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NATURAL GAS PIPELINE

The South Dyke and Becca Banks: Archaeological Report

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Network Archaeology delivers a complete consultancy and field service nationwide. The company's particular expertise is linear infrastructure, such as pipelines, roads, rail and cables. Its emphasis is upon good communication and recognition of clients' individual needs/priorities. Network is known for delivering professional support, taking care of the archaeology, and enabling projects to keep moving forward.

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EXECUTIVE SUMMARY

This document presents the final results of the post-excavation analysis related to archaeological excavations carried out on the South Dyke and Becca Banks scheduled monuments in 2007 and 2008. This document comprises: excavation data; specialist analysis of the artefacts and environmental samples; full results of radiocarbon dating, and a discussion of the monuments in light of this newly generated information.

A 15m-long section of the South Dyke was excavated, along with various adjacent features and deposits. Results indicate that the South Dyke was pre-dated by a group of Iron Age pits found on its northern side. The South Dyke was found to be of similar proportions as where excavated previously, but was here partially backfilled by a large deposit of fire-cracked stones. Although very few artefacts were recovered from the monument, a group of radiocarbon dates from its fills indicates that the ditch may have been dug in the mid- to late Iron Age, and had become backfilled before the Roman period. At some time, probably in the late Iron Age, a double-ditched enclosure was appended to the South Dyke at the point at which the pipeline later intersected it. This enclosure may have been occupied, particularly in the late Roman period, as finds of this date were relatively abundant in the enclosure ditch fills and associated abandonment deposits.

A 22m-long section of Becca Banks was investigated. A north to south aligned ditch, an east to west post hole alignment, and an extensive buried soil were found sealed beneath the monument bank. The sparse environmental remains suggest that prior to the construction of Becca Banks the local habitat was pastoral grassland with some areas of shaded scrub. Evidence indicates that the construction of Becca Banks occurred in the late pre-Roman Iron Age, and was possibly a reaction by native leaders to the presence of Roman forces on the edge of their territory. At some point after the construction of the monument, part of the bank and the hillside on which it sat on collapsed back into the ditch. In contrast with the South Dyke, relatively little evidence was recorded of re-use at Becca Banks, although Iron Age land boundaries seem to have persisted into the Roman period. Two pits radiocarbon dated to the early medieval period reveal cereal cultivation and crop rotation were being undertaken at this time. Becca Banks ditch was not fully infilled until the nineteenth century, shortly after which the bank above it was used as a rubbish dump. In the mid-twentieth century the monument, and the field boundary it had hitherto marked, were destroyed when the bank was pushed flat.

The sum of the evidence from all investigations on the Aberford Dykes now allows the differing chronologies and characters of the separate elements to be better appreciated. The Aberford Dykes are commonly referred to as a system of monuments, but they lack unity of design, and instead should be seen as a series of earthworks of varied appearance and purpose that developed over a long period of time. The South Dyke is mid-Iron Age in inception, and was probably constructed as a civil or agricultural boundary marker. Becca Banks may be a physical manifestation of the authority of a late Iron Age political elite. The presence of the nearby ford over the Cock Beck is, however, seen as fundamental to the siting of both monuments.

1 INTRODUCTION

This document reports on the archaeological excavations that took place on the South Dyke and Becca Banks, part of the Aberford Dykes scheduled monument complex, in response to the construction of a natural gas pipeline between Asselby (East Yorkshire) and Pannal (North Yorkshire). The excavation of the South Dyke occurred in 2007, that of Becca Banks occurred in 2008, and in both instances Network Archaeology Ltd (NAL) carried out the fieldwork.

Partial results of these excavations have been outlined in previous documents. Preliminary reports were produced immediately upon the excavation of each of the monuments (NAL 2007 and 2008). A joint post-excavation assessment report subsequently followed (NAL 2010). This revisited the results of the excavations, but was this time informed by initial specialist study and dating of the artefacts and environmental samples recovered from the monuments. The post-excavation assessment report also assessed the potential of the fieldwork data to contribute to current national, regional and local archaeological research priorities, and made recommendations for further research.

This document is the fruition of that research; it contains the results of the further specialist analysis of the artefacts and environmental material, and the completion of the programme of radiocarbon dating. The monuments are described in the light of these results, and following renewed consideration of the cultural and political backdrop against which they were constructed. This document has been produced to meet a condition of scheduled monument consent, although the results it contains merit publication. The process by which this will occur is outlined below.

A separate archaeological contractor, Oxford Archaeology North (OAN), carried out the archaeological investigation along the rest of the pipeline, beyond those affected portions of the Aberford Dykes. At the time of writing, the OAN volume presenting the most significant findings recorded along the pipeline is nearing completion (Gregory, Daniel and Brown, in prep.), and it will also contain the results of the excavations carried out on the South Dyke and Becca Banks. Indeed, this current document forms the basis of NAL's contribution to the OAN volume. By working collaboratively throughout the project, it has been possible to reintegrate the Aberford Dykes into their archaeological setting.

1.1 Archive

The Yorkshire Museum will receive the relevant integrated finds and documents archive from the South Dyke, and have issued the accession number YORYM:2012.219. The archive from Becca Banks will go to Leeds City Museum with the accession number LEEDM.D.2012.6. The OASIS record number for the South Dyke excavation is networka2-119279; that for the Becca Banks fieldwork is networka2-119295 (see Appendix 2).

Plate 1: The pipeline crosses Becca Banks (photograph courtesy Aerial-Cam)

2 EXCAVATING THE ABERFORD DYKES

The route of the Asselby to Pannal pipeline crossed the South Dyke and Becca Banks, two linear bank-and-ditch earthworks forming part of the group of monuments known collectively as the Aberford Dykes. As prominent earthworks, the Aberford Dykes have attracted interest for many years, and their age has been long debated. It has been speculated that the monuments may date to the revolt of Venutius, which led to the Roman annexation of the north (eg Alcock 1954), or that the earthworks defined part of the boundary of the post-Roman kingdom of Elmet (eg Faull 1981). Only recently has archaeological excavation been able to inform the debate: fieldwork by the West Yorkshire Archaeology Service (WYAS) in the 1990s suggested that the South Dyke and Becca Banks were constructed during the Iron Age (Burgess 2001a; Wheelhouse 2001a). Radiocarbon and other dating evidence suggested a later prehistoric date for the construction of the South Dyke, redefinition in the Roman period, with subsequent infilling occurring until the medieval period (Burgess 2001a, 137). The WYAS dating evidence for Becca Banks was less secure, but due to the monument's apparent 'landscape association with [the] South Dyke' Becca Banks was similarly dated to the Iron Age (Wheelhouse 2001a, 144).

A major goal of the excavations undertaken prior to the installation of the pipeline was therefore to further clarify the dates of the construction and lifespan of the monuments, as well as to seek to understand their original function, and how this may have altered over time. The pipeline excavations also offered the chance to shed light on the changing environment of the monuments, and the material circumstances of the populations that lived alongside them.

2.1 Methodology

As scheduled monuments, the South Dyke and Becca Banks were investigated using a different methodology from that in place on the remainder of the pipeline project. This methodology was partly designed in order to maximise the chances of recovering well-stratified datable remains from the monuments, particularly necessary in light of the almost complete absence of artefactual material from earlier archaeological investigations of the earthworks, itself a reflection of the general sparseness of material culture in the region in the past.

Both monuments were the focus of topographic survey, metal detecting and fieldwalking prior to excavation. A geophysical survey was also undertaken on both monuments prior to pipeline construction. At the South Dyke, however, crop cover meant that the monument could be surveyed only after the archaeological excavation had taken place. All cut features were excavated by hand, with up to 100% of each feature removed. A proportion of all archaeological spoil, typically 10%, was hand-sifted on site to augment artefact recovery. All significant or datable finds were individually located and recorded; all securely stratified deposits were bulk sampled, and regular use was made of the metal detector during fieldwork.

Excavation of the portions of the monuments affected by the pipeline was undertaken by Network Archaeology Ltd between the summer of 2007 and the spring of 2008.

2.2 The South Dyke

The South Dyke lies on the southern side of the valley of the Cock Beck, and has an east to west length of approximately 1km. A north-west to south-east orientated 'spur' some 50m in length, is located at the monument's western end; this runs downhill towards the Cock Beck (Fig. 1).

The South Dyke consists of a bank and a ditch, and has three sections with differing characteristics. The monument is best preserved in its western section, where its bank survives to a height of 2 to 3m

and the ditch is 10m wide and 1m deep. Along the easternmost third of its length the monument is less well preserved, and is here visible as a low, sprawling mound covered by weeds and scrubby vegetation. In its central section, where the pipeline intersected it, the South Dyke is not visible as an upstanding earthwork at all. Where both bank and ditch are visible, the bank is located on the northern (downslope) side of the ditch (Plate 2).

Plate 2: A well-preserved portion of the South Dyke, looking east. The arrangement of the bank to the north of the ditch is clearly visible

A 15m long section of the South Dyke was excavated. The site occupied a plateau edge location overlooking the Cock Beck, and sloped gently down to the north from 45m to 44m OD.

Permian limestone forms the natural bedrock within the excavation area. At the northern end of the site this was located immediately below the topsoil. Generally, however, the bedrock was sealed by a yellow brown calcareous till formed from weathered limestone bedrock. This material was interrupted by the remains of former periglacial ice wedges. These contained brownish orange sandy silts, which frequently extended beyond the confines of the features, and so formed a natural subsoil in the excavation area.

2.2.1 Pits

A cluster of five pits located in the central part of the excavation area (Fig. 3a and 4) appear to be the earliest archaeological features encountered at the South Dyke. These were quite substantial: around 1 to 1.6m in diameter and up to 0.8m deep. Most had near-vertical sides, with flat bases created by the horizontally banded nature of the bedrock into which they had been dug.

The majority of the pits contained a single homogeneous deposit of silty and stony material, indicative of swift and deliberate backfilling. Only one, pit *172*, contained banded fills, possibly suggesting an extended period of silting up.

The pits are not well dated. Few contained datable artefacts or material suitable for radiocarbon assay. A fragment of charcoal was recovered from the base of pit *118*, and this returned a date of 740-390 cal BC (2400±30 BP; SUERC-24490[1]), the earliest radiocarbon date from the site. Finds of struck flint debitage from pit *172* similarly suggest prehistoric use.

A consideration of the layout of the site suggests that these features pre-dated the South Dyke. The pits were located immediately north of the South Dyke ditch, where its bank would have been located. In other words, it would not have been practicable to dig them after the South Dyke had been constructed; instead the bank probably sealed and post-dated them. The dating evidence appears to be congruent with this sequence.

Nothing in the contents of these pits indicates they were used for storage or middening, although such evidence may have been removed prior to the abandonment of the features. Dug into permeable limestone bedrock, they would not have held water. It is possible that these pits were dug partly in order to mark the hitherto notional boundary later re-emphasised by the South Dyke.

One feature may have held a post: pit *118* contained what appeared to be post-packing stones at its base. This feature was also unusual in that a marked concentration of fire-cracked river cobbles and equid bone (fragments of pelvis and femur) was found filling a small concavity in its top. Such deposits are often interpreted as evidence of structured deposition, but this single instance is difficult to distinguish from casual or opportunistic waste disposal. Artefacts were sparse: two flint flakes and a small stone spindle whorl were found in pit *172*. A piece of limestone with a central hole was found in pit *142*; the hole was probably of natural origin, but the object may nonetheless have been used as a 'hagstone' or amulet.

Plant remains were scarce in the bulk samples collected from the pits, although poorly preserved cereal grains were recovered. Remains of wheat (*Triticum* sp) were recorded, but most grains could not be identified. Pit *118* contained a moderate density of charcoal fragments, pieces of charred root or stem and small fragments of burnt bone, all of which may have been derived from hearth waste or midden detritus.

2.2.2 The construction of the South Dyke

The South Dyke ditch was typically 3m to 3.5m wide; it had moderately steep sides and a wide, flattish base (Plate 3; Fig. 3b and 5). Irregularities in the profile were a reflection of the angular nature of the limestone bedrock into which the ditch had been cut.

Excavation of the fills revealed an apparently uninterrupted fill sequence, with no sign of maintenance or recutting. The ditch contained several fills, typically moderately stony brown sandy silts. The eastern half of the excavated portion contained over 1.3 metric tonnes of fire-cracked river cobbles in a charcoal-rich matrix, which also contained frequent animal bone fragments (Plate 4; Fig. 5). This deposit was approximately 0.3m thick and was located at around 0.05m above the base of the ditch, whereas it was sealed by a further 0.4m to 0.5m of later fills. This low positioning within the backfill sequence implies that the deposit was contemporary with the main active and open period of the South Dyke's lifespan. This material would appear to be a deliberate dump of domestic material, possibly associated with feasting.

A total of 1.4kg of animal bone was recovered from the South Dyke ditch, most of it from the lower part. The remains of cattle bone predominate by weight, but sheep/goat bones are more numerous, albeit in much smaller fragments. Other taxa represented are horse, red deer, dog, and amphibians, the

[1] All calibrated radiocarbon dates are expressed at 95.4% confidence. See Appendix 1.

latter presumably living in the ditch. Sparse cereal grains (mostly single specimens) were present in bulk samples taken from this deposit, along with further fragments of animal bone.

A stratified sequence of samples from the fills of the South Dyke was subjected to radiocarbon dating. A fragment of sheep or goat bone found on the base of the ditch yielded a date of 370-160 cal BC (2180±30 BP; SUERC-24493). From the middle of the ditch fill sequence a fragment of charcoal was dated to 350-40 cal BC (2110±35 BP; SUERC-30350). Towards the top of the ditch fill sequence another piece of charcoal was also dated to 350-40 cal BC (2120±30 BP; SUERC-21056), and a piece of hazelnut shell returned a date of 210-40 cal BC (2110±30 BP; SUERC-24492).

Plate 3: The South Dyke excavation area (photograph courtesy Paul Gwilliam/ Archaeological Services WYAS)

The entire artefact assemblage from the South Dyke ditch comprises four flint tools and a fragmentary clay loomweight. This material, and the absence of any later finds, supports the radiocarbon evidence in suggesting a mid- to late Iron Age date for the construction and infilling of the South Dyke; the radiocarbon sequence suggests that much of the ditch filled up relatively quickly.

The upper fills of the South Dyke were sealed by a colluvial layer, deposit ***195***[2] (Fig. 5). The next feature in the sequence of the site, however, is thought to be enclosure ditch ***196***.

2.2.3 Enclosure ditch

Ditch ***196*** was curvilinear in plan, and located to the north of the South Dyke (Plates 3 and 11; Fig. 3c and 6). It extended for over 15m across the excavation area, was typically 2m to 3m wide and between 0.9m to 1.25m deep. The ditch had a different profile from that of the South Dyke, being

[2] The use of ***bold italics*** when referring to features and deposits signifies a group number.

narrower and generally deeper. The fills of the ditch were similar to those found in the South Dyke, but lacked the concentration of heat-affected stone. Fragments of cattle, red deer, or unidentified large mammal bone were recovered from the lower fills, with much larger quantities found in its upper portion.

Whilst a 15m length of this feature was exposed during the South Dyke excavations, its full extent only became apparent through subsequent geophysical survey, and open area investigation of the wider area by Oxford Archaeology North. This revealed that ditch ***196*** was part of an enclosure apparently appended to the South Dyke. To the west of both excavation areas, ditch ***196*** appears to merge with the South Dyke, but seemingly does not continue beyond it to the south. Instead, after a short gap, a double-ditched boundary resumes the southward alignment of ditch ***196***, eventually forming an enclosure.

As the junction between the South Dyke and ditch ***196*** lay beyond the excavated area, it was not possible to examine this point and determine a relative sequence between the two features. However, the disparity between the profiles and fills of the two features suggests they were not contemporary. This is confirmed by the radiocarbon evidence, which suggests that ditch ***196*** was constructed later than the South Dyke, at some point in the late pre-Roman Iron Age. Two samples from the lower fills of the ditch were radiocarbon dated: a fragment of cattle bone recovered from approximately 0.14m above the base of the ditch yielded a date of 110 cal BC - cal AD 60 (2020±30 BP; SUERC-24494), whilst a similar date of 180 cal BC - cal AD 0 (2075±30 BP; SUERC-24491) came from a charcoal lens from a similar level. These dates, when compared with the mid- to late Iron Age date range for the construction and infilling for the South Dyke, indicate that the ditch ***196*** was almost certainly the later feature.

Dating also shows that ditch ***196*** was probably also the longer-lived feature of the two, only finally becoming backfilled after the fourth century AD. Numerous sherds of pottery dated to the late fourth century AD were recovered from the upper fills of this feature, along with a coin of equivalent date, and a piece of worked antler radiocarbon dated to 230-410 cal AD (1725 ±35 BP; SUERC-30349).

The two sets of dates from ditch ***196*** suggest that its cutting and initial infilling most probably occurred prior to the Roman invasion, while the pottery and metalwork point to the rest of the fills accumulating during or after the late fourth century AD. No dating evidence relating to occupation during the intervening three centuries was recorded from this feature, however, or within the rest of the excavation area. Assuming that none of the datable material from ditch ***196*** is heavily residual, it would appear that there was a hiatus in the infilling of the feature for the greater part of the Roman period. Perhaps the site did not host any settlement activity during this time: it may have been abandoned or only used intermittently for activities that would leave little traces in the archaeological record, such as the occasional penning of livestock.

It may be thought that if the site had been abandoned for three centuries then the ditch would have become largely infilled through natural processes, and so would not have lain open to receive the fourth century material. Study of the experimental earthwork at Overton Down, however, concluded that following an initial 10-year period of rapid erosion, vegetation stabilised the earthwork and infilling of the ditch largely ceased (Bell 1996). Alternatively, if ditch ***196*** had become entirely infilled by the fourth century AD, then an otherwise undetected shallow recutting event during the latter part of the century could also have produced the dating sequence recorded here.

2.2.4 Ditch *164*

Located in the northern part of the excavation area, field boundary ditch *164* represents further subdivision of the area around the South Dyke. Ditch *164* was at least 10m long and 0.65m wide, and was more than 0.3m deep (Fig. 3c and 7). At the south, it ended with a well-defined rounded terminal about 3m from enclosure ditch ***196***.

No finds were present to securely date this feature. A poorly preserved iron artefact was recovered and is thought to be a ring, although it is far too corroded to determine its function.

Ditch *164* stopped short of, and thus appeared to respect, enclosure ditch ***196***. This would indicate that the construction of the smaller ditch post-dated that of the enclosure. The position and density of stony tip-lines in the sections through ditch ***196*** suggest that its bank originally lay to the north of the ditch, and so it was this now-vanished bank that ditch *164* abutted. This overall arrangement probably reveals that ditch ***196*** and its bank were active components of the landscape into which ditch *164* was inserted.

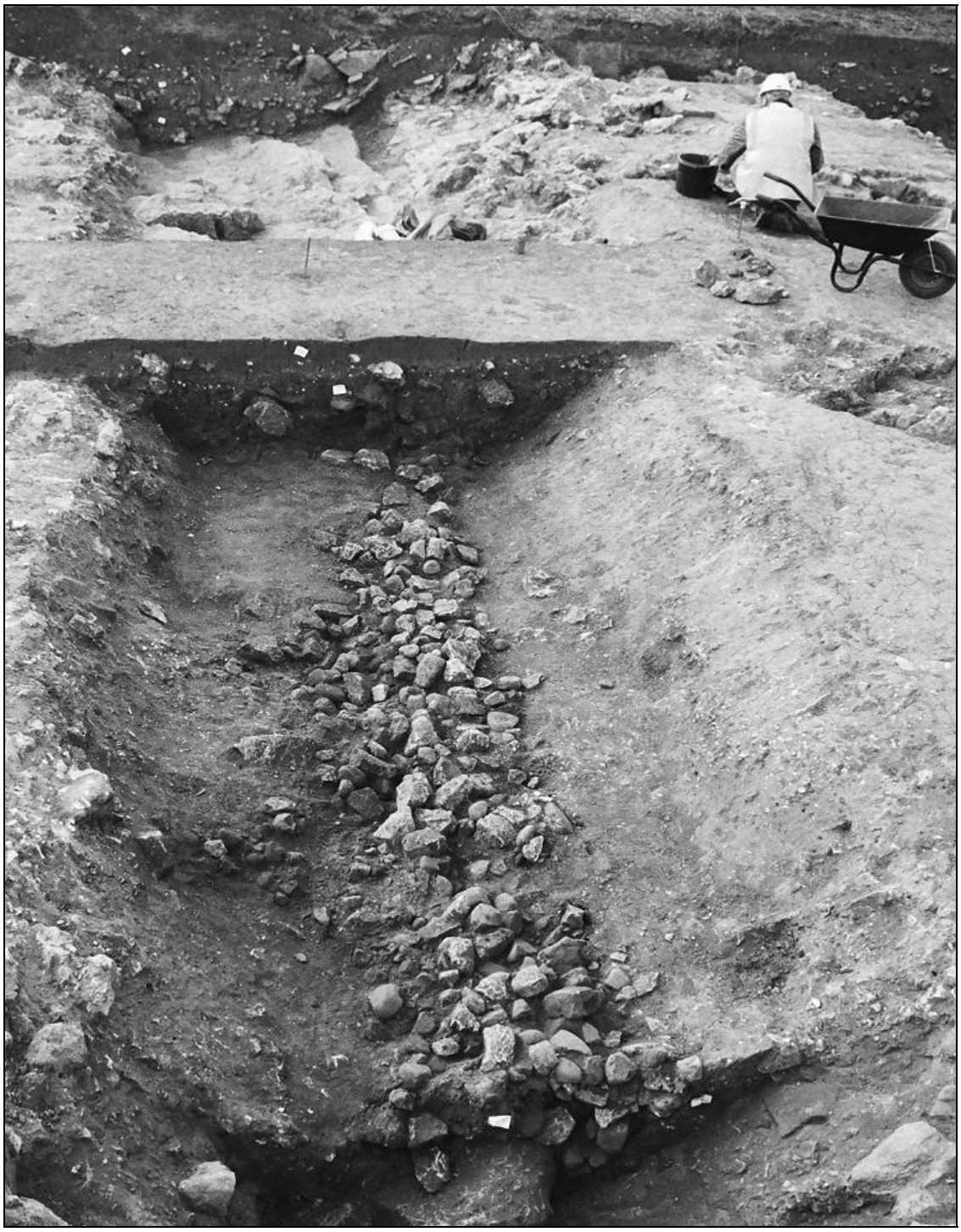


Plate 4: Deposit of fire-cracked river cobbles in the South Dyke

2.2.5 Romano-British deposits

Two relatively well-dated Romano-British deposits marked the end of the archaeological sequence at the South Dyke site. The first of these, deposit ***195***, was a 0.2m to 0.4m-thick reddish brown sandy silt colluvium. It filled the entire width of the excavation area, and extended for 14m from the southern limit of the excavation area, and so sealed the South Dyke ditch (Fig. 5). In total, 180 sherds (2.13kg) of Romano-British pottery dated from the late third to fourth century, and the late fourth century AD onwards, were recovered from this deposit. Other finds include a large fragment of beehive quern, and fragments of coal, the latter possibly imported for fuel.

The quernstone suggests that grain cultivation or cereal processing was occurring on or near the site at this time, an interpretation supported by the cereal grains and seeds from weeds associated with grain cultivation found in the bulk samples taken from this deposit.

Deposit ***195*** sealed the uppermost fill of the South Dyke, which implies that the South Dyke was largely infilled by the late Roman period; this supports the other evidence indicating a pre-Roman date for the construction of the South Dyke.

The second of the two well-dated Romano-British deposits was the material that formed the upper fills of curvilinear ditch ***196***. As noted above, these fills contained numerous fragments of Romano-British pottery (53 sherds weighing 608g) dated to the late fourth century AD onwards, along with a coin of Valens dated to 364-378 AD. A piece of worked antler from this material was radiocarbon dated to 230-410 cal AD (1725 ±35 BP; SUERC-30349). Although there were no stratigraphic relationships to record a sequence between the colluvium ***195*** and ditch ***196***, the dating evidence suggests that the colluvium and the upper fills of the ditch formed at the same time, and possibly by the same processes.

A total of 2.12kg of animal bone was recovered from the fills of ditch ***196***, most of this from the upper fills. Cattle bone predominates, with remains of sheep/goat being almost entirely absent. This contrasts with the assemblage from the South Dyke ditch in which the remains of sheep/goat were more numerous. Minimum number of individual calculations suggests that cattle became more prominent in the latter part of the site's occupation, at the expense of sheep/goat. The total assemblage is small, however, and so caution must be exercised in proposing this trend. Worked pieces of red deer antler were also present in some quantity in the later fills of ditch ***196*** (16 fragments, 0.35kg).

2.3 Becca Banks

Around 500m to the north of the South Dyke site, on the opposite side of the Cock Beck, lay the point where the pipeline crossed Becca Banks. Becca Banks is the most extensive of the Aberford Dykes earthworks, running for nearly 5km on a largely east to west course along the northern side of the Cock Beck valley (Fig. 1). Becca Banks consists of a bank, with a ditch situated on its southern (downslope) side. A slight natural scarp slope appears to have been exploited in the positioning of the bank above the ditch. To the west of the village of Aberford, a 2m-deep rock-cut ditch marks the monument, with a stony bank rising over 4m above the base. At its maximum likely height, the top of the bank would have stood over 7m above the base of the ditch. The course of the monument is poorly preserved through Aberford itself, and a length of it to the east of the village has been completely destroyed by the modern A1(M). To the east of the motorway, Becca Banks runs through arable farmland, where the monument has been extensively plough-spread and completely backfilled. The pipeline crosses this section of the monument. The eastern terminal of Becca Banks lies in woodland, which allows better preservation of the earthwork.

A 22m-long section of Becca Banks was investigated. In addition to the principal excavation site, areas to north and south were stripped of topsoil, prior to being used for spoil storage. Both of these

areas were found to contain archaeological remains, which were consequently excavated. The excavation site straddled the scarp slope that Becca Banks utilises, and thus sloped down to the south.

The excavation methodology was the same as that used on the earlier South Dyke excavation. However, safety considerations prevented the base of Becca Banks ditch from being fully exposed. The ditch was found to be too deep and too steeply cut into what was found to be unstable natural clay for hand excavation to be completed, especially since such activity in antiquity seemed to have led to the landslide of the hillside into the ditch (see below).

An amended methodology therefore utilised a trench box, a portable shoring unit from within which the team could safely investigate the ditch. The trench box was placed, by way of monitored machine excavation, across the ditch and adjacent natural deposits. Protected by the trench box, the team could continue the excavation of the monument ditch, and record and sample its fills.

2.3.1 Before Becca Banks

In contrast to the South Dyke excavation, neither Becca Banks ditch nor any other archaeological feature was dug to a depth sufficient to cut the solid limestone bedrock. At Becca Banks, the bedrock was overlain by approximately 2.5m of boulder clay of varying textures and colours. The surface of the boulder clay contained periglacial fissures and gullies filled with a brownish mixed clay and silt that formed an intermittent subsoil. This thickness of heavy boulder clay contrasted markedly with the conditions enjoyed on the South Dyke site. The greater proportion of clay in the Becca Banks deposits also hampered attempts to hand sift 10% of all spoil (especially in wet conditions), although large volumes of soil were examined in this way.

2.3.1.1 Palaeosol

The boulder clay and subsoil were overlain by a 0.1m to 0.2m-thick buried soil: deposit ***788***. This was an extensive layer of soft or friable dark brown silty loam or clay (Plate 6), and was particularly well preserved where it had been sealed under the monument bank.

Two radiocarbon dated samples were recovered from the parts of this deposit that were well sealed by the bank. A fragment of hazelnut shell was dated to 400-200 cal BC (2250±30 BP; SUERC-24501) and other plant material from a separate sample recorded a later date of 100 BC-cal AD 70 (2015±30 BP; SUERC-24502). These dates provide a late pre-Roman Iron Age *terminus post quem* for the sealing of this deposit by the monument bank.

This deposit yielded 14 flint artefacts including knapping debris, a thumbnail scraper and a backed blade, along with four pebble tools that probably functioned as burnishers. A few fragments of charcoal and burnt clay or daub were also found. Just one small sherd of pottery was recovered from the palaeosol. This piece was found in an area of the palaeosol that was not sealed by the in situ remains of the monument bank, and so could have been deposited after the monument had been built. This potsherd is in any event fairly undiagnostic, and could date to any time between the Iron Age and early fourth century AD.

This deposit would have formed the original ground surface at the time of the construction of Becca Banks. No signs of ploughing were recorded either within or beneath this deposit. Although the plant macrofossil assemblages found in this material were all extremely small, cereal grains, seeds, tubers and nutshell fragments, as well as moderate amounts of charcoal and pieces of charred root or stem, were present throughout. It is possible that the burnt material was produced by the burning of scrub during clearance prior to the construction of the monument.

The range of snail species recovered from the palaeosol indicates a fairly open grassland habitat with some areas of shaded scrub. Pollen analysis was undertaken, but the results were inconclusive as a result of poor preservation conditions.

2.3.1.2 Field boundary ditch *776*

Ditch ***776*** was found cutting the palaeosol and sealed beneath the main monument bank; it ran for approximately 13m across the north-west corner of the site (Fig. 9a and 10). Its original length was not apparent: its southern extent was presumably removed by the landslide of the slope above Becca Banks ditch, and it was truncated to the north by a later recut. Ditch ***776*** was quite substantial, with a maximum width of 2.2m, and a depth of 1.2m (Plate 5). Banks survived to a height of up to 0.26m on both sides of the ditch.

Material from the main monument bank formed the uppermost fills of ditch ***776***, indicating that the ditch was not completely backfilled when Becca Banks was constructed over it. This feature post-dated the original formation of the palaeosol: the ditch and its banks respectively cut and overlie that deposit. A hazelnut shell from one of the fills of ditch ***776*** was radiocarbon dated to 830-760 cal BC (2610±30; SUERC 24495). This date may seem surprisingly early for a land boundary ditch on the limestone ridge, where enclosure is generally thought to have not got underway until the mid- to late Iron Age (Burgess 2001b, 266; Vyner 2008, 21). There is, however, an increasing amount of evidence for extensive forest clearance, with some enclosure, from the Bronze Age onwards (Berg 2001, 8-9). Alternatively, the nutshell may have been residual, perhaps disturbed from its original context when the ditch was dug.

Plate 5: Andy Pascoe preparing ditch ***776*** *for recording*

The ditch was aligned with the direction of slope and may also have had a drainage function, channelling water downslope to the south. The scale of the ditch suggests that it may have been stock-proof; the likelihood of pastoral agriculture at the time is perhaps also revealed by the small mollusc collection indicative of grassland that was recovered from both the ditch fills and the palaeosol. However, cereal grains were also found in these deposits, probably indicating mixed agriculture overall.

2.3.1.3 Postholes

Also found sealed beneath the main monument bank were four well-defined postholes forming an approximately 12m long east to west alignment. (Fig. 9a and 14). Their diameters ranged from 0.44m to 1.03m, with depths of between 0.64m and 1m. Their fills contained large angular stones, which had presumably originally formed post-packing. The fills were very loose, and were so similar to the deposits that made up the earthwork bank, that it is assumed the postholes became backfilled as the bank was constructed.

Except for one possible pebble tool, the postholes were devoid of artefacts and provided no opportunity for radiocarbon dating. Two of the postholes cut the minor banks flanking ditch ***776***, indicating that they post-dated its construction. The fact that main monument bank material seems to have filled the upper portions of both the ditch and the postholes suggests that all of the features were decommissioned by the construction of Becca Banks, and were therefore broadly contemporary in their use. The group function of these features is unclear, although they may have marked a boundary, and this is discussed further below.

2.3.2 The construction of Becca Banks

2.3.2.1 Bank

The monument bank ran east to west along the top of the slope overlooking the ditch. It continued uninterrupted across the entire width of the site and measured up to 14m north to south. The bank lay directly adjacent to the upper edge of the scarp slope above the ditch, without an intervening berm. Its upper surface was quite level, with a cambered northern edge (Plate 6; Fig. 14). The bank survived to a maximum height of 0.6m, and it physically overlay the original ground surface, though worn areas and disturbed lenses interpreted as ‘trample’ were recorded between the palaeosol and the bank material.

The bank largely consisted of mixed deposits of redeposited boulder clay, upcast generated by the digging of the monument ditch and thrown up to form an accompanying bank. Fragments of limestone were frequent within this matrix.

This colourful material contrasted with an underlying low, linear mound of dark brown loam or silt that mirrored the alignment of the main bank, and was found under its southern part, close to the upper edge of the scarp slope. This probably represents stacked turves and topsoil from the de-turfing and topsoiling of the ground during the initial digging of the ditch. This material may have served as a marker bank, used to guide construction of the main monument. The feature was approximately 3.5m wide. It survived to a height of 0.4m, but was presumably once higher, as it had been truncated by modern ploughing.

With so little of the main bank surviving, it was not possible to determine whether it had an advanced construction that utilised elements such as a palisade or revetting. However, the 1996-7 WYAS excavation of Becca Banks indicated only a simple and undifferentiated construction method, with which the current results correspond.

Plate 6: Remains of Becca Banks earthwork overlying palaeosol, facing west

2.3.2.2 Ditch

Upon excavation, Becca Banks ditch was approximately 2.5m deep and 5 to 6m wide, with an irregular, flat-bottomed profile (Fig. 14). Due to the landslip of the hillside in antiquity that distorted the form of the ditch, and the necessity of stepping in the working area as the excavation proceeded, it was unfortunately not possible to record a complete and original profile of the feature.

There was no evidence of any recutting. The basal fills of the ditch were up to 0.75m deep, and consisted of mixed redeposited boulder clays. No dating evidence was retrieved from the bank or the basal fills of the ditch, as their constituent deposits were artefactually sterile and offered no opportunity for radiocarbon or Optically Stimulated Luminescence (OSL) dating.

Following a spell of wet weather during the archaeological excavations, the ditch filled with water and remained full for several days until it was pumped out. Thus it would appear that, despite the limestone substrate, the local ground conditions are sufficiently impermeable to allow the ditch to retain water for some time. Even if this property had not been designed or intentional, it would have been useful if the monument had had a defensive function, and would certainly have contributed to its appearance and character in the past.

2.3.3 Landslip

At some point after the construction of the monument, part of the hillside and the bank collapsed into the open ditch, transforming the hillside from a smooth slope into a series of staggered steps. This landslip was localised; the affected area appeared to be 12 to 13m wide and the upper shear edge was roughly semi-circular in plan. Its centre broadly coincided with the centre of the site (Plate 7).

Plate 7: Landslipped deposits

The most obvious evidence for this event was a series of 'steps' of redeposited dark brown palaeosol leading down from the upper break of the scarp slope and into the ditch. That these deposits were not in their original position was demonstrated by the fact that the stratigraphic sequence of bank deposits overlying them, and banding in the natural subsoil beneath them, repeated the sequence visible in the intact stratigraphy outside of the affected area. The presence of the semi-circular upper shear edge and the fact that the basal ditch fills extended under the landslipped natural deposits also reveal the distortion that had occurred.

There was no dating evidence to reveal when this event occurred. Given that the ditch was still largely empty when the landslide took place, it may be assumed that it occurred shortly after initial construction, perhaps within a generation. This may have been within the Roman period.

An earlier excavation on Becca Banks may also have recorded evidence of a very similar event, where '*old turf and topsoil in a slipped position*' and '*steps of compacted black soil*' (Brooks 1967, 12), were recorded, although these appear to be on the opposite (southern) side of the ditch.

The reasons as to why a landslip should have occurred may be found in the monument's design. The excavation of a ditch at the base of a scarp slope, with the upcast bank placed on the top of the slope without an intervening berm, created a large, steep and apparently unstable face. This would have been vulnerable to localised failure, especially during or after heavy rainfall. This resonates very well with the possibility raised by Wheelhouse when he suggested that Becca Banks' construction was potentially '*ill conceived, with every chance that the bank would erode back into the ditch after a relatively short time span*' (2001a, 144).

2.3.4 Romano-British features

Following the monument's construction, a series of field ditches was set out; Romano-British artefacts were recovered from some of these. The stratigraphic sequence and dating evidence do not allow the relative sequence of the landslide and the use period of the Romano-British ditches to be understood, although they may have been broadly contemporary.

Ditch/ feature	L m	W m max	D m max	Orient.	Profile	Fills	Dating evidence	Rel'ships with other features
791	23+	0.82	0.5	NW-SE	Deep bowl-shaped	Firm or friable reddish brown, or plain brown, clay silt	C3rd AD pottery	Abutted Becca Banks ditch?
793	38+	6.65	0.25	NE-SW	Shallow dish-shaped	Firm brown silty clay	-	Contemp. with ditch ***791***?
669	9+	1.06	0.43	NW-SE	Rounded bowl-shaped	Soft dark greenish greyish brown silty clay overlaying a firmer brown sandy clay silt	-	Cut ditch ***776***, cut by medieval pits
475	7+	1.3	0.5	NW-SE	Bowl-shaped	Soft brown sandy silt, pebbles and stones	RB pottery, saddle quern handstone	Same as ditch *669*?

Table 2.1: Characteristics of Romano-British ditches at Becca Banks

2.3.4.1 Ditch *791*

This extended for 23m in the southern spoil storage area, close to the western limit of excavation, and continued beyond its south-west corner. A rounded terminal marked its northern limit (Fig. 9b and 11). The terminal contained a substantial piece of unabraded third-century Romano-British pottery, and a sherd of the same date was found in the backfill of an intrusive land drain. The northern terminal of this feature stopped 10m short of Becca Banks ditch, suggesting that it may respect and therefore post-date the main monument.

