AD266

Land at Scorer's Lane, Great Lumley, Co. Durham

Archaeological Strip and Record Excavation

Author	Jonathan McKelvey
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For further information please contact:

AD Archaeology Ltd

South Shields Business Works,
Henry Robson Way,
South Shields,
NE33 1RF
Tel: 0191 603 0377
Email: info@adarchaeology.co.uk

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EXECUTIVE SUMMARY

AD Archaeology was commissioned by Bellway Homes to undertake an archaeological strip, map and record excavation on land at Scorer's Lane, Great Lumley, Durham, prior to the construction of a housing development.

The site consists of a cluster of prehistoric pits with areas of intense burning, situated between the pits and the line of a former stream. Four of the pits were curvilinear in shape and varied in size between 6m and 3m in length. A fifth pit was rectangular and had a small channel running into it at one end with a second channel leading into another of the pits. A smaller feature probably representing a posthole, was cut through the largest area of burning. Radiocarbon dating confirms a prehistoric date for these features with the main focus of activity being during the mid-Bronze Age period. Bayesian Analysis estimates that the main grouping of pits were in use by 1660–1530 cal BC (68% probability) with a final usage occurring by 1555–1395 cal BC (68% probability). The main period of activity is likely therefore to have occurred over a period of up to 225 years (68% probability). An earlier date from one of these features in the Neolithic period (3670–3540 cal BC) and a later date of late Bronze Age period/ early Iron Age date (800–540 cal BC) probably reflect long-term usage of the site, perhaps on a periodic or sporadic rather than a continuous basis.

It is most probable that pits and areas of burning form components of a class of monument commonly referred to as 'burnt mounds'. These typically consisted of mounds of stones adjacent to pits or troughs located near to a stream or water source. The stones would be heated then placed within the pit or trough to boil water and produce steam. Whilst no mounds of discarded stones survived at the Scorer's Lane site, this is to be expected as ploughing in the medieval and post-medieval periods has removed any ground surface features contemporary with the pits.

The discovery and recording of the features on this site represent a valuable contribution to the study of this class of site. Although there are a number of known or suspected "burnt mound sites" in County Durham and the North-East of England more generally, it is rare for there to be an opportunity to fully excavate and record one.

1. INTRODUCTION

1.1 The Project

1.1.1 AD Archaeology Ltd was commissioned by Bellway Homes to undertake a strip, map and record excavation trenching in advance of a housing development on land at Scorer's Lane, Great Lumley. The archaeological works were undertaken in December 2017.

1.2 Location, Geology and Topography

1.2.1 The development area lies on the north-eastern outskirts of Great Lumley, County Durham, on the east side of Scorer's Lane and is bounded on the south by modern housing and to the east and north by open fields. The site, centred on NGR NZ 2975 4957, was up to 90m by 32m in size and consists of a portion of a larger development.

1.2.2 The bedrock geology of the site is Pennine Middle Coal Measures Formation mudstone, siltstone and sandstone. Sedimentary bedrock formed 309 to 312 million years ago in the Carboniferous Period. The superficial geology is Devensian Diamicton glacial till formed up to 2 million years ago in the Quaternary Period when the local environment was dominated by Ice Age conditions (BGS n.d.).

1.2.3 The strip and record excavation area was located adjacent to the southern boundary of the development site, on what would have been the southern bank of a former stream last depicted on the first edition Ordnance Survey of 1857. A shallow valley or depression runs east-west across the southern portion of the development area which contains a sewer leading to the water treatment works to the east of the site. The land is flatter to the south of the shallow valley that used to contain an east-west stream present on cartographic mapping until the first edition Ordnance Survey of 1857. Presumably the course of the stream was culverted after this time.

2. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Prehistoric Period

2.1.1 The Durham HER (Historic Environment Record) only lists one feature from the prehistoric period in the vicinity of Great Lumley, a collection of flint tools (HER1044) though the exact find location of the object was not recorded.

2.2 Romano-British Period/Early-Medieval Period

2.2.1 The HER does not record any known features from the Romano-British or Early-Medieval periods within the immediate area of Great Lumley.

2.3 Medieval Period

2.3.1 The village of Great Lumley has its origins in the medieval period (HER6799) although the exact location of the original focus of the village is unknown. It is likely that the focus of the village lay near to the modern village centre close to Christ Church, and as such the development site probably lies beyond its extent and would have fallen within the agricultural fields surrounding the village. To the north of the village, Lumley Castle, built in the fourteenth century dominates the area and was surrounded by a large deer park in the medieval period (HER2174). The HER also lists a medieval chapel (HER42071) which was probably associated with the castle and its estate, though its exact location is unknown.

2.4 Post-Medieval and Modern Periods

2.4.1 The first edition Ordnance Survey of 1857 shows the site occupying the southern part of an open field with a building marked 'Bucks House' in the north-west corner of the site adjacent to Scorer's Lane, and a further unlabelled structure in the south-west corner. The site was crossed by a number of paths; one leading east - west from Bucks House; one running south-west to north-east across the site from Scorer's Lane would appear to lead towards Lumley Thicks and the post-medieval Lumley Forge; a path which runs roughly north - south across the eastern part of the site appears to lead to a Saw Mill depicted on the first edition map. Bucks House was demolished by the 1970's.

2.5 Archaeological Work

2.5.1 A Geophysical Survey (AD Archaeology 2016) and Evaluation Trenching (AD Archaeology 2017) have been undertaken at the site. Subsequent to the geophysical survey nine evaluation trenches were excavated across the site. With the exception of Trench 7, close to the southern limit of the site, the evaluation trenches were devoid of significant archaeological features. Cut features at the eastern end of Trench 7 indicate the presence of pre-modern activity at this location. Whilst the excavation of the fills indicate that these features were pre-modern in date, it was not possible to establish their nature or extent. The absence of features to the west in Trenches 8 and 9 and the presence of the main sewer to the north leading to the water treatment works, which is set in a wide corridor strip in a shallow east-west valley, means that the potential surviving extent of this activity within the development site is restricted to a narrow strip of land either side of Trench 7.

3. AIMS AND OBJECTIVES

3.1 The assessment exercises have identified that significant archaeological remains survive in a narrow strip of land either side of Trench 7. It was agreed that the loss of archaeological features should be mitigated by a programme of investigation and recording in advance of their destruction. This will ensure their 'preservation by record' consistent with the objectives of paragraphs 141 and 176 of the NPPF.

3.2 Archaeological excavation and recording in advance of development ensures that important archaeological remains are not destroyed without first being adequately recorded.

3.3 Durham County Council Archaeology Team therefore advised that the archaeological mitigation in the southern area of the site (see Figure 2) should take the form of a programme of 'strip and record' mitigation. This required that an area of development impact was stripped under archaeological supervision allowing the targeted excavation of a representative sample of archaeological features and deposits.

4. METHODOLOGY

4.1 General Methodology

4.1.1 The excavation work was carried out in compliance with all the relevant codes of practice by suitably qualified and experienced staff.

4.2 Excavation and Recording

4.2.1 The strip, map and record strategy was agreed with the County Archaeology Officer and was undertaken in accordance with an approved written scheme of Investigation (appendix 2).

5. RESULTS OF THE STRIP, MAP AND RECORD EXCAVATION

5.1 The area of the strip and record lies on the former southern bank of an east-west stream. A cluster of prehistoric pits and an area of intensive burning were located on flatter land to the north before it fell away steadily south toward the stream.

5.2 A cluster of pits was located in the central area of the excavation, two of the pits (705 and 707) had been partly exposed in evaluation Trench 7. At the western end of the main group of features was a large curvilinear feature (705). Both terminals of the pit (705) had shallow concave profiles. In the central sector the feature widened to the north-east, up to a maximum of 2.24m in width. Here the pit had steep concave profiled-sides, with a step on its south-western side, and a flat base. The pit (705), which was 6m in length, was a maximum of 2.24m wide and 0.30m in depth. It was filled with a 0.22m deep mixed deposits of reddish-brown silty clay and coal (704), overlain by a 0.16m deep grey-silty clay (703).

5.3 To the south-east of pit 705 was a 3.30m long north-west/south-east curvilinear pit (707) which had a 45 degree uniform cut on its south-western side with a steep near vertical side to the north-east. The pit (707) which was 1.04m wide and 0.58m deep was filled with mixed deposits of brown and grey silty clay (710)

0.23m in depth, overlain by brown silty clay (706) to a depth of 0.28m.

5.4 A narrow channel from a sub-rectangular pit (714) fed into the south-eastern end of pit 707. Pit 714 was sub-rectangular in shape with its long-axis north-west/south-east and was 1.90m by 0.80m in size and 0.34m in depth. A short 0.35m wide channel led into the north-eastern corner of the feature with a second 0.50m wide and 0.15m deep channel leading out and into pit 707 to the north-west. In profile the rectangular pit (714) had steep concave sides with an uneven base and was filled with a grey-brown silty clay (713). The western side of pit 714 was cut by a 0.26m wide NNW-SSE field drain.

5.5 To the east of rectangular pit (714) was a north-east/south-west curvilinear pit (716) which had been cut by a modern service. The pit (716) was 3m in length and had a U-shaped base with concave if irregular sides. It was 0.42m wide by 0.16m in depth and was filled with a brown silty clay (715).

5.5 These pits were cut through the natural subsoil which consisted of a yellow clay (702) containing a number of outcrops of coal. To the north-east of this cluster of features was evidence of extensive burning. There were a number of areas where the yellow clay natural subsoil (702) had been burnt red through intensive heat. Seven areas of burnt natural up to 3m by 2.50m in size were identified to the north-east of the complex of pits, with a further two smaller areas to the west. A rectangular feature, probably representing a former post-setting (718) was cut through one of these areas of burning. The rectangular feature (718) was 0.70m by 0.38m in size and had vertical straight sides coming down onto a flat base. The feature was 0.33m in depth and was filled with deposits of brown silty clay (720) 0.08m in depth, redeposited yellow clay subsoil which had been burnt red in places (719) 0.05m in depth, and a 0.20m deep brown silty clay (717).

5.6 To the south-west of the main cluster of pits (705, 707, 714 and 716) was an isolated curvilinear pit (712). The pit (712), which was 4.40m in length was oriented north-east/south-west, curving slightly to the east at its north-eastern end. It had a steep near-vertical cut on its eastern side with a concave-profiled cut on its western side. The pit (712), which was 0.90m wide and 0.44m in depth, was filled with mixed deposits of brown and grey silty clay (711).

5.7 The cluster of prehistoric pits and features were sealed by a 0.12m deep brown sandy clay ploughsoil (701) and a grey sandy loam topsoil (700), 0.38m in depth. Two sets of shallow furrows associated with ploughsoil 701 were traced as intermittently surviving features. These consisted of an east-west system averaging 2m in width with a wavelength of 4-6m surviving in the western half of the site. At the eastern end of the site was a north-south system of furrows up to 3.5m in width with a wavelength of 8-10m.

6. DISCUSSION

6.1 The prehistoric site consists of a cluster of prehistoric pits with areas of intense burning, up to 3m in diameter, situated between the pits and the line of a former stream. Four of the pits were curvilinear in shape varying in size between 6m by 2.24m and 3m by 0.42m. The fifth pit was rectangular, 1.90m by 0.80m in size, with a small channel leading into it at one end with a second channel running off into another of the pits. A vertically sided 0.70m by 0.38m feature, which probably represents a posthole, was cut through the largest area of burning.

6.2 Radiocarbon dating confirms a prehistoric date for these features with the main focus of activity being during the mid-Bronze Age period. On the basis of Bayesian Analysis (Appendix 6) it can be estimated that the main grouping of pits were in use by 1660–1530 cal BC (68% probability) with a final usage occurring by 1555–1395 cal BC (68% probability). The main period of activity is likely therefore to have occurred over a period of up to 225 years (68% probability). An earlier date from one of these features (pit 705) in the Neolithic period (3670–3540 cal BC) and a later date of late Bronze Age period/ early Iron Age date (800–540 cal BC) from pit 718 probably reflect long-term usage of the site, perhaps on a periodic or sporadic rather than a continuous basis.

6.3 There is a relative paucity of Neolithic and early-middle Bronze Age settlement evidence in County Durham generally, in comparison to the greater number of known sites to the north in Northumberland (most notably in the Milfield Basin) and south toward the River Tees. It is likely that the impact of the industrial revolution in the Durham Coalfield area in the 19th Century and the rapid spread and density of modern housing in the region has contributed to the apparent sparsity of early Bronze Age and Neolithic sites in this part of Durham. It is quite possible that settlement throughout much of the Neolithic and early Bronze Age periods was essentially seasonal, with many people continuing to move around the landscape in a seasonal cycle as they had for millennia during the preceding Mesolithic period, perhaps congregating at communal places in the lowlands for the winter months. If this hypothesis is correct, it would account for the difficulty in finding evidence of settlement, other than lithic scatters. Although there are exemptions such as the recently discovered complex site at Mountjoy (Brogan and Hodgson 2011) there is a difficulty in identifying settlement sites where the majority of people were living in relatively flimsy, temporary structures that leave little if any archaeological trace.

6.4 It is most probable that the cluster of pits at Scorer's Lane fall into a class of Bronze Age monument known as 'burnt mound' sites. These typically consist of mounds of stones (long since ploughed away at Great Lumley) located adjacent to pits or troughs usually located next to a stream or water source. The stones would be heated then placed within the pit or trough to boil or produce steam (the pit or trough could be stone-lined, wood-lined clay-lined or a lined with animal hide). Afterwards, the heat-shattered stone fragments were removed from the pit or trough and discarded leading to the gradual build-up of a mound. The mounds are

oval or more often crescent-shaped with the pit or trough located in the centre. It is notable that four of the pits at the Scorer's Lane site were curvilinear with pit 705 having a crescent-shape.

6.5 In the UK and Ireland mounds of burnt stones, ranging up to 15m in diameter and 1m in height, have been recorded adjacent to streams in a wide range of landscape settings. Where excavated some of the burnt mounds have proven to belong to the late Neolithic period but most date to the Bronze Age with the majority falling within mid-late Bronze Age period (1750-800BC). They have occasionally been found in Ireland and the Northern Isles in association with settlements, but in England they are mainly found as solitary sites at a distance from the nearest known settlement. This has led to the suggestion that they were used for special activities undertaken at a distance from contemporary settlements or visited by mobile groups as part of a seasonal round, where resources were exploited at particular times. At a site at Jenny's Lantern in Northumberland burnt mounds were ranged along the same small burn over a distance of 400m suggesting a succession of usage over a long time (Topping 2011). On Barningham Moor in Durham burnt mounds have been recorded on open moorland close to a concentration of rock art sites and a stone circle and it has been argued that they may be associated with culturally important landscapes. Occasionally stake built structures have been discovered near to hearths or pits, possibly representing wind breaks or some form of temporary shelter, such as a recently excavated example at Titlington Mount, Northumberland (Topping 1998). Ongoing excavations by the Bamburgh Research Project as part of the Bradford Kaims Project at Hoppenwood Bank have identified at least 12 burnt mounds.

6.6 Whilst there is a good working knowledge of how this hot-stone technology worked, its purpose is less clearly understood. A number of interpretations have been proposed for their function. Various functions have been ascribed to them ranging from cooking, bathing, sauna and sweat lodge use, wood working, leather working, fulling, dyeing, brewing, and mead-making. Whilst this technology could have been utilised for a variety of purposes, on balance the prevailing current view amongst most archaeologists is that burnt mound sites were primarily used for cooking purposes.

6.7 A programme of scientific sampling analysis and radiocarbon dating was undertaken on samples taken from the features (appendices 4-5). Charred plant macrofossil remains recovered from the cluster of pits of pits at Scorer's Lane are consistent with palaeoenvironmental evidence found at similar sites elsewhere. Environmental analysis from samples taken from the pits suggests the presence of burnt turves with superficial charring rather than being directly exposed to flames. Such material may represent the use of turves in the construction of clamp kilns or earth ovens, where parts could be converted to carbon without complete combustion. Fracturing of ferruginous stones suggests hot rock technology though the quantity of charcoal recovered from this deposit was negligible. Traces of cereal grains noted within two of the deposits imply domestic activity, although the

features may have had an alternative purpose.

6.8 A small number of finds recovered from the pits are consistent with a Neolithic or Bronze Age date for these features. The finds comprised of a small number of sherds of pottery/fired clay and flint which were recovered from contexts (710) and (711) and in the sieving of soil samples from contexts (703), (710) and (713). Two tiny black ring-shaped ? jet disc beads from pit 714 is a rare find and, again, would be consistent with a Bronze Age date.

6.9 The discovery and recording of the features on this site represent a valuable contribution to the study of this class of site. Although there are a number of known or suspected “burnt mound sites” in County Durham and the North-East of England more generally, it is rare for there to be an opportunity to fully excavate and record one. In addition to establishing and recording the nature and form of these features, scientific analysis and dating have enabled a fuller understanding of their function and chronology.

