BRAYFORD SCHOOL
HIGH BRAY
DEVON

Results of an Archaeological Excavation

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Brayford School, High Bray
Devon

Results of an Archaeological Excavation

For

Devon County Council
&
Brayford School

By

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National Grid Reference: SS69061347
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Planning application No: DCC/3358/2012
Historic Environment Officer: Bill Horner
Project Director: Colin Humphreys
Project Officer: Dr Bryn Morris
Fieldwork: Dr Bryn Morris; Matthew Timmins
Report: Dr Bryn Morris, Joe Bampton
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Graphics: Joe Bampton
Finds Processing: Dr Bryn Morris; Matthew Timmins
Specialist Report: **Pottery:** Dr Imogen Wood
Pyrotechnical Debris: Dr Lee Bray
Charcoal: Dana Challinor
Radiocarbon Determinants: SUERC

January 2013

Summary

A programme of archaeological monitoring was carried out by South West Archaeology Ltd. within the grounds of Brayford School, High Bray, North Devon. The monitoring took place in advance of the construction of a new terraced playing area. A previous test pit evaluation had identified several small features and a spread of iron slag, and the excavation revealed several linear features and a posthole concealed beneath a spread of iron smelting debris. The largest linear feature, a field or possible enclosure boundary, produced a mass of primary smelting waste and a single sherd of Romano-British greyware, and all of the features are likely to be of Roman date. These represent some of the first features to produce securely stratified Roman metalworking debris in the Brayford area. Three radiocarbon dates were obtained, all of which returned a date of c.75-225 cal AD.

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Acknowledgements

Thanks are due to:
Mr Bill Horner, DCHET
Chris Bearman, Head Teacher of Brayford Primary School

1.0 Introduction

Location: Brayford School
Parish: High Bray
District: North Devon
County: Devon

1.1 Background

South West Archaeology Ltd. was commissioned by Chris Bearman, Head Teacher of Brayford Primary School (the Client) to undertake the monitoring of a proposed new terraced play area. This work was undertaken in accordance with a Written Scheme of Investigation (WSI) (Appendix 2) designed to comply with a Brief issued by Bill Horner of the Devon County Councils Historic Environment Team (DCHET) (Appendix 1).

1.2 Location

The site is located within the grounds of Brayford Primary School, to the south of the school building (Figure 1). The school is located on the eastern side of the village, at the base of the steep-sided valley of the River Bray. The area of the proposed development is *c.*10×26m and situated on a gentle south-facing slope. An east-west orientated break of slope runs along the southern edge of this area, which corresponds to a boundary shown on the 1st edition OS map.

1.3 Topographical and Geological Background

The bedrock beneath the site consists of sandstones, siltstones and mudstones of the Baggy Sandstones Formation (BGS 2012). The soils are brown earths of the Denbigh 1 Association (SSEW 1983).

1.4 Archaeological Background

There is extensive evidence of Romano-British iron-smelting from within and around Brayford village (e.g. Tanglebray Barn, see Humphreys 2004). An archaeological test-pit evaluation of the school site (SWARCH report 110823) demonstrated that similar deposits of iron-smelting debris were to be found over the eastern part of the development area.

1.5 Methodology

South West Archaeology Ltd. conducted the archaeological excavation at Brayford School, High Bray, North Devon, on 24th and 25th July 2012. Topsoil across an area of 260m² removed by a 5 tonne tracked mechanical excavator fitted with a 1.4m wide toothless grading bucket under the direct control of the site archaeologist to the level of the buried archaeological deposits. The excavator and driver were provided by the school governors. The archaeological work was carried out in accordance with the WSI, and the Institute for Archaeologists *Standard and Guidance for Archaeological Field Evaluation.*

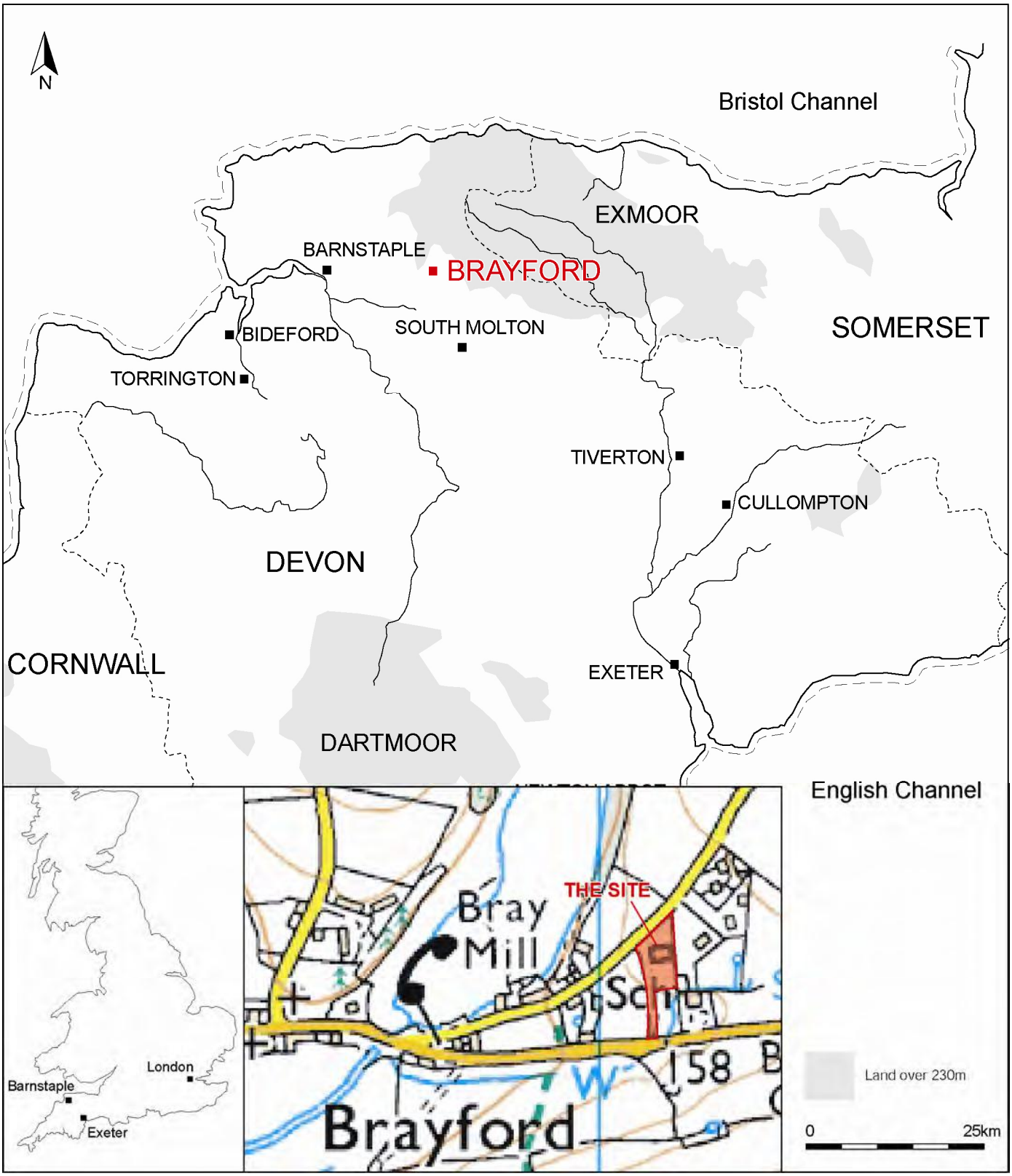

Figure 1: Site location map.

2.0 Results Archaeological Excavation

2.1 Site Summary

The topsoil was only *c*.0.2m deep at the top of the site, growing in thickness towards the base of the slope. It consisted of a dark brown loam containing frequent sub-angular fragments of the shale bedrock. The subsoil on the site consisted of an orange-brown silty clay containing frequent inclusions of sub-angular shale up to 50mm in size. This was overlain by the vestiges of an earlier topsoil (1016), a reddish-brown firm clay silt with shale lithorelicts and occasional charcoal and small abraded slag fragments. This earlier soil was cut by all features on the site. A layer of iron smelting waste (1001) extended across the north-eastern part of the site, and appeared to seal most of the observed features.

The identified features were located at the eastern end of the site. Ditch [1002] was aligned NNW-SSE and ran the width of the site. It was 1.5m wide and up to 0.80m deep. It contained multiple fills containing varying amounts of primary and secondary iron smelting debris, and a single Romano-British greyware sherd was recovered during the topsoil strip. The lower fills appeared to be the result of natural silting, but contained common large sub-angular fragments of iron slag. A lens of charcoal in context (1010) was sampled and radiocarbon dated; it returned a date of 1858±30, corresponding to a date of 81-232 cal AD (at 95%) (SUERC-43785). The upper fills (1017) (1018) were almost entirely comprised of angular iron slag with voids, and may well have formed an extension of (1001). A large hand-picked fragment of charcoal was radiocarbon dated, and returned a date of 1869±30 corresponding to 74-226 cal AD (at 95.4%) (SUERC-43786). Ditch [1002] cut an undated pit [1008], which also produced iron slag.

Parallel to [1002] ran gully [1013]; this was *c*.2m long but only 0.26m wide and 0.06m deep. Gully [1013] was cut by Gully [1004]. Gully [1004] was orientated north-south and ran the length of the site; it was 0.38m wide by 0.12m deep. It contained a single fairly clean fill (1005) that nonetheless contained a high proportion of small abraded fragments of slag. A posthole identified in the evaluation (in Test Pit #4) [1006] was observed and recorded. It proved to be *c*.0.72m in diameter and 0.14m deep, with a shallow concave profile. Its charcoal-rich fill was sampled and radiocarbon dated; it returned a date of 1864±30, corresponding to a date of 77-230 cal AD (at 95%) (SUERC-43781).

