



Willington Power Station
Willington
Derbyshire

Archaeological Evaluation Report



Oxford Archaeology

January 2006

**Client: John Samuels
Archaeological Consultants**

Issue N^o: 2
OA Job N^o: 2804
NGR: SK 309 289

Client Name: John Samuels Archaeological Consultants
Client Ref No:
Document Title: Willington Power Station, Willington, Derbyshire
Document Type: Evaluation
Issue Number: 1
National Grid Reference: SK 309 289
Planning Reference:
OA Job Number: 2804
Site Code: DBYMU:2005-330
Invoice Code: WILLPSEV/WILLPEV2
Receiving Museum: Derby Museums and Art Gallery
Museum Accession No: DBYMU:2005-330

Prepared by: R Tannahill
Position: Site Supervisor
Date: 14th October 2005

Checked by: A Norton
Position: Senior Project Manager
Date: 17th October 2005

Approved by: J Hillier
Position: Senior Project Manager
Date: 19th October 2005

Signed.....*JRH*.....pp. N. SHEPHERD, OIA
HEAD OF
FIELDWORK.

Document File Location X:\Willington Power Station\evaluation\evaluation
report.doc
Graphics File Location Servergo:/oaupubs1_R thru Z*DBYMU:2005-
330*WILLPSEV*Willington Power Station,
Derbyshire*GS*23.08.05
Illustrated by Georgina Slater

Disclaimer:

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Oxford Archaeology being obtained. Oxford Archaeology accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person/party using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm their agreement to indemnify Oxford Archaeology for all loss or damage resulting therefrom. Oxford Archaeology accepts no responsibility or liability for this document to any party other than the person/party by whom it was commissioned.

Oxford Archaeology

© Oxford Archaeological Unit Ltd 2005

Janus House

Osney Mead

Oxford OX2 0ES

t: (0044) 01865 263800

f: (0044) 01865 793496

e: info@oxfordarch.co.uk

w: www.oxfordarch.co.uk

Oxford Archaeological Unit Limited is a Registered Charity No: 285627

Willington Power Station, Willington, Derbyshire**NGR SK 309 289*****ARCHAEOLOGICAL EVALUATION REPORT******VERSION 2 JSAC REVISIONS 17/01/06*****CONTENTS**

Summary	1
1 Introduction.....	1
1.1 Location and scope of work.....	1
1.2 Geology and topography.....	2
1.3 Archaeological and historical background	2
2 Evaluation Aims	5
2.1 General.....	5
2.2 Specific aims.....	6
2.3 Zone 1	6
2.4 Zone 2	7
2.5 Zone 3	8
2.6 Zone 4	9
2.7 Zone 5	9
2.8 Zone 6	10
2.9 Description.....	10
3 Evaluation Methodology.....	10
3.1 Scope of fieldwork.....	10
3.2 Fieldwork methods and recording	11
3.3 Finds.....	11
3.4 Palaeo-environmental evidence	11
3.5 Presentation of results.....	12
4 Results: General.....	12
4.1 Soils and ground conditions.....	12
4.2 Distribution of archaeological deposits	13
5 Results: Descriptions	13
5.1 Zone 1	13
5.2 Zone 2	14
5.3 Zone 3	17
5.4 Zone 4	17
5.5 Zone 5	17
5.6 Zone 6	17
5.7 Zone 7	18
5.8 Finds.....	20
5.9 Palaeo-environmental remains.....	21
6 Discussion.....	22
6.1 Reliability of field investigation	22
6.2 Overall interpretation.....	24
Appendix 1 Trench Inventory.....	26
Appendix 2 Pottery and Fired Clay	30
Appendix 3 Worked Flint	30
Appendix 4 Environmental Data	31
Appendix 5 Radiocarbon Dating	35

Appendix 5	Bibliography and References.....	37
Appendix 6	Summary of Site Details	39

LIST OF FIGURES

- Fig. 1 Site location
- Fig. 2 Trench location plan
- Fig. 3 Zone 1, plans and sections
- Fig. 4 Zone 2 (east), plans
- Fig. 5 Zone 2 (east), sections
- Fig. 6 Zone 2 (west), plan and sections
- Fig. 7 Zone 6, plans and sections
- Fig. 8 Zone 7, plans and sections
- Fig. 9 Plan of cursus in relation to known cropmarks

SUMMARY

Between July and September 2005, Oxford Archaeology (OA) carried out two phases of field evaluation at Willington Power Station, Willington, Derbyshire (NGR SK 309 289) on behalf of John Samuels Archaeological Consultants (JSAC). The first phase of evaluation, to the north of the A5132, revealed the northern ditch of the Neolithic cursus monument known as the Findern or Potlock cursus. The ditch was located in the southern part of the site. In the centre of site a probable field boundary ditch was revealed. A late Bronze Age plano-convex flint knife was recovered from the ditch fills, although no other artefacts were seen. A large Iron Age ditch, which may have bounded a settlement, was located in the north-western corner of site and ditches that may have belonged to Romano-British enclosures were revealed to the south-west.

There were distinct areas of archaeological features preserved within the Willington site, the best of which were found along the sites southern roadside boundary. However, the site had suffered considerable disturbance during the construction of the power station in the 1950s. Nearly all the archaeological features were impacted upon, to varying degrees, by this development. Much of the site had been landscaped and areas had been set aside, and potentially utilised, for gravel extraction.

The second phase of evaluation, carried out in September, to the south of the A5132, revealed five ditches of uncertain date. One of the ditches was interpreted as being the southern ditch of the Findern/Potlock cursus. The archaeological features were well preserved and showed little evidence of disturbance.

1 INTRODUCTION

1.1 Location and scope of work

- 1.1.1 Between July and September 2005 Oxford Archaeology (OA) carried out two phases of field evaluation at Willington Power Station, Willington, Derbyshire (NGR SK 309 289) on behalf of John Samuels Archaeological Consultants (JSAC). JSAC produced a specification (JSAC 2005) outlining the archaeological requirements of the work. The specification was agreed with Dr Andrew Myers, Archaeological Advisor to South Derbyshire District Council (SDDC).
- 1.1.2 The proposed development site is located at the former Willington Power Station and within a sports field opposite the power station. The site lies immediately to the east of Willington, to the north of Repton and to the south of Findern, in Derbyshire. The power station site covers approximately 85 hectares, of this area approximately half of the site was agreed with the South Derbyshire Districts Archaeological Advisor as being either destroyed completely by later developments (power station, gravel extraction, refuse tips etc...), or as areas not requiring trenching due to its intended final use; such as green open spaces that would not be impacted upon by

development. The evaluation within the sports field was targeted to assess the archaeological potential of the site of a proposed pavilion and associated parking.

1.2 Geology and topography

1.2.1 The site lies partially within the Wick 1 soil association of deep, well drained loamy and sandy soils, resting over the River Trent's gravel terraces, and is surrounded by alluvial deposits (Sheet 3 - Soil Survey of England & Wales). The site is situated 40-50 m above OD, rising gently to its northern edge. Prior to the construction of the power station the land was under agricultural use.

1.3 Archaeological and historical background

1.3.1 The archaeological background to the evaluation has been the subject of a separate desk study (JSAC 2004) and aerial Photographic assessment (APS 2004), the results of which are summarized below.

Prehistoric

1.3.2 An archaeological review of land and settlement in Nottinghamshire and Lowland Derbyshire (O'Brien 1978) has identified, largely through the interpretation of aerial photographs, a series of potential archaeological remains. This suggested that the landscape surrounding Willington was heavily utilised/settled during this period.

1.3.3 Excavation to the south-west of Willington (Wheeler 1979) uncovered a landscape suggestive of multi-phase occupation, including Neolithic settlement, Iron Age settlement and field systems, and at least three Prehistoric monuments. These excavations have since been used to suggest possible dates for similar features closer to the development area.

1.3.4 The Findern Cursus, now known as the 'Potlock Cursus' and located *c* 650 m to the east of the development area, was identified by aerial photographs as running for *c* 487 m. The extrapolated course of this cursus passes through the proposed development site on both the northern and southern sides of the A5132. It was partly excavated by Hazel Wheeler in 1969 (Wheeler 1970). No datable material was uncovered during that excavation. Later excavations (Guilbert 1994 & Knight ed. 1994) uncovered pottery dating from the late Neolithic through to the Iron Age, and suggested a primary Neolithic date for the monument.

1.3.5 The Scheduled Monument Description and the Sites and Monuments Record indicates that other crop-marks in the area of the cursus, extending to the east and west of the development site, have been identified from aerial photographs taken by Mr. J. Pickering of Hinckley and by geophysics. These crop-marks have been interpreted as being settlements and field systems dating to the Neolithic and Bronze Age, and Bronze Age round barrows. Beyond these crop-marks, and further to the east, a possible Class I Henge and large Iron Age round house have been identified. This area is designated as a Scheduled Ancient Monument, and is of National Importance.

- 1.3.6 To the north-west, north and north-east of the development site, pit alignments, enclosures, linear features, ring ditches and double ring ditches have been recorded. Similar features have also been identified, including the possibility of a barrow cemetery to the south-west, south and south-east, an area bounded by the River Trent. These may date from the Neolithic to the Iron Age, and suggest a multi-phased prehistoric landscape.
- 1.3.7 Within the site boundary, cropmarks, identified as two Iron Age pit alignments, were recorded within Zone 6, although these were not visible during the aerial photographic assessment.

Roman

- 1.3.8 Many of the areas mentioned within the prehistoric section also provided evidence for Roman/Romano-British occupation. The spread of Roman occupation appears to be similar to that of the prehistoric period, although features/finds from this period are not as prevalent as those from the prehistoric period.
- 1.3.9 Margery (1957) records Roman Ryknild Street built in a south-west to north-easterly direction, c 2.2 km to the west of the proposed development area. This part of the road is known as the Wall to Derby (Little Chester) section, and runs for approximately 39.4 km.

Saxon

- 1.3.10 There is little evidence for Anglo Saxon material/features within and around the proposed development area, although Anglo Saxon settlement has been found at excavations conducted to the south-west of Willington (Wheeler 1979).
- 1.3.11 Meaney (1964) notes that the closest location of an Anglo Saxon burial is at Swarkestone Lowes; a re-used Bronze Age Barrow cemetery located c 5 km to the east of the proposed development area.

Medieval

- 1.3.12 The earliest written descriptions of the land within, and surrounding, the proposed development area, do not represent the current land divisions. Documentary evidence suggests that the proposed development area was situated in an area referred to as Potlock (and thus a reason why the Findern Cursus is often actually referred to as the Potlock Cursus), before later becoming part of Willington and perhaps even part of Findern. The historical references to the land divisions therefore, make use of material associated with Potlock primarily; and Willington only when required, such as the Domesday entries (Youngs 1979).
- 1.3.13 By the time of the Domesday Survey of 1086, the area of Willington is described as being part of the taxable holdings of Ralph, son of Hubert. However, the Domesday Survey of Derbyshire (1086), lists entries for Potlock also, which is referred to as a small village/berewick to the east of Willington. This is considered to be the lands encompassing much, if not all, of the former power station site.

- 1.3.14 Within the survey, the taxable holdings of the village/hamlet of Potlock are under the ownership of the Abbey of Burton (Morgan, 273b, 3, 1). These lands were located within the Hundred of Morleyston & Litchurch and, along with several other small villages/hamlets within the locality, all appear to have been serving the Abbey's interests. Given this hypothesis it may be safe to assume that land within and around the proposed development site was, by the medieval Period, given over to agricultural practices. It may also be safe to assume that Potlock at this time was occupied by several nucleated farmsteads, each of which was producing various commodities for sale and consumption by the Abbey.
- 1.3.15 Both the Sites and Monuments Record and the later Aerial Photographic Investigation Exercise appear to provide evidence to support this hypothesis, in that entries and aerial photographs note the presence of ridge-and-furrow within the locality. The aerial photographs suggest that ridge-and-furrow is preserved within part of the south-eastern edge of the proposed development site (Zone 2).
- 1.3.16 Historical records have suggested that the greater part of the Potlock manor, associated with, and supposedly occupying, parts of the land surrounding the proposed development area, contained the manor house for Geoffrey de Potlock as well as the chapel of St Leonard. The chapel is said to have been first endowed by John de Toke in 1323 with a chaplain, a house and 14 acres. The Finderns, who eventually inherited Potlock by marriage are believed to have used the manor as their principle seat, rather than Findern itself.
- 1.3.17 Little appears to be known about the manor house, or of the chapel, other than its location, which is said to be adjacent to the east/south-east edge of the former power station site. The Sites and Monuments Record (SMR) states that Potlock's House Farm has an earthwork, and documentary evidence also suggests the existence of a moat. However, there are indications within the (SMR) that this evidence is inconclusive.

Post-medieval/modern

- 1.3.18 There is little recorded archaeology of post-medieval date within the proposed development area. The only entry of this date, recorded within the SMR, records the continuation of Potlock Manor, and the probable moat said to be associated with it. Eventually the Finderns brought the chief lordship from William, 1st Lord Paget, who in 1546 had purchased the surrounding Burton Abbey lands from the Monarch. By the 17th century these lands passed to the Harpurs and the identified chapel had disappeared. The Manor of Potlock had probably disappeared some time prior to this, perhaps during the Black Death (Craven, 2002). Therefore, it is likely that by the start of the industrial period, the lands formerly associated with Potlock had become amalgamated into Willington; with perhaps some of the lands being passed into the control of Findern.
- 1.3.19 The passing of an Act of Parliament in 1699 was designed to make the River Trent navigable above Shardlow, and as far as Burton. Willington, as a consequence of this

Act became an important river port, handling the export of cheese from south Derbyshire farms and china from the potteries to London and the East Coast ports (Christian, 1987). Willington declined in importance as a port, soon after the completion of the Trent & Mersey Canal in 1777 (the canal is located c 100 m to the north of the proposed development area). The use of the port ceased entirely in 1805, when all industrial traffic appears to have been transferred across to the canal (Christian, 1987). A similar pattern was identified with the coming of the railways, in 1839, and the building of a bridge across the River Trent.

- 1.3.20 Potlock House Farm is not of medieval origin. The Potlock Manor and its buildings including that of the chapel became entirely despoiled by the 17th century. The last vestiges of the manor house were removed by 1805 and were replaced by a five bay house, with two-storeys and a central break fronted pediment. The surrounding c 147 ha of farmland, similar it is said in size and dimensions to that of the original manor, was taken over and farmed by the Glovers (Craven, 2002).
- 1.3.21 The 1887 Ordnance Survey 1:10,560 Map of Willington shows that the proposed development area was largely occupied by agricultural fields, stretching from the railway lines to the north to the River Trent to the south. The site also contained a small wooded area, later referred to as Potlock Covert, Potlock Farm (later removed and built upon by the power station) and a gravel pit (later in-filled with domestic refuse). The presence of Potlock Farm within the site should not be dismissed entirely, and as such it should be a consideration during any trenching.
- 1.3.22 The Sites and Monuments Record contains no entries that have been assigned a Modern period date, within the search area or within the proposed development area. Construction of the former power station was said to have begun in 1954, when bulldozers entered what was known locally to be a small, boggy, area of scrubland between the then B5009 and the Derby to Birmingham Railway Line. However, the power station is not recorded on the 1955 Ordnance Survey Map for Willington. The power station was decommissioned by 1999.

2 EVALUATION AIMS

2.1 General

- 2.1.1 The evaluation was undertaken in accordance with the IFA 'Standards and Guidance for archaeological field evaluation' (2001) which define field evaluation as: - "...A limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or eco-facts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate."

2.2 Specific aims

General

2.2.1 To aid a flexible approach the site was initially divided into six separate zones (Fig. 2) to address a number of zone specific questions. Zone 7, an area totalling c 10 hectares to the south of the A5132, was added to the evaluation area in September 2005. Following consultation with the South Derbyshire Districts Archaeological Advisor it was evaluated in a manner consistent with the first phase of archaeological work. The work followed the previously approved specification of works (JSAC 2005). The following issues were highlighted within the approved specification (*ibid.*) for each zone: -

2.3 Zone 1

Description

2.3.1 Located along the northern edge of the proposed development site, and stretching from the far western end to the north-east corner, this part of the former Willington Power Station was previously occupied by several runs of railway sidings. It also contains overhead electricity pylon bases and a pipeline for the removal of waste material. The pipeline was constructed from the central area towards the north-west, running the length of the northern boundary and exiting at the far north-west corner of the site.

Archaeological Potential

2.3.2 Prehistoric and Roman features have been identified to the north of this zone, although all such instances were recorded beyond both the current railway line and the canal located to the north. Crop marks, identified as two Iron Age pit alignments, were recorded within Zone 6 (south-east), whilst an area of ridge-and-furrow was recorded immediately to the south-west of this zone; although this area has since been built upon by industrial structures.

2.3.3 The aerial photographic assessment recorded the presence of ridge-and-furrow together with a number of undated features to the north of the area, although it did not substantiate the Iron Age features within Zone 6. No evidence was found for archaeological features during geotechnical testpit monitoring.