2.3.4.2 Linear feature *793*

This feature, generally rather vague in plan, was over 38m in length and continued beyond the eastern limit of excavation. Its western limit merged with the north-south ditch ***791***. No finds were recovered, but it is thought that this feature and ditch ***791*** were contemporary, as at the junction of the two features their fills were indistinguishable, and because ***793*** did not extend beyond ditch ***791*** in plan.

The function of this feature is not clear, although judging by its linear form and shared alignment with other field boundary features on the site, it was probably an element within a field system. It was recorded on site as a furrow, an apt description but for the fact that no other similar features accompanied it. A further possibility is that this feature represents a slightly hollowed trackway, although its fill was relatively 'clean' and homogeneous, not what would be expected of the trampled fill of a trackway.

2.3.4.3 Ditches 669 and 475

Ditch *669* lay in the north-western part of the main excavation area. Its southern end was located at the northern edge of the earthwork bank, and it ran on a northerly course for 9m into the north-western corner of the site. This feature was essentially a recut of that portion of Iron Age ditch ***776*** not buried beneath the main monument bank.

Ditch *475* was found in the northern spoil storage area, and appeared to represent a continuation of ditch *669*. In places, it contained noticeable concentrations of pebbles and stones, mainly in its lower

reaches. The base of a simple jar, datable only to the Roman period generally, and a handstone from a saddle quern were recovered from ditch *475*; no artefacts were found in ditch *669*. Together these ditches appear to extend the boundary line represented by ditch ***791*** on the opposite side of Becca Banks ditch, revealing the presence of landholdings on both sides of the monument following its construction.

Ditch *475* was followed on its eastern side by a parallel gully with an extremely irregular profile, possibly a hedgeline. The pebbles within the ditch's lower fill may have originated from a (now ploughed out) contemporary and accompanying trackway. These features may together represent a field boundary consisting of a ditch and banked hedgerow, which was perhaps accompanied by a metalled trackway.

2.3.5 Medieval features

2.3.5.1 Pits

Cutting the silted-up terminal of ditch *669* was pit *418*; just to the south was pit *416*, which had been dug into the remains of the main monument bank (Fig. 12).

Pit *418* was sub-circular, measuring approximately 2.5m by 1.5m across. Burning had occurred within it, as revealed by the scorching on the limestone slabs that partially lined it (Fig. 13). Pit *418* contained quantities of charred cereal grains and weed seeds; these may relate to the function of the feature, or the use of cereal processing waste as kindling or fuel. Pit *416* was slightly smaller, measuring 1.8m by 1.3m across. It also contained burnt material in the form of large quantities of charcoal, along with lesser amounts of heat-affected clay and stones, but no evidence of burning having occurred in the pit itself.

Both pits returned early medieval radiocarbon dates: a lower fill of pit *418* contained carbonised cereal grains radiocarbon dated to 680-870 cal AD (1245±30 BP; SUERC-24500), whilst a sample of charcoal taken from the base of pit *416* dated to 890-1020 cal AD (1090±30 BP; SUERC-21055). Residual Romano-British pottery was also recovered from both pits. The pottery may originally have been located in the probable Romano-British ditch that pit *418* was dug into: the downslope terminus of such a feature would be particularly likely to have such finds washed into it.

The environmental evidence from these features indicates that arable agriculture was being carried out in their vicinity. The plant macrofossil assemblage from pit *418* was relatively rich, containing a moderate to high density of grains and seeds of grassland herbs and segetal weeds. Oat (*Avena* sp.), barley (*Hordeum* sp.) and wheat (*Triticum* sp.) grains were all recorded, with wheat occurring most frequently. There was an abundance of small leguminous seeds amongst the weed seeds, possibly indicating that these plants were being deliberately grown, either as fodder crops or as part of a rotational cropping regime. The range of plant remains indicate that a variety of different soils were being utilised for agricultural production nearby, including heavy clay land as well as lighter, well-drained soils. Other materials such as fragments of charcoal/charred wood, hazelnut shells and bone were also present, and may represent the burning of cereal processing waste, possibly as kindling or fuel. In contrast, the assemblage from pit *416* is less diverse and principally composed of a large number of charcoal fragments. The difference between the two environmental assemblages may accord with the radiocarbon results in suggesting that the pits were not contemporary.

The function of these features is not certain. Pit *418* might represent a simple campfire built in the lee of the sheltering bank, but the partial stone lining and cereal grains suggest some sort of food processing is perhaps more likely. A feature apparently similar in appearance and date to pit *418* was excavated approximately 5km to the south-west at Garforth, where it was interpreted as a corn-drying kiln (Owen 2000), and such a function may also apply here. Pits *416* and *418* present rare evidence of

the use and wider environmental setting of the monument during an archaeological period that is poorly understood at the regional level.

2.3.5.2 Colluvium

The pits were sealed by layer ***794***, a 0.35m-thick deposit of homogeneous, friable reddish brown colluvium that abutted (and therefore post-dated) the main monument bank. Deposit ***794*** is probably the result of plough action and hillwash of sediment down the gentle slope to the north of the monument; the construction of the monument bank would have created a barrier against which such material could build up. That such accumulation would probably have been slow and gradual is confirmed by the miscellany of finds recovered: two struck flint flakes, nine sherds of Romano-British pottery (mostly dating from the late second to third century AD), and three sherds of medieval and late medieval pottery. The deposit was cut by stone-filled land drains, which are believed to be post-medieval in date. Overall, the dating evidence suggests that this material was accumulating from the Roman period until the Middle Ages.

Deposit ***794*** probably equates to the 'fine red soil' found to the north of the monument during the 1965 excavation on Becca Banks (Brooks 1967, 12).

Plate 8: Chris Casswell and Geoff Snowdon recording the fills of Becca Banks ditch, looking west

2.3.5.3 Infilling of Becca Banks ditch

The infilling of Becca Banks ditch was probably occurring throughout the Roman and medieval periods, although the stratigraphy did not allow any of the remains described above to be related to specific points in the depositional sequence of the ditch. Those fills that accumulated in the ditch subsequent to the landslide are difficult to date, and probably built up over a considerable period of time. The stratigraphically earliest fill to contain a datable artefact is context *544*, which contained a

highly abraded amphora sherd dated to between the mid-first and mid-third century AD. Above this context, pottery fragments were more common, with other fills containing only Roman material of a similar first to third-century date. Plant tubers recovered from elsewhere along the length of the ditch, but at a similar depth, returned a radiocarbon date of 770-980 cal AD (1155±30 BP; SUERC-24496). Immediately above the radiocarbon dated deposit, early modern pottery, mixed with medieval and Roman artefacts was found. The evidently residual nature of much of the latter material suggests deposition of a mixed ploughsoil assemblage, or perhaps even recutting. The relative absence of medieval pottery from the ditch fills may reflect an absence of medieval occupation or manuring in the vicinity, or reduced levels of material culture.

2.3.6 Becca Banks in the modern agricultural landscape

2.3.6.1 The end of the ditch

Various features and deposits attest to agricultural activity on and around Becca Banks during the latter period of the monument's lifespan, from the late medieval period up until its partial destruction in the mid-twentieth century.

Several substantial spreads of limestone fragments were found in the upper portions of Becca Banks ditch (Plate 9). The stones did not seem to be consolidated enough to represent a surface, and may instead be a product of field clearance episodes. Pottery ranging from the late medieval period through to the late eighteenth to mid-nineteenth century was found amongst these stones, possibly linking their deposition with Enclosure-era land improvement. By the time these stones were laid down, the infilling of the ditch was almost complete. The deposition of this material may have been in part a deliberate attempt at levelling up the linear hollow that would have marked the ditch, in order to bring it into agricultural production.

The articulated remains of a horse's hindquarters, possibly a fallen stock burial, were recovered from this level of the ditch. The majority of the skeleton, however, lay beyond the limits of the site; the size of the pelvis suggests that it was a large beast, possibly a heavy horse.

The uppermost fills of Becca Banks ditch consisted of 0.4m of firm clays of various shades of brown, yellow and grey. Pottery of nineteenth and twentieth century date was found, along with an assortment of earlier residual sherds. The earlier material included a few fragments of medieval and post-medieval wares, and a relatively large collection of Roman sherds (27 fragments, weighing 321g), mostly dating to the second century AD or later. It seems likely that the material represents a mixed ploughsoil assemblage, although medieval wares, especially earlier medieval pottery, are scarcely represented.

Ditch ***792*** lay in the southern spoil storage area, where it cut Romano-British ditch ***791*** close to the southern limit of excavation (Fig. 8). This appears to be the extension of a field boundary marked on the 1848 tithe map for the parish of Aberford. Material ranging in date from the thirteenth to the twentieth centuries was recovered from it, further emphasising its modernity, despite a shared alignment with the Romano-British ditches.

Plate 9: Stone dump in upper part of Becca banks ditch

2.3.6.2 Modern buried soils

A buried agricultural ploughsoil, deposit ***796*** (Plate 8; Fig. 14), sealed the final fills of Becca Banks ditch and contained much modern material. The tithe map indicates that as late as the mid-nineteenth century Becca Banks still served as field boundary, with the fields upslope and downslope of the monument (within the excavation area) named as High and Low Tofts respectively. The presence of distinctive ploughmarks indicates that deposit ***796*** was the ploughsoil of Low Tofts. This material marks the final demise of Becca Banks ditch: crops were now growing where a deep ditch had once lain.

Contemporary with this ploughsoil, and located directly to the north of it, deposit ***798*** was a dark brownish grey loamy layer, representing the remains of topsoil and vegetation that developed and

grew on the steep uncultivated scarp slope that overlooked the infilled monument ditch (Fig. 14). A very large amount (approximately 60kg) of glass, pottery, iron agricultural tools, a ha'penny of 1909, and scraps of carpet and plastic was collected from deposit ***798***. The latest pottery vessels were of mid-nineteenth to twentieth-century date, with the glass spanning a similar late Victorian to Edwardian range. The soil matrix itself presumably existed prior to the incorporation of the artefacts, however, and deposit ***798*** may have been relatively stable and long-lived, representing vegetation growing on the hillside for many centuries.

To judge by the type, range and quantity of artefacts recovered, this slope seems to have been used as a household waste disposal site from the early to mid-twentieth century. The general absence of animal bone (other than rabbit) from this material suggests that the material represents a house clearance episode, rather than routine kitchen waste. Visits to Becca Banks on the other side of Aberford reveal that that monument there continues to be (mis-) used in a similar way.

The mollusc assemblage collected from deposits on the hillside possibly indicates that at some point the hillside was hedged or overgrown. The hillside had been affected by bioturbation; several cavities were found, some containing numerous fragments of rabbit bone. The overgrown hillside would have been home to generations of burrowing rabbits.

2.3.6.3 The end of the bank

The buried ploughsoil and topsoil of deposits ***796*** and ***798*** owed their preservation to the fact that they were sealed beneath the levelled monument bank. The bank was presumably bulldozed downslope at some point in time, in order to relieve the gradient of the hitherto steep hillside above Becca Banks ditch, and so that more land could be brought into production and field patterns rationalised. This event marked the near-complete destruction of the bank, and the erasure of the field boundary that it had hitherto marked: High and Low Tofts became the single larger field that exists today.

The levelled and redeposited bank material (deposit ***799***) generally resembled what little of the bank remained in situ, and was typically approximately 0.6m thick (Plate 8; Fig. 14).

Deposit ***799*** contained twentieth-century material, and was probably laid down in the 1940s or early 1950s. Alcock surveyed the monument in 1953 and recorded that the bank between Hayton Wood and Aberford (the stretch of the monument that the 2008 site lies within) had been '*badly mutilated by farming, and the ditch has vanished*' (1954, 148). This observation accords with the recollections of local residents who visited the 2008 excavation site and stated that the hillside was much steeper in the 1940s or 1950s.

A public footpath currently follows the course of Becca Banks. This footpath led from the 'Field Lane' marked on early maps of the area, which probably served as an agricultural access track. The modern public footpath therefore preserves the line of the now-vanished field boundary, and the monument it was based on, through what is now an open arable field.

3 DISCUSSION

This section draws together the excavated evidence presented above, and considers it in light of what is already known about the monuments following earlier work, and their wider historical setting. The development of the Aberford Dykes complex can now be better understood, as sufficient evidence has now been gathered to discern something of the different narratives of the component monuments.

3.1 Landscape setting

Understanding of the monuments should proceed from an appreciation of their landscape setting. The monuments span the Magnesian Limestone ridge, indeed, their extent seems determined by the limits of the Cadeby formation limestone within it (Fig 1). Both the limestone ridge, and the valley of the Cock Beck which runs at right angles to it, are likely to have been communication routes in the past. These routes crossed at Aberford, at a fording point of the Cock Beck, and the importance of this point in the landscape seems to be emphasised by the focussing of the monuments upon it: both the Woodhouse Moor Rein (another of the Aberford Dykes), and the South Dyke appear to terminate close to the river crossing. A recent review of the prehistory of West Yorkshire has noted that transverse river crossings of the limestone ridge were often chosen as the locations for major monument groups, such as the henges at Newton Kyme and Ferrybridge, on the Wharfe and Aire respectively (Vyner 2008, 6). The proximity of Barwick-in-Elmet hillfort to the Cock Beck, as well as the Dykes themselves, may therefore be explicable in these terms (Fig. 16).

3.2 Dating the monuments

3.2.1 The South Dyke

The group of pits to the north of the South Dyke pre-dated the monument and were constructed and backfilled at some time in the mid-Iron Age. This is apparent from their presence in the area where the South Dyke bank was later located (see below), and a radiocarbon date of 740-390 cal BC (2400±30 BP; SUERC-24490) obtained from material found near the base of one of the pits.

The radiocarbon date of 370-160 cal BC (2180±30 BP; SUERC-24493) from a piece of animal bone from the very base of the South Dyke ditch pushes back the previously known date for the construction of the monument (Burgess 2001a, 134). If this date is not from a residual artefact (and the sequential integrity of associated radiocarbon dates suggests it is not) then the South Dyke may now be seen as product of the middle Iron Age. The monument's ditch was already filling up in the late Iron Age, and had probably fallen out of use by the start of the Roman occupation of the north. This is indicated by a stratified sequence of radiocarbon dates from of this feature, and the absence of Romano-British material from its fills, despite the presence of such material in other features elsewhere on site, suggesting that infilling of the South Dyke occurred before use of Romano-British cultural material was widespread in the area.

Ditch ***196***, the curvilinear enclosure ditch, is not thought to be contemporary with the South Dyke but later than it, and was constructed at some point in the late pre-Roman Iron Age. This is indicated by radiocarbon dates of 110 cal BC- cal AD 60 (2020±30 BP; SUERC-24494) and 180 cal BC-cal AD 0 (2075±30 BP; SUERC-24491) from material close to the base of the ditch, the differing form and fills of this feature in comparison with the South Dyke, and the apparent superimposition of this feature onto the South Dyke when the site is viewed in plan (Fig. 15). Finally, the artefactual and radiocarbon evidence from the upper half of the backfill sequence of ditch ***196*** appear to date the disuse of the enclosure to the late fourth century onwards.

*Plate 10: Enclosure ditch **196** at the South Dyke*

3.2.2 Becca Banks

The calibrated radiocarbon dates from the palaeosol present a first century BC *terminus post quem* date for the construction of Becca Banks. The main monument bank was later cut by a pit radiocarbon

dated to 890-1020 cal AD (1090±30 BP; SUERC-21055). If it is assumed that the material that produced this later date is broadly contemporary with its parent feature, then the construction of the monument has been bracketed to between the first century BC and the ninth to eleventh century AD. On the face of it, this may not be particularly useful in resolving the argument whether Becca Banks is an Iron Age or early medieval monument. It is our contention, however, that the monument was constructed at the very start of this time period, in the late pre-Roman Iron Age. There are four principal reasons for this assertion.

Firstly, an absence of Romano-British artefacts from any contexts stratigraphically earlier than the monument itself suggests the monument pre-dates the Roman period. Admittedly, Romano-British material was not particularly plentiful on the site, but it was generally widespread, and so it seems unlikely that contexts earlier than the monument would not have come to contain such material had they formed during or after the Roman period.

Secondly, the radiocarbon dated material from the palaeosol was relatively fragile and would have been unlikely to survive for long on the ground surface. It is therefore not thought to be residual, and was probably buried (by the monument bank) soon after it was deposited on to the old ground surface.

Thirdly, the lowest finds obtained from the Becca Banks ditch backfill sequence were fragments of Romano-British pottery, with no later material found in these same contexts: this suggests that the ditch was filling up in the Roman period.

Finally, the evidence from the 1996-7 excavations on Becca Banks, although limited, also suggested a broad Iron Age date for the monument (Wheelhouse 2001a, 144).

Overall, the dating evidence has therefore been interpreted as supporting a late pre-Roman Iron Age date for the construction of the monument although, as ever, '*this view is based on general probabilities rather than definite evidence*' (Alcock 1954, 147).

Following the landslide, infilling was seemingly slow and gradual, although few artefacts were found in the ditch, and the chronological sequence they reveal is not particularly orderly. Then, in the nineteenth century, the ditch was probably deliberately backfilled so that the land it occupied could be brought into cultivation. Overall, the ditch had a long lifespan, but unfortunately the dating material was neither abundant nor stratigraphically secure enough to permit a clear understanding of much of this.

The divergent chronologies of Becca Banks and the South Dyke are summarised in the following table.

Date	The South Dyke	Becca Banks
Modern	Arable agriculture	Arable agriculture
1940s-50s	-	Slighting of Becca Banks
Edwardian era	-	Ditch completely infilled. Dumping on hillside
Post-medieval period	-	Infilling of ditch recommences with dumps of stony material
Middle Ages	-	Apparent hiatus in infilling of ditch
Eighth to tenth century AD	-	Pits dug into bank, ditch infilling
Roman – Late	Colluvium accumulates, ditch ***196*** infilled	Field system in use. Becca Banks ditch presumably infilling
Roman – Early-mid	South Dyke presumed infilled	Initial fills of Becca Banks ditch, landslide, field system set out?
Late pre-Roman Iron Age	South Dyke infilling, ditch ***196*** (enclosure ditch) dug	Becca Banks constructed
Mid- to late Iron Age	South Dyke dug	Post alignment standing, Ditch ***776*** open
Early to mid-Iron Age	Pit cluster	Ditch ***776*** dug?

Table 3.1: Comparison of the lifespans of the South Dyke and Becca Banks

3.3 Before the Aberford Dykes

It is possible that the South Dyke was constructed along the line of an earlier trackway. The monument follows the upper edge of a scarp slope, before turning sharply downhill towards the crossing point of the Cock Beck, and so seems to reflect an obvious natural routeway through the landscape, especially if the intention was to follow the watercourse to its fording point whilst avoiding the steep valley side and its potentially boggy floor. Studies of similar linear monuments on the Yorkshire Wolds have also proposed such a sequence whereby earthworks were built along the course of trackways (eg Fenton-Thomas 2003, 41-42), and the positioning of the South Dyke within its landscape suggests that this also occurred here.

Although no confirmation of this was provided by the site stratigraphy, work at both the South Dyke and Becca Banks did recover other evidence relating to land use prior to the construction of the monuments. The South Dyke was apparently pre-dated by the cluster of five pits. Not only were these located where the monument bank would have lain, but one was also radiocarbon dated to between the eighth and fourth centuries cal BC. The pits may have been contemporary: they were closely spaced but did not intercut, suggesting that they were open, or at least apparent, at the same time. The use of the pits is unknown, but such features form part of a suite of archaeological evidence common to the wider area. Much larger clusters of similar pits have been excavated nearby at Ledston, and at 'Site M' on the A1(M) (Roberts 2005b; Brown et al 2007). A straightforward functional interpretation is elusive for these types of features, and it is likely their creation and use was at least partly determined by ceremonial considerations (Chadwick 2010, 418-20; forthcoming).

The pits at the South Dyke formed a rough east to west alignment, and their long axes shared the same east to west orientation that the South Dyke later followed. It is possible that these features may therefore have been part of a pit alignment representing the earliest marking of the hitherto notional boundary along the rim of the south side of the valley of the Cock Beck. Pit alignments were seemingly used to mark boundaries in the past (eg at Ferrybridge: Richardson 2005) and examples have been recorded elsewhere in Yorkshire of pit alignments being replaced by linear earthworks as boundary markers (eg the Cleave Dyke system: Spratt and White 1986, 196).

Evidence of pre-monument activity was also present at Becca Banks, where four postholes were found sealed beneath the monument bank. Lumps of the same material as that which formed the monument bank loosely filled the postholes, with no material representing the rotted remains of in situ posts present, and so it seems likely that these had been removed immediately prior to the construction of the monument. Posts within these sockets were likely to have been visible for some distance. It is thought that timbers are usually set with one third of their length buried below ground and two thirds standing above (Maisie Taylor, pers. comm.), and so these postholes may have contained posts up to 3m long, standing at least 2m above the ground surface.

Individually, there is little doubt that these features are postholes, indeed, they could be described as 'textbook examples', but the group function of the alignment is less clear. They possibly formed a prominent fenceline or boundary, but the irregular and discontinuous pattern of the group undermines this interpretation, and no such alignment has been reported in previous work on Becca Banks. Excavations on a similar linear monument, the Roman Ridge in South Yorkshire, recorded two earlier ditches sealed beneath the final bank (Atkinson 1994, 47-48), indicating that such major boundaries were renewed and redefined over time.

Also found sealed beneath Becca Banks bank was ditch ***776***, which has parallels with similar features found on the 1996 WYAS A1(M) excavations. The pre-monument field ditches found at the 1996 WYAS site and the 2008 site are so similar in terms of their size and profile, and also the fact that each had banks on both sides, and had been infilled and sealed by the monument bank (Wheelhouse 2001a, 139-140, fig 107), that it is conceivable that they were part of the same overall system. These excavations together offer further evidence that some of the field boundaries visible throughout the wider area through aerial photography pre-date Becca Banks, and are therefore likely to be pre-Roman in inception – although many continued in use following the Roman occupation.

Micromorphological study at the 2008 site suggests relative stability in the landuse regime over time. Column samples were extracted from the palaeosol sealed beneath the bank that accompanied ditch ***776***, as well as the palaeosol that remained exposed until Becca Banks itself was placed over it. The two samples were very similar, and neither possessed any diagnostic features to suggest rapid change within the landscape. This would suggest that the landuse regime in operation when ditch ***776*** was dug persisted until the construction of Becca Banks. The creation of the field system therefore did not seem to coincide with a radical change in agricultural practice, such as the turning of grassland over to the plough.

At both Becca Banks and the South Dyke, it appears that the marking of boundaries in the landscape was already important before the monuments were constructed. The small quantities of artefacts recovered from the pre-monument phases do little to illuminate the material circumstances of the contemporary population, and in this the sites conform to regional trends. The recovery of struck flint interpreted as in situ knapping debris from beneath Becca Banks does add to the general picture of a prehistoric presence in the landscape, and is a reminder of the utility of large earthworks in preserving such evidence.

Such environmental evidence as has been recovered suggests that prior to the construction of Becca Banks the local habitat was pastoral grassland with some areas of shaded scrub. This may have been cleared by burning prior to the construction of the monument.

3.4 The design and function of the monuments

3.4.1 The South Dyke

The Aberford Dykes have traditionally been interpreted in the light of their perceived military function (eg Crawford 1935, Alcock 1954, Faull 1981). The investigations on the Dykes in recent years, and developments in the interpretative approach to linear monuments, along with a better

understanding of the archaeology of the limestone ridge generally, now permit alternative explanations. As the dating evidence suggests that the South Dyke pre-dates Becca Banks by some two or three centuries, this monument will be considered first.

It is highly unlikely that the South Dyke was designed to operate as an impenetrable line of defence. Firstly, although the ditch was more than 3m wide it was only a little over 1m deep. Secondly, where both bank and ditch are preserved, the bank lies downslope (north) of the ditch (contra Faull 1981, 172), the opposite arrangement to that expected had defensive considerations been paramount (Plate 2; Fig. 17).

A growing body of excavation evidence suggests that territorial demarcation was taking place on the limestone ridge from the early first millennium BC onwards (Chadwick 2009, 73-75; Vyner 2008, 19-20). Grim's Ditch and linear features in the Castle Hills area have been interpreted as primary land boundaries set out during an early to mid-Iron Age campaign of pioneering land enclosure (Wheelhouse 2001b; Brown, Howard-Davis and Brennand 2007, 82-105). Similar bank-and-ditch monuments are known from the wider region, such as on the Yorkshire Wolds and the North Yorkshire Moors. It seems that the South Dyke should be seen in the context of this activity, especially as it now appears broadly contemporary with it.

The position of the South Dyke is topographically determined: it follows the line of the Cock Beck and is cut into the upper edge of the valley side. Indeed, as suggested above, it may have been built along an earlier trackway. This positioning and sequence is reminiscent of some linear ditches on the Yorkshire Wolds, which are commonly thought to be boundary markers, possibly related to pastoral farming 'estates' (Stoertz 1997; Fenton-Thomas 2003). The possible presence of a pit alignment at the South Dyke may relate to earlier attempts to mark out this boundary, or activity carried out in acknowledgement of it. The current evidence seems to indicate that the South Dyke is the physical manifestation of a potentially long-recognised boundary, one that owes its inception to landform and the consequent movements of people and their livestock.

Finally with regard to the function of the South Dyke, it is worth pointing out that, as locally excavated evidence increases, it is perhaps becoming apparent that the scale of the South Dyke is not remarkable. Apparently 'ordinary' Iron Age or Romano-British field ditches measuring over 3m wide, with some deeper than the South Dyke, have been revealed nearby at Lotherton Park Farm (On Site Archaeology 2007), and during the course of the other excavations on the pipeline (Gregory, Daniel and Brown, in prep.). These features are typically entirely plough-levelled, and so are not visible on the ground surface. It may be useful to consider how our appreciation of the monumentality of the South Dyke would be undermined if all its contemporaries still existed as earthworks. Current perceptions of the Aberford Dykes as a group may be at least partly influenced by differential preservation of their wider archaeological landscape.

3.4.2 Becca Banks

The newly excavated data supports earlier suggestions that Becca Banks was an Iron Age feature (Wheelhouse 2001a, 144). Indeed, it now seems likely that the monument dates specifically to the late pre-Roman Iron Age. This was a period of considerable flux in the organisation of local native British society. Excavations of late Iron Age sites, such as Stanwick, Wattle Syke and Dalton Parlours (Haselgrove et al 1990; Martin 2009; Wrathmell and Nicholson 1990), along with the increasing amounts of fine metalwork recorded in the region (largely through the Portable Antiquities Scheme), reveal that by the late Iron Age some individuals or communities had access to greater resources and more exotic material goods than others (Chadwick 2010, 36). This may mark the growing presence of a local native elite in an area traditionally considered to be somewhat politically backward.

From AD 43 onwards, such political leaders would have been forced to deal with the uncertainties, problems and opportunities caused by the presence of the Roman army in the south of the country (Chadwick 2010, 39). It may have been politically expedient for leaders north of the area of direct

Roman control to be on good terms with the Romans, but a balance would have to have been struck between 'tribal' loyalties, popular sentiment and longer-term strategy. The existing hierarchy would have been made vulnerable to internal challenges from those with differing attitudes to co-existing with the Romans. Issues of identity, loyalty, political control and authority would have been cast into particularly sharp relief.

The Roman historian Tacitus records that native society did indeed suffer upheaval at this time: the local queen, Cartimandua, who had negotiated a long-lasting treaty with Rome, was overthrown by a rebellion led by her former consort Venutius, prompting direct Roman military invasion. The veracity of Tacitus' account is uncertain; he was writing some 30-40 years after the described events, and his portrayal of what occurred and the personalities involved is coloured by didactic intentions (Grant 1996). Nevertheless, it is generally assumed that Tacitus' account is based on actual events, and the gist of the story seems feasible.

This political context converges with some of the excavated evidence from Becca Banks in revealing something of the circumstances of the monument's construction. Becca Banks is the most substantial of the three Aberford Dykes. Indeed, by arranging the monument around a slight scarp slope, which had the effect of raising the top of the bank as high as possible above the base of the ditch, and apparently neglecting to leave a berm of level ground between the bank and lip of the ditch, Becca Banks was seemingly 'designed to look more impressive than it actually was' (Adrian Chadwick, pers. comm.). Through its design and its use of the landscape, the monument was a statement of authority, a gesture designed to inspire respect, made at a time when local leaders may have felt vulnerable to internal and external challenges. Although massive, and clearly a product of mass labour, Becca Banks displays none of the constructional finesse, such as the use of box ramparts, a berm or revetting, in evidence at other major Iron Age earthworks. These would have stabilised the monument and ensured a longer lifespan. Rather, the priority of the builders seems to have been to raise the bank as high above the ditch as possible, as quickly as possible. In doing so, portions of open ditches of presumably functional enclosures were built over, and a number of large posts were uprooted.

The western terminus of Becca Banks lies around 1km to the north-east of the earthwork remains of Barwick-in-Elmet hillfort. Little is known about this unexcavated site, although other hillforts were constructed and used before Becca Banks, in the first millennium BC. Although there may not have been a functional relationship between the hillfort and Becca Banks, the referencing of the earlier monument may have been deliberately undertaken in order to cast legitimacy onto the new project; an attempt was made to connect with the sense of ancestry, belonging or power with which the hillfort may have been endowed. It is difficult for a modern audience to appreciate exactly how such a construction would have been viewed by those who built it. It does, however, seem clear that monumental earthworks were constructed throughout prehistory, and that such projects, here as elsewhere, often defined ceremonial or political centres. The building of earthworks was part of an established and antique vocabulary whereby power and identity were made visible in the world.

It seems a reasonable assumption that the limestone ridge operated as a corridor of movement in prehistory, and the fording point of the Cock Beck was presumably an important element of this. People and livestock would have been channelled and concentrated here, and there would have been many opportunities for informal and perhaps more formal meetings. As mentioned before, the Aberford Dykes also appear to focus on this river crossing. Becca Banks in particular bisects the limestone ridge and has a particularly commanding position above the ford. It thus dominated the locale, and may have had a role in controlling this river crossing, and was perhaps even used as base to enforce the collection of tolls and tribute. Alternatively, it may have marked the boundary between one social group and another, and was thus imbued with great political and symbolic significance.

The construction of Becca Banks thus seems to have been commissioned by an individual or group who had control over the landscape, the local population and those in transit, and was urgently keen to reinforce that control through the propaganda of monument construction. The presence of Becca

Banks in the landscape, its relationship with pre-existing sites, its incorporation of existing features, and the very act of imposing an obstacle onto an existing routeway, would all have expressed the power of the builders of the monument. As Becca Banks faces south, it is hard to deny that it also smacked of an anti-Roman attitude.

The construction of Becca Banks was possibly a reaction by native leaders to the new and challenging political situation generated by the presence of Roman forces on the edge of their domain. This is not to suggest that Becca Banks was the 'first defence of the Brigantes' or can be specifically attributed to an event such as Venutius's revolt of AD 69 (Alcock 1954). Firstly, it would have been possible to outflank the earthwork; and secondly, such an entrenchment would not have been impregnable to the sort of concerted infantry assault of which the Roman army was capable, and it would be doing the native people a disservice to think that they did not appreciate this (Adrian Chadwick pers. comm.). Permanently manning such a long linear earthwork as if it was a defensive rampart would have been beyond the means of these indigenous communities. Finally, to suggest that Becca Banks was built following the AD 69 revolt compresses the chronology of the Roman occupation of the north to an unrealistic degree: the Ninth Legion is thought to have arrived at York by AD 71 (Ottaway 2004, 11), by which time Becca Banks would either have been crossed or outflanked. The Roman military campaign proceeded extremely quickly: a fort was established as far north as Carlisle in AD 72-3 (Zant 2010). It is difficult to determine how quickly the monument may have been built: the size of the workforce would be a key factor in any calculation, and this is not currently knowable. The local populace was presumably not that numerous, given the lack of evidence for many large Iron Age settlements; and as subsistence farmers they would have already had considerable demands on their time. It seems unlikely that monument could have been built in the short interval available after AD 69.

3.4.3 The enclosure at the South Dyke

The excavated evidence reveals that the two monuments suffered differing fates following their construction. Over 1 metric ton of burnt stone was found deposited in the lower portion of the South Dyke, alongside a quantity of animal bone. This material may have been the result of feasting: fire-heated stone could have been used in food preparation, either through bringing water to the boil or in pit ovens. Indeed, such a function is often ascribed to prehistoric burnt mound features (Ó Drisceoil 1988). The stone, mostly river cobbles, had been carried to the South Dyke, possibly from the Cock Beck nearby. This suggests that this part of the monument had been deliberately chosen as an appropriate location for a perhaps significant feasting event, possibly between different groups or communities. This would reveal something of the perceived importance of the monument. What emerges from the evidence is the sense that this portion of the South Dyke was seen as a place in the past, and a place of some significance at that.

This is further outlined by the fact that this section of the South Dyke was later utilised so that it formed part of an enclosure. This measured at least 49m east to west and approximately 43m north to south, with an area of more than 0.2 ha (Fig. 16). The enclosure was double-ditched, with the South Dyke and curvilinear ditch ***196*** appearing to form, respectively, the inner and outer ditch of the enclosure's north side. Evidence from beyond the South Dyke excavation area reveals that the enclosure had an entrance in its south-west corner, and was subdivided with smaller ditches, although no features directly attributable to habitation, such as hearths or roundhouse ring gullies, were recorded.

Aerial photographic evidence suggests rectangular enclosures, measuring 0.5ha or less, were relatively common over the chalk and limestone areas of Yorkshire; these are often found in conjunction with linear ditches (Stoertz 1997, 49; Wheelhouse 2001a, 141).

A rough typology suggests that prehistoric irregular double-ditched enclosures were succeeded by regular single-ditched compounds in the very late Iron Age and Roman period (Chadwick 1999, 154; Roberts, Deegan and Berg 2010, 27-30; Stoertz 1997, 15). The South Dyke site is unusual in that such

a succession is visible at the same location. One may assume that the South Dyke was not yet infilled when the enclosure was constructed, as the enclosure seems to deliberately utilise the South Dyke, co-opting a length of it to form part of its northern boundary. This assumption is strengthened by the arrangement visible in the geophysical survey results, which reveal that the western extent of ditch ***196*** appears to intersect with the South Dyke, but does not extend beyond it, again indicating that the South Dyke was open at the time. However, it seems that the two features became backfilled at different times. Nothing resembling the substantial deposit of fire-cracked rock in the base of the South Dyke was recorded in the other ditches defining the enclosure, suggesting that their infilling was unlikely to have been contemporary. Instead, the evidence reveals that the South Dyke became infilled before the Roman period, whereas ditch ***196*** remained open until at least the late fourth century.

With the South Dyke infilled and ditch ***196*** still open, the double-ditched enclosure would have been transformed into a single-ditched space. This may have been done in order to increase the amount of available space within the enclosure, and the owners of the enclosure may have been taking advantage of changing circumstances. Perhaps defence became less of a priority, and it was considered less likely that raiders or predators would attempt to intrude. Alternatively, if the role of the enclosure had originally been the corralling of livestock, then perhaps they were now considered less likely to escape, possibly reflecting a move towards more docile breeds (or species). A simple change of fashion or taste would be a less overtly functional explanation.

The discovery of the enclosure at the South Dyke served to reveal something of the fate of the monument bank. It was appreciated during excavation that the absence of any trace of the bank from the excavation area was something of a puzzle: there was no sign of it as an upstanding earthwork, nor had it been redeposited back into the ditch – the ditch fills mostly comprised deposits of sandy silts, not chunks of the bedrock from which the ditch had been hewn. It appears that, as the monument bank and ditch ***196*** could not have co-existed, the section of the South Dyke bank that would have lain within the enclosure was probably removed when the enclosure was appended to the monument.

The position and density of stony tip-lines recorded in the sections through ditch ***196*** clearly and consistently indicate that the bank of this feature was placed to the north of its ditch. Thus, a bank, and not a ditch, formed the outermost boundary of the enclosure at the South Dyke.

That early activity at the South Dyke dates to the Iron Age is only discernible through the radiocarbon dates; the artefactual evidence is sparse and currently only allows generalities to be noted: the local people grew grain and raised sheep or goats, and cattle. They also kept horses and dogs, perhaps using these for hunting deer in nearby woodland: tools were made from the antlers of their prey. A spindle whorl and loomweight suggest that wool was turned into fabric close by. The evidence, although sparse, reveals a people sensitive to the wide range of resources and opportunities offered by their local environment.

As stated above, enclosures are commonly found appended to earlier linear boundaries in the wider area, where they are either connected by short avenues (Roberts, Deegan and Berg 2010, 30), or butt onto the earlier linear features. The example investigated here is unusual in that the later enclosure slightly overlaps the South Dyke, so that the monument forms the inner ditch of the enclosure. This might indicate that the builders of the enclosure were keen to appropriate the monument, and possessed the authority to do so. Perhaps this reveals the enhanced social status of those responsible for the enclosure, as they were apparently ‘entitled’ to convert part of the boundary for their own use. Conversely, it may indicate that the status of the South Dyke had diminished over time. This is supported by the fact that the monument known as the Woodhouse Moor Rein appears to cut through the South Dyke.