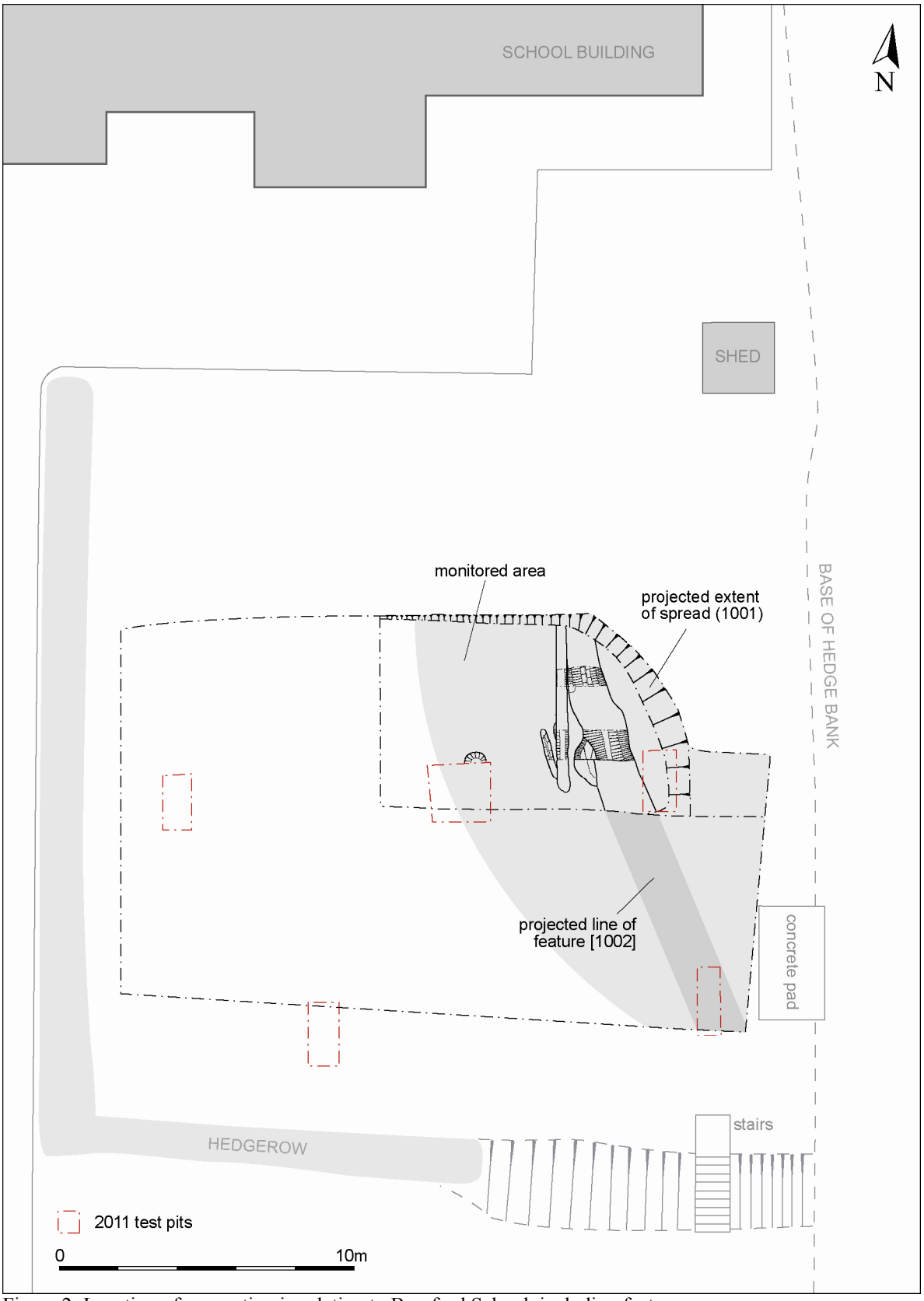

Figure 2: Location of excavation in relation to Brayford School, including features.

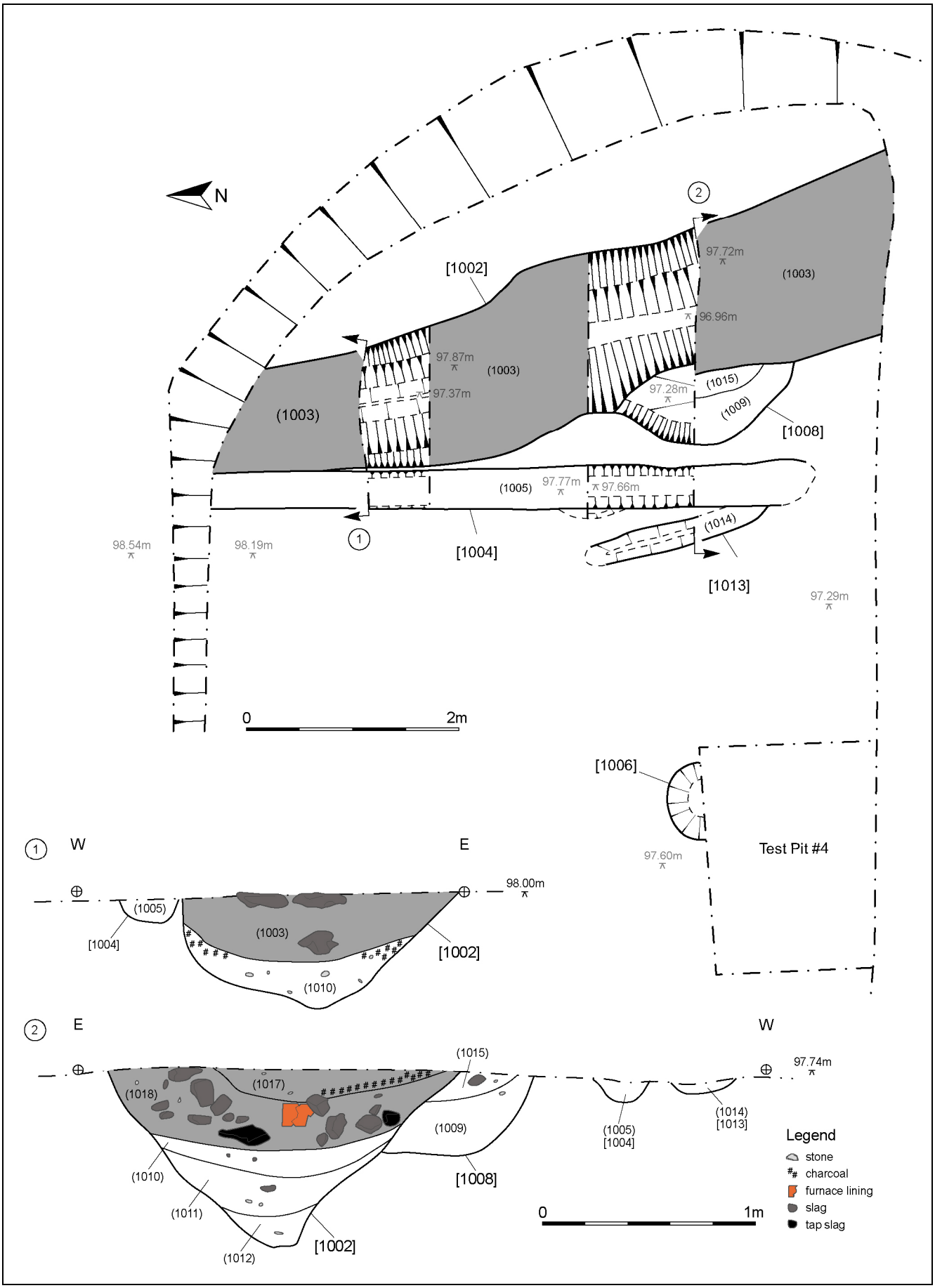

Figure 3: Site plan and sections (spot heights to arbitrary site datum).

Figure 4: Section through linears [1002], [1004] and [1013]; viewed from the south-west, looking noth-east (scales 2m).

Figure 5: Posthole [1006]. Oblique angle from NE (scales 0.1&2m).

Figure 6: South-facing section of [1002], Block #2 (scales 1&2m).

Figure 7: North-facing section of [1002], Block #2 (scales 1&2m).

Figure 8: North-facing section of [1004 and [1013] (scales 0.1m&1m).

Figure 9: South-facing section of [1002] and [1004], Block #1 (scales 1&2m).

2.2 Comment on the Smelting Waste *by Dr Lee Bray*

The character of the assemblage is very similar to that recovered during the 2011 evaluation on the same site and is consistent with its generation by metal-smelting using a slag-tapping technology. Previous investigation elsewhere in Brayford and at Sherracombe Ford, a nearby site 3.5 km to the north-east, has encountered very similar material generated by Romano-British iron smelting. Given the similar date of the Brayford School material, it most likely has a similar origin.

Context descriptions suggest that initially the area of the excavation was probably distal to the site of iron production as demonstrated by feature [1008]. Features [1004], [1006] and [1014] are also likely to belong to this early period of use although the stratigraphic relationships make this difficult to confirm. The fills of these features ((1007), (1009) and (1014)) suggest infill by natural silting over a reasonable period of time, but contain significant amounts of slag indicating smelting occurring somewhere in the vicinity. Although the average weight is skewed by the inclusion of material recovered from wet sieving in the case of (1007), the size of slag inclusions is small and consistent with their transport from the main smelting site which was thus probably upslope, perhaps in the area of the school and adjacent houses.

Linear [1002] was then cut across the area. The feature's function is unknown but it remained open long enough for a significant degree of natural silting to occur (contexts (1012), (1011) and (1010)). Again, slag fragments are frequent within these deposits, but still of small size suggesting smelting was still not occurring in the immediate vicinity. A possible exception is represented by (1011) in which the average weight of the waste fragments is higher (Table 1). The significance of this is difficult to assess as only 7 fragments were recovered, but it is possible that there was a slight shift in smelting operations that caused dumping of waste to occur closer to the excavated area.

Context (1003) appears to represent a deliberate infilling of feature [1002] suggesting a reorganization iron production in the vicinity. The character of the constituent contexts of [1003] ((1017) and (1018)) (Figure 3) represent primary dumping of smelting waste. Context (1018) consisted of numerous large fragments of slag with technical ceramics, charcoal and a high proportion of voids, suggesting it represents a stage of the *chaine operatoire* corresponding to the clearance of waste from around the furnace either during or immediately after smelting. It is thus consistent with the Type 1 waste deposits identified by Bray (2007). Context [1018] is followed by (1017), a silt containing common fragments of waste material of a moderate size (up to 80mm) mixed with charcoal, and probably represents a dump of material derived from finer cleaning of the smelting area, perhaps in association with furnace repair preparatory to the next smelt. A discrete charcoal-rich layer is present in the base of (1017), which could be seen as a separate context, also representing the cleaning out of unspent fuel from the furnace following a smelt. It is likely that the deposits of smelting waste infilling [1002] are stratigraphically similar to those encountered in Trench 2 of the 2011 evaluation, although disturbance by a later pipe trench in this case possibly prevented recognition of the ditch cut.

Dumping of material expanded after this with the deposition of (1001) across the whole area. This deposit almost certainly corresponds to the spread of stratified smelting debris encountered in Test Pits 2, 3 and 4 of the 2011 evaluation which represented *in situ* primary deposits of smelting waste.

It is worth noting that no material that could be identified as deriving from iron smithing was identified in the Brayford School assemblage. However, the significance of this should not be exaggerated as the assemblage represents a relatively small sample from the Brayford iron production complex and smithing could have occurred elsewhere.

The deposits of smelting waste encountered both in this investigation and the 2011 evaluation are typical of Romano-British smelting in the Exmoor region. They consist of sequences of contexts with varying characteristics, containing varying proportions of different types of material derived from different stages of the *chaine operatoire* of iron production. The recovery of a sherd of Exeter

Sandy Grey Ware from [1003] provides a *terminus post quem* in the early 2nd century for the infilling of [1002] and the possible reorganization of activity on the site. This is suggestive, as available dating suggests that the early 2nd century marks the starting point of smelting at Sherracombe Ford and Clatworthy Reservoir in the Brendon Hills (Bray 2007). Wider changes are also apparent in the economy of Roman Britain at this time; the Roman garrison is shifting its major sources of supply from the Continent to Britannia and urbanization is expanding (Fulford 2004). The implication is that demand for iron grew at this time (Bray 2007) and a concomitant expansion of production is apparent on many iron smelting sites elsewhere in the province.

3.0 Discussion and Conclusion

3.1 Discussion

Layer (1001) and the upper fills of linear [1002] contained a large quantity of iron smelting waste. Only a sample of this material was retained for examination, but *contra* the conclusions of the earlier test pit evaluation, significant amounts of tap and undiagnostic iron slag were recovered in addition to the large amount of furnace lining. The slag was unabraded and the clast size relatively large (up to 300mm across, averaging 80-150mm), indicating a dump of primary production waste. This material extended across the site from the north-eastern corner, and sealed or infilled all or most of the other features.

Linear [1002] is probably the ditch of a partly silted-up contemporary field boundary, but it is possible it represents the edge of an enclosure. It was backfilled with iron smelting debris (1003), and this deposit is dated to the 2nd century AD; this is very much in line with the dating of similar deposits elsewhere in Brayford and the wider Exmoor region.

The apparent intensification of iron production on this and other sites could have arisen for a number of reasons. Smelting need not have been a static activity and may have periodically moved location. Alternatively, a change in smelting technology may have occurred. Lastly, the scale of production may have increased, corresponding with an increase in demand. In this latter instance, it has been suggested this reflects the policy of the Roman army and Provincial government as they began to source more materials from within Britannia, rather than importing it from the Continent (Dr L. Bray *pers.comm*.). None of these reasons are mutually exclusive, and we may be looking at a combination of factors.