Issues

2.3.4 This area was likely to have been significantly disturbed by the construction and removal of the railway sidings and by the construction of the waste removal pipeline, which was still in situ. The main issue for this zone was to establish the level of the surviving archaeological horizon, if any. A further aim was to establish if the waste pipeline was still in place.

2.3.5 It was likely that many of these trenches would be replaced with testpits. If any archaeological potential survived as islands within zones of truncation the trenching would seek to establish the extent of the areas of potential.

2.4 Zone 2

Description

2.4.1 Located along the northern edge of Twyford Road, at the southern edge of the greater part of the proposed development site, this area had two access roads leading into the site off Twyford Road. Small-scale power station structures were also present within this area and a gatehouse is still standing. The central frontage area has a large inlet pipe and associated tanks still in situ below ground.

Archaeological Potential

2.4.2 This area has been identified as being cut by part of the Findern/Potlock Cursus and as such, it is thought that this area has a high potential for prehistoric features/finds. The cursus and associated features have also been identified, within the Sites and Monuments Record and by aerial photographic assessment, as existing to the south and east of this zone. Geophysical surveying of the field to the east of this zone also revealed the presence of a ditch, part of the cursus, an enclosure and evidence of medieval ridge-and-furrow.

2.4.3 Aerial photographic assessment also showed the presence of ridge-and-furrow to the south of the zone, extending in a northerly direction towards Zone 2, and a field boundary or gully.

2.4.4 The geo-technical monitoring exercise, whilst not providing any datable material, did suggest the presence of archaeological features towards both the western edge and the north-eastern corner of this zone.

Issues

2.4.5 The primary aim of these trenches was to establish the presence/absence of the cursus, the alignment of which was projected through this zone. This is the only zone where trenches have been located to target a known feature and as such they would only be moved if site conditions did not allow their excavation as illustrated.

2.4.6 Should the cursus be exposed care would be taken not to prejudice any future excavation; ie by inadvertently excavating a section where it relates to other significant features. The trench would be extended so that if possible both ditches could be exposed within one trench to attempt to determine the morphology of the monument and its associated banks etc. It was crucial that the cursus was investigated to allow an assessment of its state of preservation. Consideration was also be given to increasing the sample size within this zone, should the cursus be exposed, to establish the presence/absence of other possibly associated monuments. The same logic would apply to other significant features exposed, ie features would

not be excavated within evaluation trenches that might be best excavated in area excavation. Care would be taken not to compromise future excavation, however priority would be given to ensuring that the nature and state of preservation of each feature was determined. Any significant archaeological features exposed within this zone would also be extensively sampled for palaeo-environmental remains to fully establish their potential to inform us of the nature of human inhabitation of the area.

- 2.4.7 The nature of any impacts from ploughing and subsequently more modern intrusion on any surviving archaeology within this zone would be established.

2.5 Zone 3

Description

- 2.5.1 Located towards the eastern side of the proposed development area, this zone contained the greater part of the former Willington Power Station structures. These structures have since been demolished, although their foundations (including large cellared areas) are still in situ. The cooling towers and associated platform are currently still standing.

Archaeological Potential

- 2.5.2 A ring-ditch was identified from cropmarks within the area now occupied by the substation to the west of Zone 3. Prehistoric features are known to the north-east, east and south of the zone from SMR information. Cartographic evidence also indicated the presence of a series of farm buildings, referred to as Potlock Farm, within this zone.
- 2.5.3 The aerial photographic assessment showed no evidence for archaeological features within the Zone 3 area. However, the geo-technical monitoring showed possible archaeological features towards the far eastern and western edges of the zone; adjacent to both the cooling tower platform and the substation respectively.

Issues

- 2.5.4 This zone was known to have been heavily disturbed, but as with much of the remainder of the site it was possible that archaeology survived as islands within the zone. The archaeological potential appeared to be greater at the southern and western extents of the zone, in proximity to the projected line of the *cursus* and to the probable ring-ditch. Therefore there was scope to increase the sample size in these areas to establish their potential. Elsewhere within this zone it seemed likely that the construction of the buildings and their associated drains and services may well have impacted very heavily on any surviving archaeology. It was possible to replace a number of these trenches with testpits.

2.6 Zone 4

Description

- 2.6.1 Located towards the north-eastern side of the proposed development site, this zone was once utilised for coal storage. The area to the north was a former gravel pit, latterly used for landfill and to the west of that the site is bounded by Findern Primary School, a nature reserve and a former asbestos tip respectively.

Archaeological Potential

- 2.6.2 The aerial photographic assessment identified archaeological features beyond the landfill site, to the north/north-east of Zone 4. A large area of ridge-and-furrow was also recorded to the south of this zone. The Sites and Monuments Record data suggested that, despite a gravel extraction site in the area immediately bounding the northern edge of Zone 4, there existed a pit alignment, an enclosure, a linear feature and a ring ditch in this area. This Iron Age and Roman archaeology was, however, likely to have been truncated by significant reduction of this area, identified by the aerial photographic assessment. Possible features were however observed during the geotechnical monitoring within the centre of the southern area of this zone.

Issues

- 2.6.3 The initial aim of trenching within this zone was to establish the degree of truncation identified from the aerial photographs. It was possible that the former gravel pit on the zone's northern boundary also extended into this zone and this would need to be determined. Subsequent to the above an assessment could be made of the zone's archaeological potential and the amount of trenching could be adjusted accordingly. If there was significant truncation, trenches could be replaced with testpits and/or the sample size could be reduced.

2.7 Zone 5

Description

- 2.7.1 This small zone was located immediately adjacent to the north-eastern edge of the former power station cooling tower platform, and appears to have remained relatively unchanged since the 1st Edition Ordnance Survey Map.

Archaeological Potential

- 2.7.2 The zone was indicated by the Sites and Monuments Record as being located immediately adjacent to an area of Iron Age features (Zones 4 and 6), whilst also being bounded to the south by various features associated with the Findern/Potlock Cursus and a large area of ridge-and-furrow. Possible features were identified during monitoring of the geotechnical works.
- 2.7.3 This area, despite the construction of the cooling towers, appears to have remained relatively untouched. It was agricultural land before becoming a storage area for the

former power station. It was possible that features may have been preserved within the undeveloped parts of this zone.

Issues

- 2.7.4 The aim of the trenching within this zone was to establish the degree of impact of the construction of the cooling towers and associated platform. If as suggested above there was some potential for archaeological survival then it was possible that prehistoric features might be exposed. It was also possible that evidence would be found for ridge-and-furrow.

2.8 Zone 6

2.9 Description

- 2.9.1 Sandwiched between Zones 1, 3, 4 and 5, Zone 6 occupied a central position extending to the north-east. The zone was bounded to the south by the former power station cooling towers and to the north by a nature reserve and a former asbestos tip. The zone had been disturbed by a coal conveyor run and its associated features.

Archaeological Potential

- 2.9.2 An Iron-Age pit alignment was recorded within this zone, although this was not visible during the aerial photographic assessment. The only archaeology identified within the zone during the aerial photographic assessment was ridge-and-furrow on the southern boundary.

Issues

- 2.9.3 Initially an assessment was to be made on the impact of the coal conveyor and associated modern features. The sample size would reflect the potential for archaeological preservation within this zone. If the truncation was not extensive then there was the clear potential for Iron Age features to be exposed. The ridge-and-furrow was also to be assessed.

3 EVALUATION METHODOLOGY

3.1 Scope of fieldwork

- 3.1.1 In the first phase of evaluation it was proposed to excavate 72 trenches (50 m long by 2 m wide), with an allowance for a 12-trench contingency (12 trenches, 50 m long by 2m wide). A reflexive approach was embraced, designed to map the extents of areas of truncation and to establish the state of preservation of any surviving archaeology. The archaeology was likely to exist only as islands within large areas of the site. With the exception of the trenches within Zone 2, which targeted the extrapolated line of a cursus, the locations and dimensions of the remaining trenches were not fixed. To meet the aims, as set out above, 100 trenches and test pits of varying dimensions were excavated under close archaeological supervision by a 360° mechanical excavator fitted with a toothless bucket. The sample size within the zones

was adjusted in response to the circumstances on the ground. Where areas were thought to be extensively disturbed, sufficient test pits were excavated to rule out the possibility of archaeology surviving as discrete islands. Where areas were shown to have a high degree of archaeological survival, the limit on trenching was ultimately the maximum agreed amount of trenching for the site. The lengths of trench left unexcavated were added to the agreed 12-trench contingency. Contingency trenching was utilised where the preservation of the archaeology warranted additional trenching, and proved useful in Zones 1, 2 and 6. The additional trenching in these zones was undertaken to satisfy the aims as outlined above.

- 3.1.2 In addition to the above, a further 60 linear metres of trench was excavated in Zone 7. Two trenches of 25 m and 35 m long by 2 m wide were opened, one of which was specifically targeted on the cursus, the course of which was predicted to cross through the proposed development area.

3.2 Fieldwork methods and recording

- 3.2.1 The trenches were cleaned by hand and the revealed features were sampled to determine their extent and nature, and to retrieve finds and environmental samples. All archaeological features were planned and where excavated their sections drawn at scales of 1:20. All features were photographed using colour slide and black and white print film. Recording followed procedures laid down in the *OAU Fieldwork Manual* (ed. D Wilkinson, 1992).

3.3 Finds

- 3.3.1 Finds were recovered by hand during the course of the excavation and bagged by context. Finds of special interest were given a unique small find number.

3.4 Palaeo-environmental evidence

- 3.4.1 Bulk samples taken in the initial stages of the project were processed quickly and the results fed back to inform the excavation strategy. Samples of 40 litres were taken from securely dated deposits for charred remains. Monoliths and incremental series samples were also taken to assess the palaeo-environmental potential of the features/deposits found.
- 3.4.2 Samples were taken from the cursus (Zone 2) for Radiocarbon dating where datable artefacts were absent and the deposits appeared significant enough to have had a bearing upon future mitigation strategies. This sampling was agreed by JSAC, in consultation with Dr Andy Myers (SDDC).

3.5 Presentation of results

- 3.5.1 As described above, the proposed development site was divided into seven zones. This was done to aid a flexible approach to the evaluation and to help answer specific questions relating to the individual areas. Preserved archaeological horizons were located to the west of Zone 1, to the east and west of Zone 2, in the centre of the site within Zone 6, and at the southern extent of the evaluated area in Zone 7.
- 3.5.2 Section 5 comprises a detailed description of all archaeological observations within each zone, by trench, and including individual context descriptions. General archaeological information, and trenches and test pits devoid of archaeology, are summarised in the trench inventory table (Appendix 1).
- 3.5.3 By projecting the datum level of known archaeology into areas where natural geology had survived at a similar level, irrespective of whether archaeology had been found in these areas, zones of potential survival were illustrated. Areas where disturbance was so severe that the survival of archaeological horizons was thought unlikely were also grouped together into zones of disturbance. The resulting plan (Fig. 2) gives a clear visual impression of the results of the evaluation which can be used to inform any future mitigation strategy.

4 RESULTS: GENERAL

4.1 Soils and ground conditions

- 4.1.1 The evaluation revealed that the site had suffered considerable disturbance during the construction of the power station in the 1950s. Where they survived archaeological horizons were reached at an average depth of:
- 0.1 m in Zone 1 (*c* 44.5 m OD)
 - 0.85 m in Zone 2 (*c* 41.7 m OD)
 - 0.2 m in Zone 6 (*c* 41.35 m OD)
 - 0.6 m in Zone 7 (*c* 41 m OD)
- 4.1.2 Elsewhere, the ground had been truncated to a level within the natural gravels:
- Zone 3 *c* 41 m OD
 - Zone 4 *c* 39.8 m OD
 - Zone 5 *c* 40.5 m OD
- 4.1.3 For individual trench levels see Appendix 1.
- 4.1.4 With the exceptions of the north-western boundary, parts of Zone 2 and Zone 7, all the areas were overlain by modern made-ground, in places exceeding 2.5 m in depth. To the north, terraces had been created by cutting into the natural geology and large areas of gravel extraction were apparent (see Fig. 2 Areas of disturbance).
- 4.1.5 The only surviving topsoil and subsoil layers were located to the south of the site (Zones 2 and 7). The subsoil comprised a mid-yellowish brown sandy silt, which was overlain by a dark brown sandy topsoil.

- 4.1.6 In some areas ground water was a problem and some trenching was hampered by occasional flooding, particularly when machining inadvertently disturbed buried land drains and at times of heavy rainfall during the latter part of the evaluation. The heavily compacted nature of the made ground within Zone 6, and areas of hard standing on Zones 3 and 5, also hindered the progress of the machining, as did the wooded area and overhead power lines to the west of Zone 1. Large spoil heaps distributed across the site were also a problem, this resulted in the adjustment of the location of a number of trenches. In each instance, a decision was made with the South Derbyshire District Councils Archaeological Advisor as to the best way forward for these problems. Decisions were made to either move the trenches to the side of these spoil areas or to compensate by extending trenching elsewhere on the site.
- 4.1.7 Other trenches, especially within Zones 2 and 3 were hampered by live services, particularly electricity cables, which were numerous in these areas and had clearly impacted on the upper levels of the archaeological horizon. Some trenching was abandoned or the recording was curtailed as a safety precaution. Electrical cables were also difficult to detect in these areas, due to their proximity to the sub-station and high voltage overhead cables.

4.2 Distribution of archaeological deposits

- 4.2.1 The Neolithic cursus was identified in Zones 2 and 7, along the southern site boundary to the north and south of the A5132. An early Bronze Age ditch was located within Zone 6, near the centre of the site. A limited amount of archaeology also survived in Zone 1. To the west of this zone, a wide Iron Age ditch, possibly bounding a settlement, was revealed, although it had been heavily truncated.
- 4.2.2 Possible Romano-British enclosure ditches, and a number of undated features were observed within the western part of Zone 2. A limited number of undated features were also seen in Zone 6. Some of them could have been related to the prehistoric ditch, but were more likely to be post-medieval or modern in date.

5 RESULTS: DESCRIPTIONS

5.1 Zone 1

Trenches 1 & 2 (Fig. 3)

- 5.1.1 To the south-east of Trench 1, an E-W aligned ditch was revealed (100 and 102). The same ditch was also seen to continue through the south-west end of Trench 2 (200). The ditch appeared to be slightly curved, and gave the impression that it may have enclosed an area to the south.
- 5.1.2 Within both trenches the southern side of the ditch had been cut away by modern truncation. It was, however, better preserved in Trench 1 where its recorded width was 5.9 m. Following excavation it was shown to be only 0.5 m in depth and

exhibited a very shallow U-shaped profile, with a sharp dip cut into what may have been the centre of the ditch. This feature of the ditch profile may have been caused by erosion but was more likely to have been the result of re-cutting a smaller ditch.

- 5.1.3 The primary deposit in cut 102 was 107, a mid-light grey silty sand with frequent gravel inclusions. This was overlain by 106, a mid-light brown sandy silt with frequent small stone and gravel inclusions. It also contained mineralised flecks, interpreted as iron panning. This deposit contained charcoal flecks, burnt wood and 23 sherds (135g) of Iron Age pottery. This deposit was most likely derived from a slow, natural erosion of the feature sides and surrounding area. The presence of the pottery suggests that it was also likely that domestic refuse had been deposited into the ditch.
- 5.1.4 The primary fill recorded within ditch cut 200 was a greyish orange silt (201) that contained approximately 90% stone inclusions and 2 pottery sherds (43g). This deposit was overlain by 202 that was interpreted as being the same as 106; it also contained Iron Age pottery.

Trenches 3 -25

- 5.1.5 No archaeological features were revealed within these trenches. Large scale gravel extraction was evident within the south-western and eastern trenches. The base of the gravel extraction was revealed at c 42 m OD, 2.2 m below current ground level.

5.2 Zone 2

Trenches 59, 60a, 61, 62a, 73, 74 and 75 (Figs 4 and 5)

- 5.2.1 The Trenches were positioned to locate the northern ditch of the cursus monument, the alignment of which was predicted to bisect the eastern side of Zone 2. Within the trenches it was seen to run on a NE-SW alignment, although it did exhibit a slight kink in its axis in the vicinity of Trench 61. An intervention was cut into the cursus within Trench 62a (6200). The cursus was also seen in other trenches where its unexcavated dimensions were recorded. A second intervention was placed into a ditch within Trench 59. The ditch was on the same alignment as the cursus and contained a charcoal rich fill. However, 20 small fragments of post-medieval building material were recovered during the environmental sampling. It is likely that the cursus had been re-cut by a post-medieval ditch at this point.
- 5.2.2 In Trench 60a the cursus ditch was 1.4 m wide and its northern edge was truncated by a modern service trench. In Trench 61, where it was best preserved, it was 2.7 m wide and was cut by a Romano-British ditch (see below). In Trench 74 its recorded width was 1.9 m.
- 5.2.3 Within Trench 62a the cursus ditch (6200) was 1.94 m wide, 0.37 m deep and exhibited a broad U-shaped profile. Within cut 6200 the basal deposit (6201) was a light brown sandy silt, with infrequent small pebble inclusions. This was overlain by 6202 a black sandy silt with frequent organic inclusions, and was likely to have been

deliberately deposited. This deposit was overlain by a succession of naturally derived sandy silts with occasional small pebble inclusions. In sequence, from earliest to latest, they were 6203 and 6204, which were probably the same deposit and derived from the same depositional event, 6205, 6206, 6209, 6208 and 6207. Many of the deposits within this feature appear to have entered the ditch from the southern, internal, area of the cursus. This may be indirectly related to activity within the monument, but may also be indicative of erosive events acting on an internal earthwork.