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APPENDIX 1: LIST OF CONTEXTS

Context	Depth	Description
700	0.38m	Topsoil
701	0.12m	Ploughsoil
702	-	Natural subsoil
703	0.16m	Fill of pit 705
704	0.22m	Fill of pit 705
705	0.30m	Cut of pit
706	0.28m	Fill of pit 707
707	0.58m	Cut of pit
710	0.23m	Fill of pit 707
711	0.44m	Fill of pit 712
712	0.44m	Cut of pit
713	0.34m	Fill pf pit 714
714	0.34m	Cut of pit
715	0.16m	Fill of pit 716
716	0.16m	Cut of pit
717	0.33m	Fill of posthole
718	0.33m	Cut of posthole

DM/17/01757/FPA

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL MITIGATION (STRIP, MAP & RECORD EXCAVATION) OF LAND EAST OF SCORERS LANE, GREAT LUMLEY, DURHAM

1 Introduction

1.1 This Written Scheme of Investigation (WSI) represents a methods statement for archaeological mitigation for a residential development. The mitigation will consist of a strip, map and record excavation. The development (NGR NZ 2970 4960) is on an area of land to the east of Scorer's Lane, Great Lumley. The strip and record will be 3000sqm in area.

1.2 A Geophysical Survey (AD Archaeology 2016) and Evaluation Trenching (AD Archaeology 2017) have been undertaken at the site.

1.3 Policy relating to the assessment and mitigation of impacts to the heritage resource within the planning system is set out in the National Planning Policy Framework. The Framework identifies that the planning system should perform 'an environmental role', contributing to and protecting the built and historic environment (NPPF 2012, para 9) and that the pursuit of 'sustainable development' includes seeking improvements to the built, natural and historic environment.

1.4 The Framework further clarifies that, in circumstances where heritage assets will be damaged or lost as a result of development, Local Planning Authorities should require developers to record and advance the understanding of the asset to be lost in a manner appropriate to the significance of the asset. The evidence (and any archive) generated as part of the plan making process should be made publically accessible; copies of the evidence generated should be deposited with the relevant Historic Environment Record and archives with the relevant museum (NPPF, para 141).

1.5 Having assessed the potential impact of the development on the archaeological resource, Durham County Council Archaeology Team has advised that a condition should be attached to the permission requiring a programme of archaeological mitigation, comprising a strip, map and record excavation.

2 Archaeological and Historical Background

2 Archaeological and Historical Background

2.1 Prehistoric Period

2.1.1 The Durham HER (Historic Environment Record) only lists one feature from the

prehistoric period in the vicinity of Great Lumley, a collection of flint tools (HER1044) though the exact find location of the object was not recorded. Whilst there are no known sites within the development site, there is an increasing awareness of the density of the prehistoric settlement pattern in the North-East, particularly in the Iron Age period.

2.2 Romano-British Period

2.2.1 The HER does not record any known features from the Romano-British period within the immediate area of Great Lumley. It is important to note though that the wider area around the site was the location of significant Roman activity, as the nearby town of Chester-le-Street was a Roman settlement with a Roman fort known as Concangis founded in AD 216 near a Roman bridge crossing the River Wear (AD Archaeology 2016).

2.3 Early-Medieval Period

2.3.1 The HER does not record any known sites of early-medieval date on the development site itself.

2.4 Medieval Period

2.4.1 The village of Great Lumley has its origins in the medieval period (HER6799) although the exact location of the original focus of the village is unknown. It is likely that the focus of the village lay near to the modern village centre near Christ Church, and as such the proposed development site probably lies beyond its extent and could have fallen within the agricultural fields surrounding the village (ibid). To the north of the village, Lumley Castle, built in the fourteenth century dominates the area and was surrounded by a large deer park in the medieval period (HER2174). The HER also lists a medieval chapel (HER42071) which was probably associated with the castle and its estate, though its exact location is unknown (ibid).

2.5 Post-Medieval and Modern Periods

2.5.1 The HER records John Duck's Hospital (HER1291) a set of almshouses built in 1686 by John Duck the then Mayor of Durham, though these buildings have since been demolished (ibid). The HER also records a hoard of 678 silver-coins of seventeenth century date found in 1950, though the exact find location was not recorded. North of the village the HER records Lumley Forge (HER45921), an iron forge first recorded in 1779; along with its weirs and sluices (HER45958), revetment walls (HER45959) and a workers' village known as Breckon Hill (HER45967).

2.6 The geophysical survey undertaken at the site identified a small number of responses that may have low archaeological potential. There was significant magnetic disruption in the northern area of the site where Bucks House has been identified from map regression.

2.7 Subsequent to the geophysical survey nine evaluation trenches were excavated across the site. With the exception of Trench 7, close to the southern limit of the site, the evaluation trenches were devoid of significant archaeological features. Three gullies/cut features at the eastern end of Trench 7 indicate the presence of pre-modern settlement activity at this location. Whilst the excavation of the fills indicate that these features are pre-modern in date, it was not possible to establish their nature or extent. The settlement activity is likely to belong to a period ranging in date between the prehistoric and medieval periods. The absence of features to the west in Trenches 8 and 9 and the presence of the main sewer to the north leading to the water treatment works, which is set in a wide corridor strip in a shallow east-west valley, means that the potential surviving extent of this settlement activity within the development site is restricted to a narrow strip of land either side of Trench 7.

3. Mitigation Response

3.1 The assessment exercises have identified that significant archaeological remains survive in a narrow strip of land either side of Trench 7. The loss of archaeological features should be mitigated by a programme of investigation and recording in advance of their destruction. This will ensure their 'preservation by record' consistent with the objectives of paragraphs 141 and 176 of the NPPF.

3.2 Archaeological excavation and recording in advance of development impact will ensure important archaeological remains are not destroyed without first being adequately recorded.

3.3 Durham County Council Archaeology Team has therefore advised that the archaeological mitigation in the southern area of the site (see Figure 1) should take the form of a programme of 'strip and record' mitigation. This requires that an area of development impact is stripped under archaeological supervision allowing the targeted excavation of a representative sample of archaeological features and deposits.

3.4 Unless otherwise agreed, all archaeological fieldwork should be completed prior to the commencement of groundworks required for the proposed development. It may be possible for construction to start on parts of the site where archaeological fieldwork has been completed. This would need to be discussed and agreed with Durham County Council Archaeology Team.

3.5 Should the strip and record area include areas of modern disturbance which exceed the depth of known natural deposits, Durham County Council Archaeology Team will be contacted in order to establish whether the programme of archaeological work need continue in these specific areas.

4. General Standards

4.1 All work will be carried out in compliance with the codes of conduct of the Chartered Institute for Archaeologists (CIfA), will follow the CIfA Standard and Guidance for Archaeological Excavation and will be in line with the Regional Statement of Good Practice. The archaeological contractor will supply details of appropriate and current insurance to undertake excavations. All staff will be professional archaeologists who are suitably qualified and experienced for their project roles. Curriculum vitaes will be supplied to the Durham County Council Archaeology Team for approval on request. All staff will familiarise themselves with the archaeological background of the site, and the results of any previous work in the area, prior to the start of work on site. All staff will be aware of the work required under the specification, and must understand the project aims and methodologies.

5. Site briefing / 'Toolbox talk'

5.1.1 Provision will be made for the archaeological contractor to host a short project briefing or 'toolbox talk' prior to the any development work on site commencing. The briefing will include a summary of the requirements of the brief and the objectives of the mitigation exercise. Where appropriate reference will be made to the types of archaeological feature / deposits / finds potentially present on site.

5.1.2 The objective of the briefing is to ensure that all site operatives understand the scope and purpose of the archaeological mitigation work and the obligations it conveys on the developer and subcontractors. Provision should be made to brief new subcontractors before they commence work on site (or as soon as reasonably possible after they start) and to provide summary updates on the progress of the archaeological work to all site staff at appropriate intervals or following significant discoveries on site.

5.2 Soil stripping

5.2.1 Topsoil and unstratified modern material will be removed mechanically by machine using a back-acting **wide toothless ditching bucket**, under continuous archaeological supervision.

5.2.2 The topsoil or recent overburden will be removed down to the first significant archaeological horizon in successive level spits.

5.2.3 The full nature and extent of archaeological features and deposits will be exposed.

5.2.4 No machinery will track over areas that have previously been stripped.

5.2.5 Areas containing archaeological features and deposits will be recorded on a pre-excavation plan.

5.3 Recording and Excavation

5.3.1 All features exposed will be fully mapped and a site plan prepared before decisions are made regarding the appropriate level of excavation. The level of excavation and recording required will be agreed with the Durham County Council Archaeology Team following the initial topsoil strip. The aim of the mitigation is to record all and any archaeological features present on the site and to undertake sufficient intrusive excavation to enable the date, character, form and stratigraphic relationships of archaeological features to be understood. This process will typically involve significantly less intrusive excavation than would be required under full excavation conditions and potentially less than would be required for a strip and record. All excavation will be by hand. This process will typically require, as a maximum, the following level of sampling:

- Up to 100% of every discrete feature and features of particular interest
- 10% of the area of linear/curvilinear features with a non-uniform fill
- 5% of the area of linear/curvilinear features with a uniform fill
- All archaeological features and deposits must be excavated by hand
- Additional targeted excavation may also be required in certain locations in the event that stratigraphic relationships or artefactual dating evidence cannot be recovered from archaeological features via the initial sampling process.
- Any intersections of features or terminals of linear features should be excavated (this can be included within the sample percentage of a linear)

i) This work will involve the systematic examination and accurate recording of all archaeological features, horizons and artefacts identified.

ii) In the event of human burials being discovered the coroners' office will be informed. Any removal of burials will comply with relevant Ministry of Justice regulations.

iii) Appropriate procedures under the relevant legislation will be followed in the event of the discovery of artefacts covered by the provisions of the Treasure Act 1996.

iv) During and after the excavation, all recovered artefacts and environmental samples will be stored in the appropriate materials and storage conditions to ensure minimal deterioration and loss of information (this should include controlled storage, correct packaging, regular monitoring of conditions, immediate selection for conservation of vulnerable material).

v) The area will be accurately tied into the National Grid and located on a 1:2500 or 1:1250 map of the area.

vi) A full and proper record (written, graphic and photographic as appropriate) will be made for all work, using pro-forma record sheets and text descriptions appropriate to the work. Accurate scale plans and section drawings will be drawn at 1:50, 1:20 and 1:10 scales as appropriate.

vii) All archaeological deposits and features will be recorded with an above Ordnance Datum (AOD).

viii) A digital photographic record of all contexts will be taken in digital format. All photographs will include a clearly visible, graduated metric scale. A register of all photographs will be kept. The photographic record will be sent to ADS York in an approved format to be stored as part of their electronic archive.

ix) Where stratified deposits are encountered, a 'Harris' matrix will be compiled.

5.3.2 Deposits will be assessed for their potential for providing environmental or dating evidence. Sampling will be in line with the strategy agreed with Historic England Science Advisor and Durham County Council Archaeology Team (Section 6). Any variation from this scheme must be approved by the Historic England Science Advisor, Durham County Council Archaeology Team and representatives of the developer.

6 Environmental Sampling

6.1 A broad environmental archaeology sampling strategy will be agreed with the Historic EnglandNorth East Science Advisor, Don O'Meara. After the topsoil stripping and production of a site plan a detailed sampling strategy will then be discussed with the Durham County Council Archaeology Team and the HE Scientific Advisor.

6.2 The objective of the sampling strategy will be to collect a representative amount of plant, animal and inorganic material which may be preserved in the sediments on the site (English Heritage 2011, 5-7). This material will be collected where it is shown that its study is pertinent to undertanding the natural and human environment around the site. Suitable methodologies for sampling and processing will be adopted depending on whether the deposts come from waterlogged or non-waterlogged contexts.

6.3 Soil samples will be taken from the complete range of contexts representative of the archaeological remains uncovered during excavation. Sampling of features will be question lead, and will include a range of contexts (including those which do and do not contain diagnostic artefacts). Sample volumes will be determined by the

nature of the contexts excavated, and the questions being asked, but for dry/non-waterlogged deposits this will typically be 40 litres, or 100% of the context if the total volume is less than this. The outcome of any analysis will address the report format outlined by Historic England Guidelines (English Heritage 2011, 7-8), but will typically invovle the analysis of charred and uncharred plant material, and the identification of material suitable for scientific dating.

6.4 The presence of deposits containing animal bone will be treated in accordance with recent guidelines on the excavation and recovery of animal bone from archaeological sites (English Heritage 2014). This will include consideration of various appropriate recovery methods where this is appropriate and proportionate based on the nature and significance of the remains.

6.5 If evidence of industrial activity is uncovered during the stripping of the site, or during subsequent excavation or post-excavation work, a discussion between the contractor and DCC will determine the best way of approaching this material. Depending on the nature of the remains this may include the inclusion of a specialist in this field.

6.6 Bulk sample residues will be checked for the presence of industrial waste (e.g. slags, hammerscale, glass working waste) and small faunal remains (e.g. fishbones, small mammal/avian bones) as well as for plant material.

6.7 Scientific dating techniques will include, but not be limited to radiocarbon dating. Depending on the nature of the deposits recovered other techniques considered should include luminescence dating (OSL and TL), and archaeomagnetic dating. It is strongly encouraged that a dating specialist be consulted before the project commences, and that at the post-excavation stage any dating considered is conducted within a Bayesian modelling framework.

6.8 Any subsampling of soil sample for assessment will first be agreed with DCC, while any remaining samples should be kept until the completion of the project in case they prove to be useful in answering questions that may arise during the post-excavation process.

6.9 Should human remains be uncovered during any work on the site Durham County Council will be informed. The excavation and post-excavation treatment of these remains will consider the legal (Ministry of Justice; Mays 2017), moral (Mays 2017), and scientific (English Heritage 2013) issues which are outlined in agreed best practice documents.

7 Post excavation work, archive and report preparation

Finds

7.1 All finds processing, conservation work and storage of finds will be carried out in compliance with the CIFA Guidelines for Finds Work and those set by UKIC and set

out in - English Heritage (1995) “A strategy for the Care and Investigation of Finds”; Watkinson and Neal (2001) “First Aid for Finds”; UKIC (1983) “Packaging and Storage of Freshly Excavated Artefacts from Archaeological Sites”. All recovered artefacts will be stored in the appropriate materials and storage conditions to ensure minimal deterioration and loss of information (this should include controlled storage, correct packaging, regular monitoring of conditions, immediate selection for conservation of vulnerable material).

7. 2 The deposition and disposal of artefacts will be agreed with the legal owner and recipient museum prior to the work taking place. Where the landowner decides to retain artefacts adequate provision must be made for recording them. Details of land ownership will be provided by the developer.

7.3 All retained artefacts will be cleaned and packaged in accordance with the requirements of the recipient museum.

7.4 All finds and environmental samples will be processed and subsequently analysed by appropriate specialists as part of the post-excavation assessment. Specialist identification and analysis will include as a minimum and where appropriate:

- Pottery and ceramic building material (Rob Young; Alex Croom; Paul Bidwell; Andy Sage)
- Bone (Louisa Gidney)
- Flint (Rob Young)
- Metal work (David Dungworth)
- Industrial debris (David Dungworth)
- Environmental micro and macro fossils (Charlotte O’Brien ASDU)
- Residue analysis (ASDU)
- Radio carbon dating (ASDU/SUERRC)
- Any other analysis identified as necessary during the fieldwork or post excavation work

7.5 Site Archive

7.5.1 Archiving work will be carried out in compliance with the CIfA Guidelines for Archiving. Paragraph 141 of the National Planning policy Framework clarifies that Local Planning Authorities should make evidence gathered as part of archaeological mitigation exercises, including any archive, publically accessible. Copies of the primary report should be deposited with the Historic Environment Record and the archive deposited with an agreed local museum.

7.5.2 The final location for the site archive will be agreed when it is ready for deposition within **6 months** of completion of the post-excavation work and report.

7.5.3 Before the commencement of fieldwork, contact will be made with the landowners and with the recipient museum to make the relevant arrangements

7.5.4 The Durham County Council Team will require confirmation that the archive had been submitted in a satisfactory form to the relevant museum before recommending to the local planning authority that the condition should be fully discharged.

7.6 Report

7.6.1 A post-excavation archive report will be prepared to the following standards:

i) One bound paper copy of the report will be submitted:

- For deposition in the County HER to the Durham County Council Team

ii) Three digital copies (pdf/A of the report on CD) will be submitted:

- one copy to the commissioning client
- one for the planning authority (Durham County Council Archaeology Team) which must be formally submitted by the developer with the appropriate fee
- one for deposition in the County HER to theDurham county Council Team

iii) The report will have each page and paragraph numbered and illustrations cross referenced within the text. All drawn work should be to publication standard.

The report will include as a minimum the following:

- OASIS reference number and an 8 figure grid reference.
- An executive summary
- A location plan of the site at an appropriate scale of at least 1:10 000
- A location plan of the extent of the works within the site. This will be at a suitable scale, and located with reference to the national grid, to allow the results to be accurately plotted on the Sites and Monuments Record
- Plans and sections of archaeology located
- A site narrative – interpretative, structural and stratigraphic history of the site
- A table summarising the deposits, features, classes and numbers of artefacts encountered and spot dating of significant finds
- Photographs of the site, showing the location of groundworks in context and any archaeological features that are revealed.
- Contractor's details, including dates the work was carried out, the nature and extent of the work.
- Description of the site location and geology
- Artefact reports – full text, descriptions and illustrations of finds

- Laboratory reports and summaries of dating and environmental data, with collection methodology
- A consideration of the results of the field work within the wider research context (ref. NERRF)
- Recommendations for analysis of finds or environmental samples
- Copy of this Project Design
- Any variation to the above requirements will be approved by the planning authority prior to work being submitted
- Planning Application No.DM/17/01757/FPA

7.6.2 Durham County Council Archaeology Team will need to approve the report before discharging the condition on the planning permission.