Most of the other features encountered were sealed by slag (1001) or cut by [1002]. The form and layout of the narrow gullies might indicate they belonged to structures, and the metalworkers of Brayford would have needed buildings as well as furnaces, but the evidence is equivocal.

3.2 Conclusion

The excavations at Brayford Primary School revealed extensive, but relatively thin, *in situ* primary deposits of smelting waste, covering the eastern end of the proposed terraced playing area. The character of the deposits and the material they contain is very similar to that of the Roman period iron smelting operations known from elsewhere in the village, and the radiocarbon dates confirm this activity was contemporaneous.

The main significance of this finding is that it increases the known extent of Roman-period smelting in Brayford, and demonstrates that evidence for earlier occupation does survive within or below the slag heaps. The material recovered indicates smelting operations took place in the immediate vicinity, probably to the north-east, where the field contains slight earthworks suggestive of a platform and possible dumps of material. Rather surprisingly – given the amount of work that has taken place in Brayford – these are some of the first securely stratified finds from the area.

4.0 Bibliography and References

Published Sources:

Institute for Archaeologists 1995 (Revised 2001 & 2008): *Standard and Guidance for Archaeological Excavation.*

Unpublished Sources:

Bray, L.S. 2011: *Brayford School, Brayford, Devon: results of an archaeological evaluation*. SWARCH report 110823.

Humphreys, C. 2004: *Tanglebray Barn, Brayford, Charles, North Devon: results of a geophysical survey and archaeological excavation*. SWARCH report SWA061.

Internet Resources:

British Geological Society 2012: *Geological Viewer*. www.bgs.ac.uk/opengeoscience

Appendix 1

BRIEF FOR ARCHAEOLOGICAL EXCAVATION

Location: Brayford Primary School
Parish: Brayford
District: North Devon
County: Devon
NGR: SS69061347
Proposal: Creation of level playing area.
DCC Planning ref: DCC/3358/2012
Historic Environment Service ref: ARCH/CM/ND 18183

1. INTRODUCTION AND ARCHAEOLOGICAL BACKGROUND

1.1 This brief has been prepared by the Devon County Council Historic Environment Service (HES) for archaeological works to be undertaken at Brayford Primary School. This brief has been produced specifically for the above scheme and may require alteration if this scheme is revised or amended in any material way. This document is not transferable to any other scheme or planning application.

1.2 This work is being undertaken in accordance with the National Planning Policy Framework and Devon Structure Plan Policy CO8.

1.3 The principal objective of the programme shall be to ensure 'preservation by record' of evidence of presumed Romano-British iron smelting prior to the development commencing.

1.4 There is extensive evidence of Romano-British iron-smelting from within and around Brayford village. Archaeological evaluation of the site (Southwest Archaeology, Report no. 110823, August 2011) has demonstrated the survival of in-situ deposits of iron-smelting debris over part of the development area. Small discrete cut features were also identified cut into natural subsoil immediately beneath the smelting debris.

1.5 This Brief covers that portion of the application development area as shown on the attached plans.

2. WRITTEN SCHEME OF INVESTIGATION

2.1 This document sets out the scope of the works required to record surviving archaeological deposits within the application area and will form the basis of the *Written Scheme of Investigatio*n (WSI) to be prepared by the archaeological consultant.

2.2 The Written Scheme of Investigation must be submitted by the applicant or on their behalf by their agent or archaeological consultant and approved by the HES and the County Planning Authority *prior* to any development commencing on site.

3. PROGRAMME OF ARCHAEOLOGICAL WORKS

The archaeological works will include the following elements.

3.1 The archaeological consultant will familiarise themselves with the results of the previous archaeological evaluation and the local archaeological context.

3.2 The area subject to excavation will be agreed with the HES in advance of fieldwork and shown on a plan to be submitted with the WSI. See Figure 2 of South West Archaeology 2012 and drawing 104/12/02 submitted with the application.
Note: The HES currently considers that the area of investigation should include the north-eastern third of the development footprint (the whole footprint is outlined in plan in blue on drawing 104/12/02, with areas of cut and fill included in the same section).

3.3 Topsoil or overburden across the agreed area affected by the proposed development may be excavated by a 360° tracked or JCB-type machine - fitted with a toothless grading bucket - under the direct control of the site archaeologist to the depth of formation, the surface of *in situ* subsoil/weathered natural or archaeological deposits whichever is highest in the stratigraphic sequence.
Note: An appropriate machine excavator and driver may be provided by the school governors.

3.4 Where archaeological deposits are exposed machining will cease in that area and excavations continue by hand to clean the exposed surface. Archaeological features and deposits will be fully recorded by context as per the Institute for Archaeologists' *Standard and Guidance for an Archaeological Excavation* (1994 - revised 2008). All features shall be recorded in plan and section at scales of 1:10, 1:20 or 1:50. All scale drawings shall be undertaken at a scale appropriate to the complexity of the deposit/feature and to allow accurate depiction and interpretation.

3.5 All archaeological features will be investigated and as a minimum:
i) small discrete features will be fully excavated;
ii) larger discrete features will be half-sectioned (at least 50% excavated); and
iii) long linear features will be sample excavated along their length - with investigative excavations distributed along the exposed length of any such feature and to investigate terminals, junctions and relationships with other features.
Should the above percentage excavation not yield sufficient information to allow the form and function of archaeological features/deposits to be determined full excavation of such features/deposits will be required. Additional excavation may also be required for the taking of palaeoenvironmental samples and recovery of artefacts
Any variation of the above will be undertaken in agreement with the HES.

3.6 Should deposits be exposed that contain palaeoenvironmental or datable elements appropriate sampling and post-excavation analysis strategies will be initiated. The project will be organised so that specialist consultants who might be required to conserve or report on finds or advise or report on other aspects of the investigation (e.g. palaeoenvironmental analysis) can be called upon and undertake assessment and analysis of such deposits - if required. On-site sampling and post-excavation assessment and analysis will be undertaken in accordance with English Heritage's guidance in *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation 2002*.

3.7 Topsoil should be examined for the recovery of artefacts. A metal detector may be used for the identification and retrieval of objects in the spoil.

3.8 Artefacts should be labelled and bagged on site.

3.9 All features shall be recorded in plan and section at a minimum scale of 1:20, larger where necessary.

3.10 An adequate photographic record of the excavation will be prepared. This will include photographs illustrating the principal features and finds discovered, in detail and in context. The photographic record will also include working shots to illustrate more generally the nature of the archaeological operation mounted. All photographs of archaeological detail will feature an appropriately-sized scale. The photographic record should be made in B/W print supplemented by digital or colour transparency.

However, if digital imagery is to be the sole photographic record then suitably archivable prints must be made of the digital images by a photographic laboratory. Laser or inkjet prints of digital images, while acceptable for inclusion in the report, are not an acceptable medium for archives. The drawn and written record will be on an appropriately archivable medium.

3.11 Human remains must initially be left in-situ, covered and protected. Removal can only take place under appropriate Ministry of Justice and environmental health regulations. Such removal must be in compliance with the relevant primary legislation.

3.12 Should any finds identified as treasure or potential treasure, including precious metals, groups of coins or prehistoric metalwork, be exposed, these will be removed to a safe place and reported to the local coroner according to the procedures relating to the Treasure Act 1996 Code of Practice (2nd Revision). Where removal cannot be effected on the same working day as the discovery suitable security measures will be taken to protect the finds from theft.

3.13 The results of the previous evaluation and a copy of the agreed Written Scheme of Investigation must be made available to the site director/supervisor to enable the adequate interpretation of exposed features/deposits during fieldwork and that the agreed programme of works is understood and undertaken.

4. MONITORING

4.1 The archaeological consultant shall agree monitoring arrangements with the County Historic Environment Service and give two weeks notice, unless a shorter period is agreed with the HES, of commencement of the fieldwork. Details will be agreed of any monitoring points where decisions on options within the programme are to be made.

4.2 Monitoring will continue until the deposition of the site archive and finds, and the satisfactory completion of an OASIS report - see 5.5 below.

4.3 The archaeological contractor undertaking the fieldwork will notify the HES upon completion of the fieldwork stage of these works.

5. REPORTING

5.1 Upon completion of the fieldwork and required post-excavation analysis an illustrated report will be prepared. The report will collate the written, graphic, visible and recorded information outlined in section 3 above.

The report will include:

(i) a summary of the project's background;
(ii) description and illustration of the site location;
(iii) a methodology of the works undertaken;
(iv) include plans and reports of all documentary and other research undertaken;
(v) a description of the project's results;
(vi) an interpretation of the results in the appropriate context;
(vii) a summary of the contents of the project archive and its location (including summary catalogues of finds and samples);
(viii) site layout plans on an OS base;
(ix) a plan showing the location of the areas subject to the archaeological excavations in relation to the site boundaries;
(x) detailed plans of areas in which archaeological features are recognised along with adequate OD spot height information. These should be at an appropriate scale to allow the nature of the features exposed to be shown and understood. Plans must show the orientation of north. Section drawing locations will be shown on these plans. Archaeologically sterile areas need not be illustrated unless this can provide information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;
(xi) section drawings of deposits and features, with OD heights, at scales appropriate to the stratigraphic detail to be shown and must show the orientation of the drawing in relation to north/south/east/west. Archaeologically sterile areas need not be illustrated unless this can provide information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;
(xii) site matrices where appropriate;
(xiii) photographs showing the general site layout and exposed significant features and deposits that are referred to in the text. All photographs should contain appropriate scales, the size of which will be noted in the illustration's caption;
(xiv) a consideration of evidence within its wider context;
(xv) a summary table and descriptive text showing the features, classes and numbers of artefacts recovered and soil profiles with interpretation;
(xvi) specialist assessment or analysis reports where undertaken;
(xvii) an evaluation of the methodology employed and the results obtained (i.e. a confidence rating).

5.2 The timetable for the production of the report must be set out in the Written Scheme of Investigation. The HES would normally expect to receive the report within three months of completion of fieldwork - dependent upon the provision of specialist reports, radiocarbon dating results etc the production of which may exceed this period. If a substantial delay is anticipated then the HES must be informed of this and a revised date for the production of the full report agreed between the HES and the archaeological contractor. If a substantial delay is anticipated then an interim report will be produced within three months of the completion of the fieldwork.

5.3 It is recommended that a draft report is submitted to the HES for comment prior to its formal submission to the Planning Authority.

5.4 Should the development proceed in a staged manner, with each stage requiring archaeological fieldwork, and where a period of more than three months between each stage is anticipated or occurs, then the archaeological contractor shall prepare an interim illustrated summary report at the end of each stage. The report will set out the results of that phase of archaeological works, including the results of any specialist assessment or analysis undertaken. The report will be produced within three months of completion of each phase of fieldwork. At the completion of the final stage of the fieldwork an overarching report setting out the results of all stages of work will be prepared. HES would normally expect to receive the report within three months of completion of fieldwork - dependent upon the provision of specialist reports, radiocarbon dating results etc the production of which may exceed this period. If a substantial delay is anticipated then the HES must be informed of this, an interim report will be produced within three months of the completion of the final stage of fieldwork, and a revised date for the production of the full report agreed between the HES and the archaeological contractor.

5.5 On completion of the final report, in addition to copies required by the Client, hard copies of the report shall be supplied to the HES on the understanding that one of these copies will be deposited for public reference in the HER. In addition to the hard copies of the report, one copy shall be provided to the HES in digital format - in a format to be agreed in advance with the HES - on the understanding that it may in future be made available to researchers via a web-based version of the HER.

5.6 The archaeological consultant shall complete an online OASIS (*Online AccesS to the Index of archaeological investigationS*) form in respect of the archaeological work. This will include a digital version of the report. The report or short entry to the Historic Environment Record will also include the OASIS ID number.