- 5.2.4 A ditch (6100) of probable Romano-British date was seen to cut the cursus ditch in Trench 61. The ditch was aligned north-south, and was 1.25 m wide and 0.2 m deep. It had moderate to steep concave sides and a flat base. It was filled by deposit 6101, a mid brown sandy silt, with inclusions of approximately 20% small rounded pebbles. Two sherds (7g) of Romano-British pottery were recovered from this deposit.
- 5.2.5 Within Trench 59 a ditch (5900) was encountered that was broadly similar in size and shape to the cursus ditch. It was 1.36 m wide and 0.3 m deep with a U-shaped profile. The basal deposit was a dark grey silty sand (5904), with frequent gravel inclusions, and was probably derived from a process of natural silting. This was overlain by 5903, a black sandy silt with frequent gravel inclusions. This deposit was very rich in charcoal and may have been deliberately deposited. It may have been dumped from the northern, external, side of the ditch. Above this was deposit 5902, a light brown silty sand with frequent gravel inclusions, and probably the result of natural silting. The latest deposit (5901) in the sequence was similar to 5902, only slightly darker in colour and was also naturally deposited. The fills were similar to those fills seen with ditch 6200, however, 20 fragments of post-medieval tile and burnt clay were recovered from fill 5903. It is likely that ditch 5900 was a post-medieval ditch which cut through the fills of the cursus. The ditch was not seen beyond Trench 59.
- 5.2.6 An undated ditch (7500) was also recorded in Trench 75. This feature was aligned north-south and was 2.95 m wide and 0.28 m deep. It had a broad U-shaped profile and a flat base. The deposit within this cut was a mid greyish brown clayey silt, with inclusions of 3% small sub-rounded pebbles. This deposit was probably formed naturally via wind and waterborne material, and contained no datable finds.

Trench 71 (Fig. 6)

- 5.2.7 Trench 71 was located at the western end of Zone 2 and contained a ditch that may date to the Romano-British period, although this dating does rely on limited evidence (see below). Cuts 7115, 7112 and 7104 have been interpreted as belonging to this ditch, although cut 7104 was the only intervention to be fully excavated. The ditch was aligned on an E-W axis that turned sharply towards the north, perhaps forming part of an enclosure. Where excavated the ditch was 2.1 m wide with a depth of 0.58 m and had a U-shaped profile. Within cut 7104 the ditch was filled by a series of naturally formed silts, probably derived from the gradual erosion of the feature sides

and surrounding area. The primary deposit (7105) was a light brownish grey sandy silt that had entered the ditch from the east. This was overlain by 7106, a mid-brown clayey silt with inclusions of 75% small, angular and rounded stone. This deposit probably derived from the erosion of the feature sides and perhaps upcast, used to form an earthwork to the side of the ditch. This in turn this was overlain by a mid-brownish orange sandy silt (7107), which had been eroded from the western side of the ditch. It was interpreted as being the same deposit as 7113 and 7116 within cuts 7112 and 7115 respectively. Deposit 7108 overlay this deposit and was very similar in composition. The final deposit in the sequence was 7109 that contained a single sherd (58g) of Roman pottery. This deposit was the same as 7114 and 7117 within cuts 7112 and 7115 respectively.

- 5.2.8 Ditch cut 7100 lay immediately to the east of ditch 7104. It was aligned on the same N-S axis, and its dimensions and profile were also very similar. It was 1.9 m wide, and 0.52 m deep. The three deposits (7101 7102 and 7103) within the cut seemed to have derived from the same erosive processes. They were light mid-brown sandy silts and contained less stony inclusions higher in the sequence. This was probably a result of the stabilisation of an adjacent positive feature, such as a bank, that had been eroding into the ditch, and an accumulation of wind and waterborne material. It was probable, but by no means certain without further excavation, that this ditch formed part of the same boundary system as cut 7104 on its western side.
- 5.2.9 Deposit 7114, the upper fill of the possible Romano-British ditch 7112, was cut by a second ditch (7110) aligned E-W. This cut had considerably smaller dimensions to cut 7100 to the north (see above), and was probably not the same ditch. The cut was 0.95 m wide 0.35 m deep, and had steep, straight, sides and a sharply rounded base. It was filled by deposit 7111, a mid-brownish-grey, clayey silt, with inclusions of 5% rounded pebbles that was probably derived from a gradual silting process.
- 5.2.10 At the west end of Trench 71 a linear-ditch that terminated within the trench was recorded. Cut 7118 was aligned NW-SE and terminated to the south-east. It was 2.2 m in length, 0.66 m in width, and its depth was 0.12 m. It was filled by deposit 7119, a dark greyish brown clayey silt with inclusions of 5% small sub-rounded pebbles. No finds were recorded, however this ditch may be associated with the ditches located to the east of the trench.
- 5.2.11 A boundary ditch of probable post-medieval date was located at the southern extent of Trench 71 against the sites southern boundary. Its axis was east-west, and followed the same alignment as the A5132, probably acting as an early boundary with that road. The fills contained fragments of brick.

Trench 80

- 5.2.12 Trench 80 was located over a dense area of services that would have destroyed the upper levels of the archaeological horizon.

5.3 Zone 3

Trench 28

- 5.3.1 Zone 3 had been heavily disturbed although a late Victorian bottle dump was located in Trench 28 at a height of approximately 41.4 m above OD. This feature may have been a gravel pit that had been reused as a dump for domestic refuse, described in the desk based study (JSAC 2004). The feature found in Trench 28 contained bottles and leather shoes of late Victorian date. Many of the bottles, which were largely unbroken, were of similar types and some exhibited patents dated to the 1870s. This feature was overlain by 1.5 m of modern dumped deposits.

Trenches 54-56, 58, 69 and 70

- 5.3.2 No archaeological features were revealed within these trenches. Disturbance from buildings associated with the power station was recorded throughout most of the area. Gravel extraction was observed in Trenches 54-55 to a height of 40.8 m OD (c 0.9 m below current ground level).

5.4 Zone 4

- 5.4.1 No archaeological features were seen within this zone, which had been heavily truncated during the area's use as a fuel store (see Appendix 1 for excavation levels). This truncation did not extend as far south as Trench 36 although no archaeological features were encountered within this trench.

5.5 Zone 5

- 5.5.1 The evaluation found this zone to have been heavily truncated, and no archaeological features were found.

5.6 Zone 6

Trench 49 (Fig. 7)

- 5.6.1 A linear ditch aligned on an east-west axis was located in Trench 49. A 15 m length of this ditch was exposed in extensions to the trench, it was seen to have been cut away at both its eastern and western ends. Two interventions were excavated within the ditch (4902 and 4908). The cut had an average width of 0.5 m and a depth of 0.2 m. Its profile was irregular, V-shaped to the east and became U-shaped to the west. Cut 4902 was filled by clayey silt deposits (4903-5) and cut 4908 was filled by a similar deposit (4909). These deposits were a bluish grey colour and contained approximately 10% small rounded pebbles. They had probably formed naturally via wind and waterborne material eroding from the surrounding area. Although, a band of redeposited natural within deposit 4909 may have eroded from a positive feature, perhaps a bank, positioned along the ditches southern side.

- 5.6.2 A plano-convex flint knife was found within deposit 4905. The find was dated to the early Bronze Age and was very similar to flint knives known from the Beaker period (current radiocarbon span 2400-1700 BC). The knife was in pristine condition (although it had suffered damage during the excavation) and so was unlikely to have been residual.
- 5.6.3 A second linear ditch was recorded in this trench. It was 1.6 m in length and 0.65 m in width (4900), and was aligned NE-SE. It was truncated to the north-east and appeared to terminate to the south-east. The base and sides of this feature were irregular and it had an average depth of 0.23 m. It was filled by deposit 4901, a mid bluish grey clayey silt with inclusions of approximately 60% small rounded pebbles. Although no finds were seen, the ditch fills were very similar to those found in the early Bronze Age ditch and may be contemporary.

Trench 50 (Fig. 7)

- 5.6.4 A linear ditch aligned NW-SE was recorded in this trench (5000). It was 0.57 m wide, 0.1 m deep and recorded as terminating to the south-east. The sides of the cut were shallow and the base concave. The deposit within the cut was a greyish brown silty clay (5001) with inclusions of 40% small rounded pebbles.
- 5.6.5 Modern linear features filled with compacted soils and fragments of brick were seen and recorded in plan.

Trenches 27, 29-33, 45-53 and 76-79

- 5.6.6 No archaeological features were seen within these trenches. Trenches 27, 29 and 30 had been heavily truncated by gravel extraction. Natural gravel was revealed at *c* 42 m OD, 2.4 m below current ground level.

5.7 Zone 7

Trench 81 (Fig. 8)

- 5.7.1 The southernmost ditch in the trench (8104) was aligned approximately NE-SW. Following consultation with the South Derbyshire District Councils Archaeological Advisor it was decided that the ditch was likely to be the Findern/Potlock Cursus. Within the trench it had a width of 1.75 m and a depth of 1 m. Its profile was unusual, although not too dissimilar to that observed by Wheeler in 1970. It had moderate straight, V-shaped sides with the profile becoming very narrow and near vertical towards the flat base of the cut. This change in profile may have been attributable to the cleaning out or recutting of the ditch, although this could not be proved.
- 5.7.2 The ditch was filled by naturally accumulated sands and silts. The initial deposits within the cut were 8105, 8112 and 8116. These were mid reddish brown silty sands with approximately 10% small pebble inclusions. The deposit was confined to the upper levels of the ditch sides and did not extend to the base of the cut. It was

probable that periodic cleaning of the ditch may have removed traces of these deposits from the base of the ditch, although there was no evidence for any re-cutting. They were overlain by 8113, a mottled orangy grey and brown silty sand. This deposit filled the base of the cut and was formed from the deposition of large clasts. They were probably deposited fairly rapidly and may have entered the ditch after regular cleaning had been abandoned. This was overlain by deposits 8110 and 8111. These two fills were very similar and probably derived from the same depositional process. They were pale mid yellowish brown silty sands with *c* 5% small rounded pebble inclusions. They probably derive from gradual deposition by wind and waterborne material. Deposit 8115 was the final deposit recorded in the ditch. It was a mottled mid grey and brown silty sand and contained approximately 20% small rounded pebbles. This deposit may have formed from the natural erosion of the surrounding ground surface, combined with the slumping/collapse of the feature edges and adjacent positive features. Alternatively it may represent a more gradual depositional process caused by agricultural practices such as ploughing. An iron pan layer (8114) had formed over this deposit and extended to the north and south of the cut. This layer did not form over the other cuts seen within this trench and may be an indicator of the greater antiquity of this ditch.

- 5.7.3 Three undated intercutting ditches were located to the north of the cursus ditch and they all shared the same NE-SW alignment. The earliest of these ditches (8106) had been cut on its northern and southern sides by two later ditches (8100 and 8102), so only a 0.6 m width survived. It had a U-shaped base and was 0.15 m in depth. It was filled by 8107, a light yellowish brown sandy silt, probably formed gradually via the deposition of wind and waterborne material.
- 5.7.4 Ditch 8102 cut the southern side of 8106 and may have been a reworking of that feature. It was 0.75 m wide, 0.13 m deep, with a wide U-shaped profile and shallow irregular sides. It was filled by 8103, a mid reddish brown silty sand, that had also formed through natural depositional processes.
- 5.7.5 The second of the possible recuts (8100) cut the northern side of ditch 8106, it was 0.9 m wide and 0.22 m deep. It exhibited a similar profile to 8102 and was filled by a mid yellowish brown silty sand, again formed naturally by the deposition of wind and waterborne particles. A small undated posthole (8108) cut the northern side of this ditch. It was 0.25 m in diameter, 0.13 m in depth and was filled by 8109, a dark reddish brown silty sand.
- 5.7.6 These undated linear ditches may be a continuation of the features recorded as cropmarks to the east of the trench (APS 2004/10).
- 5.7.7 The iron pan layer (8114) and deposits 8103 and 8109 were overlain by a pale mid yellowish brown silty sand (8117), interpreted as a subsoil layer 0.15 m thick. Above this subsoil a layer of gravel overlain by topsoil was recorded. This deposit was probably laid during the construction of the sports field.

Trench 82

- 5.7.8 A single undated curvilinear ditch was found at the eastern end of the trench (8200). This feature may have been the corner of an enclosure running on a north-south axis before turning sharply to the east. It was 1.6 m in width and 0.36 m in depth. Its sides were moderate and straight, and its base was flat. The initial fill of this ditch was a light yellowish brown silt (8201) containing approximately 95%, well rounded, pebble inclusions. This material was similar to the natural gravels and may have derived from a bank made from upcast, situated on the north and eastern edge of the feature. This deposit was overlain by 8202, a sterile mid yellowish brown sandy silt that had probably formed through a gradual process of natural silting.

5.8 Finds**General**

- 5.8.1 The following summaries are taken from the relevant specialist reports which can be found as Appendices 2 and 3.

Prehistoric Pottery

- 5.8.2 A total of 37 pottery sherds (210g) dating to the Iron Age, were found in deposits 106 and 201. This feature was a heavily truncated ditch seen in Zone 1, possibly belonging to a settlement enclosure. Given the amount of material that came from a very limited area it was unlikely to have been intrusive or redeposited. The deposits from which these finds were retrieved were likely to have formed the basal deposits within a once substantial feature. Given the stratigraphic position of the finds, it seems probable that the dating of this feature is secure.

Roman

- 5.8.3 Two sherds of pottery (7g) were found in deposit 6101, which was the fill of a ditch located in Zone 2. Based on such limited evidence, the Romano-British date tentatively given to this feature is not totally secure. It was possible that this material was residual, within the surrounding land surface and entered the feature as part of a natural silting process.
- 5.8.4 A single sherd of Roman pottery (51g) was found in deposit 7109, which was also the fill of a ditch located in Zone 2. This sherd was found in the upper fill and again it was possible that this material was residual, entering the feature as part of a natural silting process from the surrounding land surface. However, the sherd was comparatively large suggesting that it had not been subject to excessive abrasion. Based on such limited evidence the Romano-British date given to the ditches should be viewed with caution.

Lithics

- 5.8.5 A total of three pieces of flint were recovered from context 106, a deposit within a heavily truncated ditch dating to the Iron Age (Zone 1). They were described as a small flake and a chip and were undiagnostic.
- 5.8.6 A plano-convex knife, usually associated with Beaker industries (current radiocarbon span 2400-1700 BC) was the sole find in ditch cut 4902, deposit 4905 (Zone 6). Plano-convex knives are quite rare in Derbyshire and so this example was potentially of great significance. The knife was in pristine condition (although it had suffered damage during the excavation) and was unlikely to have been a residual find.
- 5.8.7 Two flint flakes were recovered from the residues following the environmental sampling of context 8101, a fill of the southern cursus ditch. Although both have pronounced ripples on one side, neither piece has a clear striking platform or convincing dorsal features. It is likely that these flakes have been naturally, as opposed to humanly, struck.

5.9 Palaeo-environmental remains

General

- 5.9.1 The following summaries are taken from the relevant specialist reports, which can be found as Appendices 4 and 5.

Carbonized plant remains and charcoal

- 5.9.2 Samples were taken to explore a range of environmental ecofactual evidence. These included columns for micromorphology and palynology subsampling and bulk samples for charred plant remains, molluscs, small bones and artefacts. A range of ditches were sampled; these included the Neolithic cursus ditch, a Bronze Age ditch and an Iron Age ditch. Incremental samples were taken to assess the preservation of molluscs through the cursus ditch, however due to the low quantities of snails recovered in the flots from the bulk samples, the snail incrementals were not processed at this stage.
- 5.9.3 The charred material from the contexts sampled at Willington was limited in its nature. With the exception of the few unidentified charred weed seeds recovered from three samples, the charred material was exclusively charcoal. Most of the charcoal was less than 2 mm in diameter and therefore not identifiable. Of particular interest perhaps is the charred material from the Neolithic cursus ditch (sample 13013 context 6206). There were significant mineral deposits on the exterior of the charcoal and present in the pores. While full mineral exchange has not taken place (and therefore the material cannot be described as mineralised) mineral deposition in this sample is significant. The mineral deposits could be symptomatic of charcoal deposited in the presence of quantities of ash in an environment with a fluctuating water table. It also seems likely that some iron panning resulted from a seasonally waterlogged deposit. These mineral deposits could result from a gleyed soil, and it

seems likely that at the very least the lower sediments of this feature were seasonally waterlogged. The presence of *C. avellana* (Hazel), a relatively short-lived species, in the charcoal from this context provided a sample for radiocarbon dating (see below).