8 Publication

8.1 Should a significant archaeological site be located a post-excavation assessment report will include all the information necessary to make decisions about the future direction of the project in line with Historic England's Guidelines on the Management of Research Projects in the Historic Environment (Historic England 2015). The report will be submitted to the Durham County Archaeologist for comment and approval prior to any further analysis or publication work commencing.

8.2 The publication article will be submitted within one year of the approval of the updated project design for full analysis and publication, unless previously agreed with all relevant parties. A summary will also be prepared for "Archaeology in Durham".

8.3 Durham County Council Archaeology Team will require confirmation that the publication report has been submitted in a satisfactory form to an appropriate journal before recommending to the local planning authority that the condition should be fully discharged.

9 OASIS

9.1 Durham County Council Archaeology Team supports the Online Access to Index of Archaeological Investigations (OASIS) Project. The overall aim of the OASIS project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large scale developer funded fieldwork.

9.2 The contractor will therefore complete the online OASIS form at http://ads.ahds.ac.uk/project/oasis/ and will contact Durham County Council Archaeology Team HER prior to completing the form. Once a report has become a public document by submission to or incorporation into the HER, Durham County Council Archaeology Team HER will validate the OASIS form thus placing the information into the public domain on the OASIS website.

10 Monitoring

10.1 Durham County Council Archaeology Team will be informed on the start date and timetable for the watching brief in advance of work commencing. Reasonable access to the site for the purposes of monitoring the archaeological scheme will be afforded to the Durham County Council Archaeology Team or his/her nominee at all times. Regular communication between the contractor, the Durham County Council Archaeology Team and other interested parties will be maintained to ensure the project aims and objectives are achieved.

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ASSESSMENT OF PREHISTORIC POTTERY AND FLINT FROM EXCAVATIONS AT SCORER'S LANE, GREAT LUMLEY, CO. DURHAM

Dr. Rob Young

Introduction

Pottery/fired clay and flint was recovered in the course of the 2017 excavations from Contexts (710) and (711) and in the sieving of soil samples from Contexts (703), (710) and (713). These finds are discussed in detail below.

Methodology

All sherds/fragments of pottery/fired clay and flint have been counted, weighed, and recorded and all recovered material was examined under a X10 magnifying hand lens, in natural light, in order to allow fabric type and other features to be identified and summarised.

Quantification and Finds by Context

In total, 21 sherds and crumbs of prehistoric pottery/fired clay, 4 pieces of flint, and one possible jet bead were submitted for analysis. (See **Table 1** below).

Context No.	Small Find No.	Description	Excavation/Sieving	Max. Dimensions (mm)	Weight (gms)
703	3	1 rim sherd, 15 frags. and crumbs of pottery (Vessel 1)	Sieving	20mm x 24mm x 11mm	5 gms
711	2	3 crumbs of pottery (? Vessel 2)	Sieving	-	Less than 1 gm
713	4	2 small ? pottery frags. (? Vessel 3)	Sieving	-	Less than 1gm
710	1	2 grey inner flint chips	Sieving	9mm x 4mm x 1mm; 7mm x 6mm x 1mm.	Less than 1gm
710	-	Orange/brown secondary flint flake	Excavation	34mm x 22mm x 7mm	6 gms
711	-	Burnt white inner flint flake	Excavation	22mm x 11mm x 3mm	Less than 1 gm
713	4	Fawn/grey translucent inner flint chip	Sieving	10mm x 3mm x 1mm	Less than 1 gm
713	4	Small circular perforated ?jet? disc bead	Sieving	Diam: c. 3mm Perf. Diam c. 1mm	Less than 1 gm.

Table 1: Quantification

Pottery Fabrics (See **Table 2** below).

Two basic fabric types were identified:

Fabric No.	Fabric Description	Vessel Numbers
1	Thick fabric with many small, crushed, angular, fragments (possibly of limestone and dolerite), with some small angular quartz inclusions.	1
2	Sandy fabric with frequent quartz sand particles and some small black grits with very small / dolerite fragments present.	2, 3

Table 2: Fabric Types

The clay matrix and observed inclusions would all have been available in the local drift geology.

Discussion (See Pls. 1-2).

Most of the recovered material is not chronologically diagnostic. The small fragment of rim sherd from Vessel 1 might, however, be of Neolithic date. Burnishing on the outer faces of vessels is common in this period and the rounded rim bevel might be indicative of a bowl form. The other ceramic finds are too small to allow any firm chronological conclusions to be arrived at.

The flint finds are equally undiagnostic. The chips are the bi-product of the knapping process and Cat. No. 5 suggests that pebble flint, probably derived from either local river gravel or beach gravel deposits was being exploited. None of the material would be out of place in a Bronze Age context.

The possible ? jet disc bead is a rare find and, again, would not be out of place in a Bronze Age context. In Scotland complete necklaces made with jet disc beads are know. These invariably feature beads that are between 5-10mm in diameter and graded in size. The associations of these necklaces have been discussed by Holden and Sheridan (2001) and where pottery is present it has been either of Late Beaker or Food Vessel type. The use of tiny disc beads certainly continues into the Early Bronze Age and would seem to have a currency of several centuries. Excellent examples come from Early Bronze Age contexts at Garton Slack in Yorkshire but they have been found in use as late as the 15th century BC at Amesbury Solstice Park in Wiltshire (Sheridan in Valentin *et al*. 2012).

CATALOGUE

POTTERY

1) VESSEL 1: Context (703), Small Find No. 3. Fabric Type 1. Medium Abrasion. From Sieving: I rim sherd (**Max. Dimensions**: 20mm x 24mmx 11mm; **Weight**: 5gms) and 15 fragments/crumbs of prehistoric pottery. The rim sherd is thick with a rounded rim bevel. Grey/brown external surface (possibly burnished), lighter fawn brown inner surface and core. The crumbs and smaller fragments exhibit similar features. This material may be from a bowl or jar form and, with the possible evidence for burnishing on the external face, it could be of broadly earlier Neolithic date. (Though a definitive chronological assignation is problematic due to the small size of the pieces).

2) VESSEL 2: Context (711), Small Find No. 2. **Fabric Type 2. Heavy Abrasion**. **From Sieving**: 3 small fragments of pottery ? from the body of a vessel (**Weight**: Less than 1gm).

3) VESSEL 3: Context (713), Small Find No. 4. Fabric Type 2. Heavy Abrasion. From Sieving: 2 small fragments of pottery ? from the body of a vessel (**Weight:** Less than 1 gm).

FLINT

4) Context (710), Small Find No. 1: From Sieving, Max Dimensions: 9mm x 4mm x 1mm ; 7mm x 6mm x 1mm. **Weight**: Less than 1 gm. Two, light grey, inner flint chips.

5) Context (710), No Small Find No. From Excavation. Max. Dimensions: 34mm x 22mm x 7mm. **Weight**: 6gms. Orange/brown secondary flake with thin, plain butt and pronounced bulb of percussion. Hinge fracture at distal end. Retains hard, smoothed, grey/fawn pebble cortex on dorsal face. Hinge fracture scars from previous removals visble on dorsal face. Large chip removed on dorsal face at distal end.

6) Context (711), No Small Find No. From Excavation. Max Dimensions: 22 mm x 11mm x 3mm. **Weight**: Less than 1 gm. Grey, crackled, spalled and burnt, inner, blade-like flake, thin, plain butt, diffuse bulb and bulbar scar. Shattered at distal end. Abraded on left edge.

7) Context (713), Small Find No. 4. From Sieving. Max. Dimensions: 10mm x 3mm x 1mm, **Weight**: Less than 1 gm. Fawn/grey, translucent, inner flint chip.

BEAD

8) Context 713, Small Find No. 4. From Sieving. Max. Dimensions: Diam. c. 3mm. **Perforation diam.** c. 1mm **Weight:** Less than 1 gm. A very small but beautifully made ? jet disc bead.

Pl. 1: FLINT: From left: Cat. 5, Cat. 4 (two chips), Cat. 6, and Cat. 7.

Pl. 2: POTTERY: Cat. 1 (Vessel 1)

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ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
AD Archaeology Ltd

Land at Scorer's Lane
Great Lumley
County Durham

palaeoenvironmental assessment

report 4699
March 2018

Durham University

Contents

South Road · Durham · DH1 3LE · tel 0191 334 1121 · fax 0191 334 1126
archaeological.services@durham.ac.uk · www.dur.ac.uk/archaeological.services

1. Summary

The project

1.1 This report presents the results of palaeoenvironmental assessment of five bulk samples taken during archaeological works at Great Lumley, County Durham.

1.2 The works were commissioned by AD Archaeology Ltd, and conducted by Archaeological Services Durham University.

Results

1.3 Charred plant macrofossil remains recovered from a cluster of pits at Great Lumley are consistent with palaeoenvironmental evidence found at similar sites elsewhere. Four of the features contain material indicative of clamp kilns or earth ovens. Traces of cereal grains noted within two of the deposits imply domestic activity, although the features may have more than one function. Pit clusters of this nature are usually associated with earlier prehistoric activity. Finds comprising a few sherds of coarse-grained pottery, small fragments of flint and a tiny black ring-shaped bead (possibly jet) are consistent with a Neolithic or Bronze Age origin.

Recommendations

1.4 Further discussion of the palaeoenvironmental remains could be undertaken in conjunction with radiocarbon dating evidence and included in any publication of the site. Full identification of the charcoal and charred plant macrofossil assemblages could be considered for any future synthesis, if an earlier prehistoric origin is confirmed by scientific dating, as sites comprising Neolithic and Bronze Age activity are considered a priority for further palaeobotanical investigations (Huntley 2010; Hall & Huntley 2007). This would help to understand the nature and chronology of sites characterised by pit clusters, and offers the opportunity to address key research objectives outlined in the regional archaeological research framework, including agenda item NBii: Settlement chronology (Petts & Gerrard 2006).

1.5 Any unassessed bulk samples could also be examined for additional relevant data. If further excavation is planned, the strategy could include adequate provision for the recovery of more palaeoenvironmental evidence. The results of this assessment should be incorporated with any further palaeoenvironmental data produced.

1.6 The flots should be retained as part of the physical archive of the site. The residues have been kept for possible future examination concerning the function of the features.

2. Project background

Location and background

2.1 Archaeological works were conducted on land at Scorer's Lane, Great Lumley, County Durham by AD Archaeology Ltd. This report presents the results of palaeoenvironmental assessment of five bulk samples, taken from a cluster of pits with areas of intense burning, located next to a former stream. A small quantity of flint recovered from the site may indicate the features date to the earlier prehistoric.

Objective

2.2 The objective of the scheme of works was to assess the palaeoenvironmental potential of the samples, establish the presence of suitable radiocarbon dating material, and provide the client with appropriate recommendations.

Dates

2.3 Samples were received by Archaeological Services on 5th February 2018. Assessment and report preparation was conducted between 16th February and 9th March 2018.

Personnel

2.4 Assessment and report preparation was conducted by Lorne Elliott. Sample processing was by Lisa Snape-Kennedy and Jeff Lowrey.

Archive

2.5 The site code is **GLS17**. The flots, residues and finds are currently held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University awaiting collection. The charred plant remains will be retained at Archaeological Services Durham University.

3. Methods

3.1 The bulk samples were manually floated and sieved through a 500μm mesh. The residues were examined for shells, fruitstones, nutshells, charcoal, small bones, pottery, flint, glass and industrial residues, and were scanned using a magnet for ferrous fragments. The flots were examined at up to x60 magnification for charred and waterlogged botanical remains using a Leica MZ7.5 stereomicroscope. Identification of these was undertaken by comparison with modern reference material held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University. Plant nomenclature follows Stace (2010). Habitat classifications follow Preston *et al.* (2002).

3.2 Selected charcoal fragments were identified, in order to provide material suitable for radiocarbon dating. The transverse, radial and tangential sections were examined at up to x600 magnification using a Leica DMLM microscope. Identifications were assisted by the descriptions of Schweingruber (1990) and Hather (2000), and modern reference material held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University.

3.3 The works were undertaken in accordance with the palaeoenvironmental research aims and objectives outlined in the regional archaeological research framework and resource agendas (Petts & Gerrard 2006; Hall & Huntley 2007; Huntley 2010).

4. Results

4.1 Palaeoenvironmental evidence recovered from the bulk samples is often consistent. The predominant material is 'slivers' of coal shale or possibly cannel coal, which has a black dull 'earthy' lustre and a fissile shaly nature. Fragments of this material also comprise a vitreous sheen and evidence of fracturing, which is most obvious in deposit [703]. Small ferruginous (iron-rich) stones are also a common feature of some of the deposits. Again, evidence of cracking is noted in fragments from [703].

4.2 Fragmented charcoal remains (often <4mm) containing mineral inclusions occur in four of the deposits, ranging from rare [703] or occasional [710], [717] to common [711], [713]. Identified fragments indicate the remains of oak, hazel and alder are present in [710], [711] and [713]. Deposit [717] contains oak, hazel and blackthorn, and fill [703] contains oak, hazel and Maloideae (representing hawthorn or apple).

4.3 Charred plant macrofossils occur in relatively low numbers and largely comprise small (mainly <5mm) indeterminate grass-type rhizomes and monocot stems, which are present in all of the samples except fill [703]. Evidence for the use of cultivated cereal crops includes a barley grain from [713] and a wheat grain from [711]. The wheat grain has almost parallel sides, is symmetrically rounded in section and has slightly flattened ventral and dorsal surfaces. The poor condition of the grains (pitted/degraded) prevents further identification and diagnostic chaff is absent. Additional charred plant remains include a buttercup achene in [711] and a small number of soil fungus sclerotia (resting bodies) of *Cenococcum geophilum* in [713].

4.4 Finds comprise a few sherds of pottery from [703] and [713], small fragments of flint from [710] and [713], and a tiny black ring-shaped bead (possibly jet) from [713].

4.5 Material suitable for radiocarbon dating is available for all of the samples. The results are presented in Appendix 1.

5. Discussion

5.1 Charred plant debris comprising grass-type root and stem fragments occurs in a wide variety of sites, but is often a particular feature of prehistoric pit deposits. Material of this nature has been interpreted as evidence of burnt turves, as have the charred remains of the soil fungus *Cenococcum* and buttercup achenes (Hall 2003). The good preservation of these remains suggests superficial charring rather than being directly exposed to flames. Such material may represent the use of turves in the construction of clamp kilns or earth ovens, where parts could be converted to carbon without complete combustion (ibid.). Four of the five samples from the site at Great Lumley contain this type of evidence, suggesting the features involve a similar activity. It is uncertain whether the burning of coal shale and the fracturing of ferruginous stones is accidental or deliberate. Context [703] contains evidence of intense burning, although the quantity of charcoal recovered from this deposit is negligible. Traces of cereal grains noted within two of the deposits imply domestic activity, although the features may have an alternative purpose, such as mineral pigment extraction.

5.2 Dating evidence from pit clusters in North Wales and North East England indicates these sites occur during the early Neolithic through to the middle Bronze Age. Analysis suggests they are often ephemeral features and have a range of functions

including processing and rubbish pits, earth ovens with tethered hearths, and clamp kilns (Kenney 2009; Grant & Jones 2011; Grant 2015; Archaeological Services 2018). They are usually found next to streams or water bodes such as kettle holes, probably due to the fact that their function often requires natural resources (water and stones) associated with hot rock technology. Earlier prehistoric pit groups have been recorded in the Milfield Basin (Petts & Gerrard 2006). Recent discoveries indicate they may be more widespread than previously thought.

6. Recommendations

6.1 Further discussion of the palaeoenvironmental remains could be undertaken in conjunction with radiocarbon dating evidence and included in any publication of the site. Full identification of the charcoal and charred plant macrofossil assemblages could be considered for any future synthesis, if an earlier prehistoric origin is confirmed by scientific dating, as sites comprising Neolithic and Bronze Age activity are considered a priority for further palaeobotanical investigations (Huntley 2010; Hall & Huntley 2007). This would help to understand the nature and chronology of sites characterised by pit clusters, and offers the opportunity to address key research objectives outlined in the regional archaeological research framework, including agenda item NBii: Settlement chronology (Petts & Gerrard 2006).

6.2 Any unassessed bulk samples could also be examined for additional relevant data. If further excavation is planned, the strategy could include adequate provision for the recovery of more palaeoenvironmental evidence. The results of this assessment should be incorporated with any further palaeoenvironmental data produced.

6.3 The flots should be retained as part of the physical archive of the site. The residues have been kept for possible future examination concerning the function of the features.

