

**Land East of  
Burnsome Forde,  
Dunkeswell Abbey,  
Devon**

**Archaeological Test  
Pit Excavation**

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## Land East of Burnsome Forde, Dunkeswell Abbey, Devon Archaeological Test Pit Excavation

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## EXECUTIVE SUMMARY

A Test Pit investigation on land to the east of Burnsome Forde was initiated by Heritage Arts and People as part of a wider National Lottery Heritage Funded Project – 'Discovering Dunkeswell Abbey'. The work was carried out on the 8th and 9th November 2019 with the voluntary assistance of Alex Farnell and local Dunkeswell residents.

The principal aim to characterise and date putative deposits of iron slag and a linear earthwork were achieved. The depth and character of iron smelting waste at the top of the steep slope was established, as was the good potential for more complex archaeology to be preserved below the dumped waste. It was also shown that the linear earthwork is likely to be a later boundary feature, unrelated to the industrial activity.

The full extent and form of the slag and industrial waste dumping was not established, and the striking topography of the site would require further investigation to adequately explain. No datable artefacts were recovered from any of the excavated deposits. However, a soil sample recovered from a charcoal rich deposit of furnace waste produced material suitable for radiocarbon dating.

This deposit is considered to be a securely sealed and rapidly formed deposit of burnt waste directly related to iron production activity. The radiocarbon determination for charcoal recovered from this sample returned a date in the late Roman Period. This is considerably earlier than had been previously anticipated and is broadly contemporary with Roman iron working deposits recorded at Bywood Farm, located 3km to the southeast.

The presence of a possible Roman quern stone is suggestive of additional associated settlement activity in the vicinity of the site.

## **1. INTRODUCTION**

### **1.1 Project Background**

- 1.1.1 This document sets out the results of an archaeological test pit investigation undertaken at Burnsome Forde, Dunkeswell Abbey, Devon. The work was initiated by Heritage Arts and People (HAP) as part of a National Lottery Heritage Funded Project 'Discovering Dunkeswell Abbey'. It was carried out in consultation with Devon County Council (DCC) and Historic England (HE) and engaged the voluntary assistance of professional archaeologist Alex Farnell and local Dunkeswell Abbey residents.
- 1.1.2 The initiation of this fieldwork element to the Discovering Dunkeswell Abbey project was in response to its overarching aims:
- To engage the local community with the history of Dunkeswell Abbey; and
  - Extend the existing body of knowledge of the Abbey and its history by investigating features identified by the Blackdown Hills AONB and East Devon River Catchments Aerial Investigation and Mapping Survey.

### **1.2 Site Location & Description**

- 1.2.1 The site chosen for the test pit investigation (Figure 1) was on land to the immediate east of Burnsome Forde, Dunkeswell Abbey, Devon, centred on National Grid Reference NGR: ST 13901071. The site lies approximately 250m to the west of the Scheduled Area of Dunkeswell Abbey (National Heritage List for England (NHLE) ref: 1009303) and to the immediate north of the Scheduled Area of the Dunkeswell Abbey Fish Ponds (also recorded under NHLE ref: 1009303).
- 1.2.2 The site is a single field in the ownership of the adjacent property 'Burnsome Forde'. It is currently under pasture with the exception of a small wooded area on its north-east side.

### **1.3 Geology & Topography**

- 1.3.1 The British Geological Survey records the underlying geology of the site as the Mercia Mudstone Group comprising sedimentary mudstone bedrock formed approximately 201 to 252 million years ago. Superficial Quaternary 'Head' deposits of clay, sand and gravel are recorded across the northern half of the site.
- 1.3.2 The site lies on the south facing slopes of the river valley of a tributary of the River Madford and occupies gently sloping land at between 164-180m above Ordnance Datum (aOD).
- 1.3.3 Localised topography within the site is most likely related to human activity. The site occupies two distinct topographic levels. The lower of these includes the southern extent of the pasture field (adjacent to the Scheduled fish-ponds) and the wooded area which extends along the north-east boundary of the site. The upper level is open, relatively flat pasture, occupying the northern part of the site. The upper and lower levels of the site are joined by steep slopes unlikely to be natural in origin. Within the wooded area the steep sides have the ragged and scoured character of quarrying. However, within the pasture field, a steep straight slope joins

the upper and lower levels. This steep slope continues to the west into the adjacent garden of Burnsome Forde.

## 1.4 Historical and Archaeological Background

- 1.4.1 The site lies immediately north of well-preserved fish-ponds associated with Dunkeswell Abbey. Remains of the Abbey lie some 250m further to the east of the site. The Cistercian Abbey at Dunkeswell was founded by William Brewer and was in occupation between 1201 until its dissolution in 1539. Full details of the Abbey are given in its listing description on the National Heritage List for England under its reference number 1009303.
- 1.4.2 The known extent of upstanding and buried remains of the former Abbey are defined by the Scheduled Area of Dunkeswell Abbey which falls into two areas and also includes the associated fish-ponds. The wider historic landscape beyond the Scheduled Areas features earthworks potentially related to the Abbey and its broader activities, but of which the origins are not currently well understood.
- 1.4.3 Current knowledge of these features has been informed by the 'Blackdown Hills AONB and East Devon River Catchments Aerial Investigation and Mapping Survey' using data from LiDAR and aerial photography. A number of such features (see Figure 2) across the southern half of the site have been recorded on the Devon Historic Environment Record (HER) as a 'Possible Furnace Site' (Devon HER ref: MDV54143) comprising '*A range of earthworks...*'.
- 1.4.4 Viewed on the ground the earthworks within the site present a complex picture, likely to be the result of more than one phase of activity. The most striking topographic aspect of the site is the steep slope between the upper and lower levels of the pasture field (Photo 1), positioned at c.45m to the north of the Scheduled fish-ponds.



Photo 1: View from the top of the slope, looking towards the lower area of site

- 1.4.5 It is well known, in part because of late 20<sup>th</sup> century landscaping undertaken in the garden of Burnsome Forde, that the top of this slope is composed of deposits containing substantial volumes of iron slag. The top of the slope is also emphasised by a well-defined linear earthwork, composed of a bank and ditch which either terminates, or has been truncated, at its eastern extent by possible quarrying (within the wooded area of the site). This earthwork has been shown (see Figure 2) to be a continuation of an east - west aligned linear feature in the adjacent field to the west, recorded on the Devon HER as a post medieval field boundary (Devon HER ref: MDV115983).
- 1.4.6 A recent geophysical survey of the upper level of the pasture field, undertaken as part of the 'Discovering Dunkeswell Abbey' project (Geoflow 2019), yielded limited results beyond confirmation of the known earthworks. However, high magnetic readings across the top of the steep slope supported the likely presence of slag deposits and defined their potential northern extent.

## **2. AIMS & METHODOLOGY**

### **2.1 Project Rationale**

- 2.1.1 The test pit investigation was initiated to investigate the potential of the site to contain features and deposits related to historic iron production and, if possible, to characterise and date any such deposits. Following careful consideration of the earthwork evidence and results of the geophysical survey, the well-defined linear earthwork at the top of the steep slope was chosen as a focus for this investigation.

### **2.2 Aims**

- 2.2.1 The principal aim was to investigate the form, character and date of deposits at the top of the slope, including the east-west aligned linear earthwork.