Carbon Dating

- 5.9.4 Hazel charcoal was recovered from a fill within the cursus ditch (6206) and sent to the *Leibniz Labor für Altersbestimmung und Isotopenforschung*, Kiel, Germany for carbon dating. At a probability of 95.4% the calibrated determination falls into the range 3340-3020 cal. BC. This places the back-filling event in the Neolithic. Due to the calibration plateau at this period the range of the calibrated date is relatively wide (3340 cal BC-3020 cal BC). The date does however provide a TAQ for the construction of the cursus ditch and a TPQ for the back-filling of the cursus ditch (see Appendix 5).

6 DISCUSSION

6.1 Reliability of field investigation

Zone 1

- 6.1.1 The evaluation demonstrated that large areas to the south and east of Zone 1 had suffered from heavy truncation during the construction of the power station and later gravel extraction along the northern boundary. As a result of gravel extraction in Zone 1, natural geology was reached at a depth of *c* 42 m OD. The landscaping associated with the power station, or perhaps the construction of the railway, was less destructive. The base of a heavily truncated Iron Age ditch was revealed in Trenches 1 and 2 and was located at a level of 44.32 m above OD. The ditch was the only archaeological feature observed within Zone 1 and it is likely that most of the upper fills had been lost to landscaping. Any shallower features within Zone 1 would also have been lost to this landscaping. Their absence is unlikely to be due to a lack of settlement activity.
- 6.1.2 Despite the levels of disturbance to the archaeological record there appeared to be little cross-contamination of finds. The Iron Age ditch was securely dated.

Zone 2

- 6.1.3 In Zone 2 there was relatively little disturbance within the area to the south of the power station. The evaluation found that the area may have been reduced by 0.3 or 0.4 m, if the depth of the cursus ditch is compared to that excavated by Wheeler in 1970.
- 6.1.4 Within Trench 61, where the best preservation was seen, the natural geology was found at 40.96 m above OD, below 0.75 m of overburden. It was suggested that the monument had been ploughed over by the turn of the first millennium AD (JSAC 2004). Certainly prior to the construction of the power station, modern farming methods had caused damage to the monument's ditches, and levelled any surviving

earthwork. A large part of the eastern end of Zone 2 had been reduced to the base of the subsoil, with small areas of subsoil preserved against the eastern boundary and to the north of the present car parking area, in the vicinity of Trenches 62b, 74 and 75. Service trenches were prevalent in the area, the largest of which is illustrated on Figure 4 as an area of truncation on a NW-SE axis across the eastern end of the zone. Further to this, most of trenches 59 and 80 were abandoned, due to live services in the area.

- 6.1.5 The archaeology was also well preserved at the western end of Zone 2, natural geology was found at an average depth of 41.3 m above OD, 1.3 m higher than at the eastern end of the zone. It was overlain by 0.85 m of overburden that included subsoil and topsoil.

Zone 3

- 6.1.6 Zone 3 was found to have been heavily truncated by the construction of the power station. Some of the proposed trenches were either reduced in size or were replaced by test pits. However, a small area to the north and east of this zone was less truncated and potentially significant archaeological horizons may have survived here. The recorded depth above OD at the surface of the natural geology in Trenches 54a, b and Trench 55 ranged between 42.03 m and 41.39. This was comparable to the depth at the surface of the Bronze Age ditch in Zone 6, at 41.55 m above OD. The late 19th century refuse tip in Trench 28 also indicated that truncation may not have destroyed all archaeological horizons, however it is likely that only deeper archaeological features would survive.

Zone 4

- 6.1.7 Only a small area of Zone 4, in the vicinity of Trench 36, was considered to be of potential archaeological interest, the rest of the area had been greatly reduced by gravel extraction. No archaeological features were seen, however, the natural geology was preserved at 48.83 m above OD, a level at which archaeological features were found to have survived elsewhere.

Zone 5

- 6.1.8 Two test pits were excavated in Zone 5 and natural geology was seen at *c* 40.5 m above OD. This apparent disturbance to the area made the survival of significant archaeological horizons unlikely.

Zone 6

- 6.1.9 Zone 6 had been landscaped and the level of the natural gravel was artificially low. However, a large area of Zone 6 was found to be of archaeological interest. The exposed features indicated that archaeological horizons were preserved, although heavily truncated. It was probable that the Prehistoric ditches dimensions had been drastically reduced by recent disturbance to that area. What remained of the features

was probably the primary fills of what would have been much more substantial ditches.

Zone 7

6.1.10 The evaluation in Zone 7 showed that this area of the site had not suffered from modern truncation and an early sub-soil layer had survived below the recently laid topsoil and makeup layer. The ditch interpreted here as the southern ditch of the cursus monument was also well preserved, with similar dimensions to those illustrated by Wheeler in 1970.

6.2 Overall interpretation

Neolithic

- 6.2.1 The northern and southern ditches of the Findern/Potlock Cursus were revealed within the southern part of the site. In the south-eastern part of the power station site the northern cursus ditch was revealed within four Trenches but could not be traced beyond Trench 60a, due to the presence of live cables and a post-medieval ditch. The southern cursus ditch was probably revealed within Trench 81, within the sports field. The distance between the two ditches was approximately 60 m. No datable finds were retrieved from the ditches. A C14 sample taken from the northern ditch produced an early to mid-Neolithic date.
- 6.2.2 The fills of the ditches were mostly indicative of natural silting, although the charred deposit seen within the northern ditch may have been deliberately deposited.
- 6.2.3 The undated ditches within Trench 81 are likely to be the continuation of the ditches seen on aerial photographs (APS 2004/10), to the east of Zone 7 (Fig. 9). However, it is also possible that the ditches formed part of later field systems. The linear feature shown as bisecting the southern end of the evaluated area, and also on the same alignment as the cursus, was interpreted as a probable drainage system of recent date. To the east of the sports field this feature's orientation appears to turn to the south-east. Based on the aerial photographic assessment this cropmark crosses the evaluated area approximately 13.5 m to the south of the cursus ditch seen in Trench 81. One of the linear features located slightly to the north of this cropmark, and interpreted as probably being part of a trackway incorporating parts of the cursus, would be a more likely candidate for the cursus.
- 6.2.4 Further to this, the evaluation found that a gravel layer had been deposited over the sports field prior to the laying of new topsoil. This may explain why most of the cropmarks were not shown to extend into the sports field. That the cropmark seen bisecting the sports field was visible through these makeup layers also suggested that it was of modern origin.
- 6.2.5 The possible enclosure ditch seen within Trench 82 may have formed part of a Prehistoric feature associated with the cursus, although no dating evidence was recovered.

Bronze Age

- 6.2.6 Three possible Bronze Age ditches were revealed within Trenches 49 and 50. The fills were broadly similar and the ditches may have been contemporary. No pottery was recovered although a Beaker style flint knife was recovered from one of the ditches. The area had been subject to landscaping and it is likely that the ditches formed the bases of larger features. It is likely that the site was once an active Bronze Age landscape, although only limited evidence survives as a result of the construction of the power station.

Iron Age

- 6.2.7 A large Iron Age ditch was revealed in the north-west part of the site. The ditch was heavily truncated but was *c* 6 m wide and 0.5 m deep. What was left of this ditch indicated that it had been a very substantial feature. Truncation in this area might have been by at least 1.5 m, if not substantially more. The levels of truncation in this area made interpretation difficult. Large ditches of this type are often interpreted as being defensive, and associated with settlement sites. This, and the comparatively large amounts of pottery found within the surviving fills, would indicate that a habitation site had existed in the area, probably to the south. The high level of truncation to the northern part of site meant that any evidence for structures or activity would have been lost.

Romano-British

- 6.2.8 Limited Romano-British dating evidence was recovered from two features to the north of the northern cursus ditch. The possible enclosure ditches seen to the west, within Trench 71 may have formed stock pens. The linear ditch to the east may have formed part of an associated field system.

Post-medieval/modern

- 6.2.9 The Victorian bottle dump found within Trench 28 is likely to have been associated with Potlock Farm. The modern ditches may also have been associated with the farm complex.

APPENDICES

APPENDIX 1 TRENCH INVENTORY

Trench	Length	OD on natural geology	Depth excavated	Context No.	Type	Finds No./wt	Dating
1	56 m	44.32 m	0.4 m	100	Ditch		
				101	Ditch fill		
				102	Ditch		
				103	Dumped deposit		
				104	Dumped deposit		
				105	Dumped deposit		
				106	Ditch fill	Pot, 23, 135g Flint, 2	Iron Age
				107	Ditch fill		
2	50 m	44.47 m	0.36 m	200	Ditch		
				201	Ditch fill	Pot, 14, 75	Iron Age
				202	Ditch fill		
3	42.5 m	44.407 m	0.25 m		-	-	-
4	40.6 m	44.137 m	0.36 m		-	-	-
5a	8.2 m	-	0.7 m		-	-	-
5b	17.3 m	-	1.50 m		-	-	-
6a	27.4 m	44.46 m	0.4 m		-	-	-
6b	10.2 m	44.56 m	0.4 m		-	-	-
7	50 m	-	0.45 m		-	-	-
8a	7.5 m	-	1 m		-	-	-
8b	9.3 m	-	1 m		-	-	-
8c	11.5 m	43.93 m	0.8 m		-	-	-
9	10 m	-	0.8 m		-	-	-
11a	23.9 m	-	1.2 m		-	-	-
11b	3.1 m	-	1.2 m		-	-	-
12	26.2 m	-	0.95 m		-	-	-
13	46.2 m	44.92 m	0.4 m		-	-	-
14	50 m	44.89 m	0.23 m		-	-	-
15	50 m	44.86 m	0.25 m		-	-	-
16	50.3 m	44.98 m	0.35 m		-	-	-
17	49.9 m	45.11 m	0.35 m		-	-	-
18	27 m	45.17 m	0.3 m		-	-	-
19	50 m	45.03 m	0.35 m		-	-	-
20	43 m	44.91 m	0.6 m		-	-	-
21a	8.1 m	-	1.2 m		-	-	-
21b	7.2 m	-	1.2 m		-	-	-
21c	6.3 m	-	1.35 m		-	-	-
21d	5.6 m	-	1.35 m		-	-	-
22	6.2 m	-	1.1 m		-	-	-
23a	7.5 m	-	1.65 m		-	-	-
23b	4.7 m	42.07 m	2.25 m		-	-	-
24	5 m	42.03 m	2.1 m		-	-	-
25	8 m	-	0.6 m		-	-	-
26	2 m	-	0.75 m		-	-	-

Trench	Length	OD on natural geology	Depth excavated	Context No.	Type	Finds No./wt	Dating
27	8 m	41.93 m	2.4 m		-	-	-
28	2.5 m	41.4 m	1.5 m		Refuse tip	Bottles (Not retained)	Post-medieval
29	4 m	-	1.1 m		-	-	-
30	21.3 m	-	0.7 m		-	-	-
31	50 m	41.96 m	0.35 m		-	-	-
32	49.8 m	41.75 m	0.42 m		-	-	-
33	50 m	41.3 m	0.65 m		-	-	-
34	50 m	-	1.2 m		-	-	-
35	7 m	-	1.2 m		-	-	-
36	50 m	43.83 m	0.4 m		-	-	-
37a	5 m	-	1 m		-	-	-
37b	5 m	-	1.2 m		-	-	-
38a	5 m	-	0.97 m		-	-	-
38b	4 m	-	1.3 m		-	-	-
39	7 m	-	1.3 m		-	-	-
40	4 m	-	1 m		-	-	-
42	5 m	-	1 m		-	-	-
43a	7 m	-	1.25 m		-	-	-
43b	17 m	-	1.2 m		-	-	-
43c	7 m	-	1.25 m		-	-	-
44	50 m	-	1.2 m		-	-	-
45	50 m	-	1 m		-	-	-
46	50 m	41 m	0.5 m		-	-	-
47	50 m	41.02 m	0.65 m		-	-	-
48	50 m	41.37 m	0.35 m		-	-	-
49	80 m	41.35 m	0.2 m	4900	Ditch		
				4901	Ditch fill		
				4902	Ditch		
				4903	Ditch fill		
				4904	Ditch fill		
				4905	Ditch fill	Flint Knife, 1	Early Bronze Age
				4908	Ditch		
				4909	Ditch fill		
50	50 m	41.3 m	0.4 m	5000	Ditch		
				5001	Ditch fill		
51	50 m	41.14 m	0.7 m		-	-	-
52	50 m	41.01 m	0.8 m		-	-	-
53	50 m	41.19	1.1 m		-	-	-
54a	14.7 m	40.83 m	0.87 m		-	-	-
54b	5.9 m	41.95 m	0.92 m		-	-	-
55	25 m	42.03 m	0.7 m		-	-	-
56	8 m	-	0.3 m		-	-	-
58	30 m	-	2 m		-	-	-
59	13.9 m	42.01 m	0.7 m	5900	Ditch		
				5901	Ditch fill		
				5902	Ditch fill		
				5903	Ditch fill	CBM, 20	Post-medieval
				5904	Ditch fill		
60a	28.5 m	40.79 m	0.9 m		Ditch	-	Neolithic (extrapolated)

Trench	Length	OD on natural geology	Depth excavated	Context No.	Type	Finds No./wt	Dating
60b	14 m	-	1.5 m		-	-	-
61	22.4 m	40.96 m	0.75 m	6100	Ditch	-	
				6101	Ditch fill	Pot, 2, 7g	Roman
					Ditch		Neolithic (extrapolated)
62a	27 m	41.07 m	0.30 m	6200	Ditch	-	Neolithic (extrapolated)
				6201	Ditch fill		
				6202	Ditch fill		
				6203	Ditch fill		
				6204	Ditch fill		
				6205	Ditch fill		
				6206	Ditch fill		
				6207	Ditch fill		
				6208	Ditch fill		
				6209	Ditch fill		
62b	25 m	39.33 m	1 m		-	-	-
63a	11 m	-	1.1 m		-	-	-
63b	3 m	-	1.1 m		-	-	-
63c	5 m	-	0.5 m		-	-	-
64a	7 m	-	1.1 m		-	-	-
64b	7 m	-	1.2 m		-	-	-
65a	7 m	-	1.1 m		-	-	-
65b	6 m	39.76 m	2.1 m		-	-	-
66a	7 m	-	0.5 m		-	-	-
66b	7 m	-	1.1 m		-	-	-
67	4.5 m	40.72	1 m		-	-	-
68	4.5 m	40.41 m	1.1 m		-	-	-
69	50 m	-	1.2 m		-	-	-
70	50 m	-	0.6 m		-	-	-
71	63.5 m	41.3 m	0.85 m	7100	Ditch		
				7101	Ditch fill		
				7102	Ditch fill		
				7103	Ditch fill		
				7104	Ditch		
				7105	Ditch fill		
				7106	Ditch fill		
				7107	Ditch fill		
				7109	Ditch fill	Pot, 1, 58g	Roman
				7110	Ditch		
				7111	Ditch fill		
				7112	Ditch		
				7113	Ditch fill		
				7114	Ditch fill		
				7115	Ditch		
				7116	Ditch fill		
				7117	Ditch fill		
				7118	Ditch		
				7119	Ditch fill		
72	3.5 m	41.98 m	0.9 m		-	-	-
73	27 m	-	1.2 m		-	-	-
74	32 m	41.1 m	0.75 m		Ditch	-	Neolithic

Trench	Length	OD on natural geology	Depth excavated	Context No.	Type	Finds No./wt	Dating
							(extrapolated)
75	31 m	41.22 m	0.65 m	7500	Ditch	-	Undated
				7501	Ditch fill		
76	50 m	41.11 m	0.4 m		-	-	-
77	35 m	41.12 m	0.55 m		-	-	-
78	50 m	41.85 m	0.45 m		-	-	-
79	112 m	41.5 m	0.35 m		-	-	-
80	11 m	-	0.5 m		-	-	-
81	25 m	41.1 m	0.6 m	8100	Ditch		Undated
				8101	Ditch fill	Flint 2	
				8102	Ditch		Undated
				8103	Ditch fill		
				8104	Ditch		Neolithic (extrapolated)
				8105	Ditch fill		
				8106	Ditch		Undated
				8107	Ditch fill		
				8108	Posthole		
				8109	Posthole fill		
				8110	Ditch fill		
				8111	Ditch fill		
				8112	Ditch fill		
				8113	Ditch fill		
				8114	Iron panning		
				8115	Ditch fill		
				8116	Subsoil		
				8117	Subsoil		
82	35 m	41.07 m	0.5 m	8200	Ditch	-	Undated
				8201	Ditch fill		
				8202	Ditch fill		

APPENDIX 2 POTTERY AND FIRED CLAY*By Edward Biddulph*

Forty sherds of pottery, weighing 275 g, were recovered from the site. Pottery fabrics were identified with the aid of a microscope at x20 magnification and assigned codes from Oxford Archaeology's standard recording system (Booth, n d).

