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ORIGINAL VERSION

A Buried Prehistoric Landscape at Barnack

Cambridgeshire County Council

Rural Strategy

A BURIED PREHISTORIC LANDSCSAPE AT BARNACK

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1992

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Report no. 58

Examination of preserved oak circa 15AD from Barnack

cambridgeshire archaeology

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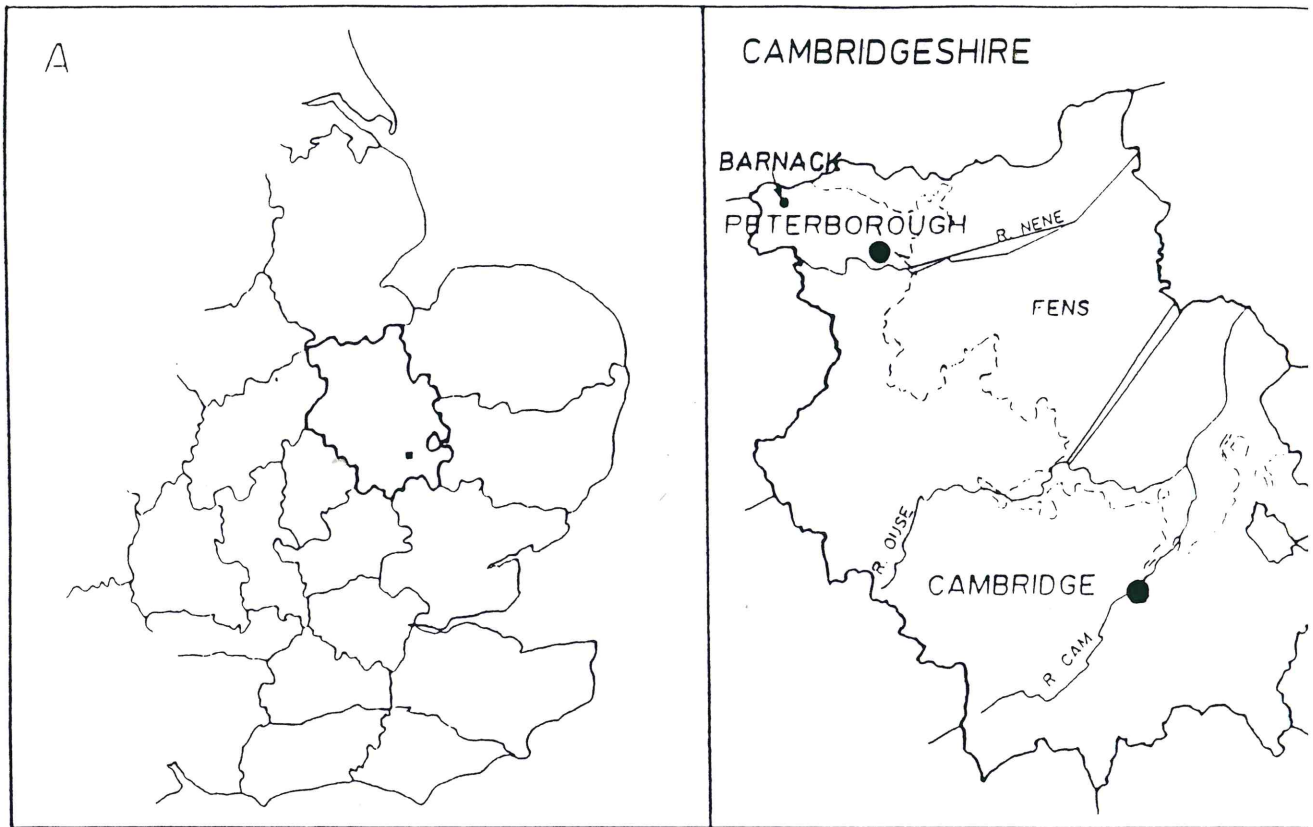

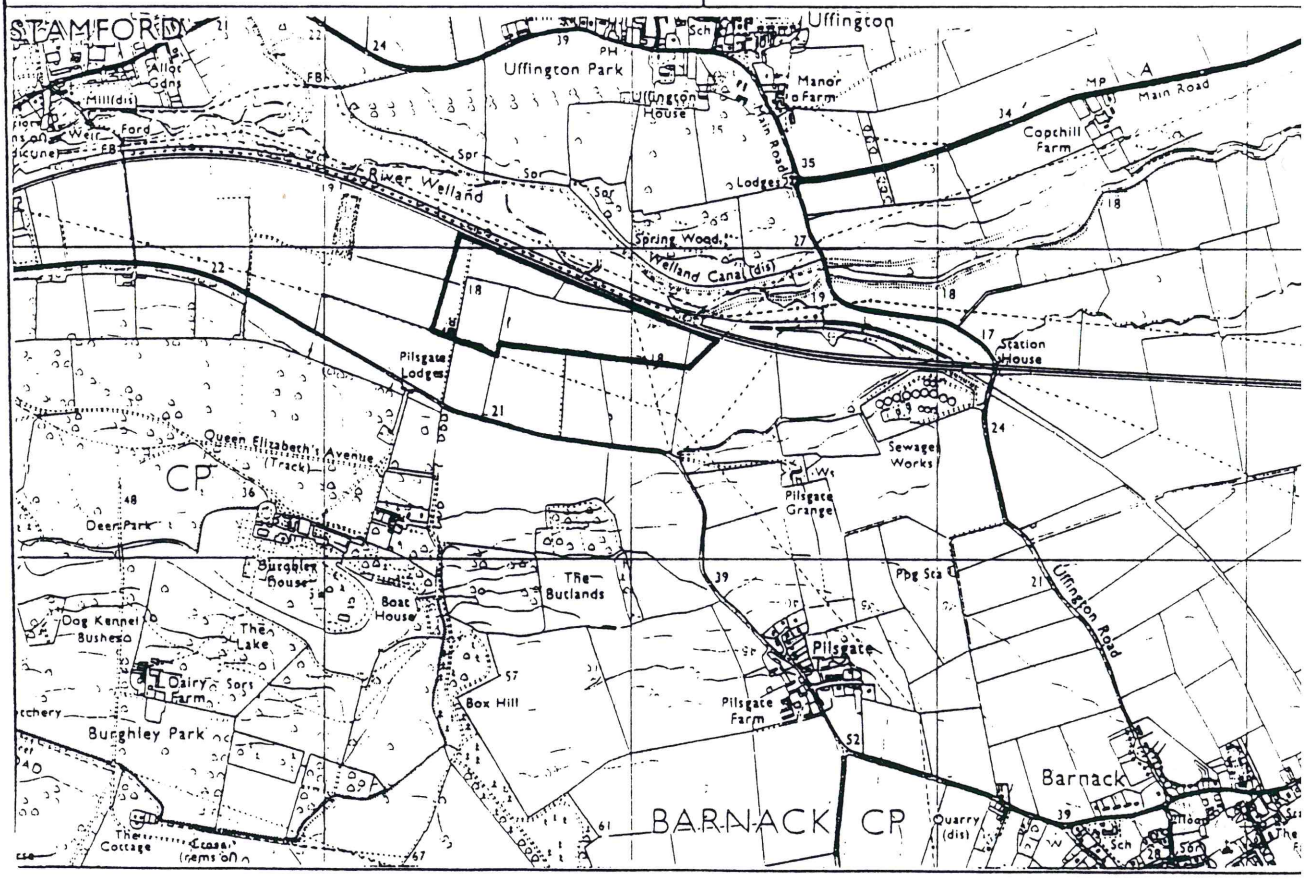

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Fig. 1 Location Map

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Initials R.P.

BARNACK ROAD QUARRY EXTENSION.

TF057 068

1.0 SUMMARY.

1.1 An archaeological evaluation was conducted at Barnack, Cambridgeshire (TF 057 068) by Cambridgeshire County Council Archaeology Section in an area rich in cropmarks and near the site of the Barnack Man Bronze Age burial. Augering and fieldwalking were conducted and test pits were dug, along with a series of seventeen trenches. A rich series of agricultural and ritual features were identified including a hengiform monument, ring-ditches and a late Iron Age/Roman trackway. The most important discovery was the recognition of an extensive late Iron Age/Roman ploughsoil over much of the area.

The features are sealed by a post-Roman alluvium and so are well preserved and a river channel in the east of the site yielded peat including waterlogged wood (radiocarbon dated to AD 15) and clay which will allow environmental research to support the study of the archaeological agricultural and ritual landscapes.

One particular feature, in the section of the present quarry, yielded three human burials which have been radiocarbon dated to the Bronze Age,1908 BC.

2.0 INTRODUCTION.

2.1 An archaeological evaluation was called for when Mineral Surveying Services (acting on behalf of Star Quarries) applied for a licence to extract sand and gravel from arable land owned by Burghley Estates. The area of the application is approximately 32ha centered on TF057 068 (Fig. 1). Consultation of the County Sites and Monuments Record (SMR) showed a number of cropmark features present within the threatened area. A desk top study and field assessment were commissioned from the field side of Cambridgeshire County Council's Archaeology Section and were carried out by the author between February 10th and March 27th 1992.

3.0 IMPACT OF DEVELOPMENT PROPOSALS.

3.1 The proposal for the area is for extraction of sand and gravel which will remove all archaeological deposits and finds. Extraction will follow the removal of topsoil which, if carried out carefully in collaboration with an archaeologist could enable features cut into the subsoil to be recorded.

4.0 GEOLOGICAL AND TOPOGRAPHICAL BACKGROUND.

4.1 GENERAL CHARACTER.

The lower Welland Valley may be divided up into i) an upland area well-known for its limestone resources, and ii) the river terrace, which comprises a mixture of gravels, colluvium and alluvium. The distribution of these varies according to the proximity of the river, which has shifted its course within the valley periodically. The valley is narrow at this point (1km, approximately) despite the proximity of the confluence of the River Gwash and the Welland.

4.2 THE FIELDS.

The fields under evaluation are located on river deposited first terrace sands and gravels made up of limestone and flint with Bunter pebbles and ironstone (Fig. 1). Deposits of alluvial sands, silts and clays overlie the gravel whilst local soil varies in composition from clay loam to sandy clay loam, sandy loam, and silt loam. The soils are generally permeable and well

drained. The river is less than 100m away at its nearest point to the study area. Present land use is arable farming.

4.3 THE SITE.

The site slopes gently and evenly in its western part from south to north, being some 19.81m in its southern corner, dropping to 18.7m in the north. In the eastern part, the site retains an overall south - north slope but the surface is undulating, slightly lower than in the west.

5.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND.

5.1 INTRODUCTION.

Navigable rivers have always been important as communication routes. Their valleys were also suited for early settlement, as light gravel soils were easily cleared of vegetation and ploughed with primitive implements. As such they are usually occupied and farmed, both for arable and pasture, from earliest times. The Welland valley contains useful arable land and was being cleared of its natural forest cover in the Neolithic period. Large scale clearance of valley slopes and upland probably began in the Iron Age (Pryor et al. 1985a). The ironstone occurring both in the gravels and the uplands allowed local iron-working which is clearly evident by Roman times, as is the agricultural value of the area, for extensive Roman farming activity is present (Simpson 1966). Such land use is demonstrated by the extensive system of boundaries and enclosures associated with villas, and the presence of two such villas in the Barnack area. The importance of the area in wider communication networks is clear, as the area is crossed by two major Roman roads, Ermine Street and King Street, and the river was an essential part of the economy for exploitation of Barnack stone which was used in Roman buildings as far to the south as London and Rochester.

Use of the river and its valley was maintained in Saxon and Medieval times, with economic control of the whole region falling to the Abbey of St Peter's in Peterborough. From Anglo-Saxon times the parishes of the area were divided in such a way as to permit access to its resources evenly. Long thin parishes cross-cutting the valley are the norm so as to provide the parish with lowland pasture and arable land, and grazing on the upland. The local churches are pre-Conquest establishments, with Barnack church being founded in the 10th century. They suffered from Danish incursions in the 11th century. Once the Abbey took control of the area it was farmed as arable and pasture land, with quarrying of local stone an important supplement to the economy. This quarrying died out by the 16th century as resources were depleted. Surface occurrences of gravel were used for local building work, whilst ironstone exploitation for iron production was occasional and focussed on the uplands (Pryor et al. 1985a; Ryland 1902). Establishment of the Burghley Estate in the 16th century and Enclosure during the early 19th century have led to fixed field boundary patterns, and land use has remained constant with pasture adjacent to the Welland and arable farming on the first terrace and extending onto the slopes of the upland. Industrialisation had little effect on the area except to highlight its importance in communication routes with the building of the Welland Canal and then the Peterborough - Leicester railway (Ryland et al. 1902; Serjeantson et al. 1906).

5.1.1 Archaeological Background.

The Barnack area contains many notable sites known from cropmarks and excavation including ring-ditches, cursus features, pit alignments, possible henges, trackways, pits burials, enclosures and a Roman villa (RCHM; SMR). The major source for these is the County SMR (Table 1; below). The lack of features in alluviated areas is not an accurate reflection of land use, rather, the alluvium may cover the features and mask them from aerial photography (French and Wait 1988; Pryor 1985a) (Fig. 2), thus it is always important to study the subsurface in such areas.

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Plan of Cropmarks in
Barnack Area

Fig. 2

Initials	Date
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TABLE 1.

Features recorded in the SMR for Cambridgeshire and Lincolnshire in an area c.1 mile from the proposed area.

Grid reference.	Description.
TF 0500/0660 to 050-/072- to 058-/067-to 058-/064-	At least five enclosures, known from cropmarks.
TF 0500/0660 to 050-/072- to 058-067/- to 058-/064-	At least six pit alignments known from cropmarks.
TF 0500/0660 to 050-/072- to 058-/067- to 058-/064-	Two pairs of parallel linear features and one set of three parallel linear features, known from cropmarks.
TF 0518/0690	Excavated cropmark complex comprising a ring-ditch with associated post holes, a ring-ditch with pits, and a pit alignment and track.
TF 050-/069-	Excavated multiple round barrow with ditches, known from cropmarks.
TF 057-/065-	Small stone Roman villa building of 4-5 rooms, amongst a system of enclosures, plus a ring-ditch. Known from cropmarks.
TF 0500/0660 to 050-/ 072- to 058-/ 067- to 058-/ 064-	At least 21 ring-ditches, of which at least 3 are double and 4 are interrupted, known from cropmarks.
TF 069-/ 074-	A contracted burial with a ?jet bead, known from a casual find.
TF066-/ 071-	A mound & ditch, linear feature, enclosure & ridge and furrow, known from cropmarks.
TF 053-/ 071-	A Bronze Age flint arrowhead found by fieldwalking.
TF 053-/ 072-	A Neolithic flint blade, found by fieldwalking.

TABLE 2.

Excavated sites in the Barnack area.

Grid Reference	Description.
TF 050-/ 069-	A Bronze Age round barrow with associated ditches, a recut and a new mound built over this. At least eighteen burials were made. A rich group of grave goods were with the primary burial including a schist archer's wristguard with gold insets, a bone pendant, a tanged bronze dagger and a large beaker (British Museum n.d.; Donaldson 1977; Kinnes 1976).
TF 0518/ 0690	An Iron Age penannular ditch with associated postholes and a pit. Also an Iron Age pit alignment with associated potttery (Mackreth & O'Neill 1979).
TF 0518/0690	A ring-ditch, with stake and post holes. It yielded only a few flint tools (Mackreth & O`Neil 1979).
TF 0518/0690	Two linear features, possibly trackways, and various post holes and hollows (Mackreth & O`Neil 1979).
TF 049-/069-	Two Bronze Age unmounded burials with associated pottery in a large pit. 12 amber beads and flint tools were also recovered. Radiocarbon dates of 1572 bc & 1346 bc were obtained (Pryor 1974, 1981).
TF 057-/065-	A substantial Roman basilica building with a droveway. Roman pottery was recovered along with painted wall plaster. Also evidence for iron production (Simpson 1966).
TF 057-/072-	A series of Mesolithic hearths & pits (Hall & Ford 1992).

5.2 DISCUSSION.

The lower Welland Valley has been subject to extensive archaeological study (Pryor et al. 1985) and has yielded a number of sites important at regional, national and even international levels. Such sites include the finds from Fengate (Malim 1989) and Flag Fen near Peterborough, Maxey and Etton (Pryor et al. 1985a. & b, 1986), and the Barnack burial itself (Donaldson 1976, 1977; Kinnes 1976). The latter has been described as having grave goods of `real international significance` (British Museum n.d.), but the most important aspect of archaeological work in the area is that it deals with a relatively undisturbed landscape which places all the individual finds into a broader regional perspective. The Barnack cropmarks are a part of such a landscape and therefore can both enlarge the known area and answer questions arising from earlier work.

To the east of the assessment area a series of cropmarks were scheduled to preserve them for the future, but those in the present assessment area remain threatened. The cropmarks preserved in the west include at least two ring-ditches resembling the Barnack burial and trackway/cursus features such as have been found at Fiskerton in Lincolnshire and Fengate in Cambridgeshire (Field 1986; Malim 1989). These features often yield numbers of rich items

and are regarded as important ritual monuments. Whilst the chalkland monuments of Wiltshire such as Stonehenge and Avebury are well known, it is appreciated less that these recent finds in the Welland and Nene Valleys are a similar (Pryor et al. 1985a & b, 1986) but less disturbed phenomenon. Equally, whilst major parts of the famous sites have been excavated earlier this century and before, the Cambridgeshire work has all been recent. A much fuller picture of the past is emerging here which can be applied more widely on a national basis.

6.0 METHODOLOGY.

6.1 INTRODUCTION.

It was decided that the most appropriate method to deal effectively with such a large area would be a stage by stage approach of methods and techniques, beginning with known features and using work on these to increase knowledge about the areas where nothing was visible from the aerial photographs.

6.2 STAGE 1. KNOWN ARCHAEOLOGICAL REMAINS.

The 'known' archaeological materials were i) surrounding cropmarks and ii) excavation reports of sites now quarried away, west of the assessment area, and iii) existing features in the western part of the site itself.

6.2.1 Fieldwalking.

The majority of cropmarks in the site lay within a single field (Fig. 3) (see also plates 1 & which show some of the cropmarks in the assessment area) which, unlike those surrounding i was not under a crop at the time of investigation and was therefore acessible for fieldwalking. was thought, therefore, that fieldwalking this field would provide information as to whether th features could be dated by materials being pulled from them by ploughing, and also whether th features were being destroyed by ploughing.

6.2.2 Quarry Face.

The western part of the site abutted a section created by quarrying which clearly cut throug cropmark features. Study of this showed the depth of these features, whether they were beir damaged by ploughing and provided indications of age and function.

6.2.3 Geophysical Survey.

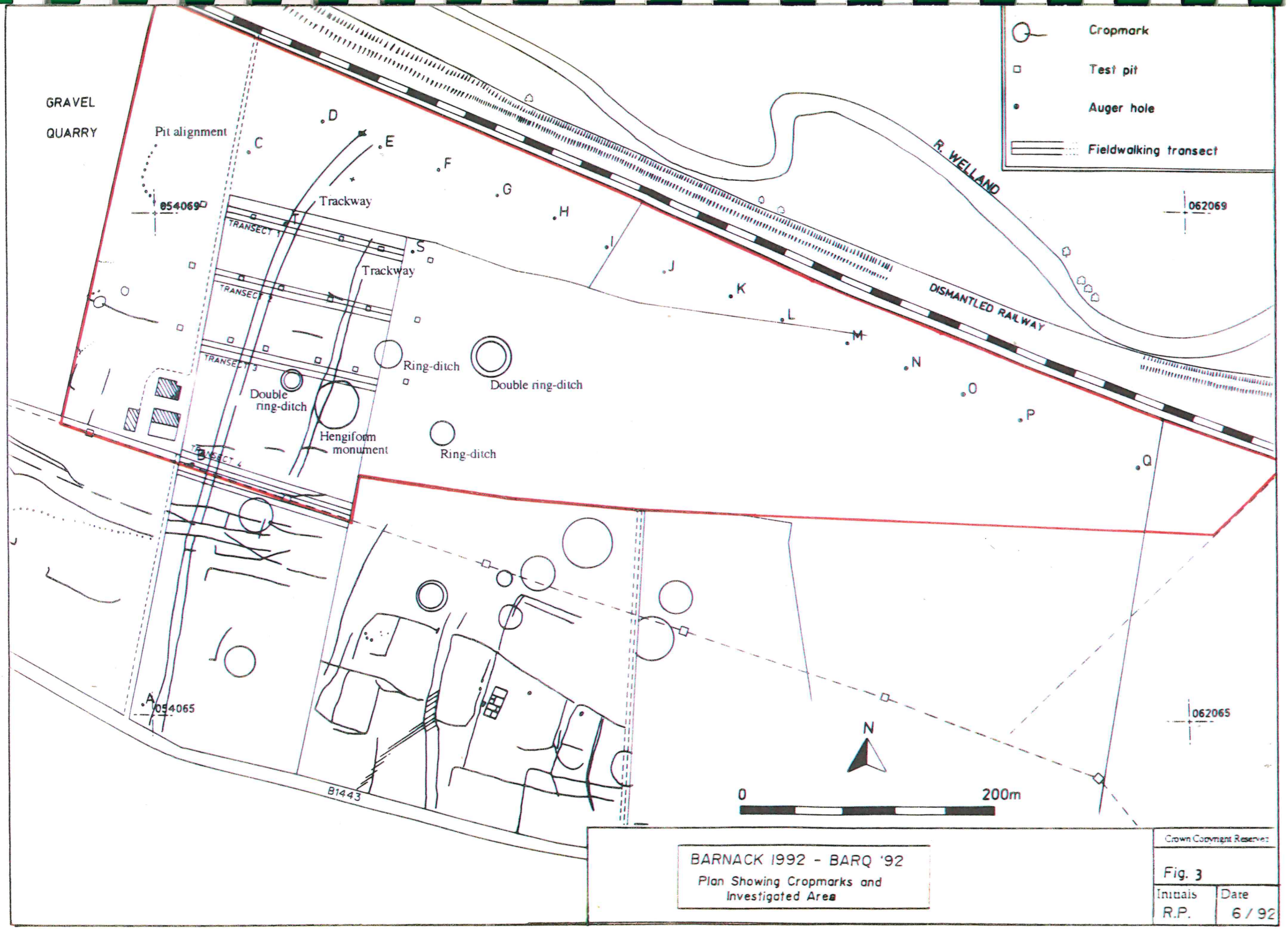
Geophysical survey provides methods of examining the subsurface for disturbances which c inform on the presence of archaeological features. A magnetometer survey was commission from Geophysical Surveys of Bradford to i) identify the location of the cropmark features mo accurately on the ground and ii) look for unknown features in areas where cropmarks are r visible.

6.2.4 Auger Survey.

It was also decided to undertake an auger survey, in advance of the geophysical survey, sir the latter can only operate effectively to depths of c. 1m. The auger survey tested the depth alluvial cover over the site and gave an indication of the types of sediment to be dealt with was also used to look for buried land surfaces.

6.2.5 Hand-dug Test Pits.

After fieldwalking, it was decided to test the results of that procedure, by digging 1m sq. pits. These examined artefact density in the topsoil, indicating whether features were be disturbed by ploughing, and the likely quantity of finds. It also provided information ab overlying sediments.



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Plan Showing Cropmarks and Investigated Area

Fig. 3

Initials	Date
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6.3 STAGE 2. MACHINE EXCAVATED TRENCHES.

Once information from these techniques had been processed, a strategy for trenching usin machine dug trenches, was devised. Trenching involved the stripping away of overlying deposi to identify archaeological features and exposed them for further study. Once features we mapped, they were excavated to investigate their age, form and possible function.

6.3.1 It was intially proposed to open 40 trenches of 100m x 2m, this being approximately 2 of the area to be evaluated as stated in the brief (for trenching strategy, see below). Limitatio of resources and machinery led to a change in approach, following consultation with the Coun Archaeologist, after work was underway and so fewer trenches were dug. The earlier trench were dug rapidly and dug straight down to the underlying natural gravel. This was to identi features in trenches rapidly, they were recorded in section, and grab samples taken for finds, et There were insufficient resources to permit excavation of features in trenches if fourty trench were to be dug. An additional complication was the discovery of Mesolithic materials across t river (See Table 2, above), these would underlie later prehistoric features but are of gre archaeological interest, so some allowance for these (i.e. digging through higher prehistor layers) was necessary.

7.0 PRELIMINARY FIELD ASSESSMENT.

7.1 INITIAL VISIT.

The area was visited briefly by Tim Reynolds on February 3rd and the field surface examin for artefacts. The fields were growing winter wheat with the exception of one which had be ploughed. Thus only this field could realistically be evaluated. It yielded very few artefacts all, a period of ten minutes produced a single flint flake and two Roman sherds over a distan of 50m.