### **2.3 Methodology**

- 2.3.1 Two test pits were positioned to target a linear earthwork and putative slag deposits at the top of a steep slope, approximately 45m to the north of the Dunkeswell Abbey fish-ponds. Test Pit 1 targeted the north side of the earthwork bank and extended into the flanking ditch to the north of the bank. Test Pit 2 was positioned on the south side of the earthwork bank and extended to the top break of slope of the steep slope. The work was undertaken in accordance with the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Field Evaluation (CIfA 2014).
- 2.3.2 The turf and topsoil overburden was removed by hand and stored next to the test pits. The upper surface of exposed deposits was cleaned by hand and examined for its archaeological potential. Where dense deposits of slag were encountered, they were left in situ. A hand auger was used to confirm the presence of natural clay in both test pits.
- 2.3.3 All other deposits were excavated by hand and all deposits and features exposed were recorded using a system based on the MOLAS recording system (MOLAS 1994) comprising written, graphic and photographic records with plans and sections drawn at 1:10, 1:20 or 1:50 as appropriate.
- 2.3.4 Trenches were located according to a georeferenced site grid.

### 3. RESULTS

#### 3.1 Test Pit 1 (Plan Fig. 3a and Section Fig. 3b)

- 3.1.1 This Test Pit (Photos 2, 3 & 4) was aligned approximately north - south, measured 1.95m long and 0.8m wide and was excavated to a maximum depth of 0.85m below ground surface (bgs). Natural clay subsoil (106) was encountered at a depth of 0.75m bgs. Natural was composed of firm yellow clay and was investigated by auger to a further depth of 0.5m.



Photo 2: Test Pit 1, general view, looking west



Photo 3: Test Pit 1, view in plan, looking south. Scale 0.5m



**Photo 4: Test Pit 1, east facing section. Scale 0.5m**

- 3.1.2 At the northern extent of Test Pit 1 the natural clay appeared to have been cut by a shallow feature (F108) partially exposed by the Test Pit. This cut, where observed had moderate top break of slope, shallow concave sides and an imperceptible break of slope at the base. It contained a single fill (107) composed of very dark greyish-brown, loose clay-silt, with frequent small to medium fragments of rust coloured slag.
- 3.1.3 To the south of cut F108, a clay deposit (105) of distinctive form, had been placed on the natural clay (106). Deposit 105 was composed of, mottled reddish-yellow and grey, firm or plastic clay, with occasional charcoal flecks. It was only partially exposed by the test pit, but where observed it had a well-defined curved shape in plan with a flat upper surface. It continued beyond the limits of excavation to the south, east and west (Photo 5).



**Photo 5: Test Pit 1, detail of clay deposit 105, looking south. Scale 0.2m**

- 3.1.4 Natural subsoil (106), deposit 105 and fill 107 were overlain by a layered or lensed deposit of possible furnace waste (104) measuring c. 0.38m thick. This deposit continued beyond the limit of excavation in all directions. It was composed of very dark greyish brown, soft sandy clay silt, with rare angular pebbles, occasional slag fragments, common charcoal flecks and very small fired clay fragments. An environmental sample <1> was recovered from deposit 104.
- 3.1.5 Through limited investigation it was determined that deposit 104 extended below a very coarse deposit (103) composed of very dark brown, loose clay silt, with rare angular pebbles and abundant small to large slag fragments. This deposit was exposed in plan but not excavated due to the limitations of the scope of the project. It constituted the northern margin of the linear earthwork bank.
- 3.1.6 Both deposit 103 (forming the adjacent bank) and deposit 104 (possible furnace waste sealed by the bank) appeared to have been cut into by a linear feature (F102). This feature was visible at ground level as a flanking ditch to the linear earthwork measuring c. 2m wide. It was partially exposed in section and measured 0.32m deep with a sharp top break of slope, concave sides, gradual bottom break of slope and a flat base. Ditch F102 contained a single fill (101) composed of very dark brown, loose slightly sandy silty clay with rare angular

pebbles, occasional angular boulders and small-large slag fragments. A large fragment of worked stone was recovered from the fill.

- 3.1.7 A layer of topsoil and turf (100) sealed the bank (103) and ditch fill (101). It was composed of very dark brown, soft clay silt with high humic content, rare angular pebbles and occasional small – large slag fragments.

### 3.2 Test Pit 2 (Plan Fig 4a. Section Fig. 4b)

- 3.2.1 This test pit (Photo 6) was aligned approximately north – south, measured 4.4m long and 0.8m wide and was excavated to a maximum depth of 0.2m. A slag rich deposit (201) was exposed in plan across the trench but was not excavated due to the limitations of the scope of the project. The exposed upper surface of deposit 201 was composed of very dark brown, loose clay silt, with rare angular pebbles and abundant small to large slag fragments. Topsoil (200) sealed deposit 201. It was composed of very dark brown, soft clay silt with high humic content, rare angular pebbles and occasional small – large slag fragments.'



**Photo 6: Test Pit 2, general view, looking northwest**

#### Auger Investigation

- 3.2.2 A hand augured bore hole, positioned at the southern extent of Test Pit 2, encountered natural clay at a depth of c. 1.1m bgs. Between 1.1m and 0.5m bgs the augured bore hole recorded a deposit (203) composed of very dark greyish brown soft sandy clay silt, with fragments of slag, charcoal flecks and very small fired clay fragments. This deposit was overlain by coarse slag rich deposit 201 (described above) recorded at between 0.5 and 0.2m bgs.

## 4. THE FINDS *By Naomi Payne*

- 4.1.1 The artefacts recovered from the excavation of the two test pits are summarised in Table 1.
- 4.1.2 A reasonably large quantity (384 fragments, 25180g) of iron smelting slag and a smaller quantity of clay furnace lining (45 pieces, 2721g), much of it vitrified, were recovered from the two test pits. The high furnace slag to furnace lining ratio suggests that smelting activity was taking place very nearby, but the furnace itself was not located within the excavation area; rather, slag from a nearby furnace appears to have been dumped onto the site and during this process much of this material has broken up into pieces. A small quantity of probable iron ore (12 fragments, 375g) was also recovered from three contexts in Test Pit 1. Most of this is reddish in colour, suggesting it has been roasted. Bloomery smelting was the norm from the Iron Age until the 16th century AD (Bayley, Dungworth and Paynter 2015, 17).
- 4.1.3 Context 101, fill of probable ditch F102, contained a probable smithing hearth bottom. This is a plano-convex oval, c. 240 x 180mm, with two linear projections from the convex base. The upper surface responds to a magnet, suggesting it contains hammerscale. The 16 fragments (1980g) of undiagnostic iron-working slag recovered from Test Pit 1 could also relate to smithing activity, as well as the 503g of magnetic material recovered from the processed sample taken from context 104, a layer of dumped metalworking waste.
- 4.1.4 Other finds from the test pits included two pieces (6g) of pottery from the topsoil in Test Pit 2, 15 pieces (158g) of heat-affected flint, chert and chalk, and a large worked stone fragment from context 101, fill of probable ditch F102. The pottery includes a small body sherd of transfer-print and a rim sherd from a flowerpot, both probably of 19th century date. The worked stone is an irregular flattish fragment of (unidentified) stone measuring approximately 245mm by 200mm by 60mm. There are no certainly original edges. One side is very slightly convex with a circular indentation adjacent to two of the broken edges. This is c. 30mm in diameter and c. 27mm deep. The other side is slightly dished. The most likely identification for this object is a fragment of the lower stone from a rotary quern. If this is correct it would have had an original diameter of at least 370mm, based on what survives and the position of the hole. The wear on the base may indicate reuse. A date in the Roman or perhaps early-medieval periods would be appropriate. Two Half Penny coins of 1910 (Edward VII) and 1919 (George V) were recovered from topsoil (101) in Test Pit 1.

