BRIAR HILL

Excavation 1974-1978

View of Briar Hill from north: Hunsbury in background

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Excavation 1974-1978

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More than 100 people took part in the excavation of Briar Hill and, although they are too numerous to mention individually, I should like first of all to acknowledge with gratitude their hard work and endurance, often in most difficult and trying conditions

The project was initiated by John Williams, Chief Archaeologist of Northampton Development Corporation Unit and was directed by the writer, assisted in the last two seasons by Andrew Chapman. Andrew Chapman also worked for eighteen months as Research Assistant on post-excavation analysis and I am indebted to him for many useful discussions and suggestions as well as for his specific contributions to this report. Ann Liddon assisted with preliminary analysis of the worked flints and the computer program used in processing the flints data was devised by Brendan Grimley of the Department of Archaeological Sciences, University of Bradford, under the supervision of John Haig. The project was funded with the aid of a CASE studentship.

I owe much, also, to my colleagues in Northampton Development Corporation, in particular to Varian Denham who advised on the preparation of the neolithic pottery report and to Ken Connor who designed and drew the plans, sections and diagrams. Drawings of finds were done by Ken Connor and Heather Lovett. Angela Brittain and Steve Jepson helped with design problems and Doug Jardine provided photographic services. The typing of the report was done with great patience and skill by Jane Elkayam.

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PREFACE

This report is presented in two parts: the main printed text and a series of appendices in microfiche

The main text is concerned primarily with the description and discussion of the neolithic earthwork and the history of its construction and use, and only secondarily with the later occupation. It is intended to provide data sufficient to enable the reader to understand and evaluate the nature of the evidence presented in support of the interpretation, and some detailed specialist reports are included where essential to this purpose. The microfiche appendices are intended to be used in conjunction with main text and are cross-referenced accordingly. They contain additional information on the structural and artefactual evidence as well as various ancillary studies arising out of the excavation.

The site record and further records of post-excavation analysis are to be deposited in an archive set up jointly by Northampton Development Corporation and Northamptonshire County Archaeological Unit and administered by Northampton Museum

The text is organised as follows:

1. Introduction: This provides information on the background of the excavation, the geological and topographical context of the site and excavation methods.
2. The excavation: The structural development and phases of occupation of the site are described with reference to examples of the features excavated, and the chronological sequence inferred from stratigraphic and other evidence is presented and discussed. The evidence is illustrated extensively by diagrams and a selection of plans and sections, the lay-out of which has been designed so that the user may view and compare plans and sections together. This section is backed in microfiche by a full descriptive list of the feature identified and by additional, simplified section drawings of major features not illustrated in the main text.
3. The finds: Artefactual material of neolithic and early bronze age date is analysed and discussed at length, with some additional material in microfiche. The full reports on finds relating to later occupation, including the iron age and Saxon pottery, are given in microfiche with summaries in the main text, and environmental evidence is presented in similar fashion.
4. Interpretation and discussion of the evidence: The chief concern of this as an excavation report is the site itself, and it would be premature to attempt a full synthesis of the evidence for prehistoric settlement in the Northampton region. The neolithic earthwork and the subsequent occupation are nevertheless considered as far as possible within the local and regional context and with reference to comparable sites elsewhere in the British Isles.

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INTRODUCTION

by H M Bamford

Background to the Excavation

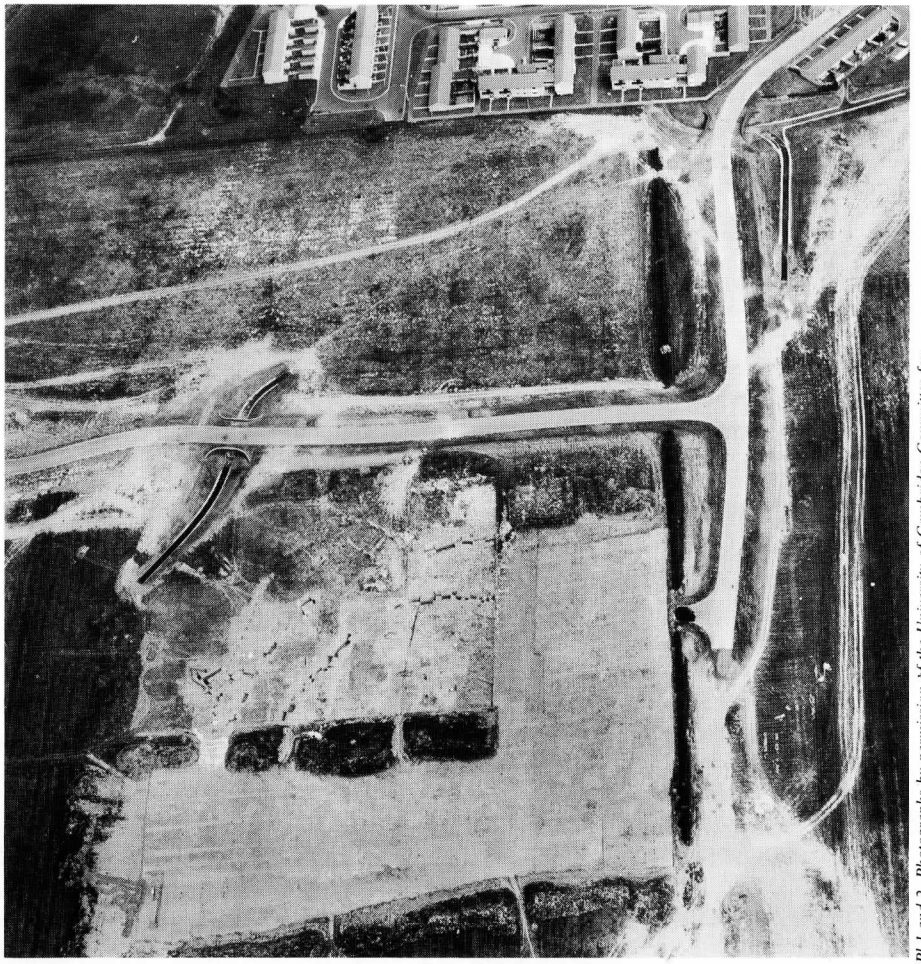
The existence of a neolithic enclosure on Briar Hill, near Northampton, was first discovered in the summer of 1972 when a crop-mark was observed and photographed for the Cambridge University Committee for Aerial Photography and by Mr James Pickering in the course of independently conducted aerial surveys of the district. The distinctive pattern of segmented ditch circuits which is visible in the photographs (Pl 1) caused it to be classed as an interrupted ditched enclosure of presumed neolithic date (Wilson 1975) and the site was scheduled as an ancient monument.

In Northamptonshire alone, four crop-mark sites of this type have been recorded to date, and many more are known to exist throughout the midland region (Palmer 1976; and see Fig 1. inset). At the time of the discovery on Briar Hill no excavation had been carried out on any of them north of the Thames Valley, apart from two very limited trial trenchings at Southwick, Northamptonshire and Cardington, Bedfordshire respectively (RCHM 1975,86; RCHM 1960,50), neither of which produced any clear evidence of date.

The size of these enclosures suggested that they were sites of some importance. The supposition that they were neolithic earthworks, which was based on their general similarity in plan to the causewayed camps of Southern and South Western England, had yet to be backed by proof. Evidence of prehistoric activity on or near the Briar Hill site did exist, however, in the form of several thousand worked flints which were collected from the surface of fields in the locality, mainly in the years between 1904 and 1912, and

Pl 1 *Aerial photograph of neolithic enclosure, Briar Hill, 1972*

Pl 2 *Aerial photograph of excavation, summer 1976*



(Pl 1 and 2. Photographs by permission of the University of Cambridge Committee for Aerial Photography)

deposited in Northampton Museum (Northamptonshire Archeol 9 (1974), 84). They are chiefly of neolithic and early bronze age type, although some microliths are included.

The land on which the Briar Hill enclosure was sited was due to be developed for housing as part of the planned expansion of Northampton under the provisions of the New Towns Act of 1965, and some kind of investigation prior to this was clearly necessary.

In November 1973 a geophysical survey of the site, carried out by the geophysics section of the DoE Ancient Monuments Laboratory using a fluxgate gradiometer, confirmed and amplified the plan visible in the air photographs and enabled the main features to be plotted more precisely (Fig 3; microfiche Apendix 15). At the same time, staff of Northampton Development Corporation Archeological unit conducted a trial excavation, in the course of which ditch segments were located and sectioned at four points on the north, south west and south sides of the enclosure. The ditch segments were found to resemble those of causewayed camps excavated in Southern England, and worked flints and pottery from their fills indicated that they were, indeed, of neolithic date.

In the light of these results it was decided to conduct a full-scale excavation of the site in advance of building work, and provision for this was made by Northampton Development Corporation at the planning stage.

Digging began in October 1974 and was carried out over four extended seasons of between 32 and 34 weeks, ending in October 1978. In all, 150 weeks were spent on site.

Description of the Site

The neolithic enclosure as a whole covered approximately three hectacres. Two main ditch circuits, dug in concentric arcs 15m-28m apart, bounded an area measuring 162m×146m. On the south side a hedge-row running east-west marked the limit of both the geophysical survey and the excavation, but beyond it the line of the outer ditch was plotted from air photographs and the continuation of the inner ditch, which is not visible in these, was confirmed by a section in the side of a service trench. It may be assumed, therefore, that both circuits were complete.