5.7 *Publication*

Should particularly significant remains, finds and/or deposits be encountered, then these, because of their importance, are likely to merit wider publication in line with government planning guidance. If such remains are encountered, the publication requirements – including any further analysis that may be necessary – will be confirmed with the HES.

6. PERSONNEL

6.1 The work shall be carried out by a recognised archaeological consultant, agreed with the DCHES. Staff must be suitably qualified and experienced for their project roles. All work should be carried out under the control of a specified Member of the Institute for Archaeologists (MIFA), or by a specified person of equivalent standing and expertise. The Written Scheme of Investigation will contain details of key project staff and specialists who may contribute during the course of the works - excavation and post-excavation.

6.2 All staff, including subcontractors, must be fully briefed and aware of the archaeological work required under the brief and written scheme of investigation, and must understand the aims and methodologies of the project.

6.3 Health and Safety matters, including site security, are matters for the consultant. However, adherence to all relevant regulations will be required.

6.4 The work shall be carried out in accordance with IfA *Standard and Guidance for Archaeological Excavation (1995),* as amended *(2008)*.

6.5 The archaeological consultant shall give the HES two weeks notice of commencement of works and shall be responsible for agreeing monitoring arrangements. Details will be agreed of any monitoring points where decisions on options within the programme are to be made.

7. PUBLIC OUTREACH

7.1 Should these excavations expose significant archaeological or artefactual deposits then the archaeological contractor should consider, with the developer or their agent, whether a programme of public outreach should be implemented. This may take a variety of forms, from the provision of notice boards on the site boundary with information on the site and the ongoing results of the archaeological excavations, the preparation of press releases, through to public open day(s) and talks to local interested organisations. While the cost for undertaking such outreach is borne by the applicant/agent, in certain circumstances the HES may be able to offer assistance in any outreach undertaken.

8. CONFLICT WITH STATUTORILY PROTECTED SITES

8.1 It is the archaeological contractor's responsibility - in consultation with Brayford Primary School - to ensure that the undertaking of the required archaeological works does not conflict with any statutorily protected sites and should also consider any biodiversity issues as covered by the NERC Act 2006. In particular, such conflicts may arise where archaeological investigations/excavations have the potential to have an impact upon protected species and/or natural habitats e.g. SSSIs, National Nature Reserves, Special Protection Areas, Special Areas of Conservation, Ramsar sites, County Wildlife Sites etc.

9. DEPOSITION OF ARCHIVE AND FINDS

9.1 The archaeological consultant shall contact the museum that will receive the site archive to obtain an accession number and agree conditions for deposition. The accession number will be quoted in the Project Design.

9.2 The artefact discard policy must be set out in the report.

9.3 Archaeological finds resulting from the investigation (which are the property of the landowner), should be deposited with the appropriate museum - in a format to be agreed with the museum, and within a timetable to be agreed with the HES. The museum's guidelines for the deposition of archives for long-term storage should be adhered to. If ownership of all or any of the finds is to remain with the landowner, provision and agreement must be made for the time-limited retention of the material and its full analysis and recording, by appropriate specialists.

10. CONTACT NAME AND ADDRESS

Bill Horner, County Archaeologist, Devon County Council, Planning, Transport & Environment, Matford Offices, County Hall, Exeter EX2 4QW
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9th July 2012

Appendix 2

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL EXCAVATION AT BRAYFORD PRIMARY SCHOOL, BRAYFORD, DEVON

Location: Brayford Primary School
Parish: High Bray
District: North Devon
County: Devon
NGR: SS69061347
Proposal: Creation of level playing area
DCC Planning ref: DCC/3358/2012
Date: 18.07.2012

1.0 INTRODUCTION

1.1 This document forms a Project Design (PD) which has been produced by South West Archaeology (SWARCH) at the request of Chris Bearman Head Teacher of Brayford Primary School (the Client) and sets out the methodology for archaeological excavation of the site prior to the creation of a playing field, and for related off site analysis and reporting. The WSI has been devised in accordance with a brief issued by Devon County Council Historic Environment Service (DCHES) (Bill Horner, 09.07.2012)

1.2 This work is being undertaken in accordance with the National Planning Policy Framework and Devon Structure Plan Policy CO8.

2.0 ARCHAEOLOGICAL BACKGROUND

2.1 There is extensive evidence of Romano-British iron-smelting from within and around Brayford village. Archaeological evaluation of the site (South West Archaeology, Report no. 110823, August 2011) has demonstrated the survival of in-situ deposits of iron-smelting debris over part of the development area. Small discrete cut features were also identified cut into natural subsoil immediately beneath the smelting debris.

3.0 AIMS

3.1 To ensure 'preservation by record' of evidence of presumed Romano-British iron smelting prior to the development commencing;

3.2 Analyse and report on the results of the project as appropriate.

4.0 METHOD

4.1 SWARCH personnel will familiarise themselves with the results of the previous archaeological evaluation and the local archaeological context.

4.2 The area subject to investigation is shown on the attached plan, with excavation particularly concentrated on the area formerly sampled by test pits 2, 3 and 4 situated within the north-eastern part of the site. Topsoil or overburden across the agreed area affected by the proposed development will be excavated by a 360° tracked or JCB-type machine - fitted with a toothless grading bucket - under the direct control of the site archaeologist to the depth of formation, the surface of *in situ* subsoil/weathered natural or archaeological deposits whichever is highest in the stratigraphic sequence. An appropriate machine excavator and driver will be provided by the school governors.

4.2.1 The archaeological work will be carried out in accordance with the *Institute for Archaeologists Standard and Guidance for Archaeological Field Evaluation 1994 (revised 2001 & 2008)* and *Standard and Guidance for an Archaeological Watching Brief 1994 (revised 2001 & 2008)*.

4.2.2 Spoil will be examined for the recovery of artefacts. A metal detector may be used for the identification and retrieval of objects in the spoil.

4.2.3 All excavation of exposed archaeological features shall be carried out by hand, stratigraphically, and fully recorded by context to IfA guidelines.

4.2.4 If archaeological features are exposed, then *as a minimum*:
i) small discrete features will be fully excavated;
ii) larger discrete features will be half-sectioned (50% excavated);
iii) long linear features will be sample excavated along their length - with investigative excavations distributed along the exposed length of any such feature and to investigate terminals, junctions and relationships with other features.

4.2.5 Should the above percentage excavation not yield sufficient information to allow the form and function of archaeological features/deposits to be determined, full excavation of such features/deposits will be required. Additional excavation may also be required for the taking of palaeoenvironmental samples and recovery of artefacts.
Any variation of the above or decisions regarding expansion will be considered in consultation with the Client and DCHES.

4.2.6 In exceptional circumstances where materials of a particularly compact nature are encountered, these may be removed with a toothed bucket, subject to agreement with archaeological staff on site.

4.2.7 Should archaeological or palaeoenvironmental remains be exposed, the site archaeologist will investigate, record and sample such deposits.

4.2.8 Human remains must be left *in-situ*, covered and protected. Removal can only take place under appropriate Ministry of Justice and environmental health regulations. Such removal must be in compliance with the relevant primary legislation.

4.2.9 Any finds identified as treasure or potential treasure, including precious metals, groups of coins or prehistoric metalwork, must be dealt with according to the Treasure Act 1996 Code of Practice (2nd Revision) (Dept for Culture Media and Sport). Where removal cannot be effected on the same working day as the discovery, suitable security measures must be taken to protect the finds from theft.

4.3 The Client will provide SWARCH with details of the location of existing services and of proposed groundworks within the site area, and of the proposed construction programme.

4.4 Health and Safety requirements will be observed at all times by any archaeological staff working on site, particularly when working with machinery. As a minimum: high-visibility jackets, safety helmets and protective footwear will be worn.

4.4.1 Appropriate PPE will be employed at all times.

4.4.2 The site archaeologist will undertake any site safety induction course provided by the Client.

4.4.3 If the depth of trenching exceeds 1.2 metres the trench sides will need to be shored or stepped to enable the archaeologist to examine and if appropriate record the section of the trench. The provision of such measures will be the responsibility of the client.

4.5 If significant or complex archaeological remains are uncovered, SWARCH will liaise with the client and DCHES to determine the most satisfactory way to proceed.

4.6 Monitoring

4.6.1 SWARCH shall agree monitoring arrangements with the HES and give two weeks notice, unless a shorter period is agreed, of commencement of the fieldwork. Details will be agreed of any monitoring points where decisions on options within the programme are to be made.

4.6.2 Monitoring will continue until the deposition of the site archive and finds, and the satisfactory completion of an OASIS report - see 6.6 below.

4.6.3 SWARCH will notify the HES upon completion of the fieldwork stage of these works.

5.0 ARCHAEOLOGICAL RECORDING

5.1 This will be based on IfA guidelines and those advised by DCHES and will consist of:

5.1.1 Standardised single context recording sheets, survey drawings in plan, section and profile at 1:10, 1:20, 1: 50 and 1:100 as appropriate and digital photography.

5.1.2 Survey and location of features.

5.1.3 Labelling and bagging of finds on site, post-1800 unstratified pottery may be discarded on site after a representative sample has been retained.

Any variation of the above shall be agreed in consultation with the DCHES.

5.2 A photographic record of the excavation will be prepared. This will include photographs illustrating the principal features and finds discovered, in detail and in context. The photographic record will also include working shots to illustrate more generally the nature of the archaeological operation mounted. All photographs of archaeological detail will feature an appropriately-sized scale. The photographic record for the excavations will be made in B/W print supplemented by digital or colour transparency. However, if digital imagery is to be the sole photographic record then suitably archivable prints will be made of the digital images by a photographic laboratory. The drawn and written record will be on an appropriately archivable medium in accordance with the current conditions of deposit of the Royal Albert Memorial Museum.

5.3 Should suitable deposits be exposed (e.g. palaeoenvironmental) then scientific assessment/analysis/dating techniques will be applied to further understand their nature/date and to establish appropriate sampling procedures. The project will be organised so that specialist consultants who might be required to conserve or report on other aspects of the investigations can be called upon. Should deposits be exposed that contain palaeoenvironmental or datable elements appropriate sampling and post-excavation analysis strategies will be initiated. On-site sampling and post-excavation assessment and analysis will be undertaken in accordance with English Heritage's guidance in *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation 2002* and if necessary with reference to and with advice for the English Heritage Regional Science Advisor.

6.0 ARCHIVE AND REPORT

6.1 An ordered and integrated site archive will be prepared in accordance with *The Management of Archaeological Projects* (English Heritage, 1991 2nd edition) upon completion of the project. This will include relevant correspondence together with field notes and drawings, and environmental, artefactual and photographic records. The archive and finds will be deposited with the Museum of Barnstaple and North Devon - in a format agreed with the museum, and within a timetable to be agreed with the HES under accession number NDDMS 2011.31. The museum's current guidelines for the deposition of archives for long-term storage will be adhered to. If ownership of all or any of the finds is to remain with the landowner, provision and agreement will be made for the time-limited retention of the material and its full analysis and recording, by appropriate specialists.

6.2 The reporting requirements will be confirmed with the HES on completion of the site work. In the event that few or no archaeological remains are exposed, only minimal reporting would be required. The results may be presented in the form of a short entry to the Historic Environment Record (HER), sent to the HES either digitally or as a hard-copy. If archaeological deposits or remains are exposed during the course of the works, then more detailed reporting would be required, in the form of an illustrated summary report submitted both in hard-copy and digitally and, if merited, wider publication.