Table 1. Summary of finds by context (weights in grams)

Context	Context description	Furnace slag		Furnace lining		Iron ore		Smithing hearth bottom		Undiag iron-working slag		Burnt stone		Pottery		Worked stone		Coins	
		No.	weight	No.	weight	No.	weight	No.	weight	No.	weight	No.	weight	No.	weight	No.	weight	No.	Weight
100	Trench 1 topsoil	177	5639	9	164	4	72			4	83	5	53						
101	Fill of probable ditch F102	95	9395	17	1076	1	136	1	3800	5	1060	6	55			1	3900	2	9
104	Layer of dumped metalworking waste	49	5405	13	940	7	167			4	437	1	44						
107	Fill of possible cut F108	15	943	2	55					3	400	1	1						
200	Trench 2 topsoil	48	3798	4	486							2	5	2	6				
Totals		384	25180	45	2721	12	375	1	3800	16	1980	15	158	2	6	2	6	2	9

## 5. ASSESSMENT OF ECOFACTS *By Gemma Warham & Alex Farnell*

### 5.1 Introduction

- 5.1.1 As part of a Community Heritage Project exploring the landscape around Dunkeswell Abbey ruins, Devon, one bulk-sieving sample was taken during archaeological excavations at Burnsome Forde (NGR: 313900 110700). The bulk-sieving sample was processed by GeoFlo and submitted for assessment. The sample was assessed in order to determine the concentration, diversity, state of preservation and suitability for use in radiocarbon dating, of any palaeoenvironmental material present. A further aim of this assessment was to evaluate the potential of any palaeoenvironmental material present in the samples to aid in an interpretation of the sampled context and an understanding of the nature of the site and the local environment, particularly in relation to the landscape associated with the Abbey.
- 5.1.2 The site is located in a field adjacent to Burnsome Forde, near the grounds of Dunkeswell Abbey (an early-13th to mid-16th century Cistercian monastic site), and archaeological excavations targeted earthworks previously identified as a possible medieval furnace site (Devon HER ref MDV54143). The bulk-sieving sample was taken from a deposit (104), which was noted to contain lenses of charcoal-rich material and fired clay. The sampled deposit (104) extended under a linear earthwork (103) that has been identified as a possible bank comprising dumped slag, and overlaid a possible clay structure (105), the latter which appears to have been set on the natural subsoil.

### 5.2 Methodology

- 5.2.1 The bulk-sieving sample was processed by flotation for the recovery of charred plant remains and wood charcoal by GeoFlo using a water separation machine. Floating material was caught on a 0.25 mm mesh, and the remaining heavy residue was retained in a 0.50 mm mesh. A total of 20 litres of sediment was processed in this way. The flot and heavy residue were air-dried and their volume recorded. The sample was assessed in accordance with Historic England guidelines for environmental archaeology assessments (Campbell et al., 2011). A preliminary assessment of the sample was made by scanning the flot using a stereo-binocular microscope (x10 – x65) and recording the abundance of the main classes of material present. Material present in the sample was quantified using a scale of abundance (- = < 10 items, + = 10-29 items, ++ = 30-49 items, +++ = 50-99 items, ++++ = 100-499 items, +++++ = > 500 items). Where less than thirty items of charred crop material or wild/weed plant seeds were present, this material was identified and quantified in full. A magnet was passed over a 1kg sub-sample of the heavy residue in order to extract any metallurgical debris, such as hammerscale.
- 5.2.2 Identification of the plant material and wood charcoal was carried out by comparison with material in the reference collections at the Department of Archaeology, University of Sheffield and various reference works (e.g Cappers et al., 2006, Hather, 2000, Jacomet, 2006, Schweingruber, 1990). Cereal nomenclature follows Zohary et al. (2012) and other (wild) plant nomenclature follows Stace (2019). Information relating to the ecology of various plant taxa was sourced from Stace (2019) and Preston et al. (2002). The composition of the bulk

sieving sample plot is recorded in Table 2. The seed, in the broadest sense, of the plant is always referred to in the table unless stated otherwise.

- 5.2.3 Wood charcoal selected as suitable material for radiocarbon dating was examined using high power binocular reflected light (episcopic) microscopy (x 50, x 100 and x 400), and identifications made based on the anatomic features observed in transverse, radial and tangential planes.

**Table 2** – Composition of bulk-sieving sample plot from Dunkeswell Abbey, Devon (DDA BF19)

<b>Context number</b>	104
<b>Feature number</b>	-
<b>Sample number</b>	1
<b>Context type</b>	Sealed deposit
Date	Medieval?
Sample volume (L)	20
Volume of intrusive roots (ml)	200
Flot volume excluding roots (ml)	550
<b>Cereal grain*</b>	
<i>Cerealia</i> indet. (indeterminate grain)	1
<b>Total identifiable crop material</b>	
<b>Other charred plant material*</b>	
Poaceae culm internode & culm base fragments (grass stem/root fragments)	+
<b>Wood charcoal*</b>	
>4mm round wood charcoal fragments	-
>4mm wood charcoal fragments	+++++
2-4mm wood charcoal fragments	+++++
<2mm wood charcoal fragments	+++++
Charcoal (DP = predominantly diffuse porous; RP = predominantly ring porous)	RP
<b>Other archaeological remains*</b>	
Slag	+
<b>Recommendations</b>	
Sample suitable for further analysis? (CPM = charred plant macros, WC = wood charcoal)	WC
Material suitable for C14 dating?	1x <i>Quercus</i> sp. round wood frag

Abundance scale: - = <10, + = 10-29, ++ = 30-49, +++ = 50-99, ++++ = 100-499, +++++ = >500.

Preservation by charring unless otherwise denoted.

## 5.3 Results

### Preservation and contamination

- 5.3.1 The flot of sample 1 (104) primarily consists of wood charcoal, the state of preservation of which is good and will support further identification. The only other charred archaeobotanical remains recorded from the sample are restricted to a single cereal grain, which is very degraded in appearance, and a very small quantity of herbaceous stem and root fragments. In addition to the charred plant macrofossils, several untransformed seeds of bramble (*Rubus fruticosus* agg.) were identified, as well as occasional remains of disarticulated insect (Arthropoda). As no evidence for anoxic preservation was apparent at the point of excavation or processing, and given the presence of recent roots in the flot, these uncharred plant seeds and insect remains may be derived from intrusive material.