Within the main enclosure, on the eastern side, an extension of the inner ditch curved inwards clockwise in a continuous spiral to define an inner enclosure measuring 84m×92m internally and symmetrical in plan. The main enclosure itself was bilaterally symmetrical on a north west-

Fig 1 *Briar Hill: Location Map*

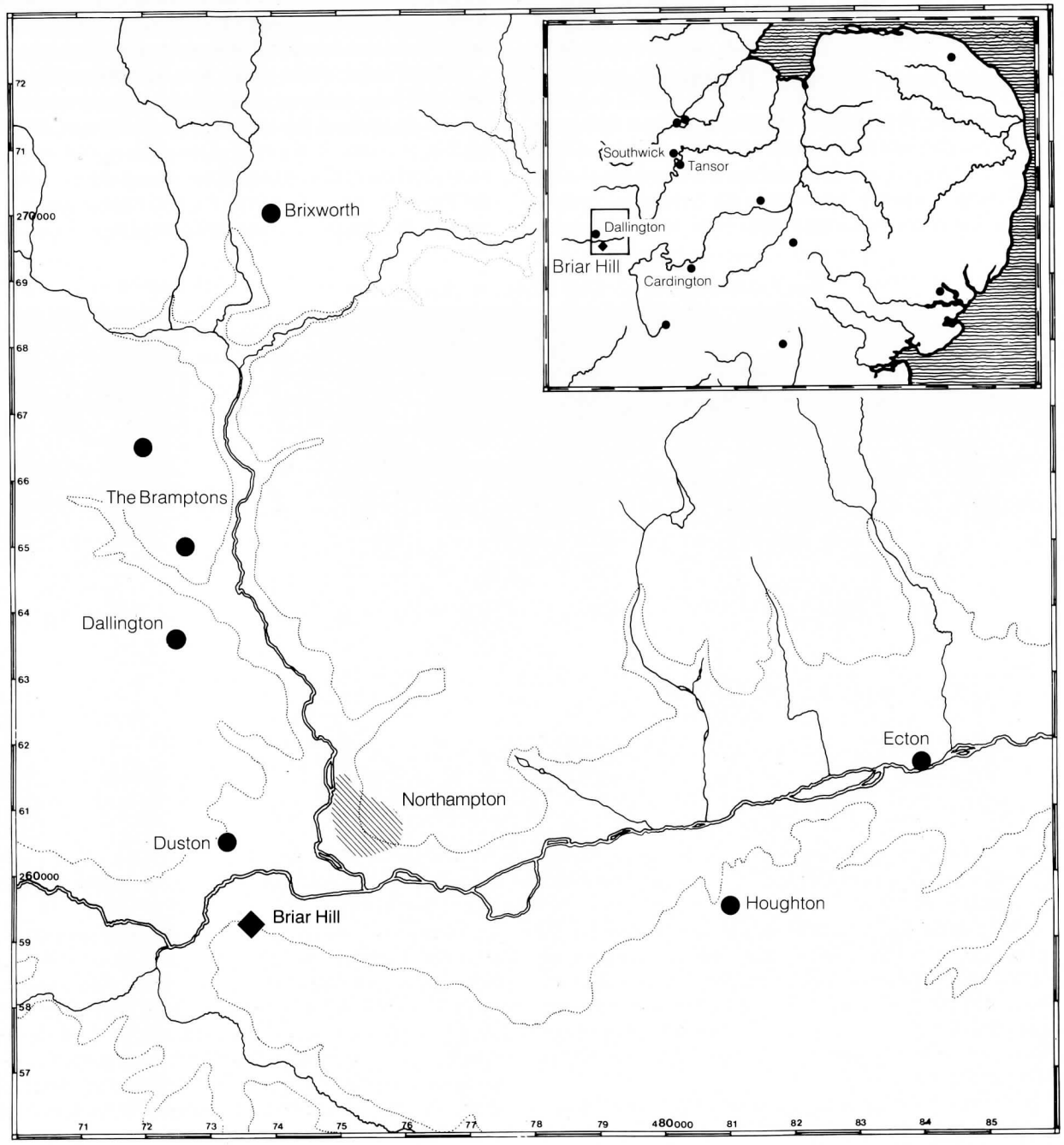


Fig 2 *Briar Hill: Location of Site Grid*

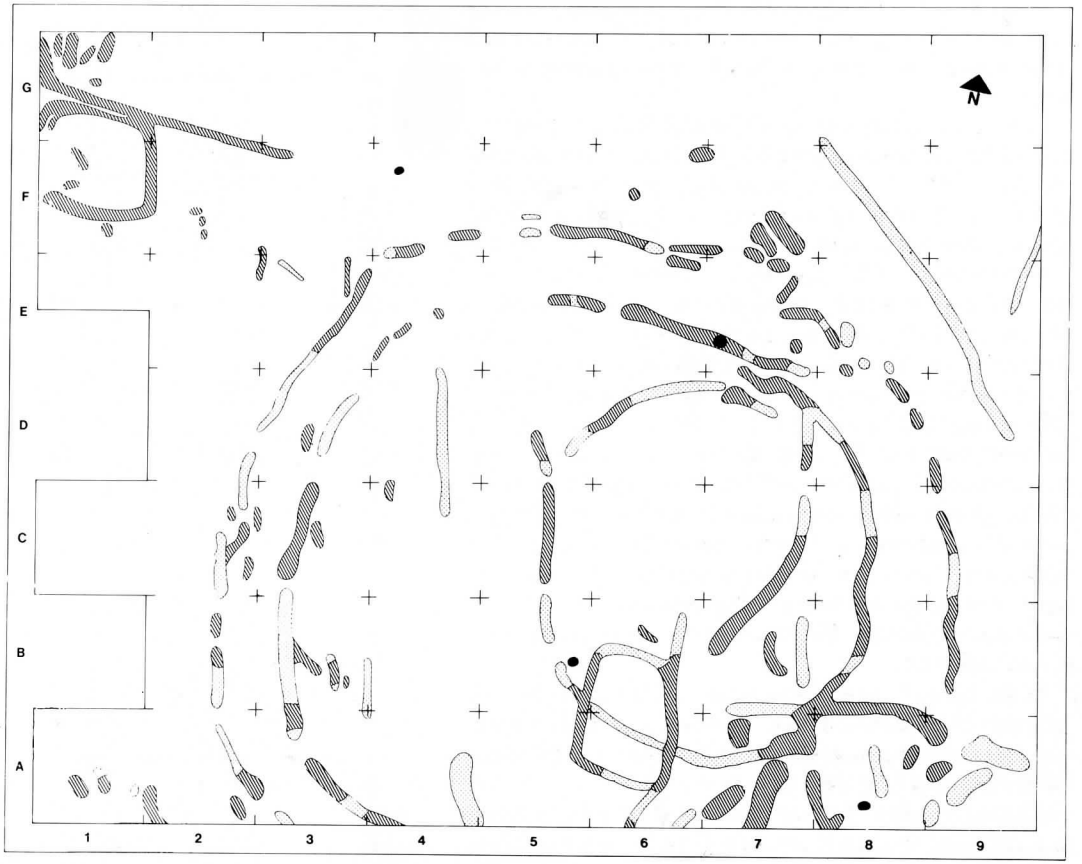


Fig 3 *Briar Hill: Plot of Magnetometer Survey*

south east axis. The apparently regular geometry of this construction is described and analysed in microfiche (Appendix 3) with a summary in the main text

All the ditches were interrupted at irregular intervals by 'causeways' of varying width, but unusually large gaps aligned opposite one another in the main inner and outer circuits indicate functional entrances on the west and south west sides of the enclosure and at the north western end of the axis of symmetry, where the line of the ditches curved outward slightly.

Both the air photographs and the magnetometer survey show two sub-rectangular ditched enclosures apparently unconnected with the neolithic ditch circuit. One lay north west of the site, the other intersected the ditch on the south side of the neolithic inner enclosure.