Table A2.1. Summary of pottery

Context	Count	Weight (g)	Comments	Date
106	23	135	Fabrics QP3, AG3: Bodysherds	Iron Age
201	2	43	Fabric QP3: Rim of barrel-shaped jar; bodysherd	Iron Age
202	12	32	Fabric QP3: Bodysherds	Iron Age
6101	2	7	Derbyshire coarse ware bodysherds	c AD 150-300
7109	1	58	Fabric R30: Jar base	AD 43-410
Total	40	275		

The majority of pottery belonged to the Iron Age, and all of this was retrieved from trenches 1 and 2. Two fabrics - or, at least, two versions of essentially the same fabric - were encountered: a medium-coarse quartz- and grog/clay pellet-tempered fabric, with lesser amounts of smaller sand grains and mica (QG3), and a medium-coarse sand- and grog/clay pellet-tempered fabric (AG3). Context 201 yielded a rim sherd from a probable barrel-shaped jar, perhaps of middle to late Iron Age date. The other sherds from contexts 106, 201 and 202 comprised bodysherds, although it is possible that some of these and the rim belonged to the same vessel.

The remaining pottery dated to the Roman period. Context 6101 yielded two sherds of hard-fired Derbyshire coarse ware. These probably form part of a jar, the commonest vessel type available in the ware, and date to the 2nd or 3rd century, the main period of production (Tyers 1996, 190-1). A fragment from a jar base in sandy grey ware (R30) from context 7109 could not be closely dated within the Roman period.

Context 5903 contained 20 fired clay fragments, weighing 12 g. All were oxidised and pink/orange-red in colour. Fabrics were generally fine with few inclusions. None of the pieces was sufficiently diagnostic to allow identification, but it is likely that some may belong to tiles or similar. One piece had the traces of a slip and could form part of a ceramic vessel. A tentative post-medieval date can be suggested for the group as a whole.

APPENDIX 3 WORKED FLINT*By Rebecca Devaney*

A total of three pieces of flint were recovered from two contexts at Willington Power Station (Table A3.1). Context 106 contained a small flake and a chip. The flake has a partly cortical platform and a broken ventral surface. Both pieces are slightly damaged and exhibit sporadic iron staining.

A plano-convex knife, usually associated with Beaker industries, was the sole find in a Bronze Age ditch (context 4905). The piece was broken during excavation, however, it has been reconstructed with only a few missing fragments. Invasive retouch covers the dorsal surface with just a small area of dorsal cortex remaining in the centre. Retouch on the ventral surface is limited to the edges and on the whole results from the preparation of the edge for

dorsal flaking. A small amount of reworking is present on the medial left. There is an old break at the distal end and a small nick in the right edge. These are distinguished as being older than the modern breaks by the iron staining that covers the whole of the piece and the broken edges. In comparison, the modern breaks are a pale grey, the colour of the flint before the post-depositional staining.

Two flint flakes were recovered from the residues following the environmental sampling of context 8101, a fill of the southern cursus ditch. Although both have pronounced ripples on one side, neither piece has a clear striking platform or convincing dorsal features. It is likely that these flakes have been naturally, as opposed to humanly, struck.

Table A3.1. Summary of flint

	106	4905	8101	Total
Flake	1		2	3
Chip	1			1
Plano-convex knife		1		1
Total	2	1	2	5

APPENDIX 4 ENVIRONMENTAL DATA

By Seren Griffiths and Prof Mark Robinson

Methodology

Two phases of evaluation were undertaken at the Willington Power Station. Samples were taken to explore a range of environmental ecofactual evidence. These included columns for micromorphology and palynology subsampling, and bulk samples for charred plant remains, molluscs, small bones and artefacts. A range of ditches were sampled, these included a Neolithic cursus, an Iron Age (IA) ditch and a Bronze Age (BA) ditch. Sample volumes ranged between 10 l and 60 l (see table A4.1). The bulk samples were processed by floatation using a modified Siraf-type machine, the flot being collected onto a 250 micron mesh. The samples were air-dried and the flots scanned under a binocular microscope at Oxford Archaeology. Initially assessment was undertaken at Oxford Archaeology by Seren Griffiths, and several samples were assessed by Prof Mark Robinson at the Environmental Archaeology Unit, Oxford University Museum. Incremental samples were taken to assess the preservation of molluscs through the cursus ditch, however due to the low quantities of snails recovered in the flots from the bulk samples, the snail incrementals were not processed at this stage.

Results

Charred Plant Remains

The first phase of evaluation

Samples 13003 (context 4905), 13014 (context 4909), 13000 (context 106), 13013 (context 6206), 13015 (context 5903).

Four of the samples produced moderately-sized flots, between 150 and 100 ml, while sample 13015 (context 5903) produced a much larger flot of ca. 1000 ml. The majority of the charred plant material present in the samples proved to be charcoal. This was frequent in sample 13013 (context 6206) and common or abundant in samples 13000 (context 106) and 13015

(context 5903). Charred weed seeds were present in samples 13003 (context 4905), 13000 (context 106) and 13014 (context 4909). Molluscs were present in sample 13014 (context 4909) but were limited to *Cecilioides acicula*. Coal and slag/klinker material was recovered from sample 13003 (context 4905). Charcoal from the Neolithic cursus was heavily infused with sediment and had significant mineral deposition both around the items and within the pore structure, while this made identification difficult some of the charcoal was classified as probable *Corylus avellana* (Hazel).

Zone 7

Samples 13016 (context 8101), 13017 (context 8111), 13018 (context 8113) and 13019 (context 8115).

After the interesting results from the first phase it was decided to sample every potentially Neolithic context uncovered in Zone 7. Because of the low yield of material from the first set of samples it was also decided to increase the sample size to 60 litres.

The flots from the second set of samples were of fairly uniform volume ranging from 30 to 50 ml. The samples all had significant quantities of modern root and insect material. Charred remains were infrequent in any of the samples. Charcoal was present in sample 13019 (context 8115) and frequent in sample 13016 (context 8101). No other charred plant remains were visible in sample 13019 (context 8115) and no charred plant material was present in sample 13018 (context 8113). Sample 13016 (context 8101) contained a highly degraded Graminaea (cereal grain) seed and two weed seeds. Sample 13017 (context 8111) contained a fragmentary Graminaea (grass) seed.

Sieved Finds and Residues

Zones 1-6

Finds of pottery, burnt stone and flint were recovered from 13000 (context 106). Burnt clay and burnt stone were recovered from sample 13015 (context 5903). Klinker/slag material was recovered from sample 13003 (context 4905). Residues with apparent ferromagnetic properties were retained from samples 13015 (context 5903), 13003 (context 4905), 13000 (context 106) and 13014 (context 4905).

Zone 7

Two undiagnostic struck flint flakes were recovered from sample 13016 (context 8101).

Discussion

The charred material from the contexts sampled at Willington was limited in its nature. With the exception of the few unidentified charred weed seeds recovered from three samples (see table A4.1) the charred material was exclusively charcoal. Most of the charcoal was <2mm and therefore not identifiable. Of particular interest perhaps is the charred material from the Neolithic cursus ditch (sample 13013 context 6206). There were significant mineral deposits on the exterior of the charcoal and present in the pores. While full mineral exchange has not taken place (and therefore the material cannot be described as mineralised) mineral deposition in this sample is significant. The mineral deposits could be symptomatic of charcoal deposited in the presence of quantities of ash in an environment with a fluctuating water table. It also seems likely that some iron panning resulted from a seasonally waterlogged deposit. These mineral deposits could result from a gladed soil, and it seems likely that at the very least the lower sediments of this feature were seasonally waterlogged. The presence of *C. avellana* (Hazel), a relatively short-lived species, in the charcoal from this context provided a sample for radiocarbon dating.

The coal/slag/klinker material found in sample 13003 (context 4905) is also of interest. This material was recovered from a fill of a feature dated to the BA. While such deposits might arise from ancient metal working, this type of material would be more expected to result from a dump of modern iron working residue, particularly if the material is coal and is likely to be intrusive.

The only molluscs present in the samples were *Cecilioides acicula* a burrowing species likely to be intrusive and therefore not indicative of contemporary environment.

The ecofactual material recovered from Zone 7 at Willington Power Station was very different from that recovered from the first phase. The charred material in the second batch of flots was limited and fragmentary, or so degraded as to make identification difficult. The volumes of modern plant material in the flots are large, as are the quantities of modern insect matter, which might suggest a relatively disturbed deposit.

There is a distinct difference between the flots derived from the Neolithic cursus from the first evaluation and those derived from the second evaluation. It would seem likely that either the charcoal rich deposit sampled in the first stage (sample 13013, context 6206) represented a discrete area of dumping, or the deposit sampled in the second phase of evaluation represents a different feature or use of that feature. It may be that the differences in the deposits within the cursus ditch reflects spatially discrete activity, but at this stage no further interpretation is possible.

Future work

Some further work could be undertaken on the bulk charred plant remains from the first phase of work, specifically the identification of the weed seeds, however there is no further potential from the bulk charred plant remains from the second phase of work. If pollen survives, further work could provide information pertaining to the environment associated with the fills of the Neolithic cursus ditch.

Given the rarity of the deposits and features any further work at the site would deserve a detailed sampling strategy in lines with current best practise. These strategies should be discussed at the planning stage of any further work to reflect the rarity of such sites and the import attached by English Heritage to research in environmental archaeology of the Neolithic.

Table A4.1- a summary of the charred plant remains

Sample No	Context No	Flot vol (ml)	Type of context	Charcoal	Grain	Chaff	Weeds	Other charred	Molluscs	Volume floated (litres)	Notes
13003	4905	60	BA ditch				+	+ stem matter		40	Very glassy klinker, ?coal and slag material. Modern worm egg cases, and modern plant material-10% volume
13014	4909	50	BA ditch				+		+ <i>Cecilioides acicula</i>	40	
13000	106	80	IA ditch	+++ <2mm			+			40	Modern ant, 10% volume modern root matter
13013	6206	100	Neolithic cursus ditch	++ inc <i>C. avellana</i> (Hazel)						10	Mineral deposition around charc and in pores- fluctuating water-table and/or iron panning?
13015	5903	1000	Post-med ditch	+++ <2mm						40	Lots of charc generally <2mm
13019	3115	30	Neolithic cursus ditch	+						60	Worm eggs, modern root matter 90% vol., modern insects, modern weed seeds
13016	8101	50	Neolithic cursus ditch	++ <2mm	?+ Graminac a-highly degraded		+			60	++ worm eggs, modern weed seeds, modern insects/. Charc. highly comminuted
13017	8111	50	Neolithic cursus ditch		?+ Graminac a					60	
13018	8113	50	Neolithic cursus ditch							60	No charred plant material

Key: +=present (up to 5 items), ++=frequent (5-25), +++=common (25-100)

APPENDIX 5 RADIOCARBON DATING

By Seren Griffiths

Sample selection and aims

Environmental samples were taken from the two phases of evaluation at Willington Power Station. Charcoal was recovered from a context which was regarded as a deliberate dumped deposit within the backfill of the Neolithic cursus ditch. This charcoal was identified by Professor Mark Robinson of the University Museum, Oxford as *Corylus avellana* (Hazel), a relatively short-lived tree species. Neolithic cursuses are rare monuments and relatively few radiocarbon determinations have been made. Even the ability to produce a relatively coarse absolute chronology, such as a *terminus post quem* (TPQ) or *terminus ante quem* (TAQ) for these monuments' construction is of national and regional importance and in line with current best practise as defined by English Heritage (eg Campbell and Straker in prep.). It was therefore decided to produce a radiocarbon determination on the material recovered from the Willington cursus ditch. The aims were to establish that the feature was of Neolithic origin and to aid the archaeological interpretation of the site, particularly whether the site was in use at the same time as other similar monuments. Accordingly a sample of *C. avellana* wood charcoal was sent to the Radiocarbon Laboratory in Kiel, Germany.

Results

Accelerated Mass Spectrometry (AMS) allows the direct counting of naturally occurring radioactive carbon isotopes (^{14}C) which can be used as a 'radioactive clock' to establish time of death of any organic material. Mass spectrometry also allows the counting of other isotopes of carbon (^{13}C) which are used as part of a quality control test (Reimer *et al.* 2004). The number of units of these isotopes are expressed relative to internationally agreed standards and expressed as delta ^{13}C parts per thousand ($\delta^{13}\text{C}$ ‰). Because the production of radiocarbon has not been uniform through time, radiocarbon measurements need to be calibrated using computer programs such as (and this case) Oxcal vers. 3.10 (Bronk Ramsey 2005). Standard error expressions on radiocarbon determinations are generated through the counting process at the lab, these are expressed as probability percentages of confidence that the actual event lies within the range quotes.

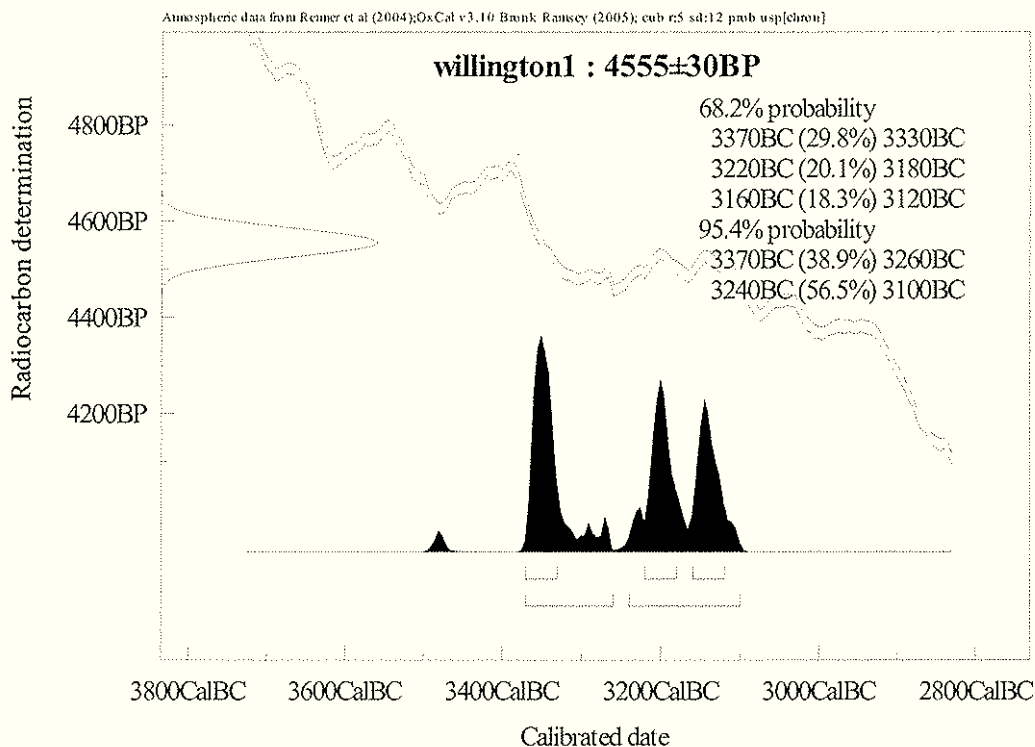
An AMS determination was made on the sample at the Kiel Radiocarbon Laboratory. The graph of the calibrated age range and the confidence levels is shown below (see A5.1). This calibrated date put the death of the charred hazel wood (and we assume subsequent charring and back-fill of the ditch) in the middle British Neolithic. However, the $\delta^{13}\text{C}$ ‰ for this determination, was unusually negative (-41.81 ± 0.31), wood charcoal would be expected to have a value of c -25‰ (Bowman 1995). $\delta^{13}\text{C}$ is used as a means to correct for fractionation in nature, and can thus have an effect on the age determination of a sample, as it is usually normalised to -25‰ . It can also be indicative of problems with the laboratory procedure, for example, transfer of gases in a vacuum system may involve fractionation error if the sample gas is not allowed to equilibrate. The significantly higher than expected value for wood charcoal was therefore cause for concern. The Kiel Radiocarbon Laboratory agreed to re-run the determination, at no extra cost, to investigate this reading. The new determination resulted in a $\delta^{13}\text{C}$ value of -27.40 ± 0.08 ‰ and a subsequent change in determination and calibrated date (see A5.2). This determination was regarded as reliable.