6.3 If a report is produced it will include the following elements:

6.3.1 A report number, date and the OASIS record number;

6.3.2 A copy of the DCHES brief and this WSI;

6.3.3 A summary of the project's background;

6.3.4 A description and illustration of the site location;

6.3.5 A methodology of the works undertaken, and an evaluation of that methodology;

6.3.6 Plans and reports of all documentary and other research undertaken;

6.3.7 A summary of the project's results;

6.3.8 An interpretation of the results in the appropriate context;

6.3.9 A summary of the contents of the project archive and its location (including summary catalogues of finds and samples);

6.3.10 A location plan and overall site plan including the location of areas subject to archaeological recording;

6.3.11 Detailed plans of areas of the site in which archaeological features are recognised along withadequate OD spot height information. These will be at an appropriate scale to allow the nature of the features exposed to be shown and understood. Plans will show the site and features/deposits in relation to north. Archaeologically sterile areas will not be illustrated unless this can provide information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;

6.3.12 Section drawings of deposits and features, with OD heights, at scales appropriate to the stratigraphic detail to be shown and must show the orientation of the drawing in relation tonorth/south/east/west. Archaeologically sterile areas will not be illustrated unless they can provide information on the development of the site stratigraphy or show palaeoenvironmental deposits that have influenced the site stratigraphy;

6.3.13 A description of any remains and deposits identified including an interpretation of their character and significance;

6.3.14 Assessment and analysis, as appropriate, of significant artefacts, environmental and scientific samples;

6.3.15 Discussion of the archaeological deposits encountered and their context;

6.3.16 A consideration of the evidence within its wider context;

6.3.17 Site matrices where appropriate;

6.3.18 Photographs showing the general site layout and exposed significant features and deposits referred to in the text. All photographs will contain appropriate scales, the size of which will be noted in the illustration's caption;

6.3.19 A summary table and descriptive text showing the features, classes and numbers of artefacts recovered and soil profiles with interpretation;
6.3.20 Specialist assessment or analysis reports where undertaken.

6.4 DCHES will receive the report within three months of completion of fieldwork, dependant on the provision of specialist reports, radiocarbon dating results etc, the production of which may exceed this period. If a substantial delay is anticipated then an interim report will be produced and a revised submission date for the final report agreed with the DCHES.

6.5 Should the development proceed in a staged manner, with each stage requiring archaeological fieldwork, and where a period of more than three months between each stage is anticipated or occurs, then the archaeological contractor shall prepare an interim illustrated summary report at the end of each stage. The report will set out the results of that phase of archaeological works, including the results of any specialist assessment or analysis undertaken. The report will be produced within three months of completion of each phase of fieldwork. At the completion of the final stage of the fieldwork an overarching report setting out the results of all stages of work will be prepared. HES would normally expect to receive the report within three months of completion of fieldwork - dependent upon the provision of specialist reports, radiocarbon dating results etc the production of which may exceed this period. If a substantial delay is anticipated then the HES must be informed of this,an interim report will be produced within three months of the completion of the final stage of fieldwork, and a revised date for the production of the full report agreed between the HES and the archaeological contractor.

6.6 Where excavations reveal significant archaeological remains with the potential to yield important information about the site and its environment, then a formal Post-Excavation Report and revised Project Design may be required. This document may also fulfil the requirement for an interim report if a substantial publication delay is anticipated. This document will include the following elements:

6.6.1 A summary of the project and its background;
6.6.2 A plan showing the location of the site, and plans showing the location of archaeological features and deposits;
6.6.3 Research aims and objectives;
6.6.4 A method statement, outlining how these aims and objectives will be achieved;
6.6.5 Detail the tasks to be undertaken;
6.6.6 The results of specialist assessment reports;
6.6.7 The project team;
6.6.8 The overall timetable, including monitoring points with DCHES;
6.6.9 Detail the means by which the material will be published.

DCHES would receive a draft of this report within three months of the completion of the fieldwork, specialist reports allowing.

6.7 Should particularly significant archaeological remains, finds and/or deposits be encountered, then these, because of their importance, are likely to merit wider publication in line with government planning guidance (PPS5). If such remains are encountered, the publication requirements – including any further analysis that may be necessary – will be confirmed with the HES.

6.8 A copy of the report detailing the results of these investigations will be submitted to the OASIS (*Online AccesS to the Index of archaeological investigations*) database under reference southwes1-107628 within 3 months of completion of fieldwork.

7.0 PUBLIC OUTREACH

7.1 Should these excavations expose significant archaeological or artefactual deposits then the archaeological contractor should consider, with the developer or their agent, whether a programme of public outreach should be implemented. This may take a variety of forms, from the provision of notice boards on the site boundary with information on the site and the ongoing results of the archaeological excavations, the preparation of press releases, through to public open day(s) and talks to local interested organisations. While the cost for undertaking such outreach is borne by the applicant/agent, in certain circumstances the HES may be able to offer assistance in any outreach undertaken.

8.0 CONFLICT WITH OTHER CONDITIONS AND STATUTORY PROTECTED SPECIES

If groundworks are being undertaken under the direct control and supervision of SWARCH it is their responsibility - in consultation with Brayford Primary School - to ensure that the required archaeological works do not conflict with any other conditions that have been imposed upon the consent granted and should also consider any biodiversity issues as covered by the NERC Act 2006. In particular, such conflicts may arise where archaeological investigations/excavations have the potential to have an impact upon protected species and/or natural habitats e.g. SSSIs, National Nature Reserves, Special Protection Areas, Special Areas of Conservation, Ramsar sites, County Wildlife Sites etc.

9.0 PERSONNEL & MONITORING

9.1 The project will be managed by Colin Humphreys; the archaeological monitoring will be undertaken by SWARCH personnel with appropriate expertise and experience. Where necessary, appropriate specialist advice will be sought (see list of consultant specialists in Appendix 1 below).

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Bone

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Pottery

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Figure 10: Plan of the area subject to monitoring.

Appendix 3

List of Contexts

Context No	Context Type	Description	Relationships	Thickness
(1000)	Layer	Topsoil; greyish-brown soft loam with occasional sub-angular fragments of slag.	Overlies (1001)	0.20m
(1001)	Layer	Thin layer of slag covering north-eastern part of the site; *c*.0.30-0.40m thick; extends as far as [1002], and slightly beyond in south and may extend into (1003); poorly-sorted angular slag (tap/furnace/undiagnostic); matrix of buff greyish-brown clay-silt with orange tinge.	Overlain by (1000); overlies (1003)	*c*.0.30m
[1002]	Cut	Cut; linear; 1.5m wide by 0.8m deep; "V"-shaped profile, multiple fills. Romano-British date.	Cuts (1014); contains (1010)(1011)(1012) (1017)(1018)	0.80m
(1003)	Fill	Upper fill of [1002]; group context, upper fills of Linear [1002]; See (1017), (1018).	Comprised of (1017) and (1018)	0.38m
[1004]	Cut	Cut; linear gully 0.38m wide by 0.12m deep; steep sides, nearly flat base.	Cuts (1014); contains (1005)	0.12m
(1005)	Fill	Fill of [1004]; yellowish-brown soft sandy-silt with moderate small (40-60mm) fragments of sub-angular slag (tap/hearth/undiagnostic); common charcoal fragments.	Fill of [1004]; overlain by (1001)	0.12m
[1006]	Cut	Cut; posthole; half-sectioned and recorded in 2011Test pit #4 as [404]; *c*.0.72m diameter by 0.14m deep; shallow concave profile.	Contains (1007)	0.14m
(1007)	Fill	Fill of [1006]; mid-to-dark brown soft-to-firm clay silt; common small (40-80mm) sub-angular slag (mainly tap) fragments; frequent charcoal.	Fill of [1006]	0.14m
[1008]	Cut	Cut; ovoid pit 1.7×*c*.0.75m by 0.4m deep; steep-sided profile with a flat base.	Contains (1009)(1015)	0.40m
(1009)	Fill	Lower fill of [1008]; tipping lines evident; generally buff-brown soft clay-silt with moderate to frequent sub-angular slag (40-80mm) and loose stony fill at top.	Fill of [1008]; overlies (1015)	0.40m
(1010)	Fill	Fill of [1002]; buff greyish-brown soft slightly moist slightly clayey silt with frequent fragments sub-angular slag (tap/furnace/undiagnostic); contains lenses of darker charcoal-rich material.	Fill of [1002]; overlies (1011); overlain by (1018)	0.23m
(1011)	Fill	Fill of [1002]; light buff yellowish-brown clay-silt; occasional slag (tap/furnace/undiagnostic) as above and redeposited shillet.	Fill of [1002]; overlies (1012); overlain by (1010)	0.18m
(1012)	Fill	Fill of [1002]. redeposited natural shillet; clean yellow firm clay-silt.	Fill of [1002]; overlain by (1011)	0.14m
[1013]	Cut	Cut; narrow linear 1.8×0.26m by 0.06m deep; shallow concave profile; parallel to [1002].	Contains (1014)	0.06m
(1014)	Fill	Fill of [1013]; dark greyish-brown firm silty loam; frequent small (40-60mm) sub-angular slag (largely tap slag).	Fill of [1013]; cut by [1004]	0.06m
(1015)	Fill	Fill of pit [1008]; greyish-brown slightly clayer silt; occasional sub-angular fragments slag (40-60mm).	Fill of [1008]; cut by [1002]	0.29m
(1016)	Fill	Buried soil cut by all features; reddish-brown, firm clay-silt with frequent small shillet lithorelicts; occasional small charcoal and slag fragments (30-60mm).	Cut by [1002][1004] [1008][1013]	-
(1017)	Fill	Fill of [1002]; part of (1003); loose greyish-brown clay-silt; frequent small (40-80mm) sub-angular slag (tap/hearth/undiagnostic) fragments 40-80mm; common small charcoal fragments.	Fill of [1002]; part of (1003); overlies (1018)	0.15m
(1018)	Fill	Fill of [1002]; primary slag deposit; large angular fragments of slag (tap/hearth/undiagnostic) with some voids; loose matrix of greyish-brown silt; common small charcoal and occasional large charcoal fragments; occasional sub-angular stones (some burnt) up to 120mm diameter.	Fill of [1002]; part of (1003); overlain by (1017); overlies (1010)	0.37m

Appendix 4

Finds Concordance

	POTTERY			RETAINED SLAG			Charcoal		
Context	sherds	Wgt.(g)	Notes	Frags	Wgt.(g)	Notes	Bags	Wgt.(g)	Notes
1001				10	922	slag, various			
1003 Blk A				16	8.113	slag, various	1	19	heartwood
1003 Blk B				30	17.251	slag, various	1	56	heartwood
1005				65	2.485	slag, various			
1007				12	1.511	slag, various			
1009				27	1.439	slag, various	1	8	heartwood
1010									
1011				7	2.657	slag, various			
1012									
1014				4	0.206	slag, various			
1016									
1017	1	12	RB greyware with cross-hatch decoration, possibly pecked to form pot-lid						
1018									
TOTAL	**1**	**12**		**171**	**34.584**		**3**	**83**	

Appendix 5

Pottery Report *by Dr Imogen Wood*

One sherd from contex (1017)

Appearance
Body sherd, reduced throughout with greyish colour, soft fired with fairly well-sorted fabric. Wheel-made with traces of riling on interior and external burnishing with acute lattice decoration. Sherd 4mm thick level 2 abrasion recorded.

Fabric
Temper 10%

- Muscovite Mica, cleavage flakes abundant in matrix also, generally 0.5mm and less
- Quartz opaque, scatter, angular in shape and between 0.5mm and 1mm in size
- Feldspar, off white in colour, scatter angular in shape generally between 0.5mm-1mm in size
- Mudstone micaceous, silver grey, rare in fabric sub-rounded in shape 1.5mm in size

Matrix-Smooth fine micaceous clay

Comment
The fabric is compatible with Roman Exeter Sandy Grey Ware first identified in Exeter (Holbrook and Bidwell 1991).The acute lattice decoration on a burnished surface and jar form are typical of Roman examples found in stratified deposits in Exeter dating to the early 2nd century AD (Holbrook and Bidwell 1991). The sherd may have been subject to secondary working, and form part of a pecked ‘pot lid’.