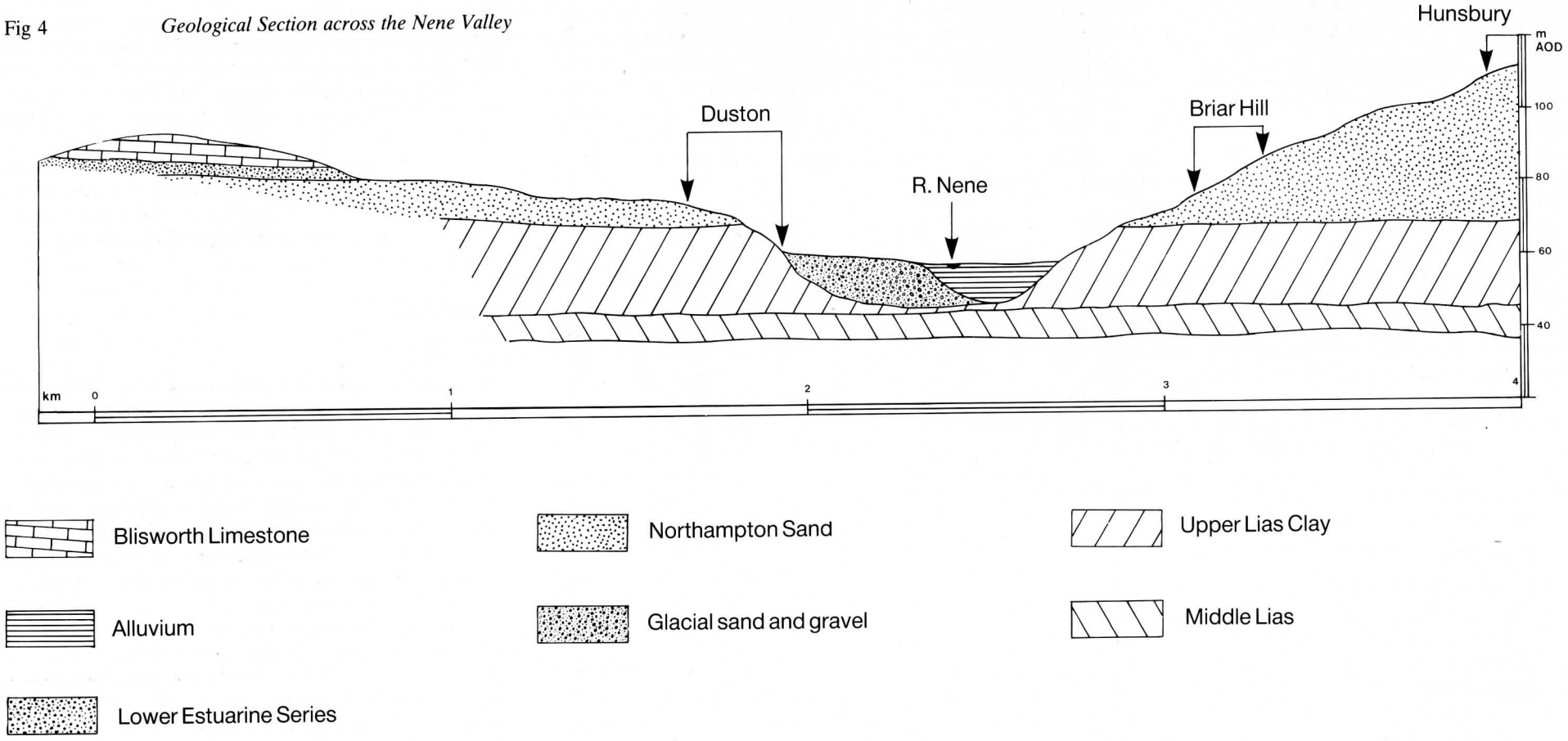
The field had evidently been under cultivation from at least the mediaeval period onward and, when excavation began, interpretation of the subsoil surface was hampered by the presence of broad furrows up to 0·15m deep which traversed the site from north to south at intervals of approximately eight metres. A shallow ditch and a possible mediaeval hollow way which ran parallel to the furrows across the neolithic outer enclosure are marked on the aerial photograph by well-developed crop-marks.

Site Location

(Figs 1, 2)
NGR SP73625923

Briar hill is on the south west side of Northampton, two kilometres from the town centre and in the parish of Hardingstone. The enclosure lies at a height of between 75m and 85m AOD across the steepest part of a gentle, north-facing slope on the south side of The Nene Valley, 650m south of the river itself, and 700m from Hunsbury iron age hill fort which is sited on the crown of the hill at 110m AOD.

Fig 4 *Geological Section across the Nene Valley*



Geology

The site, like Northampton itself, is on the Northampton Sand, a Jurassic formation of the Inferior Oolite series which here consists of a bed up to 20m thick of ferruginous sandstone or sandy ironstone, often referred to simply as 'ironstone'. This overlies Upper Lias blue clay which is exposed in the valley sides where the river system has cut down through the strata (Fig 4). The soils of the Northampton Sand are freely draining, but water held in the sandstone above the impervious clay underlying it tends to form springs at the junction. On Briar Hill the clay outcrops just below the neolithic enclosure, where it may be seen as a darker area at the top and to the left of the aerial photograph (Pl 1). A spring and derelict pump are also visible top left. In the valley bottom opposite the site are extensive deposits of glacial sands and gravels.

The subsoil on Briar Hill is unlike that of any other causewayed enclosure excavated to date and for two reasons merits discussion in some detail. Firstly and most obviously, it is one of the principal factors to consider when interpreting the results of weathering and silting of the major features on the site. Secondly, it posed exceptional problems to the excavator.

The solid sandstone/ironstone is capped over most of the site by a mixed deposit of clayey sand, sand, sandy clay, and weathered ironstone rubble up to two metres deep. This deposit is much contorted by cryoturbation and, in the south eastern part of the site, its surface was patterned by a polygonal network of gullies up to three metres wide and 0·75m deep. Some of them had a tapering section resembling the typical profile of ice-wedge casts (J G Evans 1972, 82ff; Williams R G B 1973; Limbrey 1975, 103). More often

they had a shallow, U-shaped profile and there was little distortion of the strata immediately surrounding them. Similar formations are not uncommon in the Northampton area, and extensive areas of 'patterned ground' have been recorded as crop marks in Hardingstone parish (Williams and Shaw 1981, 91) and at Moulton, east of Northampton (Hollowell 1971, 16).

Many of the gullies on Briar Hill were hard to distinguish from man-made features because the top 0·20m or so of infill was a brown, loamy sand very like the fill of some neolithic and later features, and contained worked flints and small, abraded sherds of iron age, Roman and Saxon pottery.

It is possible that some of the gullies may have survived into the neolithic period as depressions in the old ground surface, and that the upper fill was the remnant of a buried topsoil. Certainly some types of ice-formed features are visible to the present day as, for example, on East Walton Common in West Norfolk (Coombe 1977). A more likely explanation is that worms had been more active in the relatively sandy fill of the gullies than in stony soils around them, and that mixing of material from the topsoil had therefore occurred to a greater depth, although it must be noted that evidence for such mixing, in the form of obviously intrusive material, was found in very few of the dated features.

Prehistoric Settlement in the Northampton Area

There is ample evidence of a prehistoric presence in the Northampton area from the mesolithic period onwards. It is attested not only by the results of excavation but by crop marks and chance finds, and by surface assemblages of worked flints and pottery recorded before 1920 during ironstone quarrying and more recently as a result of systematic field-walking. The distribution of known sites and finds, as shown in the Archaeological Atlas of Northamptonshire (RCHM 1980) is in fact denser in and around Northampton than in almost any other equivalent area of the county and, although this is undoubtedly a distortion of the actual pattern of prehistoric settlement and land use (RCHM forthcoming) it does indicate that the district was well populated in the neolithic period and subsequently. The highest concentration of sites is to the north and east of Briar Hill, within an arc of radius 13km, and it coincides to a large extent, though not exclusively, with the main outcrop of the Northampton Sand.

One of the most significant sites in relation to Briar Hill itself is a crop mark at Dallington Heath (SP72546350) just over four kilometres to the north across the river on a spine of higher ground at *c*100m AOD. Here air photographs show what appears to be another causewayed enclosure, ovoid in plan and approximately five hectares in area with a single interrupted ditch. Exactly in the middle of it is a large ring-ditch, about 50m in diameter, with a possible single entrance (RCHM forthcoming; Dallington (2)). Extensive multi-period crop-mark complexes recorded nearby include smaller ring-ditches and a number of pit alignments.

North west of this, in the neighbouring parish of Harlestone, are three parallel linear ditches (RCHM 1981, 98, Harlestone (4)). They are part of the network of triple ditch systems recorded in eastern England, and the Midlands by Pickering, roughly along the line of the Jurassic Way, and interpreted by him as major territorial boundary markers of prehistoric date (Pickering 1978).

In the adjacent parishes of Church Brampton and Chapel Brampton further very extensive crop-mark complexes and several surface concentrations of worked flints have been recorded (RCHM 1981,17ff) as well as a small bronze age cremation cemetery (Bull Northampton Fed Archaeol Soc 5 (1971); Northamptonshire Archaeol 8 (1973), 3). Around Brixworth, in the same general area, intensive field-walking has resulted in the collection of some 20 000 worked flints dating from the mesolithic period to the bronze age (Martin and Hall 1980) and there have been several finds of later neolithic/early bronze age beakers and bronze age collared urns.

East of Northampton the recorded sites cluster south of the river around Little Houghton and Brafield-on-the-Green and on the gravels and alluvium of the Nene Valley bottom, where part of a small settlement of later neolithic date was excavated near Ecton (Moore and Williams 1975) and where there are a number of barrows and possible barrow sites.

In Northampton itself, recent excavations near the town centre have uncovered residual evidence of mesolithic and neolithic occupation in the form of worked flints and abraded sherds of pottery, found chiefly in Saxon and later contexts (Williams J 1979 Williams F 1979; Williams and Shaw 1981). At least ten polished stone and flint axes have been found in various parts of the town.

The most productive site of all was at Duston (SP731605), one kilometre north west of Briar Hill on the north bank of the river, where an estimated 25 000 flint implements and cores of all periods from mesolithic to bronze age were collected from an area of about 50ha in the course of ironstone extraction between 1904 and 1912.

Apart from the probable causewayed enclosure at Dallington, however, no major earlier neolithic monuments are known for certain in the vicinity of Briar Hill. A long mound at Upton, in the river valley one kilometre east of the site, has been indentified as a possible long barrow (RCHM forthcoming; Upton (2)), but this is unconfirmed, as is the possibility that ring ditches recorded as crop marks in the area may include neolithic mortuary enclosures of the kind excavated further down the Nene Valley at Aldwincle (Jackson 1976) and at Orton Longueville, Cambridgeshire (F E O'Neill pers comm).