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Appendix 1: Data from palaeoenvironmental assessment

Sample		**1**	**2**	**3**	**4**	**6**
Context		**710**	**711**	**703**	**713**	**717**
Feature number		**707**	**712**	**705**	**714**	**718**
Feature		**pit**	**pit**	**pit**	**pit**	**pit**
Material available for radiocarbon dating		✓	✓	✓	✓	✓
Volume processed (l)		20	16	25	18	10
Volume of flot (ml)		300	150	250	250	200
Residue contents						
Bead (black)	Jet?	-	-	-	1	-
Charcoal		++	+++	+	+++	-
Cinder		+	+	++	++	+
Coal / coal shale	cannel?	+++	++++	+++	+++	+++
Ferruginous stone fragments	magnetic	+++	-	+++	+++	-
Fired clay		-	-	+	-	++
Flint (number of fragments)	tiny	2	-	-	1	-
Pot (number of fragments)		-	-	5	2	-
Flot matrix						
Charcoal		++	++	+	++	++
Cinder		+	-	+	+	+
Coal / coal shale	cannel?	+++	+++	+++	++	+++
Monocot stems (charred)		+	-	-	-	-
Rhizomes / tubers (charred)		++	++	-	++	+
Roots (modern)		-	++	++	+++	++
Uncharred seeds		-	(+)	(+)	(+)	-
Charred remains (total count)						
(c) *Hordeum* sp (Barley species)	grain	-	-	-	1	-
(c) *Triticum* sp (Wheat species)	grain	1	-	-	-	-
(x) *Cenococcum geophilum* (Soil fungus)	sclerotia	-	-	-	2	-
(x) Ranunculaceae undiff. (Buttercup family)	small achene	-	1	-	-	-
Identified charcoal (✓presence)						
Alnus glutinosa (Alder)		✓	✓	-	✓	-
Corylus avellana (Hazel)		✓	✓	✓	✓	✓
Maloideae (Hawthorn, apple, whitebeams)		-	-	✓	-	-
Prunus spinosa (Blackthorn)		-	-	-	-	✓
Quercus sp (Oaks)		✓	✓	✓	✓	✓

[c-cultivated; x-wide niche. (+): trace; +: rare; ++: occasional; +++: common; ++++: abundant]

ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
AD Archaeology Ltd

Land at Scorer's Lane
Great Lumley
County Durham

palaeoenvironmental analysis

report 4895
November 2018

Durham University

Contents

South Road · Durham · DH1 3LE · tel 0191 334 1121 · fax 0191 334 1126
archaeological.services@durham.ac.uk · www.dur.ac.uk/archaeological.services

1. Summary

The project

1.1 This report presents the results of palaeoenvironmental analysis of five bulk samples taken during archaeological works at Great Lumley, County Durham.

1.2 The works were commissioned by AD Archaeology Ltd, and conducted by Archaeological Services Durham University.

Results

1.3 Examination of bulk samples taken from the cluster of pit features at Great Lumley provides evidence that these enigmatic sites are short-lived and probably involve a range of activities. Palaeoenvironmental evidence shows signs of a relatively open environment, with changes in the tree species exploited over the various phases of activity, and the use of easily collectable wood. The use of turves is noted in the Bronze Age features. Apart from small-scale use of cereals and wild-gathered foods, conclusions about economy and diet are limited.

2. Project background

Location and background

2.1 Archaeological excavation of a cluster of pit features was conducted by AD Archaeology Ltd, on land at Scorer's Lane, Great Lumley, County Durham. Palaeoenvironmental assessment of five bulk samples indicated prehistoric activity at the site (Archaeological Services 2018a). Radiocarbon dating confirmed prehistoric activity representing the early Neolithic, the middle Bronze Age and the late Bronze Age-early Iron Age transition. This report presents the results of charcoal and charred plant macrofossil analyses.

Objective

2.2 The works offer the opportunity to address key research objectives outlined in the relevant archaeobotanical resource agendas (Hall & Huntley 2007; Huntley 2010), and the regional archaeological research framework (Petts & Gerrard 2006). In this instance, the works address the agenda item relating to earlier prehistoric pit groups NBii: Settlement chronology (ibid.). The aim of the scheme of works is to analyse the plant macrofossil and charcoal assemblages in order to help characterise the function of the site and provide information concerning economic changes, fuel resources, and the palaeoenvironment during the various phases of activity.

Dates

2.3 The samples were received by Archaeological Services on 5th February 2018. Analysis and report preparation was conducted between October and November 2018.

Personnel

2.4 Analysis and report preparation was conducted by Lorne Elliott.

Archive

2.5 The site code is **GLS17**. The finds have been returned to AD Archaeology. The flots and are currently held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University. The charred plant remains will be retained at Archaeological Services Durham University.

3. Methods

3.1 The bulk samples were manually floated and sieved through a 500μm mesh. The residues were examined for shells, fruitstones, nutshells, charcoal, small bones, pottery, flint, glass and industrial residues, and were scanned using a magnet for ferrous fragments. The flots were examined at up to x60 magnification for charred and waterlogged botanical remains using a Leica MZ7.5 stereomicroscope. Identification of these was undertaken by comparison with modern reference material held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University. Plant nomenclature follows Stace (2010). Habitat classifications follow Preston *et al.* (2002).

3.2 Charcoal analysis was concentrated on the >4mm fraction of dry-sieved material. Fragments from the 2mm sieve fraction were examined in order to trace small-sized taxa such as shrubs or twiggy material (Asouti & Austin 2005; Asouti & Hather 2001). Twigs are defined as <10mm in diameter including pith and bark (Huntley 2010). Due

to the relatively small quantities of charcoal recovered from each sample, all of the available fragments per context were examined. Analysis was undertaken following Marguerie & Hunot (2007), which in addition to species identification, involved recording tree ring curvature, the number of tree rings, the diameter of roundwood, and the presence of reaction wood, tyloses, pith, bark, insect degradation and alteration by vitrification and radial cracks.

3.3 For species identification, the transverse, radial and tangential sections were examined at up to x500 magnification using a Leica DMLM microscope. Identifications were assisted by the descriptions of Gale & Cutler (2000), Hather (2000) and Schweingruber (1990), and modern reference material held in the Palaeoenvironmental Laboratory at Archaeological Services Durham University. Weights and fragment counts were obtained for each species.

3.4 Where comparable anatomical properties and poor preservation prevent secure identification, charcoal remains were recorded to genus level or assigned to family groups. Cherries include blackthorn, wild plum, bird and wild cherry. Willow and poplar are grouped as Salicaceae (willow family), and the subfamily Maloideae represents apple and hawthorn.

4. Results

4.1 The upper fill [703] of curvilinear pit [705], the largest feature of the pit cluster, was sampled for palaeoenvironmental evidence. Twenty five litres of soil was processed, producing a moderate-sized flot (250ml) and a sample residue, both predominantly comprising slivers of coal shale, with small quantities of fragmented (mainly <4mm) charcoal, cinder and coal. The residue also contained magnetic iron-rich nodules and ferruginous stones, a few small fragments or crumbs of prehistoric pottery, and traces of semi-vitrified fuel waste. The coal shale is possibly carbonaceous shale or cannel coal, and is distinguished from coal by having a dull black 'earthy' lustre and a fissile shaly nature as opposed to the vitreous appearance and solid 'block' structure of coal. Fragments of coal shale and iron-rich material are <25mm, and more often <10mm. Evidence of cracking due to exposure to high temperatures is noted in both the coal shale and the iron-rich stones. Analysis of the small quantity of charcoal (<0.5g) indicates fragments are often <4mm and primarily comprise oak sapwood and hazel branchwood, with both species having evidence of rapid and restricted ring growth. Traces of alder and Maloideae charcoal are also present. Charred plant macrofossil remains and food waste are absent. A fragment of hazel branchwood charcoal provided a radiocarbon date of 3700 to 3530calBC.

4.2 Bulk samples of 20, 16 and 18 litres were taken from the fills [710], [711] and [713] of pits [707], [712] and [714] respectively. Soil processing produced moderate-sized flots (150-300ml) and residues of similar composition. As with pit [705], fragments of coal shale are common to abundant. Fragment size is <25mm, though often <10mm, and frequent cracking, presumably due to burning, is noted for many fragments. Some fragments also have a vitreous sheen possibly due to the same process that formed the cracking. Similarly, the samples contain iron-rich nodules and several types of ferruginous stones, including traces of iron pyrite (having a metallic lustre and brass yellow hue). Fragments of this magnetic material are generally <10mm. A few of the fragments from pit [714] appear to have impact marks. Traces of vesicular cinder and coal are noted.

4.3 Where these three deposits differ from the fill [703] of pit [705] is the greater quantity of charcoal present (approximately 3-8g), although these are still relatively small amounts. Additionally, the tree species noted in the charcoal assemblages differ from [703], especially with regard to the greater prevalence of alder. Slivers of oak sapwood dominate the charcoal remains, with alder stemwood and branchwood generally making up a third of the assemblages and small calibre hazel branchwood forming roughly a quarter of the total charcoal. Also in contrast to [703], deposits [710] and [713] contain evidence of domestic waste.

4.4 Charred plant macrofossils occur in low numbers, with poorly preserved barley and wheat grains making up the majority of the assemblages for pits [710] and [713]. Further identification of the cereal crops is not possible due to pitting and erosion, and diagnostic chaff is absent. Two barley grains from fill [713] have a twisted form characteristic of 6-row barley, but the poor condition prevents certain identification. A tiny hazel nutshell (<2mm) is present in fill [710].

4.5 Fills [710], [711] and [713] also contain low numbers of charred seeds from plants usually associated with damp heathy grassland. These small seeds (<2mm) represent heath-grass, common knapweed, pale persicaria, buttercup, knotgrass, grasses and vetches. Charred grass-type rhizomes and monocot stems add further evidence of an open grassland environment. Fragments of pot and flint, and two small jet disc beads (<4mm) are indicative of Bronze Age contexts. Radiocarbon dating evidence, provided by hazel and alder charcoal, suggests pits [707], [712] and [714] date to the middle Bronze Age, ranging from 1640 to 1420calBC.

4.6 A ten-litre bulk sample from pit fill [718] produced a moderate-sized flot (200ml), again dominated by fragments of coal shale, with only traces of cinder and coal. Unlike other deposits from the site, artefactual evidence and iron-rich material are absent from [718], and so too is any evidence of domestic waste. Sparse charred plant macrofossils comprise traces of heather twigs and herbaceous-type rhizomes. The small quantity of charcoal from [718] (<30 fragments) is predominantly of oak and hazel, and a few fragments of cherries. The sample from fill [718] is the only one from the site, where the charcoal assemblage has no evidence of alder. Radiocarbon dating of oak sapwood charcoal produced a date of 800-540calBC.

4.7 Analysis results are presented in Appendices 1-2. A summary of radiocarbon dating is provided in Appendix 3.

5. Discussion

5.1 Radiocarbon dating indicates an early Neolithic origin for pit [705], which is consistent with evidence suggested by the pottery remains. Although the origin of pit [705] can be determined, the function of the feature is less certain. The absence of charred plant macrofossils and lack of food waste hinder characterisation of the feature. Analysis of the bulk sample from fill [703] provides evidence of high temperature. This includes fire-cracked fragments of iron-rich nodules and coal shale, and traces of semi-vitrified fuel waste. In addition, the charcoal remains show the deliberate selection of oak and hazel, which are two of the more efficient fuelwoods for producing high temperatures (The Scout Association 1999). However, this evidence seems to be incongruous with the small amount of charcoal recovered from the feature. Additional charcoal remains may have been present in the primary

fill [704], however, the recording of coal in fill [704] during excavation and the concentration of shaly coal recovered from fill [703], indicates the natural outcrop of coal at the site may have been used, either to enhance temperatures or provide a longer-lasting source of heat.

5.2 The sparsity of palaeoenvironmental and archaeological evidence suggests [705] was a short-lived feature. This is consistent with previous studies that indicate pit groups have an ephemeral nature. They can have a range of functions such as midden (rubbish) pits, processing pits (hazelnuts and apples), earth ovens or steaming pits with tethered hearths, and clamp kilns used to manufacture a single pottery vessel (Grant & Jones 2008; 2011; Grant 2015; Kenney 2009; Archaeological Services 2016; 2018bc). The abundance of coal shale and lack of domestic waste, apart from a few fragments of pottery, is unusual for an early Neolithic feature, and the sparsity of charcoal is uncommon for isolated features such as burnt mounds, which generally contain litres of charcoal. The fractured remains of iron-rich material are probably the result of accidental burning, although it is possible these small fragments are the remains of roasting and grinding of mineral outcrops for pigment extraction (Newman 2016). However, flint scatters that might be expected at such sites are absent from [705].

5.3 Radiocarbon dating evidence from features [707], [712] and [714] suggests they are broadly contemporary, providing Middle Bronze Age dates of 1640-1420calBC. The dates are consistent with artefactual evidence from pits [707] and [714], and the palaeoenvironmental remains provide further support for a similar origin. Evidence from the fuel remains show the pit deposits have distinctive charcoal assemblages. Total charcoal quantities are comparable, the same tree species occur, and the total proportions recorded for each taxa are remarkably alike. These characteristics not only indicate a similar origin, but also probably reflect a particular function.

5.4 Oak and alder charcoal predominantly makeup the fuel remains of the Bronze Age pits. This is noteworthy considering oak is an efficient firewood that burns slowly with lasting heat, whilst alder burns quickly giving off little heat as firewood, but makes an excellent steady burning charcoal (Boulton & Jay 1946). However, adding of a few faster burning alder logs will liven up an oak fire, possibly explaining the preferential selection of these two species in pits [707], [712] and [714].

5.5 The number of charcoal fragments showing evidence of radial cracking and vitrification is notable. Oak charcoal fragments from all three pits comprise unusually high levels of vitrification, including strong brilliance, providing further evidence of high temperatures. The ‘glassy’ nature of the charcoal and the vitreous sheen noted on fractured fragments of coal shale, may partly be due to rapid cooling, possibly by pouring water on to the fire. The former stream crossing the site may have determined the location of the pit cluster.

5.6 In contrast to feature [705], the deposits dated to the Bronze Age contain evidence of domestic activity. Charred plant remains from pits [707] and [714] are similar in both quantity and character. These comprise a small number of poorly preserved wheat and barley grains. The poor condition of the grains is typical of hearth waste, reflecting intense heat and rapid combustion (Boardman & Jones 1990) or prolonged exposure to fire, amongst the cinders. Their low numbers are probably an indication that occupation of the site was short-lived. A charred fragment of hazel nutshell in

fill [710] indicates wild-gathered foods were utilised. The small jet beads recovered from pit [714] would be easily lost amongst the black deposits of coal.

5.7 Another characteristic of the Bronze Age contexts is the presence of charred plant debris. This material comprises small grass-type root and stem fragments, and seeds from plants normally found on damp heathy grassland. Several of the plants such as buttercup, pale persicaria and common knapweed, especially occur on the open margins of streams (Preston *et al.* 2002). Charred material of this nature frequently occurs on prehistoric sites in northern England and is thought to be evidence of burnt turves (Hall 2003). Such evidence is consistent with the use of grass sods in the construction of clamp kilns, steaming pits or earth ovens. Turves not directly exposed to flames are likely to be converted to carbon without complete combustion (ibid.), leading to the prospect of charred plant remains surviving in relatively good condition, similar to the good preservation of the weed plant remains noted in deposits [710], [711] and [713].

5.8 Charcoal assemblages from the Bronze Age deposits provide further signs of plants found besides streams and rivers. Alder is common in [710], [711] and [713], and fragments of Salicaceae (probably willow) are present in context [713]. These trees and shrubs favour damp or wet ground. Most of the charcoal seems to reflect the collection of smaller stems and branches. A few of the alder fragments from pit [707] and [714] show signs of insect tunnels, indicating the use of easily collectable decaying wood. Wide growth rings recorded in most of the alder charcoal from pits [707], [712] and [714] represent the typically fast growth of this moisture- and light-demanding species (Claessens *et al*. 2010), probably reflecting an open environment.

5.9 The relatively low quantities of charcoal may indicate a shortage of woodland resources locally, although the specific function of the features probably determines the choice of fuel. Turf-covered earth ovens and steaming pits used for baking often have low quantities of fuel remains. Usually, stones are used to capture the heat generated by fast burning fuel, which would otherwise dissipate into the air before many foods could be cooked over flames (Thoms 2008; 2009). These features are potentially fuel sparing due to the heat retention of the turves.

5.10 Of the five pits analysed for palaeoenvironmental evidence, pit [717] is the most enigmatic, as the scarcity of charred plant macrofossils, low quantity of charcoal and absence of domestic waste provide little indication of the function of the feature. The small charcoal assemblage is similar to pit [705], predominantly comprising oak and hazel, although evidence of blackthorn is present in [717]. Although evidence is limited for this later phase of activity, indication of change in the local landscape may be evident, as pit [717] is the only feature that contains traces of heather twigs and the only feature where alder is absent from the charcoal assemblage. As with other features from the site, coal shale is abundant in [717], whereas iron-rich stones and nodules are absent.

5.11 The close grouping of the pits at Great Lumley suggests the site had a significant draw, considering the chronological range spans more than 2000 years. The only distinct connection between these features seems to be the proximity of a former stream and the abundance of shaly coal within the deposits. This implies natural resources at the site are likely to have determined their location. Plausibly, mineral outcrops and even the pits themselves were visible in the landscape for a lengthy

period. Evidence representing a heathy grassland or scrub is recorded in the plant macrofossil record of four of the pits, and wide growth rings noted in much of the charcoal (especially the alder remains from the Bronze Age activity) is likely to reflect a relatively open environment.

5.12 Examination of bulk samples taken from the cluster of pit features at Great Lumley provides further evidence that these enigmatic sites are short-lived and probably involve a range of activities. Palaeoenvironmental evidence shows signs of a largely open environment, with changes in the tree species exploited over the various phases of activity, and the use of easily collectable wood. The use of turves is noted in the Bronze Age features. Apart from small-scale use of cereals and wild-gathered foods, conclusions about economy and diet are limited. Evidence from further sites is required in order to understand fully the chronology, function and distribution of pit groups.