References
Holbrook, N. & Bidwell, P.T. 1991: *Roman finds from Exeter*. Exeter Archaeological Reports 4. Exeter: Exeter Archaeology.

Appendix 6

Metallurgical Debris Assessment *by Dr Lee Bray*

Introduction
Dr. L. S. Bray was engaged by South West Archaeology in August 2012 to provide a quantification and assessment of an assemblage of metallurgical debris recovered during excavation at Brayford Primary School, Devon in advance of the construction of a playing area. The investigation followed an evaluation, also undertaken by South West Archaeology, carried out in July 2011.

Methodology
Sampling of most of the contexts from which the assemblage derived was not undertaken according to a rigorously defined methodology. Rather, fragments of representative material and those displaying unusual morphologies or textures, in the judgment of the excavators, were selected by eye. Additionally, the material from contexts (1007) and (1010) includes fragments of material retrieved from a wet sieving sample. Accurate analysis of the proportions of material types and fragment size ranges is thus difficult, although it is likely that broad reliable conclusions can be drawn.

During assessment, each fragment of the assemblage was weighed and its basic type identified, based on the presence of characteristic compositions, morphologies and textures. The results of this work are presented in Appendix 7.

Assemblage Description
The assemblage consisted of a total of 293 individual fragments of debris with a total weight of 35.95kg. Average weight was thus 122g although this is skewed by the inclusion of numerous smaller fragments recovered during wet sieving of selected contexts. In fact, some fragments reached a significant size, the largest measuring 210mm in its maximum dimension and weighing 3.21kg. Table 1 indicates the contextual origin of the material in the assemblage by weight and fragment count.

Context	Fragments	Total Weight (g)	Average Weight (g)
Unstratified	10	916	92
1003	45	25,031	556
1005	66	2,544	39
1007	32	2,045	64
1009	29	1,495	52
1010	100	1,077	11
1011	7	2,643	378
1014	4	202	51
Totals	*293*	*35,953*	

Table 1: Contextual origin of the assemblage.

The assemblage contains compositions, textures and morphologies identifiable as most likely being the result of metallurgical processes. Its overall character was very similar to that of the material encountered during the 2011 evaluation (Bray, 2011).Three basic types of material; slag and technical ceramics, were identified (Appendix 7):

Slag: Three broad types of slag were apparent in the assemblage:

1. Most distinctive was tap slag, identifiable by a lower surface displaying textures consistent with flow over the ground and an upper surface with a smooth or ropey texture indicative of a molten, flowing state. This material is diagnostic of smelting using a slag-tapping technology. Included in this category were fragments of slag displaying 'runnel' and 'finger' morphologies and textures. Both have elongated morphologies, the textures of the latter suggesting unrestricted flow as a 'dribble' from the edge of a larger mass of tap slag. In contrast, slag 'runnels' displayed a cylindrical morphology indicating solidification within a tube-like space. It is suggested that these were formed by slag cooling within the aperture through which slag was tapped from the furnace during smelting. One possibility is that a larger aperture in the furnace was blocked by a material such as wet sand. When tapping was required, this could be pierced with a rod, allowing slag to flow out. Solidification of slag within the resulting aperture resulted in the formation of fragments with the 'runnel' morphology. Additionally, several fragments of tap slag displayed morphologies suggestive of vertical flow, perhaps indicating that the slag tapping aperture was not always at ground level.

2. Several fragments were interpreted as having cooled inside the furnace and were thus classified as furnace slags. These specimens were characterized by adhering vitrified or baked furnace material, or distinctive morphologies or textures such as the presence of a high proportion of charcoal impressions which suggested an origin in the furnace

combustion zone. A further fragment had a conical morphology with a concave base and elongated point which suggested formation just inside the point from which slag was being tapped.

3. The third type of slag identified occurred in amorphous fragments with a massive or vesicular texture. This material is undiagnostic of any specific process other than metal production as a whole although it is likely that much of it is actually furnace slag and the absence of characteristic textures or morphologies prevents its interpretation as such.

Technical Ceramic: This was of variable composition, but generally consisted of fired or vitrified material, sometimes displaying orange/red oxidation or grey reduction colours. Characteristically, it was either a sandy-clay or clay-sand with frequent inclusions of stone and rare inclusions of fired or vitrified material or slag. These features are consistent with an origin as part of a structure subject to elevated temperatures. In this context, the most likely explanation is that these fragments have derived from a smelting furnace or smithing hearth.

Recommendations

The assemblage of smelting waste from Brayford School is typical of that encountered on Romano-British iron production sites elsewhere in the Exmoor region. However, it has local significance within Brayford as it is the only assemblage recovered and recorded stratigraphically. This is enhanced to a regional level of importance by the potential of the material to shed light on iron production before the 2nd century apogee of iron production on the southern fringes of Exmoor. Accordingly, two main recommendations can be made:

1. Improvement of the sequence chronology. A sherd of pottery provides an early 2nd century *terminus post quem* for context [1003]. Where appropriate material is available, radiocarbon dates should be obtained, particularly from lower contexts.
2. As the only stratified assemblage of material currently available from the smelting site in Brayford, the material should be archived as a useful resource for future research.

References

Bray, L. S. 2007; *The Archaeology of Iron Production: Romano-British Evidence from the Exmoor Region*. Unpublished PhD thesis, University of Exeter.

Bray, L. S. 2011; *Brayford School, Bryaford, Devon; Results of an Archaeological Evaluation*, Unpublished report.

Fulford, M. 2004; Economic Structures. In M. Todd (ed.); *A Companion to Roman Britain*, Oxford, Blackwell, 309-326.

Appendix 7

Metalugical Debris Quantification *by Dr Lee Bray*

Context	Max Dimension (mm)	Weight (g)	Identification	Notes
Unstratified	200	367	Tap Slag	Upper and basal flow surfaces. Vesicular texture. Morphology suggests fragment is edge of slag cake that has flowed in depression.
Unstratified	90	119	Tap Slag	Smooth upper flow surface, basal incorporates stone inclusions. Curved planar morphology c. 5mm thick.
Unstratified	90	110	Technical Ceramic	Tightly curved morphology. Fired sandy clay with oxidized outer surface and heavily vitified inner.
Unstratified	100	77	Tap Slag	Finger' of slag from edge of larger cake with upper and basal flow surfaces.
Unstratified	50	22	Tap Slag	Slag runnel morphology.
Unstratified	45	25	Technical Ceramic	Amorphous, fired sandy clay. Light grey colour.
Unstratified	95	41	Tap Slag	Slag 'finger' with upper and basal flow surfaces.
Unstratified	55	24	Tap Slag	Fragment with smooth upper flow surface and vesicular texture.
Unstratified	90	74	Tap Slag	Slag runnel morphology. Stone inclusions.
Unstratified	80	57	Tap Slag	Basal flow surface. Vesicular texture suggestive of high viscosity.
1003	140	333	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	160	883	Technical Ceramic	Fired sandy clay, mostly reduced with heavily vitrified inner surface with adhering vesicular slag with charcoal impressions - probably part of combustion zone.
1003	230	1597	Technical Ceramic	Fired sandy clay, mostly reduced with heavily vitrified inner surface with adhering vesicular slag with charcoal impressions - probably part of combustion zone.
1003	110	464	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	140	717	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	80	100	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, slightly concave, vitirified inner surface.
1003	75	84	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	70	89	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, slight vitrification.
1003	120	267	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	190	1848	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface. Iron oxide staining.
1003	65	20	Tap Slag	Slag 'finger' with upper and basal flow surfaces.
1003	80	95	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface. Possible tool imprint.
1003	100	289	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, vitirified inner surface
1003	190	944	Technical Ceramic	Fired sandy clay with stone inclusions. Redox colours, heavily vitirified, thick inner surface

1003	140	591	Tap Slag	Smooth upper flow surface
1003	80	85	Tap Slag	Smooth upper flow surface
1003	115	339	Tap Slag	Ropey flow surface. Edge of larger slag cake
1003	90	294	Tap Slag	Viscous, vesicular flow texture with two possible separate flow episodes
1003	165	1481	Undiagnostic	Blocky, morphology irregular surface with ridge on one side reminiscent of slag runnel. Contains discrete fragments of slag. Possibly derived from furnace interior
1003	190	942	Tap Slag	Smooth flow surface with probable charcoal impression in broken section. Some suggestion of vertical flow onto one side
1003	130	558	Tap Slag	Unusual morphology suggests possible flow in a channel
1003	50	23	Tap Slag	
1003	60	11	Tap Slag	Slag ‘finger’ morphology
1003	50	47	Tap Slag	Slag runnel with large slag ‘bubble adhering
1003	110	392	Technical Ceramic	Fragment of furnace structure with fired oxidized and reduced sandy clay. Heavily vitrified surface with strong flow morphology
1003	85	32	Tap Slag	Slag ‘finger’ morphology
1003	100	117	Technical Ceramic	Fragment of furnace structure with fired oxidized and reduced sandy clay. Heavily vitrified surface.
1003	130	429	Technical Ceramic	Fragment of furnace structure with fired oxidized and reduced sandy clay. Heavily vitrified surface.
1003	150	697	Technical Ceramic	Fragment of furnace structure with fired oxidized and reduced sandy clay. Heavily vitrified surface.
1003	150	1926	Technical Ceramic	Fragment of furnace structure with very heavy vitification and possible tool impression.
1003	210	1773	Tap Slag	Ropey flow surface
1003	210	3218	Tap Slag	Ropey flow surface - edge of larger cake - charcoal inclusion
1003	90	238	Tap Slag	Ropey flow surface, vesicular texture
1003	50	24	Undiagnostic	Vesicular, irregular morphology
1003	60	48	Tap Slag	
1003	110	595	Tap Slag	Smooth flow surface with signs of vertical flow into its centre
1003	70	97	Tap Slag	Double slag runnel morphology
1003	90	121	Tap Slag	
1003	130	489	Tap Slag	
1003	70	109	Tap Slag	Crystalline texture on concave upper surface
1003	95	288	Tap Slag	Smooth flow surface, vesicular with cooling texture
1003	65	106	Tap Slag	
1003	110	272	Tap Slag	Concave upper surface, charcoal inclusion
1003	105	236	Tap Slag	

1003	160	1723	Tap Slag	Dense, massive texture
1005	50	30	Tap Slag	
1005	65	55	Tap Slag	
1005	40	34	Tap Slag	
1005	45	30	Tap Slag	
1005	25	16	Tap Slag	
1005	60	48	Tap Slag	Slag ‘finger’ with stone inclusion
1005	60	65	Undiagnostic	
1005	40	45	Tap Slag	
1005	55	53	Tap Slag	
1005	45	24	Tap Slag	Slag ‘finger’ morphology
1005	40	18	Tap Slag	
1005	40	16	Tap Slag	
1005	35	20	Tap Slag	
1005	50	19	Tap Slag	
1005	35	16	Tap Slag	
1005	70	46	Tap Slag	Thin, curved planar morphology
1005	45	23	Tap Slag	
1005	40	21	Tap Slag	
1005	40	22	Undiagnostic	
1005	40	12	Undiagnostic	
1005	55	46	Tap Slag	
1005	30	8	Undiagnostic	Charcoal inclusion
1005	50	44	Tap Slag	
1005	28	28	Technical Ceramic	
1005	50	61	Tap Slag	Slag ‘finger’ morphology
1005	35	19	Tap Slag	
1005	65	70	Tap Slag	Vesicular Texture
1005	30	18	Tap Slag	
1005	30	16	Tap Slag	
1005	40	27	Tap Slag	
1005	25	26	Tap Slag	
1005	35	32	Tap Slag	