Excavation

Objectives

The excavation was a 'rescue' operation designed and conducted as a major research project on a site of obvious importance. The main object was to recover the maximum possible information about the history and use of the site in the hope of establishing to what extent it was or was not directly comparable to causewayed camps investigated in Southern and South Western England (cf Smith 1971; Mercer 1980a, 1-17), and of gaining some understanding of its purpose and function in the general context of neolithic settlement in the Northampton area.

Given that any occupation or use of the site could have left detectable traces in the subsoil surface within the enclosure, and given also that such traces might be localised in an unpredictable fashion, it seemed essential to examine as much as possible of the area inside the compass of the ditch circuits and to examine it thoroughly and carefully. Even if such traces were to prove sparse or lacking altogether, as they appeared to have been in several causewayed enclosures, it was important to establish conclusively that they were absent (Whittle 1977b, 343f). The stratigraphy of the ditch fills, on the other hand, constituted a potentially crucial record of the history of the earthwork which, as soon became apparent, was long and complex. The possibility that activity relating to the enclosure might have extended beyond the ditch circuits had also to be borne in mind, and a watch was kept on construction work in the surrounding fields in case any evidence of this should come to light. Features of iron age date were observed, but

nothing other than a few worked flints which could be attributed to a neolithic presence.

The original intention was to excavate the entire neolithic earthwork, but by the end of the first year it was clear that such an aim might be impractical. Most of the earlier man-made features were filled with soils little different in colour, texture or composition from the surrounding geological deposits. In the contorted and very variable subsoil surface it was often impossible to identify them except by means of extremely careful, and therefore relatively slow methods of cleaning, excavating and recording; total excavation could have been achieved only at a speed which would have entailed the loss of a great deal of important information.

It was decided, therefore, to concentrate most effort on studying the inner enclosure, of which more than 75% was examined in detail. Approximately 30% of the outer enclosure was similarly explored, including a continuous strip 26m wide from east to west across its width and smaller areas on the north and south west sides. The main ditch circuits were sampled extensively on the north, east, west, and south west sides.

Eighteen stratigraphically separate lengths of the inner ditch circuit and nineteen lengths of the spiral extension were sectioned, amounting to approximately 250m or 38% of the total length including 'causeways', and eight separate lengths of the outer ditch amounting to some 80m, or 13% of its total length. In all the excavation covered 14 500m^2, which is almost half of the entire site.

Methods of Excavation and Recording

The preliminary geophysical survey had been carried out using a grid of 30m squares designated by alpha numerical coordinates. The same grid was retained throughout the excavation as the basis of the metric coordinate system used in all recording and the 30m 'areas' were adopted as a convenient subdivision of the site. The areas investigated in each were as follows:

1974-1975 Areas C7, C8 and C9 (part)
1975-1976 Areas D7, E7 and parts of D8, E8 and F7
1976-1977 Areas A6 (part), A7, B6 and B7, (Areas B5, C5, D5 cleaned and planned)
1977-1978 Areas C2 (part), C3, C4, C5, C6 (part), D5, D6 (part) and parts of A2, A3, B3, E5, F5, F6

The areas to be examined were first cleaned of ploughsoil using a JCB 110 Loader followed by a JCB 3c fitted with a five foot ditching blade which was used to 'back-blade' the surface. The last one or two centimetres above the subsoil were cleaned by hand.

The subsoil surface was then trowelled carefully and photographed in units of 4·00m×4·00m, using a 7·5m high collapsible quadrupod tower with hoist and self levelling plate for the camera which was operated by means of an air-release cable. The vertical photographs obtained in this way were printed at a scale of 1:40 and mounted as a mosaic which was used in conjunction with outline soil plans drawn to the same scale on transparent Admel Draftex sheets. The surface then continued to be monitored in a variety of conditions and stages of weathering which sometimes revealed additional details.

The excavation of each ditch segment, as well as of most other features, was normally carried out in alternate quadrants, so as to allow the recording of complete longitudinal as well as transverse sections of the fill. This method has certain obvious disadvantages, chief of which is that it does not permit the viewing or photographing of any section in its entirety; it also tends uncomfortably to restrict the area in which the the excavator has to work. Such drawbacks were, however, far outweighed by the benefits. Firstly it was economical, in that it enabled an optimum return of information in relation to soil lifted: alternate quadrants were left unexcavated in the larger features, except where their removal was necessary for the resolution of a particular problem or the checking of a doubtful interpretation. Secondly, the extra measure of stratigraphic control which is built into the system was invaluable in the conditions encountered on Briar Hill, where soil layers were so often poorly differentiated. Record photographs were taken of the sections of all major features, in addition to detailed drawings at a scale of 1:10.

Plans of the excavated features were drawn, usually at a scale of 1:40 according to a system of visual or 'false' contours which enabled small but sometimes important irregularities in the ditch sides to be recorded in accurate detail. Where useful, intermediate plans of particular fill deposits were also drawn. Spot heights were measured at frequent intervals on all plans and on the datum of each section drawn.

The written record was kept in A4 science notebooks. Each individual feature, such as a ditch segment, pit or post hole, was identified by a unique number in a single series used for the excavation as a whole. In this report, subsidiary numbers denoting, for example, the main stages of infilling in a ditch are a simplification of the more detailed system of layer numbering used on site, whereby every layer identified within each 30m area was given an individual number in a series prefixed by the area reference. Layers and features were cross-referenced throughout, and a standard procedure was followed in entering descriptions of both, including the use of Munsell colour references.

The position of all artefacts found during cleaning of the subsoil surface prior to excavation was recorded to the nearest 10mm within the site grid and plotted on overlay sheets to the surface plans. The position of stratified artefacts was recorded three dimensionally in relation to the site grid and ordnance datum and the context noted. This was to ensure the precise location of finds in the observed stratigraphy, and to enable a detailed spatial analysis to be carried out.

Survival of Evidence

The old prehistoric ground surface on Briar Hill had, of course, been destroyed entirely by ploughing, together with any features standing above it and the upper part of features cut into it. The modern fields above the site were ploughed across the slope, but the direction of earlier cultivation, represented by the furrows below the modern ploughsoil, ran downslope and so may have contributed to soil movement in that direction. The depth of soil lost in this way from the prehistoric surface can be calculated only by extrapolation from the truncated stratigraphy of large features such as the neolithic ditch segments, which suggests it was in the order of 0·30m. There did not seem to be any significant difference in this respect between the upper and lower ends of the site.

The subsoil of Briar Hill is very acid, and for this reason certain materials found on many other neolithic sites did not survive. Environmental evidence was sparse, and even the preservation of pottery seems to have been affected.

Probably the greatest loss to the record is that of bone, of which almost nothing remained in contexts earlier than the Roman period. Almost all of the little which was found in neolithic contexts had been thoroughly burnt and was extremely fragmentary. Molluscan remains were, naturally, also absent.

It was decided not sample for pollen although circumstances favoured its preservation, because of the nature and potentially wide derivation of the ditch fill deposits and the lack of any well defined buried soil horizon. Large samples of particular, charcoal-rich deposits within features were collected and floated, however, and a small quantity of seeds and plant remains was recovered.

THE PREHISTORIC AND LATER OCCUPATION OF THE SITE: THE EVIDENCE

by H M Bamford with A Chapman

A Summary of Phases

Excavation of the neolithic ditch system revealed evidence that the earthwork had been renovated several times over a long period, but no feature recorded within the enclosure could be shown to be contemporary with any of this activity. Neolithic pits and structures which were found in the inner enclosure all seem to have dated from some time after the latest recutting of the ditch. Other features could not be dated securely, but those which might have been neolithic included an east-west pit alignment which touched the outer ditch of the enclosure tangentially on the north side of the circuit. Use of the enclosure as such ceased with the final silting of the ditches in the later neolithic/early bronze age period but, during the middle bronze age, cremations were interred in a small cemetery on the south west side of the outer enclosure.

The sub-rectangular ditched enclosure across the southern part of the neolithic enclosure, which was clearly visible in both the aerial photographs and the plot of the geophysical survey proved, as expected, to be of iron age date. Two smaller rectilinear enclosures and a number of pits and post pits belonging to the same period were also discovered.

Subsequent activity on the site included the digging, in the second century AD or later, of several pits across the northern edge of the neolithic enclosure. Several centuries after this some kind of small settlement was established nearby: up to four early/middle Saxon sunken-featured buildings were found on the east side of the excavation.

In all, fourteen successive phases have been identified in the archaeological record. They are defined both by major events such as the recutting of the neolithic ditches, which provide a series of chronological and stratigraphic horizons within a continuum of use, and by the intervals between quite separate occupations of the site. The sequence may be summarised as follows:-

Phases I-VII ?*c*3600bc-*c*2600bc

Construction and successive renovations of the neolithic enclosure.

Phase VIII *c*2500bc-*c*1900bc

Occupation or use of the inner enclosure following the latest recutting of the ditch.

Phase IX *c*1800bc-*c*1600bc

Later neolithic/early bronze age activity on the site. A series of pits dug above the fill of the earlier neolithic ditches.

Phase X ?*c*1500bc-*c*1150bc

The bronze age cremation cemetery.

Phase XI ?Third century bc-First century bc

The iron age occupation of the site.

Phase XII First century AD-Second century AD

The Roman period.

Phase XIII ?AD400-AD700

The early/middle Saxon period.

Phase XIV

Mediaeval and post-mediaeval agriculture.