7.2 FIELDWALKING.

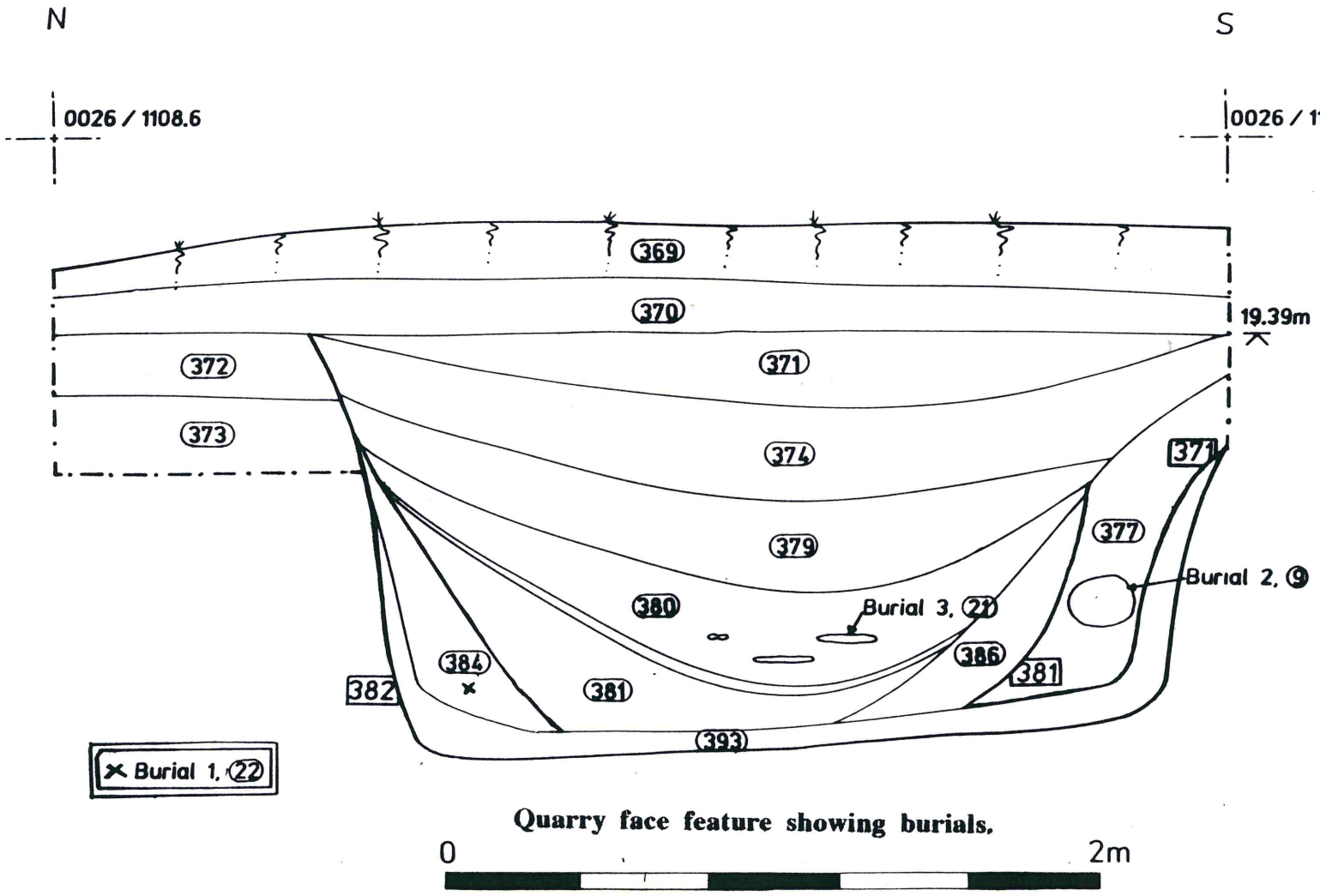
The area was returned to on February 10th with a team of four archaeologists. Given the desi to identify material being ploughed out from specific features identified on the aeri photographs, it was decided to walk transects crossing the densest concentration of su features (Fig. 3), collecting intensively. Transects of five metre square boxes were laid out a everything within these boxes collected. The impressions of the original visit were confirme with very little material being recovered. Most of this was abraded and of Roman or po Roman date. No specific finds could be allocated to cropmark features and so no dating cou be suggested for the features (Appendix 1).

7.3 QUARRY SECTION FEATURES.

The extant quarry adjoins the proposal area and was seen from aerial photographs to be cutti through cropmarks. This section was examined between 17th - 20th February to identify the cropmarks and note their state of preservation and contents.

Three possible cropmark features were observed. One was probably the line of an old fi boundary, one was emphemeral and could not be confirmed as of archaeological significan but the third had well-defined edges, fills and human bone jutting out into the quarry (Fig Excavation of this feature was undertaken to retrieve the human remains. No dateable artefa were recovered, but a sequence of burials was identified. A sample of bone from the lowest (a earliest) burial was submitted to Beta Analytical Inc. of Florida and a date of 1908 BC (Bet 53122) was obtained (Appendix 3). This places the earliest of the burials into the Bronze A and the others are likely to be of similar age as they appear to be buried in the same manner a in the same ditch.

There were three burials. An initial crouched inhumation associated with a pig bone w disturbed by two later cuts into the feature and the placing of a further two bodies into it (F 4). The last of these was in a contracted position, the other was too disturbed for



Quarry face feature showing burials.

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Fig. 4

Initials	Date
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positioning to be clear. The bones from these burials were studied by C. Duhig. All w thought to be male, and two were considered to be young adults but the other could not be a accurately (See Appendix 5). No artefacts were recovered. The feature was remarkably cl of debris with the single exception of the pig bone which might suggest it had been deliberat placed into the grave. The plough soil was separated from archaeological deposits by sev centimetres of reworked alluvium. This has the effect of demonstrating that the feature was being disturbed by ploughing and would explain the lack of artefacts on the field surfaces.

7.4 GEOPHYSICAL SURVEY.

A team from Geophysical Surveys of Bradford was employed to survey intensively within area of cropmarks and more extensively in the surrounding fields where the surface obscured by wheat. This work took place on February 10th - 11th. The results of the sur were most encouraging, with features from the cropmarks being well defined by magnetometer and their location on the ground being confirmed (Fig. 5) and plotted greater accuracy at 1:500. Additionally, a double ring-ditch currently in the area covere crop was recorded as showing a central anomaly, probably representing the position of primary burial and an additional anomaly which may be a later, secondary, burial. In the where alluvium masks features from aerial survey a large ditch, possibly part of an enclos with associated features (possible pits) has been identified. The survey was continued trenching to further investigate the eastern part of the site (Appendix 2).

7.5 AUGER HOLE SURVEY.

A series of auger holes were dug between 13th - 17th of February to determine the dept deposits, identify the distribution of alluvium and search for any preserved palaeosols (locations are shown in Fig. 3). No palaeosols were identified, although a dark humic de was identified within the bounds of one of the parallel linear features. Additionally, the all cover was recognised. Depths to the gravel `bedrock` varied between 1m - 2m (Appendix

7.6 TEST PITS.

A series of eighteen 1m sq. test pits were hand dug to examine the topsoil for artefacts. were laid out across the area fieldwalked (their distribution can be seen in Fig. 3) and 20m the fields on either side of this. All test pits but one were void of finds. This pit (C) yi artefacts on top of one of the cropmark features. The upper fill of this small linear featur both Nene Valley colour-coat and Samian pot sherds and some animal bone. The pottery give this fill a 2nd century date although only three sherds were recovered, a base of Valley ware, an abraded Samian sherd and a dark coarse ware body sherd (this mate presented in plate 3 along with two sherds from the linear ditch [180] excavated in tren The animal bone comprised a fragment of scapula, and two long bone fragments, one of was a sheep radius.

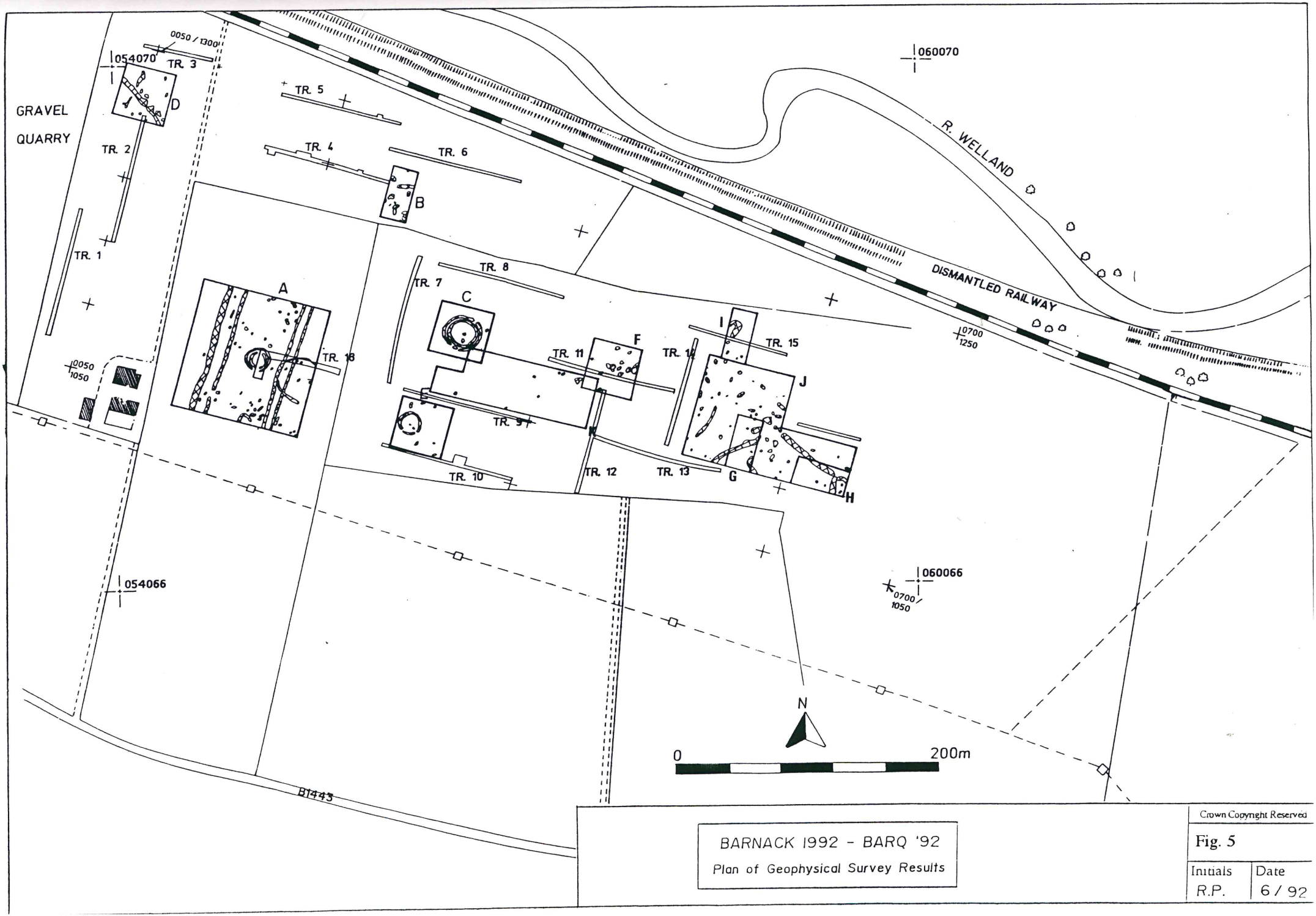
7.7 SUMMARY.

As a result of this work it can be argued that a rich sequence of cropmark features ex physical features in very good condition. Bone is well preserved in the feature fills cropmark features do not represent the total number of archaeological features, as others e areas where there is an overlying cover of alluvium. The depth of this alluvium varies b be greater than 2m. The site as a whole has a dense spread of archaeological features sim those lost to quarrying to the west of the site and also similar to the area of sche cropmarks to the east. There is a remarkable absence of artefacts.

8.0 EXCAVATION ASSESSMENT.

8.1 TRENCHING STRATEGY.

8.1.1 It was decided to begin trenching in a similar fashion to the overall site strategy, n to work from the known to the unknown. As a result of this the first trench was placed



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Plan of Geophysical Survey Results

Fig. 5

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to the quarry section in the west of the site, with trench two being placed parallel to that b further east in the same field (Fig. 5). These two trenches overlapped and so some correlatio between them could be maintained. Trench 3 was placed in the northern part of this weste area at right angles to the other trenches to carry the evaluation over towards the east of the si and it was particularly placed to examine a large ditch with associated features which had be identified tentatively in the field by the geophysical survey. Misunderstanding of initial repo in the field suggested the ditch and associated features were further north than subseque plotting of them shows and so trench 3 was, in fact, incorrectly placed.

8.1.2 Trenches 4, 5 and 6 were placed across the north of the cropmark complex to investig whether the linear features from it ran as far north as the railway.

8.1.3 Further trenches extended the area trenched to the south and east, trenches 7, 8 an were placed to give details about the soil cover around the ring ditches identified by b cropmarks and geophysical survey. It was decided to avoid trenching through these features they seem well preserved and resources were not such to give them adequate attenti Trenches 10 - 15 extended the area explored further to the east whilst trench 17 was placed examine the extent of the river channel identified in trench 15. It was at this point that change in proposed strategy was made, a new trench, 16, was opened over the cropmarks examine their state of preservation, form, function and to gain artefacts for dating purpos The presence of the river channel in the eastern part of the site, combined with evidence fr the auger survey for further riverine clays beyond the area trenched, was taken as suffici evidence that archaeological features were preserved under a great depth of alluvium but, in river channel(s), unlikely to exist. Thus, attention could be focussed during the latter part of evaluation upon the 'known' cropmark features.

8.1.4. Machining quality during the trenching was poor, inexperienced drivers and a equipment resulted in a loss of accuracy in digging. As a result of this more time had to spent in the trenches cleaning sections and the bases than would otherwise have b necessary. Additionally, the first three trenches were excavated with a JCB which was not ideal machine for the task and much longer had to be spent machining these trenches.

8.1.5 Spoilheaps were searched with metal detectors by the Soke Metal Detectorist's Club they also assisted by scanning the base of trench 16 prior to the sectioning of features to further information to locate the sections. In fact, no objects were found in the trench and spoilheaps yielded only modern debris which has currently been stored in the Archaeo Section store at Fulbourn.

8.2 RECORDING.

8.2.1 General recording of trenches.

All trenches were recorded according to the standard Cambridgeshire County Co Archaeology section context sheets with single context recording. A context number was g to each deposit and cut within each trench and any artefacts, samples, etc. are related to context numbers. Context numbers for a cut are in square brackets whilst those for a depo fill are in round brackets.

All trenches were walked regularly and context numbers given to features as they identified. It was difficult to identify features during the machine trenching, as c differences were hard to spot. However, after weathering features became much clearer floors and sections of all trenches were cleaned to permit identification of features. Se were drawn at 25m intervals down one side of each trench and all sections of features drawn. The north-south orientated trenches had their east-facing sections drawn and orientated east-west were recorded along their north-facing sections. In the sections illust the scale relates to the drawn section, each one is the first of the sequence taken along the (i.e. in north-south orientated trenches it is the first, southern end and in east-west trenche the westernmost drawn section). All running sections have been inked up and are in th archive.

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TRENCH 16 - GENERAL PLAN

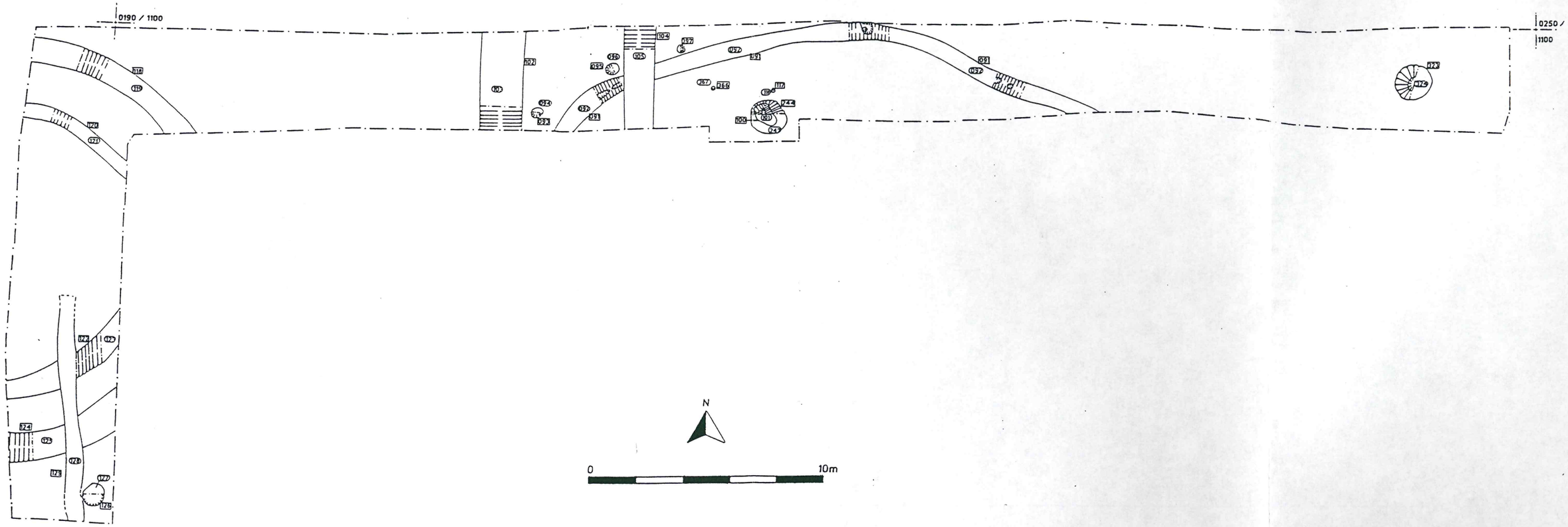

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Fig. 6

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Because many of the trenches were excavated too deep by the mechanical digger it was decided that base plans would not be informative, all sections do, however, have their coordinates. Additionally, trench sections were photographed at 25m intervals, but including a stretch of 3m compared to the 0.25m stretches recorded by section drawing. All features were photographed.

Trench 15 was recorded in more detail than stated above because of the need to identify the nature and bounds of the river channel and to assist environmental sampling.

8.2.2. Recording of trench 16.

In trench 16, an overall trench plan was drawn up to show the inter-relationships between the cropmark features identified in the floor of the trench (Fig. 6). Again, recording was by single context methods. After planning, all features had sections excavated through them to identify their state of preservation, form, possible function and to obtain materials for dating. The excavated sections were all drawn and photographed. Given that the ploughsoil directly overlay the natural gravel into which the features were cut, no overall trench sections were drawn, rather, the sections drawn of features were extended to include the overlying ploughsoil.

Trench 16 comprised two lengths, east - west and north - south. The latter was cut to investigate a gap in the ditches of the double ring-ditch identified during the geophysical survey. These would have been of particular interest as possible entrances to the structure and butt ends of such ditches have been recorded as sites for the deposition of materials during rituals. Thus, it was thought that such an extension might be more likely to provide material for dating purposes and give an indication of the use to which the feature was put.

8.3 SUMMARY OF TRENCHING RESULTS.

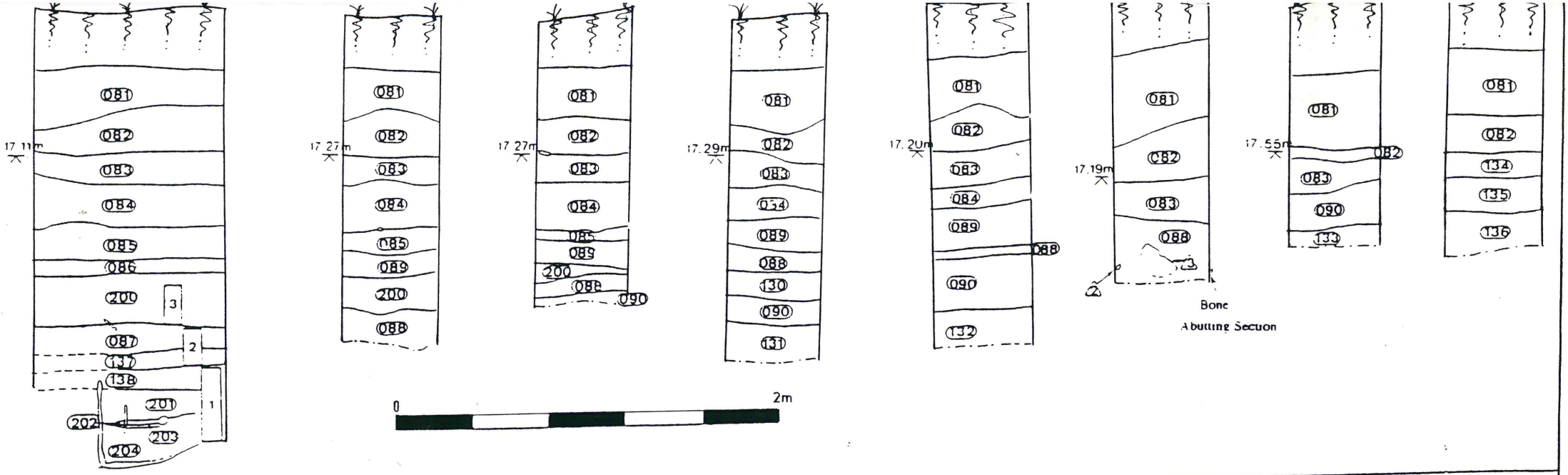
8.3.1 Introduction.

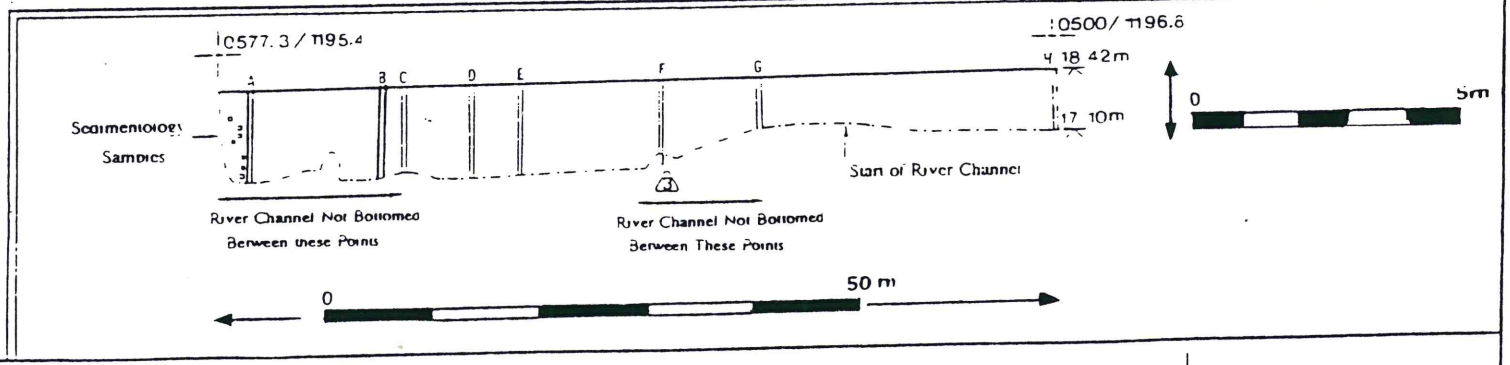
Trenching revealed a series of ditches, and, more rarely, pits, but material for dating these was lacking. It can, however, be confirmed that the majority of features pre-date, or are contemporary with, the late Iron Age/early Roman periods because a ploughsoil of this date was found in many of the trenches (Trenches 1 to 14) which can be used as a marker horizon (This ploughsoil is referred to as 'prehistoric' in this report as a shorthand, it does not exclude a Roman date for it). It can be dated because furrows preserved in its base in trenches 1, 2, 7 and 9 would require a well developed mouldboard plough to form them, which was unknown prior to the late Iron Age. It is also dated by the presence over it of a sealing alluvial deposit which has, elsewhere in the Welland valley, been dated to the late Roman/post-Roman period. This deposit is also important in that its presence over the entire site acts to partly protect the archaeological deposits beneath. It also confirms the suggestion that the cropmarks are a minimal representation of the archaeology of the area, as it masks features in the north and east of the site where it has greater thickness. As so few artefacts were recovered, and their quality was limited, no drawings are presented here, however, the prehistoric material from the double ring-ditch in trench 16 together with the flint from trench 15 are presented in plate 4.

Three trenches were of particular interest, 15, 17 and 16.

8.3.2 Trench 15.

This trench is towards the east of the site (Fig. 5) and is remarkable for the presence of stream channels in its section (Fig. 7). In this part of the site the alluvial cover is marked and terrestrial deposits progressively give out to fluvial ones from west to east along the trench. The fluvial deposits are marked by a heavy, sterile clay which is yellow in its upper part but which grades into blue and grey towards the base. This reflects the height of the water table and gleying due to anaerobic conditions below this. As a consequence of these conditions wood has been preserved. Several oak branches and trunk fragments were recovered and an oak tree base with roots was found on the interface between a peaty layer and the clay. This has been dated by radiocarbon to 1935 BP (i.e. 15 AD) Beta-53123 (Appendix 3) (See comments by C.A.I. French and E. Guttman in Appendix 6). The date marks a point at which the channel stabilised. Below it is a cycle of peat giving way to clay and then a return to peat - probably reflecting





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Sections in Trench 15

Fig. 7

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minor changes in sea levels and inundation of the fens further down the Welland and the subsequent 'backing up' of the waters of the Welland. After this date the channel bed consistently infilled with clays, and no peat formation took place. The date of this channel is interesting as it would appear to be contemporary with some of the archaeological features identified. In particular, the possible ditched enclosure identified by geophysical survey in the eastern part of the site may respect and relate to the presence of the river. A single flint flake-blade was recovered from the clays of the channel (plate 4), lying just below an oak trunk fragment in the clay above that which yielded the radiocarbon date. This piece is likely to be derived but is not particularly rolled.

8.3.3 Trench 17.

Trench 17 was placed to investigate the channel further, and to seek for additional archaeological features in the eastern part of the site. It bisected the channel and showed the eastern edge of it, but failed to yield any archaeological features. The section through the channel showed the same sequence as that of the upper part of trench 15 (Fig. 8). Wood was also preserved in this trench. A single rounded branch of oak was found in the middle of the trench towards the eastern edge of the channel which was sticking into the underlying gravel. It is possible that this branch was a driven stake dating from prehistoric times, although examination of it by Richard Darrah, a specialist in worked wood, failed to reveal any traces of human working. No other finds or features could, however, be associated with it. No other possible artefacts came from trench 17.