1005	45	27	Technical Ceramic	
1005	85	110	Tap Slag	Ropey upper flow surface, vesicular texture
1005	65	34	Tap Slag	
1005	30	9	Tap Slag	
1005	65	162	Undiagnostic	
1005	45	25	Tap Slag	
1005	40	42	Tap Slag	Vesicular Texture
1005	55	48	Tap Slag	
1005	45	19	Tap Slag	
1005	35	16	Tap Slag	
1005	60	59	Tap Slag	
1005	60	34	Quartz	White
1005	50	58	Quartz	White
1005	40	26	Tap Slag	
1005	40	23	Tap Slag	
1005	50	76	Technical Ceramic	Fired sandy clay with vitirified surface and stone inclusions
1005	45	44	Tap Slag	
1005	90	141	Technical Ceramic	Fired sandy clay with redox colours and vitrified surface
1005	70	71	Tap Slag	
1005	55	52	Technical Ceramic	Fired sandy clay with redox colours and vitrified surface
1005	65	29	Tap Slag	
1005	30	10	Tap Slag	Slag ‘finger’ morphology
1005	60	60	Technical Ceramic	Reduced fired sandy clay with vitrified surface
1005	55	45	Tap Slag	
1005	35	24	Undiagnostic	
1005	65	85	Tap Slag	
1005	35	10	Technical Ceramic	Oxidized clay fragment
1005	45	38	Tap Slag	Slag runnel morphology.
1005	50	55	Tap Slag	
1005	55	35	Tap Slag	
1005	35	15	Tap Slag	
1005	40	11	Technical Ceramic	Vitrified material with adhering fired sandy clay
1005	25	19	Tap Slag	

1005	40	24	Tap Slag	
1007	65	110	Quartz	White
1007	95	251	Quartz	White
1007	65	77	Quartz	White
1007	85	251	Tap Slag	Massive texture, Smooth upper flow surface. Suggests low viscosity.
1007	30	17	Technical Ceramic	Vesicular texture
1007	90	186	Technical Ceramic	Stone inclusions, slightly vesicular texture
1007	65	38	Tap Slag	Slag ‘finger’ morphology
1007	65	65	Tap Slag	charcoal inclusion
1007	65	32	Technical Ceramic	Fired sandy clay with redox colours and vitrified surface.
1007	55	78	Tap slag	Ropey upper flow surface.
1007	65	79	Technical Ceramic	Stone inclusions, fired sandy clay, vitrified surface
1007	70	106	Furnace slag	Wedge-shaped slag fragment with fired sandy clay adhering to opposite surfaces - possible flow over sandy surface
1007	70	71	Technical Ceramic	Fired sandy clay with redox colours and vitrified surface.
1007	85	245	Tap Slag	Ropey upper flow surface.
1007	105	344	Tap Slag	Ropey upper flow surface.
1007	15	5	Technical Ceramic	x2 fragments. (Bag 1/3) <1>
1007	25	62	Undiagnostic	x13 fragments of slag. Bag 1/3 <1>
1007	45	28	Undiagnostic	x2 fragments of slag Bag 2/3 <1>
1009	70	62	Tap Slag	Slag ‘finger’ morphology, iron oxide deposit adhering
1009	45	32	Tap Slag	Planar morphology, smooth upper flow surface, vesicular with cooling texture
1009	90	270	Tap Slag	Ropey upper flow surface, edge of larger slag cake
1009	75	36	Tap Slag	Slag ‘finger’ morphology
1009	40	24	Technical Ceramic	Redox colours
1009	35	22	Tap Slag	Vertical flow structures
1009	70	30	Tap Slag	Slag ‘finger’ morphology
1009	80	223	Tap Slag	Ropey upper flow surface, edge of larger slag cake
1009	60	37	Tap Slag	Ropey upper flow surface
1009	55	44	Tap Slag	Ropey upper flow surface.
1009	35	11	Tap Slag	Slag ‘finger’ morphology
1009	55	19	Tap Slag	Slag ‘finger’ morphology
1009	65	90	Tap Slag	
1009	50	25	Tap Slag	

1009	85	104	Tap Slag	Ropey upper flow surface.
1009	30	23	Tap Slag	Possible flow over sandy surface
1009	80	73	Tap Slag	Ropey upper flow surface.
1009	80	87	Technical Ceramic	fired oxidized and reduced andy clay with heavily vitrified surface.
1009	50	27	Tap Slag	
1009	60	58	Tap Slag	Ropey upper flow surface. Very vesicular basal surface - possible flow over sandy/vitrified surface.
1009	50	33	Furnace Slag	Morphology suggests possible fragment of slag drain morphology
1009	35	23	Tap Slag	Slag runnel morphology.
1009	40	19	Technical Ceramic	Irregular morphology, vitirified
1009	45	51	Quartz	White
1009	45	18	Tap Slag	
1009	25	6	Technical Ceramic	
1009	40	15	Tap slag	
1009	40	10	Tap Slag	Slag ‘finger’ morphology
1009	45	23	Tap Slag	
1010	60	578	Undiagnostic	x75 fragments. Bag 1/3 <2>
1010	60	335	Tap Slag	x12 fragments. Bag 1/3. <2>
1010	60	95	Tap Slag	Slag runnel morphology. Bag 1/3. <2>
1010	35	21	Technical Ceramic	x3 fragments, fired and vitrified material. Bag 2/3. <2>
1010	45	48	Technical Ceramic	x9 fragments, fired and vitrified material. Bag 1/3 <2>
1011	140	547	Technical Ceramic	Planar morphology. One surface intensely vitified, the other oxidized sandy clay with stone and quartz inclusions.
1011	120	285	Tap Slag	Morphology suggests flow in a narrow channel. Upper flow surface has ‘custard skin’ creasing indicating surficial cooling.
1011	100	315	Tap Slag	Vesicular texture. Interior cooling textures are apparent.
1011	100	1365	Furnace slag	Massive crystalline texture. Irregular cuboid morphology. Very dense with adhering furnace wall material
1011	60	71	Technical Ceramic	Friable, fired sandy clay. Mostly oxidized with vitrified surface.
1011	50	36	Technical Ceramic	Vitrified material with stone inclusions.
1011	50	24	Technical Ceramic	Vitrified material with stone inclusions.
1014	55	46	Undiagnostic	Ropey flow surface, no clear basal surface
1014	35	51	Undiagnostic	Slag with vesicular texture and adhering baked grey sandy clay and iron oxide deposit
1014	45	45	Tap Slag	Ropey flow surface, no clear basal surface
1014	65	60	Tap Slag	Smooth flow surface, no clear basal surface

Appendix 8

Charcoal Report *by Dana Challinor*

Introduction and Methodology
Five samples of charcoal were submitted for identification, comprising two flots resulting from the processing of soil samples and three hand-collected samples. The charcoal was derived from contexts associated with evidence for Romano-British iron smelting.

The charcoal from the flots was scanned at low magnification (up to ×45) and an estimate of taxonomic abundance was made. Twenty fragments were then selected, with the intentions of recovering any non-oak species for radiocarbon dating and to examine the maturity of the oak fragments. Where necessary, identifications were confirmed using a Meiji incident-light microscope at up to ×400 magnification, and with reference to appropriate keys (Schweingruber 1990; Hather 2000) and modern reference material. Classification and nomenclature follow Stace (1997).

Results
The condition of the charcoal was generally very good, although there was some vitrification (including strong brilliance to almost complete fusion) in the oak from samples <1> and <2> which obscured maturity in some fragments. The reason for vitrification in charcoal is currently unclear but is not necessarily related to high burning temperatures (McParland *et al.* 2010). There were large fragments preserved in the samples, not only in the hand-collected material, but also from the flots where pieces of up to 40mm in length and >25 years growth were noted.

The charcoal was overwhelmingly dominated by *Quercus* sp. (oak) (Table 2). Only two fragments of non-oak were identified, *Alnus glutinosa* (alder) and *Corylus avellana* (hazel), which were selected for radiocarbon dating. Variable maturity was noted, including fragments of heartwood and sapwood. There were no complete stems of roundwood, but where the growth rings exhibited moderate to strong curvature, this is recorded as roundwood and assumed to represent branchwood. Growth rates were also variable, but with a general tendency towards narrow rings, indicating slow growth.

Feature type		**Ditch**			**Posthole**	**Pit**
Feature number		1002			1006	1008
Context number		1010	1003		1007	1009
Sample number		2	Blk1	Blk2	1	-
Total quantity		+++	1	+++	++++	1
Quercus sp.	oak	19 (4s, 4r, 5h)	1w, r	5 (5s, 2?w)	19 (2s, 5h, 1r)	1w, r
Alnus glutinosa Gaertn.	alder				1	
Corylus avellana L.	hazel	1r				

+++=up to 50 fragments; ++++=>100 fragments; s=sapwood, r=roundwood, h=heartwood, w=worked wood
Table 2: Results of the charcoal analysis

Worked wood was recorded from the hand-collected samples of (1003) and (1009). The identification of wood-working is problematic in charcoal due to its fragmentary nature, but the evidence here was compelling, if incomplete. The piece from (1003), Blk1, showed clear evidence of curvature (Figure 11) which was unrelated to the natural curvature of the growth rings, indicating deliberate shaping. There were also two fragments from (1003), Blk 2, which measured up to 75mm long with a very angular square shape. Archaeological charcoal fragments tend to be slightly softened, rounded or uneven at the edges, but these were very sharp. However, the evidence for these pieces was uncertain.

The piece from (1009) was more distinctive, with a two sharp, straight edges leading to a curved point (Figure 12). One side of this piece was distinctly flat, as though cut.

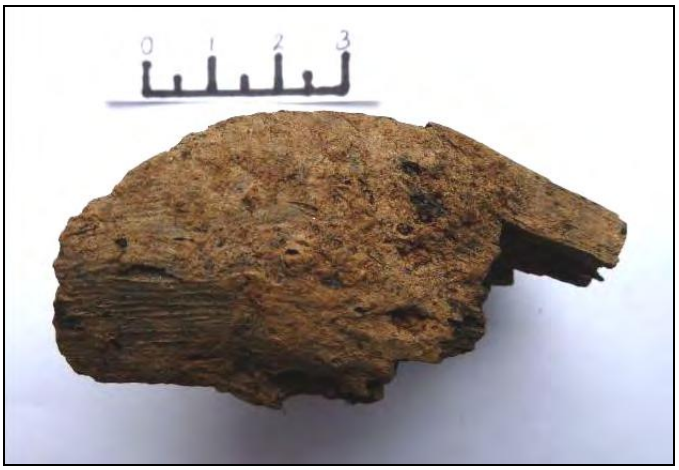

Figure 11: Worked charcoal from context (1003.Blk 1).

Figure 12: Worked charcoal from context (1009).

Discussion

Although the dataset from Brayford School is small, it clearly indicates the use of oak as the primary fuel for metalworking. This is unsurprising as the use of oak for both smithing and smelting is well attested at other Romano-British sites, such as Pomeroy Wood, Devon (Gale 1999), West Hawk Farm, Kent (Challinor 2008) and Chesters Roman Villa, Gloucestershire (Figueiral 1992). These sites provide examples that differ in location and nature (a military base, a roadside settlement and a villa) but all produced abundant oak in association with iron-working.

It is generally agreed that the activities of both iron smelting and smithing would have required the use of charcoal as fuel (Cleere & Crossley 1985, 37; Goffer 2007, 174), as it provides a high heat and produces less smoke than wood fuel. Oak makes a good charcoal fuel (Edlin 1949), with heartwood providing the necessary heat for smelting. Conversion to charcoal requires a large amount of wood, estimated at 6-7 tonnes of wood to produce 1 tonne of charcoal (Gale 1999, 383) and is unlikely to have been used if wood supplies would have sufficed. At the Roman military base at Pomeroy Wood, Devon, Gale argues that woodland management was employed to meet the high demands on wood (*ibid.*). The evidence at Brayford High School is too slight to offer conclusive evidence, but it is worth noting that the slow-growth noted in much of the oak is not consistent with the fast growth associated with coppiced stems.