Discussion

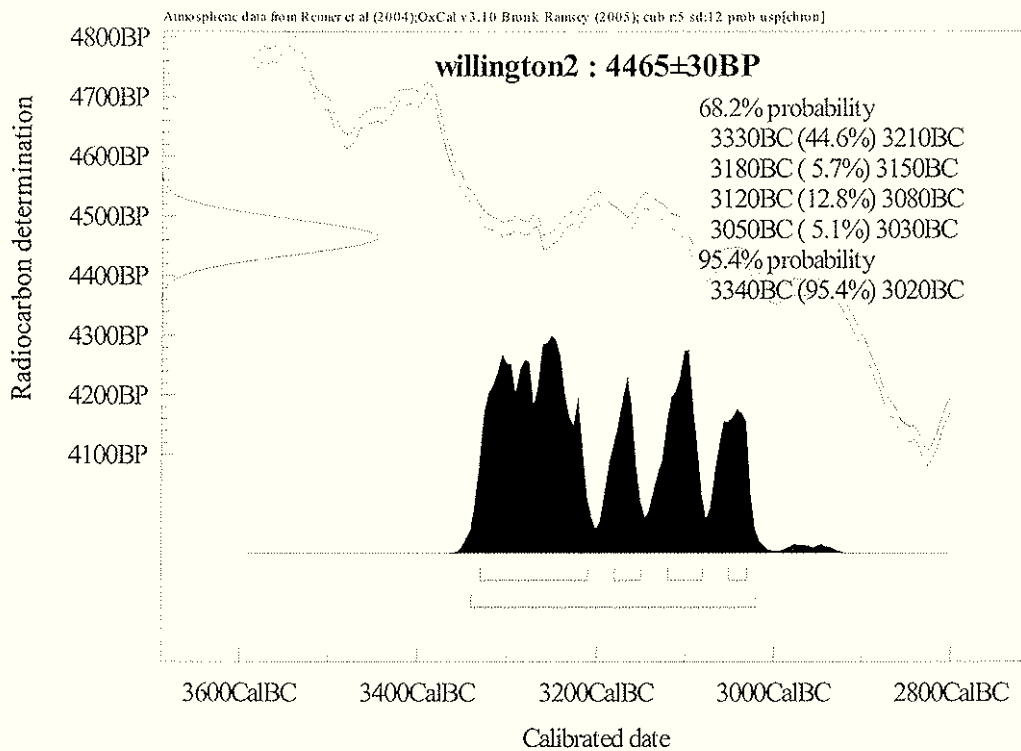
At a probability of 95.4% the second calibrated determination falls into the range 3340-3020 cal. BC. This places the back-filling event in the Neolithic. Due to the calibration plateau at this period the range of the calibrated date is relatively wide (3340 cal BC-3020 cal BC). The date does however provide a TPQ for the back-filling of the cursus ditch, and a TAQ for the construction of the cursus ditch. Because a short-lived wood species (*C. avellana* lives to c 50-70 years without coppicing) was chosen it is possible to state that this calibrated date provides a reasonably close approximation for the date of burning and back-fill. Such ritual structures are relatively rare, and absolute chronology is essential given their regional and national significance. Willington is now the twenty third such monument with a radiocarbon determination (see Barclay and Bayliss 1999). It would be desirable to explore the development of the site through time, and a suite of radiocarbon determinations combined with appropriate modelling would allow significant refinement of the chronology. As noted (*ibid*) there are a number of questions of great archaeological interest which can only be answered by a detailed engagement with the chronology. These might include the possibility of the phased construction of the cursus, including the re-cutting of ditches through time and back-filling of the ditches. Statistical modelling, especially, which is only possible on a range of determinations, might allow us to narrow the phase of construction.

The reason for the more negative than expected $\delta^{13}\text{C}$ on the first determination is unclear, but could possibly result from a fractionation event in the graphitisation rig. The difference between the first and the second date is 88 ± 44 years. It is important to note, that while in this case the effect of the fractionation of ^{13}C was relatively limited, a non-laboratory derived contaminant which is not removed by the pre-treatment procedures can have a significant effect on the final date.

Graph A5.1



Graph A5.2

**Radiocarbon Age Willington 2: BP 4465 ± 30****Lab identification KIA2768 Charcoal <13013>(6206)**

Calibrated Ages:

One Sigma Range

(Probability 68.3%) cal BC 3330-3210 (44.6%)
 cal BC 3180-3150 (5.6%)
 cal BC 3120-3080 (12.8%)
 cal BC 3050-3030 (5.1%)

Two Sigma Range

(Probability 95.4%) cal BC 3340-3020 (95.4%)

APPENDIX 5 BIBLIOGRAPHY AND REFERENCES

APS, 2004 Willington Power Station, area centred SK3129, Derbyshire: aerial photographic assessment, 2004/10

Barclay, A. and Bayliss, A. 1999 in *Pathways and Ceremonies* (eds. Barclay, A. and Harding, J.) Oxbow Books, Oxford

Booth, P, n d Oxford Archaeology Roman pottery recording system: an introduction, Oxford Archaeology, unpublished

Bowman, S. (1995) *Radiocarbon Dating*. British Museum Press, London

- Campbell, G. and Straker, V. (in prep.) *A Review of macroscopic plant remains studies in Southern England* English Heritage
- Christian, R, 1987 The village of Willington, *Derbyshire life & countryside*, Vol. 52, Pages 36-39
- Craven, M, 2002 Those other country houses: Potlock House, *Derbyshire life & countryside*, Vol. 67, pages 59-60
- Guilbert, G, 1994 Potlock, Derbyshire: excavations, 1994-summary report
- IFA , 2001 Standards and Guidance for archaeological field evaluation
- JSAC, 2004 An Archaeological Desk-Based Assessment of the Former Willington Power Station, Willington, Derbyshire, 1133/04/02
- JSAC, 2005 A Specification for an Archaeological Evaluation of Land at the Former Willington Power Station Site, Willington, Derbyshire, 631/05/01
- Knight, D, (ed.), 1994 A564 (T) Derby Southern Bypass: Summary of rescue archaeological works at Aston Cursus, Potlock Cursus & Swarkestone Lowes
- Margary, I.D, 1957 *Roman roads in Britain Vol. 2. north of the Foss Way - Bristol Channel (including Wales & Scotland)*, Phoenix House, London
- Meaney, A, 1964 *A gazetteer of Early Anglo-Saxon burial sites*, George Allen & Unwin, London
- Morgan, P, (ed.), 1978 *Domesday Book 27 Derbyshire*, Phillimore, Chichester
- O'Brien, C, 1978 Land & settlement in Nottingham & Lowland Derbyshire: An archaeological review, *ENAB* No. 12 (Supplement)
- OA, 1992 Fieldwork manual (First edition, ed. D Wilkinson)
- Reimer, P. *et al.* (2004). IntCal04. Terrestrial radiocarbon age calibration, 26 – 0 ka BP. *Radiocarbon* , 46.
- Soil Survey of England & Wales, 1983 *Map of the soils of England & Wales, Sheet 1 @ 1:250,000*, Southampton
- Stuiver *et al.*, *Radiocarbon* **40**, 1041 - 1083, 1998
- Tyers, P, 1996 *Roman pottery in Britain*, Routledge, London
- Wheeler, H, 1970 The Findern Cursus, *Derbyshire Archaeological Journal*, Volume XC, Pages 4-7
- Wheeler, H, 1979 Excavations at Willington, Derbyshire, 1970-1972, *Derbyshire archaeological journal*, Vol. XCIX, Pages 58-220
- Youngs, F, 1991 Guide to the local administrative units of England volume I: Southern England, Royal Historical Society, London

APPENDIX 6 SUMMARY OF SITE DETAILS

Site name: Willington Power Station

Site code: DBYMU: 2005-330

Grid reference: NGR SK 309 289

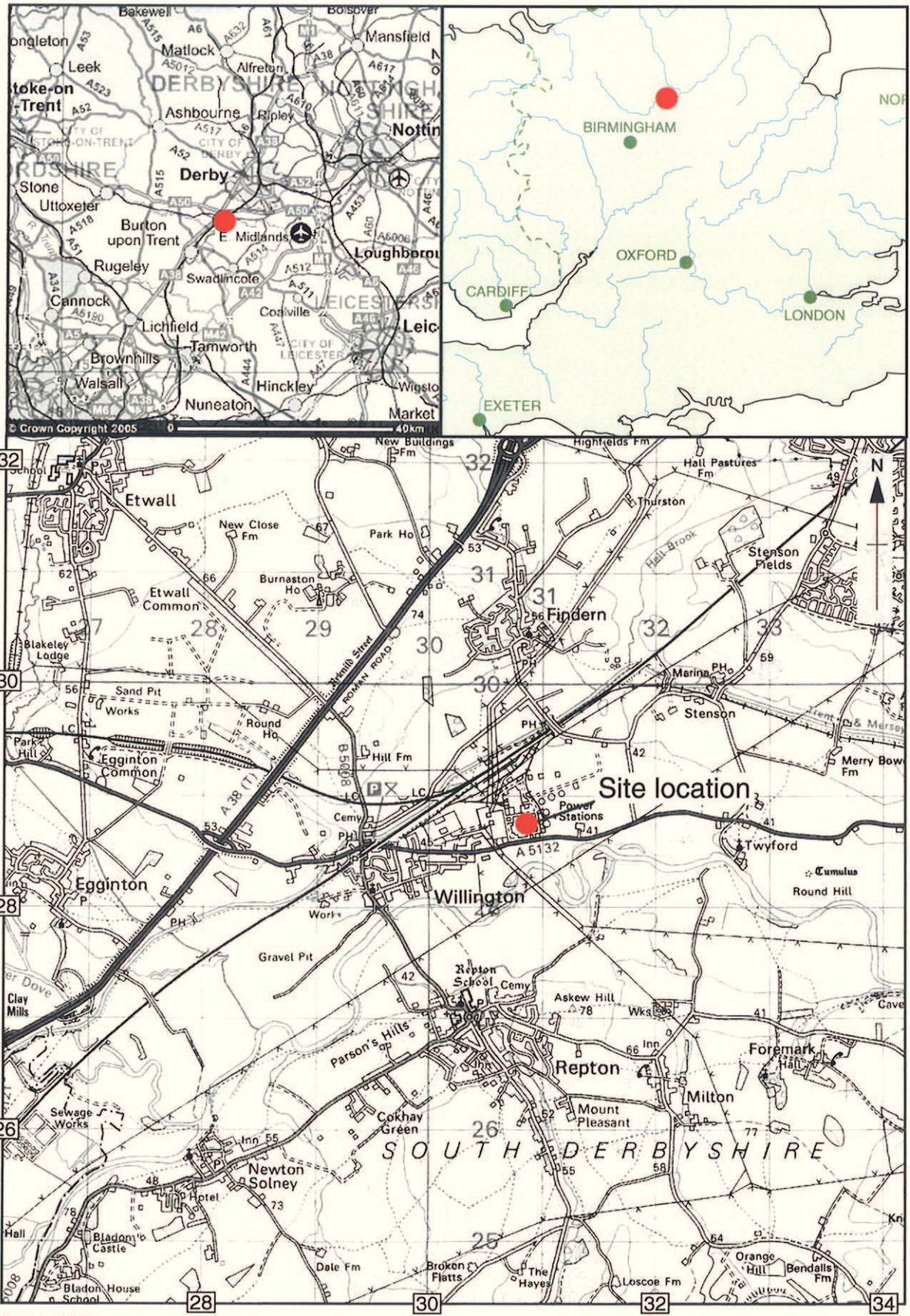
Type of evaluation: 100 trenches and test pits

Date and duration of project: Two phases between July and September 2005

Area of site: 95 hectares

Summary of results: The evaluation found evidence of a Neolithic cursus monument, an early Bronze Age boundary ditch, and enclosure/Boundary ditches dating to the Iron Age and Romano-British periods. Several undated ditches were also found.

Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with Derby Museums and Art Gallery in due course, under the following accession number: DBYMU: 2005-330



Scale 1:50,000

Reproduced from the Landranger 1:50,000 scale by permission of the Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office
© Crown Copyright 1991. All rights reserved. Licence No. AL 100005569

Figure 1: Site location

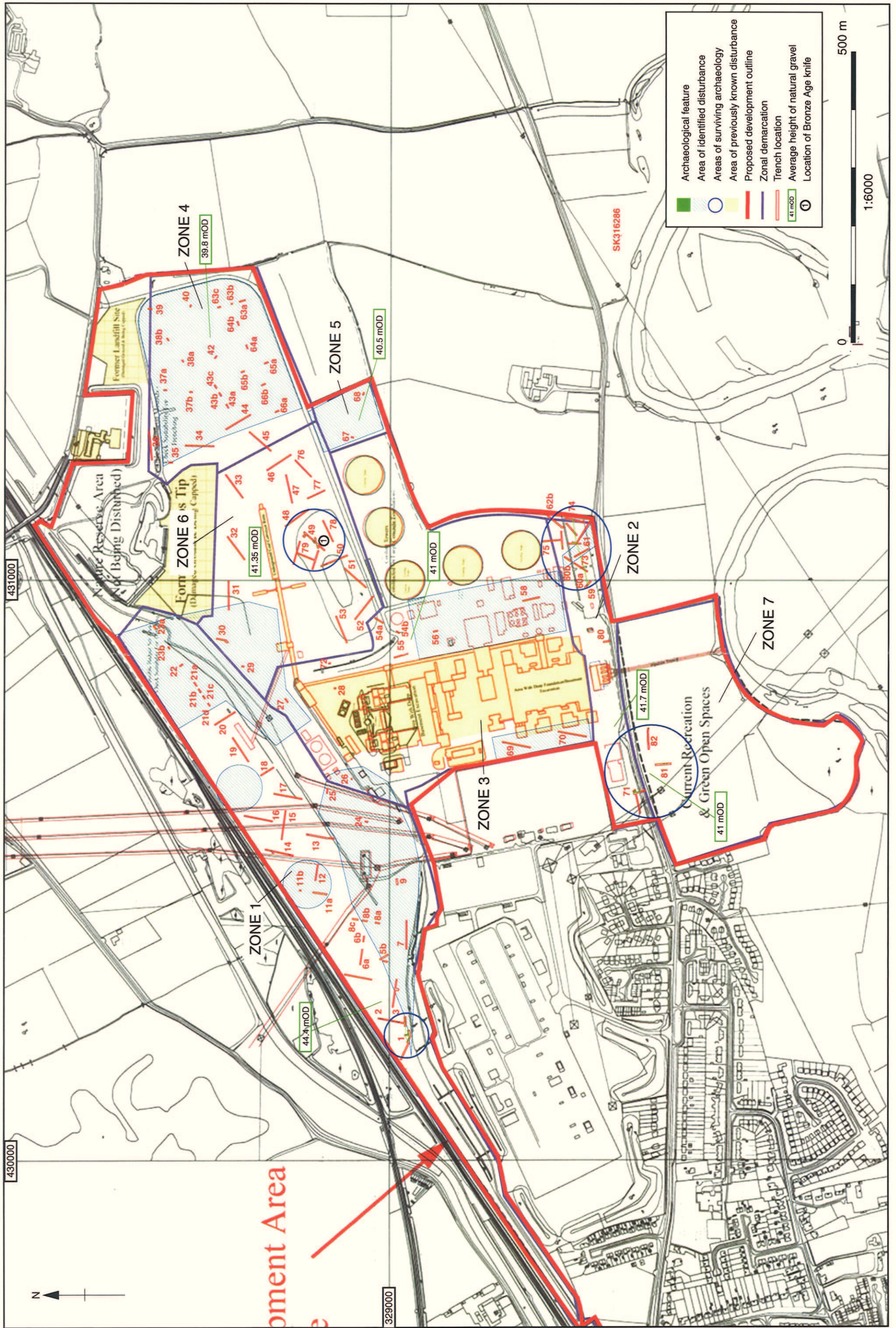
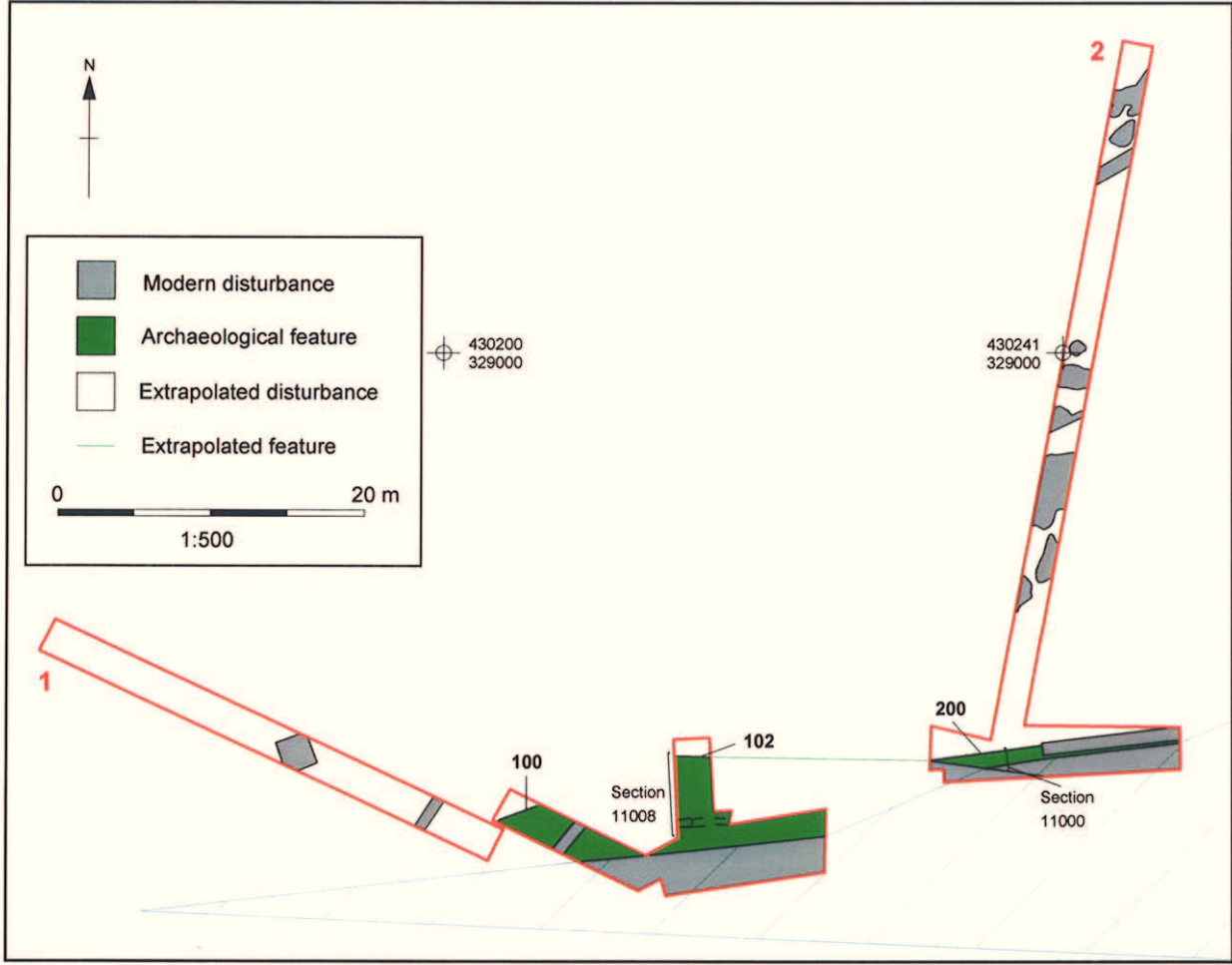
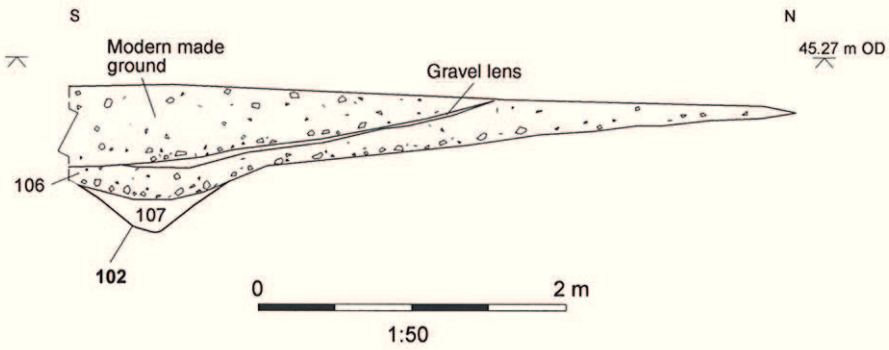