8.3.4 Trench 16 (Fig.6).

8.3.4.1 Introduction.

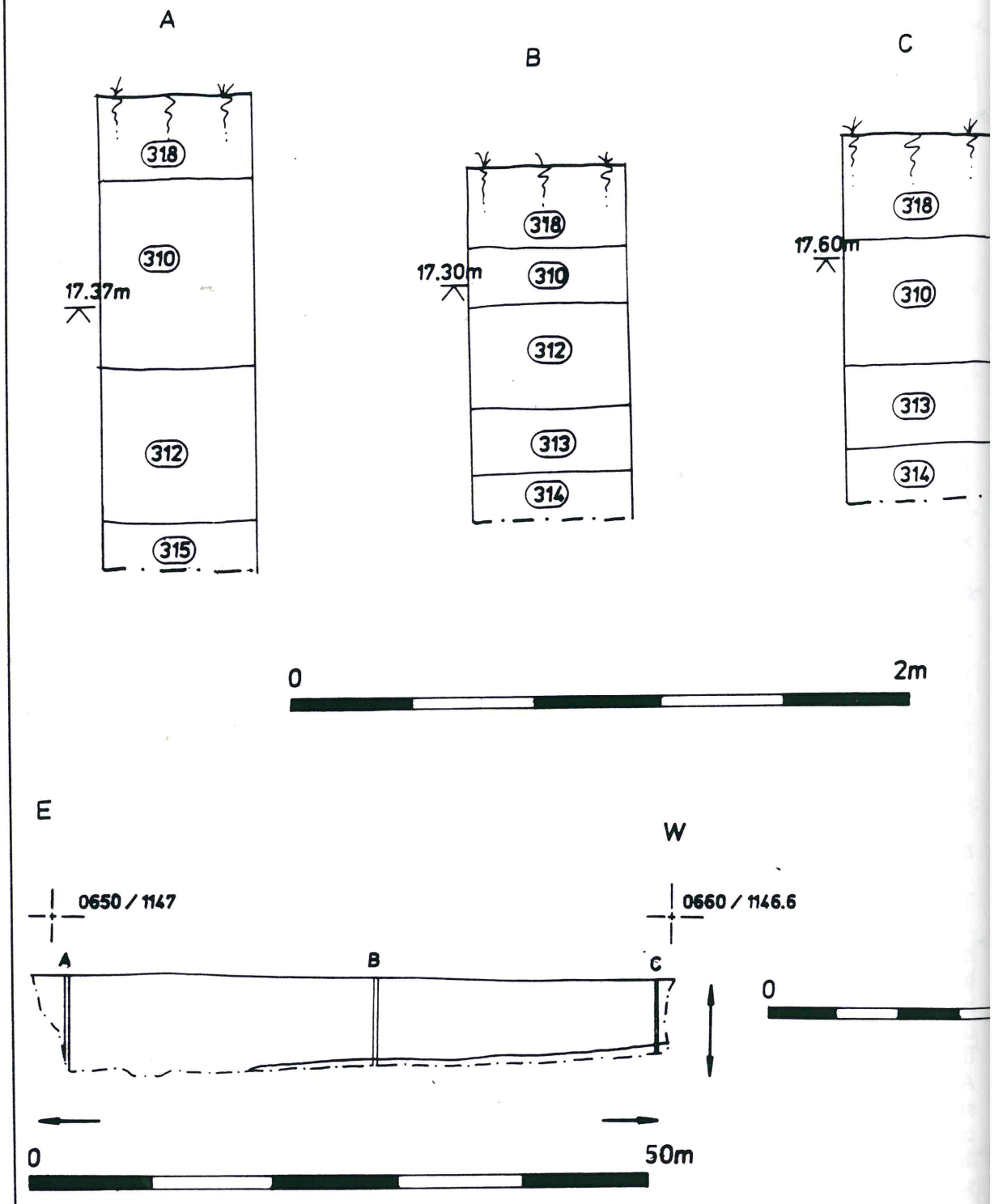
Trench 16 was placed to investigate cropmark features in the south-western part of the site. It was very shallow, reflecting effects of ploughing and erosion. There was little alluvial cover, probably due to downslope movement accelerated by ploughing along the gradient. Ploughsoil gave straight onto natural gravels into which the features had been cut. Features had originally been cut from higher than this but ploughing has truncated the features. Features examined in trench 16 fall into five categories: a 'hengiform monument, a double ring-ditch, linear ditches, pits and postholes. Each will be discussed below.

8.3.4.2 The 'Hengiform Monument'.

The 'hengiform monument' [091] was a roughly circular feature which was exposed in the east - west running part of the trench. It was sectioned in three parts to examine its form and recover material for dating. Unfortunately, no artefacts were recovered from it. The sections across it, however, did show that the ditch had originally been lined with small posts and that the monument had been constructed by the digging of a series of small shallow ditches into which these posts were fitted. Each stretch of ditch abutted the next but none were particularly even, thus giving the monument an irregular outline. The posts were set into small cut depressions. After the posts had been removed the ditches were recut and run into each other making a smoother outlined ditched area. The diameter of the monument was c. 45m and the ditches comprising it were only c.0.4m wide and c. 0.4m deep. The ditches were U-shaped in profile and the post holes in the base were shallow, only a few centimetres deep (Figs. 9 & 10). Each section cut through the feature was slightly different but the two phases, a post-lined and a non-post-lined re-cut , were identifiable in all of them. At the junction of two stretches of ditch a series of small depressions only a few centimetres wide and deep were identified which probably represent stake holes.

8.3.4.3 The Double Ring-Ditch.

The double ring-ditch was sectioned twice (Fig. 6), once in the east-west running part of the trench and once in the north-south part. The latter part was investigated because geophysical survey suggested the presence there of an entrance. This turned out not to be the case, a very shallow gully [128] in the base of the ploughsoil which had not been identified by the survey had masked the presence of the ditches continuing unbroken in this area.



Sections of trench 17.

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Fig. 8

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The area within the ring-ditch was not excavated as deeply by machine in case any mound material might be present, and the earth within the feature was permitted to weather to assist in the identification of any other features or structures within it prior to excavation. None of this, however, revealed any surviving structures or mound material. The outer ditch sections [118] & [124] were similar in both excavated parts, the sides were straight but sloping with a small flat base (Fig. 11). In the east-west trench section [118] a sample of very degraded pottery was recovered (plate 4). This was an oxidised coarse ware, thicker than 1cm. The fabric had a sand temper and the inside of the pot remains a dark black. There was no obvious external decoration.

The inner ditch differed between the two points sectioned [120] & [122] (Fig. 12). The east-west trench section [120] was nearly vertical sided with a flat bottom. Its overall form in this part resembles a timber slot. The section in the north-south trench [122] part resembled that of the outer ditch. Neither of these sections yielded any artefacts.

8.3.4.4 The Linear Features.

Both linear features (ditches) [102] & [104] were sectioned and had the same form (Fig. 13); almost V-shaped with straight sloping sides with a small flat bottom. The topmost fill of the western ditch [102] yielded some abraded Roman (1st / 2nd century) sherds, some Iron Age/ Romano-British pot sherds and animal bone, whilst the upper fill of [104] yielded a broken flint flake and a very abraded well-fired ?Roman sherd. The lower fills, which are more readily associated with the ditch itself, were sterile. The geophysical survey and mapping of the cropmarks suggest that this pair of ditches respect the western side of the 'hengiform monument' which would imply that the latter was still an observable feature in the landscape at the time the ditches were dug. Given the topmost finds and stratigraphy of the features in other trenches (i.e. they are cut from the level of the fossil ploughsoil), a late Iron Age/Roman date would be a reasonable interpretation of the age of these ditches. They do extend much further north and one was also sectioned in trenches 4 [307] and 5 [194], where it was larger and had evidence of cleaning out (See below).

8.3.4.5 Pits and Postholes.

There were a number of pits and postholes sectioned in trench 16 (Figs. 14, 15 & 16). Some of these may be related to each other, such as the series of three postholes that run around the edge of the 'hengiform monument' and the pair of postholes inside the monument near a large pit. The shallow pits at either end of trench 16 seem unrelated to any of the other features.

The series of postholes running around the edge of the monument [093], [095] & [097]were of slightly differing form, but are all less than 1m in diameter and relatively shallow (Fig. 14). No clear evidence for postpipes was found as the posts seem to have been removed. No artefacts were in the postholes and no dating can be assigned to them, but they do seem to respect, even if not directly associated with, the hengiform monument.

The pair of postholes within the hengiform monument [366] & [117] may relate to the large pit [244] near to them but again no artefacts were found in either and so dating and sequencing is not possible. The postholes are deep with homogenous fills, suggesting the posts were removed and the holes filled in.

The large pit [244] is U-shaped in profile, it was packed with silts to support a large post in it. This post may have been burnt *in-situ* because a line of consolidated charcoal marks an inner edge of this feature [100]. No artefacts were found in the pit. It cannot, therefore, be regarded as a rubbish pit for domestic refuse (no organic materials were found either) it is probably best regarded as structural.

The two shallow pits [323] & [126] at either end of trench 16 may also be regarded as structural, the eastern one had a central depression, possibly to hold an upright timber, whilst the southern pit had a setting of stones for the same possible function. Once again, no artefacts

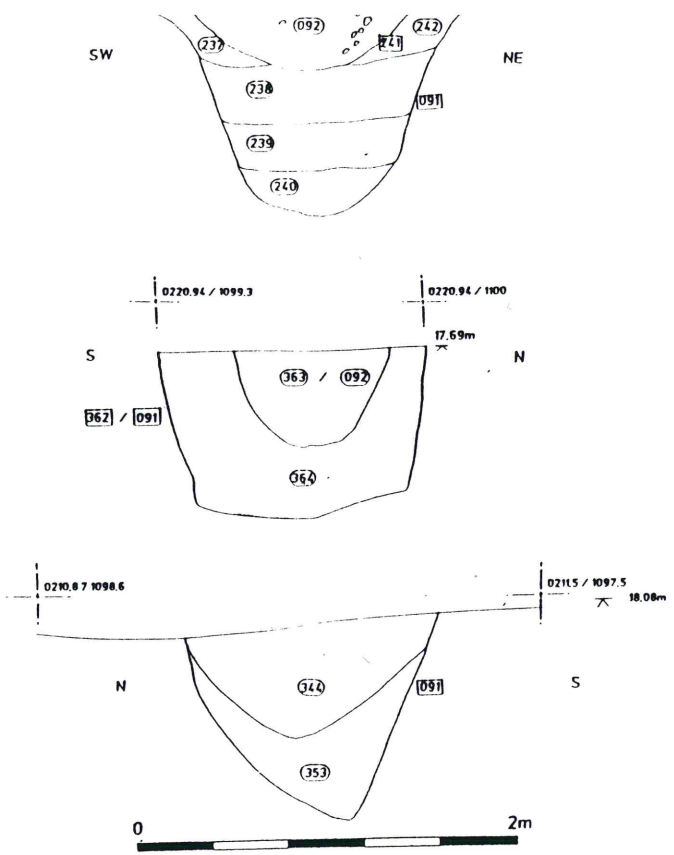

Fig. 9

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Sections Through The
'Hengiform Monument'

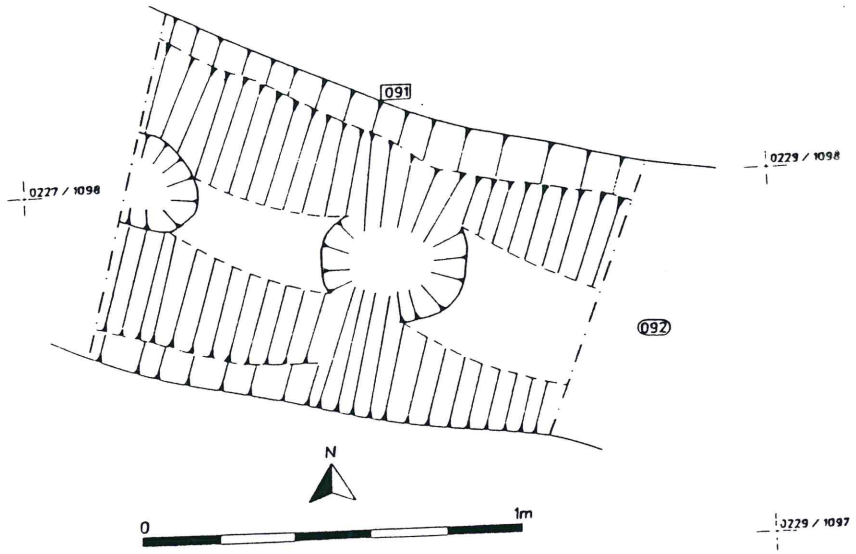

Fig. 10

BARNACK 1992 - BARQ '92
Plan of Section Through The
'Hengiform Monument'

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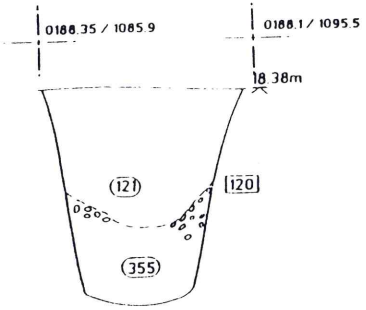
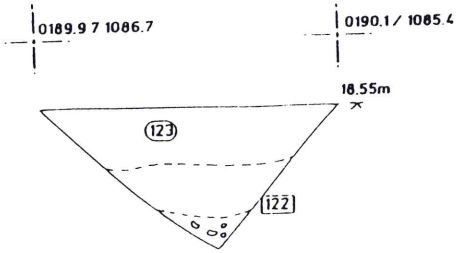
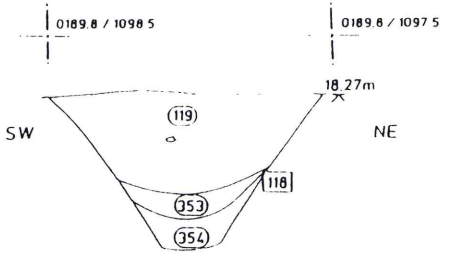
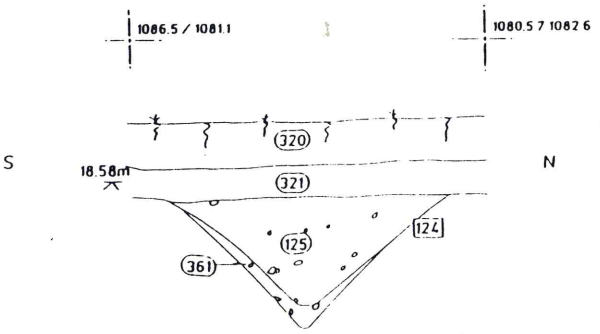




Sections Through Inner Ditch
Of Double Ring-Ditch
Fig.12





Sections Through Outer Ditch
Of Double Ring-Ditch
Fig.11

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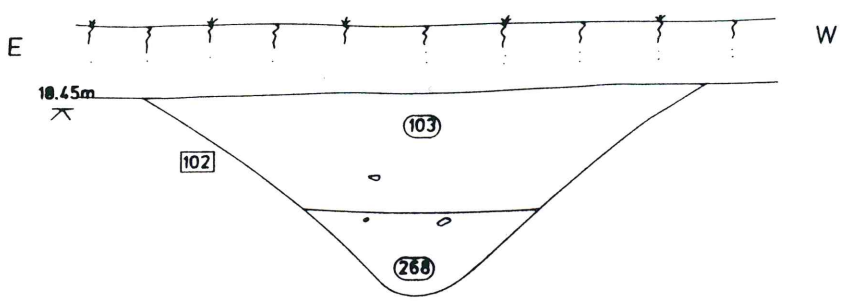


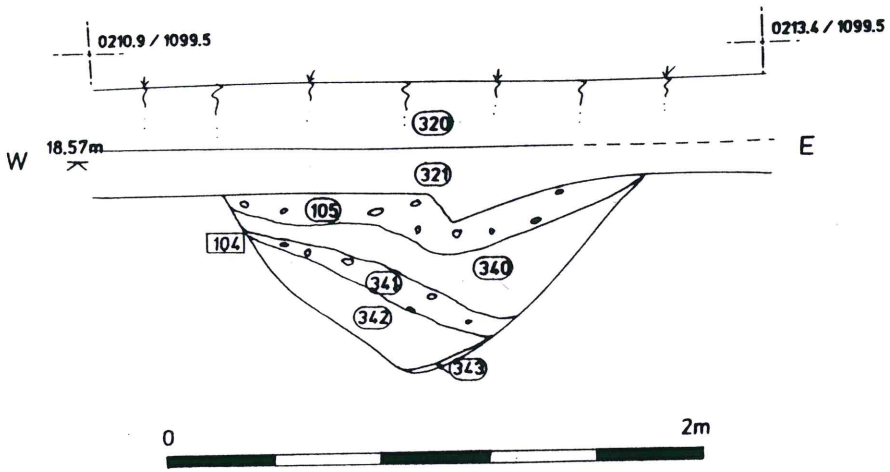
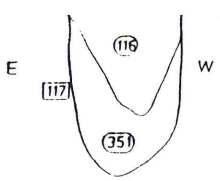
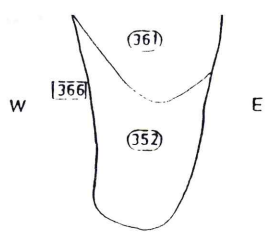
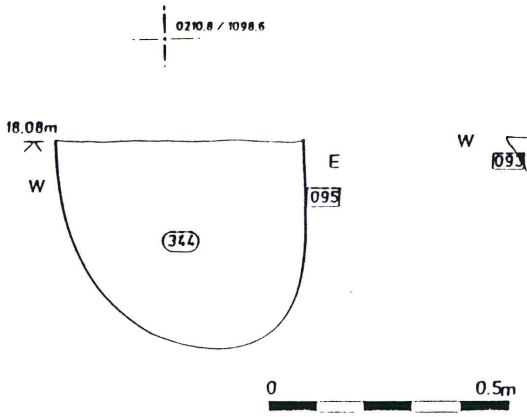


Fig. 13 Sections Of Linear Features in Trench 16







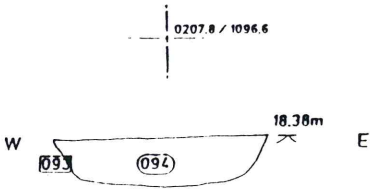


Fig. 14 Sections of Postholes in Trench 16

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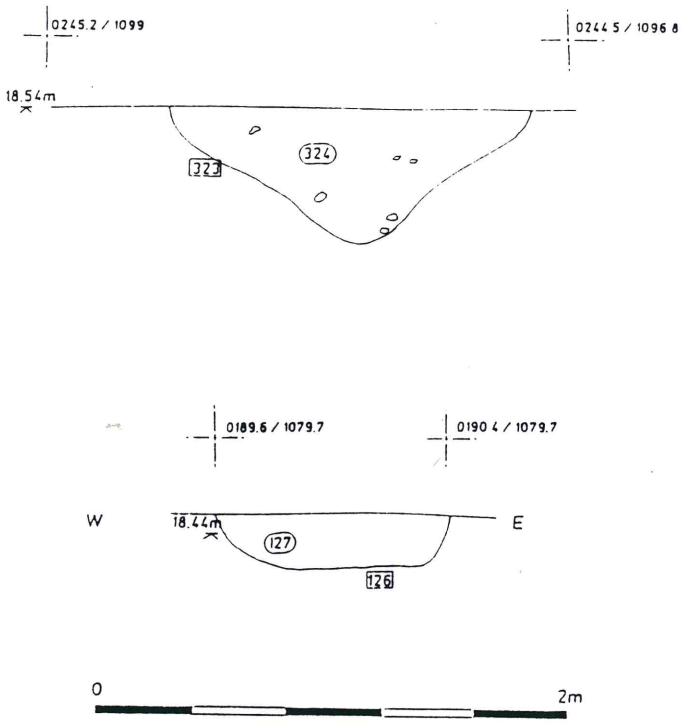

Fig. 15 Sections of Pits in Trench 16

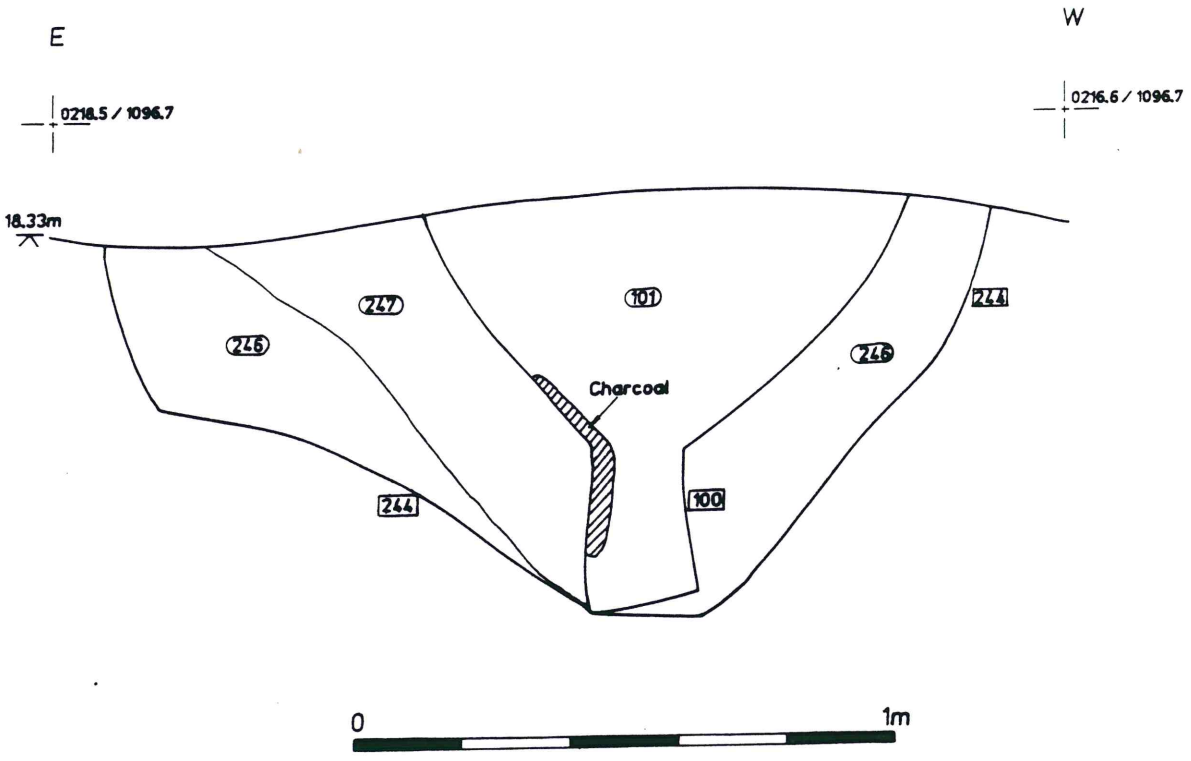

Fig. 16 Section of Pit [244]

were found and so little evidence to date or place features in relation to other features in trer 16 is impossible. Both pits are outside the enclosure of the hengiform monument.

8.4 TRENCHES 1 TO 14.

8.4.1 Trench 1.

This trench ran parallel to the existing quarry edge and was placed to identify any continuat of the quarry section features. It was 100m N-S and 2m wide. It was dug by a JCB and resulting edges were jagged. Topsoil was 0.3m deep and overlay 0.3m of subsoil. Subs includes reworked alluvium which increased in depth moving north along the trench (Fig. 1 There are two features to note in this trench:

1) an east - west running linear feature [006] with a flat base and sloping sides (Fig. 18). It v originally quite shallow but was recut deeper. The fill comprises sterile fine sands and silts. feature is undated but represents a cut through the ditch of a ring-ditch known from cropmar A second ditch (which appears further north along the trench) was unexcavated. A Bronze A date for this feature would not be unusual on the evidence of other excavated ring-ditches linear cropmark containing three Bronze Age bodies where it was cut by the modern qua face intersects with this feature.

2) a series of undulations and depressions [038] & [043] filled with fine silts cut in the top the gravel natural. These are also evident in the section and appear at the base of a prehistc ploughsoil. The hollows preserved in the base of the trench are round-based and are 0.2r 0.5m in diameter. It is believed that these are the result of prehistoric ploughing activity.

8.4.2 Trench 2.

This trench is 100m N - S and 2m wide, it was dug by JCB and has ragged edges which it v necessary to straighten and clean by hand (Fig. 19). It was cut down to natural gravels and three features.

1) a circular pit [015] found within the middle of the trench, marked by a sterile grey-bl clay. The machine removed almost all of it but it was noted as having an origin in prehistoric ploughsoil. The spoil from the feature was isolated in the spoilheap and sieved no finds were recovered. The pit was approximately 1m in diameter.

2) a c.1m wide pit or ditch terminal which was cut from above the prehistoric ploughsoil (I 20) and yielded a single, very abraded, well-fired, oxidised pot sherd of probable Roman d The feature had a rounded base with gently sloping sides. A consistent silt fill built up withi which was, in turn, overlain by a mixed gravel. A covering of alluvium overlay this. The sh came from the silt deposit (019).

3) a complex of 'post holes' in the floor of the trench [038] & [043], these resemble th identified in trench 1. In this trench, however, they shared a general east - west orientation aligned with grooves in the section which came off the base of the prehistoric ploughsoil (0 They are, therefore, interpreted as the remnants of prehistoric ploughing (Fig. 21). micromorphology samples were taken from this layer (016).

An additional channel/ditch was identified [045] which was filled with sterile silty-sand. It very gradual sloping edges which graded into the base and could have been a natural drain channel.

8.4.3 Trench 3.

This trench ran 50m E-W and was 2m wide. It was dug with a JCB and again had rag edges. The prehistoric ploughsoil was evident in the sections (Fig. 22) and so was an overly alluvial cover. There were two features noted.

1) a series of undulations filled by silts, as noted in trenches 1 and 2 [043].