THE NEOLITHIC ENCLOSURE

The Ditch System

The ditch system which defined the earthwork can be divided into three principal elements: the outer circuit which measured 615m in circumference, the main inner circuit measuring 480m in circumference, and the spiral extension of the inner ditch, 170m in length, which formed the western boundary of the inner enclosure. This last, although structurally a continuation of the main circuit, differed in some respects from the rest and most markedly so in its north western half.

The excavated lengths of both the two main ditch circuits were made up of segments which were for the most part between one and two metres deep measured from the present surface of the subsoil. The spiral arm of the inner ditch was composed largely of smaller segments, or pits, one metre or less in depth.

No trace was found of a palisade or any extensive system of earth-fast timbering contemporary with or structurally related to the ditches. The probable entrances are identified in plan by wider than usual interruptions occurring opposite one another in the main inner and outer circuits. The chief example was on the west side of the enclosure between 195 and 197 in the outer ditch and 192 and 200 in the inner. Another may be postulated at the southern ends of 247 and 248, about 60m south of the first. There was no detectable hollowing of the surface of the subsoil at these points, although this could be because of the truncation by ploughing.

The gap between outer ditch segments 195 and 197 seems at an early stage, possibly at the time the earthwork was originally constructed, to have been flanked on the north side by a thick upright post an estimated two metres high, contained in the pit 219 (Fig 7). There was, however, no indication of a complex gate or entrance structure there. The most likely entrance to the inner enclosure, which is the gap between 159 and 162 on the north west side, appears at a somewhat later stage also to have been marked by upright wooden posts or pillars, again probably free-standing and about two metres high. They were set approximately two metres apart in pits 160 and 161 in the middle of the gap (Fig 12; Pl 4).

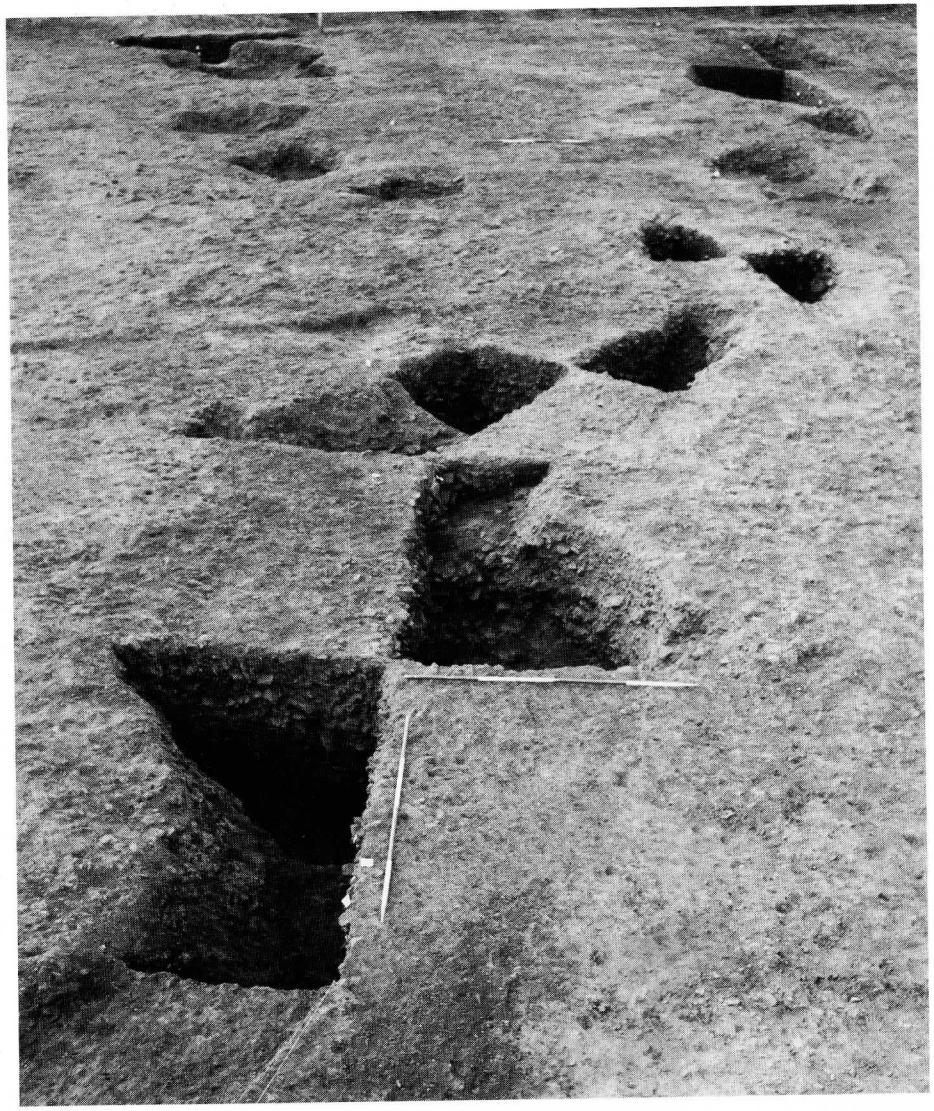
The Ditch Segments

Recutting

All three elements of the ditch system, including some of the smallest pits at the northern end of the inner ditch spiral were found to have been subject to repeated recutting. The final plan, as it appears in the plot of the magnetometer survey, in the air photographs and after excavation was completed, is a composite of many segments dug one above the other or overlapping. In section the recuts could be seen as a series of discontinuities in the accumulated layers, where the fills of earlier segments had been truncated and succeeded by a new sequence of deposits.

Unfortunately, these discontinuities were rarely obvious in the difficult soil conditions, and very close and careful observation was necessary to identify them. The need for extreme care in excavation had to be balanced against the need to examine as large an area as possible in the time available and some compromise was inevitable in the methods adopted to deal with the problem.

Pl 3 *North end of the spiral arm of the inner ditch circuit, view west*



Pl 4 *Spiral arm of the inner ditch circuit: west side of the inner enclosure, view south. 162/165 in foreground*

Neolithic Ditch Segments: Sequence Diagram

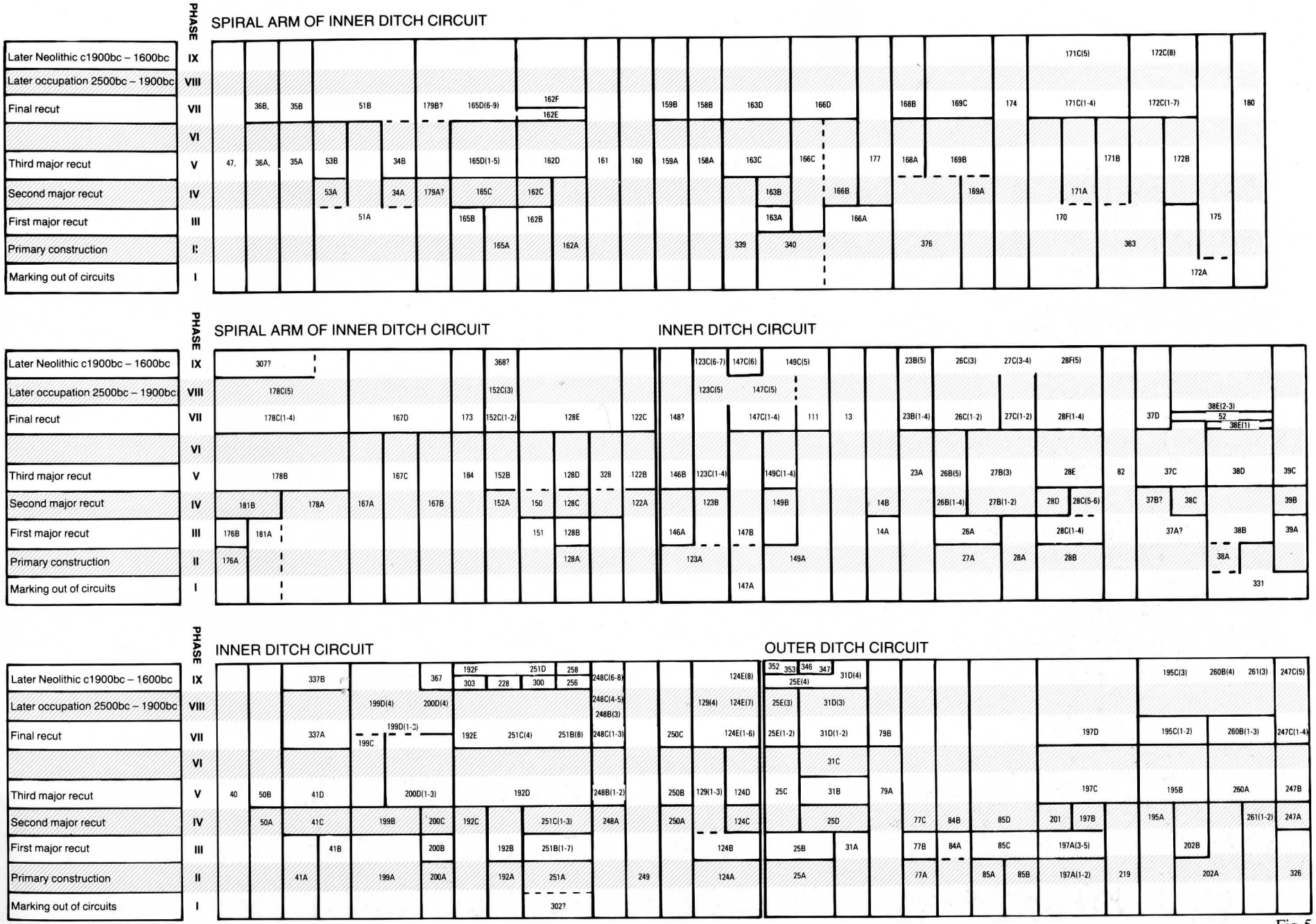
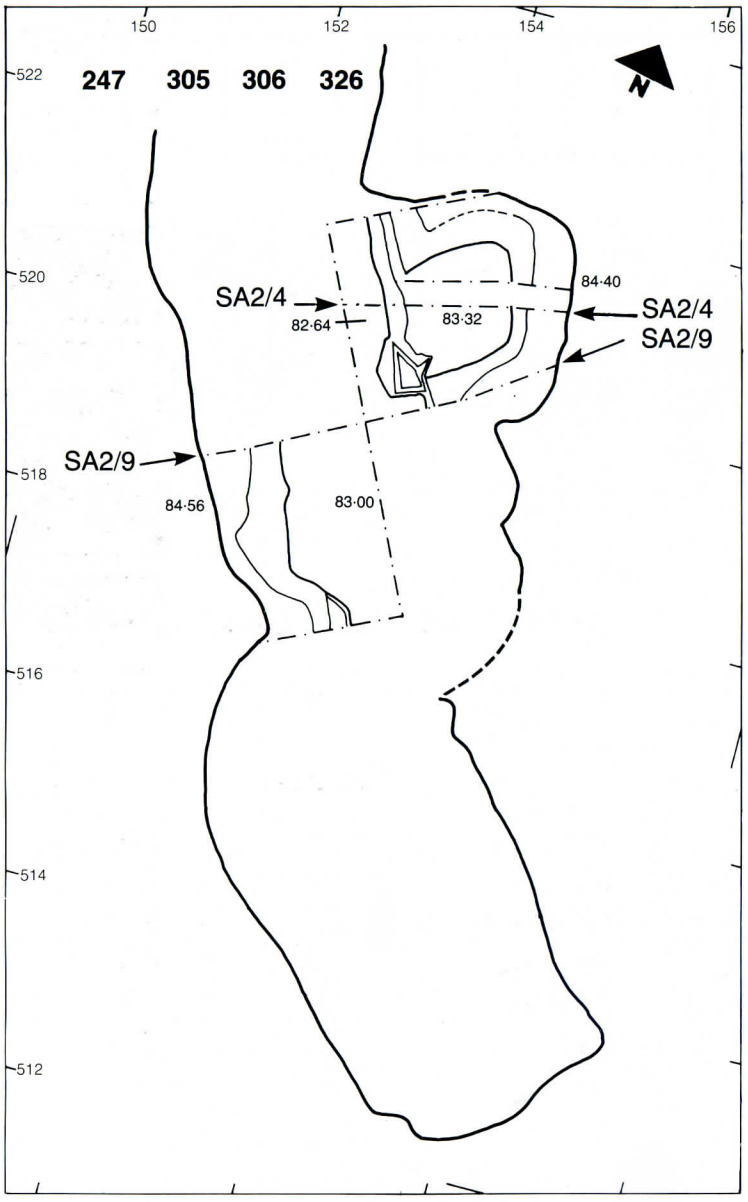