3.4.4 The Aberford Dykes in the Romano-British landscape

In the centuries of the Roman occupation, the two portions of the monuments later crossed by the pipeline would each have had a very different sense of place. The South Dyke site was part of an enclosure, and may have been inhabited. The quantity and variety of Romano-British artefactual evidence, including almost 3kg of pottery, a coin, jewellery, worked antler and a fragment of quernstone, indicate occupation in the vicinity. By contrast, the Becca Banks site revealed just one section of a long linear earthwork, here probably partially collapsed and neglected, and with apparently little activity in its vicinity.

As Becca Banks was seemingly built as a political statement by a native elite, then once the imposition of Roman authority had reconfigured the local political scene, the monument would have become something of an anachronism. This impression is underlined by the fact that the monument was seemingly not repaired following its partial collapse. During the Roman period, Becca Banks was perhaps little more than a field boundary of rather excessive proportions. The 2008 excavation did not reveal any evidence to suggest that there was any substantial settlement activity in close proximity, nor was there any sign of significant re-use of the monument. Instead recutting, and possible extension, of adjacent Iron Age land boundaries in the Roman period presents a picture of stability following the occupation. The evidence from the excavations conforms to a wider trend of continuity in rural settlement whereby Romano-British enclosure and settlement developed or expanded upon the pre-existing template.

The Aberford Dykes had a role in the extensively used Romano-British landscape: they were presumably field boundaries, the use of the raised earthwork of Becca Banks as an agricultural access track may date back to this period. Part of the South Dyke was modified to form an enclosure that appears to have been occupied in the later Roman period. In addition, finds from ditches associated with the Woodhouse Moor Rein suggest that this monument was probably also a feature of the Romano-British landscape (On Site Archaeology 2007, 15).

Evidence from the South Dyke enclosure reveals that wheat was grown nearby at this time, and was possibly milled on site. Wild foods continued to be used: hazelnuts were gathered and deer hunted, their antlers being an enduringly useful resource. Cattle were still reared, although the sparse animal bone evidence may suggest that sheep or goat were no longer as numerous. The presence of animals aged beyond that considered prime for meat production suggests that traction and secondary products such as milk, hides and manure were considered of higher importance. Mixed agriculture, with a subsistence rather than a specialised output, seems to have been in operation in the later Roman period.

In many respects, daily life may have largely resembled that before the Roman occupation, save for the important addition of the nearby road between Castleford and Tadcaster, and the Roman markets and goods to which it provided access. Surplus agricultural produce could now be efficiently transported to a number of local markets, and Roman material culture could flow in return. The artefacts and materials from the enclosure on the South Dyke – pottery, jewellery, coinage, coal, copper, a gritstone quern – show a reasonable level of engagement with Roman material culture and a degree of access to the resources of the wider area, perhaps higher than that typically encountered on rural sites in the area. Some pottery vessels from this phase of the site, namely the Crambeck, Oxfordshire and Nene Valley fine wares, even suggest a degree of affluence. The proximity of the road, and the travellers along it, may have facilitated and encouraged engagement with the wider world, unusual in an area where inconspicuous consumption had long been the norm: '*Rome seemed a lot nearer, if you lived by a road*' (Martins 2006, 324).

Finally, the evidence from the South Dyke enclosure conforms to a common regional pattern whereby both late Iron Age/early Romano-British and late Romano-British occupation are visible, but remains from the intervening period are not: similar chronologies have been noted, for example, around Whitwood, Methley and Gale Common (Burgess and Roberts 2004; Roberts and Richardson 2002;

Still and Randerson 2008). The extent of this pattern, and the reasons behind it, are as yet unclear. The apparent abandonment and reoccupation of settlements and field systems may actually be explicable in terms of the differing use of material culture within a stable occupation pattern. Alternatively, it may reflect a diaspora of townsfolk from ailing urban centres such as Castleford at the end of the Roman period (Roberts 2004), or reorganisation of landholdings related to changes in agriculture at a similar time.

3.4.5 Later activity

There was no evidence to suggest that occupation activity at the South Dyke enclosure continued beyond the late fourth century AD. The fact that the majority of the artefacts were recovered from the final fills of the enclosure ditch and from the colluvial deposit that sealed the South Dyke itself, suggests that by the early medieval period there would have been little indication on the surface of this stretch of the South Dyke or the adjacent enclosure. The final abandonment of the enclosure was probably part of a much wider process whereby swathes of the countryside were reorganised following the collapse of the Roman market economy. Some continuity is, however, evident: short stretches of the South Dyke still coincide with current field boundaries.

As a rather larger monument, Becca Banks persisted as a field boundary for most of its length until the mid-twentieth century, although like the South Dyke, parts of it have been partially or wholly erased. The monument functioned as a township, parish and wapentake boundary in the medieval period (Wheelhouse 2001a, 144), although the excavated evidence allows little to be said regarding activity on the monument in the centuries following the end of the Roman period. The charred seed assemblage from Pit *418* sheds light on the range of crops grown and the ground tilled in the late first millennium AD, and may also reveal the existence of settlement in close proximity. Other than this, the medieval period is represented only by a trio of radiocarbon dates and a few scraps of pottery, deposited as the monument was quietly silting up.

The north to south routeway along the limestone ridge would have been of continuing importance after the Roman period, and the strategic position of Becca Banks, overlooking a river crossing on such a key road, might have prolonged its value as a boundary earthwork. Between the seventh and tenth centuries AD, the southern frontier of the lands controlled from Northumbria advanced and retreated over the monument several times, but the excavated portions of the monument contain no evidence to reveal whether or not it had a role in those turbulent times.

3.5 Conclusion

The Aberford Dykes are commonly referred to as a system of monuments, but in reality they lack unity of design, and instead should be seen as a series of earthworks of varied appearance and purpose that developed over a long period of time. The sum of the evidence from all investigations on the monuments now allows the differing chronologies and characters of the separate elements to be better appreciated. The South Dyke would appear to be mid-Iron Age in inception, and was probably constructed as a civil or agricultural boundary marker. Different portions of it suffered different fates over the years. Becca Banks may be a physical manifestation of the authority of a late Iron Age political elite, or an aspirational gesture with the same intent. Its siting may have been influenced by the existence of the South Dyke (and possibly the Woodhouse Moor Rein) or more fundamentally, by the ancient and enduring perceptions of this part of the landscape responsible for the siting of the earliest monuments. The Woodhouse Moor Rein is known to be later than the South Dyke, was probably in use during the Roman period, and shares the same focus on the crossing point of the Cock Beck as the South Dyke, but is otherwise poorly understood. There is now, however, a sense of dialogue between the three monuments: the construction of the later Dykes was influenced by the existence of the earlier monuments. The excavated evidence thus allows a more nuanced understanding of the Aberford Dykes, yet paradoxically, also highlights the difficulties in attempting to reconstruct the chronology of long linear features through narrow interventions: each such investigation may reveal its own narrative, as sub-histories become discernible.

Plate 11: Claire Gannon and Jennifer Jackson sieving spoil at the South Dyke; ploughing of Becca Banks in background

4 SPECIALIST REPORTS: MATERIAL CULTURE

4.1 The Romano-British pottery

by Ruth Leary

4.1.1 Methodology

The pottery was examined in context groups and catalogued according to the Guidelines of the Study Group for Romano-British Pottery for basic archiving (Darling 2004). The fabrics were recorded and source suggested where appropriate. Reference was made to the National Fabric Collection where appropriate (Tomber and Dore 1998). Forms, decoration, abrasion, cross joins and use patterns were described, and the pottery was quantified by sherd count, weight and estimated vessel rim equivalents (EVES).

4.1.2 The pottery

There were 307 sherds of Romano-British pottery (3223g) and one handmade bodysherd of probable prehistoric date (9g). The quantities of pottery sherds recovered from the excavated areas and contexts and detailed lists are in the archive. The group from Becca Banks was appreciably smaller than that from the South Dyke and the assemblages also contrasted chronologically and in their condition. Pottery from Becca Banks included types dating from the second to late third century while the assemblage from the South Dyke was mid- to late fourth-century in date. At Becca Banks, the pottery was more abraded and scattered in small quantity through the features. Much of the Romano-British pottery from Becca Banks came from assemblages containing post-medieval pottery and was redeposited, while that from the South Dyke was securely stratified within ditch 197 and colluvial layer 195.

4.1.2.1 Range and variety of material

The assemblages from Becca Banks and the South Dyke contrasted in quantity, character and date range. A small group of some 77 sherds (706g) was recovered during the excavation at Becca Banks and although the average sherd weights from the two sites were similar at 9g and 10g respectively, the sherds from the South Dyke were noticeably less abraded. The two assemblages contrast markedly in the wares present. The Becca Banks group was dominated by grey wares with a smaller quantity of black burnished ware while the South Dyke group was made up largely of East Yorkshire calcite-gritted ware in Huntcliff forms, with a smaller amount of shell-tempered ware from Lincolnshire dating to the mid- to late fourth century.

Only one sherd of Crambeck grey ware was present at Becca Banks, whereas Crambeck grey, mortarium and parchment wares were more plentiful at the South Dyke, where they comprised nearly 5% of the assemblage by count and weight. The grey wares at Becca Banks are difficult to source. Some certainly came from the South Yorkshire kilns around Doncaster (Buckland et al. 1980), but the majority are likely to have a local source, perhaps around Castleford. The BB1 vessels at Becca Banks were completely absent at the South Dyke, and it is noticeable that late shell-tempered wares were also rare at Becca Banks but common at the South Dyke. Similarly, the earlier imported wares, such samian and amphora, were only present at Becca Banks, as was Ebor ware (Monaghan 1997 Ebor 1). By contrast, late fine wares such as Crambeck parchment ware, Nene Valley colour-coated wares and one vessel possibly from Swanpool were present at the South Dyke, with only one scrap of Nene Valley colour-coated ware from Becca Banks.

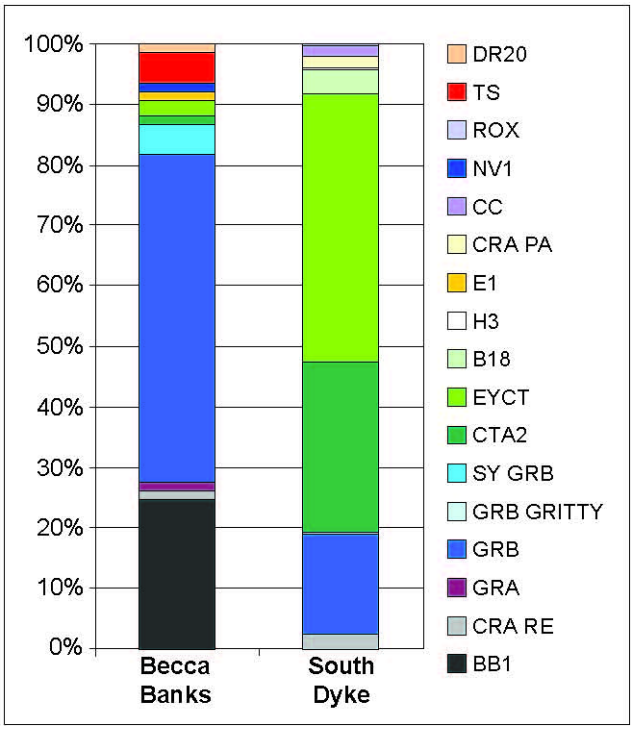


Figure 18: Relative quantities of wares by sherd count at Becca Banks (ABD) and the South Dyke (ASP)

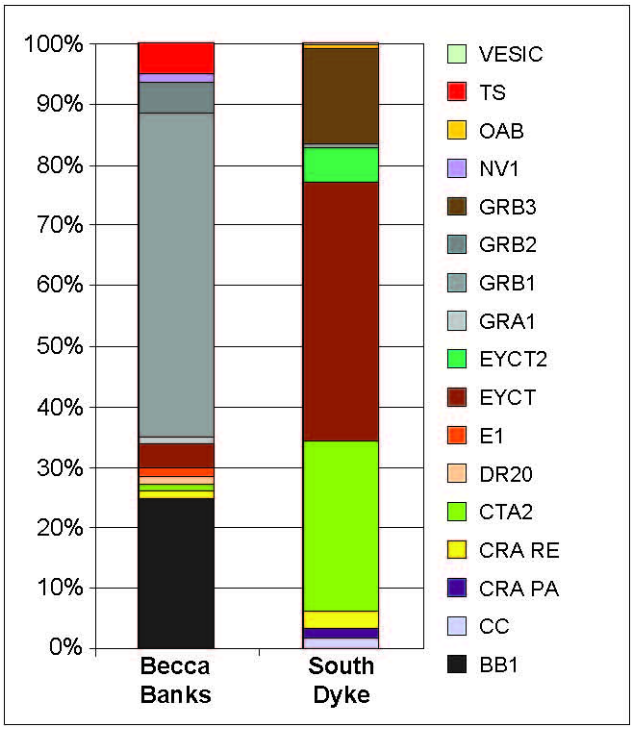


Figure 19: Relative quantities of wares by sherd weight at Becca Banks (ABD) and the South Dyke (ASP)

At Castleford, it was noted that black burnished wares were most common in the late third century, with a pronounced change to Dales ware, with some Crambeck and East Yorkshire grey wares, in the early fourth century (Rush 2000, 158). The ware profile of the assemblage from Becca Banks therefore points to a date range in the third century with some second-century types. The group from the South Dyke, by contrast, is clearly of the later fourth century, after AD 370, when Crambeck

parchment ware appeared (Bidwell 2005) and Huntcliff ware typically dominated ceramic assemblages. The two groups give remarkable snapshots of the nature of the local pottery in these two periods and the virtual disappearance of distance trading and local grey ware supplies by the mid- to late fourth century.

4.1.2.2 Forms

The two assemblages also contrasted in respect to the vessel types present (Evans 1993 and 2001a). The Becca Banks group had more tableware in the form of dishes, but was otherwise dominated by jars, whereas the South Dyke group included a fine ware flagon and sherds from mortaria, as well as small amounts of bowls and dishes. If the bodysherds are also taken into account, evidence for an amphora, a NV1 beaker and a samian dish from Becca Banks redresses the balance slightly. Nevertheless the Becca Banks group was of a more restricted character than that from the South Dyke.

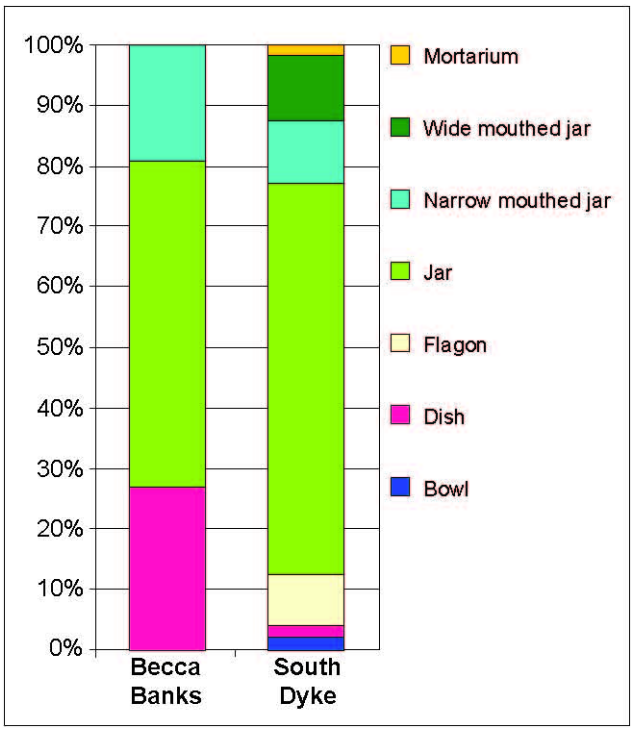


Figure 20: Relative quantities of vessel types using rim equivalents at Becca Banks and the South Dyke

The dishes from Becca Banks were predominantly BB1 plain-rim dishes of mid-second-century type (Gillam 1976 nos 75-6) with one samian dish of the type 18/31 group. The single NV1 scrap was from a beaker, but was otherwise undiagnostic. Nene Valley colour-coated ware might be expected in the region by the late second or early third century. The jars were made up of everted-rim jars in grey ware or BB1, and all would fit a third-century date. The BB1 jars were more closely datable, and compared with vessels dated to the late third century (Gillam 1976 no. 10), with obtuse lattice burnish around the girth zone. One sherd from an East Yorkshire calcite-gritted ware jar was also present in the colluvial layer 794. It was abraded and difficult to date precisely, as this fabric was used in the Iron Age as well as the late Roman period. A grooved rim in a fabric similar to Crambeck grey ware, probably from a lugged jar, was present as a residual find in fill 417 from early medieval pit *416*. Crambeck grey wares appeared at the end of the third century and, although their distribution may have been restricted, Evans notes them at Castleford from the early fourth century (Evans 1989, 72).

At the South Dyke, over 70% of the vessels were Huntcliff or Huntcliff type jars with at least three wide-mouthed Huntcliff jars. Other jar types included a late double lid-seated jar in a grey shell-

tempered ware of Lincolnshire type (Darling 1977 double lid-seated jars) and a Crambeck large jar (Corder 1937). Bowls comprised a grey ware bodysherd from a flanged hemispherical bowl copying samian form 38, and a Crambeck parchment ware bowl type 5b (Corder 1937). Sherds from a very small grooved-rim dish in Crambeck grey ware and a single plain-rim dish in a Huntcliff related ware with sparse calcite grits were identified. Sherds from one flagon with a rebated rim, cordoned neck and rouletted body were in a coarse oxidised ware with orange colour coat. This belonged to the late flagon series typified by Howe et al (1980 no. 68) in the Nene Valley industries; this vessel may come from those kilns. A grooved rim sherd in Crambeck grey ware may belong to a dish. The mortaria included a Corder type 8 vessel and bodysherds.

4.1.3 The South Dyke

At the South Dyke, the pottery dated overwhelmingly to the later fourth century (approximately AD 360-70 onwards). The pottery came from two groups, the curvilinear enclosure ditch ***196*** and the colluvium ***195***. Bidwell (2005) has recently shown that Crambeck parchment ware should be dated after around AD 370, and this ware was present in the colluvial hillwash layer (deposit 195) and the upper and main fill of the curvilinear ditch ***196*** (context 124). Fill 116 from the curvilinear ditch ***196*** included a rim sherd from a Huntcliff ware lid-seated jar dating from around AD 360 to the early fifth century. The large proportion of Huntcliff ware points to a date in the later fourth century at the earliest for this assemblage.

Recent work by Bidwell and Croom (2010) in the North has suggested the continued use of these wares into the fifth century. In large stratified groups from fort sites in the North the proportion of Huntcliff ware to Crambeck wares increases with time and the proportion at the South Dyke, 1:7 by EVES, compares with Bidwell and Croom's latest groups (2010, table 4.3) pointing to a fifth-century date range. This is, of course, a very small group and we also do not know how the assemblages from fort sites compared with those from rural site at this time. In general, rural sites tend be dominated by jars in the fourth century, so this ratio may reflect status rather than chronology. Further independent dating of late assemblages on rural sites is needed before groups can be given a fifth-century date with any certainty.

At the South Dyke earlier Roman pottery diagnostic of the second and third century was absent and although some types started in the third century, they are most common in the fourth century or later. All of the diagnostic types could belong to the late fourth or early fifth century.

4.1.4 Becca Banks

At Becca Banks, a very small scrap of reduced, shell-tempered pottery from the palaeosol, deposit ***788***, is difficult to date. In this region shell-tempered Iron Age wares are known, but this could also be from a Dales ware jar, a type most common in the early fourth century. Unfortunately, the sherd is lacking in other datable features. The sherds from early medieval pit *416* included a sherd from a large jar in Crambeck grey ware fabric dating from the early fourth century at the earliest. A sherd of Dressel 20 amphora came from fill 544 from the central portion of Becca Banks ditch. This kind of amphora was imported from Spain in the first to third century AD and the fabric of this sherd belongs late in that sequence, perhaps in the second century. A BB1 vessel recovered from the terminal of field boundary ditch ***791***, and the modern land drain cutting it, was of late third-century type. The grey ware jar from fill 474 of ditch *475* in the northern spoil storage area was not closely datable but its date range probably fell within the mid-second to third century.

Sherds from the uppermost fill of the Becca Banks ditch included mid-second century coarse ware and several small scraps of samian only broadly datable to around AD 120-200. The stony dump of late date included residual Roman pottery of late second-century type. The colluvial layer 431

included vessels types common in the late second to third century, and one East Yorkshire calcite-gritted ware, which may be of pre-Roman Iron Age date, or belong to the late third to fourth century.

The excavations produced four scraps of samian ware, all from the upper fills of Becca Banks ditch, and so not sufficiently stratified for close dating. Felicity Wild comments on these sherds as follows, "The largest (from context 532) weighed 4g, the other three (contexts 519, 520, 522) each weighed 1g or less. All are likely to have been manufactured in Central Gaul in the Antonine or (less likely) the Hadrianic epoch, with a date range, at widest, of approximately AD 120-200. None was large enough for the form to be identifiable".

Overall, the pottery from Becca Banks dates from the second to late third century; this is contemporary with the three Romano-British sherds recovered by Oxford Archaeology in the adjacent area, which included samian of the same date range, and a sherd from a late third to early fourth-century BB1 jar. There is no evidence for earlier Roman activity in the first century; the earliest types present could all date from the mid-second to late third century.

4.1.5 Previously excavated pottery

Elsewhere on the South Dyke, earlier work recovered one sherd of Dressel 20 amphora (Evans 2001b, 172). At Becca Banks, three handmade sherds, given an Iron Age or early Roman date were found on the buried soil located under the upcast bank. Roman sherds of the second century were found in the ditch infill, together with a radiocarbon date of AD 559-674 from a cow pelvis and femur from the same deposit. The presence of this material, and medieval sherds from the later fills, suggest gradual infilling (Wheelhouse 2001, 141 and 144). These groups contrast with the material examined, and suggest that, not unexpectedly, the ceramic assemblage recovered from any particular portion of the monument will reflect those activities once carried out in the vicinity, and so variations can be expected along the length of the monument.

The author also examined material from excavations carried out in the vicinity of the South Dyke and Becca Banks by Oxford Archaeology North, and undertaken as part of the same pipeline project. The area adjacent to Becca Banks yielded two sherds of second-century samian and a single sherd from a late third to early fourth-century BB1 jar comparable to the date range of the pottery excavated by Network Archaeology. The pottery from the excavations carried out by Oxford Archaeology North adjacent to the South Dyke yielded six undiagnostic sherds of Roman pottery in grey ware and one undiagnostic sherd in a dark handmade ware probably related to Huntcliff ware. It was not possible to date this material with any precision.

4.1.6 Trade and exchange

The most common ware group at Becca Banks was grey ware (60%) and although some of this was undoubtedly from the well-known South Yorkshire kilns, it is suspected that the GRB1 group, with its more angular quartz inclusions, comes from local kilns, perhaps near Castleford. A fine grey ware was of unknown source. Some 40% of the assemblage comprised traded wares including specialist wares, such as: Central Gaulish samian, Nene Valley colour-coated ware, Spanish oil amphora, along with regional traded wares, including black burnished ware, Ebor ware, shell-tempered ware, probable Dales ware, and East Yorkshire grey and calcite-gritted wares.

At the South Dyke, East Yorkshire calcite-gritted ware in the form of Huntcliff jars made up 48% by sherd weight and north Lincolnshire late shell-tempered ware accounted for 28%. A harder fired grey ware was similar to the possible local grey ware from Becca Banks but its source is uncertain. Small amounts of grey and parchment wares came from Crambeck (5%) and a colour-coated flagon was present; this probably came from the Nene Valley, although the late Swanpool kilns are another possibility (Darling 1977 nos 24 and 25). Most of the pottery seems to come from East Yorkshire and

north Lincolnshire, with few wares traded from further afield, and with very little local pottery. This is similar to the latest assemblage from Wattle Syke (where approximately 76% of the assemblage came from East Yorkshire sources), but contrasts with sites such as Parlington Hollins (occupied into the first half of the fourth century) and Swillington (recorded activity into the late fourth century). These sites have smaller proportions of East Yorkshire wares: 4% and 14% respectively of their pottery assemblages was derived from East Yorkshire (Evans 2001b). Similarly, at site C4SA on the A1(M), the takeover by the East Yorkshire potteries can be seen in the groups from buildings 3932 and 3931 (mid- to late fourth and late fourth century respectively; Leary 2008, 250-1, fig. 154).

4.1.7 Function and site status

The groups are perhaps too small to allow accurate statements to be made regarding site function and status. The condition and quantity from the South Dyke suggests the disposal of fresh domestic debris from a rural site typical of those in the region. Some vessels suggest a degree of affluence, namely the Crambeck and Nene Valley tablewares. Most of the pottery is from East Yorkshire. The distribution of Crambeck and East Yorkshire calcite-gritted wares appears to have been by road (Evans 1989, 74-7) and the South Dyke settlement would be well placed to acquire such vessels. Compared with other contemporary rural sites in the region, the ratio of jars to bowls and dishes is very high suggesting a relatively low status. But as mentioned above, the predominance of the jar group could also be due to the late date.

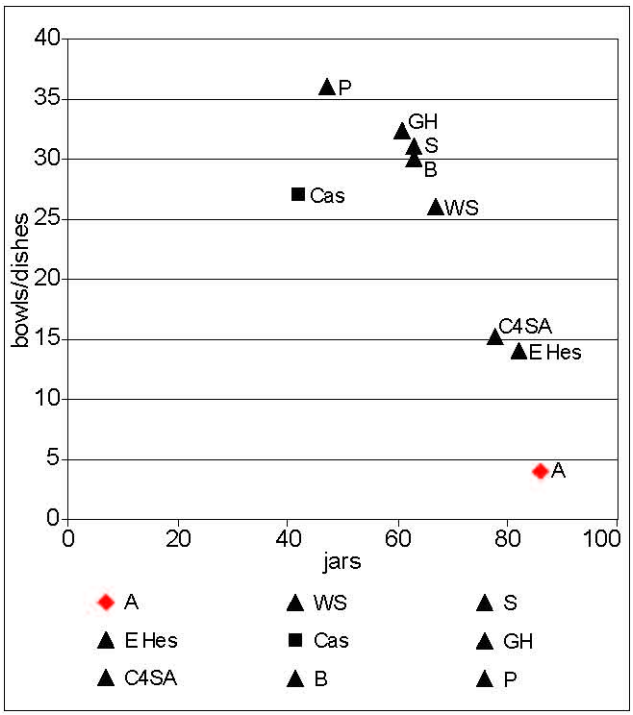


Figure 21: Relative quantities of jars to bowls/dishes at Castleford and rural sites of the fourth century. A=Aberford South Dyke, E HES= East Heslerton (Evans 1993), C4SA= A1 north site CS4a (Leary 2008), WS=Wattle Sykes (Leary in prep), CAS= Castleford (Evans 1993 and Rush 2000), S= Swillington Hollins (Evans 2001b), GH= Green Hammerton (Leary 2010), P=Parlington Hollins (Evans 2001b)

The small Becca Banks group is more abraded and rather restricted in range, suggesting casual loss at some remove from the centre of domestic occupation. The presence of small amounts of fine traded wares and luxury items such as oil amphora, as well as traded coarse wares from Dorset, may indicate

the related human activity was not of the lowest order, but still lies within the range expected of a humble rural settlement in this region (Evans 2001a). The proximity to the main road from Castleford to Tadcaster facilitated access to such imports and traded wares.

4.1.8 Sherds conditions

Two burnt vessels were noted from the colluvial layer ***195*** at the South Dyke, a CRA PA mortarium base, which was blackened and burnt through, and an EYCT2 bodysherd which was slightly oxidised and surface cracked. A Huntcliff lid-seated jar from fill 124 from enclosure ditch ***196*** also had a marked circle of wear around the groove for the lid and a second Huntcliff jar from fill 124 had a small perforation on the neck made after firing. The evidence of wear and repair is consistent with a late date for the South Dyke group when perhaps pottery was not so readily available and careful curation of irreplaceable vessels was necessary.

4.1.9 Illustrated sherds (Fig. 22)

Becca Banks

1. BB1 splayed rim jar. Fill 457 of modern land drain cutting the terminus of a Romano-British boundary ditch; SF 315. Bodysherds with obtuse lattice also found in the land drain and in fill 436 of the field boundary (***791***). Gillam 1976 no. 10 late third century.

South Dyke

2. EYCT Huntcliff jar. Fill 116 of enclosure ditch ***196***; SF 175

3. EYCT2 Huntcliff jar with much wear around lid rebate. Upper and main fill 123 of enclosure ditch ***196***; SF 140

4. EYCT Huntcliff jar with perforation on neck. Upper and main fill 123 of enclosure ditch ***196***; SFs 156, 170 and 173

5. CRA PA incomplete rim of Corder type 8 mortarium. Upper and main fill 123 of enclosure ditch 196

6. EYCT2 plain-rim dish Colluvial deposit ***195***; SF 5111096

7. EYCT Huntcliff jar. Colluvial deposit ***195***; SF 5111094

8. EYCT Huntcliff wide-mouthed jar. Colluvial deposit ***195***; SF 5111091

9. CTA2g double lid seated rim from late shelly ware jar. Colluvial deposit ***195***; SF 5111067

10. CRA RE grooved rim vessel, probably small dish. Colluvial deposit ***195***; SF 265

11. GRB1 flanged bowl copying samian form 38. Colluvial deposit ***195***; SF 122

12. CC neck and cordoned shoulder of flagon. Identical fabric to no. 13 and probably the same vessel. Colluvial deposit ***195***; SF 5111087

13. CC rim and body of flagon with cupped rim and rouletting on body. Identical fabric to no. 12 and probably the same vessel. Howe et al 1980 no. 68 or 63 and Darling 1977 nos 24-5. The body sherd has a grey core and the coarseness is more like Swanpool than Nene Valley colour-coated wares. Context 100 (unstratified)

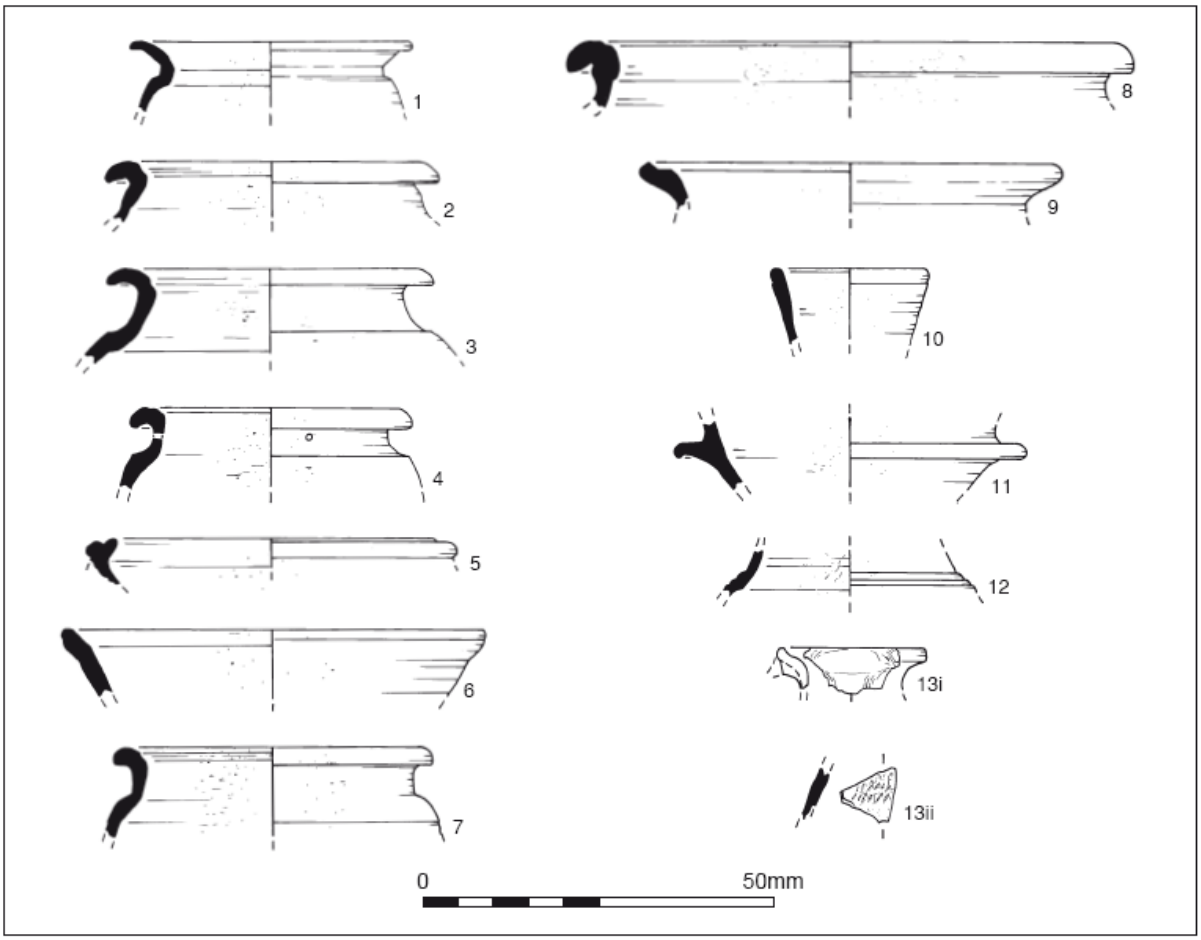


Figure 22: The Romano-British pottery

4.1.10 Fabric descriptions

The fabric of the pottery was first examined by eye and sorted into ware groups on the basis of colour, hardness, feel, fracture, inclusions and manufacturing technique. If the sherds could not be adequately grouped by eye very limited examination under a x30 binocular microscope was carried out and comparison made with sherds from known sources. National Roman fabric reference collection codes (NRFRC, Tomber and Dore 1998) are given wherever possible.

Ware group	Common name	Description	Source	NRFRC Code	Count	Weight	Rim %
BB1	Dorset Black burnished ware		Dorset	BB1 DOR	19	119.2	7
CC	Colour-coated ware	Orange with orange/brown colour coat. Hard and sandy where not covered with colour coat. Moderate, medium, subangular quartz and sparse, medium to coarse rounded brown ferrous inclusions	Nene Valley or Swanpool	LNV C or SWN CC	4	37.5	20
CRA PA	Crambeck parchment ware		Crambeck	CRA PA	4	37.5	20
CRA RE	Crambeck grey ware		Crambeck	CRA RE	7	51.3	30
CT, prob CTA2	Shelly ware, probably Dales ware	Brown, fairly soft with leathery feel and laminar fracture. Abundant, ill-sorted medium to coarse shell.	N. Lincs./Humberside	DAL SH?	1	2	

Ware group	Common name	Description	Source	NRFRC Code	Count	Weight	Rim %
CTA2	Dales ware	Dark brown, soapy with irregular fracture, Moderate, ill-sorted platey vesicles, formerly shell.	N. Lincs./Humberside	DAL SH	1	7.1	4
CTA2G	Dales ware (grey)	Grey with darker grey surfaces. Hard with rough feel and laminar fracture. Moderate, ill-sorted white platey inclusions. Clearly some shell	N. Lincs./Humberside	DAL SH	64	406.8	3
DR20	Dressel 20 oil amphora		Southern Spain	BAT AM	1	39.7	
E1	Ebor ware	Orange. Hard with smooth feel and irregular fracture. Moderate, well-sorted, medium, subrounded and subangular quartz. Similar in texture to GRB1	York or Vale of York	EBO OX	1	26	
EYCT	East Yorkshire calcite-gritted ware	Brown/dark brown, fairly hard with rough feel and hackly fracture. Moderate to abundant, ill-sorted, coarse to fine angular calcite or vesicles. Variable quantities of medium subangular quart	E Yorks	HUN CG	97	1350.8	160
EYCT2	East Yorkshire calcite-gritted ware with quartz	Dark grey with lighter grey core. Hard with sandy feel. Sparse very medium- to coarse subangular quartz	E Yorks	HUN CG	13	395.7	21
EYCT?	East Yorkshire calcite-gritted ware or PRIA calcite-gritted ware?	Brown/dark brown, fairly hard with rough feel and hackly fracture. Moderate to abundant, ill-sorted, coarse to fine angular calcite or vesicles. Sparse medium rounded back inclusions and rare subangular quartz	E Yorks		4	12.6	
GRA1	Fine grey ware	Medium grey with slightly powdery feel and irregular fracture. Moderate, well-sorted, fine, subrounded quartz.	Uncertain		1	6.5	
GRB1	Medium grey ware	Medium and dark grey. Hard and sandy feel with irregular fracture. Moderate subangular to angular medium quartz and sparse brown ferrous inclusions	Uncertain, compares well with Vale of York		43	499	8
GRB2	Medium grey ware probably South Yorkshire	Medium and dark grey, hard and sandy with irregular to hackly fracture. Moderate to abundant subrounded and subangular, medium quartz	Uncertain but more rounded quartz comparable to South Yorkshire grey wares		4	32.3	6
GRB3	Medium grey ware with orange/brown core	Medium grey with orange/brown core. Hard and sandy feel with irregular fracture. Moderate subangular to angular medium quartz.	Local or possibly Holme-on-Spalding Moor		36	113.1	
H3	Erratic-tempered type ware		Yorkshire		1	8.6	
NV1	Nene Valley colour-coated ware		Nene Valley	LNV CC	1	2.2	
OAB	Oxidised ware with traces of red or self slip	Orange with grey core. Hard with powdery feel. Moderate, fine, subangular quartz and sparse fine rounded red/brown inclusions. Micaceous.	Possibly late red ware		1	36	
TS	Samian		Gaul	SAM	4	4.7	
VESIC	Vesicular ware, formerly calcareous temper	Brown and partially oxidised with grey core. Round with irregular fracture. Sparse. Medium, irregular vesicles and rounded stone inclusions including quartz.	Uncertain, possibly pre-Roman		1	10.6	

Table 4.1: Quantities and description of wares

4.2 The Worked Flint

By Hugo Anderson-Whymark

4.2.1 Introduction

Thirty-four flint and chert artefacts and one piece of burnt unworked chert were collected from archaeological works at the Aberford Dykes (Table 4.2). The majority of these artefacts were residual finds contained within Iron Age and Roman features, including the fills of Becca Banks ditch, but fourteen lithics were found in the palaeosol preserved beneath Becca Banks and these probably represent an *in situ* scatter. The lithic assemblage is challenging to date, but the great part of the assemblage probably dates from the Mesolithic and/or early Neolithic, although some Neolithic or Bronze Age artefacts are also present.