Figure 2: Trench location plan



Trench 1
Section 11008



Trench 2
Section 11000

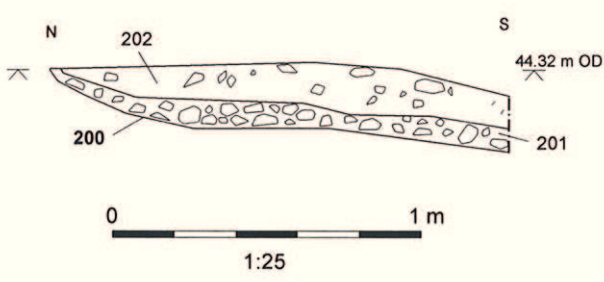


Figure 3: Zone 1, plans and sections

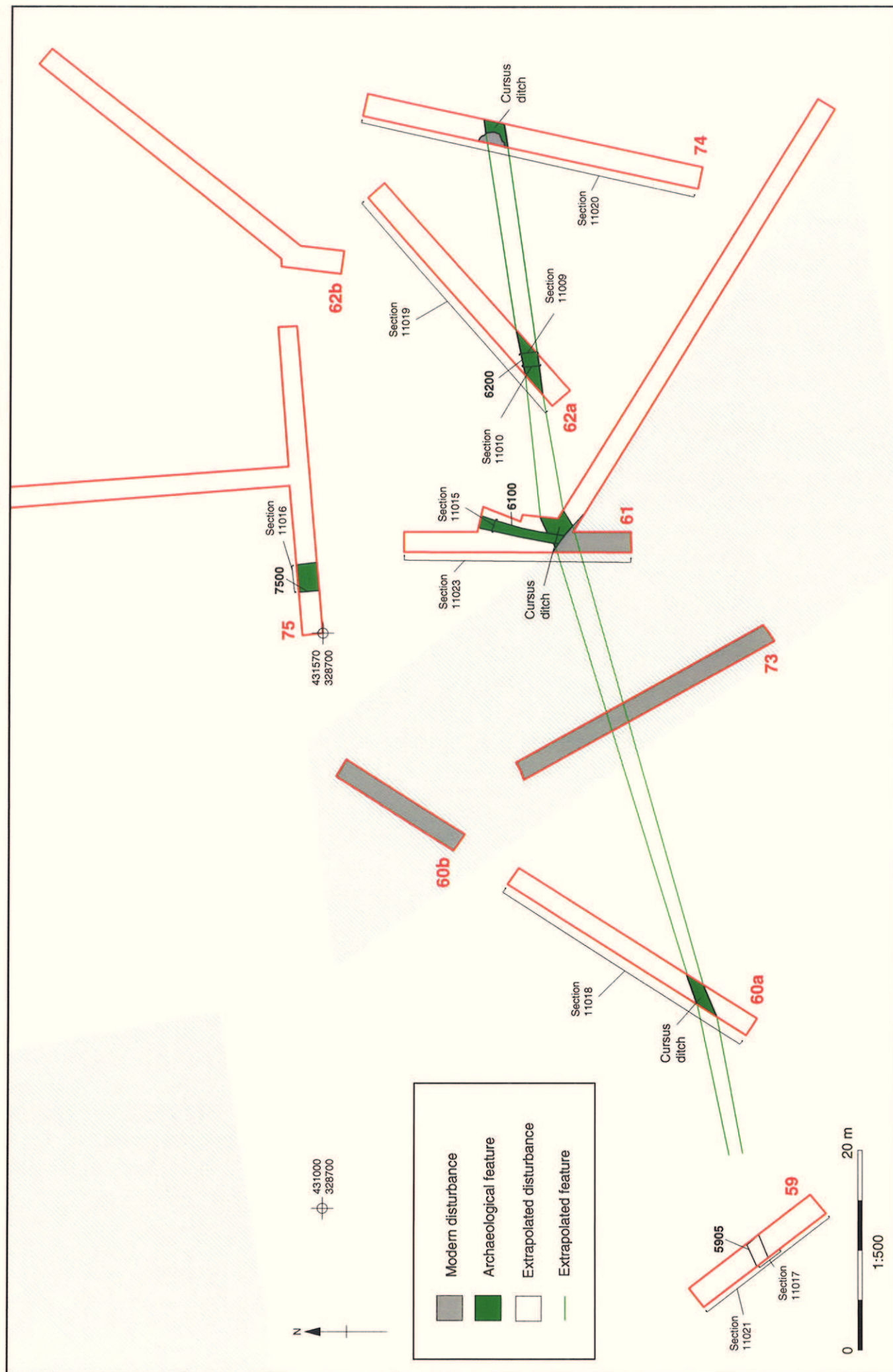


Figure 4: Zone 2 (east), plans

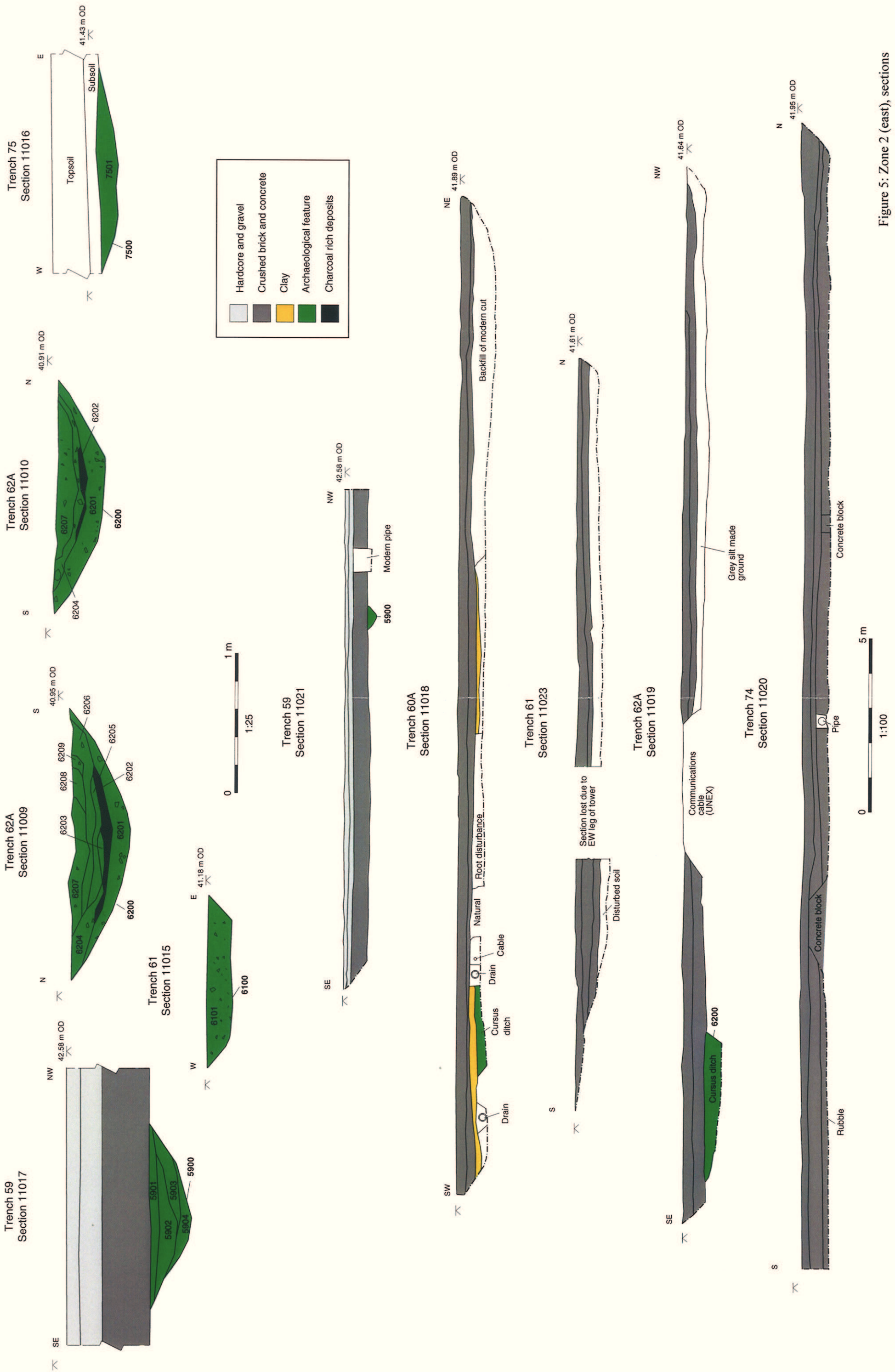
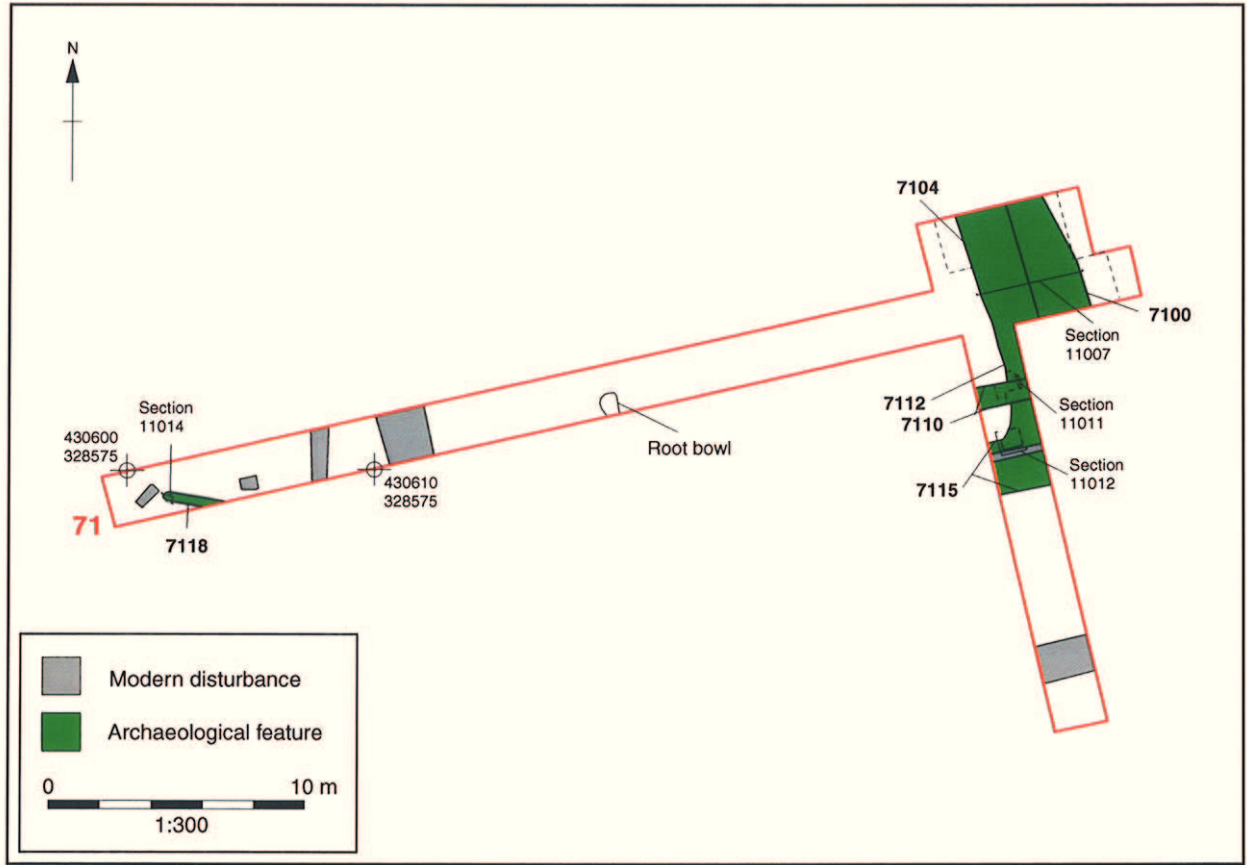
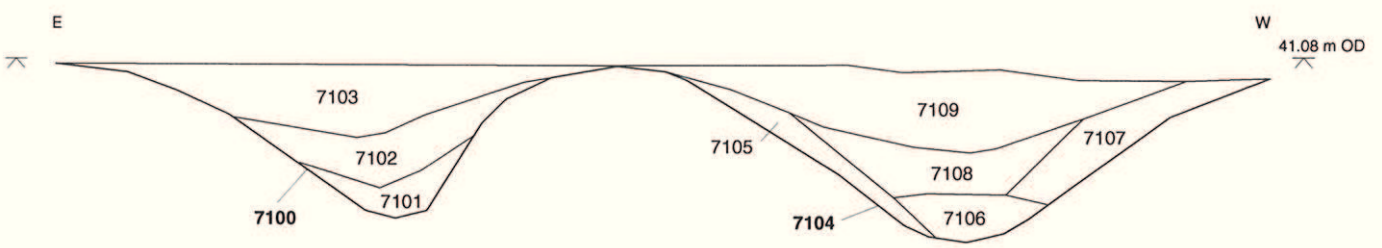