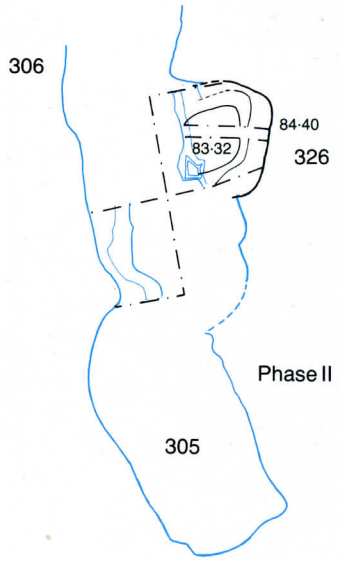
Fig 5

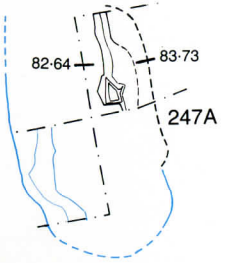
Outer Ditch Circuit: 247A–C, 305, 306, 326

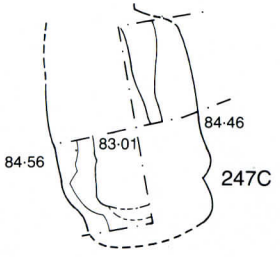


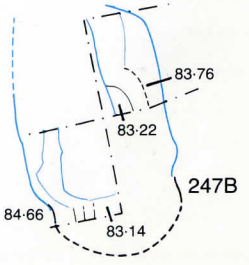
Scale 1:80

metres 0 1 2 3 4









Scale 1:160

m 0 1 2 3 4 5

Fig 6:1

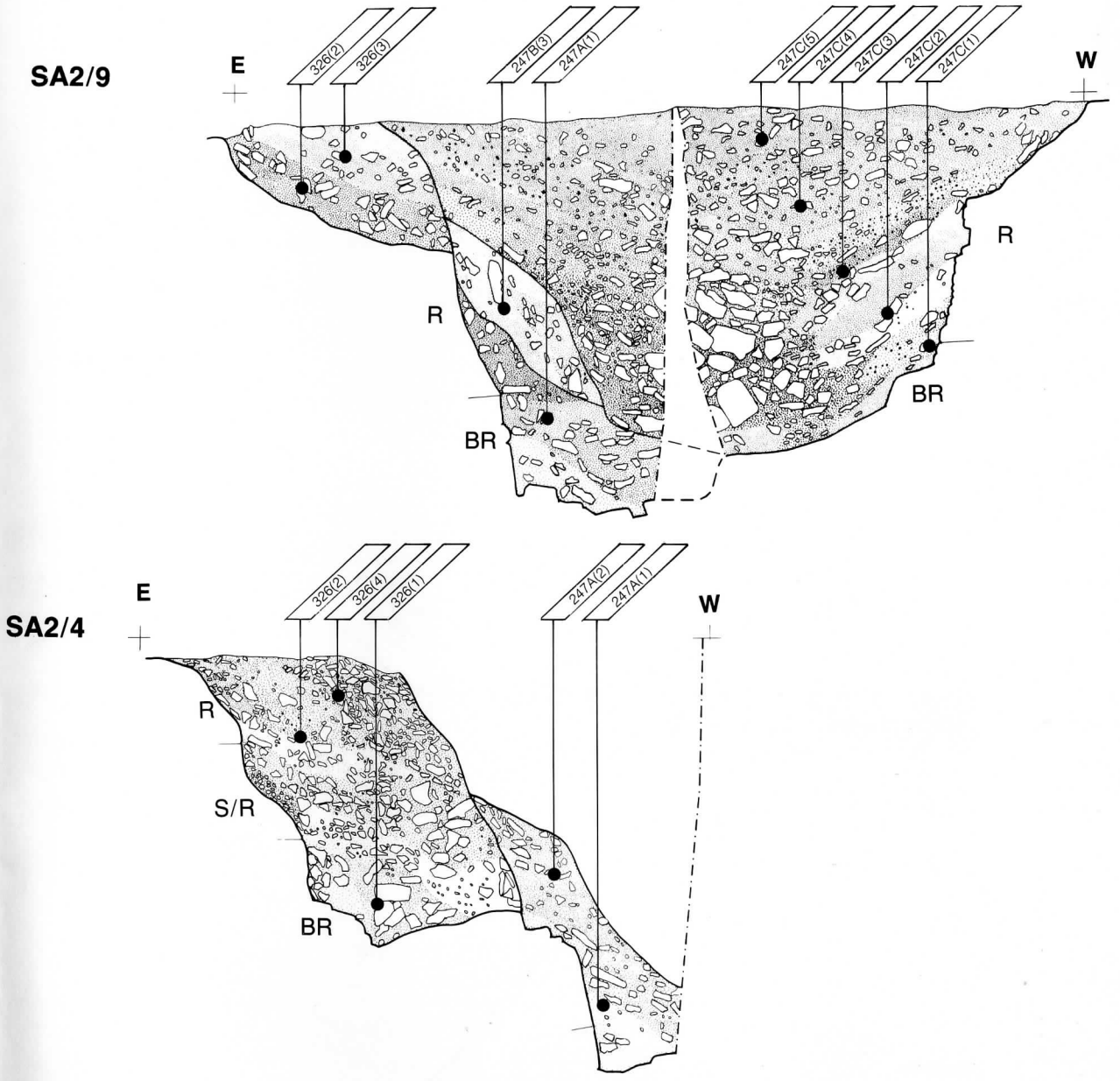


Fig 6:2 **Scale 1:30**

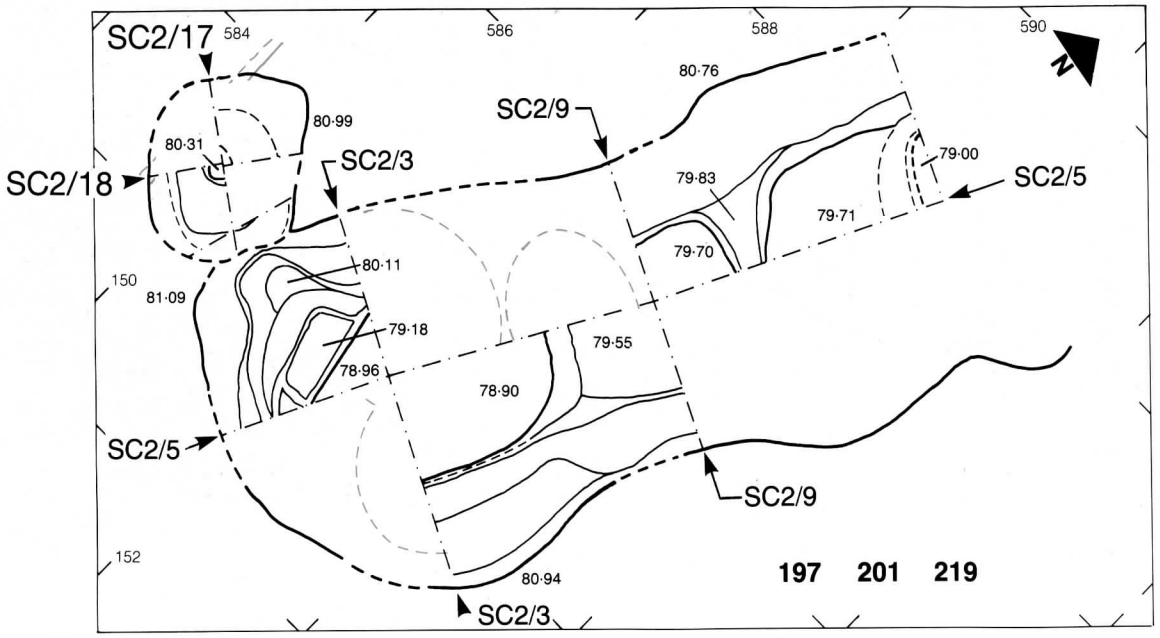
Key to conventions used in sections

Clay	
Charcoal	
Scorched sand	
Burnt ironstone	
Slag	
Sandstone and Quartzite pebbles	