4.2.2 Methodology

The flints were catalogued according to broad artefact/debitage type and retouched pieces were classified following standard morphological descriptions (for example, Bamford 1985, 72-77; Healy 1988, 48-49; Bradley 1999, 211-227; Butler 2005). Evidence for burning and breakage was also recorded. Unworked burnt stone was quantified by weight and number.

4.2.3 Raw materials

The majority of the lithics were manufactured from flint, but several types of chert were also present. The flint included a small number of grey flakes with white cherty inclusions; this material is comparable to flint from the Yorkshire Wolds. The majority of the flint was, however, light to mid-brown and semi-translucent with a thin, abraded or pitted surface. This material was collected from a secondary flint source, such as river gravels. The chert included a large flake of a fine black chert with a thin brown weathered surface, a grey-black chert that had been collected from a fluvial source, and a dark brownish-red chert with a grey-black weathered surface. These raw materials are not available locally and had been imported to the site.

4.2.4 Condition

The condition of the assemblage is discussed in detail below, but the flint from the palaeosol preserved beneath Becca Banks is in fresh condition, while the flint from the ditch fills and later features generally exhibits slight to moderate edge-damage. The majority of the flint artefacts exhibit a light to moderate white cortication, but some flints and the chert artefacts are free from surface cortication.

4.2.5 The assemblage

The flint assemblage will be considered by site below, highlighting condition, raw materials, assemblage condition and provenance.

4.2.5.1 Fieldwalking

Two lithics were recovered from a fieldwalking exercise undertaken prior to the excavations (Table 4.2). These comprise a heavily burnt and edge-damaged flake possibly of chert, and a blade-like flake of black chert that exhibits dorsal blade scars. These lithics are not intrinsically datable, but the blade-like proportions of the latter artefact may indicate a Mesolithic or earlier Neolithic date.

4.2.5.2 South Dyke

Twelve lithics were recovered from the South Dyke excavations, including two flint flakes that were recovered as unstratified finds from beyond the excavation area (context 100, see Table 4.3). The remaining flints were recovered colluvium (deposit ***195***), the fills of South Dyke ditch itself, the fill of Roman ditch 196, and the upper fill of pit *172*; an unstratified flint flake was also recovered from the excavation area. The flints are therefore residual finds in later archaeological deposits. Pit *172* contained two flint flakes in reasonably fresh condition, one of which exhibited platform-edge abrasion and had been struck from an opposed platform core producing thin and narrow flakes. This technology is not particularly datable, but is most comparable to Mesolithic to early Bronze Age industries. The other artefacts are all manufactured from flint and include a blade, two bladelets and a blade-like flake, indicating they derive from a blade-orientated industry of Mesolithic or earlier Neolithic date. In contrast, two end scrapers are manufactured from thick, squat, hard hammer flakes that were struck without preparation of the platform-edge (see Figure 23.1). Scrapers are notoriously difficult to date, but these examples are more characteristic of the Neolithic or Bronze Age, rather than the Mesolithic.

4.2.5.3 Becca Banks

Nineteen flints were recovered from the excavation at Becca Banks and a further flint core was found unstratified in the southern spoil storage area (see Table 4.4). The lithics from the excavation include fourteen from a palaeosol (layer ***788***) preserved beneath Becca Banks. The lithics from the palaeosol are in fresh condition and are unlikely to have moved far from their original place of deposition. The assemblage comprises six small flakes, five chips (flakes with a maximum dimension less than 10mm), a small tested nodule, a thumbnail scraper (Figure 23.2) and a fragmentary backed blade (Figure 23.3). The flakes comprise four of a grey flint with cherty inclusions and a small squat flake of a dark brownish-red chert. The tested nodule is a small grey-black chert pebble, weighing 13 g, and exhibits a single small flake removal. The chips are all of flint and include one possible retouch chip that may result from the manufacture or re-sharpening a flake tool, such as a scraper (Newcomer and Karlin 1987). The other chips may result from the same activity or a limited knapping event, perhaps no more than the removal a couple of flakes from a core. No refits were located between the larger flakes, perhaps indicating that they are utilised tools rather than knapping debitage.

The preserved soil yielded two retouched flint artefacts: a thumbnail scraper and a backed blade. The scraper exhibits semi-abrupt retouch around its entire perimeter with slight spurs created at the proximal and distal ends (Figure 23.2). The backed blade is burnt and broken, but the proximal and distal breaks may be deliberate as they create a regular sub-rectangular blade segment (Figure 23.3). The blade is relatively broad and exhibits dorsal blade scars, indicating that the blank was struck from an opposed platform blade core. The left and right hand sides of the flint exhibit relatively coarse abrupt retouch, but heating has removed a large spall from the ventral surface and much of the retouched edge. The blade appears well worn, but this may reflect use rather post-depositional damage. The backed blade is a Mesolithic artefact, but this presents a problem in interpreting the thumbnail scraper. The majority of thumbnail scrapers date from the late Neolithic/early Bronze Age (Beaker period), but small forms are not unknown in Mesolithic assemblages. The flake debitage from the preserved soil does not assist with dating, so we can only conclude that the preserved soil contains at least one Mesolithic artefact and other flintwork that may date from the Mesolithic to early Bronze Age.

The remaining five flints were recovered from the topsoil, colluvium (***794***) and fills of Becca Banks ditch. These flints are residual and comprise a thick hard hammer flake, three burnt and broken flakes and a serrated blade-like flake. The latter artefact exhibits fine teeth along the along the right hand side and a narrow band of silica gloss is present on the ventral surface. The silica gloss indicates that the flint was used for processing silica rich plants, probably for fibres that may have been used for textiles or cordage. Serrated flakes and blades are found in Mesolithic to early Bronze Age assemblages. The other flakes are not intrinsically datable.

Category Type	Fieldwalking	South Dyke	Becca Banks	*Total*
Flake	1	5	10	*16*
Blade		1		*1*
Bladelet		2		*2*
Blade-like	1	1		*2*
Chip			5	*5*
Core on a flake			1	*1*
Tested nodule/bashed lump			1	*1*
End scraper		2		*2*
Thumbnail scraper			1	*1*
Serrated flake			1	*1*
Retouched flake		1		*1*
Backed blade			1	*1*
Total	*2*	*12*	*20*	*34*
Burnt stone No./wt (g)			1/ 4	*1/ 4*
No. of burnt lithics	1		5	*6*
No. of broken lithics	2	3	9	*14*
No. of retouched lithics		3	3	*6*

Table 4.2: The lithic assemblage from fieldwalking and excavation at Becca Banks and South Dyke

Category	Unstrat	Ditch (*196*)	Colluvium (*194*)	South Dyke ditch (*194*)	Pit 172	Total
Flake	3				2	*5*
Blade				1		*1*
Bladelet				2		*2*
Blade-like flake		1				*1*
End scraper			1	1		*2*
Retouched flake			1			*1*
Total	*3*	*1*	*2*	*4*	*2*	*12*

Table 4.3: The lithic assemblage from the South Dyke site, by feature

Category	Unstrat	Topsoil	Colluvium (*794*)	B'Banks ditch	Palaeosol (*788*)	*Total*
Flake		1	2	1	6	*10*
Chip					5	*5*
Core on a flake	1					*1*
Tested nodule/bashed lump					1	*1*
Thumbnail scraper					1	*1*
Serrated flake				1		*1*
Backed blade					1	*1*
Total	*1*	*1*	*2*	*2*	*14*	*20*

Table 4.4: The lithic assemblage from Becca Banks, by feature

4.2.6 Discussion

The lithic assemblage indicates human activity in the landscape prior to the construction of the Aberford Dykes and adds to the known Mesolithic and Neolithic activity in the local area. A backed blade from the palaeosol preserved beneath Becca Banks provides evidence of activity in the Mesolithic and further residual flakes from a blade-industry, particularly at South Dyke, provide further evidence for activity in the Mesolithic and/or early Neolithic. A small number of Neolithic or Bronze Age flints may also be present, but these form only a limited component of the assemblage.

The majority of the flint was recovered from the topsoil or late archaeological features, but the construction of Becca Banks preserved a small *in situ* lithic scatter within the pre-monument topsoil. The scatter includes a number of chips that may result from a brief knapping episode – possibly the manufacture or re-sharpening of a scraper – and flakes that may have been used and abandoned. The presence of two retouched tools – a backed blade and a thumbnail scraper – may further highlight activity at this location. There is, however, some ambiguity over the date of these artefacts and while the former is Mesolithic, the latter may be Mesolithic or early Bronze Age. This may indicate that the lithics in this scatter derive from several periods of activity, which is quite possible, as this soil horizon was not buried until the Iron Age.

4.2.7 Catalogue of illustrated flint (Fig. 23)

1. South Dyke, context 108, SF 109. End-scraper manufactured on a hard hammer flake of mid grey flint. Neolithic or Bronze Age?

2. Becca Banks, palaeosol context 467, SF 384. Thumbnail scraper exhibiting semi-abrupt retouch around its entire perimeter with slight spurs at the proximal and distal ends. 17mm long by 14mm wide and 6mm thick. Mesolithic or late Neolithic/early Bronze Age.

3. Becca Banks, palaeosol context 504, SF 388. Backed blade, burnt and broken medial segment. 22mm long by 14mm wide and 5mm thick. Mesolithic.

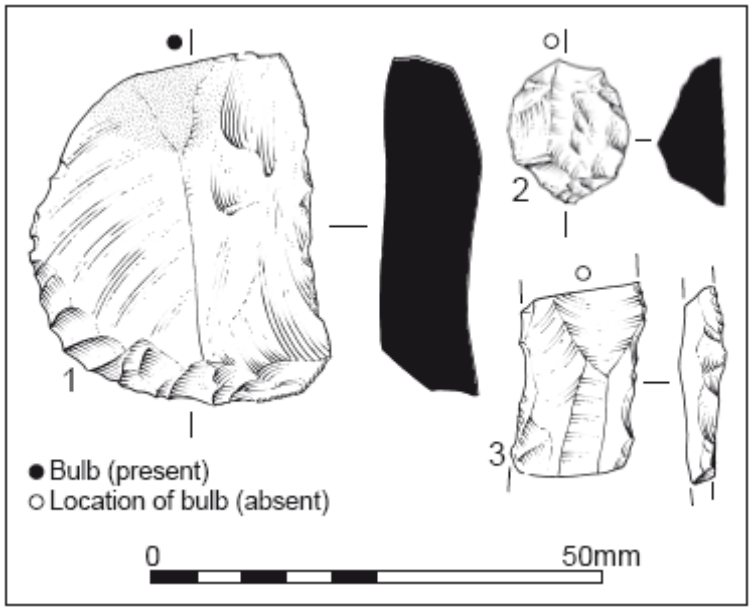


Figure 23: The worked flint

4.3 The Penannular Brooch

by Nina Crummy

Figure 24.1. SF 177. Context 116, fill of ditch ***196***. Copper alloy penannular brooch, missing the pin. The ring is flat on the underside, slightly rounded on the inner face and fully rounded on the upper and outer faces. The flat underside is scarred by many file marks and was clearly not meant to be seen, whereas the other faces are all smooth and polished. The terminals have a single collar before a small knob that is scarcely wider than the ring. The collars do not continue onto the underside, matching the poor finish of that surface. Diameter 19mm, ring 2.5 by 2mm. Weight 1.52g.

Typologically the brooch belongs to Fowler's Type A3, a form with a wide distribution across Britain and a long life-span running from the first century AD to the late Roman period (Hattatt 1989, table 7). This broad date range does not allow the South Dyke brooch to provide a close *terminus post quem* for the infill of ditch ***196***. An example from Maiden Castle from a context dated to the first century BC is certainly mis-phased; there is a mid-first century AD example from Hod Hill and several belonging to the later first century from Castleford (Wheeler 1943, 264, fig. 86, 2; Brailsford 1962, 12, fig. 11, E2; Cool and Philo 1998, 55). The closing date is more obscure, but on Hadrian's Wall it appears to lie in the late third century (Snape 1993, 28) while Mackreth suggests that examples from fourth century contexts are residual and the terminal date may lie in the early third century (2002, 157). As the type was not the product of a single workshop operating within a restricted time span, in some areas it probably dropped out of the repertoire of bronzesmiths earlier than in others. The association with the Roman army suggested by the sites mentioned above is misleading, as this is an insular type that is also well represented on civilian settlements, such as Ilchester and Rudston (Leach 1982, 247; Stead 1980, 95). A few reused examples have been found in early Anglo-Saxon graves, but they are curated Romano-British objects, not evidence of a second phase of manufacture at that period (Fowler 1960, 174-5; White 1988, 8).

The skimpy workmanship of the South Dyke brooch points to its being a local product and a low status object of little economic value. Its small size suggests that it was made for a child. Type A3 copper-alloy penannular brooches with single collars from Yorkshire tend to range from 28 to 34mm in diameter: e.g. Bishop 1996, 58, fig. 33, 349 from Aldborough; Cool and Philo 1998, 55, nos 130-1, 134-5, 137-40 from Castleford; Stead 1980, 95, fig. 62, 23 from Rudston villa; Cool et al. 1995, 1544, no. 6334 from York; Mackreth 2002, 157, fig. 305, 33 from Catterick; and three recorded on the Portable Antiquities Scheme database: NCL-34A5F3 from Cliffe, SWYOR-DCEF77 from Hunsingore and LVPL-551A82 from near Skirpenbeck. Exceptions are a 20mm diameter brooch from Hawnby in the British Museum (BM 82.3-23.33) and one from Rudston villa that is about 18mm in diameter. These can also be seen as children's brooches, although the scale of the illustration of the latter may not be accurate (Steer 1937, 337, fig. V, 5).

The South Dyke brooch can most pertinently be compared to a Type A3 measuring 22.5 by 21mm in diameter from a Roman Iron Age child burial at Dunbar, East Lothian. Human bone from the burial was radiocarbon dated to AD 75-242, covering the period of manufacture placed on the brooch type by Snape. The child was about two to three years old, possibly male, and had been buried in a stone-lined cist, face down but with the legs flexed (Baker 2002, 207-8; Henderson 2002, 209). The brooch lay on the left hand side of the chest and had probably been used to fasten a cloak or similar garment wrapped around the body. The collars at its terminals are poorly defined and, as with the South Dyke brooch, it was also seen as a local product (Hunter 2002, 210). Children are rarely represented among the material culture of rural sites, but the similarity of the South Dyke brooch to that from Dunbar provides some evidence for the clothing and perceived status of two from north Britain. The workmanship on each brooch is perfunctory, a sure indication that they were everyday functional items with no pretence at quality. The Hawnby brooch, in contrast, is well made.

Although not primary smithing debris, as a local product the South Dyke brooch also adds to the evidence for bronzesmithing in the area. Metal-working was a major part of the economy of Castleford to the south and there are also crucibles containing copper-alloy residues from Dalton Parlours to the north (Cool and Philo 1998, 358-9; Bayley 2002, 105). There is no evidence for brooch manufacture at Dalton Parlours, nor have copper-alloy type A3 penannular examples been found there (Mackreth 1990), but they are present in some numbers at Castleford in the later first and early second century and it may well have been a brooch production centre (Cool and Philo 1998, 55; Mackreth 2009, 147). However, all the A3 penannular brooches from Castleford are well-finished full-sized examples, and much closer stylistic links would be needed before the South Dyke brooch can be assumed to be a Castleford product.

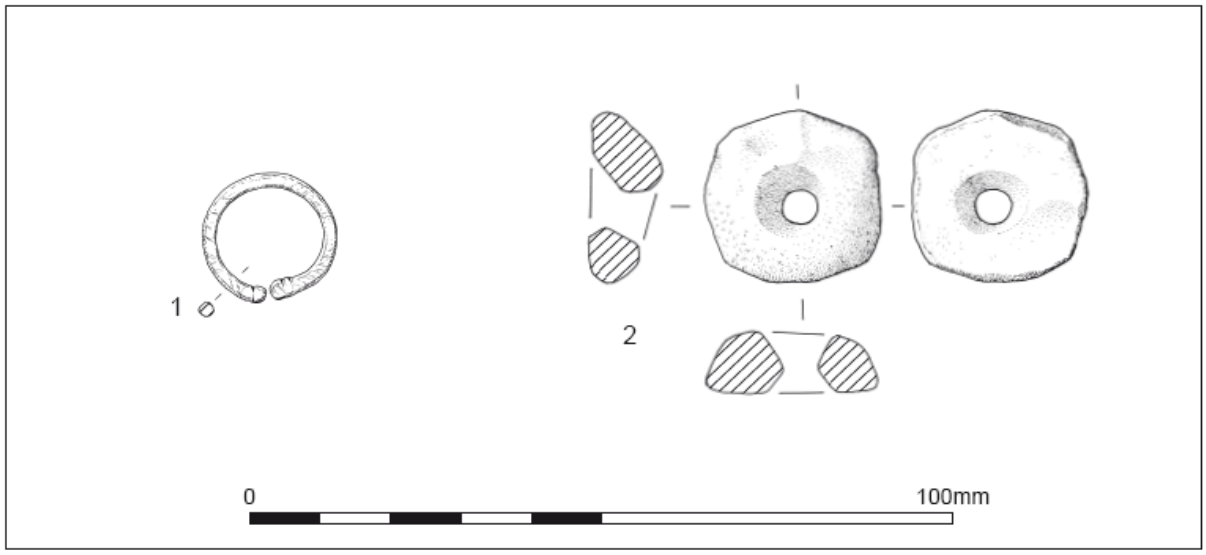


Figure 24: The penannular brooch and spindle whorl

4.4 The Spindle Whorl

by Ruth Shaffrey

A small roughly circular piece of sandy limestone (SF 226) was found in fill 135, the uppermost fill of early Iron Age pit *172* (Figure 24.2). Although a decorative function is possible, it is not a particularly attractive item and seems most likely to have been used as a spindle whorl. There is clear wear inside the perforation, indicating that it was suspended and it is a small, light whorl, suggesting it was used for spinning delicate threads. As a spindle whorl, however, it is irregular in shape and poorly made, it is not circular and neither face is flat. More significantly, the perforation is off centre and although the position of the hole may have been exaggerated by uneven wear of the item on one side, it was probably never precisely central.

The whorl's narrow perforation of only 4.5mm indicates it has a broadly early date, as spindle whorl holes widened over time from the narrowest size of 4mm to 11mm in late Anglo-Saxon examples (Walton-Rogers 2007, 23). However, it is irregular in shape and it is not possible to date the whorl more closely than to the Iron Age or Romano-British period.

Cont	Cont. type	SF No	Notes	Size	Lithology	Date
135	Uppermost fill of pit of unknown function	226	Crudely made with off centre perforation measuring 4.5mm diameter. Both faces are irregular and one is flat and the other bumpy. The edges are not circular	Dia. 23-24mm x 10mm thick	Limestone	Early Iron Age

Table 4.5: Summary description of spindle whorl

4.5 A Fired Clay Object from the South Dyke

by Lisa Wastling

4.5.1 Cleaning and consolidation methodology

The fired clay object consisted of 12 separate fragments, all of which were encrusted in a layer of hardened clay and dusty soil. The outer dusty layer was brushed away using a baby toothbrush with soft bristles.

It was then apparent that the smallest fragment bore no extant external object surfaces. This fragment was given a spot test with water (without being immersed) and a very soft brush in order to determine how the pieces would react to a gentle cleaning in this way. It was decided that the fragments were too friable to clean with water, as the brush became coloured with dislodged clay particles. The fragments were subsequently manually cleaned using a scalpel and soft brush.

Following cleaning, two sections of the object could be re-fitted, and were glued together using HMG adhesive.

4.5.2 The object

A fragmentary fired clay object was recovered from context 174, a deposit within the South Dyke, context group ***194***.

This object originally possessed a perforation of 10mm diameter and consisted of 12 fragments, some of which join. Unfortunately the thickness and height of the object are no longer discernible, however the joining fragments and surface colouring provide some indication of original shape. This object is most likely to have been a pyramidal loomweight with a rounded top.

Unfortunately due to the fact that the part of the weight without the perforation does not join the perforated part, it is not possible to discern whether the perforated piece is oriented with the hole at the bottom (Figure 25a) or with the hole at the top (Figure. 25b). If the former is the case then the object is likely to be an elongated pyramidal weight; if the latter, then a weight of squat form with the unperforated piece forming part of the opposite side of the object is more likely.

There are diverse discussions, often contradictory, concerning the varying dates and distribution of pyramidal and triangular loomweights of the later prehistoric and Romano-British periods. It is likely that the chronological distribution of loomweights by form is region-specific, but further work is needed to clarify this. It was once thought, for example, that northern Lincolnshire marked the northernmost limit of the distribution of triangular loomweights (Barford 1996, 330). However, recent work on the north bank of the Humber indicates that triangular loomweights do appear in small quantities from the late Iron Age onwards, though pyramidal weights, such as this example are the dominant form and continue in use into the Romano-British period. This is the case at North Cave for example, some 30 miles to the east of Aberford (Wastling, forthcoming).

With respect to pyramidal loomweights, squatter pyramidal weights are usually earlier in date than the elongated type.

Pyramidal loomweight. Fragmentary and incomplete. Originally in 12 fragments, four of which and five of which join. Three fragments do not re-fit. Of the two joined parts one bears a perforation 10mm in diameter. The object tapers slightly, has rounded arrises and has a rounded top.

H. >105mm, W. 77mm, Th. >36mm

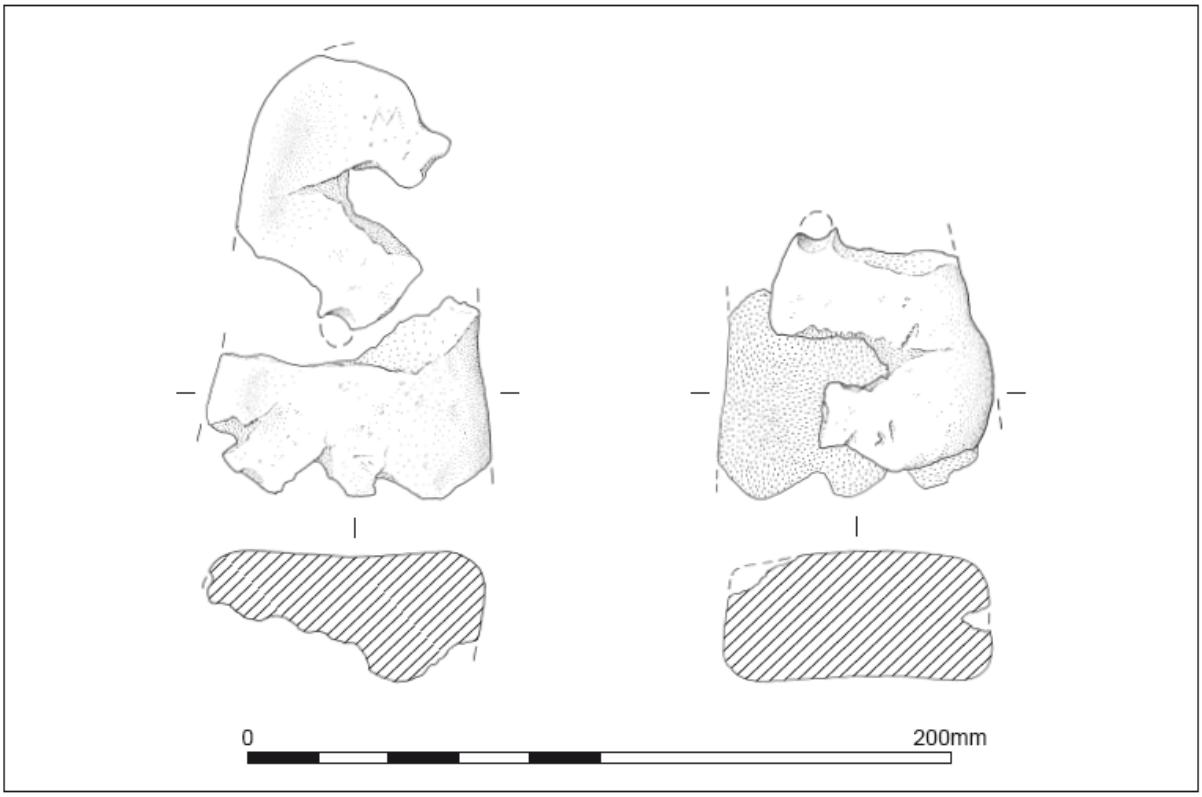


Figure 25: The loomweight: two potential reconstructions

4.6 The Other Small Finds from the Aberford Dykes

by Rose Nicholson

4.6.1 The Small Finds from the South Dyke

A total of four Small Finds were recovered from three contexts at the South Dyke. This assemblage consisted of an iron ring, a copper alloy penannular brooch, a fragment of copper alloy sheet, and a Roman coin. The note on the penannular brooch appears elsewhere in this volume.

The Roman coin (No.1) is a *nummus* of Valens dating to AD 364-378. The reverse shows the goddess Victory and the inscription, *Securitas Reipublicae*, is a stock phrase used by late Roman emperors to refer to the security that their reign supposedly brought to the empire. This issue is a common find in Britain on both rural and urban sites.

The plain iron ring (No.2) came from the fill of a ditch dated to the Iron Age or Roman period. Such iron rings are fairly common finds on Iron Age and Romano-British sites, and this example may have had any one of a number of uses, for example, as a component of a horse harness.

The fragment of copper alloy sheet (No.3) came from the fill of a ditch dated to the Roman period. Fragments of copper alloy sheet are fairly common finds on Roman-period sites. Such fragments could once have been part of a wide range of different objects, such as decorative mounts on caskets and vessels. Because this fragment has no distinguishing features it is not possible to say what kind of object it had once been part of.

4.6.2 The Small Finds from Becca Banks

Two small finds were recovered, from two contexts. The assemblage consisted of a copper alloy post-medieval farthing and two fragments of worked shale.

The farthing (No.4) was recovered from an otherwise undated tree throw. Unfortunately, the farthing has been worn smooth on both obverse and reverse, and therefore it has not been possible to narrow down the broad date range by identify the issuing authority or the year of production.

The two fragments of worked shale (No.5) were recovered from a central fill of Becca Banks ditch and are likely to date from the Roman period. Objects made of shiny black materials, such as jet, shale and cannel coal, were popular during the Roman period, and a jet working industry centred on York developed. During the Iron Age and Roman period, shale deposits at various places were exploited, including Dorset shale from the Kimmeridge area, and shale from Yorkshire, Northumberland, Midlothian and the Midlands. Recent work has revealed that the majority of the finds from the Military Zone were made from sources in Yorkshire, Derbyshire and Midlothian (Allason-Jones 2002). Because of the way shale shears along planes when it dries out, it could only be used to make certain kinds of objects, such as tables, bracelets and decorative mounts for furniture. It is probable that these fragments of shale were once part of a mount of some kind.

4.6.3 Discussion

The small nature of the assemblages from each site limits the conclusions that can be drawn. Of the six small finds, two can be securely dated to the Roman period, and three are probably of Roman date.

The assemblage from the South Dyke site supports the view that the monument attracted activity in the Roman period, although other evidence suggests that the monument ditch itself had been

backfilled by this period. The finds from Becca Banks are of little use in resolving questions regarding the date or use of the monument.

Overall, this small assemblage suggests that there was only a modest adoption of Roman material culture by the native rural population on these sites. This is perhaps surprising, given the proximity of the Dykes to the Roman road between Castleford and York, but does conform to regional patterns.

4.6.4 The Small Finds catalogue

1. A copper alloy Roman *nummus* of the emperor Valens of the House of Valentinian, dating to AD 364-378. Obverse: D.N.V[ALENS P.F.AV]G. Bust of Valens wearing pearl diadem, draped cloak and cuirass, facing left. Reverse: SECVRITA[S REIPV]BLICAE. Victory advancing left holding palm and wreath in her right hand. In the exergue the mint mark: OF/I/LVGP indicates the coin was minted in workshop 1 at Lugdunum, Roman Lyon (Sear 2004). Weight 1.84g. Diameter 17.32mm. ASP06; context 124; fill of ditch ***196***; SF164

2. An iron ring, annular with a circular section. Weight 22.3g. Dimensions 42.39mm by 10.03mm. ASP06; context 165; fill of ditch *164*; SF223

3. A fragment of cut copper alloy sheet, roughly triangular in shape with chips along the edges. Weight 0.54g. Dimensions 26.77mm by 13.49mm by 5.88mm. ASP06; context 124; fill of ditch ***196***; SF197

4. A copper alloy farthing, worn smooth and illegible on obverse and reverse. The even thickness of the coin and slightly irregular edge suggest the coin was milled rather then struck by hand. The size and weight indicate it is probably a farthing dating from the post-medieval period. Farthings were minted from 1672 until 1956, and withdrawn from circulation in 1961 (Spink 2002). However, the slightly uneven edge and size indicate this farthing is earlier rather then later. Weight 4.78g. Diameter 21.82mm. ABD06; context 480; SF328

5. Two fragments of worked shale, part of the same object and sharing a clean break. When joined together the fragments are roughly rectangular in shape. The fragments have a worked concave upper surface and one of the outer edges has been worked smooth. The lower surface and other outer edges appear unworked. The shale fragments were probably once part of a decorative mount, dating to the Roman period. Weight 1.15g. Dimensions 20.54mm by 13.29mm by 5.88mm. ABD06; context 543; central fill of Becca Banks ditch

4.7 The Worked Stone[3] (assessment report)

by Elizabeth Wright

The worked or utilised stone assemblage from the South Dyke and Becca Banks comprises over thirty artefacts, including two fragments of quern, several pebble tools (a spindle whorl – see Shraffrey above, whetstones, 'polishers' etc), numerous fragments of modern building material and some natural, unmodified pieces, which include fossils. One natural piece, a stone with a hole, was recovered from an Iron Age or Romano-British pit, where it may possibly have formed part of a structured deposit.

A total of thirty three finds of worked or utilised stone were submitted for assessment (struck flint having been studied by a separate specialist). The finds varied from a large fragment of fine beehive quern, to modern roofing slate. Most pieces were recorded as Special/Small Finds (SF) when excavated, but a quantity of more modern material from Becca Banks was received as 'bulk' finds.

4.7.1 The South Dyke

Context no./ description	SF	Artefact description
101: modern ploughsoil	511-1056	Angular fragment of dark brown glossy polished stone with a flint or chert-like texture. No signs of shaping or use.
102: Roman hillwash	283	One third to one half of the upper stone of a beehive quern in a dense, medium grained well- sorted millstone grit or sandstone, the outer surface heavily iron stained, possibly as a result of the oxidation of iron redistributed by water. The base colour of the rock where unweathered is a pale creamy yellow. There is a very deep U- to V-shaped hopper of estimated width 180mm and depth 110mm in the very neatly pecked and shaped outer surface. The grinding surface, measuring about 165mm radius, is worn smooth and is slightly convex (by about 15mm). The remaining height of quern is about 180mm. During the quern's period of use so much of it had worn away that the cylindrical handle socket was left only 10mm above the grinding surface. There are indications that the handle socket had worn through onto the grinding surface of the quern during its active life as there are signs of wear polish where the handle socket now meets the grinding surface of the quern. Handle socket measurement 25mm diameter reducing to 17mm at the base and 98mm deep. Some dark staining within the hopper might have come from a humic layer in its depositional environment or else result from blackening by fire, though there are no other obvious signs of heat damage to suggest this. The quern seems to have been forcibly broken and has a missing surface facet.
102: Roman hillwash	272	5 fragments of a stone 'tile' of micaceous sandstone, possibly originally trimmed to shape. Slight heat reddening on one piece. One piece 17mm thick, one 8mm

[3] This report is an edited version of that produced at the assessment stage. A full analysis report was not produced, as the assemblage was not judged to merit such treatment. This report is included here to accompany the worked stone that was retained within the physical archive.

Context no./ description	SF	Artefact description
		thick.
107: natural periglacial till	104	Horn-shaped piece of limestone which seems to be a large fossil. Height 145mm, diameter of one end 43mm, diameter of opposite end 65mm. The piece appears to have some inner structure in the form of concentric layers and several joints along its length.
135: uppermost fill of pit 172: IA/RB? Function of pit unknown	226	Very small stone spindle whorl, made from a sandy limestone of a yellowish colour. The spindle whorl measures 25mm diameter by 10mm deep and has a 6mm cylindrical hole through it. Quite neatly made and small and light (weight 7g). See Shaffrey (above).
138: postglacial fill of natural periglacial hollow	147	Concretion of small fragments of solid limestone held together by interspersed swirls of rougher, less dense limestone with a central 'feed pipe'- a cylindrical hole through the centre measuring 40 x 34mm at one end and 45 x 50mm at the other. Height 110mm, diameter 175mm. One end flat, the other rounded. Probably a natural concretion formed in fluctuating conditions of temperature and moisture in geological time, though exactly when is not determined. The central 'pipe' may have been caused by solution of the initial fossil or core around which the concretion formed.
148: fill of curvilinear ditch; RB	181	Small unworked angular piece of sandy limestone.
143: fill of pit 142: IA/RB? Function of pit unknown	158	Piece of fine-grained creamy white limestone with a central hole, probably of natural origin, but suitable for use as an amulet or 'hagstone'.

Seven small finds of stone were examined from the South Dyke excavations, one of these comprising a collection of five pieces in the same material. Of the seven small finds, five pieces were ultimately judged to be of natural origin, though this was not immediately apparent.

Small Find (SF) 158 from context 143 comprised a small irregular pebble of white limestone with a central perforation. It was almost certainly of natural formation, probably a product of solution of natural limestone bedrock, but as a result of its attractive creamy white colour and central perforation, it is possible that it might have been deliberately collected and conserved as an amulet, so that its appearance in an Iron Age or Romano-British pit of unknown function might not be entirely fortuitous. Dating and interpretation would depend on other material deriving from the same pit and whether this object might be considered as constituting a component of a structured deposit.

SF 5111056 was a small angular but polished fragment of dark brown siliceous flint or chert, probably also of natural origin.

SF 147 from context 138 came from the fill of a probable natural periglacial hollow. It is a strange concretion consisting of largely concentric layers of differing densities and textures incorporating

breccia-like layers of limestone fragments probably cemented by precipitated limestone. It may have formed around an original fossil now dissolved away as there is a cylindrical hole through the centre. It seems likely that this unusual object formed under fluctuating conditions of temperature and moisture in past geological periods.

The horn-shaped object, SF 104 from context 107, is probably a naturally occurring fossil coral recovered when a test-pit was dug into the natural subsoil.

The remaining two stone items from the South Dyke excavation comprise part of the upper stone of a beehive quern and a complete small spindle whorl made from a yellowish sandy limestone.

A large piece of a beehive quern upper stone of a medium grained sandstone (probably millstone grit from the Pennines) was a prestige product, extremely well-shaped and executed, probably being the product of a skilled maker at a specialist quarry or workshop. It may date to the later part of the Iron Age, or the Roman period

This quernstone had seen very heavy use, having worn down to the handle socket, as lightly worn querns often have the handle socket positioned between one third and one half the distance from the summit to the grinding face in order to allow for wear. Beehive querns appear to have been employed with an oscillating rather than fully rotary action as they are frequently found worn quite asymmetrically. This quern shows few signs of asymmetric wear, which may suggest that it originally had more than one handle. Whilst a single handle socket is more usual, it is not uncommon to find beehive querns with a pair of opposite handle sockets and occasionally with as many as three. Sometimes an original single socket was replaced by a later one in another part of the quern in order to even out the asymmetric wear which had occurred and extend the life of the quern, or even to replace a socket which had worn through onto the grinding face of the quern. The development of querns with more than one handle socket may therefore post date that of querns with a single handle socket. The cylindrical nature of the handle socket on this quern suggests that the handle was of wood rather than metal, though this type of beehive quern generally had a very narrow feed pipe necessitating the use of an iron spindle. Some beehive querns had metal handles which have usually worn the handle socket into a rectangular slot, providing further evidence for the oscillating motion with which the quern was used.

During the Roman period there can be wide differences between the types of querns used at more ‘Romanised’ sites and larger settlements, where flatter types of Roman querns were quickly adopted, and smaller and sometimes remoter rural settlements where preferences for more traditional native types of beehive quern seem to have persisted. This may have been at least in part governed by comparative wealth or poverty and desire for innovation and ostentation or display.