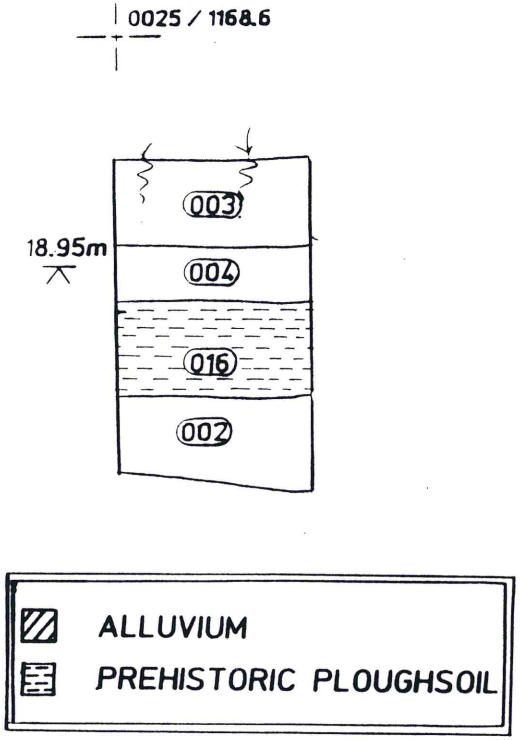

Fig. 17 Section in Trench 1

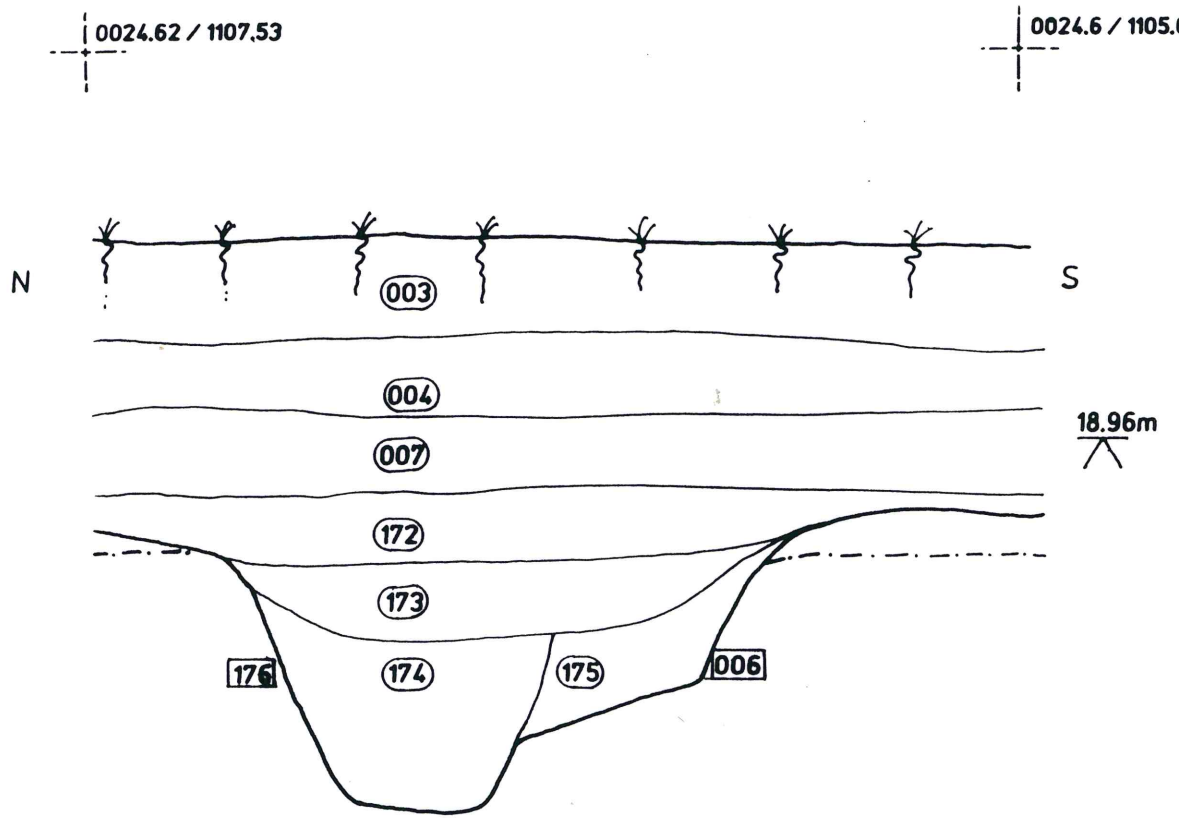

Fig. 18 Section of Feature [006] in Trench 1

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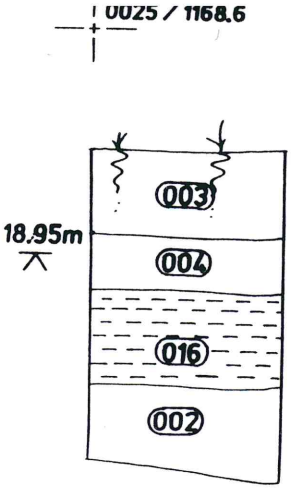

Fig. 19 Section of Trench 2

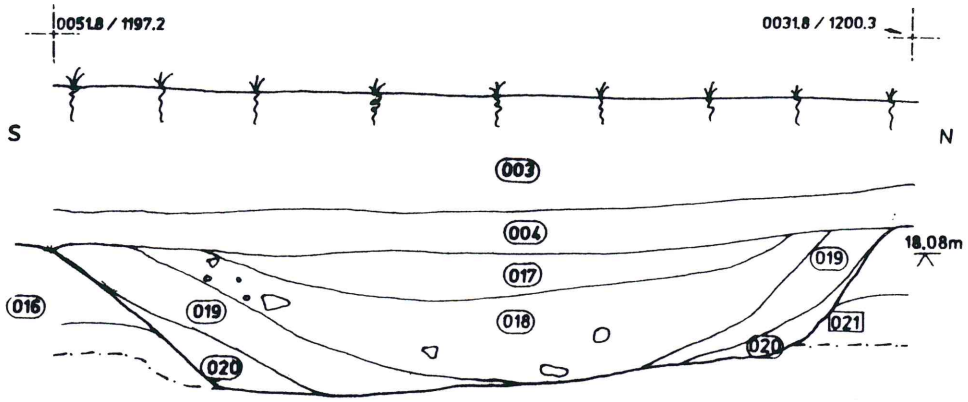

Fig. 20 Section of Feature [021] in Trench 2

ALLUVIUM

PREHISTORIC PLOUGHSOIL

0 2m

0 2m

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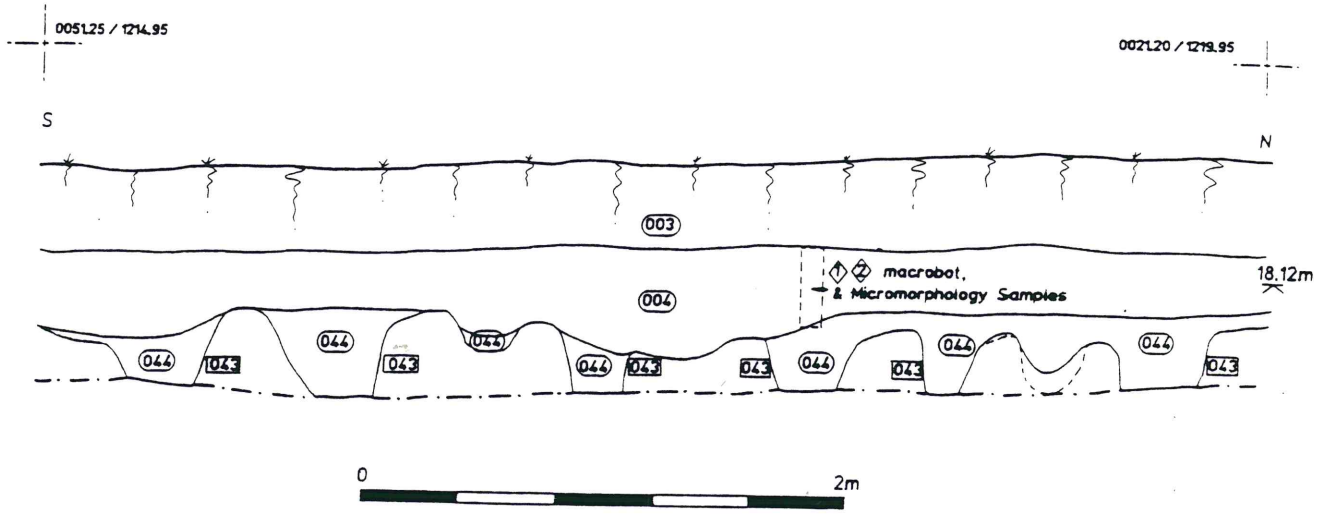

Fig. 21 Plough Marks in Trench 2

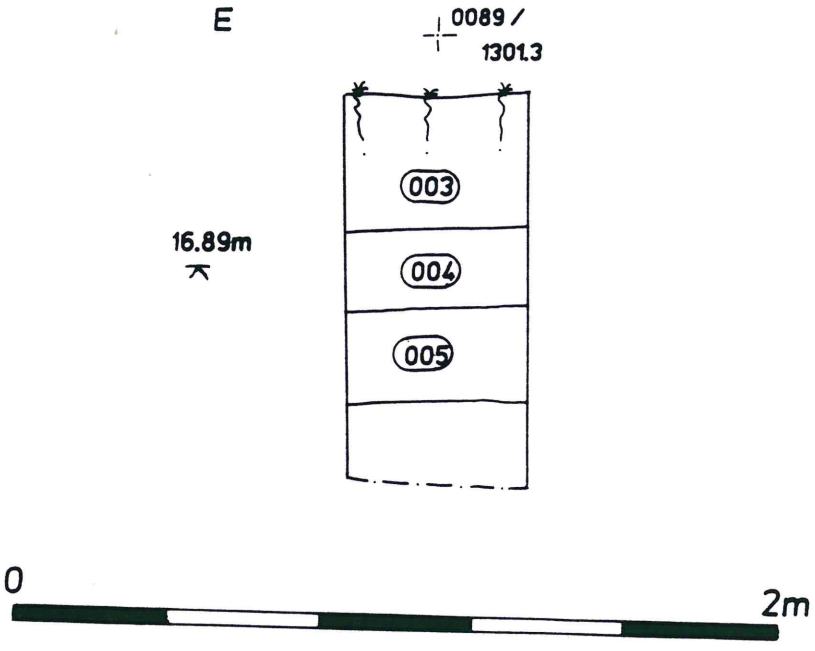

Fig. 22 Section in Trench 3

2) a sub-circular feature [042] identified in the north-facing section, which is probably a pit. It lacked any material for dating. One interrupted layer may be either a lens within the pit or an earlier feature remnant truncated by the digging of pit [042].

A large Barnack stone in the base of the trench was probably a glacial erratic embedded in the top of the gravel.

8.4.4 Trench 4.

This trench ran 100m east - west and was 1.6m wide, it was dug using a tracked machine. Additional boxes were cut back from the line of the trench when features were identified in the trench that required elaboration. Three complexes of features were identified in the trench, these being:

1) a complex of dark organic silts [163], postholes [161] and ditches [109] (Figs 26 & 27).

2) a parallel pair of ditches [260] (Fig. 20) & [270] with evidence of cleaning out, and a series of postholes [294] to retain the cleared material/bank [273] (Figs. 23 & 24).

3) a single north-south running ditch [307] (Fig. 25).

The first has been interpreted as the result of tree cast (the falling tree and moving roots churned up the soil throwing organic material preferentially to the side on which the roots are exposed). The complex of possible postholes and ditches may then be explained as the result of roots.

The second is a pair of parallel ditches which run N-S, and are an extension of the pair of linear features identifiable further south as cropmarks. They are both U-shaped in profile and cut down into natural gravels from the level of the fossil ploughsoil, which can be seen continuing between the two ditches. Both ditches initially had a wash of sand and fine gravels which was then overlain by an infilling of sterile yellow clay. Across the top of this clay was a spread of gravel which appears to have been dragged into the top of the ditch after it was infilled by ploughing. Alluvium then seals the sequence from the modern ploughsoil. No artefacts were associated with any of these deposits, but the eastern ditch was revetted along its eastern edge by a series of 8 to 9 postholes. Four ran N-S along the edge of the ditch in a 2.5m stretch and a further row of posts ran parallel to this. These posts have an average diamater of 0.35m and seem to be placed to hold back material built up from emptying the ditch but their size and frequency may argue for the presence of a more substantial structure running parallel to the ditch, possibly a boundary fence placed onto the top of the embanked ditch-cleaning material. The features are believed to date to the late Iron Age/Roman period because they are cut through the prehistoric ploughsoil which is believed to be of this date and yet they underlie the alluvium which is considered to be of late- or post- Roman date. They may relate to the functioning of the Roman villa which lies to the south of the evaluation area.

The third feature is a single N-S running ditch which is less substantial than the pair of ditches to its west. This single ditch aligns with one of the pair of ditches sectioned in trench 16. It is shallow but cuts into the natural gravel from the level of the ploughsoil and is sealed by alluvium. This stratigraphic information is lacking in trench 16 where modern ploughing cuts as far down as the natural gravel surface. Once again, this feature is devoid of artefacts. It is infilled with sticky clay and had stones dragged across its infilled surface by later ploughing. The dating of this feature would appear to be late Iron Age/Roman on the same set of assumptions used to date it in trench 16 and those for dating the paired ditches in the western part of trench 4. A single posthole [316] was identified on its western edge associated with material cleaned out from the ditch. This ditch is probably associated with drainage or boundary marking of the estate of the Roman villa.

8.4.5 Trench 5.

Trench 5 was placed further north than trench 4 to investigate whether the linear features found in the latter extended further north. It was 100m east-west and 1.6m wide. Once again a

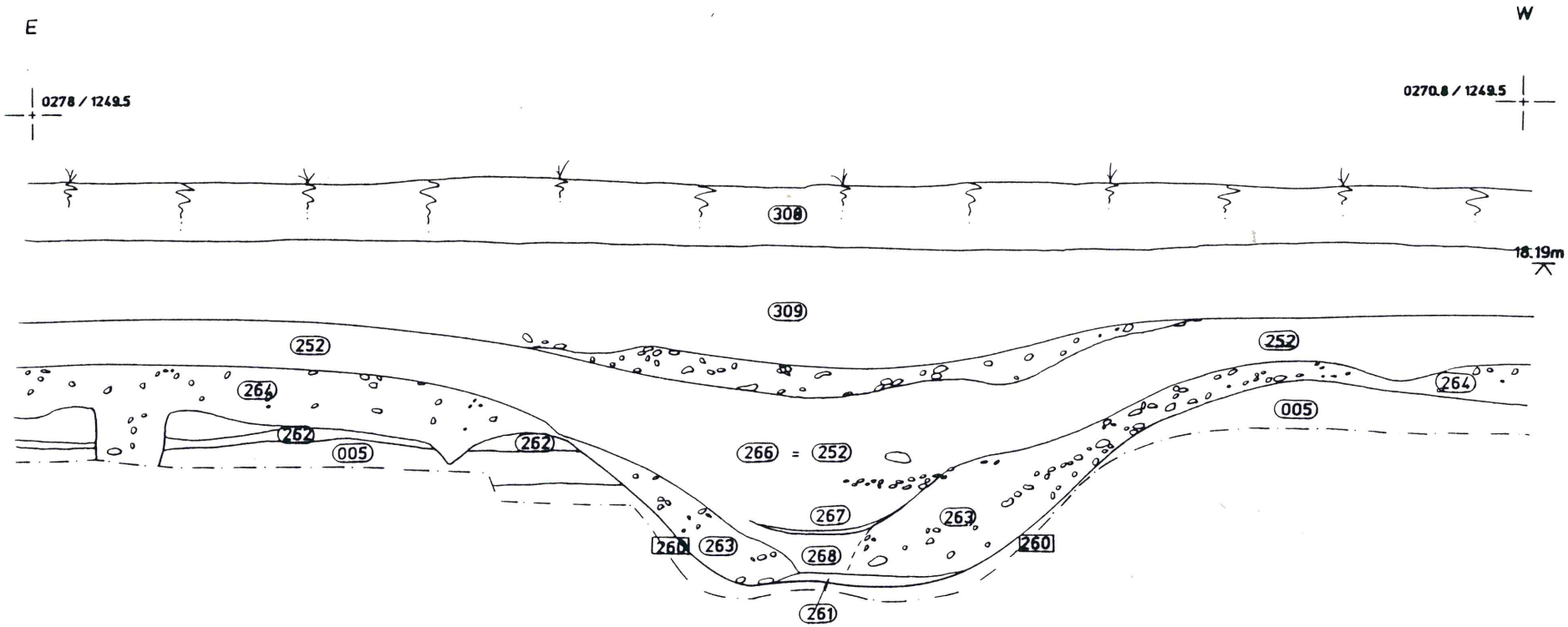

Fig.23 Section of Ditch [260] in Trench 4

0 2m

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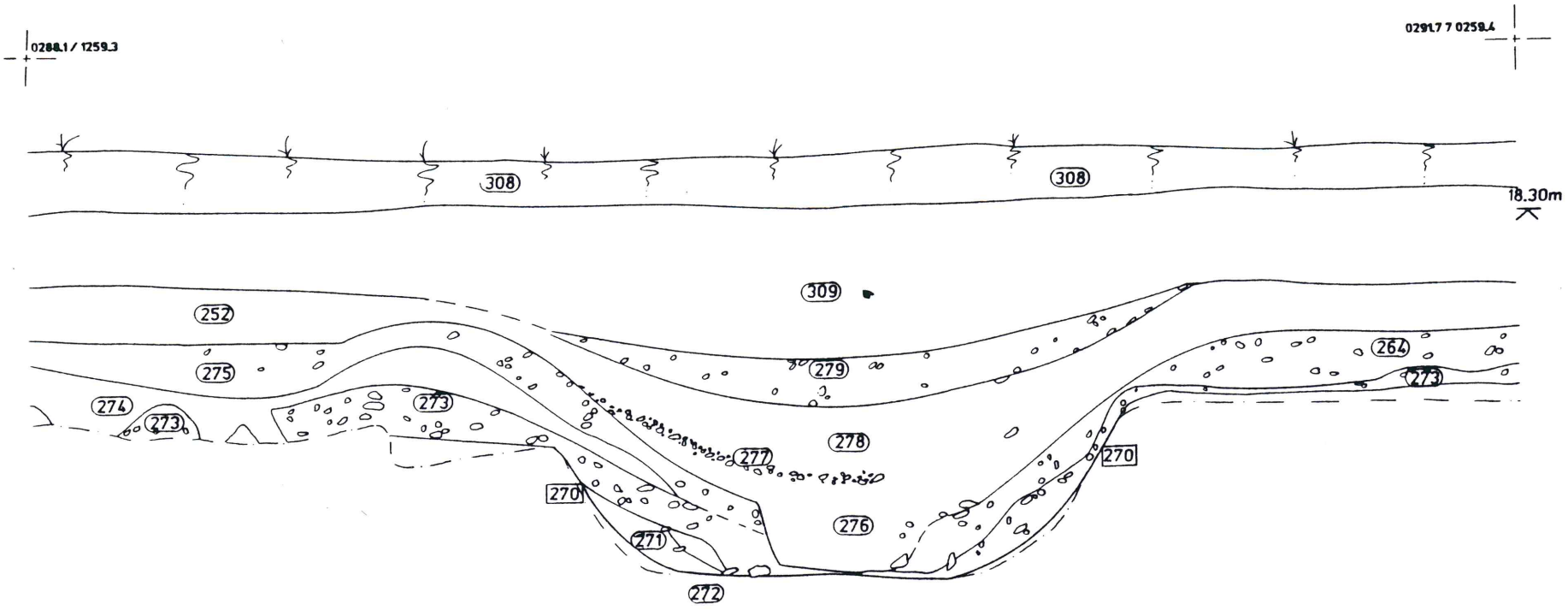

Fig.24 Section of Ditch [270] in Trench 4

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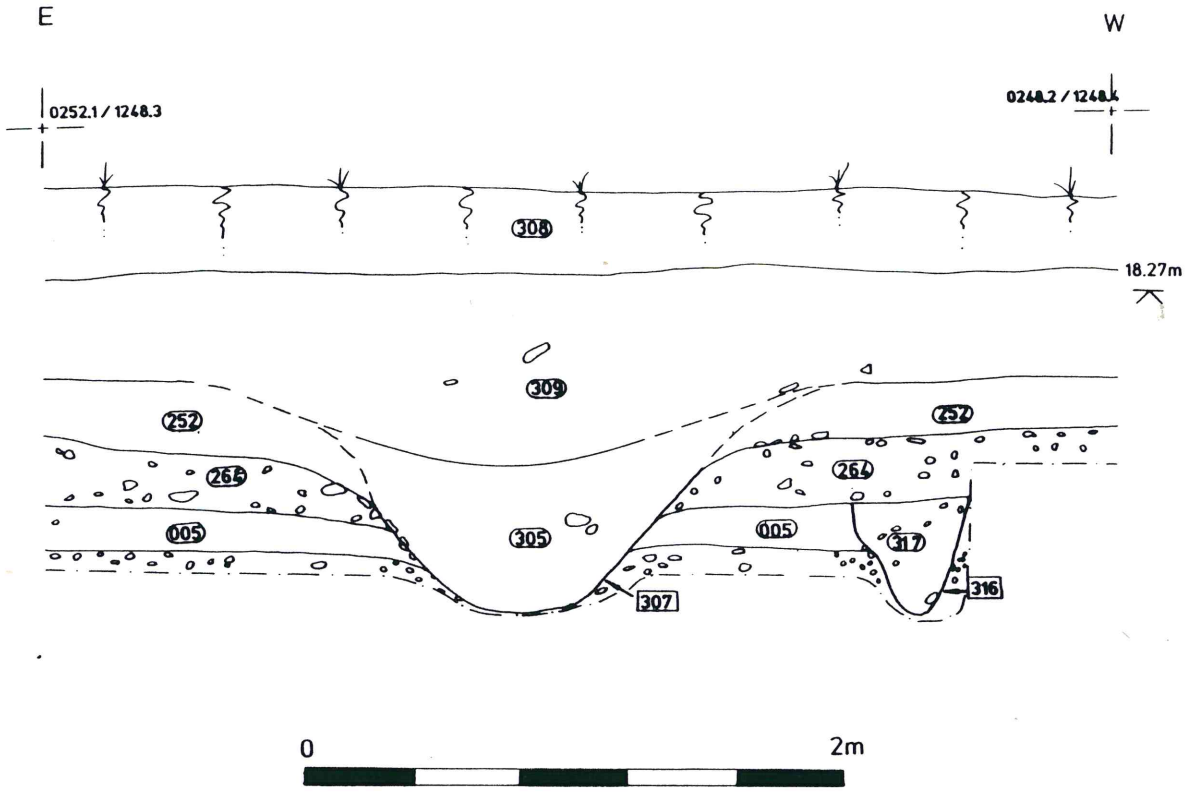

Fig. 25 Section of Ditch [307] in Trench 4

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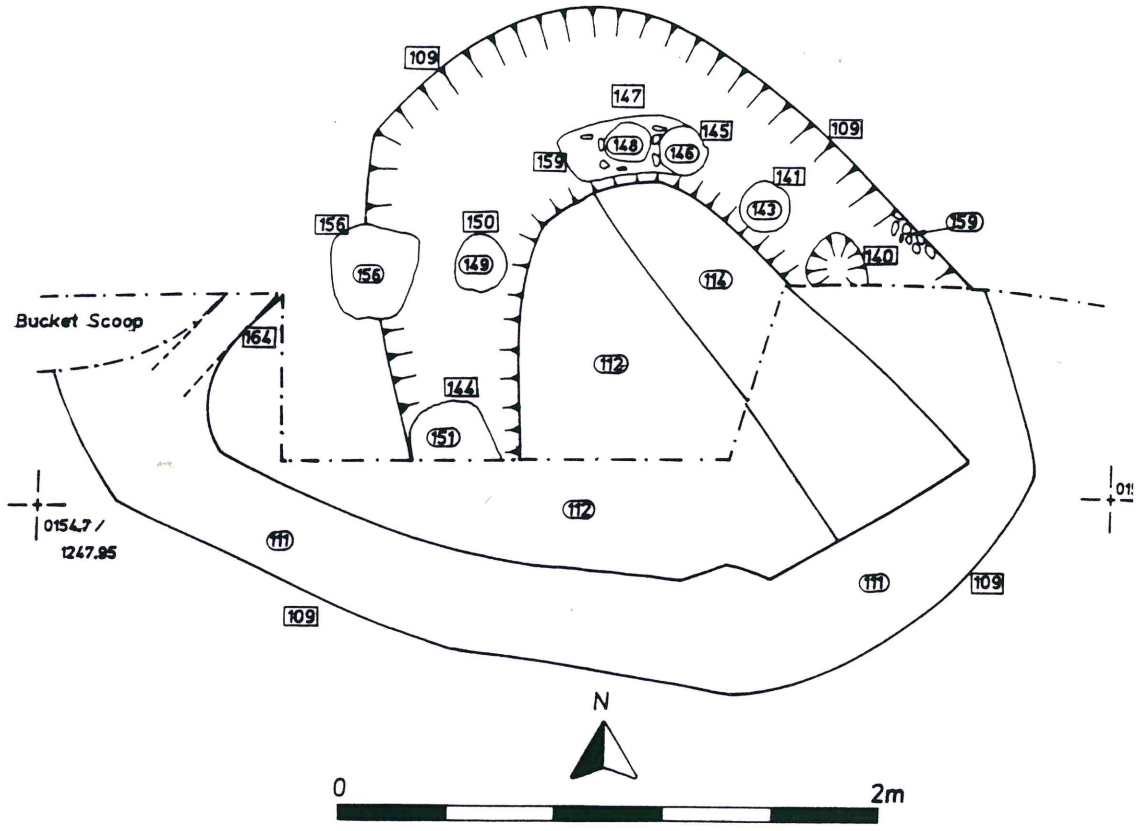

Fig. 26 Plan ofTree Cast in Trench 4

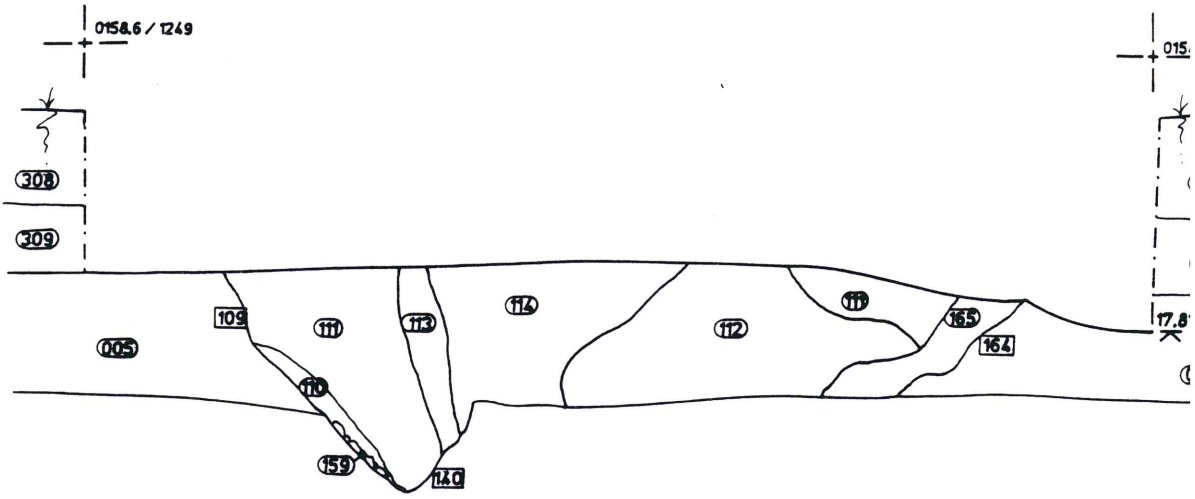

Fig. 27 Section of Tree Cast [163], [161] & [109]