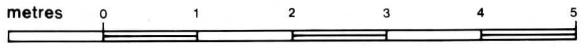
Subsoil strata

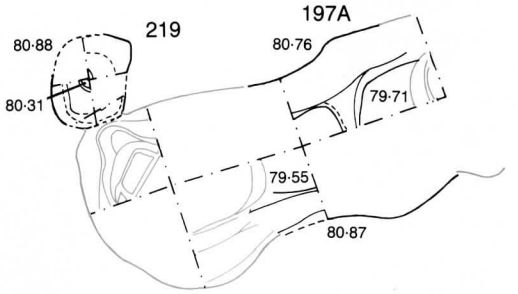
Bedrock	BR
Rubble	R
Sand and Rubble	S/R
Firm sand	FS
Soft sand	SS
Clay	C

Outer Ditch Circuit: 197A–D, 201, 219

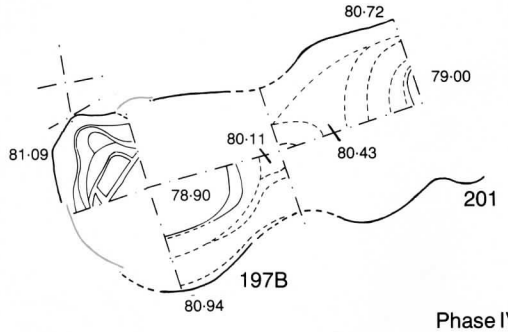


Scale 1:80

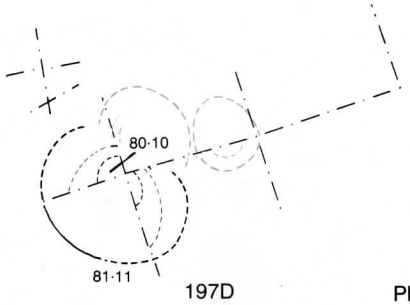




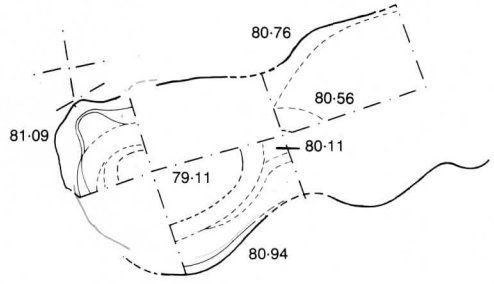
Phase II/III



Phase IV



197D Phase VII



197C Phase V

Scale 1:160

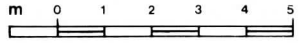
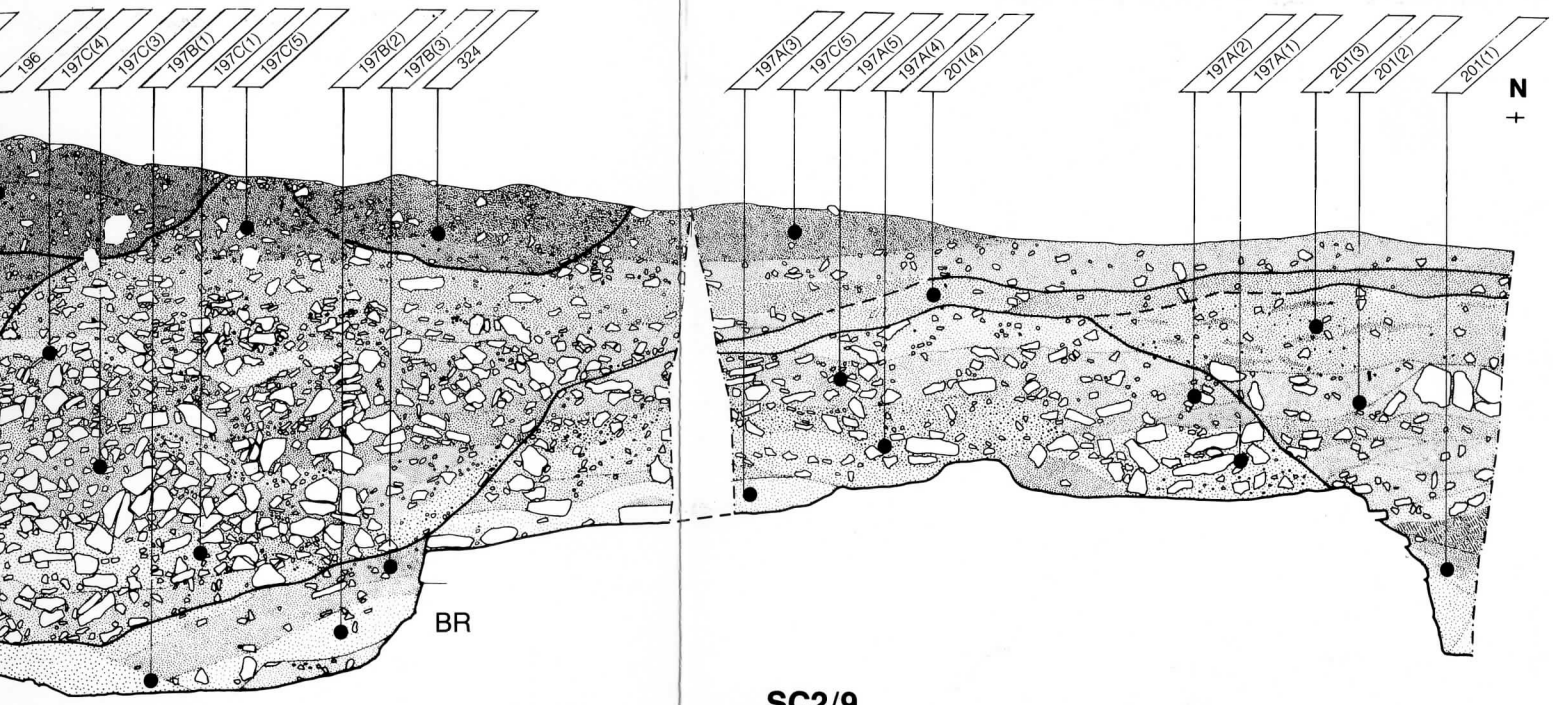
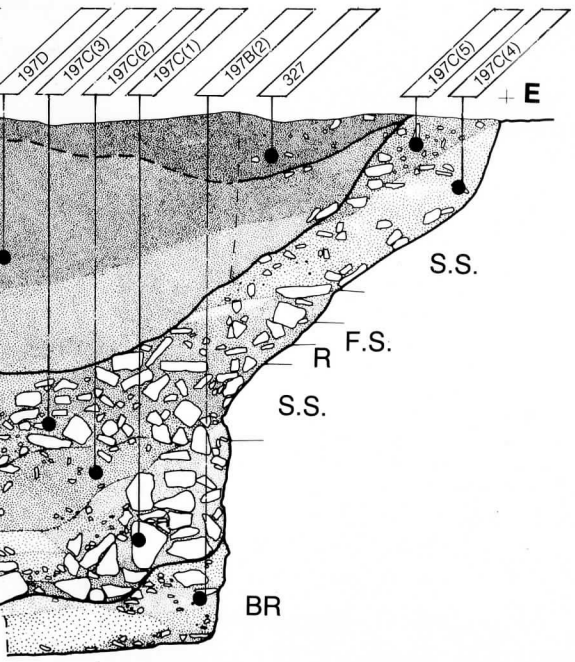