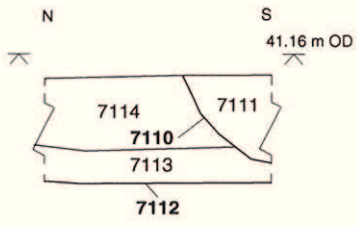
Figure 5: Zone 2 (east), sections



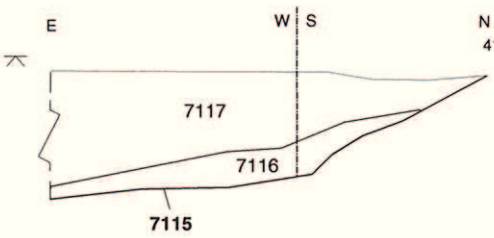
Trench 71
Section 11007



Trench 71
Section 11011



Trench 71
Section 11012



Trench 71
Section 11014

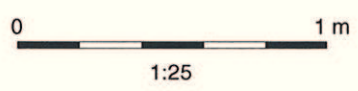
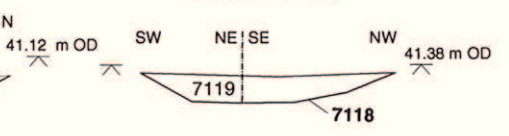


Figure 6: Zone 2 (west), plan and sections

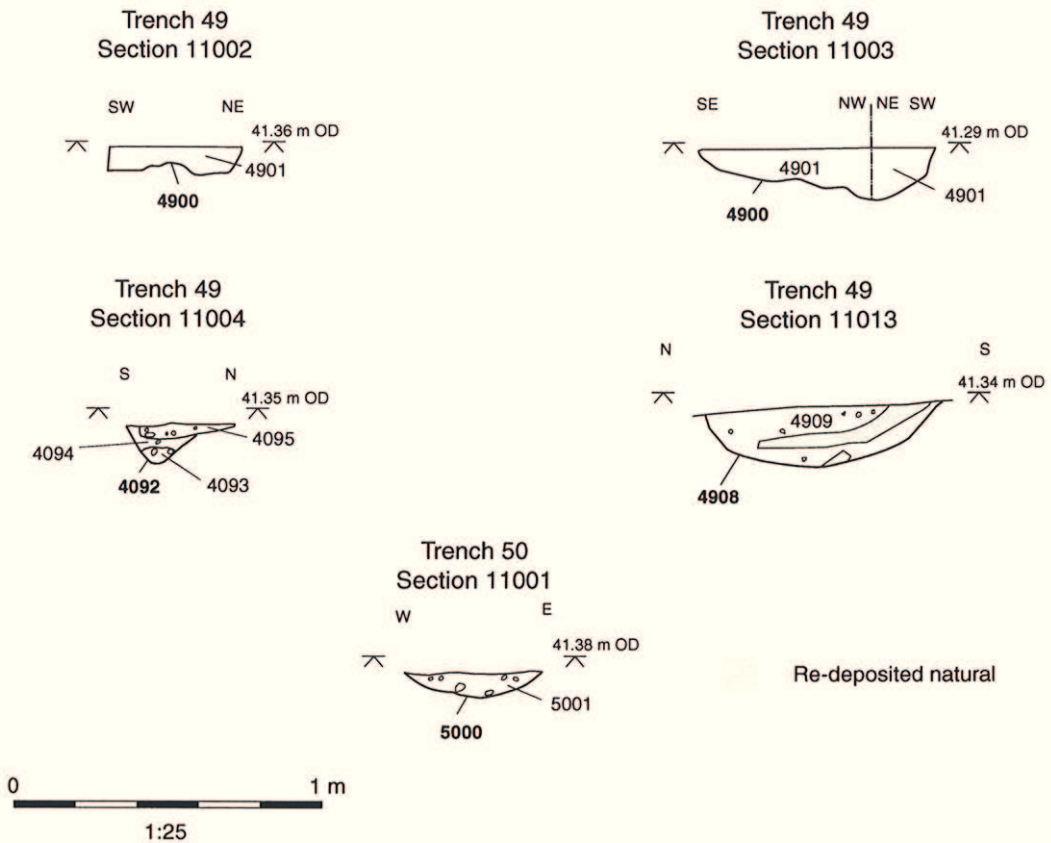
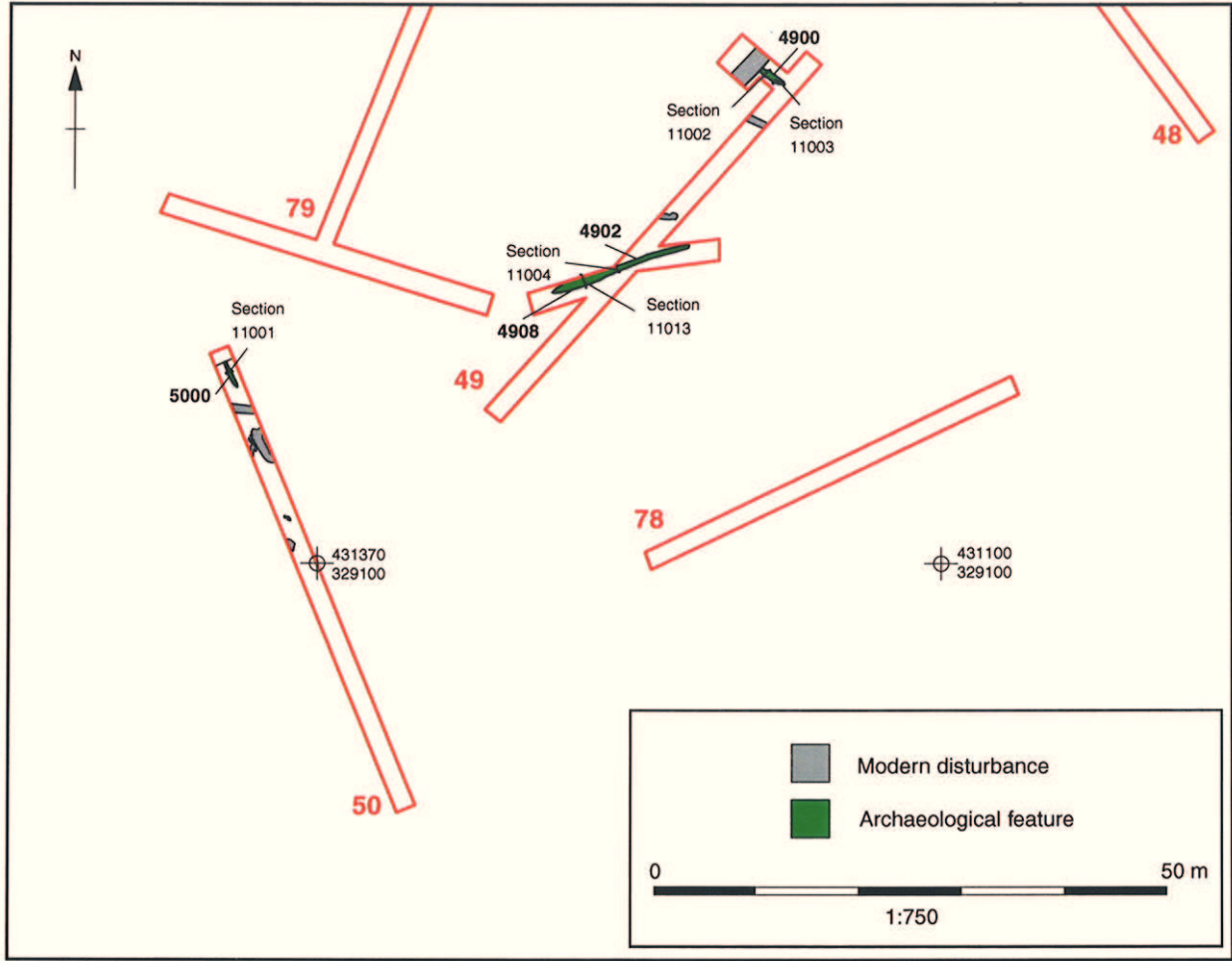
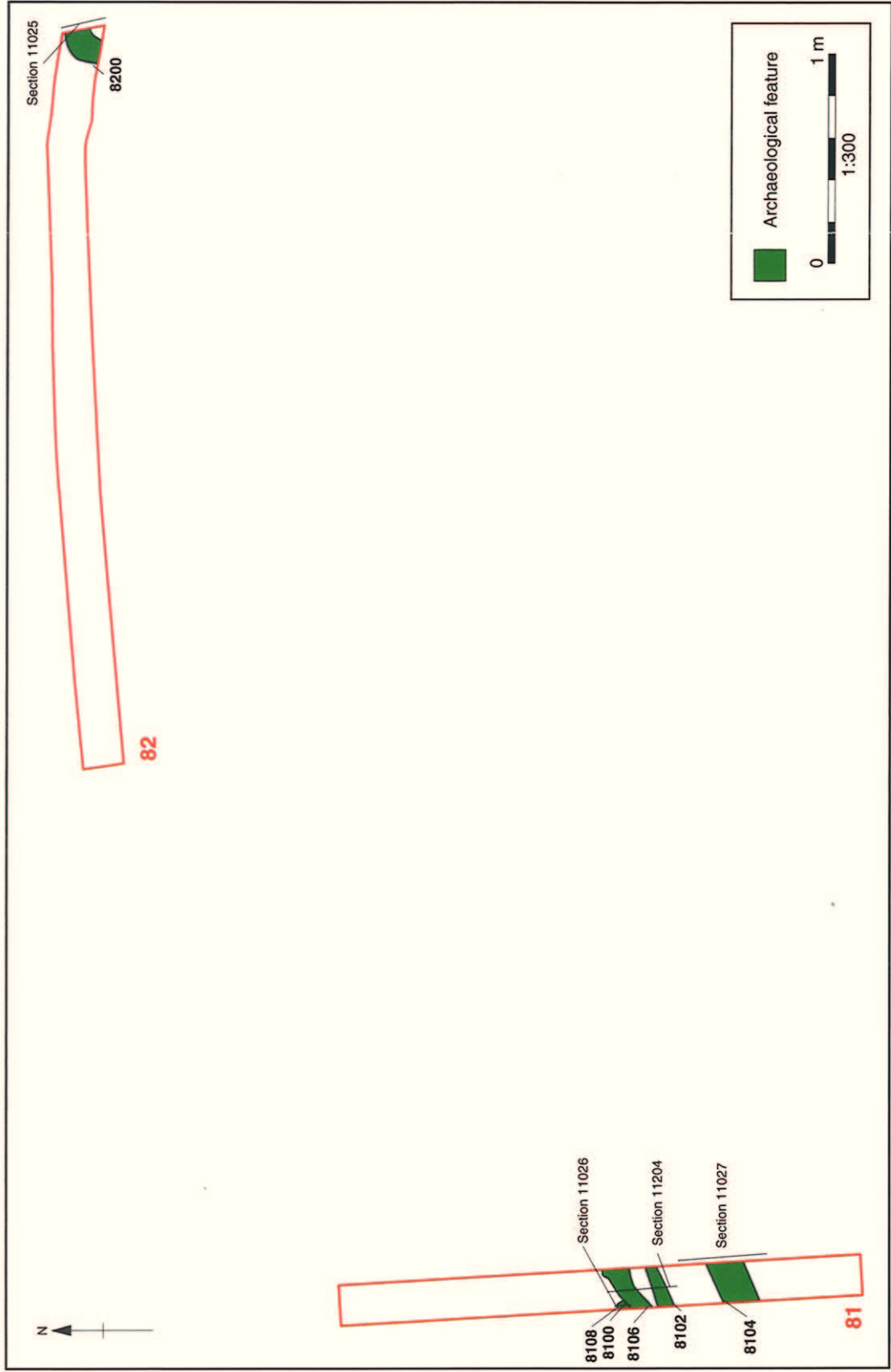
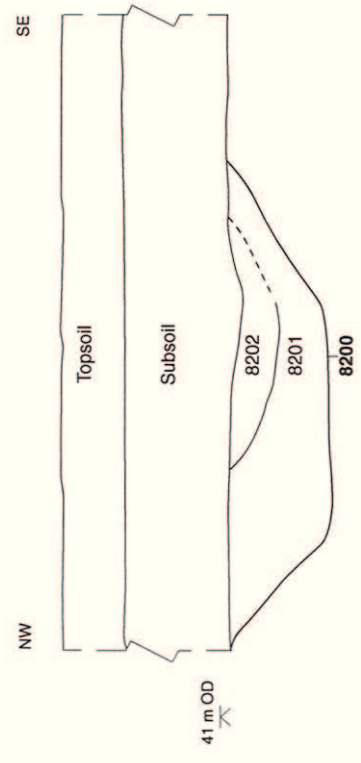


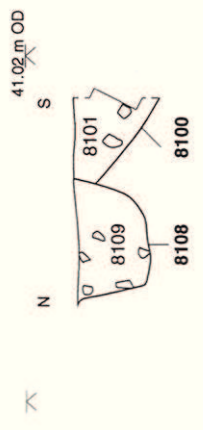
Figure 7: Zone 6, plans and sections



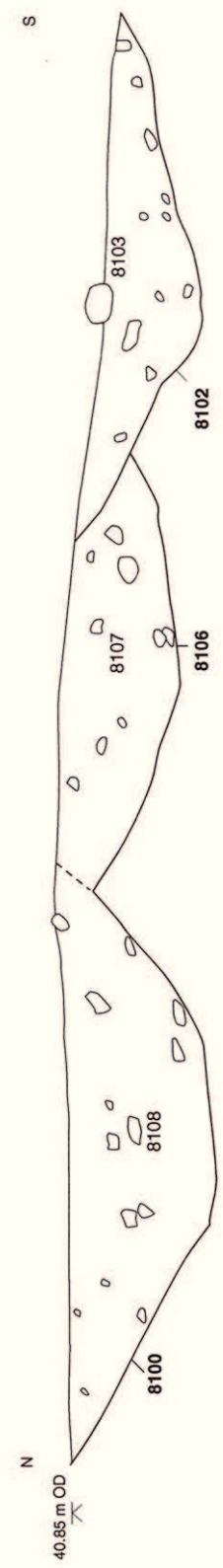
Section 11025



Section 11026



Section 11024



Section 11027

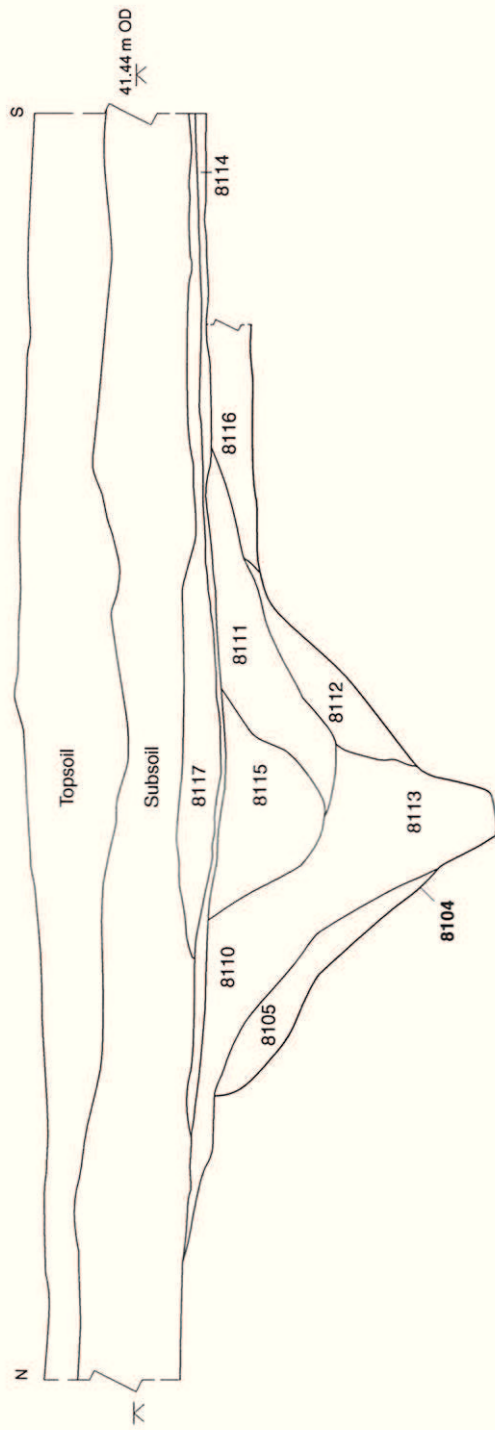


Figure 8: Zone 7, plans and sections



Figure 9: Plan of cursus in relation to known cropmarks



Oxford Archaeology

Janus House
Osney Mead
Oxford OX2 0ES

t: (0044) 01865 263800
f: (0044) 01865 793496
e: info@oxfordarch.co.uk
w: www.oxfordarch.co.uk



Oxford Archaeology North

Storey Institute
Meeting House Lane
Lancaster LA1 1TF

t: (0044) 01524 541000
f: (0044) 01524 848606
e: lancinfo@oxfordarch.co.uk
w: www.oxfordarch.co.uk



Director: David Jennings, BA MIFA FSA

Oxford Archaeological Unit is a
Private Limited Company, N^o: 1618597
and a Registered Charity, N^o: 285627

Registered Office:

Oxford Archaeological Unit
Janus House, Osney Mead, Oxford OX2 0ES