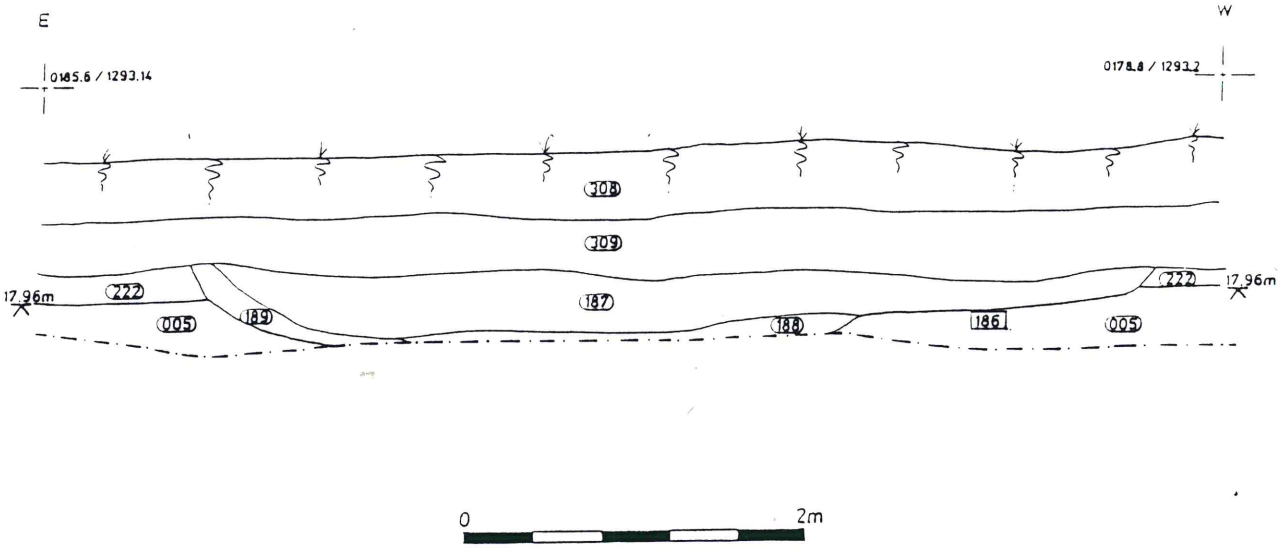

Fig. 28 Section of Ditch [186] in Trench 5

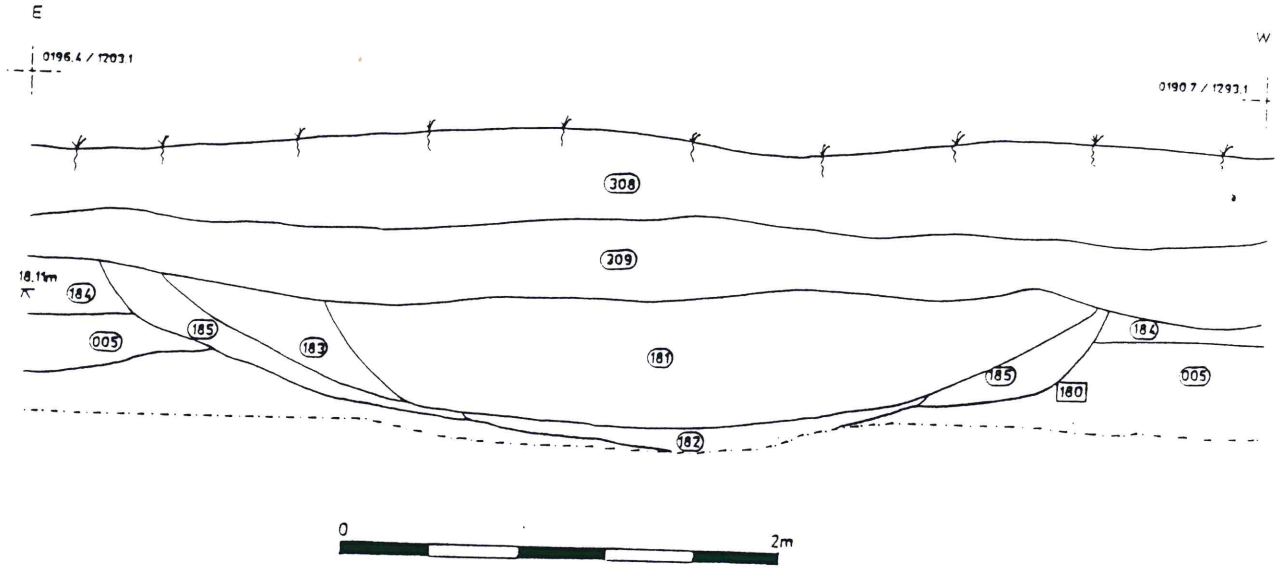

Fig. 29 Section of Ditch [180] in Trench 5

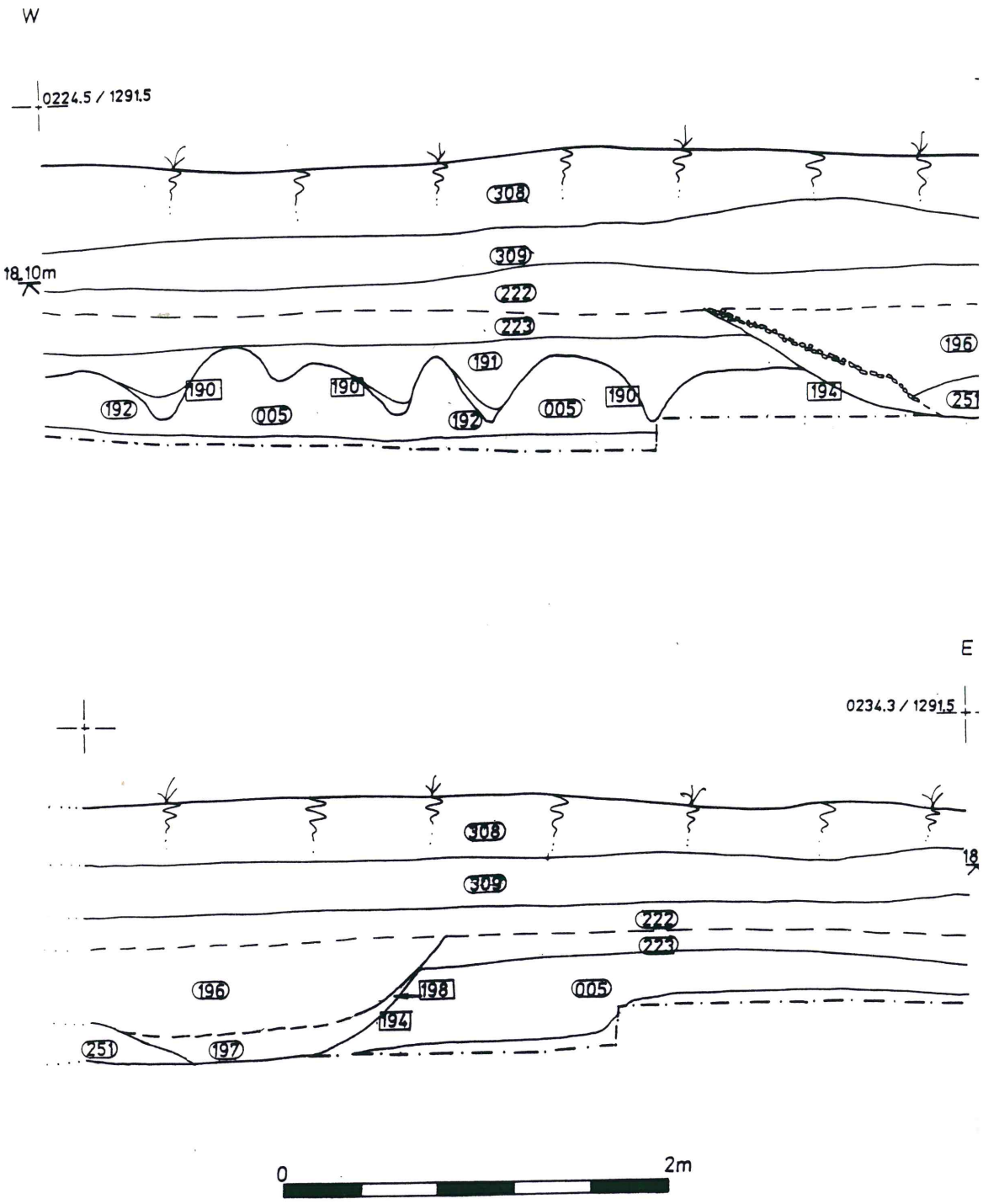

Fig. 30 Section of Recut to Ditch [194] in Trench 5

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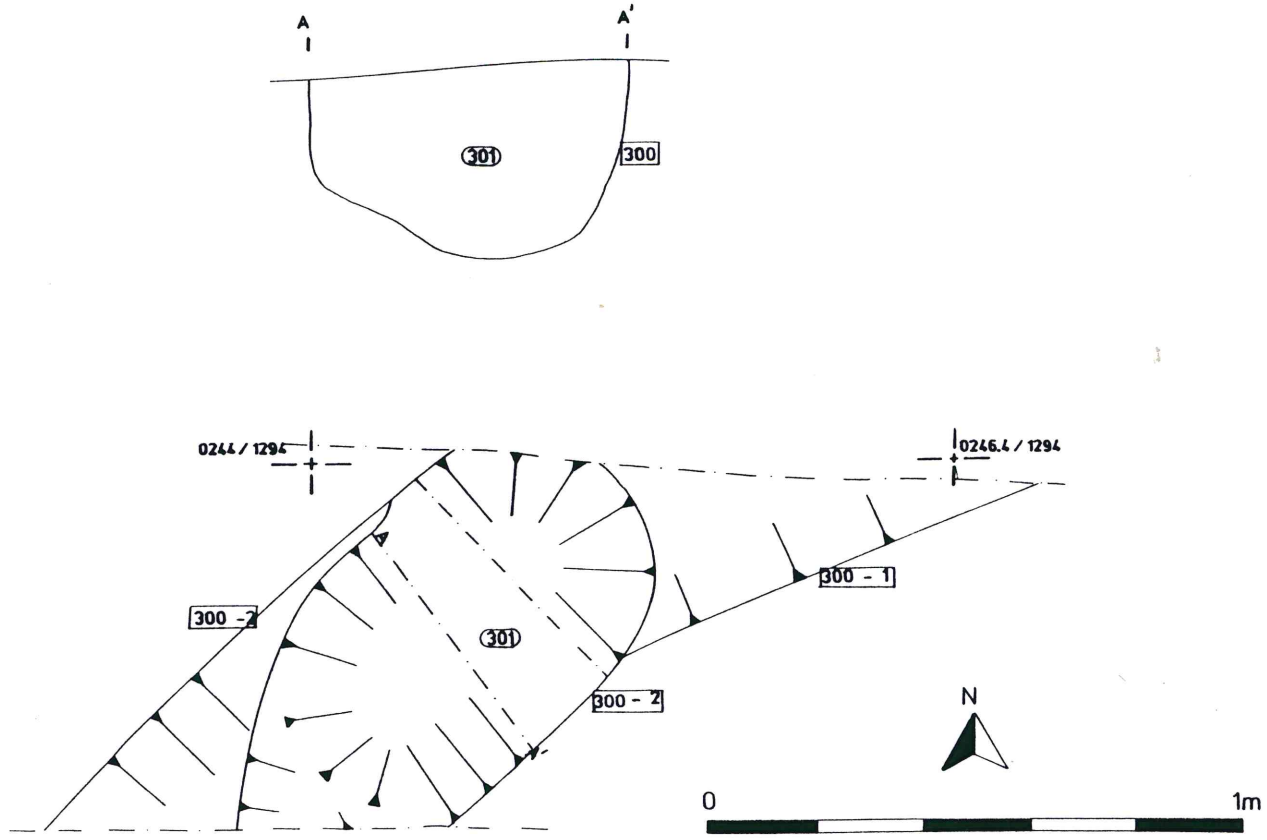

Fig. 31 Pit [300] in trench 5

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prehistoric ploughsoil (c.0.2m thick) and an overlying alluvial covering (0.2 - 0.4m thick) were found running the length of the trench. Features within it comprise three complexes:

1) The pair of N-S running ditches continuing north from trench 4, here labelled [180] & [186 (Figs. 28 & 29). These were identified from their alignment and the grey clay filling them, bu were not sectioned as time did not permit this. Their place in the overall stratigraphy matched that of the ditches in trench 4. The postholes to the east of the ditches in trench 4 were not seen in trench 5 but this could be due to the fact that the base of trench 5 was higher than that o trench 4, so they were simply not exposed. The upper fill of [180], (181) yielded two well fired, shell tempered coarse-ware pot sherds, including a rim sherd (plate 3). These have large fragments of crushed shell as a major visible component and would fit a late Iron Age date.

2) This complex of features is a continuation of the easternmost ditch in trench 4 but on it western edge has, in trench 5, a complex of postholes [190] and a possible bank, while the ditch itself has been recut on its eastern side (Fig. 30).

The postholes are the earliest part of the complex of features, four were identified in the south facing section with another three in the north-facing section. They do not seem to align between the sections. The postholes have two fills, the lower being more clayey than the overlying coarse sands, this could be the result of post-depositional sorting. The postholes are sealed by a thin gravel layer (193) and the prehistoric ploughsoil. The ditch [194] is then cut from the ploughsoil down to natural gravels. There is a slump deposit (251) in the western part of the ditch base which is overlain by material washed in from both sides. After infilling of the ditch part of the buried soil has been dragged into the top of the feature by ploughing. A recut of the ditch is clear on the eastern side [194], it truncates the ploughsoil and mixes material on the western side of the ditch where its edge is less clear. No artefacts were found to give dating to this sequence of events except for three sherds of black, shell-tempered coarse ware which when discovered, were wet and pliable. No decoration is present and no evidence for the form of the vessel can be inferred from these sherds. They came from the initial infilling of the ditch (197), immediately after the western slump deposit. The ditch had a rounded base with sloping sides.

3) The final feature complex in trench 5 is a SW-NE running gully/ditch [300-1] with a sub oval pit [300-2] cut into it (Fig. 31). The upcast from the pit was dumped in a 'D' -shaped mound on the eastern side of the pit. No finds were recovered from either feature and the fills were very homogenous. This feature could be structural, e.g. a line of post pits with a gully linking them, but only one pit has been identified.

In between the feature complexes 2 & 3 was an irregular U-shaped profile ditch which ran N-S It cuts the prehistoric ploughsoil and could be a post-Roman field drain.

8.4.6 Trench 6.

This trench ran 100m E-W and was 1.6m wide, it extended the area trenched towards the edge of the area where cropmarks are visible (Fig. 32). Only two features were identified within these being a posthole [177] 0.64m deep which was cut from below the alluvium *through* the ploughsoil. It, therefore, almost certainly dates to the Roman period. The fill is very dark and rich in charcoal suggesting that the post may have burned *in-situ*. (Fig. 34). No other features could be related to it and no finds were associated with it.

The second feature is a pit [171], or ditch terminal 1.0m wide and 0.4m deep which occurs in the south-facing section (Fig. 33). It was devoid of artefacts and had a flat base with steeply sloping sides. The pit/ditch was cut from the subsoil and so is a relatively recent feature probably a field drain.

Alluvial cover in the trench is c.0.7m thick and the prehistoric ploughsoil lies towards the base of the trench.

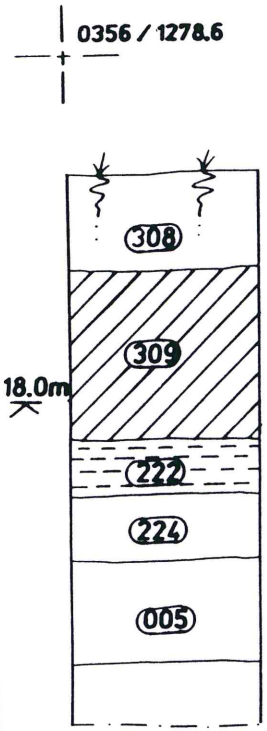


Fig. 32 Section of Trench 6

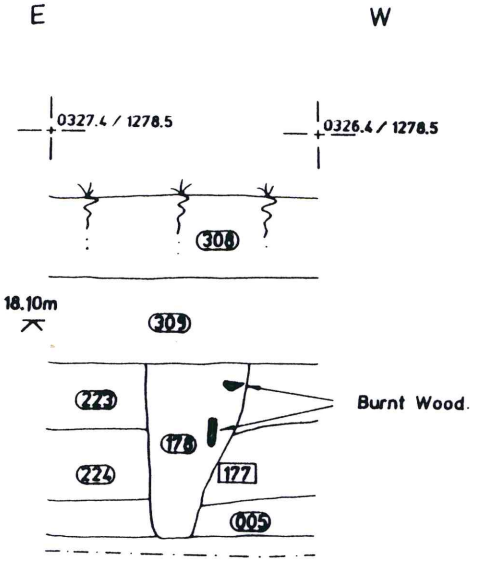


Fig. 33 Section of posthole [177]

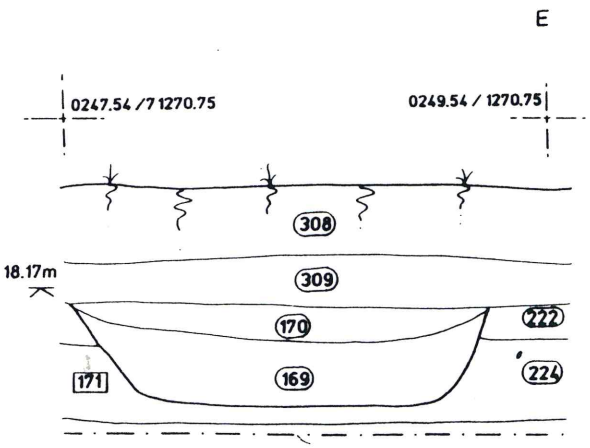
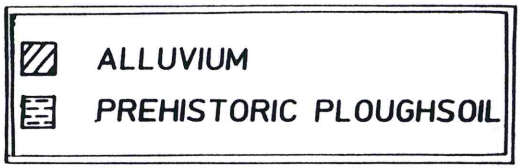


Fig. 34 Section of pit [171] in Trench 6.



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8.4.7 Trench 7.

This trench was excavated running N-S 100m and 1.6m wide. It ran through the eastern part of the cropmark area to identify the depth of topsoil and alluvial cover of features, to seek for further features and extend the trenched area further east. A number of features were identified and the alluvial cover was seen running throughout the length of the trench varying in depth below the ploughsoil between 0.16m - 0.3m (Fig. 35). The prehistoric ploughsoil was present in the south end of the trench, being 0.07m thick and a series of ploughmarks could be seen cutting into the underlying natural gravel.

Features identified were:

1) a large ditch/channel [053] at the northern end of the trench. It was flat bottomed with a straight-sloping southern side. The lowest fill has a high humic content. The ditch is running approximately E-W and the northern edge of it was beyond the end of the trench. No finds were recovered from the feature.

2) a 3m wide, shallow (0.25m) gully [055], running SW-NE cut into natural gravel. No finds were recovered from it but it pre-dates the alluvium as it underlies it. It has a rounded base and gently sloping sides, the fill is mixed gravels and is likely to be natural in origin.

3) a 5m wide probable palaeo-channel [058] runing SW-NE with a gentle slope to its sides and a rounded base. The fill is a series of well-sorted sands.

4) a double linear feature [060] two parallel strips only 0.6m wide together, having identical fills and running SW-NE. They are cut through an overlying gravel layer and are best interpreted as ploughmarks - other linear features [064] & [210] like this also occur in the south end of the trench and all have similar fills, sandy silts with some gravel. Unlike the double linear feature, however, they are less regular and have been truncated by machining.

8.4.8 Trench 8.

This trench runs 100m E-W and is 1.6m wide. It was placed in the northern part of the cropmark area and was intended to show the amount of soil and alluvial cover in this area. Both the alluvium and the prehistoric ploughsoil were identified along the length of the trench (Fig. 36) and the depth of alluvial cover generally increased from west to east. Only two features were observed in section (Fig. 37) and none in the floor of the trench itself. Both of the identified features [211] & [213] were U-shaped pits or ditch terminals cut from the subsoil and, therefore, postdate both the alluvium and the prehistoric ploughsoil. They were similar, being 0.4m & 0.48m deep and 0.85m & 1.0m wide. No finds came from either feature. Both could be modern field drains.

8.4.9 Trench 9.

This trench ran 100m E-W and was 2.0m wide. It was placed further south than trench 8 to give further information about the topsoil and alluvial cover in the vicinity of the double ring-ditch known from cropmarks (Fig. 38). The western end of the trench had a well developed series of ploughmarks [218] (Fig. 39). The buried soil was also well developed in this area and the covering alluvium increased in depth from west to east. No features were observed either in the sections or in the trench itself.

8.4.10 Trench 10.

This trench was placed to explore the topsoil depth and alluvial cover near the single ring-ditch identified by cropmarks, and to investigate the southern part of the site. It ran 100m E-W and was 2m wide. The only features identified in this trench were some dark, silt-filled 'ditches'. It was thought that as these occurred in both sections the trench had cut through a small ring ditch. This was investigated by using the machine to cut back an extension on the northern side of the trench. Once this had been done, the 'ditches' were seen to be part of a complex o

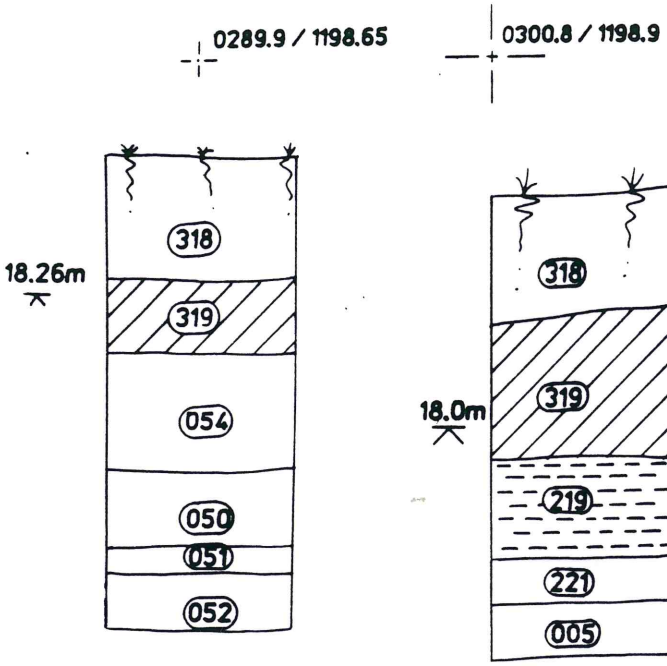

Fig. 35 Section of Trench 7

Fig. 36 Section of Trench 8

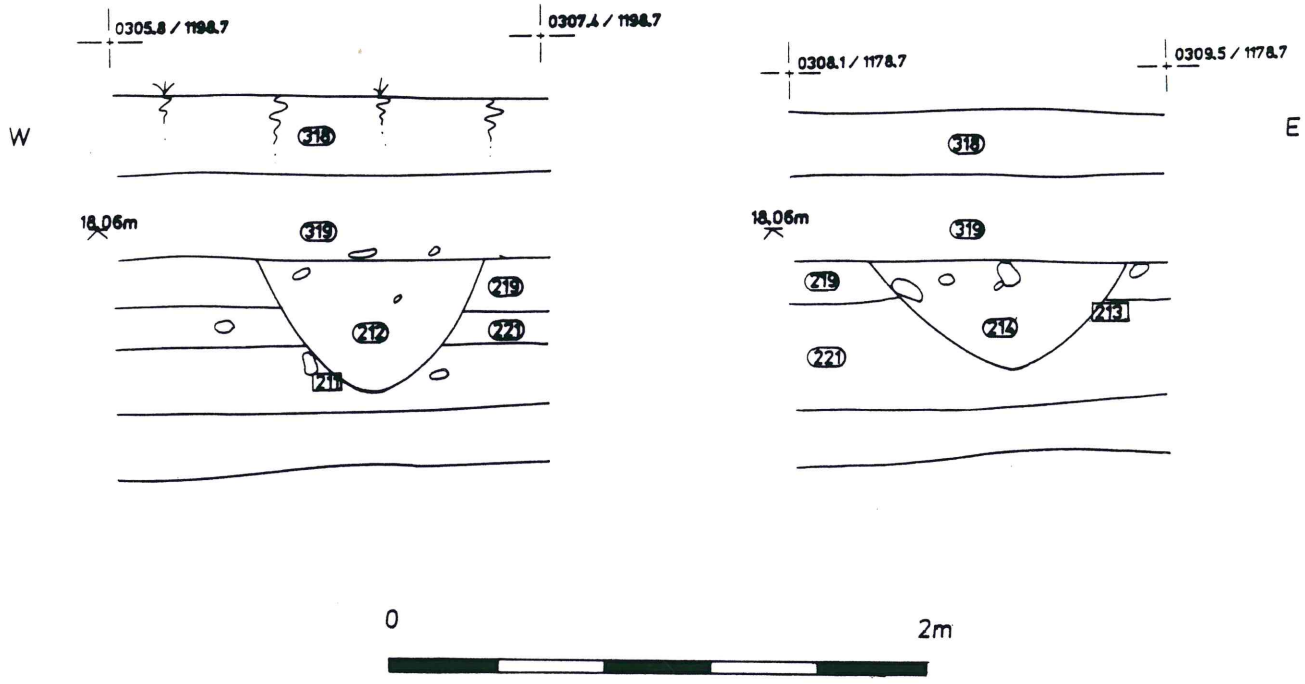

Fig. 37 Sections of ditches [211] & [213] in Trench 8

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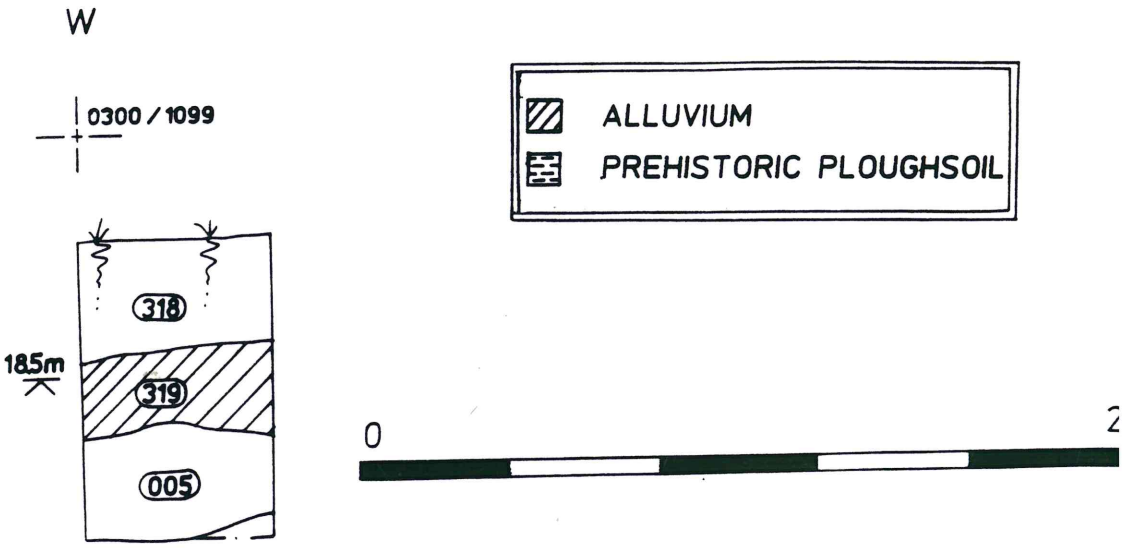