A body of evidence now points to the frequency of deliberate breakage of beehive querns on discard and sometimes for structured deposition of their fragments. Heslop’s work (2008, 73-80) draws attention to the wide range of behaviours applied to fragmentation and deposition of beehive quern fragments in contexts both on and off settlement sites, where they may on occasions be associated with boundaries. They were not easy artefacts to break in the course of normal use and a good deal of force must have been applied in order to break them, sometimes employing fire or heat to weaken the artefact first. Once broken, fragments of querns could be used for secondary purposes and were often either deliberately or incidentally incorporated in pits and ditches.

Querns were long-lived artefacts in use and could be ‘reworked’ into a number of different contexts following discard, so that context dates can be hundreds of years after their date of original manufacture and use. Context 102, an extensive layer of colluvium from which this beehive quern fragment was recovered, is not helpful in elucidating the circumstances of use or disposal of this artefact.

4.7.2 Becca Banks

Context no./ description	SF	Artefact Description
409: buried turf on hillside above Becca Banks ditch, modern	N/A	Fragment of roofing slate with lines on one side and a chequerboard pattern on the other. Modern.
411: buried turf on hillside above Becca Banks ditch, modern	N/A	Fragment of roofing slate with chamfered edge. Modern
415: surface finds from colluvial build-up against Becca Banks earthwork, Roman-medieval	317	Four fragments of laminated fine mudstone, two fragments of which conjoin and the others appear to match. They form part of a deliberately shaped and utilised piece of stone, but it is possible that they represent the debris from the manufacture of some other artefact(s). Most of the narrow edges of the large piece are smoothed, though it is not clear if this is a result of their shaping or of use wear. The smoothed area includes a re-entrant curve. One edge is rough and broken. There are smooth edges on the outer curve of one of the two smaller fragments. The larger piece measures 87 x 45mm and varies between 8mm and 11mm in thickness.
431: colluvial build-up against Becca Banks earthwork, Roman-medieval	304	Tiny, thin, light fragment with a finely porous texture. The colour is grey-brown with creamy inclusions. It is possible that it is a small fragment of limestone which has burnt at a very high temperature or another very altered material.
439: subsoil beneath WW2 ploughsoil, early modern to modern	N/A	Triangular piece of burnt limestone. The curved surface shows no signs of heat but the rest has largely oxidised to a pink colour. The fragment measures 135 x 82 x 32mm maximum.
439: subsoil beneath WW2 ploughsoil, early modern to modern	N/A	Two fragments of similar pale creamy micaceous sandstone, which have been split through a micaceous layer. One measures 40 x 40 x 11mm and the other, which has two shaped straight edges set at right angles, measures 190 x 94mm and has a similar thickness. This is probably part of a stone roof tile or similar produced by a skilled mason. There are signs of tooling at right angles on the upper surface and some signs of smoothing caused by wear, though not across all of the surface. The surface is not greatly weathered. Probably debris from a building of post Roman date.
468: buried turf on hillside above Becca Banks ditch, modern	N/A	An unmarked fragment of rather thicker slate than previous examples. Probably hand riven slate rather than machine cut and probably of earlier date.
470: buried turf on hillside above Becca Banks ditch, modern	N/A	Piece of sandstone measuring 92 x 105 x 20mm with two right angled corners. There is some black staining (probably paint) on one side and the edges and some heat marks on the broken part. No signs of wear. Modern.

Context no./ description	SF	Artefact Description
470: buried turf on hillside above Becca Banks ditch, modern	N/A	Roof slate with nail hole. Modern, but hand made, not machine cut.
471: buried turf on hillside above Becca Banks ditch, modern	N/A	Fragment of roofing slate with neatly chamfered edge on both sides and inscribed chequerboard pattern on the reverse at right angles to the chamfered edge. Modern
471: buried turf on hillside above Becca Banks ditch, modern	N/A	Three fragments of slate, one with a nail hole and parallel lines, another with a chequerboard pattern and a small piece with no marks.
490: hillside deposit above Becca Banks ditch, post medieval onwards	331	A pebble tool, possibly used as a whetstone. The tool is made from a dense, fine grained rock showing some surface weathering and is probably from an original igneous or metamorphic source, most probably obtained as a pebble in a patch of glacial drift. The tool has two flat facets set at right angles and two other surfaces which meet in a curve. The most utilised face has a smooth, flat surface. The tool measures 105 x 30 x 34mm.
502: fill of N-S field boundary ditch, RB	330	Fragment of dense, gritty, sandy limestone which is rounded with angular, broken facets. The piece has one flattish face and a more rounded dorsal face. The flatter face shows a limey encrustation which may be of more recent origin than the artefact itself, possibly a result of its depositional environment. The better preserved, rounded side of the artefact shows pitting suggestive of deliberate shaping or percussion. The dorsal, curved surface exhibits a smooth, silky polish, probably resulting from constant handling. The artefact has probably been the hand stone of a saddle quern. Maximum dimensions 100 x 125 x 60mm.
504: pre-monument ground surface, IA?	392	Small hand held polishing tool made from a purply brown iron rich pebble of igneous or metamorphic rock. The artefact is bun-shaped with one flat surface. It has a very smooth texture and polish and measures 58 x 55 x 27mm maximum dimensions. One small corner is damaged.
506: dump deposit on hillside above Becca Banks ditch	N/A	Probably the end part of a small whetstone made from a probably igneous, possibly metamorphic, charcoal-grey stone showing veins of pale grey (quartz?) running and wandering through it multidirectionally. It was probably part of a whetstone and has a worn deep, narrow groove running longitudinally along its surface which may have been used in putting an edge on knife blades. The groove is up to 3mm deep at its maximum, becoming narrower and shallower towards the extremities. The tool is broken part way along its length. The utilised part shows a very smooth polish. One end and parts of the surface are complete, other parts are broken. Measurements remaining 73 x 31 x 25mm.
513: later hillside deposits, post med.	332	A piece of fossiliferous dark, banded limestone with bands of fossils exposed on the upper and lower surfaces. It is believed that this

Context no./ description	SF	Artefact Description
and later		abrasive textured stone may have been utilised. Its rough texture would have served as a 'sandpaper' substitute, but the rough texture of the outer layers also serves to conceal wear traces so that these are not obvious. The lower surface is flat and would have worn to a rough surface, while the upper surface which would have been handled shows possible slight signs of smoothing. Measurements 89 x 37 x 29mm.
534: central fill of Becca Banks ditch	N/A	Large chunk of very fine pale grey sandy limestone which may have been subjected to slight heat. The shattered surfaces have a rough texture, other surfaces have a smooth but undulating polish. The polish extends over the edges of the piece, except where broken more recently. Maximum measurements144 x 95 x 60mm. Artefact in 3 pieces.
534: central fill of Becca Banks ditch	N/A	Broken pebble tool of pale beige coloured metamorphic rock, probably quartzite. All surfaces have a smooth, undulating polish except for one broken surface. The flattest surface has worn to a rough texture in one area, following the strained crystal boundaries produced within this metamorphic rock. The pebble tool fits comfortably within the hand and was probably a polisher/sander, though it could have been used in the processing of small quantities of food items. Measurements 90 x 40 x 50mm
534: central fill of Becca Banks ditch	N/A	A small pebble tool of fine yellow brown sandstone having a flat, polished facet with most other surfaces also smoothed. There is a rough, unshaped facet where the tool is broken. Operating surface 55 x 24mm in extent. Maximum dimensions 58 x 54 x 24mm.
534: central fill of Becca Banks ditch	N/A	Tiny fragments of stone. One appears to represent a struck bulb of percussion from a piece of chert or poor quality flint. The other is a very light fragment of sandstone, possibly burnt, measuring 15 x 18mm.
558: remains of Becca Banks earthwork filling pre-existing boundary ditch	382	A small tool of unknown purpose composed of a mid to dark grey somewhat slatey material showing laminar patterning. There is some yellow/green weathering on the surface which is often suggestive of an igneous source though other features suggest a metamorphic rock. Probably obtained as a pebble from an area of glacial drift. The piece was probably once oval and rather flat. Probably only about half of the original remains. The two flat surfaces are both polished as are the rounded edges. Measurements 96 x 64mm and of variable thickness.
595: pre-monument ground surface, IA?	393	A small pebble tool probably of metamorphosed sandstone. One end narrows to a point, the opposite end being rounded and there is a small broken area on one surface. All the surfaces of the tool are smoothed, but two faces meeting at an angle of approximately 120 degrees are smoother than the others and were probably the active surfaces of the tool with other surfaces smoothed by handling polish. Measurements 95 x 47 x 28mm.

Context no./ description	SF	Artefact Description
595: pre-monument ground surface, IA?	394	This small hand tool is of similar shape and dimensions to SF 392 from context 504. It appears to have served a similar purpose. It is a pebble of dense yellowish quartzitic sandstone showing some iron staining, is of a sub- square shape with all surfaces very smooth, but the flat base being the main operative surface. Measurements 65 x 57 x 25mm maximum.
681: pre-monument ground surface, IA?	389	Most of a quartzite pebble probably originating in an area of glacial drift. There is one small conchoidal fracture on the rounded end probably resulting from a sharp impact, otherwise the piece appears complete. All surfaces have a smooth polish from use- wear. One flat surface is the smoothest part and indicates that the stone was a rubber or polisher, though not necessarily from a quern. Maximum dimensions 35 x 23 x 28mm.
738: fill of posthole, probably IA	386	A slightly wedge shaped pebble tool with a very smooth, flat rubbing surface. All other surfaces show probable handling polish. Measurements 80 x 55 x 43mm.

The utilised stone from Becca Banks excavations (site code ABD) comprised 26 distinct 'finds' though a few of these consisted of several individual pieces. For such a limited assemblage it proved very varied, ranging in date from the prehistoric to modern periods. With the exception of one rubbing stone, probably from a saddle quern, there were no other parts of quernstones represented.

There were a number of pebble tools, and other more amorphous pieces showed signs of utilisation, but little information can be derived from them regarding specific uses they may have served, or any close date of use. Most could have been used at any time between the Bronze Age and end of the Romano-British period, though an earlier date cannot be ruled out. There were parts of two probable whetstones , one being SF 331, and another the unnumbered find from context 506. Either of these could have been used at a later period, but as they were made from simple hard pebbles they could have been as early as the late Iron Age or Romano-British period. It seems likely that the deep, narrow groove in the latter of these was produced by edging a small iron tool such as a knife.

Small 'polishers' SF 392 and SF 394 are very similar in proportions and probably of identical but unknown function. They are smooth and polished from much use but seem too small for food processing activities and probably served an unknown craft function. They both derive from the palaeosol forming the original ground surface pre-dating the construction of Becca Banks.

It is probably significant when considering the pebble tools to note that almost without exception they showed small areas of damage and missing flakes or larger areas of rough, broken surface. Most of these 'tools' were made of hard, resistant rocks which would be difficult to damage in normal use or even under quite rough handling. This may suggest a culture of deliberate defacement or 'killing' of tools before or at the time of discard. A number of the pebble tools came from the palaeosol underlying the Becca Banks earthwork or the remains of the earthwork which had later slumped into the ditch. The presence of these 'tools' does tend to suggest that there may have been a minimal amount of activity on the site prior to the construction of the earthwork which might have destroyed one or more small earlier features.

The quern handstone, SF 330, was found in cut 498, the north to south aligned field boundary ditch, in the same context as 11 sherds of Romano-British pottery. Saddle querns began to be replaced by rotary querns during the later part of the Iron Age, but small numbers of saddle querns are found in Roman contexts by which time they may have had a specialised use. Although broken, the handstone showed signs of deliberate shaping and had been carefully chosen for the abrasive qualities of its raw material.

A number of items were of much more recent date, a fact supported by other datable items from the same contexts. These included two fragments from a mason-shaped stone roof tile or floor tile, a modern tile marked with black paint, probably twentieth century, and a number of fragments of roofing slate. The roofing slates fell into two groups, machine manufactured slates and earlier slates which had been riven and trimmed by hand.

4.7.3 Overall Discussion

The modest size of these two assemblages, the largely undiagnostic character of the stone artefacts, and the generally secondary contexts from which they were recovered thwarts efforts to understand the two sites by comparing and contrasting their utilised stone artefacts.

There were only two utilised stone artefacts from the South Dyke site: the piece of beehive quernstone and the stone spindle whorl (see Shaffrey, above); both may relate to settlement in the near vicinity of the monument in the Iron Age to Romano-British period. This material was, however, far too sparse to draw any firm conclusions. The spindle whorl might have been a casual loss, but, on the basis of its size, the quern fragment was more likely to have been deliberately disposed of than accidentally lost. SF 158, the stone with a hole from pit 142, may form part of a structured assemblage within this feature. This may be difficult to prove, but should be borne in mind, as similar features in the region have displayed characteristics of controlled deposition (Brown, Howard-Davis and Brennand 2007, 103)

The stone artefacts from Becca Banks were much more numerous, but this was largely due to deposits of relatively modern domestic waste. It is difficult to know when the pebble tools from intermediate contexts, such as the fill of Becca Banks ditch, were used but finds from the palaeosol sealed by the monument bank accord with the struck flint assemblage in recording a slight human presence on the site in prehistory.

It is not felt that further, more detailed analysis of these two assemblages is likely to contribute more to site dating or interpretation, or even to artefact studies. The simplicity and longevity of the artefacts themselves and the contexts from which they derive are largely uninformative.

5 SPECIALIST REPORTS: ENVIRONMENTAL REMAINS

5.1 The Animal Bone

By Jennifer Wood

5.1.1 Introduction

A total of 333 (4586g) refitted fragments of animal bone was recovered by hand during archaeological works undertaken at the South Dyke. A further 28 (111g) fragments of bone were recovered from the sieved environmental samples.

In addition, a total of 209 (3162g) fragments of animal bone was recovered by hand at Becca Banks with a further 35 (4g) fragments of bone recovered from the environmental bulk samples. However, the assessment of the Becca Banks assemblage judged the remains to be of little archaeological value, as the bones were recovered from the early modern backfills and levelling layers, and were unlikely to have been in their original depositional contexts. Therefore the assemblage from Becca Banks will not be considered further within this report.

The assemblage from the South Dyke site was recovered from the monument ditch, with further remains recovered from associated pits and the possible settlement boundary ditches.

5.1.2 Methodology

The entire assemblage has been fully recorded into a database archive. Identification of the bone was undertaken with access to a reference collection and published guides. All animal remains were counted and weighed, and where possible identified to species, element, side and zone (Serjeantson 1996). Also fusion data, butchery marks (Binford 1981), gnawing, burning and pathological changes were noted when present. Ribs and vertebrae were only recorded to species when they were substantially complete and could accurately be identified. Undiagnostic bones were recorded as micro (rodent size), small (rabbit size), medium (sheep size) or large (cattle size). The separation of sheep and goat bones was done using the criteria of Boessneck (1969), and Prummel and Frisch (1986), in addition to the use of the reference material. Where distinctions could not be made the bone was recorded as sheep/goat (S/G).

The condition of the bone was graded using the criteria stipulated by Lyman (1996). Grade 0 being the best preserved bone and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable.

The quantification of species was carried out using the total fragment count, in which the total number of fragments of bone and teeth was calculated for each taxon. Where fresh breaks were noted, fragments were refitted and counted as one.

Tooth eruption and wear stages were measured using a combination of Halstead (1985), Grant (1982) and Levine (1982), and fusion data was analysed according to Silver (1969). Measurements of adult, that is, fully fused bones were taken according to the methods of von den Driesch (1976), with asterisked (*) measurements indicating bones that were reconstructed or had slight abrasion of the surface.

Analysis of the animal remains has been undertaken in accordance with the chronological and depositional context within which they were found.

5.1.3 Results

5.1.3.1 Condition

The condition of the hand and sieve collected assemblages are summarised below within tables 5.1 and 5.2. As can be seen, the assemblage averages at Grade 4, giving an overall poor condition. There appears to be a notable difference between the condition of the remains recovered from the South Dyke ditch compared with the later Roman deposits. The majority of the remains recovered from the South Dyke had a more moderate overall condition of grade 3, whereas material from the Roman-era deposits had an average of grade 4 giving an overall poor condition.

Within the sieved assemblage the remains averaged at grade 4, with a poor overall condition.

Condition	Early Iron Age pits	South Dyke ditch: mid- to late Iron Age	Basal fills of ditch *196*: late Iron Age	Main and upper fills of ditch *196*: Late Roman	Unstrat.	*Total*
2		23		4		*27*
3	1	109	2	10		*122*
4	12	64	7	96	1	*180*
5		2		2		*4*
Total	*13*	*198*	*9*	*112*	*1*	*333*

Table 5.1: Condition of hand collected assemblage, by feature/period

Condition	South Dyke ditch: mid- to late Iron Age	Basal fills of ditch *196*: late Iron Age	*Total*
2	4	1	*5*
3	7	2	*9*
4	13	1	*14*
Total	*24*	*4*	*28*

Table 5.2: Condition of sieve collected assemblage, by feature/period

5.1.3.2 Butchery

A total of three fragments of animal bone recovered from the South Dyke ditch displayed evidence of butchery marks. The butchery marks, all represented by knife cuts, were consistent with activities associated with disarticulation of the carcass and meat removal.

5.1.3.3 Working

A single fragment of sheep/goat tibia, SF 259, recovered from the South Dyke ditch was noted to have been broken at the distal shaft, which had subsequently been polished to a tapered point to make a possible awl or pointer.

A single red deer antler tine, sawn through the beam was recovered from the South Dyke ditch. A further 16 fragments of red deer antler and a single fragment of skull with the antler crown attached were recovered from Roman-era deposits within curvilinear ditch 196. All of the antler fragments, including the skull with antler crown, display evidence of working. All antler fragments were sawn through, with a single beam fragment displaying further working. The single fragment of antler had been sawn and shaped into a rectangular fragment, with the internal spongy bone structure removed. The poor condition of the antler has limited further observation, however, due to the incomplete nature of the object it is most likely that the piece was discarded before completion. The rest of the remains also appear to be consistent with antler working discard.

5.1.3.4 Burning

A single fragment of large mammal size long bone, charred to a brown/black coloration, was recovered from the South Dyke ditch.

5.1.3.5 Gnawing

Two fragments of cattle and sheep/goat bone recovered from South Dyke ditch, displayed evidence of carnivore gnawing.

5.1.3.6 Pathology

No evidence of pathological conditions was noted within the assemblage.

5.1.3.7 Species Representation

Taxon	**Early Iron Age pits**	**South Dyke ditch: mid- to late Iron Age**	**Basal fills of ditch *196*: late Iron Age**	**Main and upper fills of ditch *196*: Late Roman**	**Unstrat.**	***Total***
Equid (Horse Family)	4	2		5		*11*
Cattle	2	30	3	25		*60*
Sheep/Goat		38		1		*39*
Sheep		3				*3*
Dog (*Canis* Sp.)		1				*1*
Red Deer (*Cervus elaphus*)		1	1	15		*17*
Frog (*Rana temporaria*)		1				*1*
Frog/Toad		1				*1*
Large Mammal		37	5	62	1	*105*
Medium Mammal	1	49		3		*53*
Unidentified	6	35		1		*42*
Total	*13*	*198*	*9*	*112*	*1*	*333*

Table 5.3: Number of individual species present (NISP), hand collected assemblage, by feature/period

Taxon	**South Dyke ditch: mid- to late Iron Age**	**Basal fills of ditch *196*: late Iron Age**	***Total***
Cattle	2		*2*
Sheep/Goat	2	3	*5*
Pig	1		*1*
Amphibian (Frog/Toad)	1		*1*
Large Mammal	6	1	*7*
Medium Mammal	4		*4*
Unidentified	8		*8*
Total	*24*	*4*	*28*

Table 5.4: Number of individual species present (NISP) sieve collected assemblage, by feature/period

Across the entire assemblage cattle were the most abundant species identified within the assemblage, followed by sheep/goat. Three fragments of bone were identified as sheep, no positive evidence for goat were identified. Red deer (*Cervus elaphus*) remains were the next most abundant species followed by equid. Isolated fragments of amphibian (frog/toad), common frog (*Rana temporaria*), dog and pig were also identified within the assemblage.

As can be seen in tables 5.3 and 5.4, the South Dyke ditch, and enclosure ditch ***196*** were the most productive features for animal bones, and therefore are the most useful for comparison. There appears to be some variation between these features regarding species abundance. Within the mid- to late Iron Age South Dyke, sheep/goat remains are slightly more predominant than cattle, whereas within the late Roman assemblage from ditch ***196***, cattle are the most abundant identified species.

The minimum number of individuals (MNI) was calculated for the main domestic species present to remove the potential bias of partial skeletons within the assemblage, and is summarised within table 5.5. The assemblage is too small to provide meaningful data on the husbandry practices; however, underlying general trends are apparent.

Taxon	**Early Iron Age pits**	**South Dyke ditch: mid- to late Iron Age**	**Basal fills of ditch *196*: late Iron Age**	**Main and upper fills of ditch *196*: Late Roman**
Equid (Horse Family)	1	1	0	1
Cattle	1	2	1	2
Sheep/Goat	0	5	1	1
Pig	0	1	0	0

Table 5.5: Minimum number of individuals, by feature/period

The assemblages from the Iron Age pits and the lower fills of ditch ***196*** are too small to provide useful ratios for comparison, save the presence of the species. The South Dyke ditch, and the main and upper fills of enclosure ditch ***196***, however, do provide some variation. As can be seen, within the South Dyke ditch, the minimum numbers of sheep/goat represented are greater than the number of cattle, whereas the NISP abundances would have suggested that cattle would have been more prominent. In the late Roman ditch ***196*** assemblage the minimum number of individual cattle represented suggests that the species were retained in higher ratios than sheep/goat. This apparent change in animal ratios may suggest a change in emphasis in the animal husbandry practices for the site.

Cattle

Cattle were the most abundant species identified within the overall site assemblage, but they do not represent the most abundant species in each of the phased sub-assemblages. Cattle appear to have less emphasis during the mid- to late Iron Age of the site, but become more prominent in the late Roman deposits.

Within the cattle assemblage, all of the skeletal material appears to have been from skeletally mature animals. Only two mandibles, recovered from late Roman fills from ditch ***196***, were capable of providing a tooth wear age score. One mandible was from an adult animal and the second was from an animal aged within the senile range. As these animals seemingly survived the slaughter age of animals raised primarily for meat production, this would suggest secondary products such as milk, traction and manure were considered of higher importance.

None of the remains was complete enough to provide measurements for withers height calculations.

Sheep/goat

Sheep/goat were the next most abundant species identified within the assemblage, after cattle. Three fragments of bone were positively identified as sheep, but no definite goat remains were noted. However, due to the similarity between the morphological characteristics of the two species, it is difficult to prove goats were absent.

Minimum number of individual calculations suggests that within the mid- to late Iron Age sheep/goat were much more prominent than cattle. This may suggest that the site economy was sheep/goat based at this time. By contrast, sheep/goat became less prominent by the late Roman period.

A total of seven mandibles recovered from the South Dyke ditch assemblage provided a tooth wear age score. The remains represented a range of ages: two animals at 3-10 months, three animals at 3-5 years and two animals at over 8 years. The presence of young animals suggests that breeding was taking place on the site or nearby. The rest of the animals represented are adults, some of which are of a very old age. These animals had been retained beyond ages considered prime for meat production, suggesting that secondary products such as wool and breeding were of a higher priority. The fusion age scores for sheep/goat within the assemblage are very limited; however, the information available does not differ from the information given from the tooth wear scores.

No complete bones were available to provide measurements for withers height calculations.

Red Deer

A total of 17 fragments of red deer was recovered, all but two of which came from deposits from ditch ***196***. All but one fragment was of antler. A single skull fragment from the ditch had an antler crown still attached. As antler is naturally shed, its presence here need not indicate the species was hunted nearby (although the specimen with skull fragment attached might suggest that this did occur). As a useful resource, it is possible that antler was traded or transported over some distance. The fact that no postcranial bones were noted within the entire assemblage suggests that such was the case here, and so the existence of significant woodland nearby should not be extrapolated from the presence of red deer remains.

Equid

Although equid remains were present in small numbers within most phases of the site, it was not possible to distinguish between horse and donkey. Minimum numbers of individuals calculations suggest that equids were generally consistently present on the site, but were never a major part of its husbandry strategy. Equids would have been utilised for riding and traction, and, to judge by evidence from elsewhere, were possibly processed for meat after a certain age.

The equid remains are rather fragmentary and therefore provide few measurable bones. Where possible to assess, all of the skeletal elements were from skeletally mature animals; no tooth wear ages scores were available within the assemblage.

Pig

A single pig tooth was recovered from the sieved samples from South Dyke ditch. The lack of pig remains could be attributed to two factors. Either large numbers of pig could not have been supported by the local environment (pigs thrive as woodland foragers), or the animals were only kept for breeding and meat production, and were therefore slaughtered at a young age, when any skeletal elements would have been too fragile to survive.

Dog

A single fragment of dog ulna was recovered from South Dyke ditch. It is likely that dogs would have been kept as working animals, used for guarding, herding, and hunting, and may have been responsible for the carnivore gnawing also noted in the South Dyke ditch assemblage.

Amphibian (Frog/Toad)

A total of three fragments of amphibian bone (one positively identified as common frog (*Rana temporaria*) was recovered from the South Dyke ditch. Common frogs live all over Britain, wherever a suitably damp environment is available (Hart-Davis 2002, 352), and so these remains may have become included in the assemblage through natural means.

5.1.4 Discussion

The excavation of the South Dyke has produced relatively small but fairly well-dated late Iron Age and late Roman period animal bone assemblages. The remains appear to represent domestic activity, with the skeletal elements suggesting both butchery and food waste. In addition, craft activity in the form of antler and bone working also appears to have been undertaken.

The majority of the assemblage was derived from large ditches, with no definite settlement features identified. However, the animal bone assemblage suggests that the site was a small producer settlement, where animals were both raised and utilised. The site practiced a mixed economy, utilising both cattle and sheep/goat. To judge from the identifiable bone, within the late Iron Age there appears to have been an emphasis on sheep/goat and wool production, whereas within the late Roman period cattle seem to be more prominent, with an emphasis on traction and milk production.

Hambleton (1999) analysed animal bone assemblages from Iron Age settlements in northern Britain, concluding that sheep/goat were the mainstay of the economy of the period. A sheep/goat-based economy is generally associated with the Iron Age, with the progression to a cattle-based economy attributed to changes resultant of Roman occupation (King 1978, 1991, 1999). This theory, however, does not take into account topographical or environmental constraints, such as cattle being more frequently associated with lowland environments, due to their greater need for water and plentiful grazing, with sheep being more suited to upland areas, due to their capacity to survive on poor grazing and reduced water availability. When environmental constraints are less stark, other factors, such as cultural norms and the demands of the broader economy, are perhaps more likely to inform the choices behind animal husbandry strategies.

A recent review of Iron Age and Romano-British animal remains from archaeological sites in west and south Yorkshire (the region which encompasses Aberford) highlighted a dearth of data: poor preservational conditions and small sample sizes provided little usable data for comparison (Chadwick 2010, 119-136). Broad patterns were, however, observable: '*cattle were generally more important during the later Iron Age and earliest Romano-British period'*, with most animals *'kept for breeding and secondary products, and...slaughtered after their prime meat-bearing age*' (134, 135). In eastern Yorkshire, late Iron Age to Romano-British settlements at Hayton (Jaques 2004) and Shiptonthorpe (Mainland 2006) present a differing picture. Both settlements favoured sheep/goat husbandry throughout the entire phase of occupation, despite being in lowland positions. However, the proximity of the Yorkshire Wolds, with extensive chalkland pasture, may have been a factor on these sites.

The situation is clearly a complex one, with many site-specific variations influencing apparent livestock specialisation. It is clear that landuse and environment affected the species reared in a particular area, and that '*trends cannot simply be read off as an index of "Romanisation*"' (Chadwick 2010, 135). Fuller understanding is likely to remain elusive until further works in the area remedy the current lack of extensive animal bone assemblages.

5.2 The Charred Plant Macrofossils and Other Remains

by Val Fryer

5.2.1 Introduction and method statement

Of the 137 bulk samples studied at the assessment stage of this project, only four (samples 501, 504, 505 and 506), from fills within stone-lined pit *418*, contained a sufficient density of material for further quantification. Although it was originally thought that this feature was of Roman date (largely because of the Romano-British pottery found within the fills), a radiocarbon determination of 680-870 cal AD (SUERC-24500), obtained from material within the lower fill, proved otherwise. This greatly increased the significance of the recovered assemblages, as environmental data regarding this period from West and North Yorkshire is very scarce. It was hoped, therefore, that analysis of this material would provide information regarding the nature of the environment and the utilisation of local resources during the early medieval period.

The samples were processed by manual water flotation/washover and the flots were collected in a 300 micron mesh sieve. The dried flots were sorted under a binocular microscope at magnifications up to x16 and the plant macrofossils and other remains noted are listed in Table 5.6. All plant remains were charred. Nomenclature within the table follows Stace (1997) and identifications were made by comparison with modern reference specimens. Counts of cereal grains include only whole grains or apical ends. Abbreviations used in the table are explained at the end of the text section.

5.2.2 Sample composition

Cereal grains and seeds of common segetal weeds were present at a moderate to high density within all four assemblages. Preservation was moderately good, although some grains and seeds were puffed and distorted, probably as a result of combustion at very high temperatures.

Oat (*Avena* sp.), barley (*Hordeum* sp.) and wheat (*Triticum* sp.) grains were recorded, with wheat occurring most frequently. The wheat grains were all of a rounded hexaploid form, and bread wheat (*T. aestivum/compactum*) type rachis nodes, with diagnostic crescentic glume inserts, were noted within all but sample 504. A single wheat grain from sample 506 had a transverse break with a very distinctive convex surface, possibly indicating that this specimen had been 'gristed' or roughly milled prior to being charred. Oat grains were also common, but as floret bases, with their diagnostic abscission scars, were not present, it was not possible to ascertain whether wild or cultivated species were present. However, it was noted that the oats ranged from small specimens through to very large grains, possibly indicating the presence of primary, secondary and tertiary grains of the cultivated variety *A. sativa*. Barley grains were relatively scarce, and it was considered most likely that, along with the oats, these were relicts of earlier cropping regimes, and present as contaminants of the main wheat crop. A single possible cotyledon fragment of an indeterminate large pulse (Fabaceae), noted within the assemblage from sample 504, was the sole non-cereal food plant remain recorded.

Weed seeds were relatively abundant, especially within the assemblage from sample 504. All were of common segetal species including corn cockle (*Agrostemma githago*), stinking mayweed (*Anthemis cotula*), brome (*Bromus* sp.), goosegrass (*Galium aparine*), nipplewort (*Lapsana communis*), grasses (Poaceae), dock (*Rumex* sp.) and cornsalad (*Valerianella dentata*). The abundance of small leguminous seeds within all four assemblages was of particular note. Although all lacked intact testa and hila and were not, therefore, closely identifiable, their presence possibly indicates that these plants were deliberately grown, either as fodder crops or as part of a rotational cropping regime. Possible evidence for this latter practice has now been noted at a number of late Saxon and early medieval sites across eastern England and the Central and Western Midlands, for example at West Cotton, Northamptonshire (Campbell 1994) and St Martin-at-Palace Plain, Norwich (Murphy 1988). Small numbers of flax (*Linum usitatissimum*) seeds were also recorded within three of the Becca Bank

assemblages. Flax is commonly seen within early medieval assemblages, as it was grown both as a fibre crop and for consumption. However, in this instance, the low number of recorded seeds suggested it was present as a volunteer weed. Similarly, the sedge (*Carex* sp.) nutlets and hazel (*Corylus avellana*) nut shell fragments were also probably coincidental within the assemblages, the former possibly indicating that some field margins were damp, whilst the nut shells were probably the residue of 'snacks', which were tossed into the fire after consumption.

Small charcoal/charred wood fragments were also relatively abundant within the assemblages, but other plant remains were rare, comprising pieces of charred root or stem and indeterminate culm nodes and floret fragments. Other remains were also very scarce. The fragments of black porous and tarry material and the globules of vitreous material were all probable residues of the combustion of organic remains (including cereal grains) at very high temperatures. Small pieces of coal were present throughout, but it would appear most likely that all were intrusive within the contexts from which the samples were taken.

5.2.3 Discussion

All four assemblages appear to be principally composed of charred cereal processing waste, with different stages of processing being represented. Within the assemblage from sample 504, weed seeds are predominant (with a grain:seed ratio of 1:5), with a wide range of species being recorded. This would appear to indicate that some or all of this material was generated during a relatively early stage of processing (possibly winnowing), although it should be noted that identifiable chaff elements are entirely absent from this assemblage. The reason for this is unclear, but it may, in part, be a result of differential preservation during charring. The remaining assemblages either contain an equal ratio of grains and weed seeds or, in the case of sample 506, are grain dominant (grain:seed ratio of 3:1). In these instances, the range of weed species is limited, and the recorded seeds are mostly large, and often of a similar size to the grains. Such assemblages are most likely to be derived from batches of grain at an advanced stage or processing, where the few seeds remaining were either removed by hand prior to consumption, or tolerated as contaminants, as they neither detracted from the palatability of the grain or compromised its storage potential. The composition of the weed assemblages from all four samples appears to indicate that a variety of different soils were being utilised for agricultural production including heavy, clay land (cf. *Anthemis cotula*), lighter, well drained soils (cf. *Papaver* sp.) and gravels (cf. *Lapsana communis*).

All four of the current assemblages contain materials alien to batches of cereal processing detritus (for example the charcoal/charred wood fragments, the pieces of hazelnut shell and the bone fragments) and it would, therefore, appear most likely that the remains were mixed with other refuse prior to deposition. A growing corpus of evidence from sites across the British mainland indicates that processing waste was being used as kindling or fuel within both domestic and light 'industrial' contexts from the Roman period onwards and it is, therefore, suggested that this may be the case with the current assemblages. All four are from fills within a stone-lined pit, which had been dug adjacent to the monument bank, such a location possibly chosen as a suitably sheltered spot in which to light a fire. The pit showed evidence for in situ combustion, and it would certainly appear most likely that cereal-processing waste was burnt within this feature.

5.2.4 Conclusions

In summary, although small, these assemblages provide valuable data about agricultural practices and production in the north and west Yorkshire regions during the early medieval period. Cereal cultivation was evidently being undertaken in the vicinity of the site, and a variety of soils were being tilled. In addition, the abundance of leguminous plant remains within the assemblages suggests that a rotational cropping system was being followed, in order to improve impoverished soils.

As only four assemblages were studied, further interpretation is not possible, but it would appear most likely that cereal-processing waste was being utilised as fuel, although the purpose of the combustion that occurred within pit *418* remains unclear.

Sample No.	**501**	**504**	**505**	**506**
Context No.	**419**	**420**	**421**	**422**
Cereals and other food plants				
Avena sp. (grains)	16	23	54	13
---- (floret bases)	1			
Hordeum sp. (grains)	11	5	12	5
Triticum sp. (grains)	42	18	49	49
---- (gristed grain)				1cf
T. aestivum/compactum type (rachis nodes)	5		16	11
Cereal indet. (grains)	30	20	46	37
Large Fabaceae indet.		1cfcotyfg		
Herbs				
Agrostemma githago L.	1	4cf	6	1+2cf
Anagallis arvensis L.				1cf
Anthemis cotula L.		35	1	
Apiaceae indet.		2		
Asteraceae indet.		4		
Atriplex sp.			1	
Bromus sp.	1	32	33	6
Chenopodium album L.				1tffg
Chenopodiaceae indet.		3		
Fabaceae indet.	48+63coty	86+75coty	106+101 coty	10+19coty
---- (pod frags.)			1	
Fallopia convolvulus (L.) A.Love			1tffg	
Galium aparine L.	9+1fg	1+1cf	3+3fg	14+4fg
Lapsana communis L.	2	70	22	4
Linum usitatissimum L.		3+1fg	6+1cf	2cf
Lithospermum arvense L.			3	
Medicago/Trifolium/Lotus sp		1		
Papaver sp.		3		
P. argemone L.		3cf		
P. dubium L.		3cf		
P. somniferum L.		3cf		
Plantago lanceolata L.		1		
Small Poaceae indet.		22+8cf	3	
Large Poaceae indet.	5	14		
Ranunculus sp.		1fg		
Raphanus raphanistrum L. (siliqua frags.)			2cf	
Rumex sp.		3+1cf		1cf
Scandix pecten-veneris L.		2		
Valerianella dentata (L.) Pollich		8		
Wetland plants				
Carex sp.	1		2+1fg	
Tree/shrub macrofossils				
Corylus avellana L.	17fg		1fg	1fg
Other plant macrofossils				
Charcoal <2mm	xxx	xxxx	xxxx	xxxx

Sample No.	**501**	**504**	**505**	**506**
Context No.	**419**	**420**	**421**	**422**
Charcoal >2mm	xxx	xx	xxxx	xxxx
Charcoal >5mm	x	x		xx
Charcoal >10mm	x			
Charred root/stem	x			x
Indet.culm nodes			1	1
Indet. floret frags.			4	5
Indet.seeds		5		2
Other remains				
Black porous 'cokey' material	x		x	
Black tarry material				x
Bone	x	xb	x	
Burnt/fired clay		x		
Small coal frags.	x	x	x	x
Small mammal/amphibian bone				xb
Vitreous material	x			
Sample volume (litres)	**30**	**28**	**31**	**30**
Volume of flot (litres)	**0.1**	**0.1**	**0.1**	**<0.1**
% flot sorted	**100%**	**100%**	**100%**	**100%**

Table 5.6: Samples from pit 418

Key to Table

cf = compare coty = cotyledon fg = fragment tf = testa fragment b = burnt
x = 1-10 specimens xx = 11-50 specimens xxx = 51-100 specimens xxxx = 100+ specimens

5.3 The Thin Section Micromorphology from Becca Banks

by Stuart Morrison and Ian Simpson (University of Stirling)

5.3.1 Introduction

Sediments in archaeological sites reflect the environment in which they have been formed and so the identification and interpretation of sediment properties has the potential to offer new or more refined understandings of cultural activities and environmental conditions associated with site formation. Thin section micromorphology of undisturbed sediments is increasingly applied to the understanding of archaeological contexts and provides a detailed, microscope-based, consideration of sediment source, variability of composition, post-depositional processes, and the physical relationship between organic, mineral and anthropogenic components (Davidson and Simpson, 2001).