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Appendix 1: Data from palaeoenvironmental analysis

Sample		**1**	**2**	**3**	**4**	**6**
Context		**710**	**711**	**703**	**713**	**717**
Feature number		**707**	**712**	**705**	**714**	**718**
Feature		**Pit**	**Pit**	**Pit**	**Pit**	**Pit**
Material available for radiocarbon dating		✓	✓	✓	✓	✓
Volume processed (l)		20	16	25	18	10
Volume of flot (ml)		300	150	250	250	200
Residue contents						
Bead	jet	-	-	-	2	-
Charcoal		++	+++	+	+++	-
Cinder / clinker	vesicular	+	+	++	++	+
Coal		+	+	+	+	+
Coal shale	(cannel coal?)	+++	++++	+++	+++	+++
Ferruginous stones / iron-rich nodules	magnetic	+++	++	+++	++	-
Fired clay		-	-	+	-	+
Flint (number of fragments)		2	-	-	1	-
Iron pyrite		-	(+)	-	-	-
Pot (number of fragments)		-	3	5	2	-
Flot matrix						
Charcoal		++	++	+	++	++
Cinder / clinker	vesicular	+	+	+	+	+
Coal		+	+	+	+	+
Coal shale	(cannel coal?)	+++	+++	+++	++	+++
Heather twigs (charred)		-	-	-	-	(+)
Insect / beetle		(+)	-	-	(+)	-
Monocot stems (charred)	grass-type (<2mm)	+	++	-	++	-
Rhizomes (charred)	grass-type (<2mm)	++	++	-	++	-
Rhizomes / tubers (charred)	herbaceous-type (>2mm)	+	+	-	-	+
Roots (modern)		+	++	++	+++	-
Semi-vitrified fuel waste		-	-	+	-	-
Uncharred seeds		-	(+)	(+)	(+)	-
Charred remains (total count)						
(c) *Hordeum* sp (Barley species)	grain	7	-	-	7	-
(c) cf. *Hordeum vulgare* (cf. 6-row Barley)	twisted grain	-	-	-	2	-
(c) *Triticum* sp (Wheat species)	grain	2	-	-	-	-
(g) cf. *Centaurea nigra* (cf. Common Knapweed)	achene	-	1	-	-	-
(h) *Danthonia decumbens* (Heath-grass)	caryopsis	-	3	-	-	-
(r) *Polygonum aviculare* (Knotgrass)	nutlet	-	-	-	1	-
(t) *Corylus avellana* (Hazel)	nutshell frag.	1	-	-	-	-
(w) *Persicaria lapathifolia* (Pale Persicaria)	nutlet	-	-	-	2	-
(x) Poaceae undiff. (Grass family)	>1mm caryopsis	-	-	-	1	-
(x) *Ranunculus* subgenus *Ranunculus* (Buttercup)	achene	-	1	-	-	-
(x) *Vicia* sp (Vetches)	>1mm seed	1	1	-	1	-
Identified charcoal (✓presence)						
Alnus glutinosa (Alder)		✓	✓	✓	✓	-
Calluna vulgaris (Heather)		-	-	-	-	✓
Corylus avellana (Hazel)		✓	✓	✓	✓	✓
Maloideae (Hawthorn, apple, whitebeams)		✓	-	✓	✓	-
Prunus sp (Cherries-blackthorn, wild and bird cherry)		✓	✓	-	✓	✓
Quercus sp (Oaks)		✓	✓	✓	✓	✓
Salicaceae (Willow, poplar)		-	-	-	✓	-
Indet.		✓	✓	-	-	-

[c-cultivated; g-grassland; h-heathland; r-ruderal; t-tree/shrub; w-wet/damp ground; x-wide niche.
(+): trace; +: rare; ++: occasional; +++: common; ++++: abundant]

Appendix 2: Detailed results from charcoal analysis

Period	**Mid-Bronze Age**	**Mid-Bronze Age**	**Early Neolithic**	**Mid-Bronze Age**	**Early Iron Age**
Sample No.	**1**	**2**	**3**	**4**	**6**
Context	**710**	**711**	**703**	**713**	**717**
Feature number	**707**	**712**	**705**	**714**	**718**
Feature	**Pit**	**Pit**	**Pit**	**Pit**	**Pit**
Charcoal (g/number of fragments)					
Alnus glutinosa (Alder)	0.813 (28F)	0.865 (21F)	0.034 (2F)	2.834 (53F)	-
Calluna vulgaris (Heather)	-	-	-	-	0.002 (1F)
Corylus avellana (Hazel)	0.522 (14F)	0.608 (14F)	0.068 (5F)	0.930 (24F)	0.076 (6F)
Maloideae (Apple or Hawthorn)	0.047 (2F)	-	0.029 (1F)	0.022 (1F)	-
Prunus sp (Cherries)	0.128 (7F)	0.061 (2F)	-	0.108 (2F)	0.038 (3F)
Quercus sp (Oak)	1.418 (73F)	2.777 (100F)	0.131 (12F)	3.400 (95F)	0.426 (19F)
Salicaceae (Willow or Poplar)	-	-	-	0.052 (5F)	-
Bark	0.012 (1F)	0.113 (3F)	-	0.044 (1F)	-
Indet. >4mm	0.042 (1F)	0.103 (2F)	-	-	-
% of fragments > 4mm analysed	100	100	100	100	100
Charcoal >4mm analysed (g)	2.982	4.527	0.262	7.390	0.542
Charcoal >4mm not analysed (g)	-	-	-	-	-
Number of fragments >4mm analysed	126	142	20	181	29
Charcoal <4mm (g)	*	*	*	*	*
Total charcoal	2.982	4.527	0.262	7.390	0.542

[F = number of charcoal fragments; * No weight was obtained for the <4mm charcoal]

Appendix 3: Summary of radiocarbon dating

Context	Sample	Laboratory code	Material	Weight	$\delta^{13}C$ ‰	Radiocarbon Age BP	Calibrated date 95.4% probability
710	1	SUERC-79995 GU47754	Alder charcoal (3 wide growth rings) small calibre roundwood good condition, with pith	178mg	-26.4	3285 ± 26	1621 (95.4%) 1505calBC
711	2	SUERC-79996 GU47755	Hazel charcoal (6 variable growth rings small calibre branchwood good condition	71mg	-26.4	3299 ± 26	1633 (95.4%) 1507calBC
703	3	SUERC-79997 GU47756	Hazel charcoal (1 wide growth ring) rapid growth, longshoot good condition	31mg	-29.4	4849 ± 26	3699 (84.0%) 3631calBC 3561 (11.4%) 3537calBC
713	4	SUERC-79998 GU47757	Alder charcoal (3 wide growth rings) moderate ring curvature good condition	76mg	-27.0	3218 ± 29	1601 (2.8%) 1585calBC 1535 (92.6%) 1424calBC
717	6	SUERC-79999 GU47758	Oak sapwood charcoal (5 fairly wide growth rings) moderate ring curvature few tyloses, good condition	262mg	-24.9	2517 ± 26	792 (28.0%) 731calBC 691 (15.2%) 659calBC 651 (52.2%) 543calBC

[The calibrated age ranges are determined using OxCal4.2.4 (Bronk Ramsey 2009); IntCal13 curve (Reimer *et al.* 2013)]

Suzi Richer
Easthwaite Farm Cottage
Nether Wasdale
Cumbria
CA20 1ET

Tel: +44 (0)7983 484839
Tel: +44 (0)1946 726642
Email:

www.suzaricher.com
suzaricher@gmail.com

Radiocarbon dating report for Land at Scorer's Lane, Great Lumley, County Durham

Suzi Richer

Report number: 18/13

18th July 2018

Version: 1

Contents

Introduction

A total of 5 radiocarbon determinations from excavations at land at Scorer's Lane, Great Lumley, County Durham, form the basis of this report. Samples for radiocarbon dating were identified during the palaeoenvironmental assessment (Archaeological Services 2018) and were submitted for radiocarbon dating from a variety of pits (718, 714, 707, 705 and 712) across the site. Samples were from charcoal obtained from short-lived tree species, or from trees where the curvature was described as weak or moderate, for example oak from pit 718 (C O'Brien pers comm); this was to avoid dating samples from potentially long-lived trees.

Samples were dated at the Scottish Universities Environmental Research Centre (SUERC-) by AMS. These were processed and dated using the methods described in Dunbar et al (2016). The results (Table 1) are conventional radiocarbon ages (Stuiver and Polach 1977), and quoted in accordance with the international standard known as the Trondheim convention.

Radiocarbon calibration

The calibrations of these results, which relate the radiocarbon measurements directly to the calendrical time scale, are given in Table 1. All have been calculated using the datasets published by Reimer *et al* (2013) and the computer program OxCal v4.3 (Bronk Ramsey 1995; 1998; 2001; 2009). The calibrated date ranges cited are quoted in the form recommended by Mook (1986), with the end points rounded outward to 10 years. The ranges for calibrated dates in Table 1 have been calculated according to the maximum intercept method (Stuiver and Reimer 1986) and are cited at two sigma (95% confidence).

Bayesian modelling

The radiocarbon results are presented here in Bayesian chronological models (Tables 1, 2 and 3; Figure 1) (Buck *et al* 1996). Calibration of radiocarbon dates provides us with an accurate estimate of the age of the dated sample, whilst this is useful, archaeological questions are often more searching than this, and it is the event that the sample represents that we are usually more interested in. These events include when a site came into use, the duration of its usage and the likelihood of contemporaneity. Using the radiocarbon measurements in conjunction with archaeological information we can provide realistic estimates, called *posterior density estimates*, for such archaeological events. All posterior density estimates derived from the Bayesian modelling in this report are reported in *italics*. It should be emphasised that the posterior density estimates produced by this modelling are not absolute. They are interpretative estimates, which can and will change as further data become available and as other researchers choose to model the existing data

from different perspectives. The modelling technique used is a form of Markov Chain Monte Carlo sampling and has been applied using the program OxCal v4.3 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available in Bronk Ramsey (1995; 1998; 2001; 2009) or from the online manual.

Results and discussion

- A total of 5 radiocarbon determinations have been obtained, three from the Bronze Age, one from the Neolithic and one from the Iron Age. The Iron Age determination (SUERC-79999) has been excluded from the model because there is the possibility that this sample is from an intrusive feature due to the fact it is very different in character to the other pits (pers. comm. J. McKelvey). The Neolithic determination (SUERC-79997) has also been excluded based on the fact that this is likely to be from reworked material (pers. comm. J. McKelvey), therefore the discussion below relates soley to the three Bronze Age measurements (SUERC-79995, SUERC-79996 and SUERC-79998). These measurements are from sealed pit fills that are thought to be associated with burnt mound activity at the site (McKelvey 2018).

We can estimate that the Bronze Age pits were in first use by*1660–1530* (*68% probability*; *Start_1*; Table 2 and Figure 1) and its final usage had occurred by *1555–1395 cal BC* (*68% probability*; *End_1*; Table 2 and Figure 1). The pits were in use for a period of *0–225 years* (*68% probability*; distribution not shown).

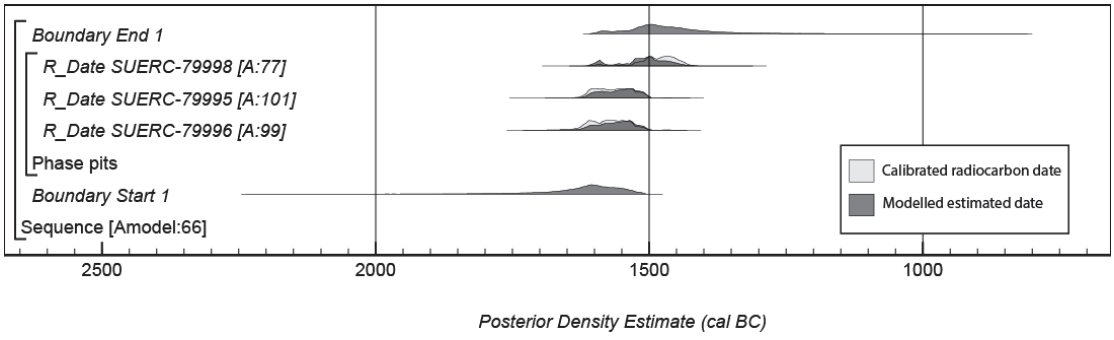

Figure 1: *Probability distributions of dates from the pits at Great Lumley. Each distribution represents the relative probability that an event occurs at a particular time. Two distributions have been plotted for each radiocarbon calibration: the pale grey outline is the result of the simple radiocarbon calibration, and the dark grey is based on the chronological model. Other terms and distributions in the image correspond to other aspects of the model, for example, 'Start' is the estimate for when the pits came into use.*

Laboratory number	Material and context	Radiocarbon Age (BP)	$\delta^{13}C$ (‰)	Calibrated date (95% confidence)	*Posterior Density Estimate (68% probability)*	*Posterior Density Estimate (95% probability)*
SUERC-79995	Charcoal, *Alnus glutinosa*, pit 707, context 710	3285±26	-26.4	1630–1500 cal BC	*1600–1580 cal BC (14%)* *1570–1510 cal BC (54%)*	*1615–1505 cal BC*
SUERC-79996	Charcoal, *Corylus avellana*, pit 712, context 711	3299±26	-26.4	1640–1500 cal BC	*1590–1520 cal BC*	*1625–1505 cal BC*
SUERC-79997	Charcoal, *Corylus avellana*, pit 705, context 703	4849±26	-29.4	3670–3540 cal BC	*Not modelled*	*Not modelled*
SUERC-79998	Charcoal, *Alnus glutinosa*, pit 714, context 713	3218±29	-27.0	1600–1420 cal BC	*1600–1585 cal BC (6%)* *1535–1460 cal BC (62%)*	*1610–1575 cal BC (13%)* *1565–1440 cal BC (82%)*
SUERC-79999	Charcoal, *Quercus sp*, posthole 718, context 717	2517±26	-24.9	800–540 cal BC	*Not modelled*	*Not modelled*

Table 1: *All radiocarbon dates from Land at Scorer's Lane, Great Lumley, County Durham.*

Parameter	Posterior Density Estimate (68% probability)	Posterior Density Estimate (95% probability)
Start_1	*1660–1530 cal BC*	*1950–1505 cal BC*
End_1	*1555–1395 cal BC*	*1610–1125 cal BC*

Table 2: *Posterior density estimates* for the start and end of the usage of the Bronze Age pits at Great Lumley (also see Figure 1).

Using the *Order* function in OxCal it is also possible assess the contemporaneity of the pits. Pit 714 is likely to be younger than Pits 707 and 712 (*94% and 95% probability*; Table 3) suggesting that its usage continued slightly beyond that of Pit 707, to which it is connected. However, the useage of Pits 707 and 712 is likely to have been broadly contemporaneous as there is only a *57% probability* (Table 3) that Pit 712 is older than Pit 70,7 and a *43% probability* (Table 3) that Pit 707 is older than Pit 712; with both these probabilities hanging in the 40–60% range it is difficult to establish which is likely to have occurred first, therefore the inference is that they are equivalent in date. This is further supported by using a Ward and Wilson chi-square test (1978) to see if the two measurements (SUERC-79995 and SUERC-79996) are consistent with each other, the results of which suggest that they are consistent at a 95% confidence level (*df=1, T=0.103, cf. 3.841*; distribution not shown).

Probability *t*1 < *t*2			
***t*1**	***t*2**		
	SUERC-79995 (Pit 707)	***SUERC-79996 (Pit 712)***	***SUERC-79998 (Pit 714)***
SUERC-79995 (Pit 707)	0	43%	94%
SUERC-79996 (Pit 712)	57%	0	95%
SUERC-79998 (Pit 714)	6%	4%	0

Table 3: Probability matrix for the ordering of the Bronze Age pits at Great Lumley. Determined by analysis of the modelled radiocarbon dates from the pits. The cells show the probability of the distribution in the left-hand column being earlier than the distribution in the top row.

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Scottish Universities Environmental Research Centre
Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor F M Stuart Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

13 June 2018

Laboratory Code	SUERC-79995 (GU47754)
Submitter	Charlotte O'Brien Archaeological Services Durham University South Road Durham DH1 3LE
Site Reference	Land at Scorer's Lane, Great Lumley, Conty Durham (GLS17)
Context Reference	710
Sample Reference	1
Material	Charcoal : Alnus glutinosa
$\delta^{13}C$ relative to VPDB	-26.4 ‰
Radiocarbon Age BP	3285 ± 26

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, 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.