Fig. 38 Section of Trench 9

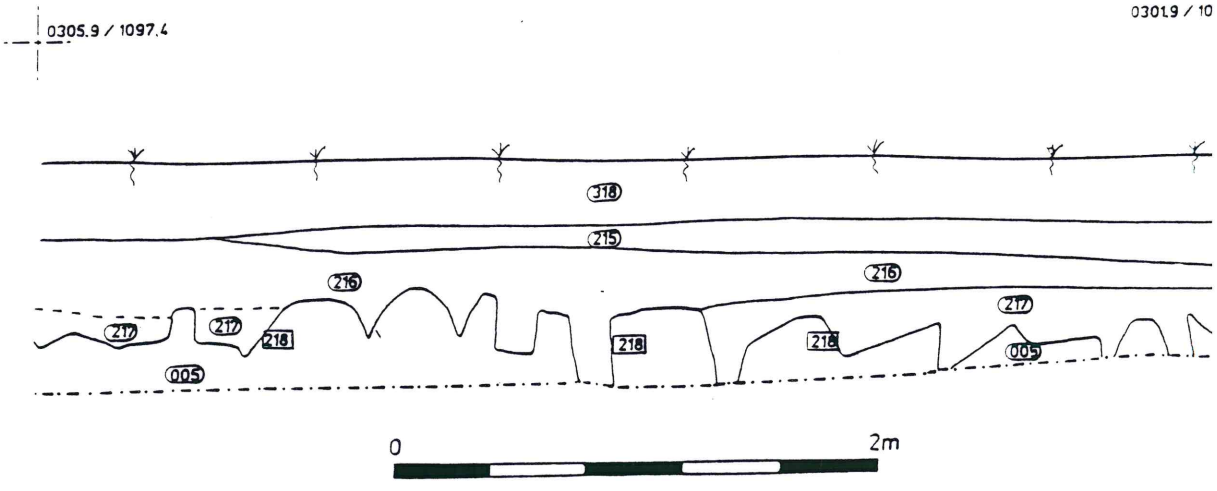

Fig. 39 Ploughmarks in Trench 9

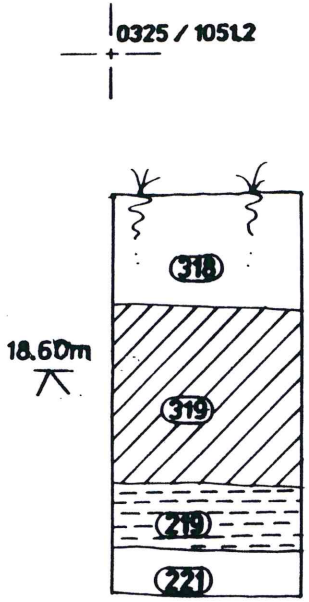

Fig. 40 Section of Trench 10

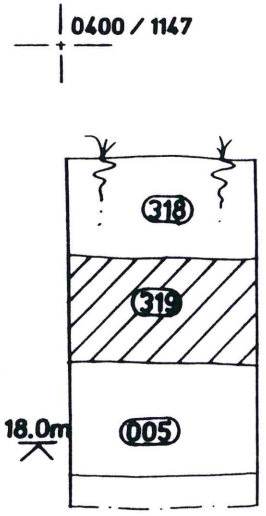

Fig. 41 Section of Trench 11

ALLUVIUM

PREHISTORIC PLOUGHSOIL

0 2m

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features that are now interpreted as a tree cast. Their resemblance to the complex of features excavated in detail in trench 4 [109], [161] & [163] is striking. The trench 10 complex of features were given master numbers [77] and [236].

The ploughsoil in this area is poorly defined but overlying alluvium is clear and has a depth ranging between 0.2m - 0.7m (Fig. 40).

8.4.11 Trench 11.

This trench was placed to extend the trenched area further east, beyond the area where cropmarks are visible. It was 100m E-W and 2m wide (Fig. 41). A series of probable drainage ditches were noted in the north-facing section of this trench (Figs. 42 & 43)). All are cut from the subsoil into the underlying alluvium and so are relatively late in date. These cuts are [285], [290], [291] & [330]. All are aligned N-S.

A further two features are cut from below the alluvium. Both appear to be ditches, one, [286] curves round from the south-facing section into the north-facing one, but its base has been truncated in the trench by machining. It had a grey-black clay fill but no finds were recovered. It had a U-shaped profile in section.

The second ditch [287] also had a U-shaped profile and was marked by a dark grey clay fill, it was very shallow and cut into the underlying gravel. It was orientated NE-SW.

Also below the alluvium was a third feature which was 'sausage-shaped' in plan, with a U-shaped section, again with a clay fill. The shape results from the feature [28] terminating within the trench, it did run into the north-facing section, but has been truncated in the base of the trench by machining.

All the features below the alluvium probably result from agricultural activities in the Iron Age/Roman periods, and may well be associated with the Roman villa which lies to the south of this trench.

8.4.12 Trench 12.

This trench was 100m N-S and 2m wide. It had an electricity cable in its southern end. The depth of alluvial cover over the prehistoric levels ranged between 0.2m - 0.6m whilst the prehistoric ploughsoil was not present (Fig. 44). No features were identified in the trench and no finds were recovered from it either.

8.4.13 Trench 13.

This trench was placed to extend the trenched area further east whilst linking with the section of trench 12. It measured 100m E-W and was 2m wide. A single complex of features was identified in the trench. This complex comprises two possible ditches [282] & [281] with disturbed fills and sediment between them. They do not run into the north-facing section and resemble the tree casts in trenches 4 and 10 but for the lack of clear, organically-rich sediments, although the fill (258) of feature [281] does get progressively darker from west to east. No artefacts were recovered from this feature complex. It is overlain by the alluvium (Fig. 45).

8.4.14 Trench 14.

Trench 14 runs 100m N-S and is 2m wide. The prehistoric ploughsoil is not present in this trench but the alluvial cover is well developed, ranging from between 0.5m to greater than 1.0m thick (Fig. 46). No features or artefacts were found in the trench.

8.4.15 Environmental considerations.

The identification of an extensive prehistoric ploughsoil and sequences of alluviation led to the collection of samples for further environmental study. During this evaluation basic assessment of the 'potential for analysis' was undertaken in that samples of the ploughsoil were examined

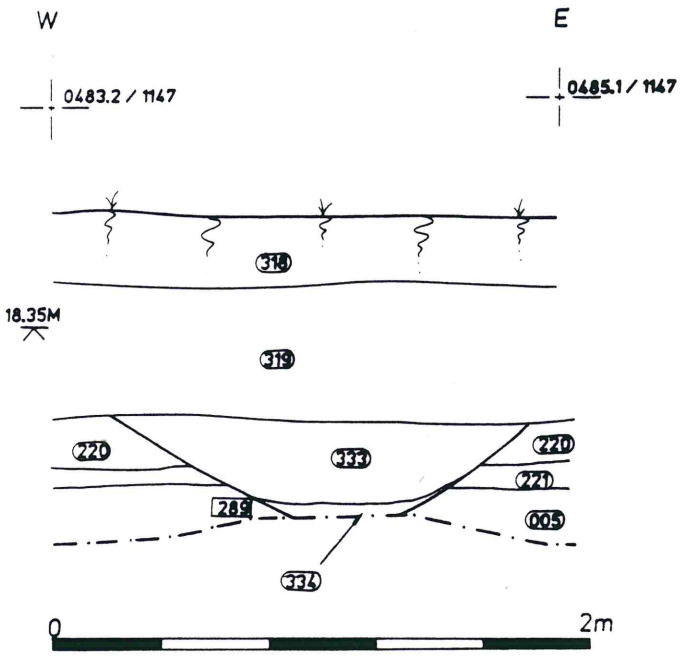

Fig. 42 Section of ditch [289] in Trench 11

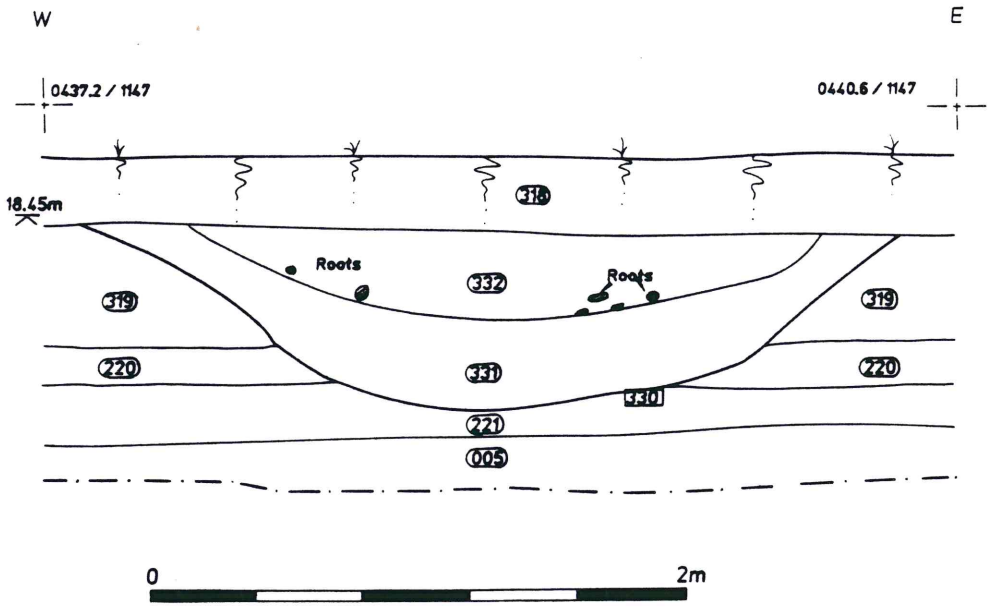

Fig. 43 Section of ditch [330] in Trench 11

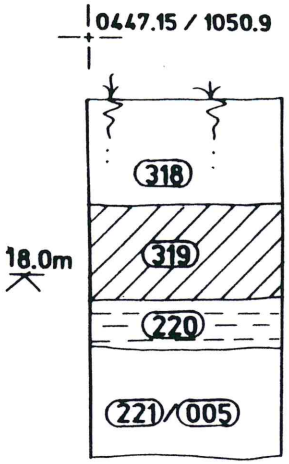

Fig. 44 Section of Trench 12

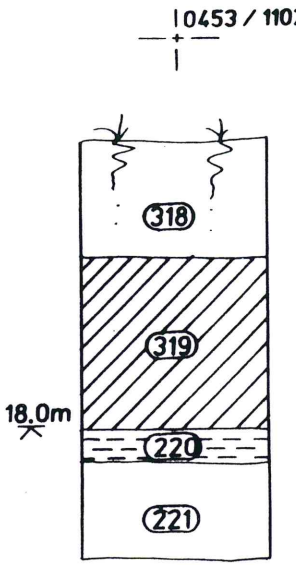

Fig. 45 Section of Trench 13

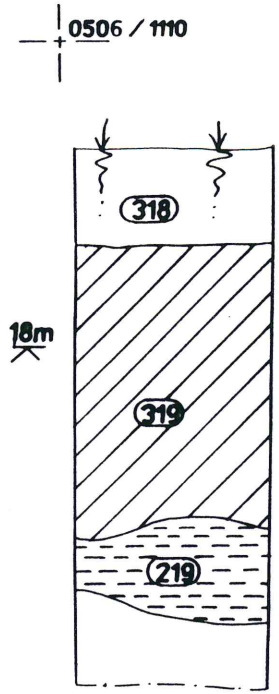

Fig. 46 Section of Trench 14

ALLUVIUM

PREHISTORIC PLOUGHSOIL

0 2m

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see suitability for micromorphology and a soil sample was studied for its pollen content. The results of these assessments are presented in appendix 6 and the environmental aspects of this site should be noted as a major element for any future work. In summary of their work further detailed work on radiocarbon dating will be required, along with the study of pollen and soil samples. Samples for macrobotanical research have been taken and are held in the County Council Archaeology store at Fulbourn.

9.0 INTERPRETATION.

9.1 Overall the trenching revealed two main forms of feature, pits and ditches. These can be related to two generalised land uses; agricultural and ritual. A sequence of land use may be drawn up as follows:

1) General clearance of the valley floor for arable agriculture during the Neolithic.

2) The placing of a series of burial monuments (ring-ditches) across the valley floor near the river in the Bronze Age.

3) Further development of the lowland for agricultural use during the Iron Age and continuing into the Roman period.

4) A period after the Roman villa was used when the area was too wet for agriculture and alluvium was laid down.

5) A post alluvium return to agriculture with the digging of field drains in relatively recent times.

There is a striking lack of artefacts, which may partly be explained as a result of machine trenching through the cultural deposits, although feature fills were sampled and sieved. Additionally, finds were very rare in hand-dug features and so the lack of finds could reflect a genuine paucity of materials in archaeological deposits.

9.2 The most important results of the trenching are:

1) the discovery of a well-preserved prehistoric/Roman agricultural landscape witnessed by the presence of a prehistoric ploughsoil, and more occasionally ploughmarks, in the underlying deposits.

2) the recognition that the site is covered by a depth of alluvium which caps the archaeological features and has preserved them. Therefore, the site has a regional importance as such a well-preserved landscape with so many intact features is very rare.

3) the recognition of features beneath alluvial cover demonstrates that the cropmarks represent only a minimal amount of the wealth of archaeological evidence in the area.

4) trenching has revealed a series of features not previously known from cropmark evidence.

5) a river channel has been identified in the east of the site which preserves a valuable amount of environmental data which, when added to the potential environmental evidence from the preserved agricultural landscape, makes Barnack of great interest to both environmental scientists and archaeologists.

All materials from the evaluation at Barnack are currently stored in the archive at the Cambridgeshire County Council Archaeology Section store.

10.0 ARCHAEOLOGICAL POTENTIAL.

10.1 The Barnack Road Quarry Extension has significant archaeological potential for two reasons. Firstly, background research shows that the Welland Valley has numerous sites which are often complex and multi-period, and of importance both regionally and nationally (and

potentially, internationally). Secondly, study of the archaeological resources at the site thus far reveals this same potential resulting from the following features:-

(1) Widespread occurence and clarity of cropmarks.

(2) Variety of cropmarks (indicating preservation of features of different dates).

(3) Unusually fine results obtained by geophysical survey for a gravel substrate.

(4) Lack of surface finds of pre-Roman date (showing lack of plough damage although the area of trench 16 is subject to plough disturbance and the farmer intends pan-busting in the area of trenches 1-3).

(5) Protective depth of alluvial cover shown in auger holes and trenches.

(6) Existing quarry section and trenches show depth of deposits, high clarity of features and their fills and the lack of disturbance of those fills.

(7) Proximity of the river and the presence of gleyed clays in the auger holes and trenches 15 & 17 suggests hydrological conditions unusually favourable to preservation of organic material e.g. timber and peat in both these trenches.

(8) Trenches show archaeological features are more frequent than just those mapped by cropmarks.

(9) Trenches show a complex of possible agricultural features associated with a prehistoric/Roman ploughsoil .

(10) Trenches reveal a series of ditches which are associated with ritual monuments such as the ring-ditches and the 'hengiform monument'.

(11) Environmental potential for the site is great both because of the stream channel and alluvial cover, and because of the evidence for a largely intact, buried ancient agricultural landscape.

11.0 CONCLUSIONS.

11.1 The Barnack Road Quarry Extension site has many features that require furthe investigation. It is suggested that, should the mineral extraction go ahead, there is full allowanc for archaeological investigation (including environmental work) of features prior to the destruction. The identification of the ploughsoil and ditches which may be associated with th Roman villa would be usefully developed by dating and mapping of the ditches in relation to th villa and study of its economic functioning. Another villa further east in Barnack parish has bee briefly tested and could be usefully compared. The villa itself is unexcavated and subject considerable plough damage and the attention of metal detector users and would also benef from archaeological attention. It lies outside the area of application for gravel extraction b clearly has importance in understanding the features within the area.

11.2 The nature of the 'hengiform monument' and any features within its bounds would be particular interest, as would further investigation of the double ring-ditch in trench 16. The latt has an inner ditch section which would appear to be a timber slot. Such monuments are knov but are rare and so would repay further investigation. The ring-ditches identified in cropmar and geophysical survey are 'known' resources which would also repay specific attenti especially as the double ring-ditch has two magnetic anomalies within it which probab represent burials. The Barnack Man burial should be considered in this context - the propos area is a Bronze Age burial field of considerable extent and few of these have been recent studied (elsewhere these are upstanding monuments and so were subject to digging in earli times when recording was less rigorous). Particular note should also be made of the quar section feature and the fact that the ring-ditches may well contain further human remains a should be excavated fully. The removal of these would be necessitated by quarrying anyway.

11.3 The geophysical survey has isolated a large ditched enclosure and associated features in the eastern part of the proposal area (Fig. 5, areas G, H & J) and the nature of this and its relationship to the stream channel would be a subject of interest in understanding the use of the valley landscape and the role of the river in settlement history. Additionally, geophysical survey identified a large ditch and associated features in the western part of the proposal area (Fig. 5, area D) to the south of trench 3. This requires investigation as to its nature, date, etc.

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GLOSSARY OF ARCHAEOLOGICAL TERMS.

Anglo-Saxon. The period dating between the withdrawal of the Roman legions in 410 and the Norman invasion of 1066. Within this period several ethnic groups from northern Europe vied for control of the British Isles, including the Angles, Saxons, Jutes, Danes, and Norwegians. The latter two groups are collectively known as the Vikings and became involved in British politics from the eighth century, later than the others. The Vikings were successful in occupying a large part of the north and Midlands of England, before providing a King (Cnut) for the whole of England. For most of this time England was divided up into several kingdoms until Saxon resistance to Viking incursions led to the unification of England under Aethelstan and Alfred.

Artefact. Any object made by people. Generally, this word is used for finds such as pottery, stone tools, or metal objects, but it can be used in a much wider context in that the landscape we have today is a product of human activity and is thus an artefact itself.

Bronze Age. Prehistoric period c. 2000 - 700 BC when bronze was used for many types of tools and weapons.

Contracted/Crouched Burial. A burial of the body with the limbs tightly flexed in a 'foetal' position, commonly used in the Bronze Age. It can save labour in grave digging as it takes up less space.

Cropmarks. Archaeological features below the ploughsoil can affect the growth of sensitive crops through moisture retention or loss. For example, the growth of cereal crops over buried ditches or pits will encourage rapid growth leading to tall, dark coloured plants, whereas walls and roads will lead to stunting and faster yellowing of the crop. These discrepancies in crop growth can be easily detected from the air, and by taking photographs the cropmark patterns can be plotted onto maps and given provisional interpretation.

Cursus. A linear feature of Neolithic date formed by a bank and ditch on both sides, possible functions suggested for them have been as trackways, horse racing tracks and ritual processional ways.

Enclosures. An area defined by a continuous surrounding ditch. These may be enclosures around human settlements, fields, or paddocks for stock. Rectilinear enclosures are ones with straight sides and corners, whilst curvilinear enclosures are ones with rounded sides.

Fieldwalking. Technique of archaeological survey. Walking over ploughed and weathered soil, an experienced observer can collect many ancient artefacts, and by plotting the distribution of such find spots on maps an idea of the use of the landscape can be built up for each period of the past.

Geophysical Survey. Investigation of changes occuring in the magnetic and electrical characteristics of the soil, which can often be induced by human activity.

Henge. See below, hengiform monument.

Hengiform monument. A feature which has the form of a henge, i.e. a circular area with opposed entrances formed by a bank and ditch, the bank of which is outside the ditch and, therefore, unlikely to be a defensive earthwork. Some of these characteristics are lacking even in 'true' henges and a hengiform monument may grade into the ring-ditch feature type, being, however, generally larger than them.

Iron Age. Prehistoric period c. 700 BC - AD 43 when iron was used extensively for tools and weapons. The period traditionally ends with the Roman invasions of AD 43 but in fact

there was a considerable time of adjustment after this date when the Iron Age way of life continued with little change from Roman influence.

Medieval. Historic period that begins with William the Conqueror's invasion in 1066. Post-Medieval is generally considered to date from 1500.

Mesolithic. The period from the end of the Last Ice Age at 10,000 BP until the start of the Neolithic period at c. 3500. The life style of the people was a continuation of hunting and gathering, no polished stone tools or pottery are associated with it in England.

Neolithic. Prehistoric period c. 3500 - 2000 BC when farming and pottery were introduced. Stone tools of fine workmanship were produced and exchanged over long distances, but before the use of metals.

Palaeosol. A preserved soil which does not owe its origin to the existing land surface.

Penannular. In the form of a complete circle, except for a single break in the ring.

Pit alignment. A line of pits, usually dated to the Iron Age or Roman period. They are thought to be a native means of boundary marking. The pits do not often have rubbish in them and so are not thought to be rubbish pits.

Posthole. A hole dug to receive a post. They can also result from driving posts into the ground. The latter, however, do not have distinct fills such as packing and a post pipe. A post pipe is the fill of a posthole which formed in the place of a removed post.

Ridge and Furrow. Medieval cultivation techniques led to a phenomenon of corrugated fields. Strips of land were allotted to individuals and a furrow was left between one person's strip and the next, leading to a corrugated ridge and furrow effect. Ridge and furrow shows up as cropmarks on air photographs and more rarely as earthworks in pasture fields.

Ring-ditch. A continuous circular ditch which is all that remains of a ploughed out round barrow, or the drainage ditch (eavesdrip gully) that surrounded a round-house.

Rolled. A measure of how worn the edge of worked flint is, when transported by streams the flint rolls downstream and the edges wear. The degree of rolling can indicate how far the piece has been transported.

Roman. Historic period AD 43 - 410 when much of Britain was part of the Roman empire. The term Romano-British is now widely used to describe the people of this period, as few were Roman themselves, but they were a provincial manifestation of the empire developing in a unique way. AD 410 was the date the legions were withdrawn, but the Romano-British culture continued for some time into the 5th century in tandem with Anglo-Saxon migration.

Round barrow. A Bronze Age burial mound formed by heaping up earth over a central burial. They have several forms, including numbers of encircling ditches and can have many burials in them. The first burial is known as the primary burial, subsequent ones are referred to as secondary burials. It has been suggested that these burial mounds are a way of marking tribal territories, and tney are often placed in prominent locations. They can occur in clusters known as 'barrow cemetries'.

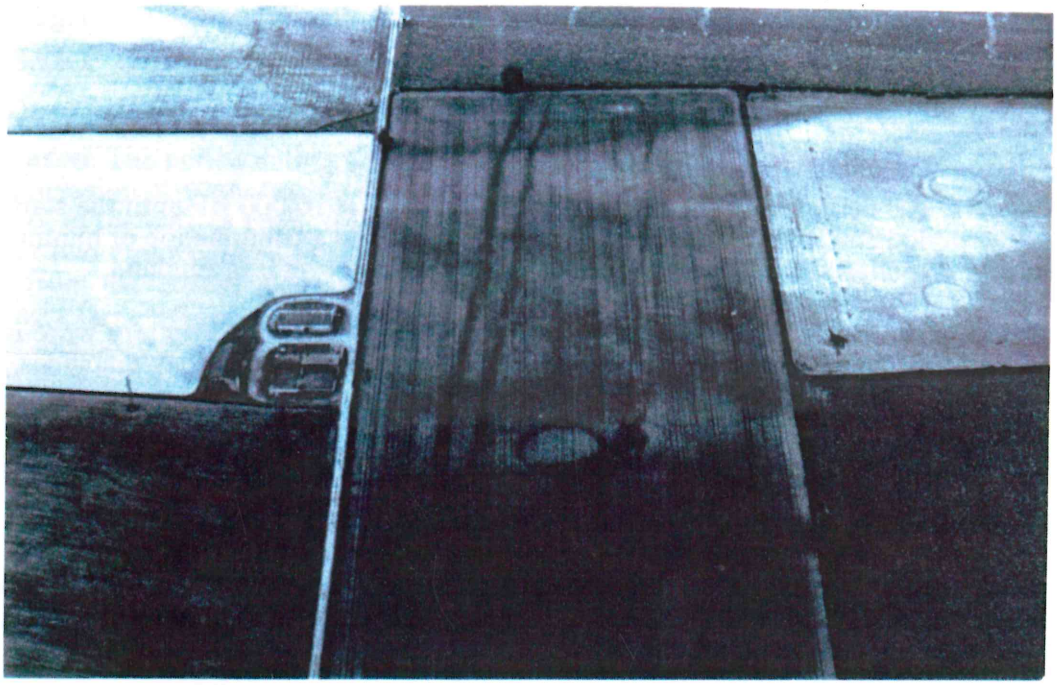


Plate 1 Cropmarks at Barnack viewed from the south showing the linear features and ring-ditches in the area fieldwalked. (Photo. by S. Upex).