5.3.2 Methodology

Thin sections were prepared at the Thin Section Micromorphology Laboratory, University of Stirling (Plate 12). All water was removed from the samples by acetone exchange. The samples were then impregnated using polyester 'crystic resin type 17449' and the catalyst Q17447 (methyl ketone peroxide, 50% solution in phthalate). The mixture was thinned with acetone and a standard composition of 180ml resin, 1.8ml catalyst and 25ml acetone used for each Kubiëna tin. An accelerator was used and the samples were impregnated under vacuum to ensue complete outgassing of the soil. The impregnated soils were cured, culminating with a period in a 40˚C oven. Resin impregnated soils were sliced, bonded to a glass slide and precision lapped to 30µm thickness, and cover slipped to complete the manufacture of the thin section.

The manufactured thin sections were described using an Olympus BX-50 petrological microscope and by following the procedures of the International Handbook for Thin Section Description (Bullock et al. 1985) and the most recent of procedures of Stoops (2003) (Table 5.7). This allows systematic description of soil microstructure, basic mineral components (MacKenzie and Adams, 1994), basic organic components, groundmass and pedofeatures. A range of magnifications (x10-x400) and light sources (plane polarised (PPL), crossed polars (XPL) and oblique incident (OIL)) were used to obtain detailed descriptions and these were recorded semi-quantitatively on a standard table. Interpretation of the observed features rests on the accumulated evidence of a number of workers, notably Courty, et al., (1989) and FitzPatrick (1993).

5.3.3 Thin section description and interpretation

5.3.3.1 Context ABD 681 (Sample No. 629), Monoliths K1 and K2

The lowest monolith in this context, K2, contains few moderately sorted and moderately degraded grains alongside traces of feldspar, limestone and sandstone grains. Very few of these mineral grains have been rubified. The fine mineral material is medium brown with lighter and darker brown transitional areas under PPL, orange/yellow under OIL. Found throughout are pockets of organic material as well as a reasonably heavy clay presence. Clay coatings are features which form rapidly under exposed conditions. The clays found within this monolith have accumulated in a variety of ways (Plate 13); there are (1) iron-rich dusty clay infused with speckled organic material, (2) laminated horizons of dusty clay and (3) purer clays with little in the way of speckled matter throughout. These are also found in a variety of states; (a) discreet domains infused within the soil matrix, (b) laminated bands layering other materials (either a different variety of clay or a mineral deposit, (c) infilling void space within the soil matrix and (d) coating organic or mineral grains. The most common clay type within this monolith is bands of dusty and purer clay, accumulating within voids and pore space. The accumulation of clays suggests movement of water within this stratigraphy, infilling into where the soil matrix permits and also where biological material was formerly found.

This last feature, along with identification of faecal material, indicates a small degree of biological disturbance within this stratigraphy. Iron features, found in discrete clusters as well as the occasional nodule support the idea that this site was subject to exposed, wet conditions.

The uppermost monolith in this stratigraphy, K1, contains more of an abundance of quartz material with varying degrees of roughness recorded. The larger of these grains show a less uniform nature, suggesting water-borne influence followed by a stronger, erratic episode leading to their deposition. Flecks of feldspar and pockets of degraded limestone are observed. The occasional heated mineral grain is observed well mixed into its surrounding matrix. The fine mineral material is medium brown with frequent darker patches observed under PPL, with paler orange containing discreet darker patches observed under OIL. Despite the fine mineral material being fairly uniform throughout, traces of charcoal are identified in a linear fashion across the monolith, raising the possibility that this may have been a surface at one time. The monolith does contain a significant clay presence, albeit a reduction on the lower monolith. Dusty clays are found close to the charcoal band, supporting the idea that this may have been a surface which was exposed for a prolonged period of time. Clays are found both as coatings and infills, all of a variety of qualities; purer clays, silty clays and iron-rich red clays. In addition to the aforementioned band of charcoal, the monolith also contains additional organic components in the form of traces of burnt turf and charcoal flecks as well as traces of cellular plant remains.

5.3.3.2 Context ABD 504 (Sample No. 630), Monoliths K3 and K4

Context 504 was described in the field as a firm/friable dark greyish brown clayish silt, with little in the way of artefactual evidence recovered. It is said to have formed an old ground surface sealed under an earthwork bank. The lowest monolith in this context, K4, contains common quartz grains along with traces of sandstone, feldspar and limestone, all of which show a moderate degree of sorting and some moderate levels of degradation. The fine mineral fraction is medium brown PPL, and orange OIL, influenced by the local geology.

Although this monolith appears to contain little in the way of anthropogenic material, there are traces of burnt turf and charcoal inclusions found throughout, much like context 681. Occasional faunal excrements point towards small degrees of biological disturbance within the stratigraphy. Two distinct forms of textural pedofeatures have been identified suggesting a degree of water movement within the stratigraphy; iron movement found in discreet areas, as well as a variety of clay features. Within monolith K4, these are found as part of domains with occasional infills and coatings of larger quartz grains. The coatings are in the form of silty clay coatings with dusty characteristics. A distinct, yet diffuse, dark band of silty material cuts through one area of the monolith, containing more in the way of organic flecks than neighbouring microstratigraphic horizons. The lack of distinct laminations or horizons demonstrates continuity throughout the stratigraphy and the uniformity of wider environmental conditions.

The uppermost monolith in this context, K3, contains frequent quartz grains which are moderately sorted progressing to poorly sorted at the top of the monolith. Also present are traces of feldspar and limestone. There is one area in the upper left corner of the monolith which is an exception to this, with an increased presence of degraded limestone within a poorly sorted matrix containing charcoal fragments and iron accumulations, all within a heavily influenced clay domain. These clays are more silty and dusty, and found in distinct clusters. In the lowest microstratigraphic horizon, there is a dark brown fine mineral material with lighter brown inclusions observed under PPL, and orange OIL. The microstratigraphy is a fairly constant subangular blocky, with little in the way of sharp laminations or transitions. Present throughout the lowest two microstratigraphic horizons are domains of clay, showing a heavier clay presence than found in monolith K4, alongside clusters of iron material and minute iron nodules. Crystalline clay is also found accumulating in infilled areas, as well as coating larger quartz grains. Occasional heated mineral grains are found throughout.

The minimal anthropogenic presence found within this stratigraphy reflects the opinion that this was a ground surface prior to the construction of the bank. Water has played a significant role in determining the features found within the monolith; the iron and clay accumulations demonstrate that water has infiltrated throughout the stratigraphy, but it has not been a determining factor in the generation of the stratigraphy through the lack of laminations. The distinct cluster of clay at the top right of monolith K3 could potentially relate to the construction of the overlying bank, however the diffuse boundary between this feature and neighbouring contexts suggest that there was no overwhelmingly sharp transition taking place.

5.3.3.3 Context ABD 593 (Sample No. 573), Monoliths K5, K8, K7 and K6

The lowest-positioned monolith in this context, K6, contains very few moderately sorted quartz, sandstone and limestone grains with limestone being the heaviest presence of the three. These grains show some rounding, which is indicative of weathering. The fine mineral material is predominantly dark brown with areas of medium to dark brown and areas of grey material. The striking characteristic within this monolith is the distinct laminations observed throughout, yet some of these show undulation and are partly diffuse. These show distinct transitions and sharp boundaries and contain a variety of materials which reflect the deposition and wider environmental conditions. The accumulation pattern and how it changes throughout the monolith is of interest; it appears at a 40° angle in a top left to bottom right direction, before it undergoes an episode of unburnt peat accumulation. The layers under peat are (1) a fine lens of weathered limestone filled with quartz fragments, on top of (2) a darker brown fine mineral material containing quartz fragments, positioned above (3) an intimate mix of larger quartz and sandstone grains with traces of burnt organic material (Plate 14). This final layer contains very pale yellow lenses of dusty clay on occasion which match the degree of orientation. Dusty clays are also found in hollowed areas as infills (Plate 15). On two occasions in this series of laminations below the peat accumulation, there are distinct bands of linear organic material, found in spatially discrete areas, up to 500 microns in size (Plate 16). These are distinct and larger than any other unburnt organic fragments found within the monolith. These horizons all show a degree of being well sorted, suggesting that water has heavily influenced the deposition patterns. The top left of the monolith gives the impression of a poorly sorted accumulation with the larger sandstone and limestone grains dominating the matrix, however there are some very fine lenses of pale dusty clay laminations suggesting that there has been some changes during the deposition and it was not necessarily part of one swift deposition sequence. The accumulation of peat is unique, as it would suggest a period where there was few disturbances within the site; however with lenses of fine clay and degraded limestone material being found within the peat and matching its orientation, it would appear that there were still movements within a short distance of the stratigraphy transporting material on top of the newly formed peat sequence.

Positioned upwards in the stratigraphy from K6, monolith K7 partly reflects what is found in the underlying monolith but on a much clearer scale. The angle of orientation of laminated deposits is around 35° from bottom left to top right, and contains weathered limestone, a deposit with larger sandstone grains, fine clay and silty clay deposits, as well as well-sorted quartz deposits of uniform size, thin lenses of organic material and thin lenses of yellowish silty clay. Progressing upwards, these deposits become somewhat more diffuse, with larger organic and mineral fragments finding their way into more of an undulating matrix containing clay and coarser mineral bands (Plates 17, 19 and 19). Some of the coarse quartz grains show a degree of rounding supporting the idea that these deposits have been heavily weathered and influenced by water movement. The sharp and clear transitions, particularly at the foot of the monolith, suggest short, sharp transitions of accumulating material. These laminations are not of uniform thickness and may suggest a variety of deposition strengths and phases.

Upwards from monolith K7, monolith K8 appears not nearly as stratified as the previous monoliths but still expresses a significant degree of lamination. There are larger, more uniform deposits

containing larger mineral grains, suggesting that deposition is continuing but of a greater magnitude. Some of these grains do contain clay coatings. There are also clay infills and accumulations throughout the monolith. These are predominantly dusty and silty clays. There are flecks of organic material found throughout however these instances are sparse. Close to the foot of the monolith, silty clay is identified adjacent to a darker organic laminated layer which progressively gets lighter before another silty clay deposit is laid down this time containing larger limestone grains. This is one example of the sharp transitions which are found within this monolith. Present at the foot of the monolith are discreet lenses of dusty clay and silt, capped with a more organically influenced lamination, which develops into an almost vertical boundary between itself and neighbouring infills of fine clay (Plate 20). These are capped by a quartz-rich deposit, which brings the stratigraphy back to a horizontal level before the commencement of the aforementioned larger, more uniform deposit. Midway up this sequence the quartz rich horizon is introduced once more, containing a fine layer of clay and silty clay lenses. At the top right of the monolith, there is a sharp boundary between a deposit containing quartz-rich material, and a finer medium brown mineral material with traces of organic inclusions.

The uppermost monolith in this stratigraphy, K5, contains larger, more uniform microstratigraphic horizons however there are still instances of finer accumulations throughout the monolith. These larger deposits are the likely result of a more powerful depositional episode. The main mineral matrix contains smaller quartz grains although there is frequent larger sandstone and limestone grains interspersed within. Some of these contain coatings of clay and organic material. There is a significant clay component within, however the laminations which make up this stratigraphy are not as pronounced as the previous monoliths (Plates 21 - 24). The lowest part of the monolith sees degraded limestone interspersed with a fine clay deposit, which is capped with a dark brown fine mineral deposit. Within this sequence are frequent lenses of yellowish silty clay which have found their way into the pore spaces. These display no parallel patterns suggesting they found their way into available pore-space formerly taken up by biological material. At the very top of the monolith is evidence of heated mineral grains being introduced to the stratigraphy, potentially related to anthropogenic activity at a neighbouring location. There is evidence of iron accumulation features, however not to the same degree as found within the stratigraphies of contexts 504 and 681.

5.3.4 Conclusions

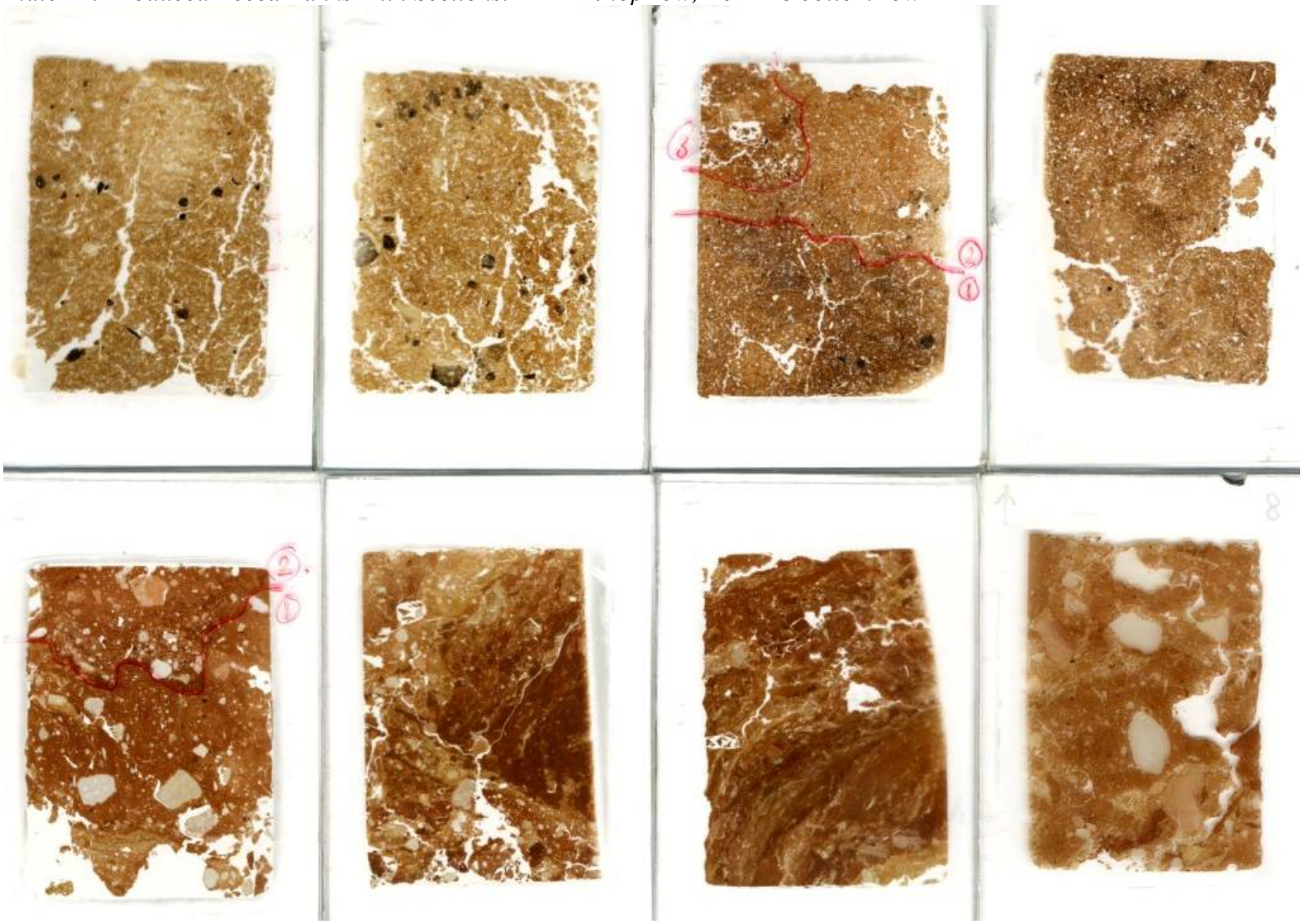
The differences observed under thin section between context 504 and the older context 681, are minimal. Both display an even presence of clay and iron features, with little in the way of laminations or distinct boundaries representative of rapid change within the landscape. This, in turn would suggest that the regime which was in place produced conditions which were a constant over the two time periods in question. There is a heavier coarse mineral material within these stratigraphies, influenced by the local geology, with the red sandstone influencing the fine mineral material under OIL. Both of these stratigraphies, both in terms of coarse mineral material and composition of the structure, as expected, are a stark contrast to what is observed under context 593, where clear laminations are identified throughout reflecting changing conditions of the environment and deposition patterns. The variety of clay types, which are deposited in a variety of thicknesses, are testament to the wide range of factors which influenced the generation of this stratigraphy. This, coupled by the range of laminations observed are testament to broader, changing environmental conditions which were influencing deposition patterns within the stratigraphy.

		Coarse Mineral Material						Coarse Organic Material			Fine Organic Material				Pedofeatures							
Monolith	Horizon	Quartz	Limestone	Feldspar	Sandstone	Headed Stones	Fine Mineral Material	Fungal Spores	Plant Material	Cell Residues	Charcoal	Amorphous (Dark)	Turf	Peat	Fine Clay	Dusty/Silty Clay	Iron-stained Clay	Iron Accumulation	Excremental Features	Microstructure	Coarse material arrangement	Groundmass B fabric	Related distribution
1		***	*	t		t	Medium brown with dark patches PPL. Pale orange with yellow OIL		t	t	t	t	t		*	**	*	*		Medium separated angular blocky	Moderately sorted	Crystallic	Double-spaced fine enaulic
2		***	t	t		t	Medium brown with lighter and darker areas PPL. Orange with areas of yellow OIL.			t	t	t	t		*	***	*	*	*	Subangular-blocky to medium separated granular	Moderately sorted	Crystallic	Double-spaced fine enaulic/ double poryphic
3	1	***	t	t	t		Medium brown PPL. Orange OIL.				t		t		*	**		*	t	Uniform with areas of subangular blocky	Moderately sorted	Crystallic	Double-spaced fine enaulic
3	2	***	t	t			Medium brown PPL. Orange OIL				*	t	t		*	**		*	t	Uniform with areas of subangular blocky	Moderate to poorly sorted	Crystallic	Double-spaced fine enaulic
3	3	***	**				Medium to medium reddish brown PPL. Strong orange with lighter patches OIL.			t	t		t		*	**	t	*		Medium separated granular	Moderate to poorly sorted	Crystallic	Double-spaced fine enaulic
4		***	t	t	t		Medium brown with reddish patches PPL. Orange with redder areas OIL.			t	t	t	t		*	*		**	t	Medium separated angular blocky	Moderately sorted	Crystallic	Double-spaced fine enaulic
5		**	***		***	t	Medium to dark brown with grey bands PPL. Strong orange with pale bands OIL.				t	*	t		*	**		*		Angular blocky/platy	Poorly to moderately sorted	Crystallic	Double-spaced poryphic to fine enaulic
8		***	***			t	Light brown with lighter and darker areas PPL. Strong orange with paler areas OIL.				t	t	t		*	*		*		Angular blocky with pockets of granular	Poorly sorted with well sorted laminations	Crystallic	Double-spaced poryphic
7		**	**		**		Medium brown with dark brown and greyish bands PPL. Orange with strong and pale orange bands OIL.					*		**	*	***		*		Sub-parallel accommodating with subangular blocky	Moderate to poorly sorted, well sorted laminations	Crystallic	Double spaced fine enaulic with close/fine enaulic in quartz areas
6		*	**		*		Dark brown with areas of medium brown and grey PPL. Orange to pale orange/yellow OIL.				t	*		**	*	***	*	*		Subangular blocky with small clusters of granular	Moderately sorted, well sorted laminations	Crystallic	Double-spaced fine enaulic

Table 5.7: Becca Banks thin section descriptions, abundances adapted from Bullock et al. *1985*

Very Dominant	> 70	****
Dominant	50-70	****
Frequent	30-50	***
Common	15-30	***
Few	5-15	**
Very Few	1 - 5	*
Trace	< 1	t

Plate 12: Produced Becca Banks Thin Sections. K1 – K4 top row, K5 – K8 bottom row



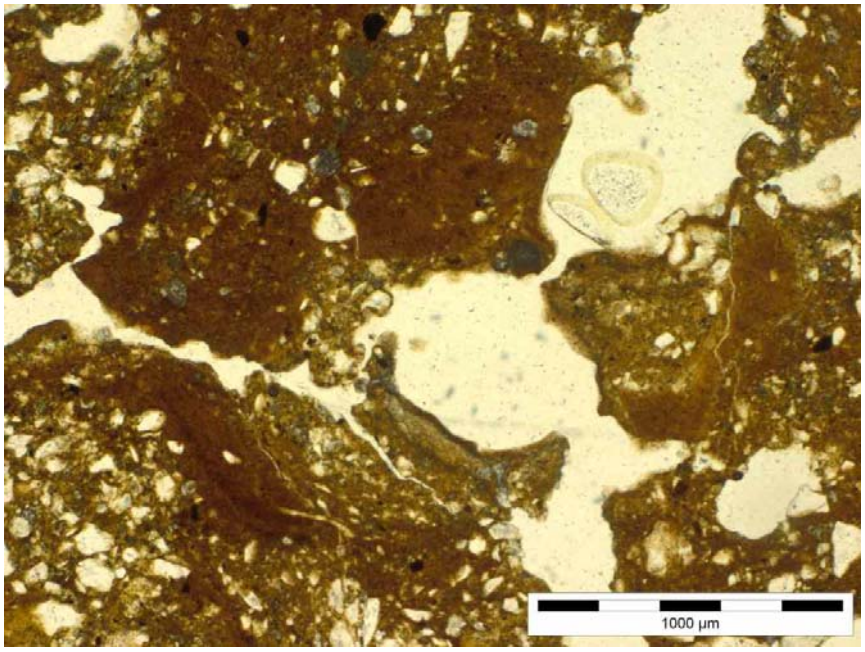


Plate 13: Sample K2, clay layers (PPL)

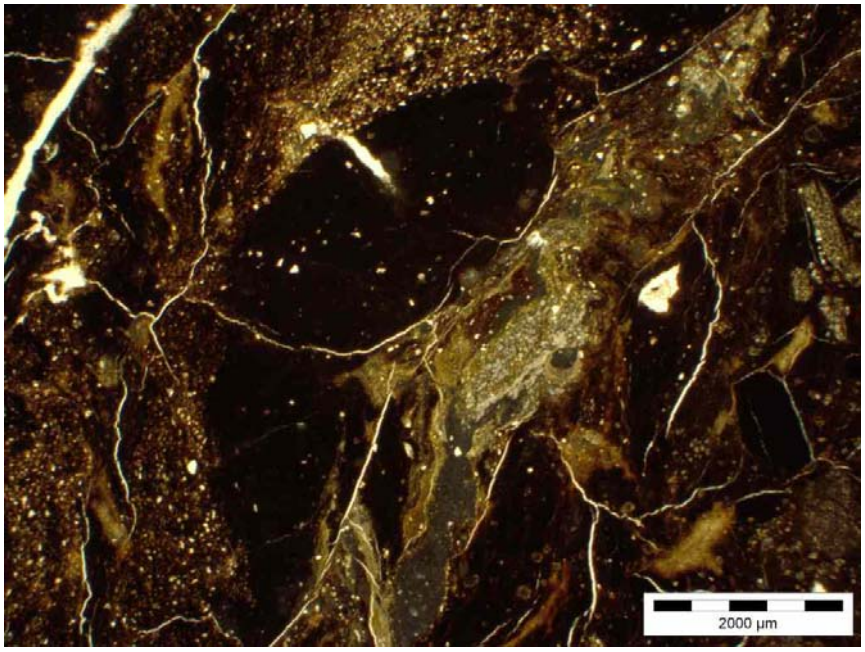


Plate 14: Sample K6, clay and peat layer (PPL)

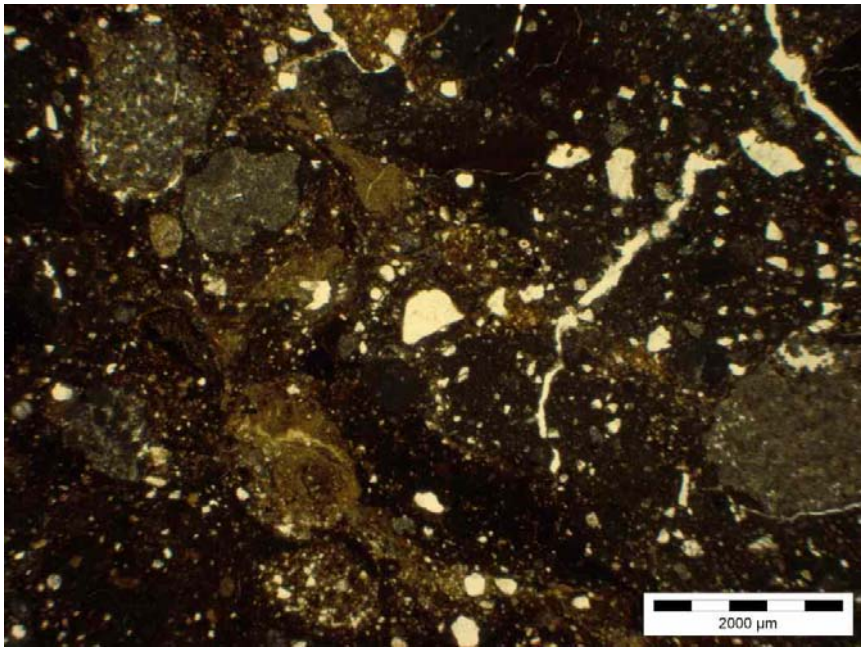


Plate 15: Sample K6, clay layers (PPL)

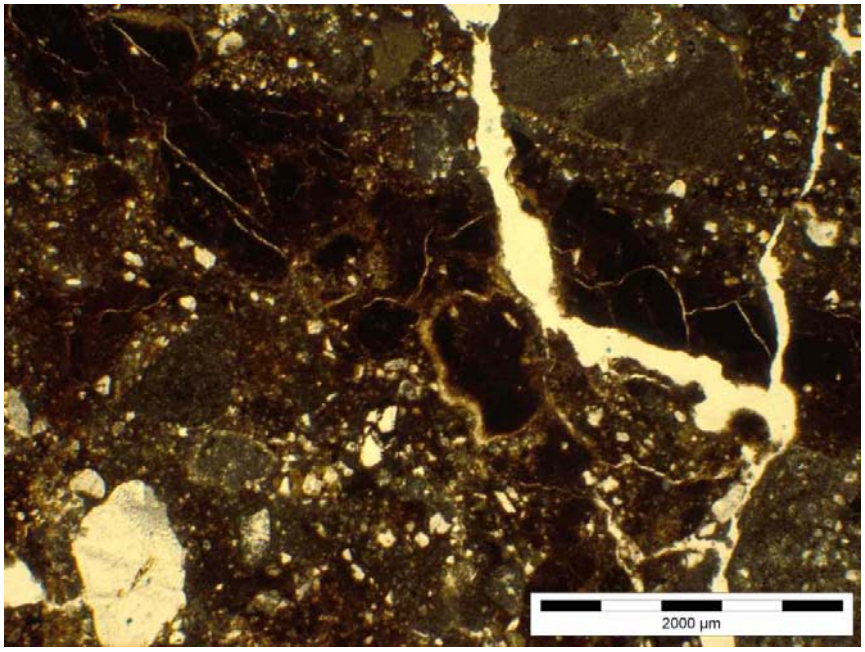


Plate 16: Sample K6, deposited organic layer (PPL)

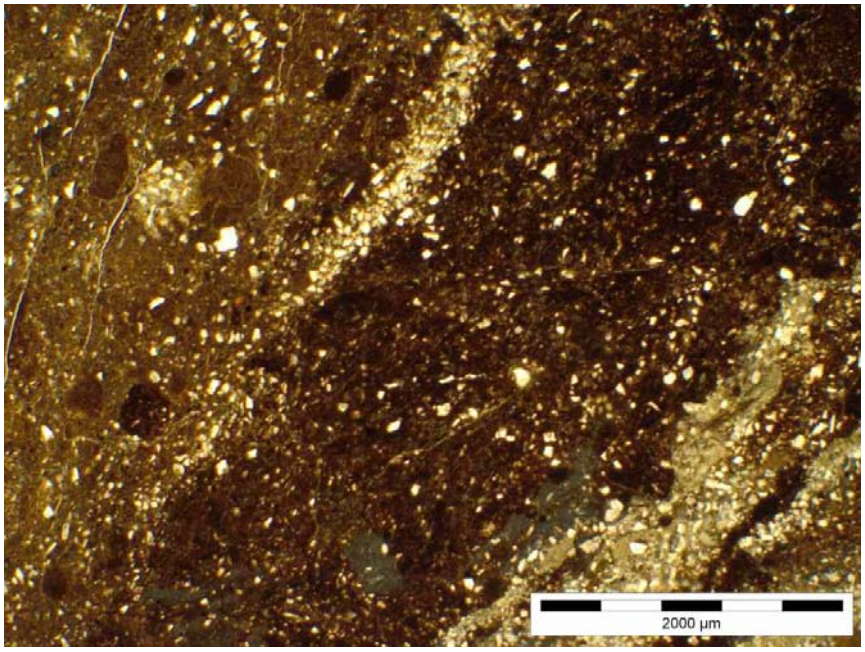


Plate 17: Sample K7, layering (PPL)

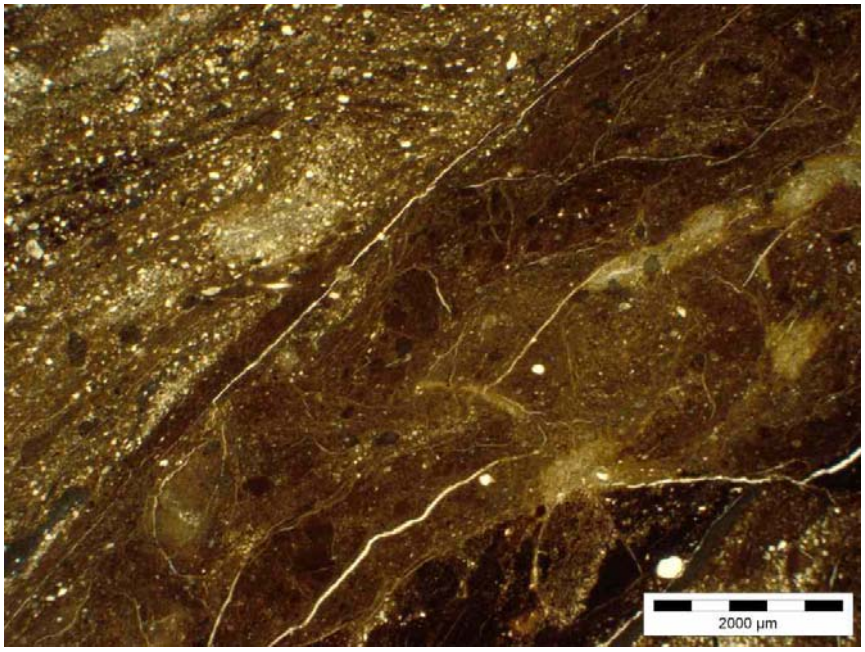


Plate 18: Sample K7, layering (PPL)

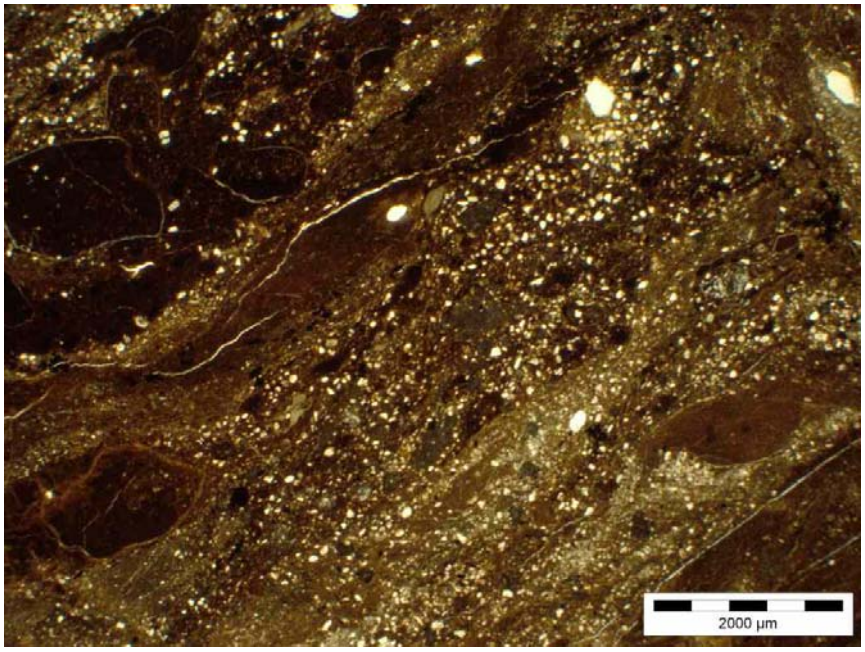


Plate 19: Sample K7, layering (PPL)

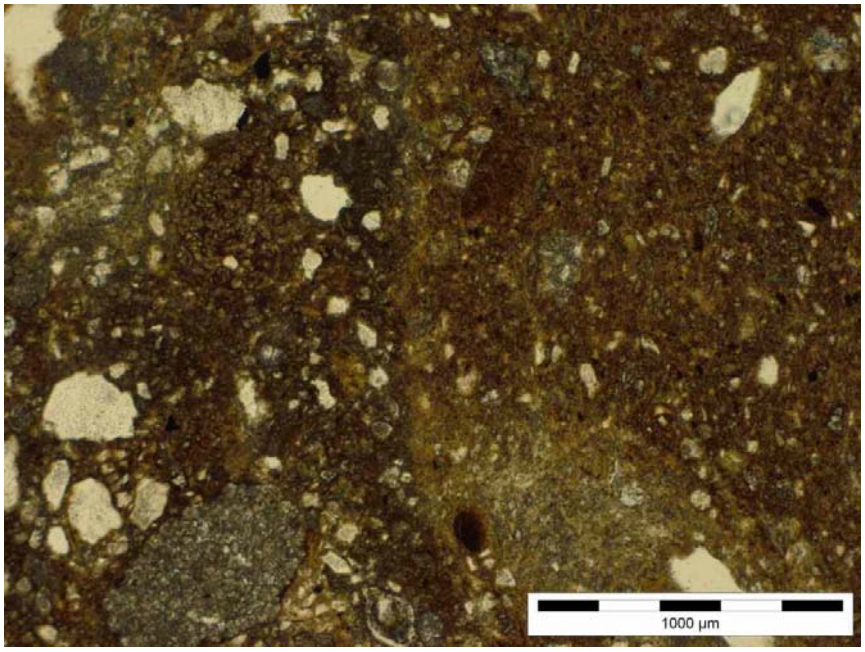


Plate 20: Sample K8, boundary (PPL)

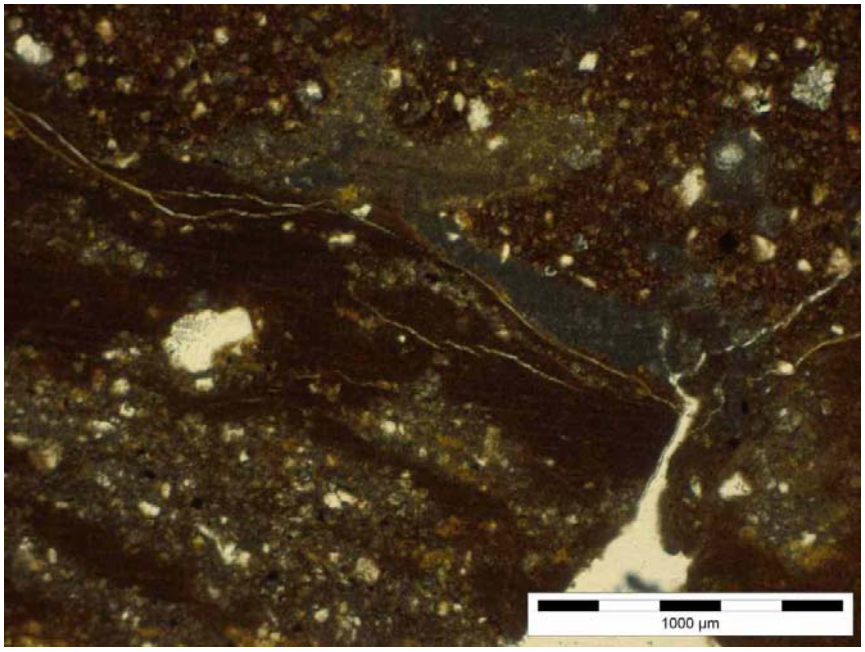


Plate 21: Sample K5, clay layers (PPL)