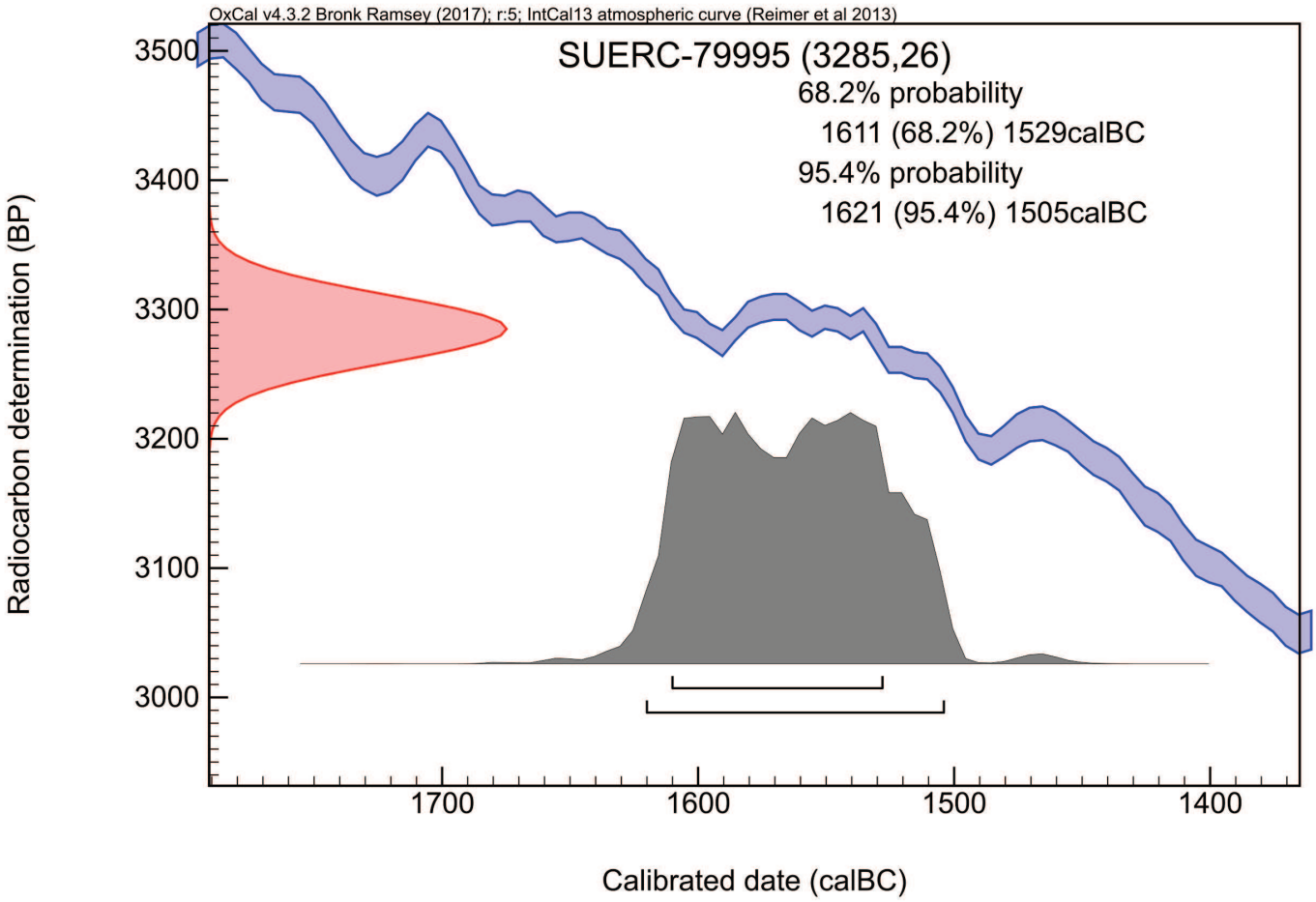
Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon 58(1) pp.9-23.*

For any queries relating to this certificate, the laboratory can be contacted at suerc-c14lab@glasgow.ac.uk.

Conventional age and calibration age ranges calculated by :

Checked and signed off by : E. Dunbar



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using the IntCal13 atmospheric calibration curve†

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon 51(1) pp.337-60*

† Reimer et al. (2013) *Radiocarbon 55(4) pp.1869-87*

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Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor F M Stuart Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

13 June 2018

Laboratory Code	SUERC-79996 (GU47755)
Submitter	Charlotte O'Brien Archaeological Services Durham University South Road Durham DH1 3LE
Site Reference	Land at Scorer's Lane, Great Lumley, Conty Durham (GLS17)
Context Reference	711
Sample Reference	2
Material	Charcoal : Corylus avellana
$\delta^{13}C$ relative to VPDB	-26.4 ‰
Radiocarbon Age BP	3299 ± 26

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, 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.

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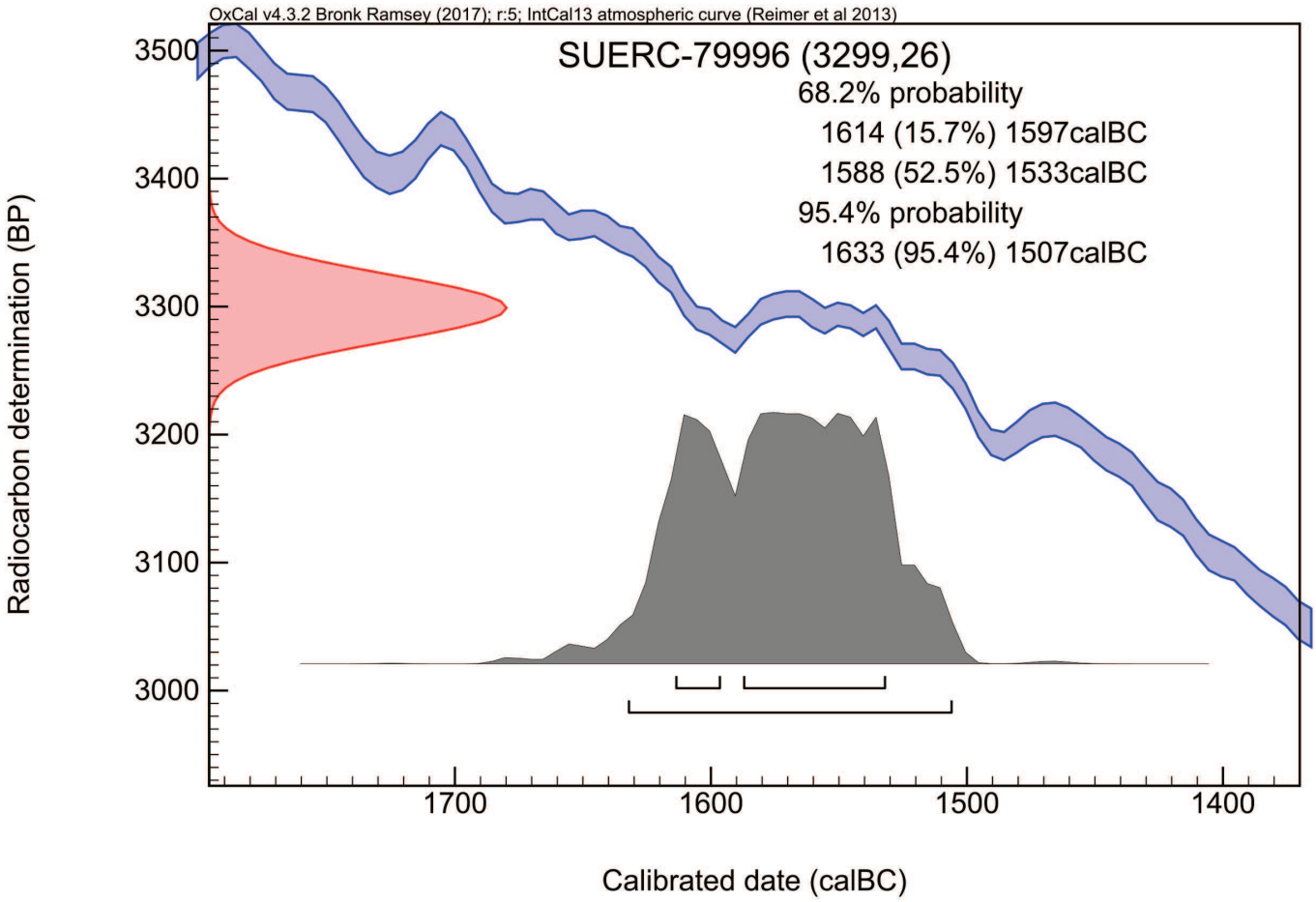

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Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
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RADIOCARBON DATING CERTIFICATE

13 June 2018

Laboratory Code	SUERC-79997 (GU47756)
Submitter	Charlotte O'Brien Archaeological Services Durham University South Road Durham DH1 3LE
Site Reference	Land at Scorer's Lane, Great Lumley, Conty Durham (GLS17)
Context Reference	703
Sample Reference	3
Material	Charcoal : Corylus avellana
$\delta^{13}C$ relative to VPDB	-29.4 ‰
Radiocarbon Age BP	4849 ± 26

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, 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.

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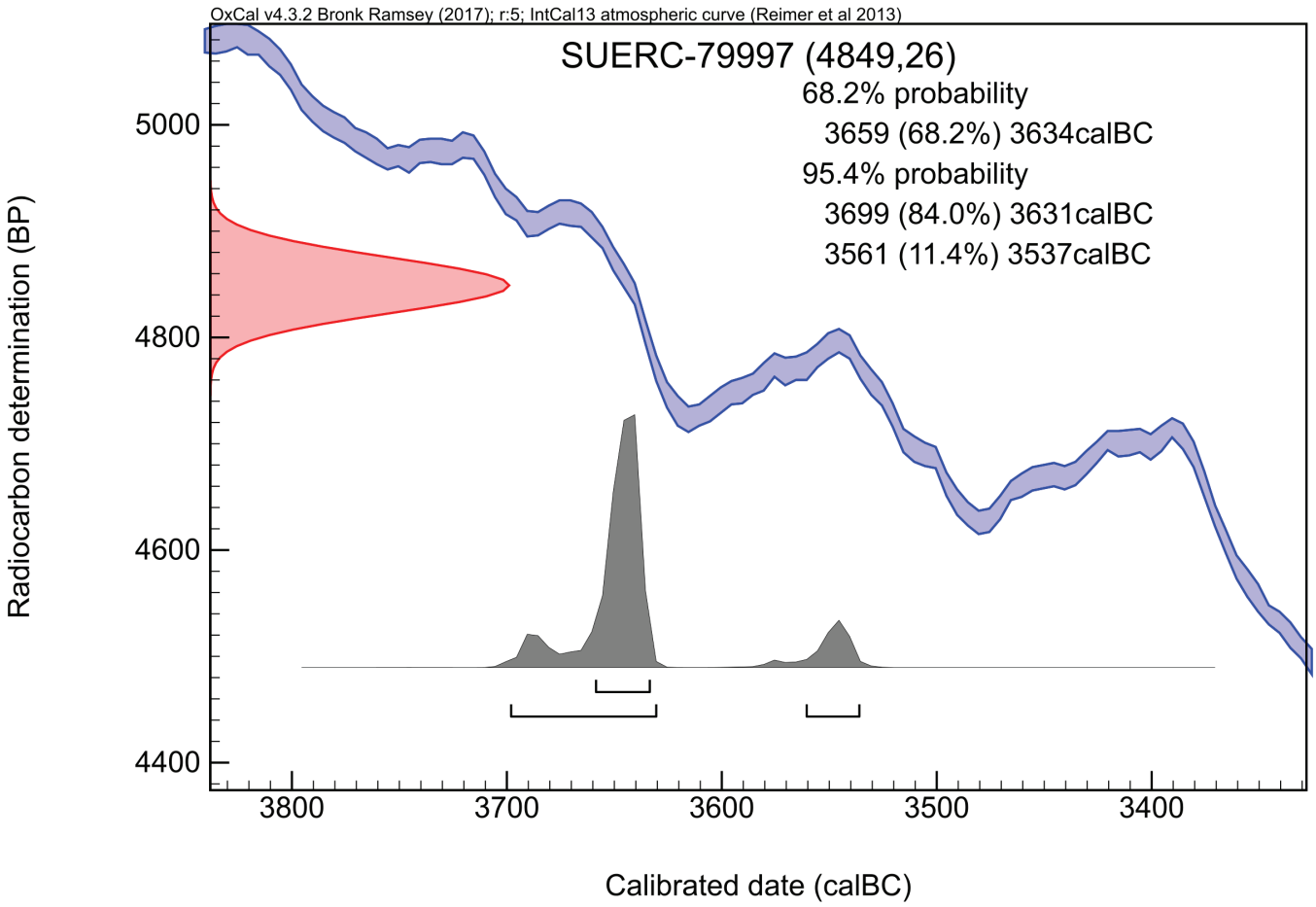

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Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor F M Stuart Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

13 June 2018

Laboratory Code	SUERC-79998 (GU47757)
Submitter	Charlotte O'Brien Archaeological Services Durham University South Road Durham DH1 3LE
Site Reference	Land at Scorer's Lane, Great Lumley, Conty Durham (GLS17)
Context Reference	713
Sample Reference	4
Material	Charcoal : Alnus glutinosa
$\delta^{13}C$ relative to VPDB	-27.0 ‰
Radiocarbon Age BP	3218 ± 29

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, 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.

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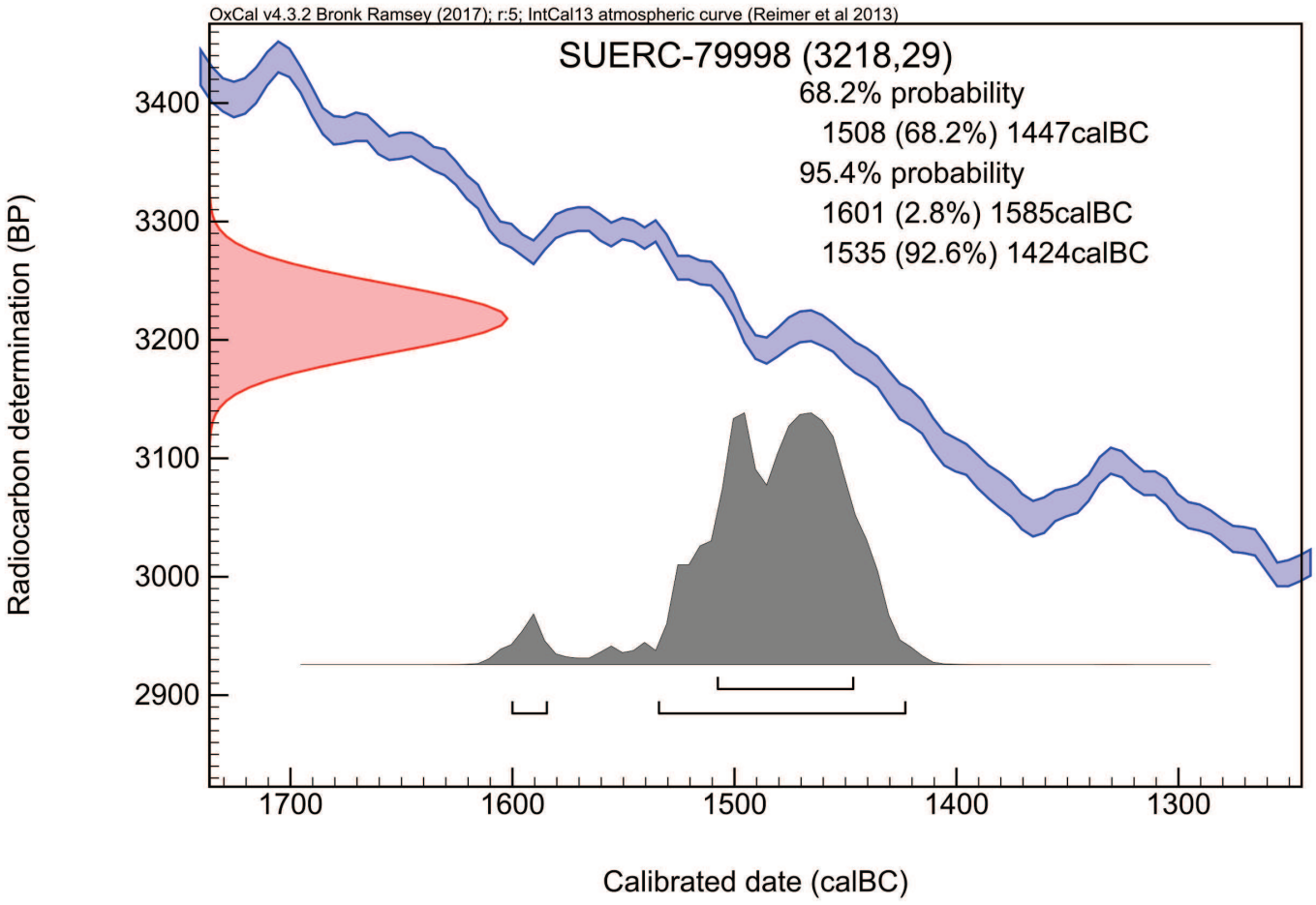

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RADIOCARBON DATING CERTIFICATE

13 June 2018

Laboratory Code	SUERC-79999 (GU47758)
Submitter	Charlotte O'Brien Archaeological Services Durham University South Road Durham DH1 3LE
Site Reference	Land at Scorer's Lane, Great Lumley, Conty Durham (GLS17)
Context Reference	717
Sample Reference	6
Material	Charcoal : Quercus sp
$\delta^{13}C$ relative to VPDB	-24.9 ‰
Radiocarbon Age BP	2517 ± 26

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, 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.