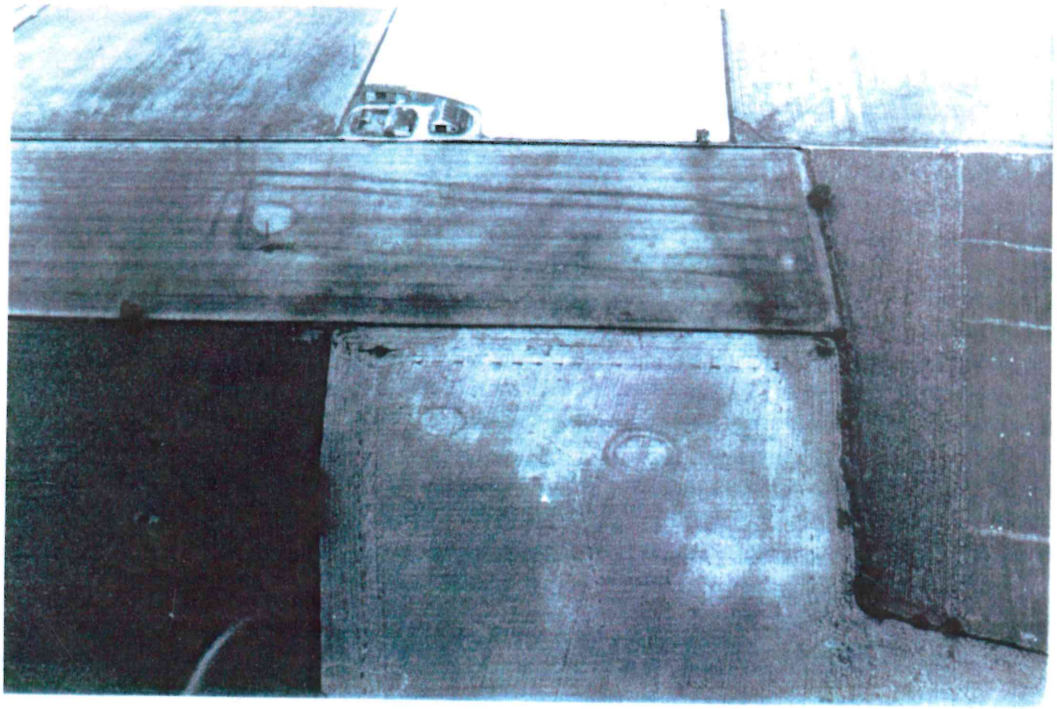


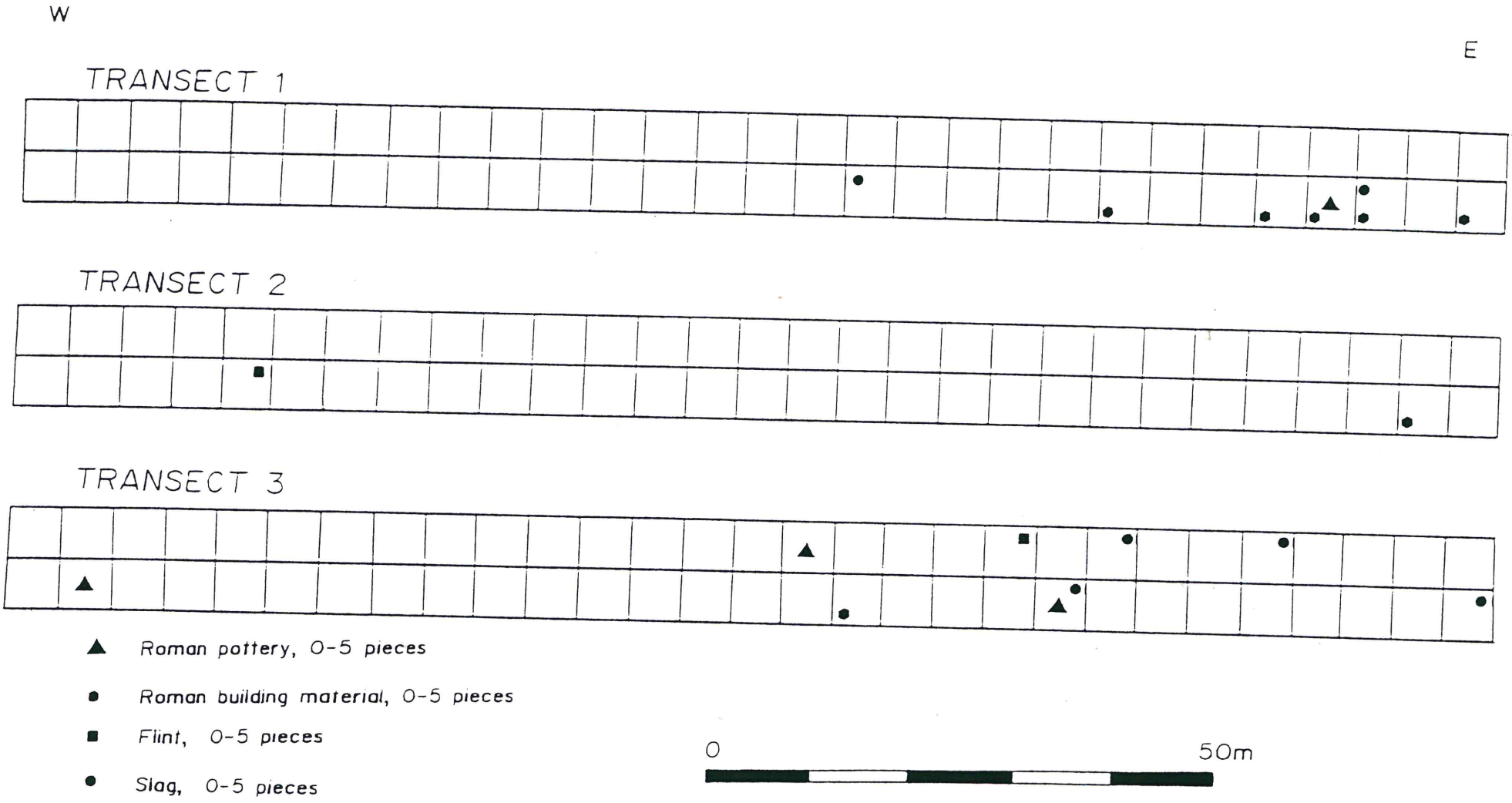
Plate 2. Cropmarks at Barnack viewed from the east, showing ring-ditches and linear features. (Photo. by S. Upex).

Plate 3. Artefacts from test pit C and two shell-tempered sherds from ditch [180] in trench 5.
(Photo. by A. Taylor).

Plate 4. The pottery from the outer ditch of the double ring-ditch in trench 16, plus the flake-blade from trench 15.
(Photo by A. Taylor).

APPENDIX 1. FIELDWALKING.

Fieldwalking was undertaken by four archaeologists from February 10th. The purpose of this study was to gain information about the features identified by cropmarks through their associations with material scattered on the field surfaces near them. It also gives an insight as to whether the features are being destroyed by ploughing. The frequency of material on the surface can also give an indication of the wealth of material to be found in the subsoil. Given the aims of the fieldwalking, it was necessary to record material scattered over the surface in detail and so it was decided to collect material in 5m sq. boxes so that materials can be related to the cropmark features. A series of four transects were walked across the field (Fig. 3) which had not been obscured by a standing crop, these were placed to cross the densest areas of cropmarks. It was decided to extend beyond the edge of the area in its southern extent because the cropmarks were particularly rich in that area and to permit evaluation of artefact densities in the adjacent area which was part of the site. Ploughing in the field ran north - south and so material would be preferentially moved along this axis, particularly as there was a slight gradient along the same axis. However, the density of material matched that noted in the initial field visit it was very low, with very few finds being recovered. Density plots of the material found can be seen in Figs. 47 & 48. The material collected was dominated by pot sherds from the Roman period, in particular, various grey fine wares and Nene Valley colour coat wares, with a mixture of coarser pottery. No clearly prehistoric finds were identified and medieval sherds were also less common than the Roman material. This material became richer closer to the villa which existed in the field to the east of the walked area.



Archaeology Section
Cambridgeshire County Council

Barnack Quarry Extension (BARQ 92).

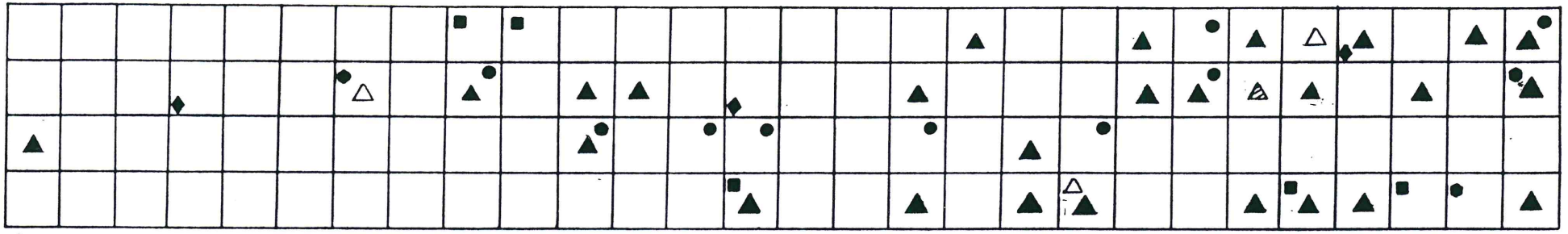
Fig. 47 Fieldwalking results

Initials	Date
R.P.	*6/92*

W

E

TRANSECT 4



▲ Roman pottery, 0-5 pieces

▲ Saxon pottery, 0-5 pieces

△ Medieval pottery, 0-5 pieces

● Roman building material, 0-5 pieces

■ Flint, 0-5 pieces

● Slag, 0-5 pieces

◆ Metal, 0-5 pieces

0 50m

Cambridgeshire archaeology

Archaeology Section
Cambridgeshire County Council

Barnack Quarry Extension (BARQ 92).

Fig. 48 Fieldwalking results

Initials	Date
R.P.	*6/92*

APPENDIX 2. GEOPHYSICAL SURVEY.

A geophysical survey was commissioned from Geophysical Surveys of Bradford (92/15). This proved to be most successful, with features being identified in areas beyond that where the cropmarks showed features and also confirming the position of the cropmark features more accurately on the ground. This can be seen in Fig. 5. Nine areas were initially surveyed and tied into the 50m grid established by S.V. Land Modelling Ltd. of Upton. This grid had a number of points out of alignment which had to be compensated for but which provided the basis for all archaeological work.

The survey used magnetometers in scanning mode to identify areas where features were frequent and then more detailed magnetometer survey was undertaken to pinpoint and elucidate the features identified. Thus, the geophysical survey showed that in addition to the features mapped, there are a number of other features in the surrounding areas which have not been mapped.

A second geophysical survey (92/30) was commissioned after trenching to further explore areas between those previously studied to give greater background to the features already isolated. This resulted in the recognition of a ditched enclosure in the east of the site which was previously only known as ditches in two smaller surveyed areas. The results of these surveys are plotted in Fig. 6 and described on the following pages.

SITE SUMMARY SHEET

92/15 Barnack Quarry

NGR: TF 055 068

Location, topography and geology

The site is positioned to the east of Stamford. The study area is next to an existing quarry/waste disposal site and a total of nine areas were surveyed in detail. The first, and largest, area was in a ploughed field, while the remainder were covered by a young crop. The underlying geology is known to be sand and gravel.

Archaeology

The fields to the south of the survey area have been found to be full of cropmarks associated with archaeological activity. Although similar cropmarks are recorded in the area to the west of this survey, many of them have been destroyed by the quarry. Within the survey area only one field had indicated a profusion of cropmarks, and that was sampled by surveying Area A. Outside of this field were suggestions of individual features, but no concentrations of archaeological activity.

Aim of Survey

In order to evaluate the extent of archaeological remains within the study area, a three stage approach was adopted. Initially, a survey was undertaken over the known archaeology to assess the strength of the anomalies and the background noise. It was then possible to 'scan' the remaining area to isolate anomalies of possible archaeological nature. The final stage was detailed survey, over small areas, to establish the cause of the anomalies.

Summary of Results*

The results from this survey have provided a wealth of information as to the nature, location and extent of the possible archaeology within the study area. It is likely that archaeological features are present in all of the nine areas surveyed in detail. The quality of the data is good, and scanning suggests that significant concentrations of other anomalies are present within the area of interest. This is particularly encouraging in an area where the cropmark evidence is limited and field survey has found few artefacts.

*** It is essential that this summary is read in conjunction with the detailed results of the survey.**

SURVEY RESULTS

92/15 Barnack Quarry, Cambridgeshire

1. Survey Areas

1.1 The location of the nine areas that were surveyed in detail can be seen in Figure **5**

1.2 The grids were positioned by **Geophysical Surveys of Bradford** (GSB) and tied into the 50m grid established for the evaluation.

2. Display

2.1 The results are displayed in three formats :- dot density plot, grey-scale image and X-Y trace. These display formats are discussed in the *Technical Section,* at the end of the text.

2.2 Simplified interpretation diagrams are presented for the detailed magnetic data within each area (1:500), as well as an overall interpretation in Figure **5**(1:2500).

3. General Considerations - Complicating factors

3.1 In general the conditions were good for survey.

3.2 All of the sample areas were under young crop at the time of the survey except for Area A, which was ploughed. The entire area of interest is flat.

4. Results (Interpretation - Figure **5**)

4.1 Area A

4.1.1 This area contains the majority of the cropmark evidence within the study area. The magnetic results are in general very similar to the aerial photographic (AP) evidence.

4.1.2 The magnetic data displays are dominated by the response from two sets of parallel ditches (A and B) that were known from the APs. There is an interruption in the eastern ditch associated with (A).

4.1.3 There are two sub-circular features, also known from AP evidence. Anomaly (C) is a double ditched feature, with no detectable internal features. Anomaly (D) is a larger feature, only partially covered by the survey grid.

4.1.4 Of interest is the fact that the western ditch of (B) respects anomaly (C), suggesting that (B) is later. In support of this is the fact that anomalies (A) and (B) are slightly stronger than the other anomalies identified in this area, suggesting that two phases may be present.

4.1.5 Two groups of pit-type anomalies (E) and (F) have been identified, which are not on the AP plot.

4.1.6. There are a number of slight linear anomalies that run approximately north-south. These are best seen in the dot-density plot. Whilst the linear anomalies in the centre of the plot are probably cultivation trends, anomalies (G) and (H) are stronger and may be archaeological. Indeed, the presumed cultivation trends may have been produced in antiquity.

4.1.7 In general, the AP and the geophysical evidence largely coincide in this sample area. However, there are some discrepancies in the exact positioning of the anomalies.

4.1.8 The analysis of the data from this area allowed us to scan and identify anomalies in the remaining area with some confidence.

4.2 Area B

4.2.1 The field to the north of Area A was scanned and a detailed survey of 40 by 20 metres was surveyed.

4.2.2 The survey produced evidence for a linear anomaly possibly associated with a series of pits.

4.3 Area C

4.3.1. Two ring-ditches were known to exist in the field to the east of Area A. This area (40 x 40m) contains the most easterly of the ring-ditches.

4.3.2 The data clearly show a double ditched feature.

4.3.3 In the centre of the ditches is a pit-type response which is likely to represent a burial. There is a second internal anomaly to the south, which may be a secondary burial.

4.3.4 To the east of the presumed burial monument is a strong anomaly that is thought to be a ferrous peak.

4.4 Area D

4.4.1 This sample area (40 x 40m) is in the field to the west of Area A.

4.4.2 There is evidence for a strong linear, and a series of other sub-linear and pit-like anomalies.

4.4.3 Whilst there is little doubt that the linear anomaly should be a ditch, the origin of the other anomalies is more debatable.

4.5 Area E

4.5.1 This survey (40m x40m) covers the second of the two known ring-ditches in this field.

4.5.2 The magnetic data indicate that the monument is a single ditched feature.

4.5.3 Whilst there is some evidence for internal features, they are not as clear as those located in Area B. Indeed, the central anomaly is very weak and is only represented by one reading. This may be caused by a sampling problem due to the position of the line of traverse.

4.5.4 Anomalies that are external to the monument are relatively strong, and should indicate pit-type features.

4.6 Area F

4.6.1 This 40 x 40m survey has indicated a series of very strong anomalies. It is suggested that these anomalies are consistent with habitation type features. The main anomaly near the centre of the grid is approximately 5 x 8m in size.

4.7 Area G

4.7.1. This small survey (40m x 20m) contains a single clear linear anomaly.

4.7.2 There are also a few minor anomalies that may be the product of the fill of archaeological pits.

4.8. Area H

4.8.1 The main anomalies in this 40 x 20m area apparently identify two ditch lengths. Scanning in the general area surrounding these anomalies suggest that they may form part of a larger 'enclosure'.

4.8.2 Again, there are weaker anomalies that also have some archaeological potential.

4.9 Area I

4.9.1 Scanning in the environs of Area I suggested the presence of a large, amorphous area of high readings.

4.9.2 The detailed survey has identified an unusual shaped anomaly. By comparison to the majority of the anomalies identified by scanning it is relatively weak and broad. This could mean that it is either more deeply buried than the other anomalies, or the fill of the feature is not as enhanced as the other anomalies. The evidence from the borehole survey undertaken by *Cambridgeshire Archaeology* suggests that the topsoil is not significantly deeper in the eastern part of the study area, and this argues against the former explanation.

4.10 The Scanning

4.10.1 The Western Field - The scanning suggested that, apart from the anomalies associated with Area B, this field was relatively quiet. There were a few anomalies in the southern part which may tie in with AP evidence.

4.10.2 The Northern Field - It was suggested from AP examination that the pair of ditches (A) located in Area A may continue into this field. Intensive scanning supported this interpretation, although the anomalies were quite weak.

4.10.3 The Eastern Field - Six areas were surveyed in detail in this field. However, the scanning

suggested that there are many other anomalies in this field that are similar to those surveyed in detail. In particular, the strongest anomalies were located in the central part of the field, around Areas F, G and H. It is known that there is a concentration of cropmarks directly to the south of this field.

4.10.4 In general the scanning has been very successful. However, in this mode of operation the sample is very extensive and cannot claim to locate all the anomalies. Anomalies which are both small and weak are likely to be under-represented.

4.11 The Magnetic Susceptibility of the Soil

4.11.1 During the magnetic survey a section of the present quarry edge was cleaned by *Cambridgeshire Archaeology* and a ditch section was identified. Four soil samples were obtained to assess the magnetic properties of the soil using a laboratory susceptibility bridge.

Sample	Position	Magnetic Susceptibility($\times 10^{-6}$ emu/g)
(A)	gravel subsoil	2
(B)	centre of the ditch	78
(C)	topsoil above the ditch	47
(D)	the topsoil adjacent to the ditch	42

The high readings obtained for the topsoil and the ditch fill clearly demonstrate that the soil is extremely enhanced. This is confirmed by the strength of the anomalies in the detailed survey, and the relatively ease with which the anomalies were identified by scanning.

---

5. Summary of Results

5.1 The nine areas surveyed in detail using the magnetic technique have identified a great number of presumed archaeological features. Using the magnetometers in a 'scanning' mode has not only helped identify anomalies of interest, but also suggested that similar anomalies are to be found outside the nine detailed survey areas.

Project Co-ordinator: Dr C F Gaffney
Project Assistants: D Redhouse and Y Minvielle-Debat.

Geophysical Surveys of Bradford
25th February 1992

TECHNICAL INFORMATION

The following is a description of the equipment and display formats used in **GEOPHYSICAL SURVEYS OF BRADFORD** reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of **GEOPHYSICAL SURVEYS OF BRADFORD.**

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions

Magnetic readings are logged at 0.5m intervals along one axis in 1m traverses giving 800 readings per 20m x 20m grid, unless otherwise stated. Resistance readings are logged at one metre intervals giving 400 readings per 20m x 20m grid. The data are then transferred to a Compaq SLT/286 and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on a Mission or Dell 386 computer linked to appropriate printers and plotters.

Instrumentation

(a) Fluxgate Gradiometer - Geoscan FM36

This instrument comprises two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to one metre deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential). Depending on the arrangement of these electrodes, an exact measurement of a similar volume of earth may be acquired. In such a case the amount measured may be used to calculate the earth resistivity. Using a 'Twin Probe' arrangement the terms 'resistance' and 'resistivity' may be interchanged. This arrangement involves the pairing of electrodes (one current and one potential), with one pair remaining in a fixed position whilst the other measures the resistivity variations across a fixed grid. Resistance in measured in ohms, while resistivity is measured in ohm-metres. The resistance method has a depth resolution of approximately 0.75m, although the nature of the overburden and underlying geology will cause variations in this generality.

(c) Magnetic Susceptibility

Variations in the magnetic susceptibility of subsoils and topsoils can provide valuable information about the 'level of archaeological activity' associated with a site. This phenomenon can also be used in a predictive manner to ascertain the suitability of a site for a magnetic survey. The instrument employed for measuring this culturally enhanced phenomenon is a laboratory based susceptibility bridge. Standard 50g soil samples are collected in the field.

SITE SUMMARY SHEET

92/30 Barnack Quarry , Cambridgeshire

NGR: TF 055 068

Location, topography and geology

The site is next to an existing quarry/waste disposal site, located to the east of Stamford. Both of the areas surveyed were covered by a young crop. The underlying geology is known to be sand and gravel.

Archaeology

The fields to the south of the survey area have been found to be full of cropmarks associated with human activity. Although similar cropmarks have been recorded in the area to the west of this survey, many of them have been destroyed by the quarry. Within the survey area only one field showed a profusion of cropmarks, and they were sampled during a previous survey (Geophysical Surveys 92/15). In the earlier report nine sample areas (A-I) were surveyed and numerous anomalies of archaeological interest were plotted.

Aim of Survey

The aim of this survey was to ascertain the extent, and clarify the nature of some of the anomalies in the eastern part of the original survey. This was achieved by sampling two further areas (J and K).

Summary of Results*

The survey has provided a more extensive context for the original magnetic survey results. The interpretation of the entire data set has allowed the identification of the most archaeologically sensitive areas.

*** It is essential that this summary is read in conjunction with the detailed results of the survey.**

SURVEY RESULTS

92/30 Barnack Quarry, Cambridgeshire

1. Survey Areas (Figure 5)

1.1 The location of the nine areas that were surveyed originally, along with the two from this survey can be seen in Figure **5**

1.2 The grids were positioned by **Geophysical Surveys of Bradford** (GSB) after consultation with *Cambridgeshire Archaeology* and tied into the 50m grid established for the evaluation. In both Figures 1 and 8 the 50m grid has been tied into the Ordnance Survey grid.

2. Display

2.1 The results are displayed in three formats :- dot density plot, grey-scale image and X-Y trace. These display formats are discussed in the *Technical Section,* at the end of the text.

2.2 Simplified interpretation diagrams at 1:500 are presented for the detailed magnetic data within each area, as well as an overall interpretation in Figure **5**(1:2500).

3. General Considerations - Complicating factors

3.1 In general the conditions for survey were good.

3.2 Both of the sample areas were under young crop at the time of the survey except for Area A, which was ploughed. Both survey areas are flat.

3.3 Evaluation trenches and their spoil, excavated since the previous report, restricted the area available for this survey.

4. Results

4.1 Area J

4.1.1 This sample area was surveyed in an attempt to assess the nature and extent of a number of possible archaeological anomalies noted in Areas G, H and I (Geophysical Surveys 92/15). Scanning in the area had suggested that the ground between Areas G and H had great archaeological potential. In the data presentations the results from Areas G, H and I have been incorporated.

4.1.2 The results from Area J correlate well with the previously surveyed areas. As a result of the interpretation of the data from Area J, it is suggested that the anomalies located in Areas G, H and I are part of a complex of archaeological ditches. These may represent part of an enclosure, with a possible entrance to the north-west.

4.1.3 Within the area encompassed by the ditches there is the suggestion of a further length of ditch and a number of pit type anomalies.

4.1.4 Outside of these ditches are a number of weaker anomalies. These include a length of curving ditch and some individual pits. The fact that they are magnetically weaker suggests that the features that they represent may be outside a main occupation area; this would result in a lesser enhancement of the ditch fills.

4.1.5 It is interesting that the curiously shaped anomaly located in the previous surveys in Area I, is stronger than the weak anomalies noted in 4.1.4. Whilst it may be supposed that the former is the product of an archaeological feature, the exact cause must remain in some doubt.

4.2 Area K

4.2.1 The aim of this survey was to look at the strip of land between Areas C, E and F. Of some interest was the fact that all three areas contained anomalies of archaeological potential - the anomalies in C and E both appear to coincide with AP cropmarks.

4.2.2 The results from Area K contrast very strongly with those from J. Although there are a number of strong anomalies, they are localised, and represent individual pits. The density of possible archaeological features within Area K is low.

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5. Summary of Results

5.1 The results from the two survey areas have helped clarify the nature of the archaeological response at this site. The majority of the definite archaeological anomalies are greater than 2nT in strength, although some of them are weaker. This variability may be a consequence of whether the features are core or peripheral to areas of major occupation.

5.2 The results have indicated that archaeology is not present throughout the whole of the field investigated in this report. It is possible to suggest that the known features, located in samples C and E, are separated from a major foci of activity which is possibly concentrated within, or near to, Area J.

Project Co-ordinators: Dr C F Gaffney and D Shiel
Project Assistants: D Redhouse and Y Minvielle-Debat.

Geophysical Surveys of Bradford
24th April 1992

APPENDIX 3. RADIOCARBON DATING.