Charred plant macrofossils and wood charcoal

- 5.3.2 The charred plant macrofossil assemblage consists of a single indeterminate cereal grain (*Cerealia* indet.) and a small quantity of well-preserved grass (*Poaceae*) culm internodes and bases. The scarcity of charred plant macrofossils from sample 1 provides extremely limited economic evidence, and these remains will not support further interpretation. The wood charcoal assemblage is large, however, and is characterised by high concentrations of fragmented charcoal, including a significant quantity of large fragments (>4mm). Initial assessment of the wood charcoal assemblage using low power microscopy indicates that the assemblage appears to be dominated by ring porous taxa (such as oak, ash or elm), although diffuse porous taxa is present (such as birch family, hawthorn/apple/pear/whitebeams, willow/poplar, cherry/blackthorn and field maple). Several fragments of round wood >4mm were observed, one fragment of which has been identified as oak (*Quercus* sp.). Further identification using high power microscopy would be necessary to confirm which taxa are present in the assemblage, and given the richness and good state of preservation of the wood charcoal assemblage, there is sufficient material suitable for further analysis.

Radiocarbon dating

- 5.3.3 Material suitable for radiocarbon dating from sample 1 (104) is present in the form of a fragment of small diameter round wood (dimensions: 8mm transection/15mm length), which has been identified as oak. This sample has been submitted for AMS dating and has returned a date of 1748 +/- 26 BP.

## 5.4 Discussion

- 5.4.1 Charcoal-rich deposit (104) is sealed by earthwork (103), the latter which has been identified as a possible bank made up of dumped slag, and the site is potentially associated with metal-working activity (see Devon HER ref MDV54143) dated by radiocarbon determination to the 3<sup>rd</sup> – 4th century AD. The scarcity of charred plant macrofossils, the presence of slag and the dominance of wood charcoal from deposit (104) reflects the industrial nature of the activity associated with the features investigated. The initial assessment of the wood charcoal assemblage from deposit (104) indicates the dominance of ring porous taxa (which includes oak), which is in keeping with the selection of oak wood for industrial fuel (Smith 2002, p. 35). More specifically, oak is known to be an excellent fuel wood as it produces a hot flame, but is slow to burn (Porter, 1990, p.93, Webster, 1919, p.45). The presence of diffuse porous taxa (such as birch family, hawthorn / apple / pear / whitebeams, willow / poplar, cherry / blackthorn and field maple), may indicate the use of mixed source of fuels.
- 5.4.2 Overall the wood charcoal assemblage has the potential to provide information relating to the character of the local environs of the landscape around Dunkeswell Abbey, and what resources were exploited for industrial purposes, during the Roman period, prior to the establishment of the Abbey.

## **5.5 Recommendations**

- 5.5.1 The rich wood charcoal assemblage from sample 1 merits further analysis, and the full identification of fifty wood charcoal fragments greater than 4mm in size and fifty fragments 2-4mm is recommended. This analysis would enable the identification of a fully representative sample of the woody taxa utilised for fuel associated with the inferred metal-working activity, and potentially reflects the character of the local habitats that were available for exploitation during the Roman period.
- 5.5.2 If further investigations and environmental sampling of the landscape around Dunkeswell Abbey ruins were to take place, there may be scope for placing the results of any analysis of the wood charcoal identified at Burnsome Forde within a wider research context for the region. Research that contributes to a greater understanding of the wild and managed landscape of southwest England during virtually all periods has been highlighted as a research priority (Grove and Croft, 2012, p.14). A further recommendation for consideration is the comparison of palynological evidence for woodland existing in the region with archaeological evidence for the woods exploited at sites in the region, in order to provide greater resolution of the composition and/or management of ancient woodlands. This cross-referencing of palynological and archaeological evidence has also been highlighted as an area of research interest for southern England (Smith, 2002, p. 45).

## 6. RADIOCARBON DATING

- 6.1.1 A single soil sample <1> was recovered from Test Pit 1, deposit 104. This deposit was interpreted as a securely sealed deposit of burnt furnace waste, directly associated with an iron production industry which has produced substantial iron slag deposits.
- 6.1.2 A sample of oak roundwood was selected by Gemma Warham for radiocarbon dating from soil sample <1>. The sample was submitted to the Waikato Scientific Dating Laboratory for AMS dating. The results are presented below with the full report in Appendix 1.

Sample	Context	Description	F14C%	Calibrated Date
1	104	Industrial iron working waste	80.4 +/- 0.3	1748 +/- 26 BP

## 7. DISCUSSION

### Introduction

- 7.1.1 Some consistency was observed in the deposit profile recorded across the two test pits. Three phases of potential activity can be identified in the stratigraphic sequence recorded in Test Pit 1 and while deposits in Test Pit 2 were only investigated to natural clay by auger, the recorded profile supports the results of Test Pit 1. The results are discussed below by stratigraphic phase.

### Phase I – Possible Industrial Activity

- 7.1.2 The natural was exposed only in the northwest quarter of Test Pit 1. In this location two possible features were exposed, both of which may be related to industrial processes taking place on the site.
- 7.1.3 Deposit 105 had some of the character of a possible clay structure. It exhibited a distinctive shape, inclusions of charcoal and possible heating. Only a small part of this deposit was exposed making interpretation highly uncertain.
- 7.1.4 Feature F108 was a shallow cut into the natural. Its full form was not exposed. However, its fill produced an assemblage of furnace slag, furnace lining and undiagnostic slag possibly derived from smithing. However no datable artefacts were recovered.

### Phase II – Deposition of Industrial Waste

- 7.1.5 This phase was recorded in both test pits and comprised a thick layer of soft ashy material (104 & 203) containing slag fragments, most likely derived from an industrial metal working process, overlain by a layer of concentrated iron slag fragments (103 & 201). These layers of waste material had been deposited over possible industrial processing features partially exposed in Test Pit 1.
- 7.1.6 The evidence suggests that they have been dumped in two a continuous layers of up to 1.1m thick at the top of the steep slope. The northern extent of these deposits has been suggested from geophysical survey to extend little further than the northern edge of later ditch F102, while to the south the extent has not been established. It is possible that it extends some way down the slope and that in fact the formation of this deposit has substantially emphasised the steepness of the slope and created an unnaturally sharp break of slope at its top.
- 7.1.7 Processing and assessment of a soil sample <1> recovered from industrial waste deposit 104 has produced a rich assemblage of wood charcoal. The assemblage is dominated by ring porous taxa (such as oak, ash or elm), and is in keeping with the selection of industrial fuel woods (Gemma Warham, this report).
- 7.1.8 A radiocarbon determination for charcoal recovered from sample <1> has placed the activity within a likely date range of 230-380AD.
- 7.1.9 An assemblage of slag fragments recovered from deposit 104 comprised predominantly smelting furnace slag and furnace lining but also included more undiagnostic fragments of possible smithing slag. However, no datable artefacts were recovered from either deposit.

### **Phase III – Linear Feature**

- 7.1.10 A linear ditch and bank, visible as an extant earthwork, was partially exposed by both Test Pits. It comprises a bank with a flanking ditch on its northside. The stratigraphic sequence observed in Test Pits 1 and 2 suggest that a ditch (F102) had been cut into the deposit of slag with the resulting arisings cast up to its south to form a bank of slag waste. This bank was not examined in section and in plan was largely indistinguishable in composition from the slag spread from which it is derived. In addition to slag fragments, a large fragment of worked stone was recovered from ditch fill (101). This stone artefact is likely to be a fragment of rotary quern of Roman to Early Medieval origin.