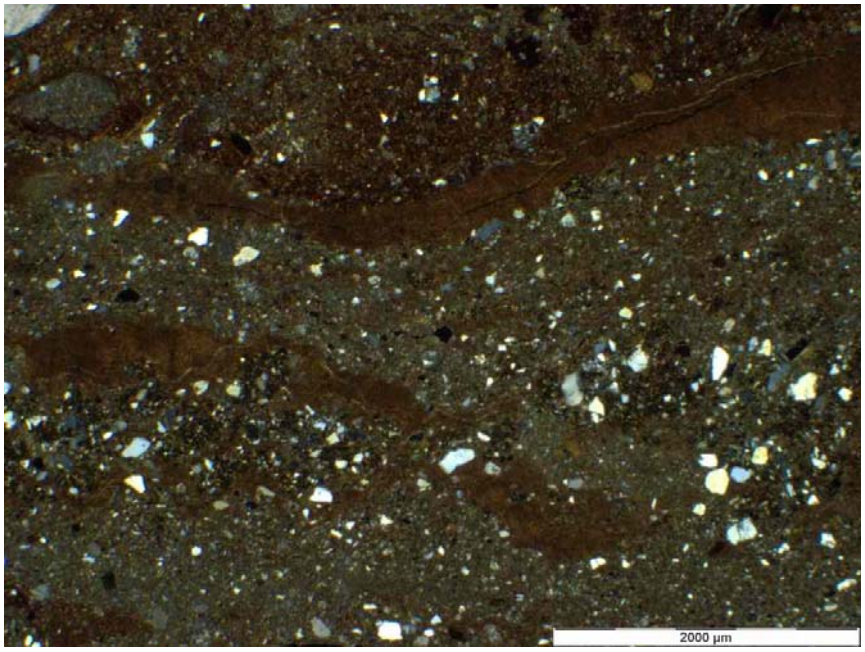


Plate 22: Sample K5, clay and coarse mineral layers (XPL)

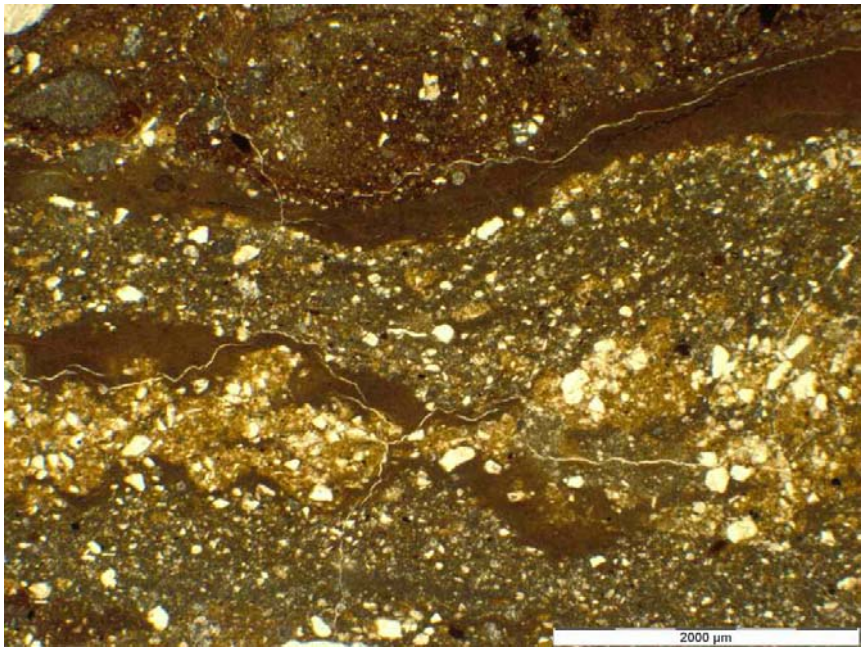


Plate 23: Sample K5, clay and coarse mineral layers (PPL)

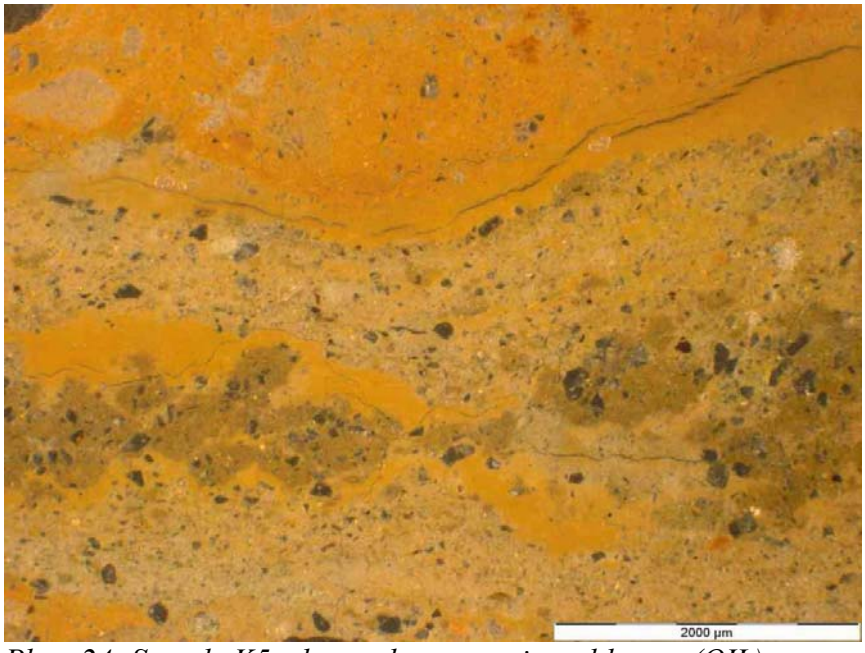


Plate 24: Sample K5, clay and coarse mineral layers (OIL)

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APPENDICES

APPENDIX 1: RADIOCARBON DATES FROM THE S. DYKE AND BECCA BANKS

Lab Code	Context	Material	δ13C relative to VPDB	C14 Date*	Calibrated Dates **
SUERC-24490	Single fill in pit *118*	Charcoal	-24.30‰	2400±30	68.2% probability 510-400 BC 95.4% probability 740-690 BC (8.2%) 660-650 BC (1.2%) 550-390 BC (85.9%)
SUERC-24493	Lower fill in South Dyke ditch	Sheep/goat tibia	-22.30‰	2180±30	68.2% probability 360-280 BC (44.7%) 240-190 BC (23.5%) 95.4% probability 370-160 BC
SUERC-30350	Middle fill in South Dyke ditch	Charcoal	-27.30‰	2110±35	68.2% probability 190-90 BC (62.7%) 70-50 BC (5.5%) 95.4% probability 350-320 BC (3.8%) 210-40 BC (91.6%)
SUERC-24492	Upper fill in South Dyke ditch	Hazel nut	-25.50‰	2110±30	68.2% probability 180-90 BC (64.1%) 70-60 BC (4.1 %) 95.4% probability 210-40 BC
SUERC-21056	Upper fill in South Dyke ditch	Charcoal	-22.50‰	2120±30	68.2% probability 200-100 BC (68.2%) 95.4% probability 350-320 BC (4.7%) 210-40 BC (90.7%)
SUERC-24494	Lower fill in ditch ***196***	Cattle skull	-21.30‰	2020±30	68.2% probability 50 BC-AD 25 95.4% probability 110 BC-AD 60
SUERC-24491	Lower fill in ditch ***196***	Charcoal	-27.40‰	2075±30	68.2% probability 160-130 BC (14.6%) 120-40 BC (53.6%) 95.4% probability 180 BC-AD 0
SUERC-30349	Upper fill in ditch ***196***	Red deer antler	-21.40‰	1725±35	68.2% probability AD 250-380 95.4% probability AD 230-410
SUERC-24501	Buried soil ***788***	Hazel nutshell	-24.60‰	2250±30	68.2% probability 390-350 BC (26.1%) 290-230 BC (42.1%) 95.4% probability 400-340 BC (32%) 320-200 BC (63.4%)
SUERC-24502	Buried soil ***788***	Plant tubers	-26.30‰	2015±30	68.2% probability 50 BC-AD 25 95.4% probability 100 BC-AD 70
SUERC-24495	Lower fill in ditch ***776***	Hazel nutshell	-24.90‰	2610±30	68.2% probability 810-780 BC 95.4% probability 830-760 BC
SUERC-24500	Lower fill in pit *418*	Cereal grains	-23.00‰	1245±30	68.2% probability AD 680-780 (60.4%) AD 790-810 (7.8%) 95.4% probability AD 680-870
SUERC-21055	Lower fill in pit *416*	Charcoal	-27.20‰	1090±30	68.2% probability AD895-920 (23.5%) AD940-990 (44.7%) 95.4% probability AD890-1020
SUERC-24496	Upper fill in Becca Banks ditch	Plant tuber	-23.50‰	1155±30	68.2% probability AD 780-790 (2.1%) AD 810-900 (40.1%) AD 910-970 (26%) 95.4% probability AD 770-980

* The above ^{14}C age is quoted in conventional years BP (before AD 1950). The error, which is expressed at one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.
** The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal v 3.10)

APPENDIX 2: OASIS DATA COLLECTION FORMS

Printable version

The South Dyke OASIS data collection form: OASIS ID: networka2-119279

Project details	
Project name	Asselby to Pannal Pipeline: Excavations on the Aberford Dykes
Short description of the project	An archaeological excavation was carried out on the South Dyke, a linear bank-and-ditch monument forming part of the scheduled Aberford Dykes complex, in advance of the construction of a gas pipeline. A 15m-long section of the South Dyke was excavated, along with various adjacent features and deposits. Results reveal that the South Dyke was pre-dated by a group of Iron Age pits found on its northern side. The evidence indicates that the South Dyke was mid-Iron Age in inception, and was probably constructed as a civil or agricultural boundary marker. A double-ditched enclosure was appended to the South Dyke at the point where the pipeline intersected it. This enclosure seems to have been occupied in the late Roman period, as finds of this date were relatively abundant. The recent investigations on the Aberford Dykes now allow them to be better understood. The Aberford Dykes are commonly referred to as a system of monuments, but they lack unity of design, and instead should be seen as a series of earthworks of varied appearance and purpose that developed over a long period.
Project dates	Start: 06-08-2007 End: 10-09-2007
Previous/future work	Yes / No
Any associated project reference codes	ASP 06 South Dyke - Sitecode
Any associated project reference codes	SM 31520 - SM No.
Any associated project reference codes	54517 - NMR No.
Type of project	Recording project
Site status	Scheduled Monument (SM)
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	BOUNDARY DITCH Middle Iron Age
Monument type	ENCLOSED FIELD SYSTEM Roman
Monument type	PIT ALIGNMENT Iron Age

The South Dyke OASIS data collection form: OASIS ID: networka2-119279

Significant Finds	POT Roman
Significant Finds	POT BOILER Iron Age
Significant Finds	COIN Roman
Significant Finds	BROOCH Roman
Significant Finds	ANIMAL REMAINS Roman
Significant Finds	ANIMAL REMAINS Iron Age
Significant Finds	QUERN Iron Age
Significant Finds	SPINDLE WHORL Iron Age
Significant Finds	LOOMWEIGHT Iron Age
Investigation type	'Full excavation','Open-area excavation','Systematic Field Walking','Systematic Metal Detector Survey'
Prompt	Scheduled Monument Consent

Project location

Country	England
Site location	NORTH YORKSHIRE SELBY SAXTON WITH SCARTHINGWELL The South Dyke
Postcode	LS25 3DT
Study area	0.04 Hectares
Site coordinates	SE 44345 37688 53.8333446275 -1.326107540390 53 50 00 N 001 19 33 W Point
Height OD / Depth	Min: 44.00m Max: 45.00m

Project creators

Name of Organisation	Network Archaeology Ltd
Project brief originator	English Heritage/Department of Environment
Project design originator	Network Archaeology Ltd
Project director/manager	Chris Taylor
Project supervisor	Patrick Daniel

The South Dyke OASIS data collection form: OASIS ID: networka2-119279

Type of sponsor/funding body	Developer
Name of sponsor/funding body	National Grid
Project archives	
Physical Archive recipient	Yorkshire Museum
Physical Contents	'Animal Bones','Ceramics','Worked bone','Worked stone/lithics'
Digital Archive recipient	Yorkshire Museum
Digital Contents	'other'
Paper Archive recipient	Yorkshire Museum
Paper Contents	'Survey','other'
Paper Media available	'Context sheet','Drawing','Map','Photograph','Plan','Report','Section','Survey '
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Aberford to Pannal Natural Gas Pipeline: The South Dyke Preliminary Excavation Report.
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Report Number 542.
Date	2007
Issuer or publisher	Unpublished
Place of issue or publication	Unpublished
Description	Short, spiral bound A4 report produced immediately upon completion of fieldwork. Copies supplied to English Heritage and N Yorks and W Yorks HER

The South Dyke OASIS data collection form: OASIS ID: networka2-119279

Project bibliography 2

Publication type	Grey literature (unpublished document/manuscript)
Title	Aberford to Pannal Natural Gas Pipeline. The South Dyke and Becca Banks: Archaeological Assessment
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Report Number 552
Date	2010
Issuer or publisher	Network Archaeology Ltd
Place of issue or publication	Unpublished
Description	Spiral-bound A4 post-excavation assessment report of c. 100 pages containing description of excavation results and specialist assessment of artefacts and environmental remains. The report was issued to English Heritage and W Yorks and N Yorks HERs.

Project bibliography 3

Publication type	Grey literature (unpublished document/manuscript)
Title	Asselby to Panal Natural Gas Pipeline: The South Dyke and Becca Banks: Archaeological Report
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Rep No. 590
Date	2012
Issuer or publisher	Network Archaeology Ltd
Place of issue or publication	Unpublished
Description	Client report of c. 100 A4 spiral-bound pages containing: excavation data; specialist analysis of the artefacts and environmental samples; full results of radiocarbon dating; and a discussion of the monuments. Plates, figures, tables, appendices etc. This text formed the basis of Network Archaeology's submission to the monograph to be produced by Oxford Archaeology North which will present the results from the archaeological investigations along the rest of the Asselby to Pannal pipeline.

Project bibliography 4

A forthcoming report

The South Dyke OASIS data collection form: OASIS ID: networka2-119279

Publication type	
Title	Exploring the Early Landscapes of West and North Yorkshire [Provisional Title]. Archaeological Investigation along the Asselby to Pannal Natural Gas Pipel
Author(s)/Editor(s)	Gregory, R A, Daniel, P and Brown, F
Date	2012
Issuer or publisher	Lancaster Imprints
Place of issue or publication	Lancaster
Description	Bound colour monograph (currently in prep.)
Entered by	Patrick Daniel (patrickd@netarch.co.uk)
Entered on	14 February 2012

OASIS DATA COLLECTION FORM: England

Becca Banks OASIS data collection form: OASIS ID: networka2-119295

Project details	
Project name	Asselby to Pannal Pipeline: Excavations on the Aberford Dykes
Short description of the project	An archaeological excavation was carried out on Becca Banks, a linear bank-and-ditch monument forming part of the scheduled Aberford Dykes complex, in advance of the construction of a gas pipeline. A 22m-long section of Becca Banks was investigated. A ditch, a post hole alignment, and an extensive buried soil were found sealed beneath the monument bank. Environmental remains suggest that prior to the construction of Becca Banks the local habitat was pastoral grassland with some areas of shaded scrub. Becca Banks seems to have been built in the late pre-Roman Iron Age as a physical manifestation of the authority of native rulers. At some point after the construction of the monument, part of the bank and the hillside on which it sat on collapsed back into the ditch. Little evidence was recorded of re-use at Becca Banks, although Iron Age land boundaries seem to have persisted into the Roman period. Two early medieval pits reveal cereal cultivation and crop rotation were undertaken here. Becca Banks ditch was not fully infilled until the 19th century. In the mid-20th century the monument, and the field boundary it had hitherto marked, were destroyed. The recent investigations on the Aberford Dykes now allow them to be better understood. The Aberford Dykes are commonly referred to as a system of monuments, but they lack unity of design, and instead should be seen as a series of earthworks of varied appearance and purpose that developed over a long period.
Project dates	Start: 19-02-2008 End: 19-05-2008
Previous/future work	Yes / No

Becca Banks OASIS data collection form: OASIS ID: networka2-119295

Any associated project reference codes	ABD - Sitecode
Any associated project reference codes	31519 - SM No.
Type of project	Recording project
Site status	Scheduled Monument (SM)
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	BOUNDARY DITCH Late Iron Age
Monument type	BOUNDARY BANK Late Iron Age
Monument type	POST ALIGNMENT Iron Age
Monument type	DITCH Iron Age
Monument type	DITCH Roman
Monument type	DITCH Post Medieval
Monument type	BURIED SOIL HORIZON Late Prehistoric
Monument type	BURIED SOIL HORIZON Modern
Monument type	CORN DRYING OVEN Early Medieval
Significant Finds	POT Roman
Significant Finds	POT Medieval
Significant Finds	POT Post Medieval
Significant Finds	POT Modern
Significant Finds	ANIMAL REMAINS Roman
Significant Finds	ANIMAL REMAINS Post Medieval
Investigation type	'Full excavation','Open-area excavation','Systematic Field Walking','Systematic Metal Detector Survey','Watching Brief'
Prompt	Scheduled Monument Consent

Project location

Becca Banks OASIS data collection form: OASIS ID: networka2-119295

Country	England
Site location	WEST YORKSHIRE LEEDS ABERFORD Becca Banks
Postcode	LS25 3AG
Study area	0.09 Hectares
Site coordinates	SE 44225 38135 53.8373726454 -1.327866660840 53 50 14 N 001 19 40 W Point
Height OD / Depth	Min: 49.50m Max: 54.00m

Project creators

Name of Organisation	Network Archaeology Ltd
Project brief originator	English Heritage/Department of Environment
Project design originator	Network Archaeology Ltd
Project director/manager	Chris Taylor
Project supervisor	Patrick Daniel
Type of sponsor/funding body	Developer
Name of sponsor/funding body	National Grid

Project archives

Physical Archive recipient	Leeds Museum
Physical Contents	'Animal Bones','Ceramics'
Digital Archive recipient	Leeds Museum
Digital Contents	'other'
Paper Archive recipient	Leeds Museum
Paper Contents	'Survey'

Becca Banks OASIS data collection form: OASIS ID: networka2-119295

Paper Media available	'Context sheet','Drawing','Map','Photograph','Plan','Report','Section','Survey '
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Network Archaeology Ltd, 2008. Aberford to Pannal Natural Gas Pipeline: Becca Banks Preliminary Excavation Report.
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Report Number 548.
Date	2008
Issuer or publisher	Network Archaeology Ltd
Place of issue or publication	Unpublished
Description	Short, spiral bound A4 report produced immediately upon completion of fieldwork. Copies supplied to English Heritage and N Yorks and W Yorks HER
Project bibliography 2	
Publication type	Grey literature (unpublished document/manuscript)
Title	Aberford to Pannal Natural Gas Pipeline. The South Dyke and Becca Banks: Archaeological Assessment
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Report Number 552
Date	2010
Issuer or publisher	Network Archaeology Ltd
Place of issue or publication	Unpublished
Description	Spiral-bound A4 post-excavation assessment report of c. 247 pages containing description of excavation results and specialist assessment of artefacts and environmental remains. The report was issued to English Heritage and W Yorks and N Yorks HERs.
Project bibliography 3	

Becca Banks OASIS data collection form: OASIS ID: networka2-119295

Publication type	Grey literature (unpublished document/manuscript)
Title	Asselby to Panal Natural Gas Pipeline: The South Dyke and Becca
Author(s)/Editor(s)	Daniel, P
Other bibliographic details	NAL Rep No. 590
Date	2012
Issuer or publisher	Network Archaeology Ltd
Place of issue or publication	Unpublished
Description	Client report of c. 110 A4 spiral-bound pages containing: excavation data; specialist analysis of the artefacts and environmental samples; full results of radiocarbon dating; and a discussion of the monuments. Plates, figures, tables, appendices etc. This text formed the basis of Network Archaeology's submission to the monograph to be produced by Oxford Archaeology North which will present the results from the archaeological investigations along the rest of the Asselby to Pannal pipeline.

Project bibliography 4

Publication type	A forthcoming report
Title	Exploring the Early Landscapes of West and North Yorkshire [Provisional Title]. Archaeological Investigation along the Asselby to Pannal Natural Gas Pipeline
Author(s)/Editor(s)	Gregory, R A, Daniel, P and Brown, F
Date	2012
Issuer or publisher	Lancaster Imprints
Place of issue or publication	Lancaster
Description	Bound colour monograph (currently in prep.)

Entered by	Patrick Daniel (patrickd@netarch.co.uk)
Entered on	14 February 2012

APPENDIX 3: REPORT ON THE CONSERVATION OF THE SMALL FINDS

by Nyssa Mildwaters (York Archaeological Trust Conservation Laboratories)

Introduction

This report describes the investigation and conservation of six small finds from the Aberford Dykes (site codes ASP and ABD) for Network Archaeology. As per the client's wishes, the finds were X-rayed producing a single X-ray plate (X7161). Small finds (SF) 164, 177, 197 and 328 where fully cleaned and where necessary stabilised. Investigative cleaning, revealing two cross sections, was also undertaken with regard to SF 223. Finally the shale fragments from context 543 were sent to Jennifer Jones at Durham University for material identification. Following conservation all finds were repackaged using appropriate archival material for return.

Condition and treatment

SF 164: Cu al Coin

Upon arrival, the coin appeared to be in a relatively good condition. The coin had a light covering of soil obscuring both sides of the coin and any underlying surface decoration. In addition to the soil present a number of small chips were visible around the edge of the coin although none appeared fresh. There were no signs of active corrosion visible. The coin's X-ray showed an uneven and pitted core with areas of relatively little metal remaining. However faint surface decoration was visible, if indecipherable.

The coin was cleaned of the surface soil as well as some light surface corrosion using a combination of Industrial Methylated Spirits (IMS) and a scalpel under magnification. Cleaning also revealed surface decoration surviving on both sides of the coin. The decoration appears to consist of a left facing standing figure possibly holding a harp or other object in its left hand, with lettering around the edge, the reverse shows a right facing bust with the remains of very faint and essentially indecipherable lettering round the edges. Further information regarding the surface decoration and potentially the date of the coin may be gained from showing the coin to a specialist. Although the majority of the coin's surface was relatively smooth and even the bust side of the coin had a circular area of surface loss towards one edge. As the surface exposed by this damage was quite fragile and prone to crumbling it was necessary to consolidate the area of surface loss using a 5% w/v solution of Paraloid B72® (methyl methacrylate co-polymer) in acetone which was applied using a brush. The following photographs show the coin before and after conservation.

SF 177: Cu al Brooch

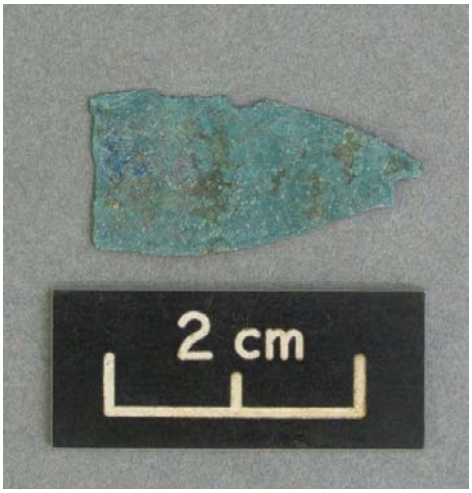
Upon arrival, the brooch appeared to be in a relatively poor condition with several areas of surface loss as well as active corrosion visible. In addition to this there was a light covering of soil across the surface of the object. In some areas the surface losses had exposed the underlying Cuprite and in virtually all cases the edges of the areas of loss shows signs of active corrosion and were extremely fragile and prone to further crumbling and surface loss. Although the areas of surface loss were present across the brooch as a whole they were noticeably more numerous on the upper curved side of the brooch. The X–ray of the brooch showed a reasonable metallic core remaining. Pitting and unevenness were, however, clearly visible.

The fragment was cleaned of the existing surface soil and corrosion products using a combination of Industrial Methylated Spirits (IMS) and a scalpel under magnification. As much as possible of the loose and active corrosion was removed, it was not feasible to remove all the corrosion present as this would have undermined the surviving surface of the brooch. In order to stabilise the brooch it was treated with the corrosion inhibitor Benzotriazole (BTA) using a 3% w/v aqueous solution, and subsequently coated with two applications of a 10% v/v solution of Incralac® in toluene with added Santocel® matting agent (this solution also contains traces of BTA). Upon completion the brooch appeared both physically and chemically stable. The following photographs show the brooch before and after conservation.

SF 197: Cu al Fragment

Upon arrival the fragment appeared to be in a relatively good condition. There was a light covering of soil present as well as several chips and losses around the edges of the fragment. The fragment, which is very thin with some slight undulations visible across its surface, also has a fine crack running approximately half way across its width, the crack appeared stable. However the presence of soil and other corrosion products made it unclear whether consolidation or support would be required. The X-ray of the fragment revealed no image upon the plate indicating that there is no core of metal remaining.

The fragment was cleaned using a combination of Industrial Methylated Spirits (IMS) and a scalpel under magnification. A relatively even smooth surface was revealed with no signs of active corrosion visible. Cleaning also revealed that the fine crack running across the fragment required no consolidation although the object should be carefully handled as some flexing does occur. The following photographs show the fragment before and after conservation.



SF 223: Fe Buckle

Upon arrival the buckle was in a relatively poor condition with extensive cracking visible across both the main fragments. The object was in two main pieces with six further smaller fragments also present. Several loose areas across the surface were also in danger of becoming detached. Spots of active corrosion were visible on the exposed areas where fragments had become detached. In addition to the active corrosion an uneven layer of medium thick corrosion products were present across the buckle's surface. The X-ray showed the object's core to be very uneven and pitted with internal cracking and mineralisation visible.

As agreed, two sections of the buckle's surface were cleaned, using an air abrasive unit with 29 micron aluminium oxide powder. During cleaning an area of the smaller section became detached, and in order to maintain a full cross section, the active corrosion visible on the break edges was removed and the fragment reattached using Paraloid B72 (methyl methacrylate co-polymer) adhesive. Two more of the previously detached fragments were also cleaned and reattached in the same manner, again to provide a complete cross section. Any excess adhesive was removed from the surface using acetone. As the buckle has not been fully cleaned and stabilised there may of course still be some spots of active corrosion present and the object should continue to be kept in the environmental conditions recommended at the end of this report. Further cleaning can also be carried out if desired. The following photographs show the largest buckle fragment before and after partial cleaning.

SF 328: Cu al Coin

Upon arrival the coin appeared to be in a fair to poor condition. There was a very small amount of soil present on both sides, overlying light green powdery corrosion products. There were some spots of potentially active corrosion. The X-ray showed a slightly uneven and pitted core, with no indications of surface decoration remaining.

The coin was cleaned using a combination of Industrial Methylated Spirits (IMS) and a scalpel under magnification. During cleaning it became clear that, as the X-ray suggested, no surface decoration survived on either side of the coin. Although the cleaned coin has an uneven and visually distinctive light green surface, there are no signs of active corrosion present and no need for either consolidation or stabilisation.

The following photographs show the coin before and after conservation.

Context 543: Shale Fragments

Upon arrival the two fragments appeared in a good condition with only a very covering of soil. The fragments share a fresh clean join. Although some small amount of chipping is visible there are no signs of delamination or other deterioration. Visual examination of the fragments indicated a material identification of shale and this identification was confirmed by Jennifer Jones using EDXRF analysis. Please refer to her report below.

EDXRF examination of a fragment from context 543

by Jennifer Jones (Conservation Services, Dept of Archaeology, Durham University)

Surface EDXRF (energy dispersive X-ray fluorescence) analysis was undertaken on an artefact made from a black, jet-like material. Levels of detected elements suggest that the fragment is probably shale.

Methodology

Analyses were carried out at two sites on the front and back of the larger of the two joining fragments. Before analysis, the surfaces were cleaned using a water/industrial methylated spirit/non-ionic detergent mix to remove remaining traces of soil, and then air dried. The EDXRF method used has been formulated to detect the range of major, minor and trace elements used to identify and distinguish between jet, cannel coal, lignite and shale.

Results

The material is not jet. Low levels of detected iron (below 605 parts per million (ppm)) are expected in jet (Pollard 1981), whereas the average iron content found here was 12147ppm, suggesting shale or cannel coal. Levels of all other diagnostic elements, (except zirconium, which lay within the limit for jet) indicate that the material is a non-jet. The presence of traces of copper, manganese, rubidium, phosphorus and lead suggest shale, as do the level of strontium (above 50ppm) and the high level of detected calcium (average 23476ppm). Potassium levels (average 544ppm), however, suggest a cannel coal.

The levels of detected iron and strontium, the presence of the suite of trace elements (Cu, Mn, Rb, P and Pb) and the high levels of detected calcium suggest that, while the identification is not definitive, the material is most probably a shale.

Recommendations

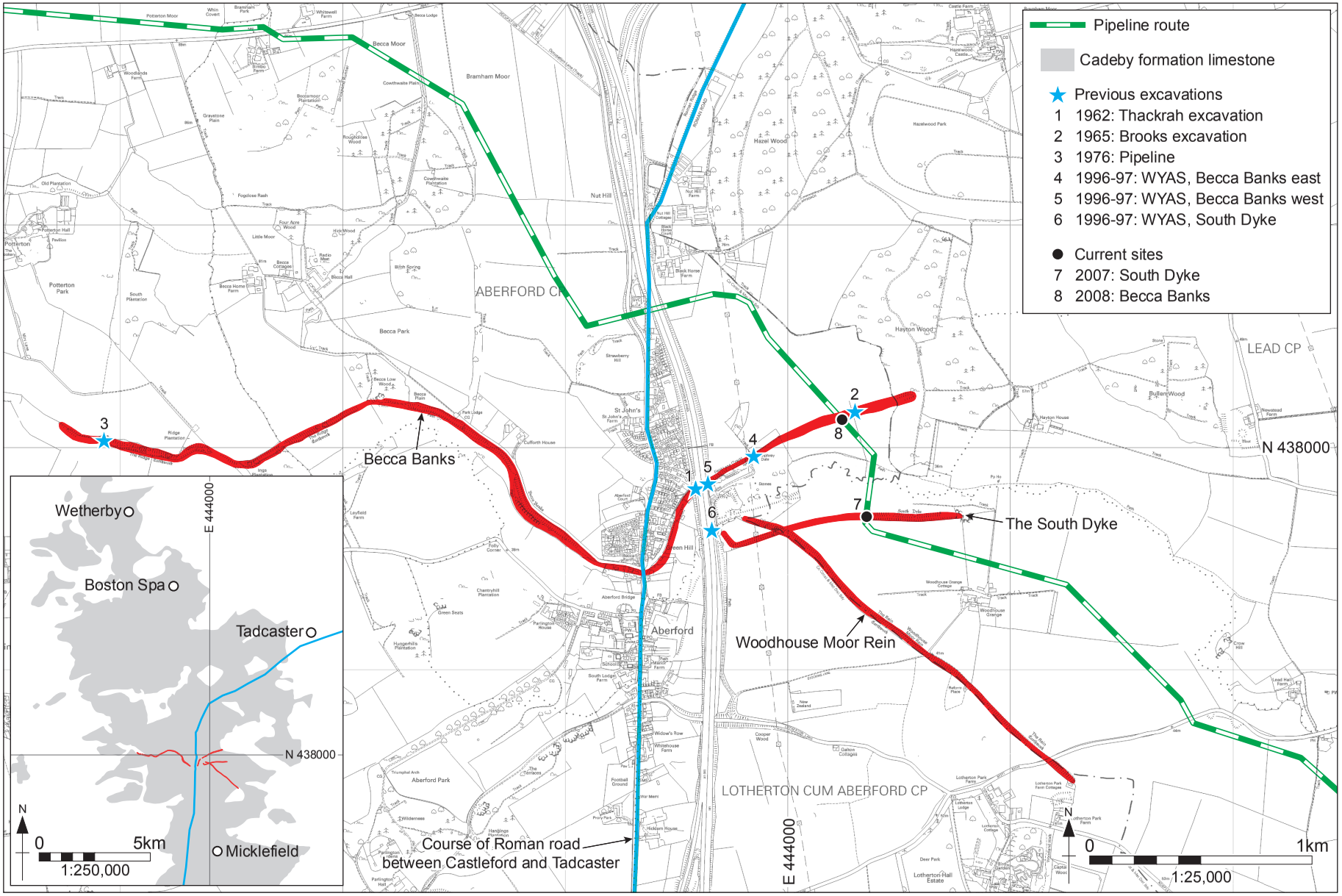
All of the conserved small finds are now suitable for careful handling and display. However in order to avoid further active corrosion the four copper alloy finds (SF 164, 177, 197 and 328) should be kept in a dry environment with a Relative Humidity (RH) of 35% or below. Similarly the iron buckle (SF 223) should be kept in a similarly dry environment although with a RH of 15% or below. In contrast the shale fragments should be stored in an environment with a RH of between 45% and 60%.

Finally it should be noted that the brooch (SF 177) has been treated with Benzotriazole (BTA) which is classified as a potentially hazardous material (limited studies have been shown potentially carcinogenic properties). The brooch should therefore only be handled if wearing gloves.