The radiocarbon dating was undertaken by Beta Analytic Inc. of Florida. Two samples were submitted to them for dating, a piece of human bone from the lowest burial in the quarry section feature, and a piece of waterlogged wood from the stream channel in trench 15. The quarry section bone from the earliest burial gave a date of :

Beta-53122 BARQ 92 **3560+/- 70 BP** **(bone collagen)**

Radiocarbon age BP 3560 + /-70 years
Calibrated age(s) cal. BC **1908**
cal. BP 3857

Minimum calibrated age ranges	(cal. ages)	Maximum cal. age ranges
one sigma cal. BC 2028	(**1908**)	1782
cal. BP 3977	(3857)	3731
two sigma cal. BC 2133	(**1908**)	1740
cal. BP 4082	(3857)	3689

The waterlogged wood was pretreated by examination for rootlets and then washed in hot acid to remove carbonates, then rinsed to neutrality and then washed in hot alkali to remove humic acids. Then the sample was washed to neutrality and then in hot acids again, finally being washed to neutrality for a third time. The resultant date was:

Beta-53123 BARQ 92 **1980 +/- 60 BP** **(wood)**

Radiocarbon age BP 1980 + /-60 years
Calibrated age(s) cal. **AD 15**
cal. BP 1935

Minimum calibrated age ranges	(cal. ages)	Maximum cal. age ranges
one sigma cal. BC 56	(**AD 15**)	AD 78
cal. BP 2005	(1935)	1872
two sigma cal. BC 152	(**AD 15**)	AD 130
cal. BP 2101	(1935)	1820

APPENDIX 4. AUGER SURVEY by E. Guttman. M.Sc.

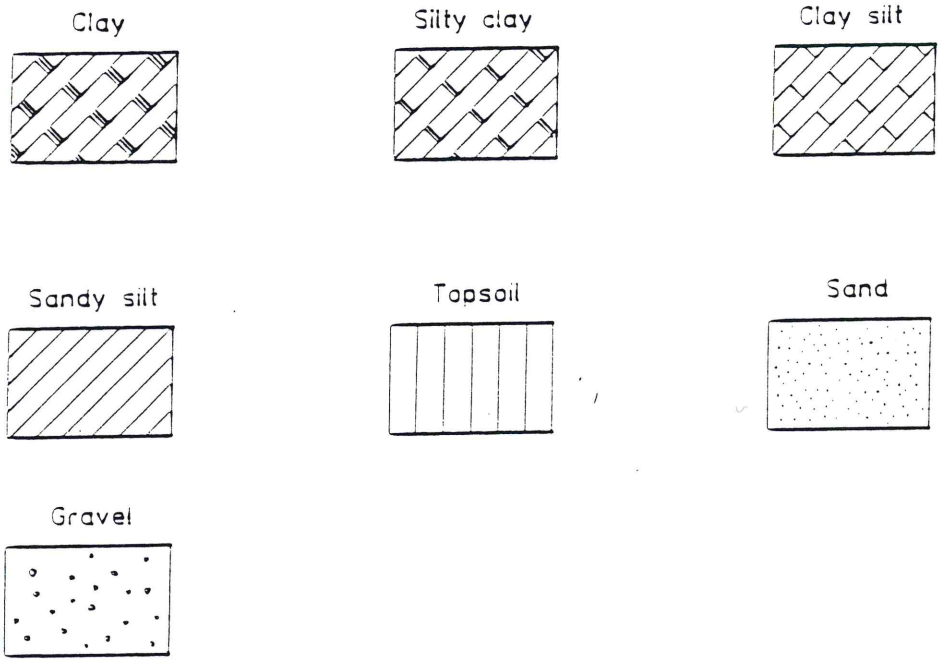
The Barnack quarry site is located on current bedded First Terrace sands and gravels made up of limestone and flint with Bunter pebbles and ironstone. Drift deposits of alluvial sands, silts and clays overlie the gravel on either side of the River Welland. Local valley soils vary in composition from clay loam to sandy clay loam, sandy loam and silt loam. The soils are permeable and well drained.

Aerial photography has shown extensive cropmark sites almost continuously along the lower Welland valley; these cropmarks are interspersed with blank areas of alluvium. Previous surveys (Prior et al. 1985; French & Wait 1988) have shown that these alluvial deposits often mask archaeological features and also protect them from later disturbance. An auger suvey was carried out as part of the site assessment in February 1992 in order to determine whether a buried soil had survived, and also to define the local stratigraphy especially regarding the depth of the alluvium. The survey was carried out by hand using a Dutch auger.

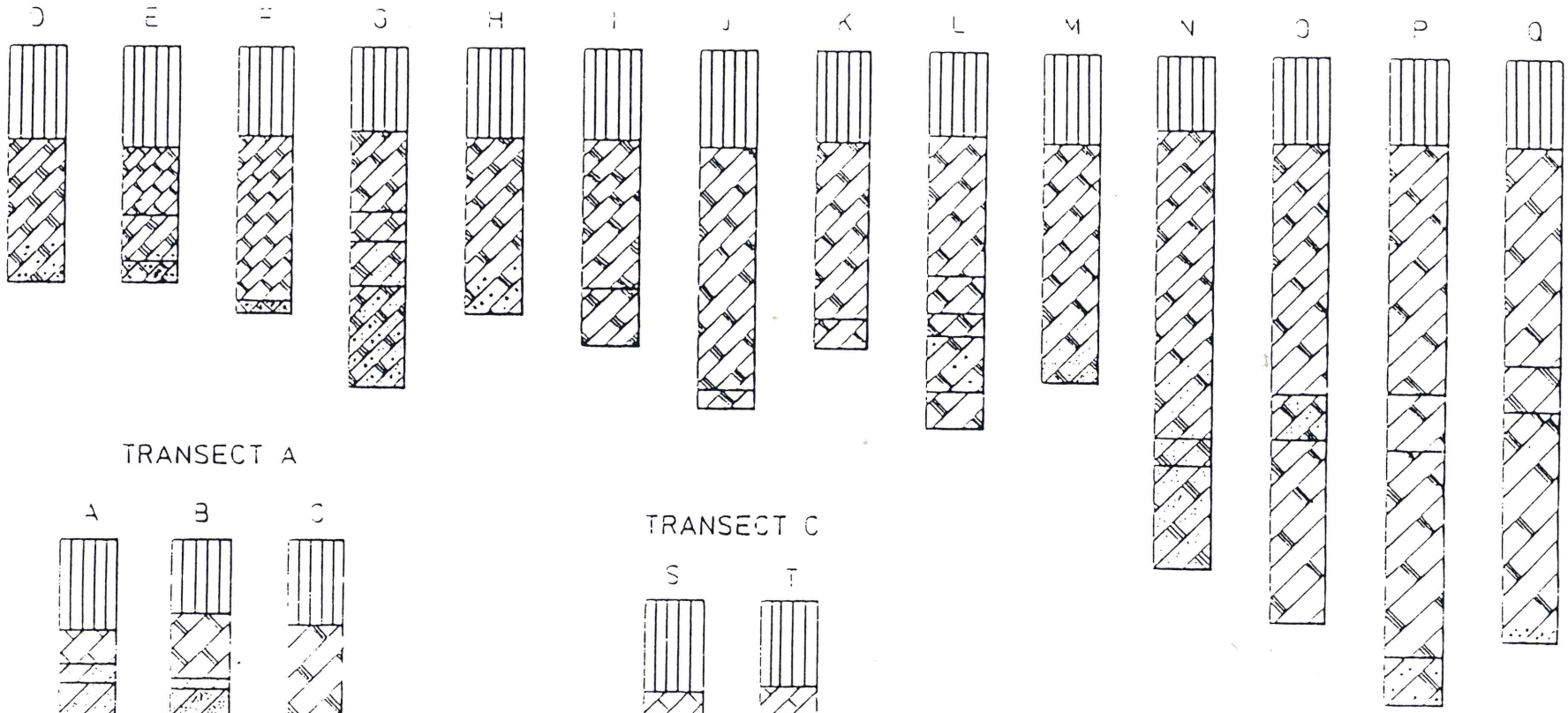
Although geophysical survey has shown the presence of archaeological features beneath the alluvium, there is no evidence for the existence of a former land surface associated with them at present (Fig. 49). Two former river channels were located, with some waterlogging occurring in the gleyed clays of the channel in transect B. The channel in borehole A is characterized by a number of thin lenses of fine sands and clays. The most notable feature in the stratigraphy is the yellow alluvial clay which runs parallel to the river at depths of up to 1.05m and diminishes to a thickness of 0.18m - 0.45m to the south.

KEY TO FIGURE 49

CONVENTIONS



BARNACK QUARRY AUGER SURVEY



Archaeology Section
Cambridgeshire County

BARNACK 1992 - BARQ '92

AUGER SURVEY RESULTS

Fig. 49

Initials R. P. Date 6/92

APPENDIX 5. HUMAN REMAINS FROM THE QUARRY SECTION FEATURE by C. DUHIG M.A. (Cantab).

Skeletal material

The bones are reddish-brown in colour, fragmentary, and friable in texture due to collagen leaching. The partial skeletons of three adult males are represented, two of which, the more complete, can be determined as being in the young-adult age range; the skulls of these have been reconstructed. One individual suffered from a pathological condition of the spine, another from severe changes in the dental enamel which might indicate nutritional deficiency or disease in childhood. Stature can be estimated in one case.

General methods used are those of Bass and Steele and Bramblett, additional methods are indicated below.

Skeleton 9

Approximately 35% of the skeleton is present: the skull, which was crushed, some fragments of the rest of the axial skeleton, both arms, and the femoral heads. The skull vault could be reconstructed, and was found to be brachycephalic, but only the more substantial parts of the face and skull base have survived, fortunately including the dentition.

Although the pelvis was too fragmentary to use for sex estimation, all the features of the skull indicated a male individual. No long bones were measurable, so stature could not be calculated, nor sex confirmed. Tooth wear, using Brothwell's (1972) method, suggests an age in the range 17–25 years.

Twenty-two teeth are present, most of which were loose among the shattered facial skull fragments. Of these teeth, 13 have crowns covered with hypoplastic lines (lines of deformed or unformed enamel) which indicate several episodes of disturbance to the developing teeth in childhood; severe febrile illness has been implicated, but the general view is that severe nutritional deficiency causes these lines, as in, for example, periodic famine or inadequate winter diet. No teeth were lost ante-mortem, and there are no other signs of dental disease.

The skull has an unclosed metopic suture, a developmental variant with some heritable element but no clinical significance.

Skeleton 21

This is the most complete skeleton, with approximately 85% of the bones represented, and only the toes completely absent. The skull and mandible are almost complete after reconstruction, with the skull being, again, brachycephalic. Once again, the pelvis is fragmentary, but 75% of the skull characteristics used for sexing suggest that this is the skeleton of a male.

All but one of the teeth in the dentition are present, and all are without disease. The dental age of this man is similar to that of skeleton 9, while the condition of the pubic symphysis (Suchey, Wiseley & Katz 1986) and auricular area (Lovejoy *et al.* 1985) support the estimate of early adulthood.

The methods of Trotter and Gleser (1952) have been used to determine living height from the length of the femur and tibia: approximately 175 cm (5' 8"–5' 9").

The spine shows lumbarisation of the first sacral segment, the top part of the sacrum having taken the form of a lumbar vertebra and remaining unfused to the rest of the sacrum. This condition is not particularly uncommon, but it weakens the spine, and can cause discomfort. Lateral facets are present on both tibiae at the ankle joints: these are commonly considered to be caused by a habitual squatting posture, and thus related to occupation, but this theory is unproven.

Skeleton 22/23/29

Three sets of bones — six vertebrae with a sacral fragment, one femur, and some bone of the lower legs and feet — are considered by the excavator to belong to the same burial, so they have been examined together. There is no reason to suggest that they represent more than one individual. The femoral head size is well within the male range, and the proportions of the sacrum are also of the male type; it is impossible to determine age, so this individual can only be described as an adult male, although the absence of degenerative changes on the vertebrae suggest no great age.

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APPENDIX 6. ENVIRONMENTAL SAMPLING AND POLLEN ASSESSMENT BY E. GUTTMAN M.Sc. & ENVIRONMENTAL ASSESSMENT BY DR C.A.I. FRENCH.

The recording of trenches 15 and 17 was principally carried out by E. Guttman, she was then commissioned to undertake an evaluation of the sediments from trench 15 to identify its potential for further pollen studies. That report is included in the pages which follow, as is the study commissioned from Dr French on the soil micromorphology. Both demonstrate the potential this site has for a fuller environmental study which, given the site, its location and characteristics, could be a major contribution to both archaeological and environmental studies in the region.

BARNACK QUARRY

ENVIRONMENTAL SAMPLING **by E. Guttman MSc.**

Environmental sampling at Barnack Quarry was largely confined to the river channel in trench 15. Further samples for bulk flotation and for species identification of charcoal were taken on a judgement basis from the buried soil in trench 2, from feature 111 in trench 4 and from contexts 100, 101 and 322 in trench 16. Two soil columns were removed for micromorphological analysis from the buried soil and from a ploughmark in trench 2

Samples for dendrochronology were taken from unworked waterlogged wood found in trenches 15 and 17. A further sample taken from wood found in the light blue clay (86) in trench 15 was also submitted for radiocarbon dating.

TRENCH 15: THE RIVER CHANNEL

The buried river channel sectioned in trench 15 is probably of prehistoric date; for more detail see the assessment report by C.A.I. French. The uppermost deposit (83) in the channel was a slightly gleyed blue and orange clay. Beneath this was (84), an oxidized clay which was far more orange in appearance than is suggested by its Munsell colour, yellowish brown. The next layer down (85) was a gleyed blue clay with orange mottles, overlying a light blue clay (86) which was much wetter and stickier than the above deposits. Below this was a very dark gray silty clay (200) which overlay the upper peat bed. None of these channel deposits exhibited any structure until the trench section had weathered for a week or so, at which point an angular blocky structure began to emerge, much finer than that of (81), the upper, Medieval alluvium. A series of samples were taken from these alluvial clay deposits for sedimentological analysis.

Beneath the alluvial clays of the channel were peaty deposits which became increasingly organic with depth. The upper of these (87) was a peaty clay with poorly preserved roundwood and twigs and with occasional animal bone. A layer of dark gray-brown clay (137) lay beneath, overlying the first layer (138) of the more organic lower peat bed. Layer (201), below, was an extremely black and organic peat in which frequent small roundwood and twigs were encountered, many with the bark preserved. This state of preservation generally characterises the lower peat which is made up of contexts 138,201,202,203,204 and 205. Context (202) was a band of reddish brown peat overlying (203), a band of black peat. Context (204) was much like (201); in fact the red and black bands could be considered as lenses within one context. Overlying the natural terrace gravel was (205), a very stony greenish mottled peat with frequent roundwood and twigs.

Roundwood samples were taken from the lower peat bed for species identification and for radiocarbon dating. A sample of peat from context 87 was also taken from the section, adjacent to the pollen sample column. For location of the radiocarbon samples see section drawing 15A.

Bulk samples of c. 5 litres were taken for analysis of insects and macrobotany from each layer or, within the larger layers, from 5 cm spits.

TRENCH 15: THE PALAEOSOL

The buried soil (134) at the western edge of the channel was a fairly loose dark yellow-brown clay silt with occasional gravel and small pebbles up to 3 cm. It was 12-18 cm thick and was penetrated by fine rootlets, despite its being buried 80 cm deep. The underlying layer (135) was a loose, fairly fine mid yellow-brown sand with occasional pebbles and stones up to 2 cm; this layer was 14-20 cm thick. Beneath this lay about 18 cm of loose, dark red-brown clayey sand with occasional gravel and pebbles up to 6 cm; this overlay the terrace gravel. Two samples were taken from the buried soil for pollen analysis, as described below.

TRENCH 15: THE LATER ALLUVIAL DEPOSITS

The channel sediments and the palaeosol were both buried beneath two layers of alluvium which together with the topsoil formed an overburden up to 80 cm thick. The upper alluvium (81) was a yellowish brown clay silt with an angular blocky ped structure distinct from the deposits below. This was probably laid down during the Middle Ages in a large-scale erosion episode following on intensified agricultural activity (see assessment by French). The lower alluvium (82) was a yellowish brown clay silt from 6 to 30 cm thick. This also displayed an angular blocky structure, but of a finer texture than that of the above deposit. The ped structure took over a week to weather out.

POLLEN ASSESSMENT

An 80 cm column was removed in monolith tins from the section face of the lower peat bed in the river channel. Four samples of 1 cc each were processed in order to determine the state of preservation and the frequence (or absence) of fossil pollen. The samples were taken from contexts 200, 87, 138 and 204 at depths of 1.39m, 1.63m, 1.89m, and 2.15m respectively. These were processed using standard methods (Moore, Webb and Collinson, 1991). Two samples of 1 cc each were also taken from small blocks cut from the section of the buried soil (time was pressing and there were no more monolith tins available); these were from depths of 88-90cm and 90-94cm.

The pollen from the peat was suprisingly sparse (c. 2-5 grains per traverse) given the extremely good preservation of the wood. Many of the grains were in excellent condition, along with a number of crumpled ones. These were not counted or identified in any systematic way due to time constraints.

The buried soil had a somewhat higher pollen density, with around 5-8 identifiable pollen grains per traverse. These were in reasonably good condition.

RECOMMENDATIONS

Although the pollen frequency in the Barnack peat samples is low, it is not by any means uncountable. Both the peat and the associated soil merit full analysis for comparison with one another and with the local analyses from Tallington (Dimbleby unpub.; Dimbleby in Simpson 1966, cited in Pryor and French, 1985) and from Maxey (Pilcher, in chapter by Simpson, Pryor and French, 1985). It is hoped that the peat may also show changes in the local ecology through time, especially as regards any anthropogenic changes.

It is vital that at least one radiocarbon sample (preferably No. 6, from near the bottom of the channel) is processed from the series adjacent to the pollen samples, in order to tie the pollen diagram into a secure chronology.

The importance of analysing this buried landscape is discussed in detail in the environmental assessment by C.A.I. French; it must be stressed that the close association between pollen sites and archaeological sites is rare.

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Other references are in Dr French's bibliography.

COSTING:

French has cited a costing of c.£15,000 for pollen analysis for the site. The analysis for the material collected so far from the peat bed and the buried soil will come to just over a third of this:

26 samples from the peat column at 3 cm intervals + 2 from buried soil= 28 samples.
3 days to analyse pollen content of each level and 4 weeks analysis and writing up.

£8.00 per hour x 7.5 hours per day
£5,040 for counts
£1,200 for analysis

Total: £6,240

ENVIRONMENTAL ARCHAEOLOGICAL ASSESSMENT OF THE PROPOSED DEVELOPMENT FOR GRAVEL EXTRACTION AT BARNACK, CAMBRIDGESHIRE.

C.A.I. FRENCH B.A. M.A. Ph.D. MIFA.

1. Introduction.

Site inspection and minimal sampling was carried out on March 12th, 1992, during the archaeological assessment conducted by the Cambridgeshire County Council's Archaeology Section. What follows is a brief discussion consisting of: (1) the main observations and their significance, (2) the necessary response if development is to proceed and (3) appropriate guide costings for these investigations.

2. Principal Observations.

1) The majority of the application area under the present investigation is sealed/covered by variable thicknesses of silty clay textured alluvium and an alluvial ploughsoil, both of which exhibit a medium sub-angular to irregular blocky ped structure. It ranges in thickness from about 30cm in the extreme southern part of the application area (essentially equating with the present day ploughsoil) to as much as about 1.25m in the northern part of the application area.

By analogy with recent archaeological survey, excavation and soil survey work carried out immediately downstream between Barnack and Northborough in the lower Welland valley (See French 1983, 1988, 1990; French & Pryor, in prep.; Pryor & French 1985) and a recent joint project by the author and Dr. M. Macklin and D. Passmore of the Department of Geography, University of Newcastle -upon-Tyne, of the developmental history of the relict river systems of the lower Welland valley between Uffington and Northborough (French et al. in press), there is little doubt that the uppermost and thickest alluvial deposit observed at Barnack is of post-Roman date. Its deposition is a direct consequence of extensive and intensifying clearance of woodland on the higher ground and 'heavier' soils and subsoils situated upstream and to the west of Stamford, associated with intensifying agricultural development of the landscape, particularly in the Roman and early medieval periods (See Jones 1981; Lambrick & Robinson 1979).

Archaeological features were observed to define in section from the base of this upper alluvial horizon.

2) Beneath this upper alluvium, there is at least one other observable phase of alluviation. It is observable towards the north of the application area in trenches 4 and 5 as a c. 10-30 cm thick horizon of yellowish brown silty clay. This alluvium is obviously derived from a different source material, as yet unknown, but it certainly exhibits a much more silty texture, but displays much less post-depositional soil development. Nonetheless, its presence here implies at least one major pre-Roman period of soil erosion and alluvial deposition.

Specific site studies further downstream between Maxey, Etton and Northborough (French 1990) has demonstrated that alluviation was occurring from at least the middle Neolithic period (i.e. from about 2,800 BC onwards). In general, this type of alluvial deposition represents much smaller amounts of soil erosion and possibly less frequently, and is associated with seasonal flooding on a wide expanse of floodplain. As this alluvium is generally only visible microscopically within buried palaeosols, not as distinct horizons in the field, the implication is that there are several more periods/phases of alluviation than just the two observable major phases of alluviation witnessed in the Barnack assessment profiles.

3) These phases of pre- and post-Roman alluviation seal a series of relict stream channels as observed in trenches 15 and 17. They are infilled with a variety of sediments including a secondary fill of reduced grey clay and primary fill of black organic 'muds'. Surprisingly, these stream deposits were no longer waterlogged as the ambient ground water table was >2m below

the present ground surface. The nature of these organic lower fills is reminiscent of the stream channel deposits which have been observed to be contemporary with the final (or later Neolithic) phases of the Etton causewayed enclosure (French et al. in press) and to overlie Grooved Ware period 'midden' deposits which were discovered beneath the A15 Bypass (French & Pryor, in prep.) about 400m to the east of the Etton site, dated to 3875 +/- 50 BP (Q-3149) (V. Switsur, pers. comm.).

Although these stream fills are no longer waterlogged, they have been until recently. Nonetheless, good organic preservation can still be expected.

4) Trench 2 in the western part of the application area exhibits a most remarkable set of features. Sealed beneath the upper, post-Roman alluvium there is an extensive and thick exposure of what I believe to be an intact ploughsoil horizon (sampled for micromorphological analysis as Profile 1). It is a very dark brown to black, organic, gravel-free silt loam, about 20cm thick, which is developed on the remainder (c. 25cm thick) of the buried soil profile (also sampled as part of Profile 1).

The only other locations in which intact Roman/prehistoric ploughsoils have been observed to be preserved in northwestern Cambridgeshire are in Dyke 9 on the southern tip of Northey 'island', east of Peterborough, and within the interior of the middle-later Iron Age ring-fort at Borough Fen site 7 (Cambridgeshire Scheduled Monument 222) (French & Pryor 1991). The former is dated to after 2,800 +/- 100 BP (Har-8511) (i.e. later Bronze Age), and the latter to 2090 +/- 80 BP (Har-8512) (i.e. middle - late Bronze Age).

In addition and just as important, there are a series of parallel 'gullies' about 50cm apart (centre to centre) and about 25cm deep which define within the lower part of the buried soil and cut into the underlying sand/gravel subsoil. These 'gully' features are undoubtedly ploughmarks associated with the intensive arable use of this landscape. These ploughmarks have been sampled for micromrophological analysis as Profile 2. As an educated guess, they may well be late Iron Age/Roman in date - first, because a sizeable mould-board plough would be required to make such furrows, and second, because this profile is sealed by post-Roman alluvium.

5) In general, every assessment trench exhibited good resolution of archaeological features and associated palaeosols. Moreover, features are observed to define at various levels down profile depending upon when and from which alluviated original ground surface they were cut.

3. The Archaeological and Environmental Significance.

Simply said, the application area contains a sealed Roman and prehistoric landscape with high feature resolution, a great density and variety of settlement, ceremonial and agricultural developments set within a series of landscapes, which are associated with sealed, more or less intact original soil profiles and relict river systems.

The potential for the sampling, excavation and analysis of these successive and evolving landscapes is enormous. Moreover, this area of land is probably the best remaining and least developed part of the lower Welland valley to survive in northwestern Cambridgeshire from an archaeological point of view.

Finally, the potential for combined landscape and archaeological analyses and interpretation makes this area of land of county-wide and national importance, if not European sigificance.

4. The Archaeological Response.

Given the archaeological and environmental importance of this land, if sand/gravel extraction was to proceed, this landscape would require the following archaeological response, in brief comprising:

1) removal of the ploughsoil and upper alluvium to reveal the top of the buried soil and/or the top of the lower alluvium by machine to archaeological standards in the late summer/early autumn of each phase of extraction;

2) this exposed land surface should be left to weather over winter, followed by intensive systematic field survey, magnetic susceptibility and resistivity surveys, systematic sampling/sieving programme of the exposed underlying palaeosol for artefacts and macrofossils;

3) removal of the lower alluvium and/or the upper half of the buried soil profile by machine to archaeological standards, followed by the same sampling procedure as in 2) above;

4) removal of the upper part of the lower half of the buried soil profile by machine to archaeological standards over the whole area to reveal the feature archaeology;

5) excavation as appropriate; e.g. field systems sampled on say a 10% basis as opposed to monuments/settlements fully excavated;

6) full environmental investigation accompanying the excavation in 5) above, especially the analyses of soils, sediments, animal bone, molluscs, plant macro-fossils, and phosphates and magnetic susceptibility where applicable;

7) full environmental investigation of the relict river systems, including aerial mapping, sedimentary/geo-chemical analyses, pollen, plant macro-fossil and insect analyses.

5. Guide Costings for the Environmental Analyses.

Although it is impossible to be precise without examining the field archaeological assessment report in detail, cost figures of about the following level of magnitude could be expected for the necessary environmental analyses:

Analysis.	Cost.
Sedimentology of river systems	£2,500
Soil micromorphology, sediments analyses of features	£6,000
Molluscs	£1,000
Plant macro-fossils	£15,000 (specialist as member of field team)
Pollen	Similar to above
Animal bones	Similar to above
Insects	£6,000 - 8,000
Geophysical services:	
Resistivity	£1,400 per hectare
Magnetic susceptibility	£725 per hectare
Phosphates	£2 per sample

(Plus machining costs of about £1,000 per week for a CAT 205/215 LC with driver; for example 2-3 weeks per hectare plus double-handling and spoil removal by quarry operator).

6. Conclusion.

In summary, if the environmental investigations are deemed an integral and inseperable part of the archaeological investigation, then this work alone could add at least as much as £75,000 - 100,000 to the total figure required during the lifetime of the quarry. The machining costs

necessary to make this and the environmental work feasible would also add considerably to the final necessary costs.

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