## **7.2 General Discussion**

- 7.2.1 The stratigraphic sequence has indicated that the visible linear earthwork is a later feature, unrelated to the deposition of concentrated slag waste at the site. The linear bank is composed of slag for the simple reason that it is derived of the up-caste slag waste through which its flanking ditch was excavated.
- 7.2.2 The depth and northern extent of the known slag deposit has been established, however its extent to the south remains unknown. The soft charcoal rich deposit below the slag spread is characteristic of waste material or rakings from an oven or furnace and is clearly widespread below the dumped slag.
- 7.2.3 The assemblage of archaeometallurgical residues recovered is dominated by fragments of smelting furnace slag and a significance quantity of furnace lining, suggesting that a production site is within the near vicinity. In addition, a number of undiagnostic slag pieces, a possible smithing heath base and a quantity of magnetic residue recovered from sample <1> suggest that the smelted iron was being further worked at the site.
- 7.2.4 Assessment of sample <1> has confirmed the character of deposit 104 as predominantly of fuel waste. The charred material recovered from the processed sample was shown to be dominated by wood charcoal of species likely to have be selected for their suitability as industrial fuel.
- 7.2.5 While the secondary evidence of iron production is abundant, the precise location of the production site remains uncertain. However, the partial exposure in Test Pit 1, of a possible feature and possible clay structure, is tentative evidence that in-situ remains of this industry are buried below the accumulated industrial waste. This interpretation is supported by the results of the geophysical survey which showed an absence of anomalies likely to represent iron production across the upper pasture field.
- 7.2.6 Good comparative deposits have been recorded to both the north and south of Bywood Farm, located approximately 3km to the southeast of the site. The deposits at Burnsome Forde appear to have close affinity with a slag mound recorded to the north of the existing Bywood farm (Devon Historic Environment Record ref: MDV75089) which is similarly positioned on a steep slope and has been radiocarbon dated to between the 1<sup>st</sup> and 5<sup>th</sup> centuries AD. Radiocarbon dates in the Early Medieval period have also been returned from metal working residues at Bywood Farm.

- 7.2.7 Further local comperanda for the sequence observed in Test Pit 1 include deposits recorded during excavations at Cumstock Road, Hemyock (Rainbird 2012) approximately 2.6km to the northwest of the site. Here, remains of slag pit furnaces, pits and gullies were sealed beneath 0.5m of slag and fuel waste derived from iron smelting activity. However, two radiocarbon dates from slag deposits at Culmstock Road indicated a probable late 8<sup>th</sup> century date for this activity, placing it some 500 years or more after the activity at Burnsome Forde.
- 7.2.8 Much remains uncertain regarding the, character and formation processes at the site. In particular, there has been no investigation of the lower area of the site. The current Test Pit investigation has highlighted the potential complexity of the site and the considerable potential for further investigation.

## 8. CONCLUSION

- 8.1.1 A Test Pit investigation on land to the east of Burnsome Forde was initiated by Heritage Arts and People as part of a wider National Lottery Heritage Funded Project – ‘Discovering Dunkeswell Abbey’. The work was carried out on the 8<sup>th</sup> and 9<sup>th</sup> November with the voluntary assistance of Alex Farnell and local Dunkeswell residents.
- 8.1.2 The principal aim to characterise and date putative deposits of iron slag and a linear earthwork was partially achieved. The depth and character of iron smelting waste at the top of the steep slope was established, as was the good potential for more complex archaeology to be preserved below the dumped waste. It was also shown that the linear earthwork is likely to be a later boundary feature, unrelated to the industrial activity.
- 8.1.3 The full extent and form of the slag and industrial waste dumping was not established, and the striking topography of the site would require further investigation to adequately explain. No datable artefacts were recovered from any of the excavated deposits. However, a soil sample <1> recovered from deposit 104 produced material suitable for radiocarbon dating.
- 8.1.4 Deposit 104 is considered to be a securely sealed and rapidly formed deposit of burnt waste directly related to iron production activity. The radiocarbon determination for charcoal recovered from sample <1> returned a date in the late Roman Period. This is considerably earlier than had been previously anticipated and is broadly contemporary with Roman iron working deposits recorded at Bywood Farm, located 3km to the southeast.
- 8.1.5 The presence of a possible Roman quern stone is suggestive of additional associated settlement activity in the vicinity of the site.

### 8.2 Potential for Future Work

#### Analysis of the existing archive

- 8.2.1 The slag and the charred wood assemblages have been assessed as part of this stage of work and a suitable fragment of wood charcoal has been radiocarbon dated. The following recommendations are made for possible further analysis, should further funds be made available in the future:
- Further analysis and study of the wood charcoal assemblage would have the potential to provide wider insight into the environs of the site during the Roman period, and how the local resources were exploited.
  - Analysis and study of the assemblage of archaeometallurgical residues has potential to provide further insight into the nature of the Iron production and working industry at Burnsome Forde.
  - Further identification and comment on the possible quern fragment recovered from fill 101.

#### Future work

- 8.2.2 It is suggested that a further stage of limited fieldwork could take the form of an auger survey. This technique would be low impact and provide useful data on the full extent of the slag

deposits and the formation of the topographic features on the site, allowing for the development of a deposit model.

## **9. ARCHIVE AND OASIS**

- 9.1.1 The paper and digital archive is currently held at the registered office of HAP. It will be held until the need for any further archaeological work on the site is established and whether the creation of a digital archive for deposition at the Archaeology Data Service is required.
- 9.1.2 An online OASIS entry has been completed, using the unique identifier alexfarn1-396261, which includes a digital copy of this report.