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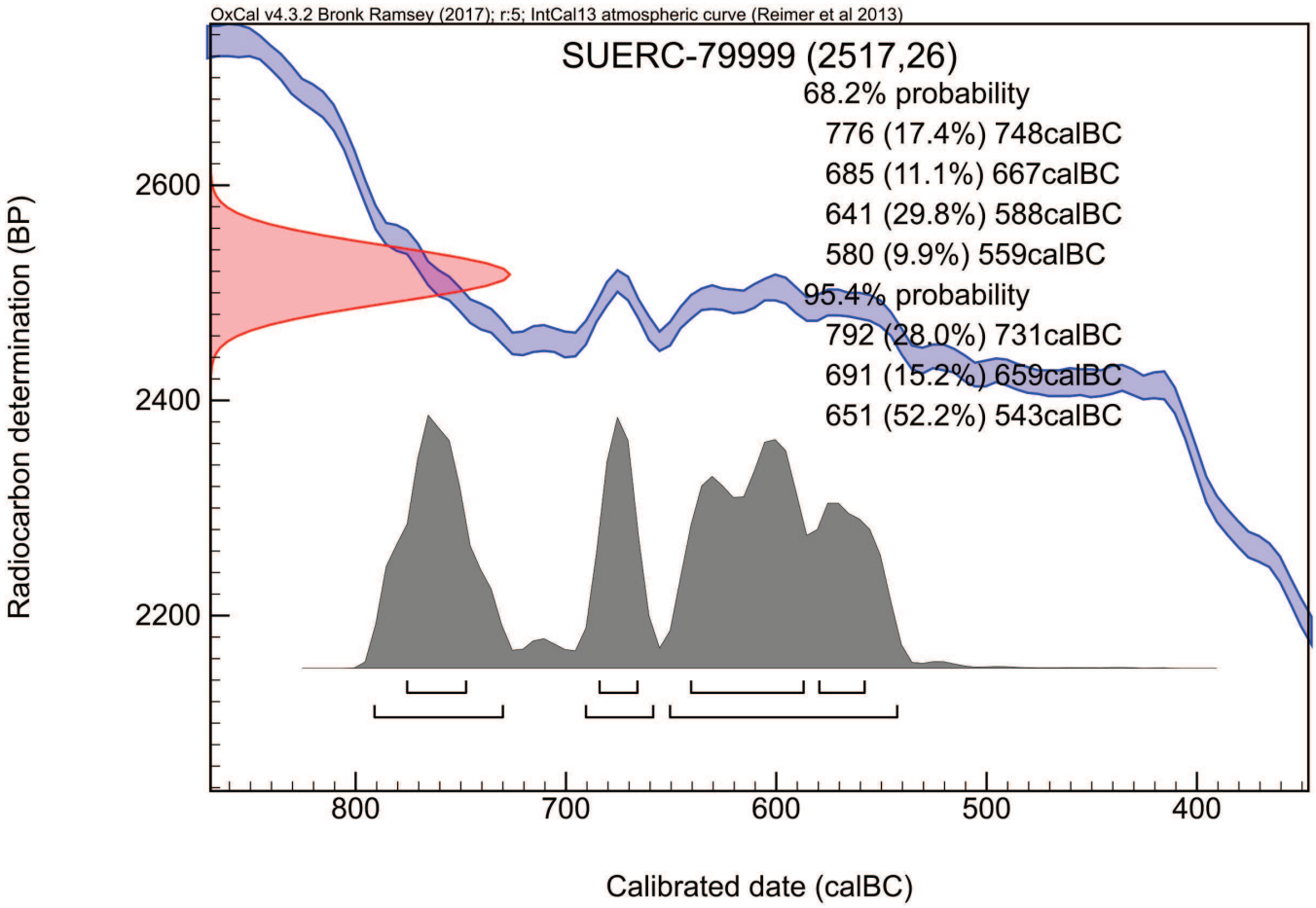

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† Reimer et al. (2013) *Radiocarbon 55(4) pp.1869-87*