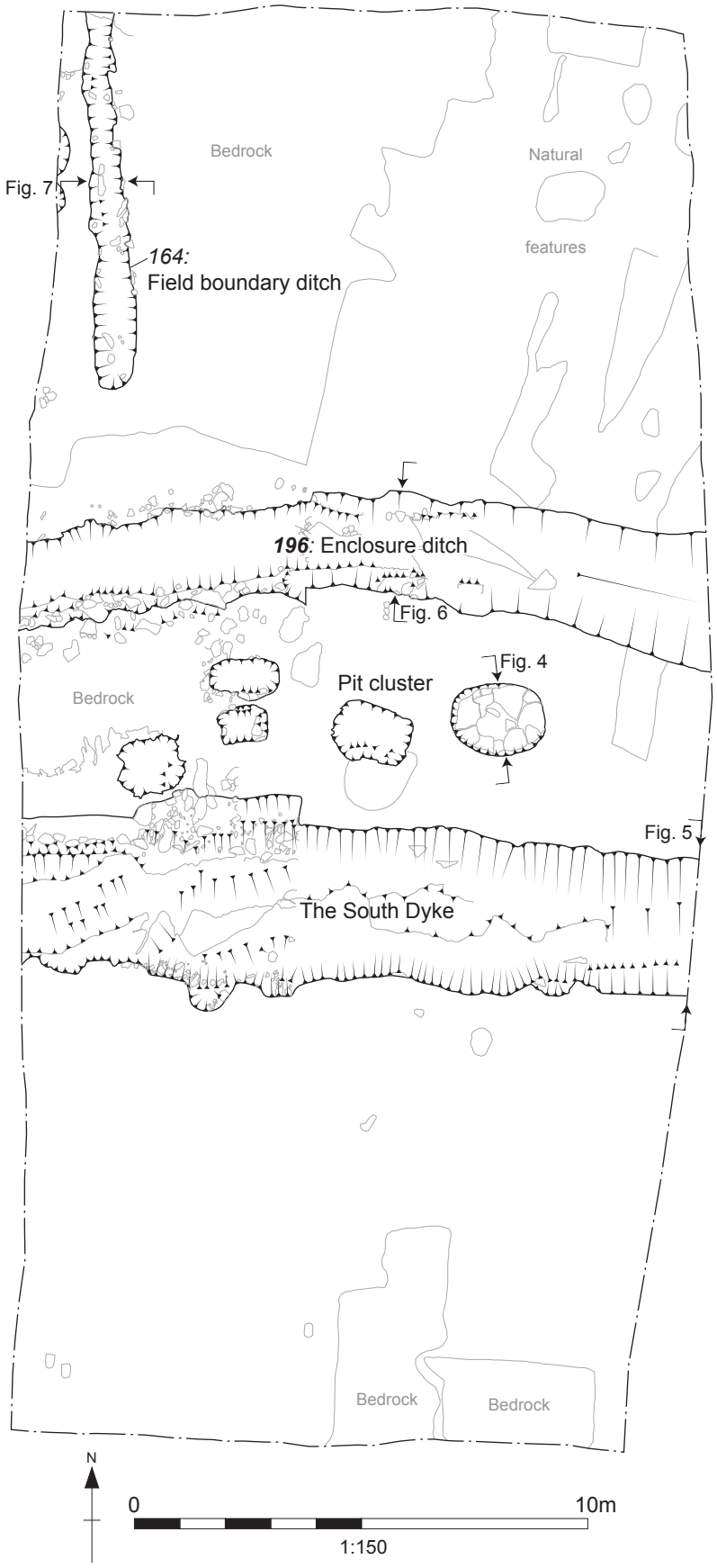
Bibliography

Pollard, A. M. Bussell, G. D. and Baird, D. C. 1981. ‘The analytical investigation of early bronze age jet and jet-like material from Devizes Museum’ in *Archaeometry* 23, 139-167

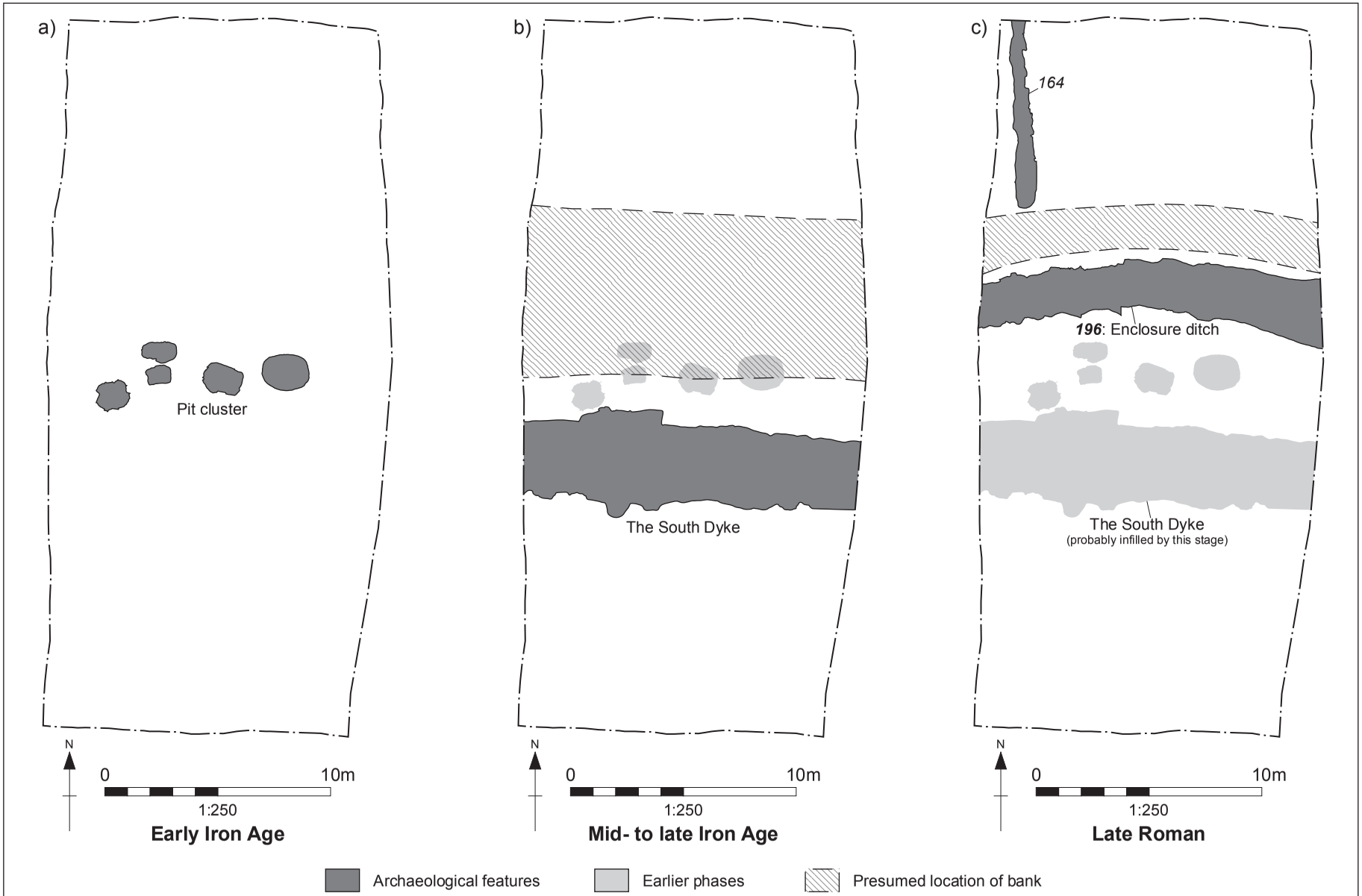
FIGURES 1-17



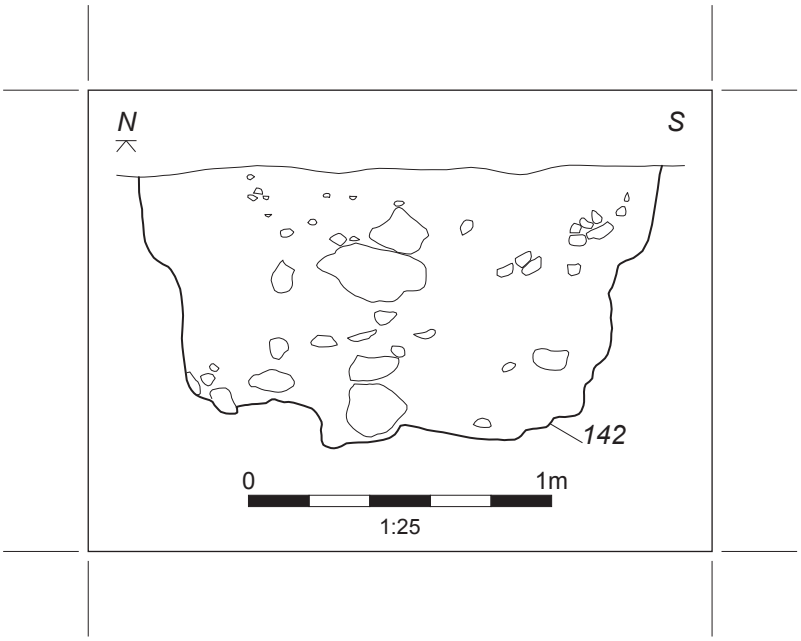
NAL Figure 1: The Aberford Dykes



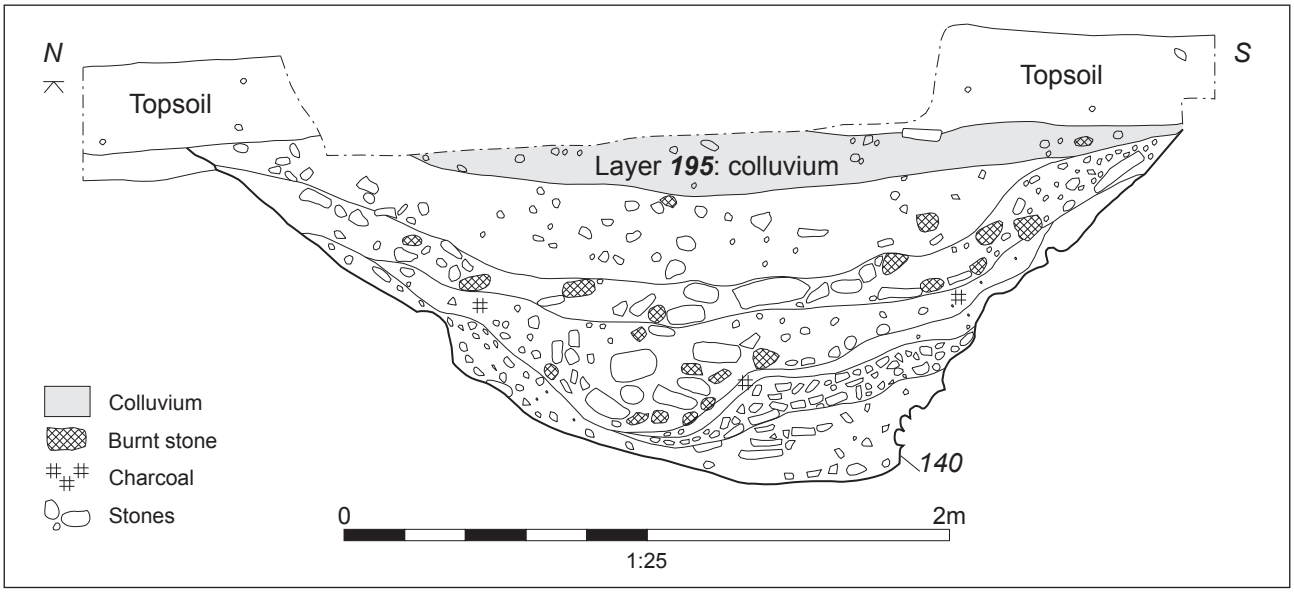
NAL Figure 2: The South Dyke excavation area



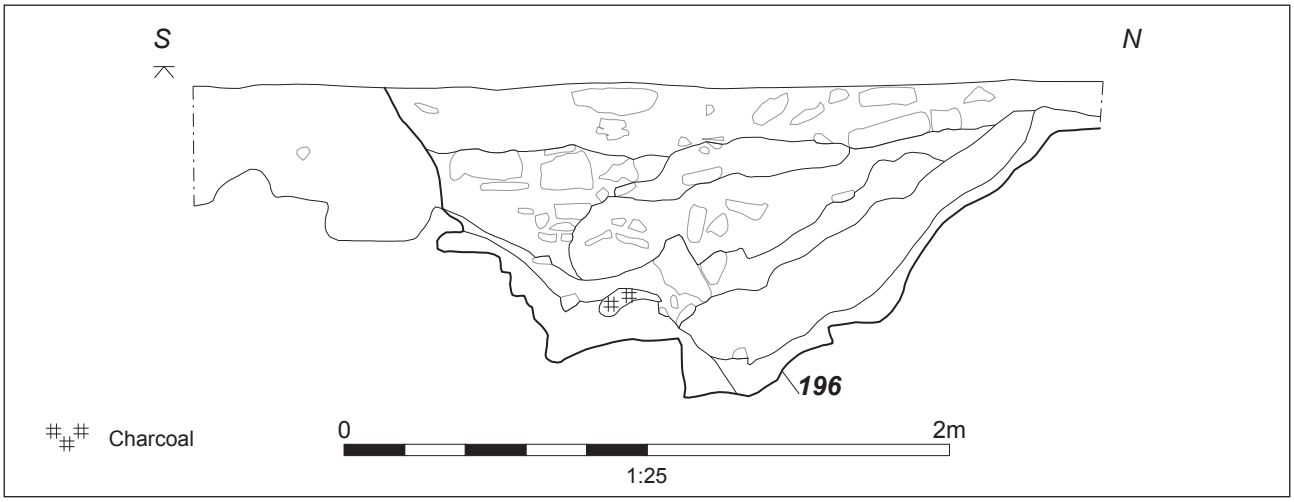
NAL Figure 3: Phase plans of the South Dyke



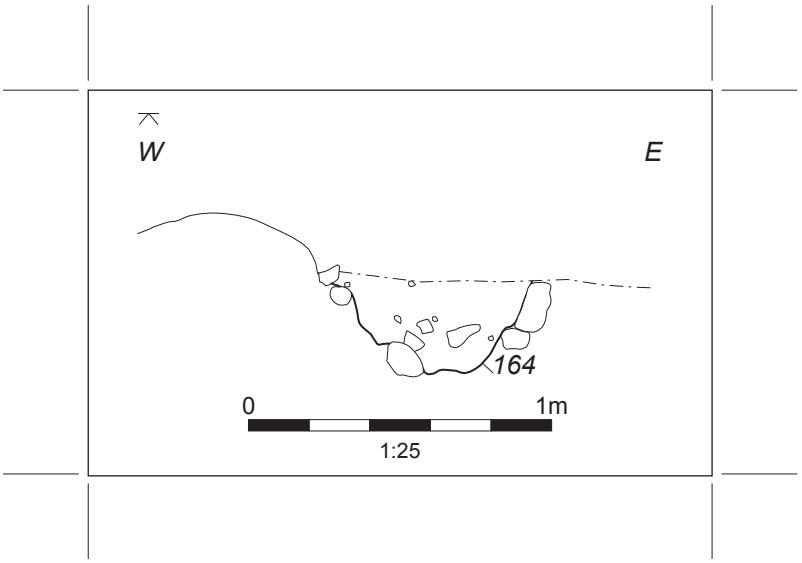
NALFigure 4: Section through pit *142*



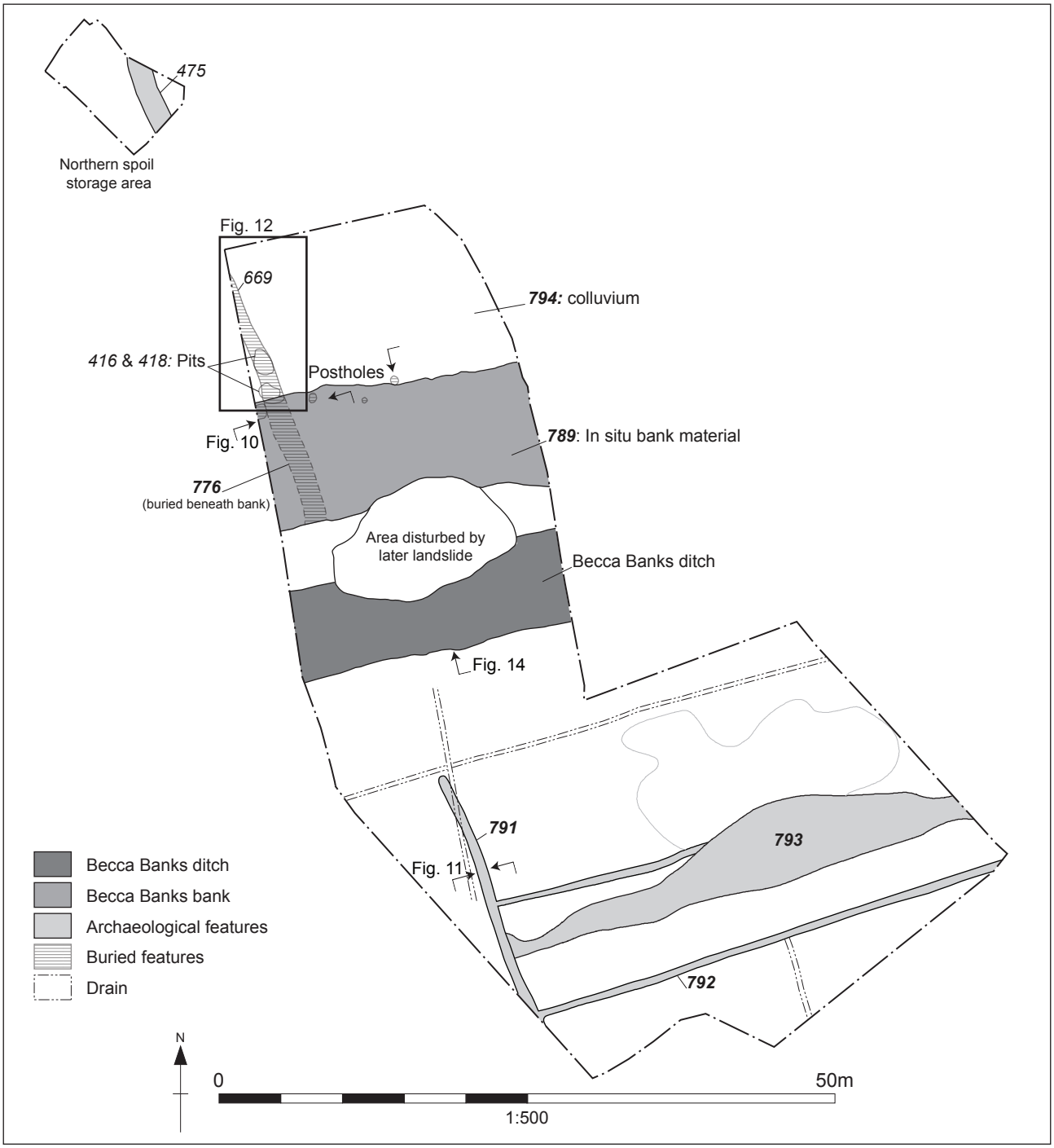
NAL Figure 5: Section through the South Dyke ditch



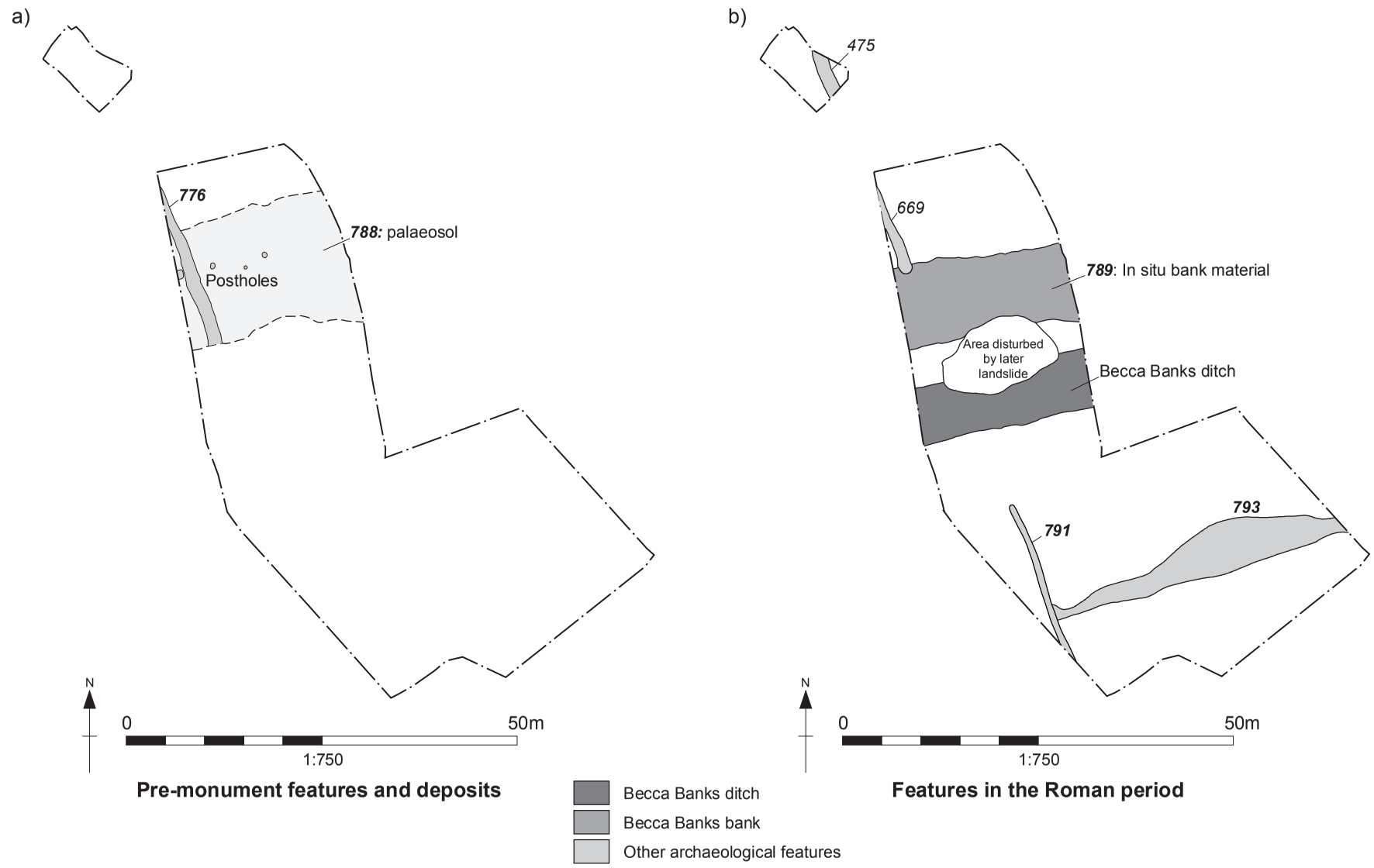
NAL Figure 6: Section through enclosure ditch ***196***



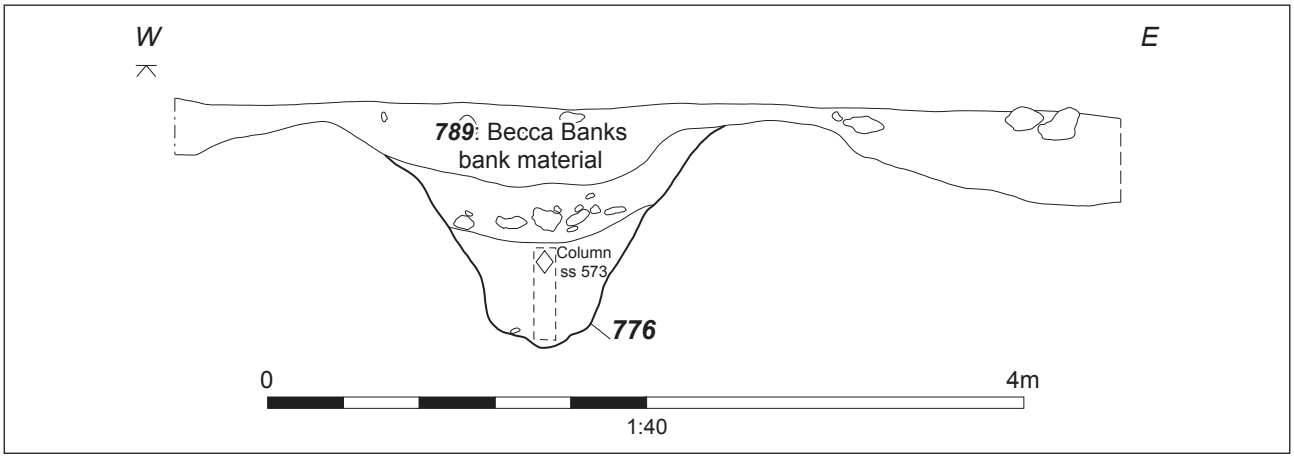
NAL Figure 7: Section through ditch *164*



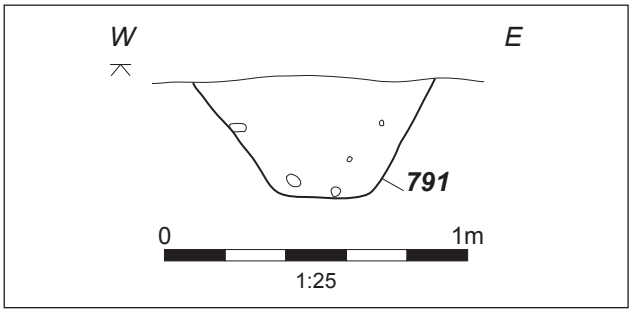
NAL Figure 8: Becca Banks excavation area



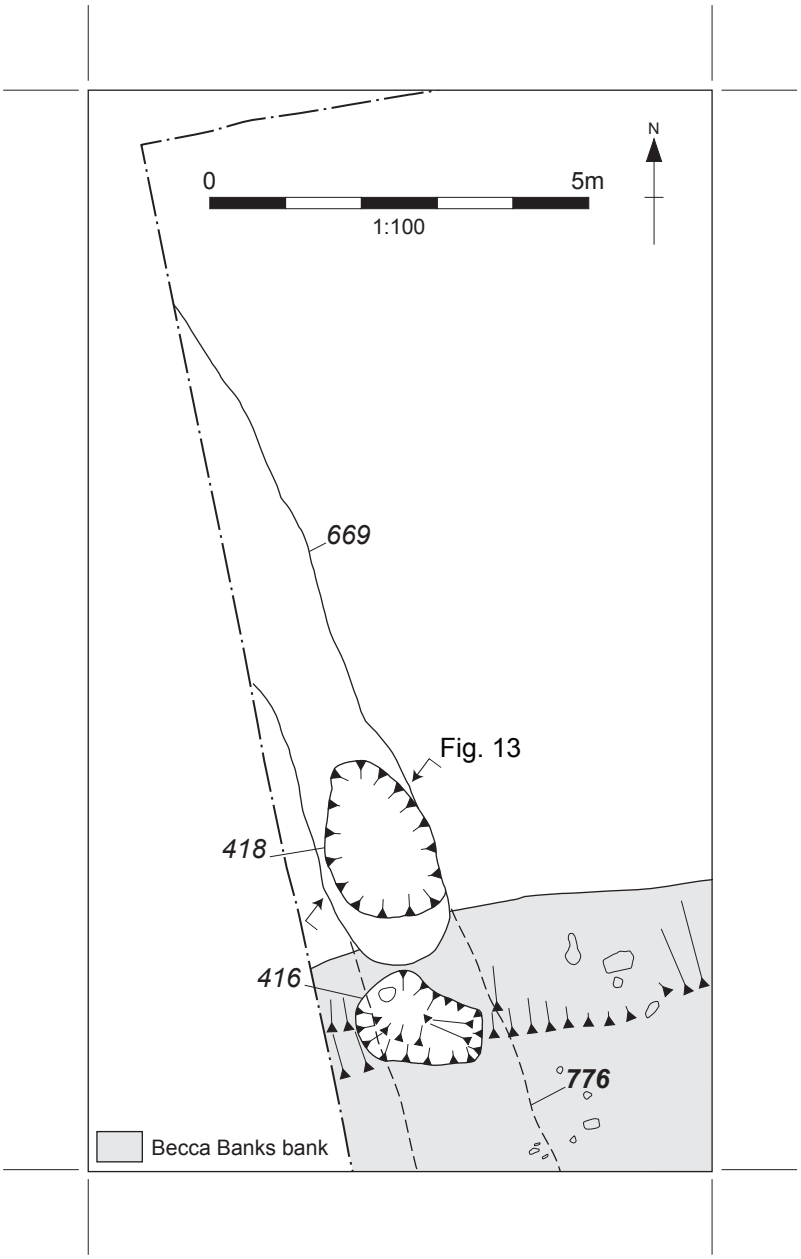
NAL Figure 9: Phase plans of Becca Banks



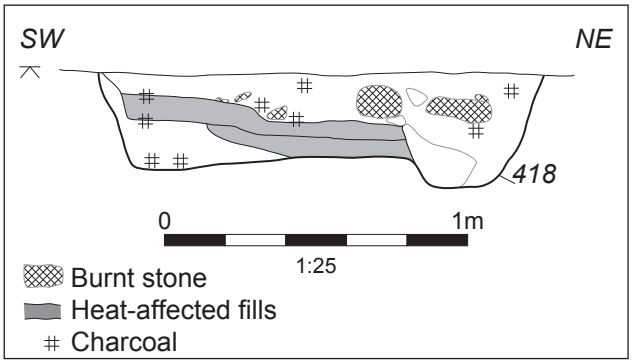
NAL Figure 10: Section through ditch ***776*** and part of monument bank



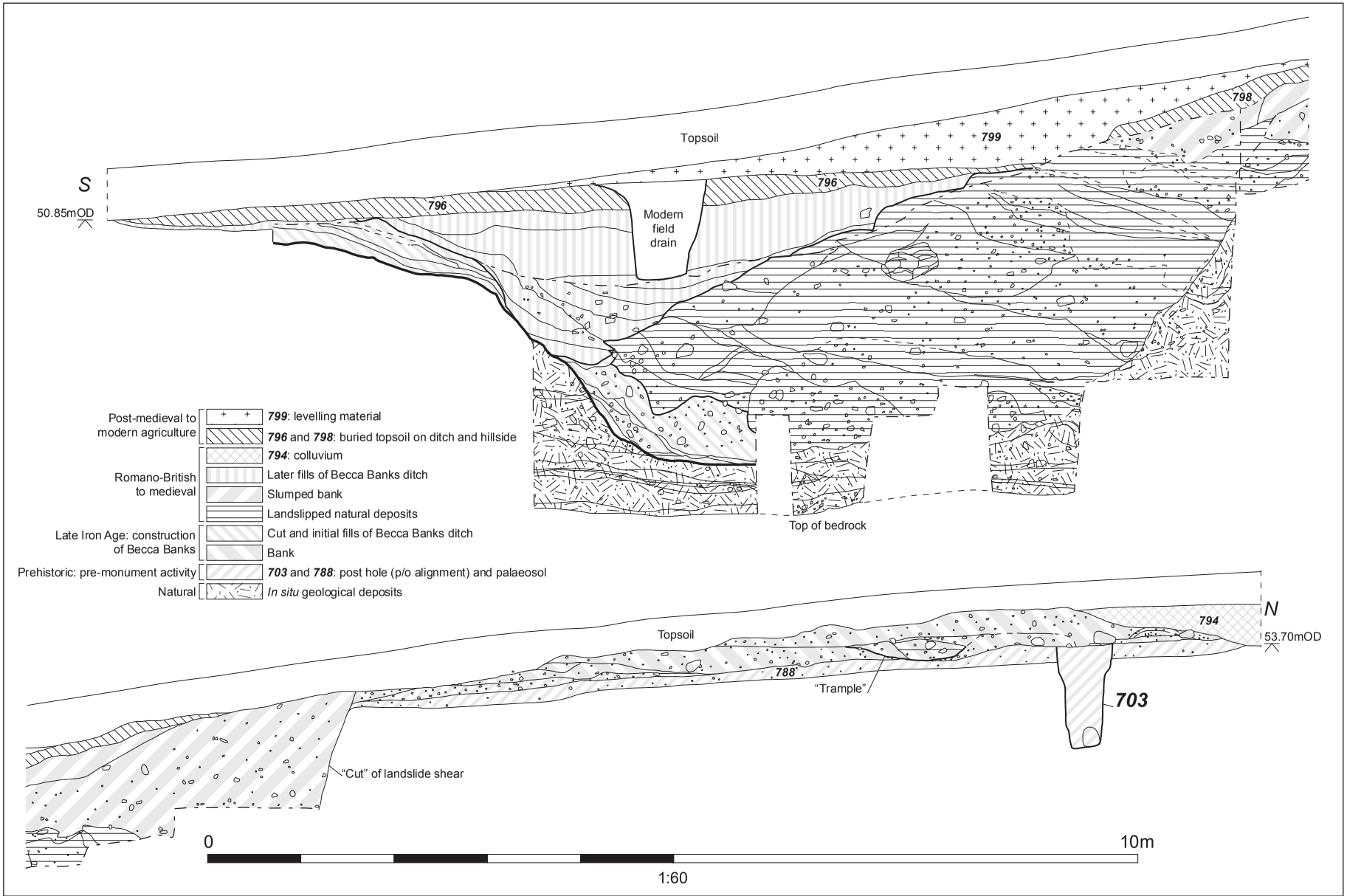
NAL Figure 11: Section through ditch ***791***



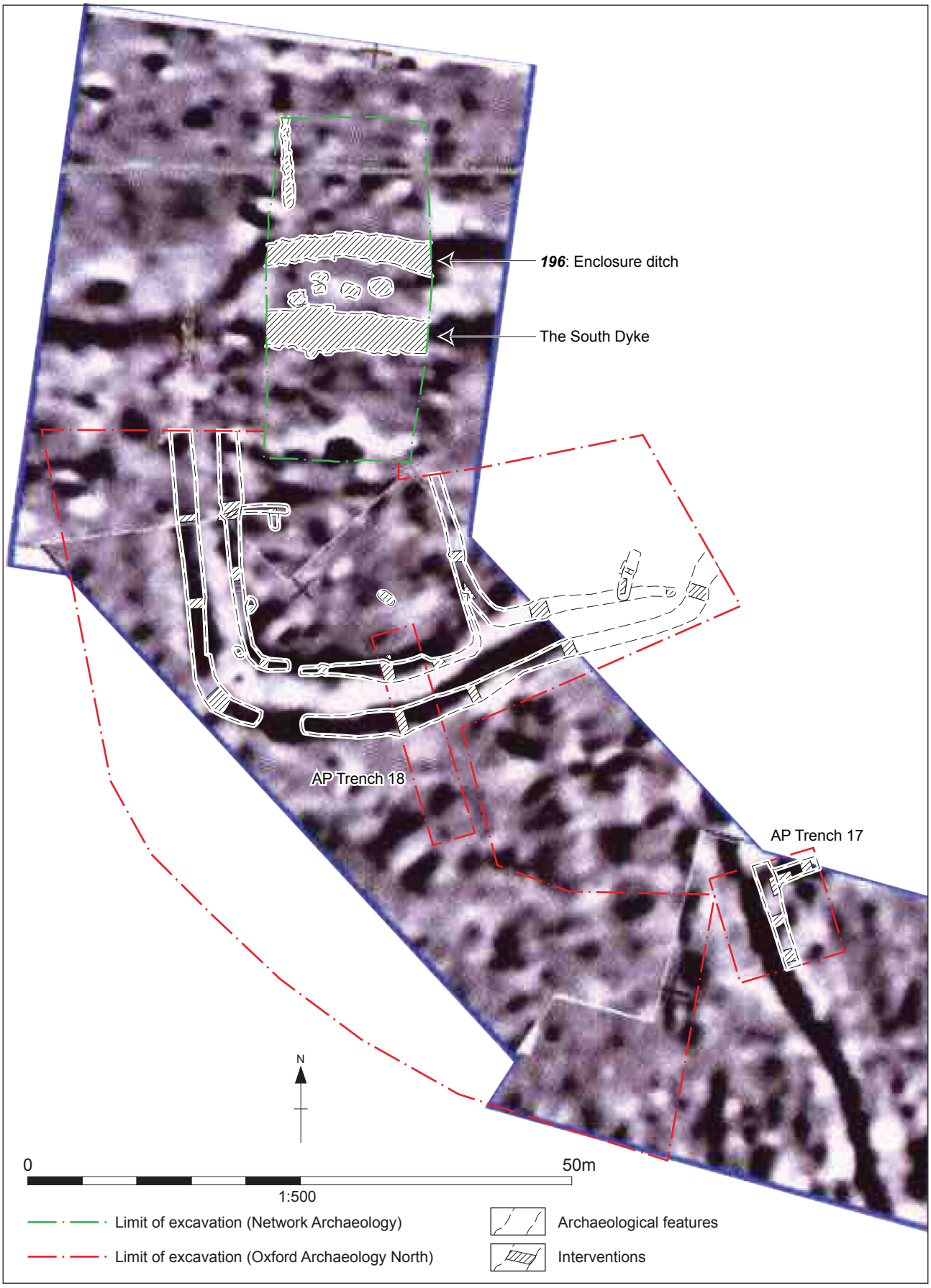
NAL Figure 12: Pits *416* and *418* (exposed following removal of colluvium ***794***)



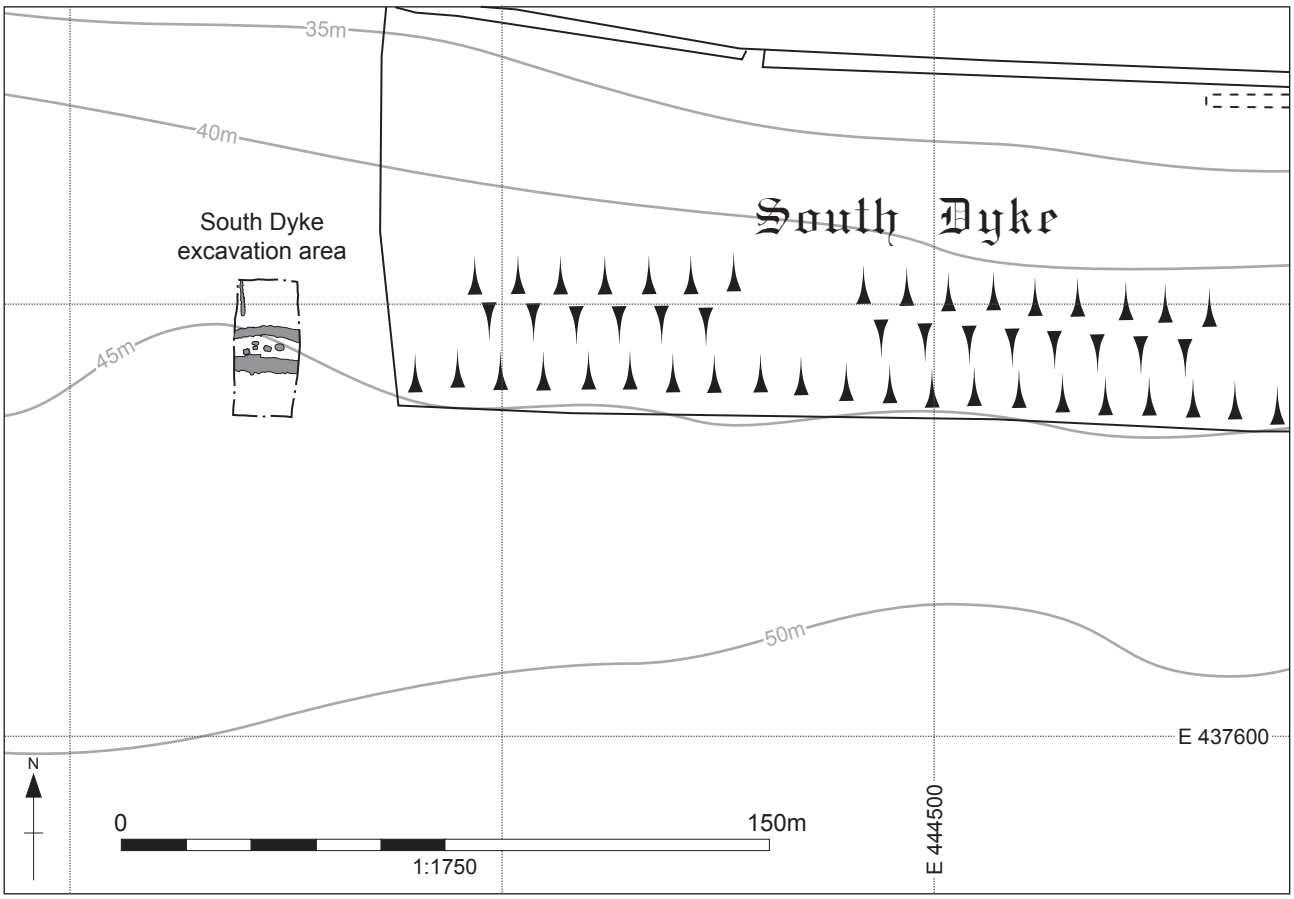
NAL Figure 13: Section through pit *418*



NAL Figure 14: Section through Becca Banks



NAL Figure 15: The enclosure at the South Dyke



NAL Figure 17: South Dyke excavation area in relation to Ordnance Survey mapping of monument