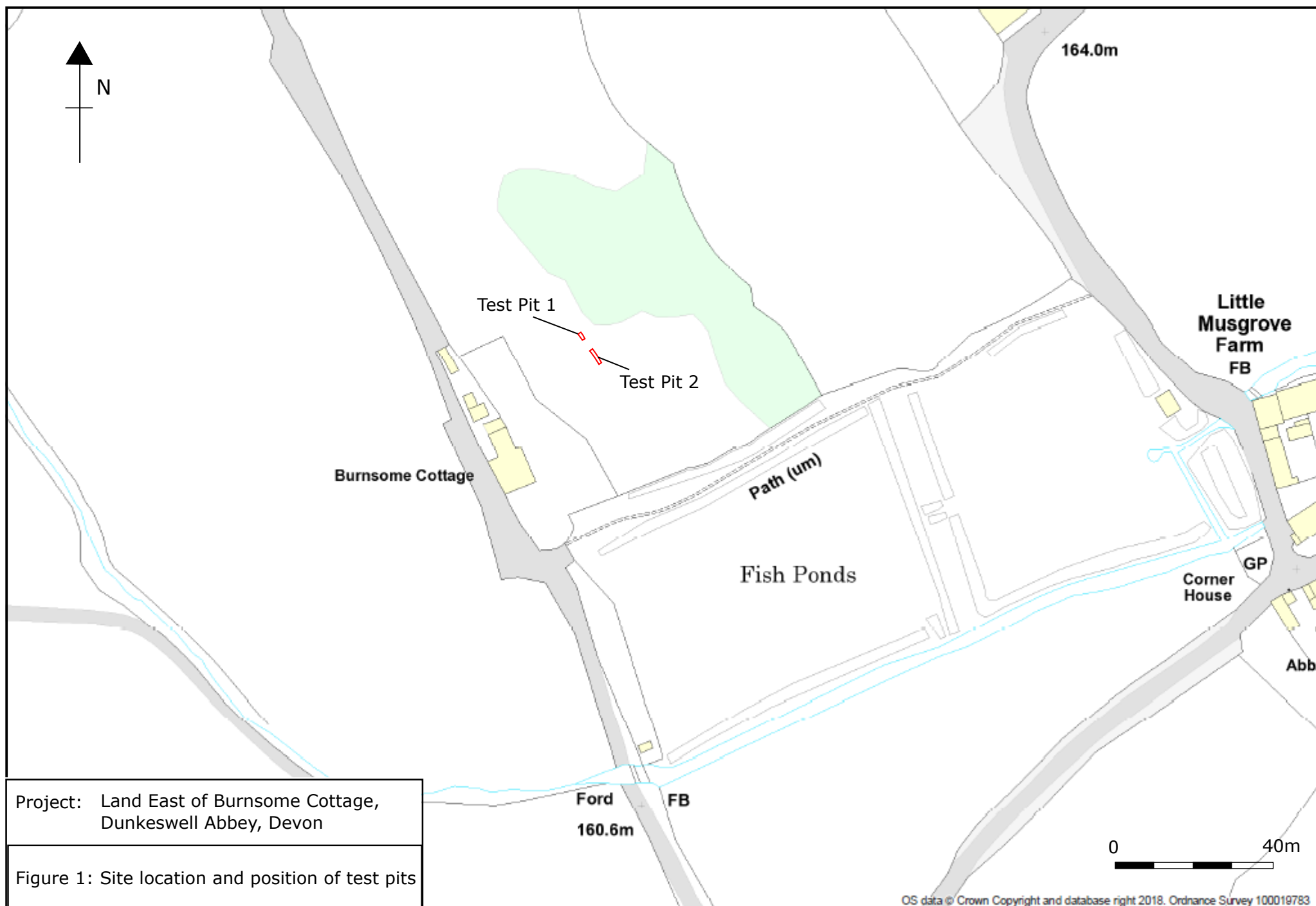
## **10. ACKNOWLEDGMENTS**

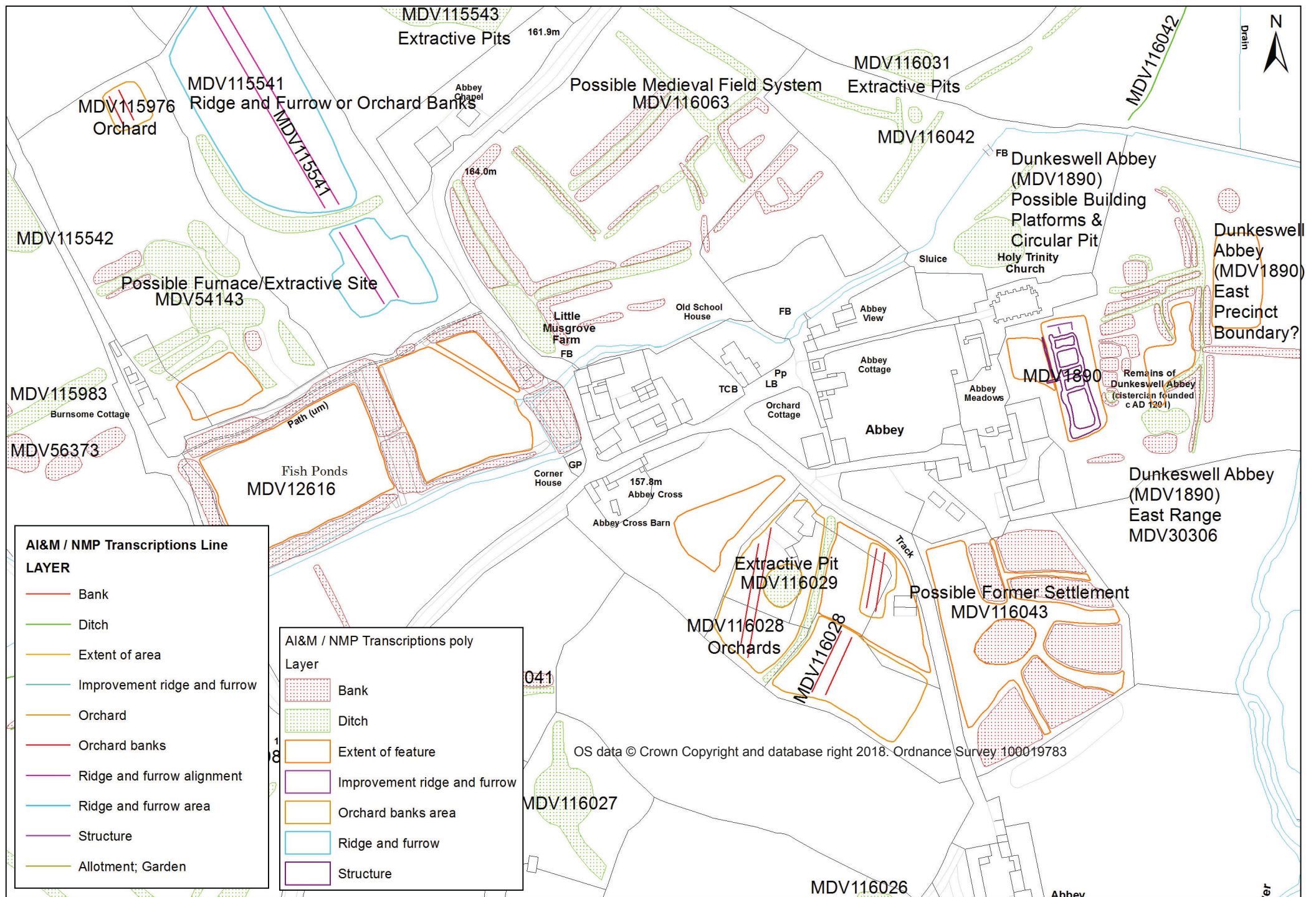
- 10.1.1 Many thanks are due to the owners of the site for allowing access to the site and for their kind co-operation, interest and support in the course of the field work. Thanks is also due to Dunkeswell Abbey volunteers for their assistance. The advice and support of Bill Horner (Devon County Council) and Charlotte Russell (Historic England) is gratefully acknowledged. The work was project managed for HAP by Catherine Farnell and Marie Leverett and was funded by the National Lottery Heritage Fund.

