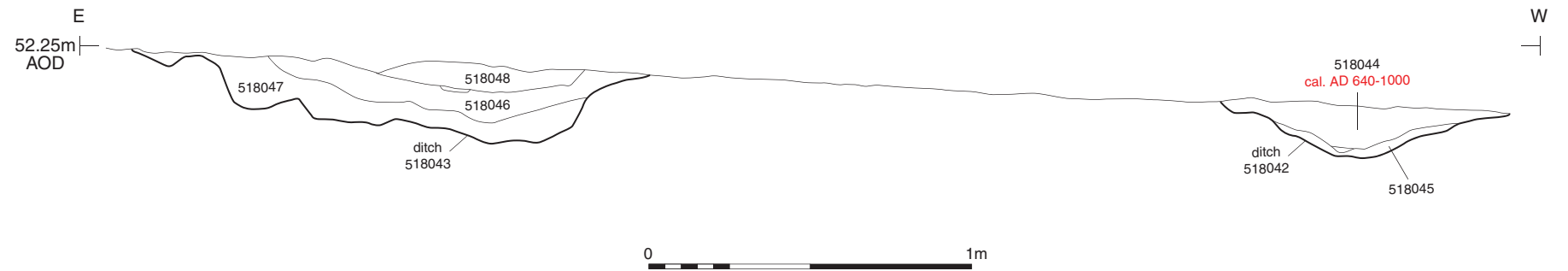
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FIGURE NO.

6



Section DD



- pipeline centreline
- X Prehistoric
- X early medieval
- X medieval to post-medieval
- X undated

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**PROJECT TITLE**  
South Wales Pipeline. Site 269, 285, 517 and 518 Canaston Wood, Llawhaden, Pembrokeshire

**FIGURE TITLE**  
**Plan and section of ditches 518062 and 518069**

|             |      |          |            |            |
|-------------|------|----------|------------|------------|
| PROJECT NO. | 9150 | DATE     | 22-01-2014 | FIGURE NO. |
| DRAWN BY    | DJB  | REVISION | 00         | 7          |
| APPROVED BY | LM   | SCALE@A3 | 1:150 1:20 |            |