Figure 1: General location of site

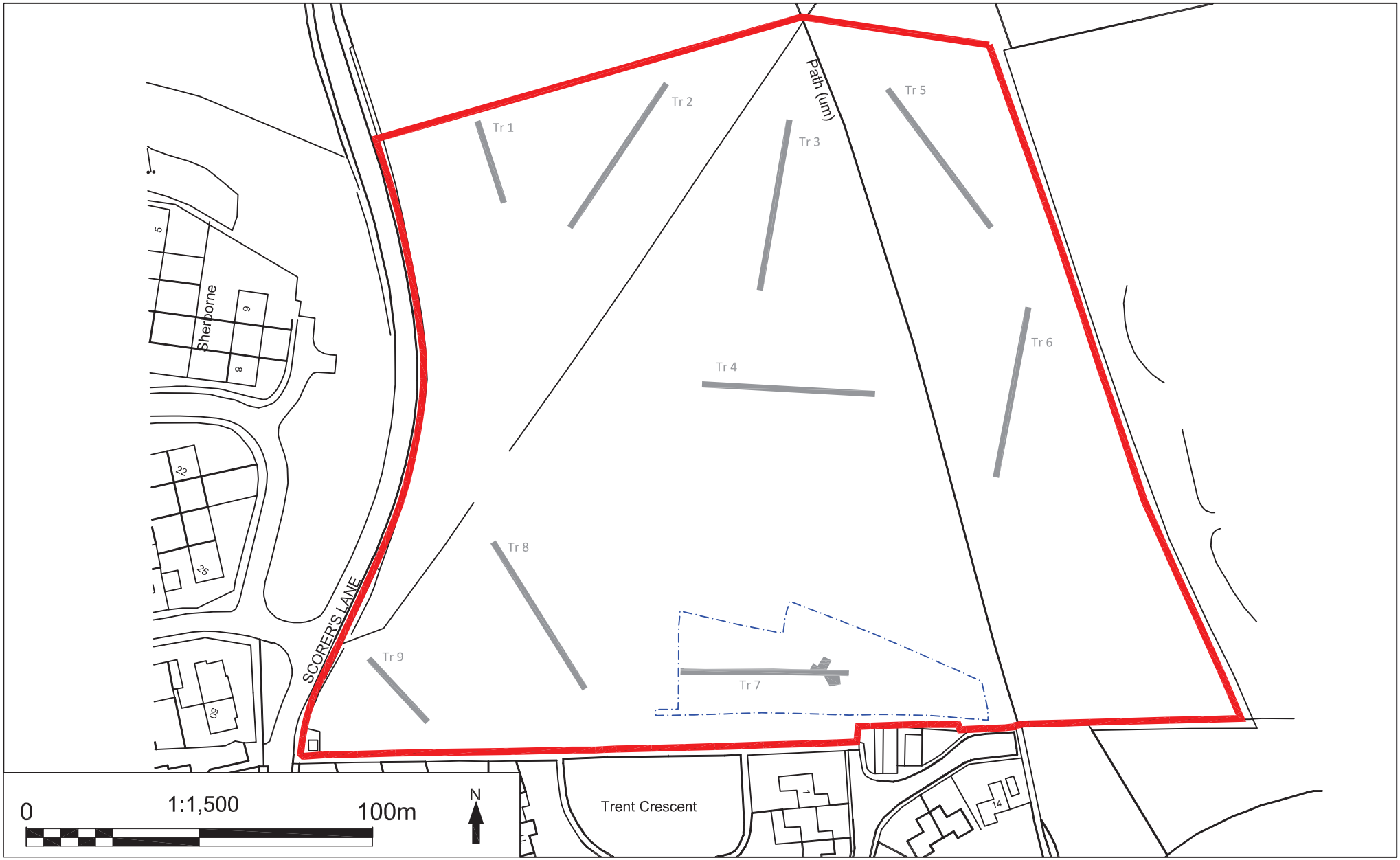

Figure 2: Excavation area overlaid on evaluation trench location plan

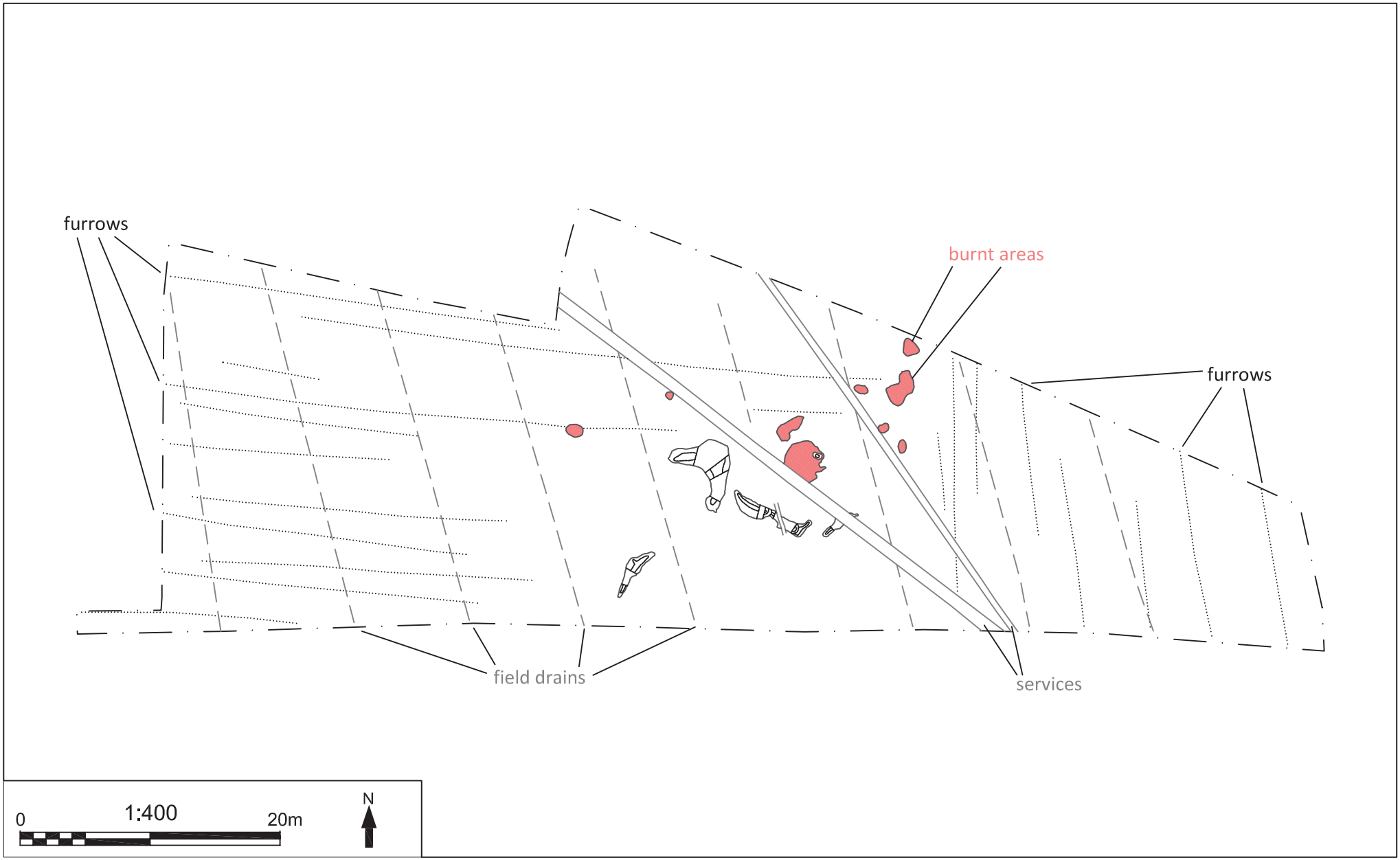

Figure 3: Plan of excavation area

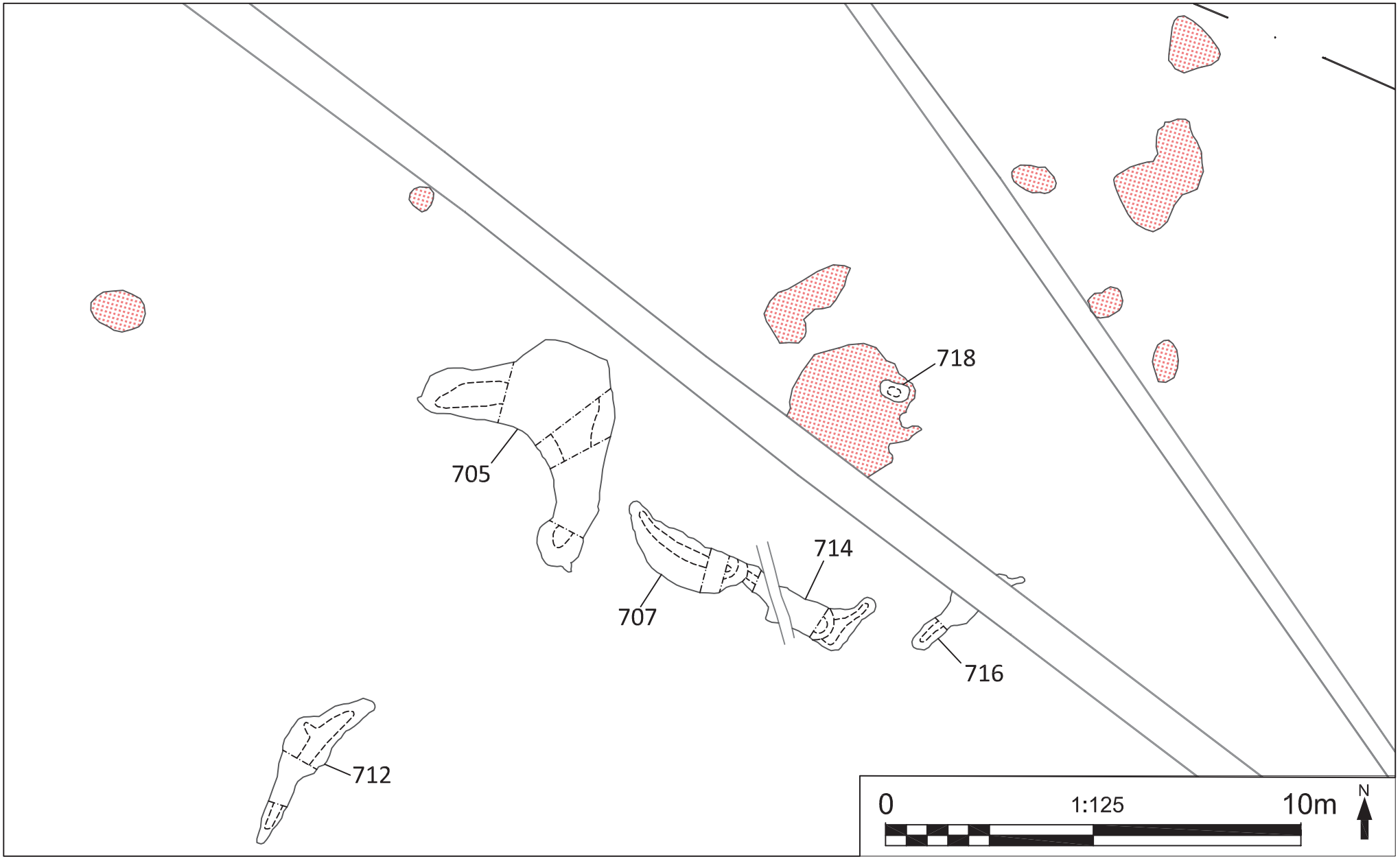

Figure 4: Plan of archaeological features in central part of excavation area

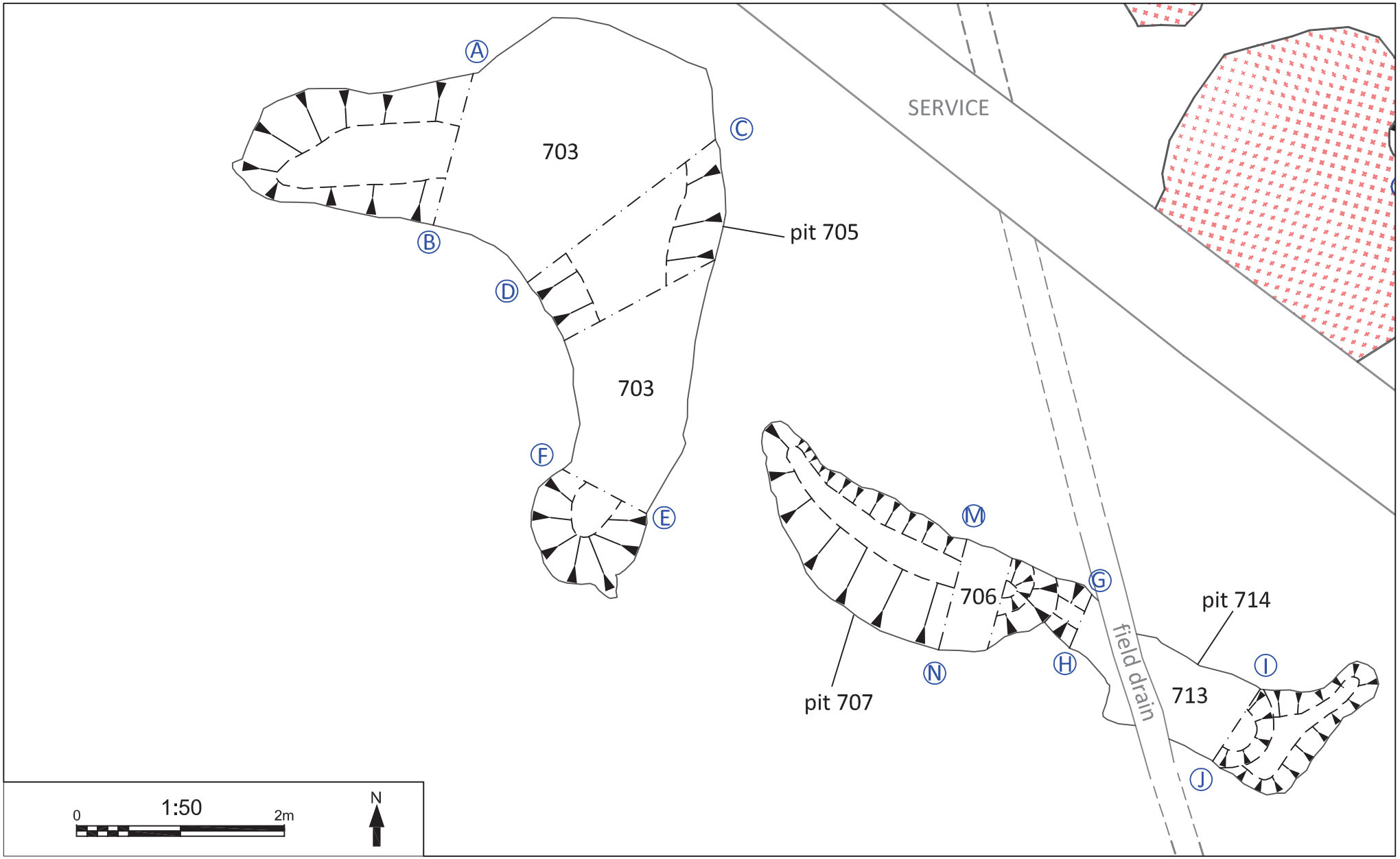

Figure 5: Pits 705, 707 & 714

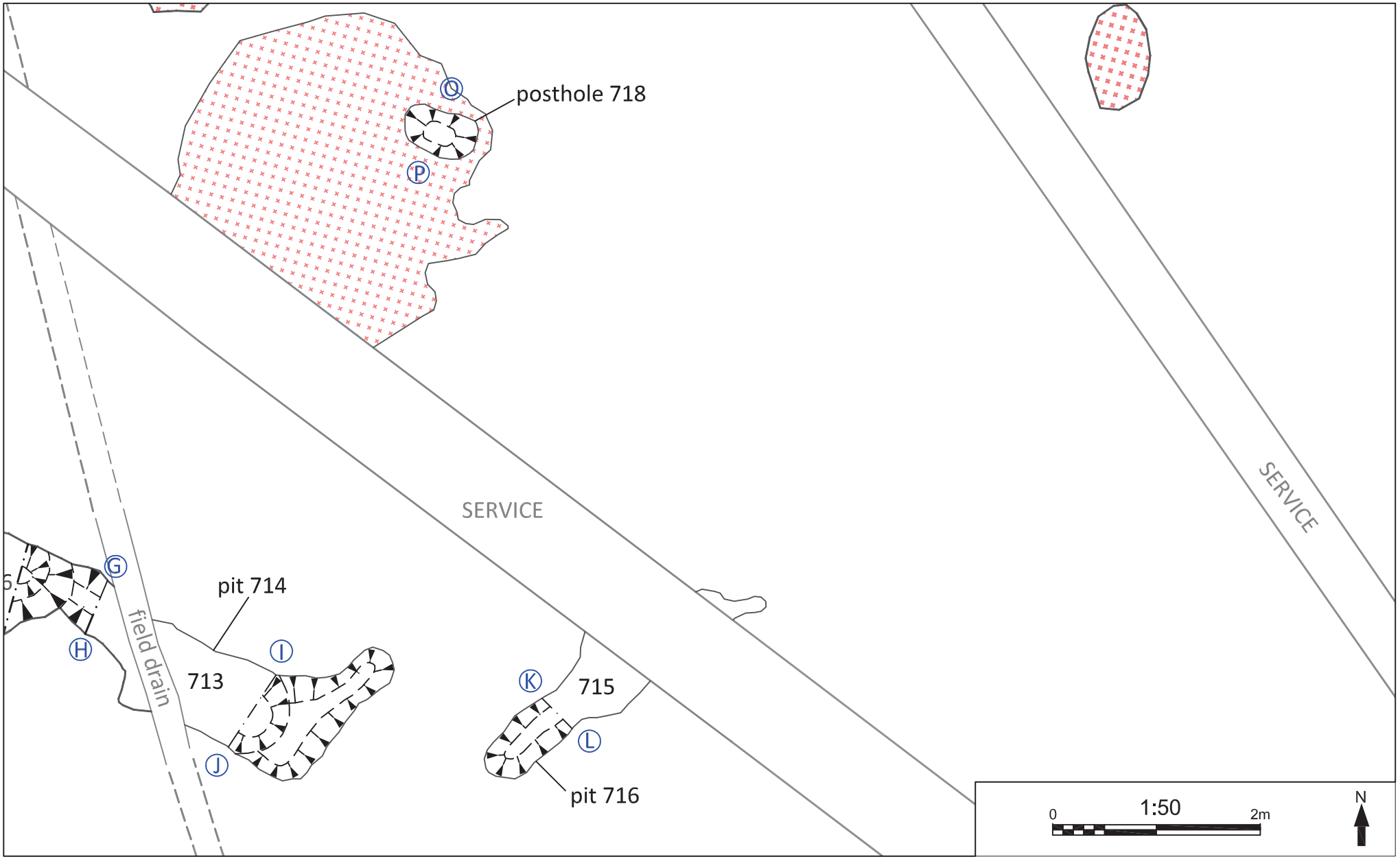

Figure 6: Pit 716 & posthole 718

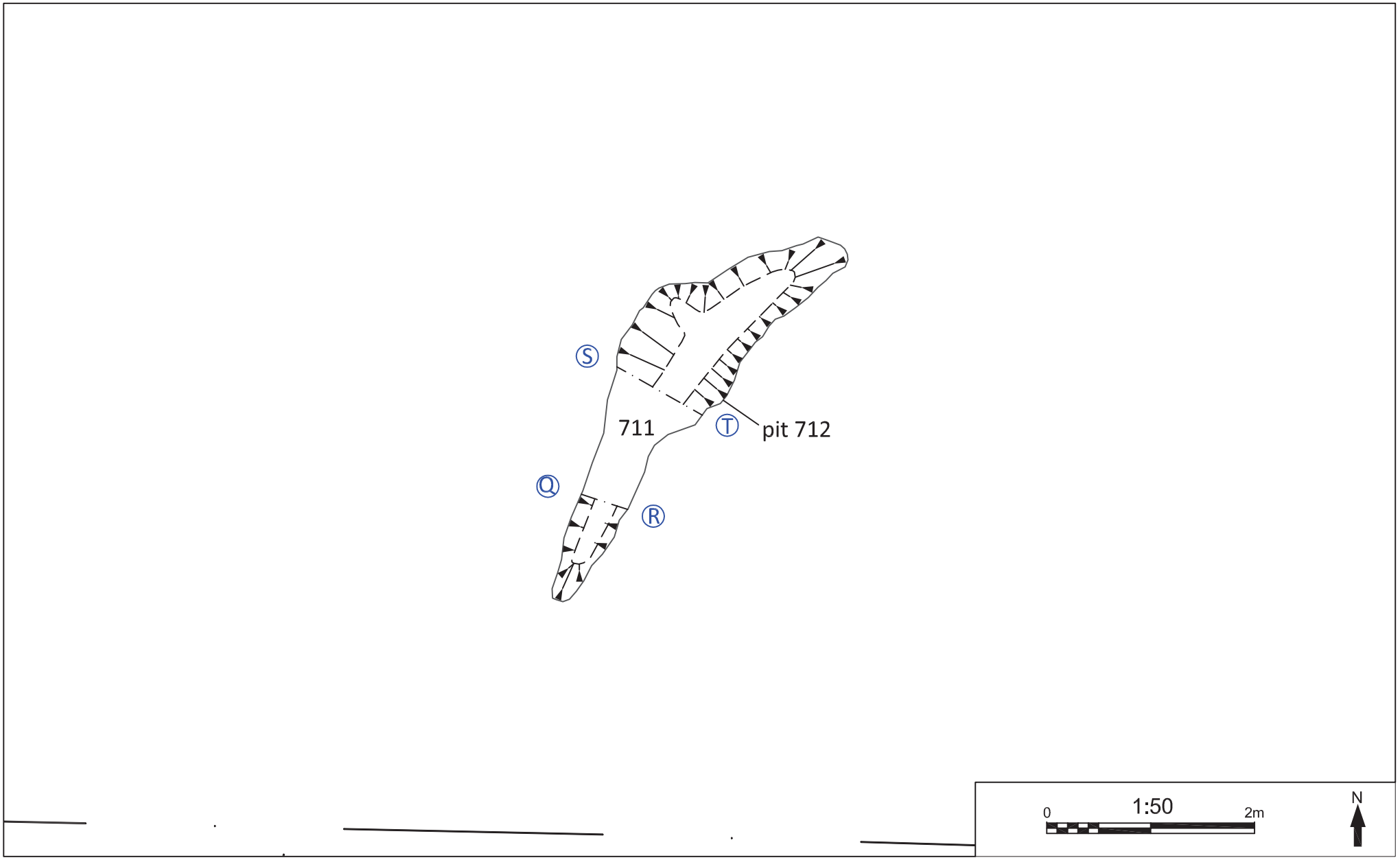

Figure 7: Pit 712

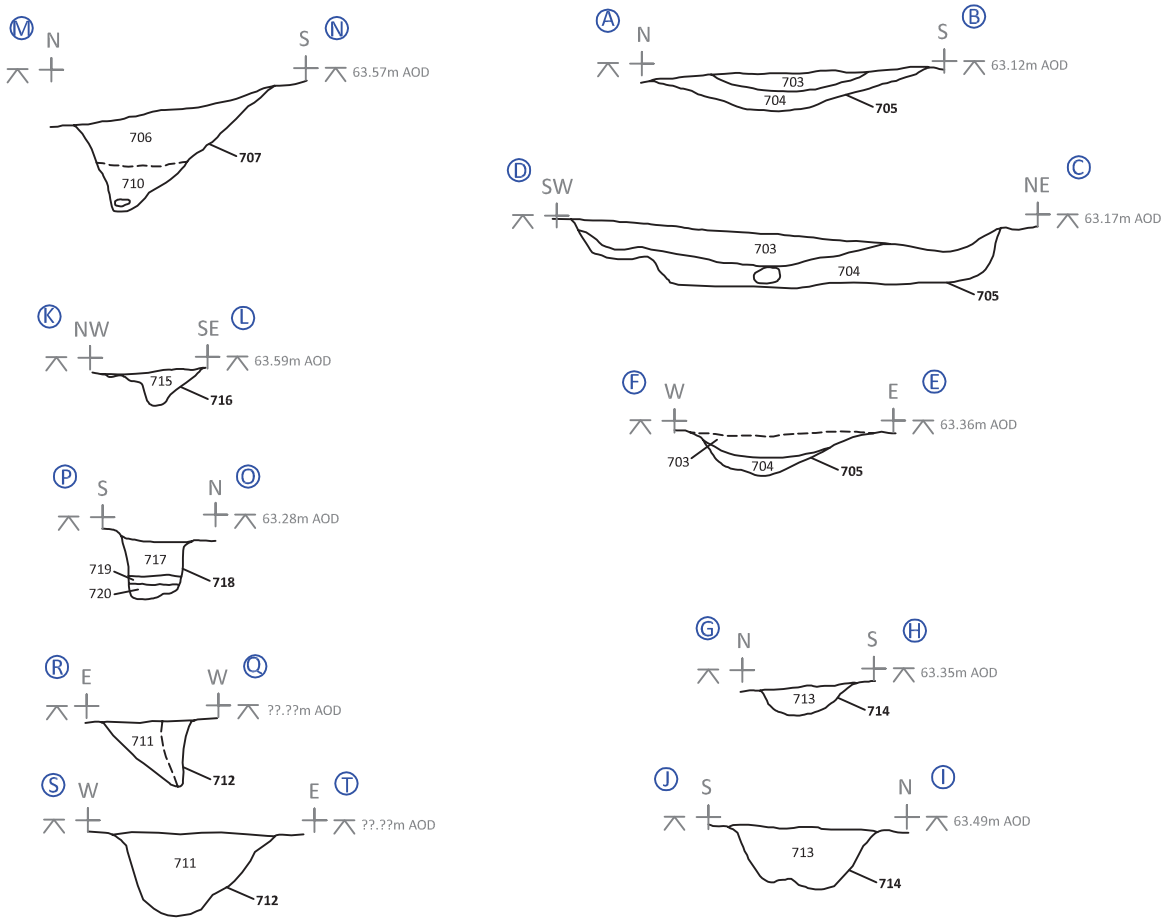

Figure 8: Sections

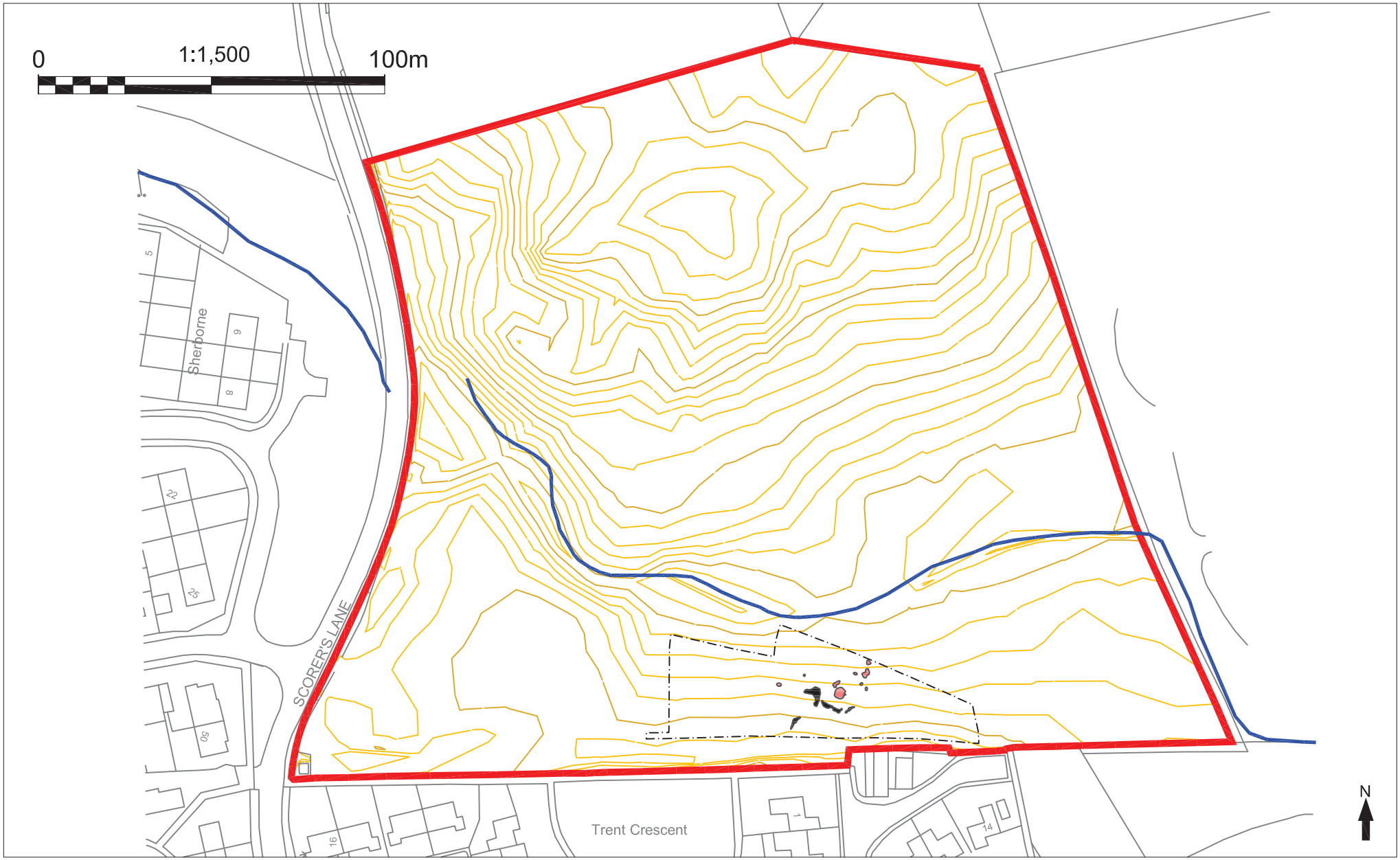

Figure 9: Location of strip and record area and prehistoric features overlain on topography of site and location of former watercourse (traced from Ordnance Survey first edition of 1857)

Plate 1: Pit 712 looking south-west

Plate 2: Pit 712 looking north-east

Plate 3 Pit 705 –looking north-east

Plate 4: Pit 705 -looking east

Plate 5: Pit 707 looking south-east

Plate 6: Pit 707 looking north-east

Plate 7: Pit 707 looking north-west

Plate 8: Pits 707 and 717 looking north-west

Plate 9: Pit 714 looking north-west

Plate 10: General shot looking north-west

Plate 11: Areas of burning looking north-east

Plate 12: Posthole 718 looking south