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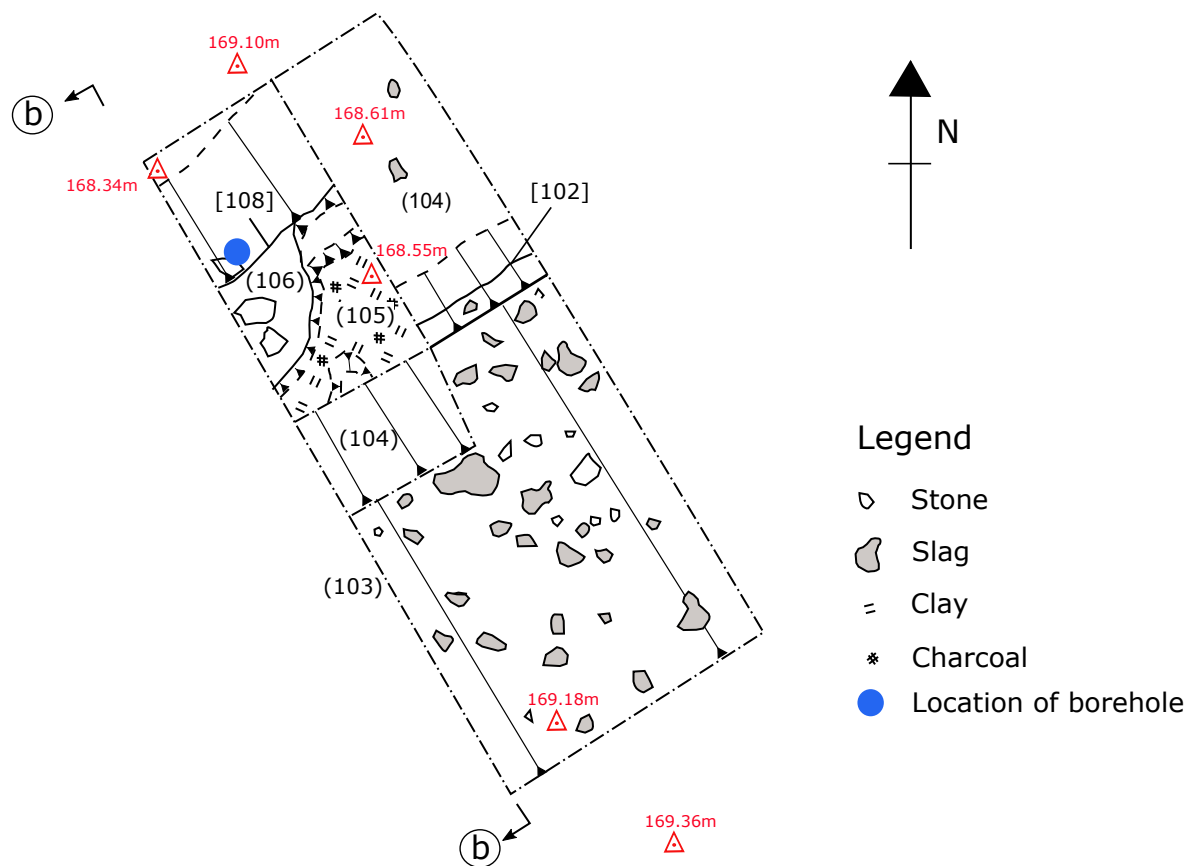
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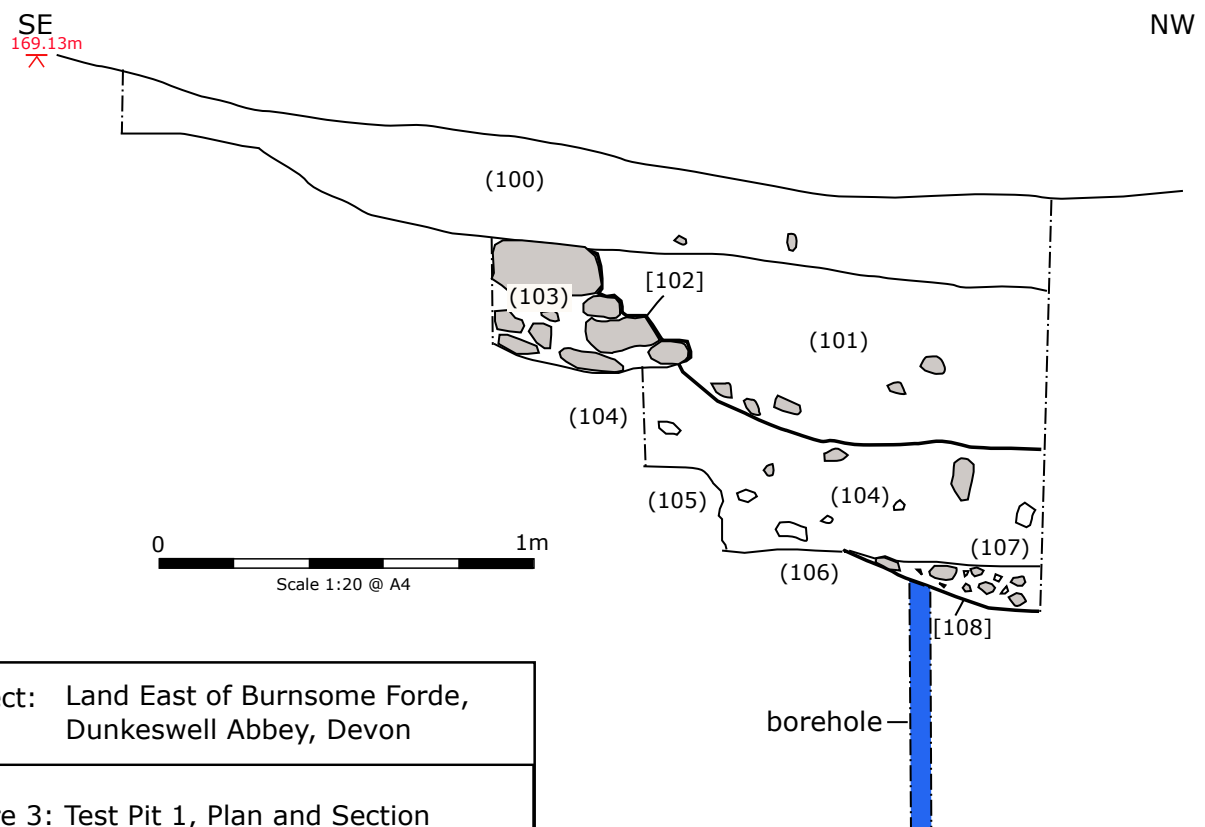