The pieces of charcoal with evidence of wood-working are of interest as it is unusual to find such preservation. The charcoal from (1009) is comparable in shape to a stake, with straight edges curving to a point, but the curved piece from (1003) is less clear and could represent part of an artefact or wood-working waste. Either way, these fragments suggest the re-use as fuelwood of worked timber or associated waste from wood-working. This picture is somewhat at odds with the evidence for the focused selection of oak and use of charcoal as fuel suggested by the charcoal assemblages from other metalworking sites. Of course, it is possible that they were used as kindling to ignite the charcoal fuel, or in fact represent the mixed remains of another fire, unrelated to smelting. In the absence of other samples from the site, the evidence remains inconclusive.

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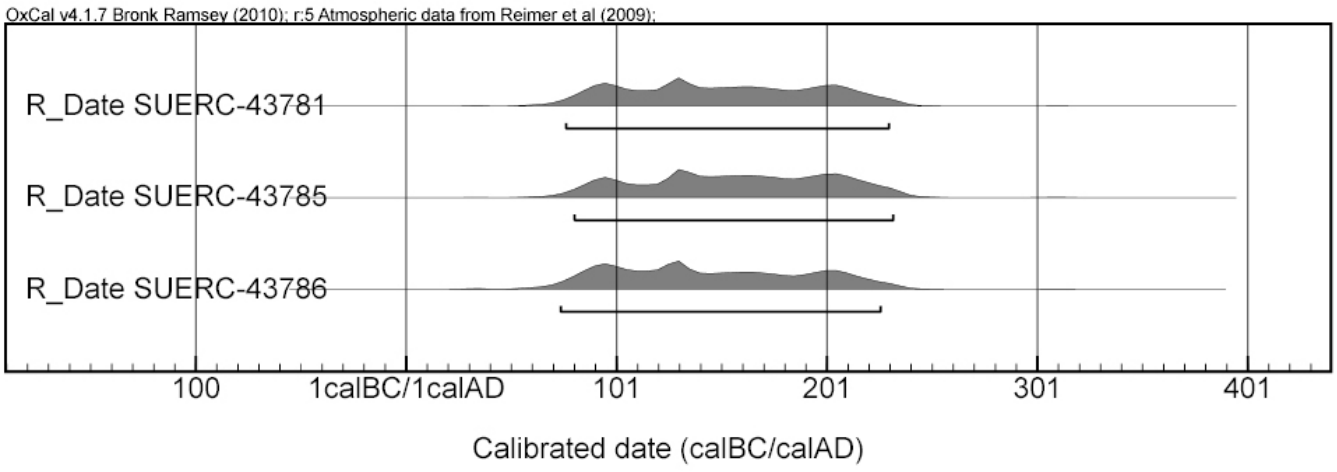
Appendix 9

Radiocarbon Determinants *by SUERC*

N.B.

1. The quoted ^{14}C ages are in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.
2. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal3).
3. Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.



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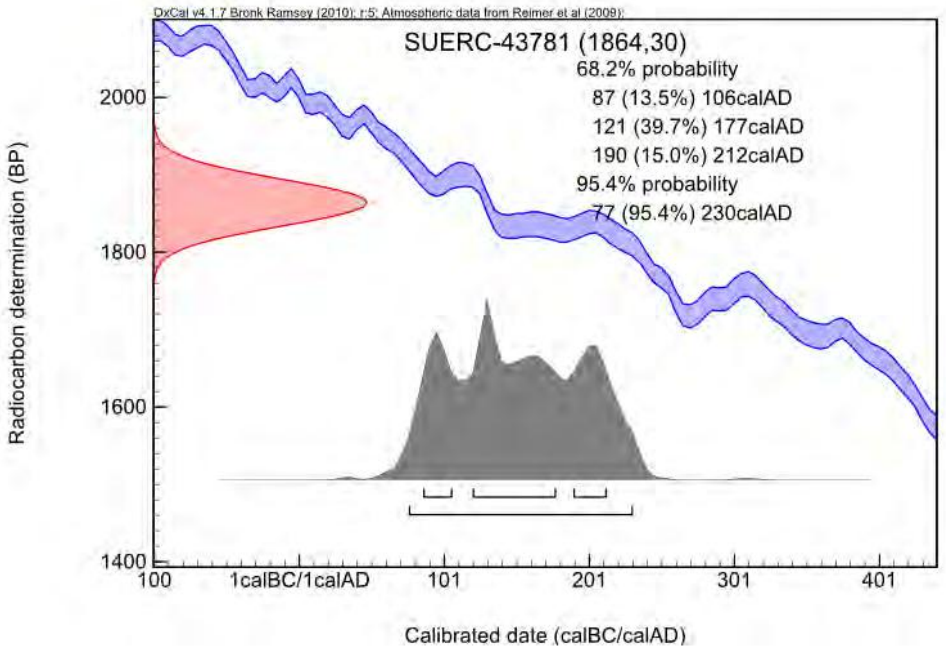
Laboratory Code	SUERC-43781 (GU-29089)
Submitter	South West Archaeology Ltd
Site Reference	High Bray Brayford School
Sample Reference	HBBS12 (1007) <1>
Material	Charcoal : *Alnus*
$\delta^{13}C$ relative to VPDB	-27.0 ‰
Radiocarbon Age BP	1864 ± 30



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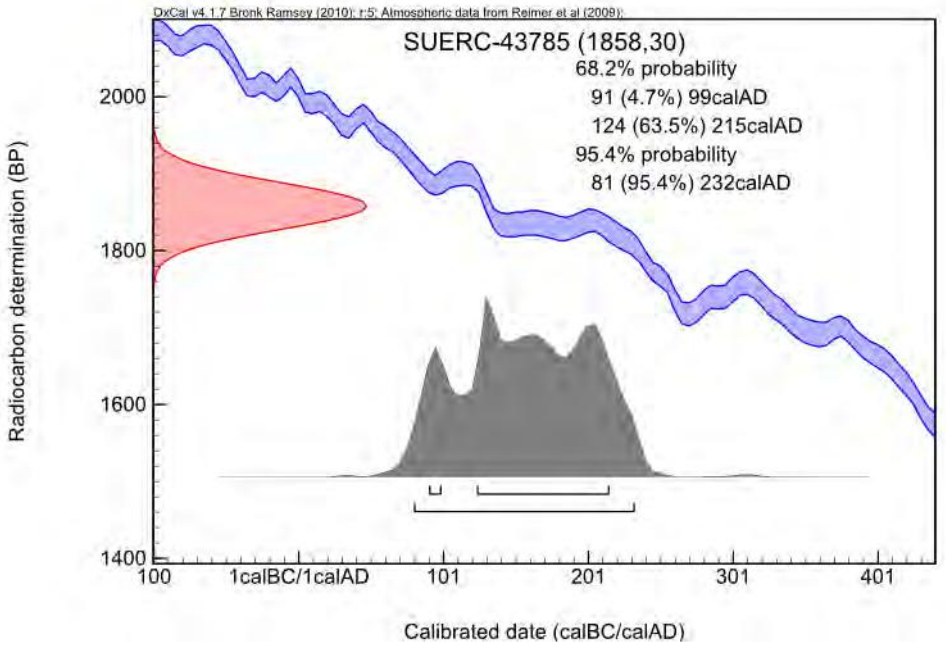
Laboratory Code	SUERC-43785 (GU29090)
Submitter	South West Archaeology Ltd
Site Reference	High Bray Brayford School
Sample Reference	HBBS12 (1010) <2>
Material	Charcoal : *Corylus*
$\delta^{13}C$ relative to VPDB	-23.7 ‰
Radiocarbon Age BP	1858 ± 30



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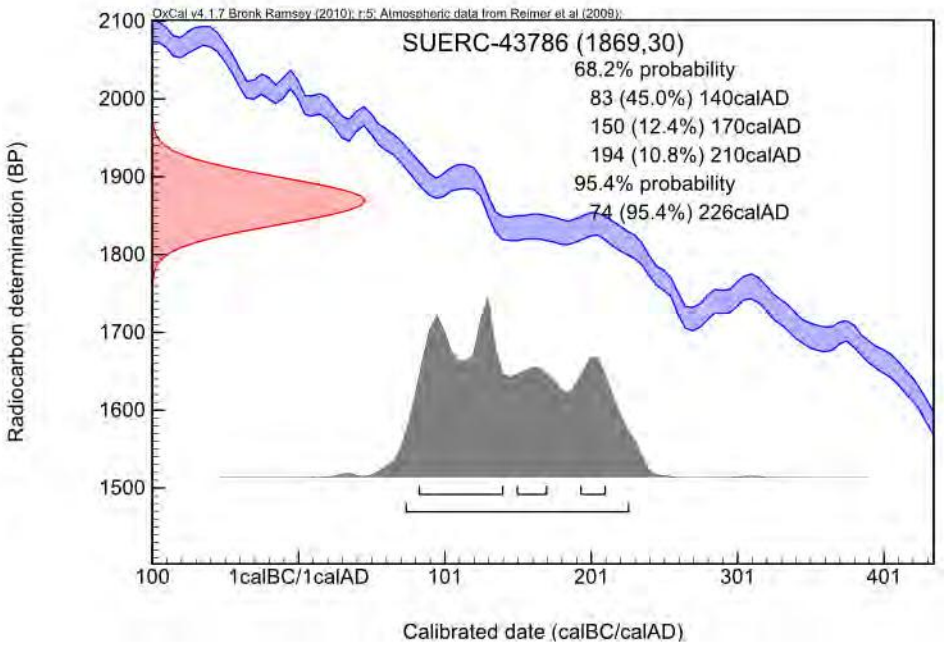
Laboratory Code	SUERC-43786 (GU29091)
Submitter	South West Archaeology Ltd
Site Reference	High Bray Brayford School
Sample Reference	HBBS12 (1003) <3>
Material	Charcoal : *Quercus*
$\delta^{13}C$ relative to VPDB	-25.4 ‰
Radiocarbon Age BP	1869 ± 30



Appendix 10

List of Jpegs on CD Rom to the rear of the report

Photo Number	*Description*	*From*	*Scale*
HBBS12 (1)	Stripped area of features.	N	2m
HBBS12 (2)	As above.	NE	2m
HBBS12 (3)	As above.	E	2m
HBBS12 (4)	As above.	S	2m
HBBS12 (5)	As above.	SSW	2m
HBBS12 (6)	Posthole [1006]. From above.	E	2m & 0.1m
HBBS12 (7)	As above. Oblique.	NE	2m & 0.1m
HBBS12 (8)	[1002], [1004]. Slot 2.	W	2m & 1m
HBBS12 (9)	As above.	SW	2m & 1m
HBBS12(10)	[1002] South facing section. Slot 2.	S	2m & 1m
HBBS12 (11)	As Above.	S	2m
HBBS12 (12)	[1002] North facing section. Slot 2.	N	2m & 1m
HBBS12 (13)	[1004], [1013] North facing section.	S	1m & 0.1m
HBBS12 (14)	[1004], [1013] North facing section.	N	1m & 0.1m
HBBS12 (15)	[1002], [1004] South facing section. Slot 1.	S	2m & 1m
HBBS12 (16)	[1002], [1004] North facing section. Slot 1.	N	2m & 1m
HBBS12 (17)	[1002], [1004]. Slot 1.	W	2m & 1m
HBBS12 (18)	Linears [1002], [1004].	N	2m

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