# Test Pit 1

a) Plan



b) Northeast-facing section

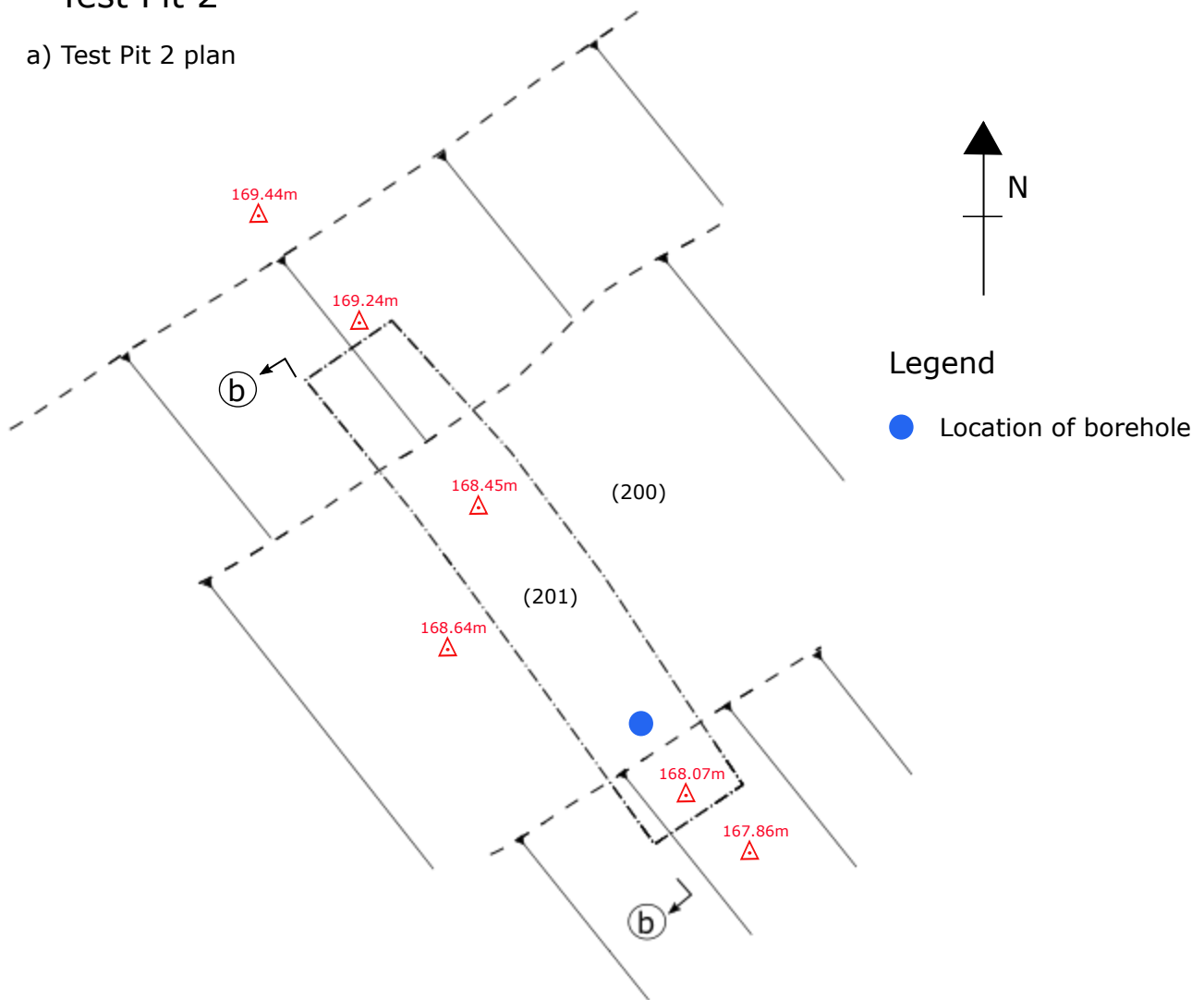


Project: Land East of Burnsome Forde,  
Dunkeswell Abbey, Devon

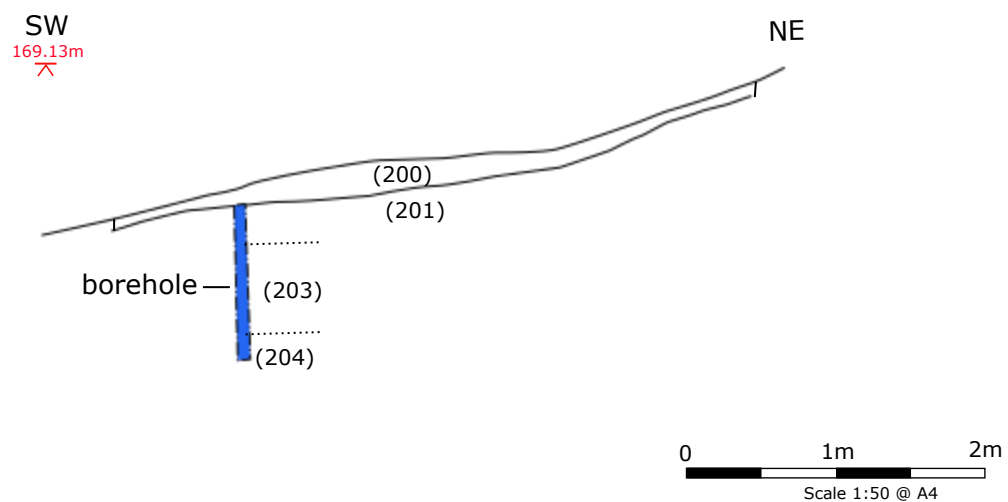
Figure 3: Test Pit 1, Plan and Section

## Test Pit 2

a) Test Pit 2 plan



b) Northeast-facing section



Project: Land East of Burnsome Forde,  
Dunkeswell Abbey, Devon

Figure 4: Test Pit 2, Plan and Section

## **Appendix 1 - Radiocarbon Date**

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Tuesday, 10 March 2020

## Radiocarbon Dating Laboratory

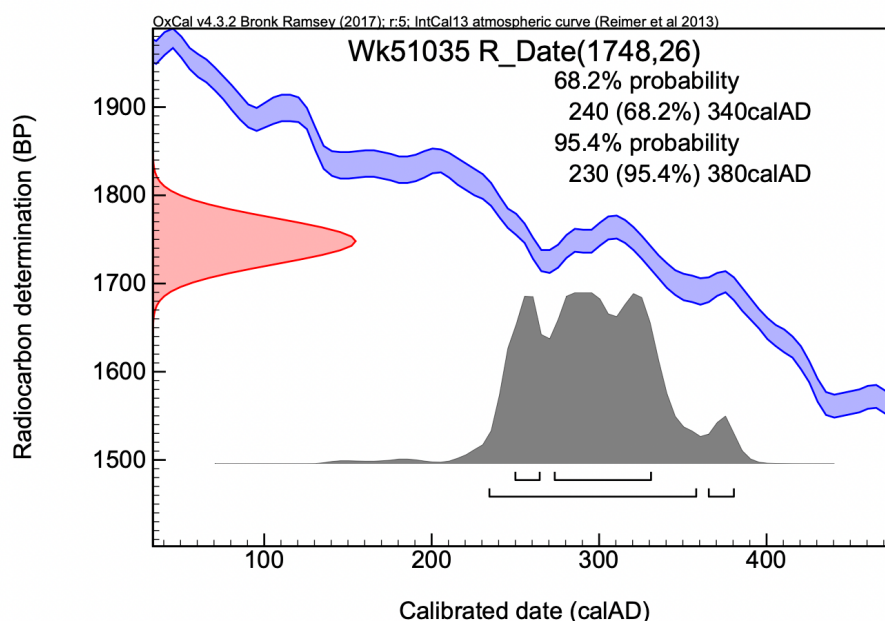
### Report on Radiocarbon Age Determination for Wk- 51035

<b>Submitter</b>	CI Farnell
<b>Submitter's Code</b>	DDA BF 19 (104) <1>
<b>Site &amp; Location</b>	Site located in field east of Burnsome Cottage. Address of nearest building:
<b>Sample Material</b>	oak roundwood
<b>Physical Pretreatment</b>	Sample cleaned.
<b>Chemical Pretreatment</b>	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

D<sup>14</sup>C            -195.6 ± 2.6 ‰  
F<sup>14</sup>C%            80.4 ± 0.3 %  
**Result**            **1748 ± 26 BP**  
( AMS measurement )

#### Comments

Please note: The Carbon-13 stable isotope value ( $\delta^{13}\text{C}$ ) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured  $\delta^{13}\text{C}$  value can differ from the  $\delta^{13}\text{C}$  of the original material and it is therefore not shown.



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation,  $\delta^{13}\text{C}$ , is expressed as ‰ wrt PDB and is measured on sample  $\text{CO}_2$ .
- F<sup>14</sup>C% is also known as *Percent Modern Carbon (pMC)*.