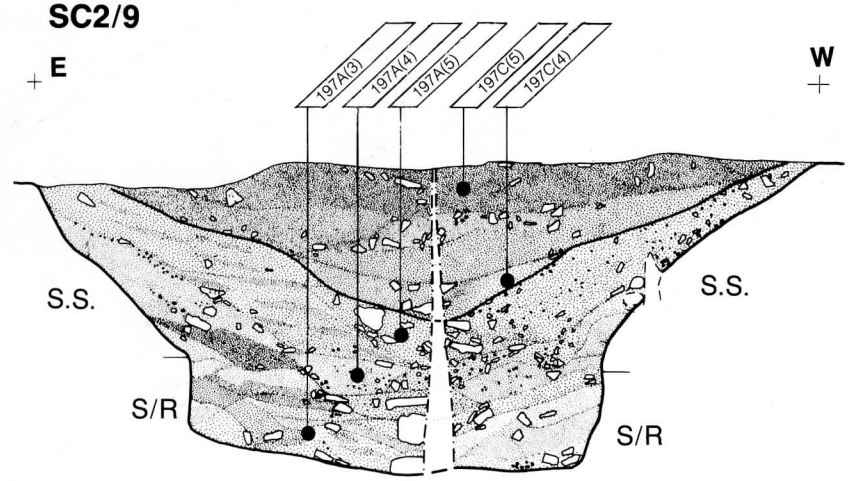
Fig 7:1


196
197C(4)
197C(3)
197B(1)
197C(1)
197C(5)
197B(2)
197B(3)
324
BR

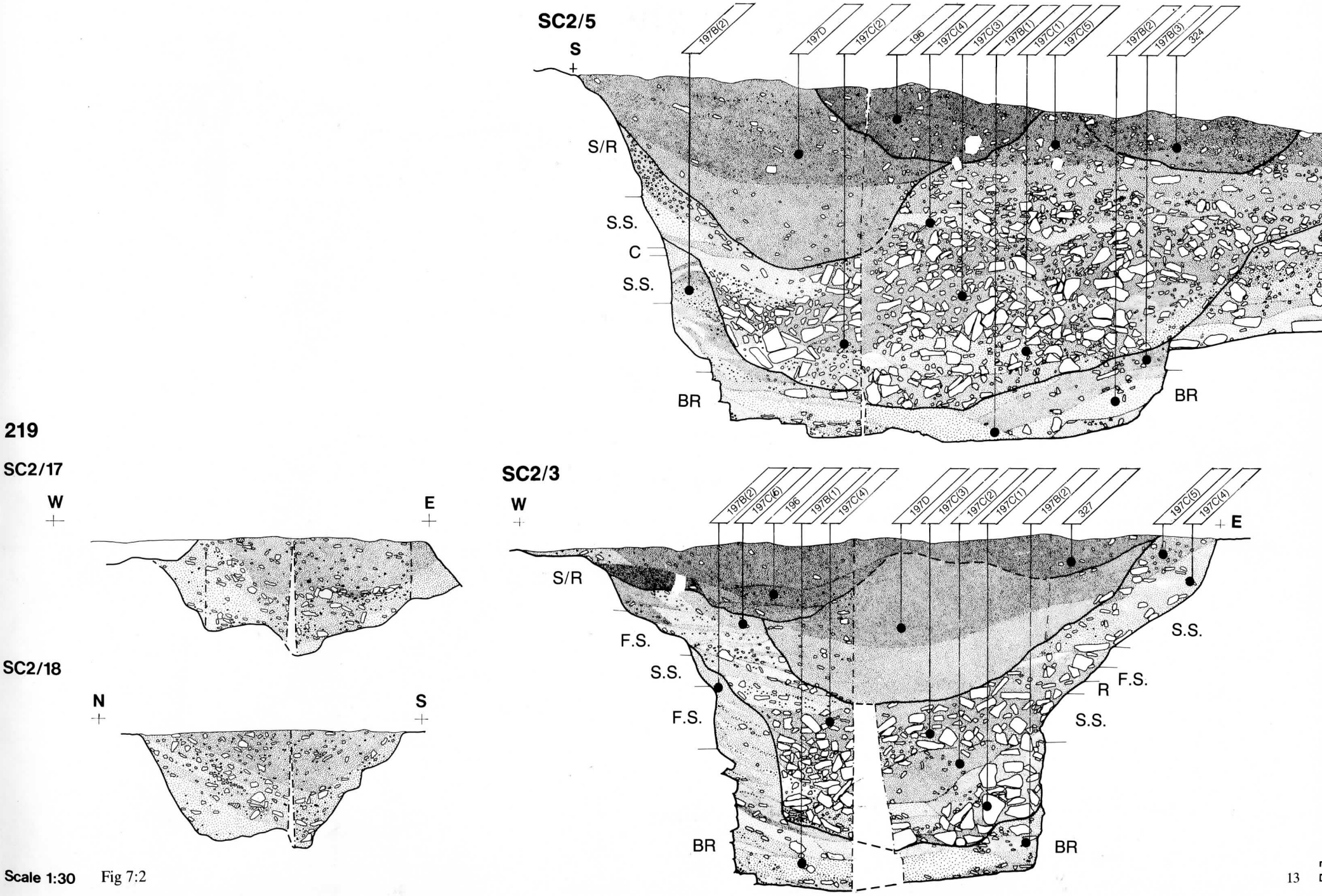
197A(3)
197C(5)
197A(5)
197A(4)
201(4)
197A(2)
197A(1)
201(3)
201(2)
201(1)
N


197D
197C(3)
197C(2)
197C(1)
197B(2)
327
197C(6)
197C(4)
E
S.S.
R
F.S.
S.S.
BR

SC2/9

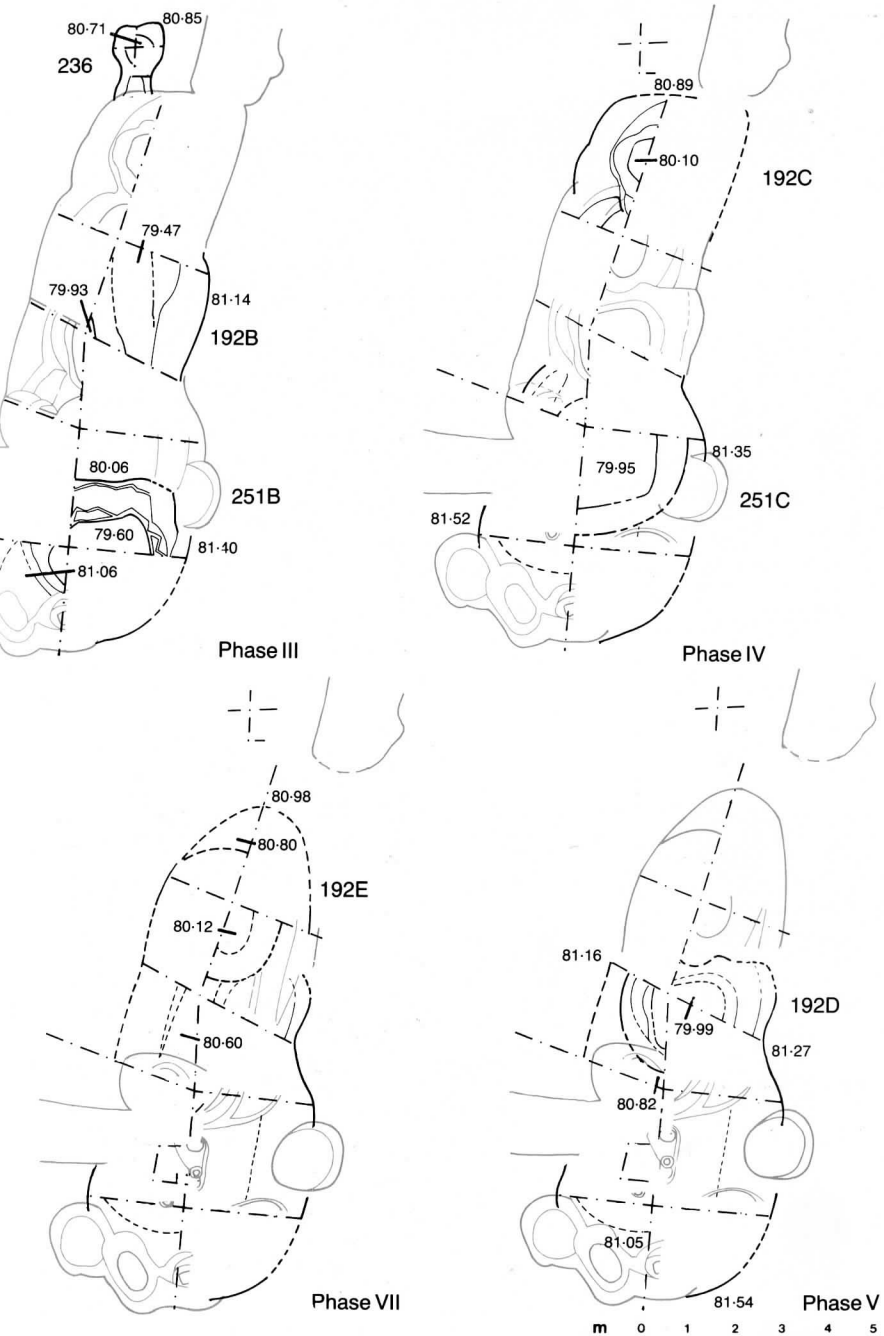

E
W
197A(3)
197A(4)
197A(5)
197C(5)
197C(4)
S.S.
S.S.
S/R
S/R


metres
0
1
2
3
4
5



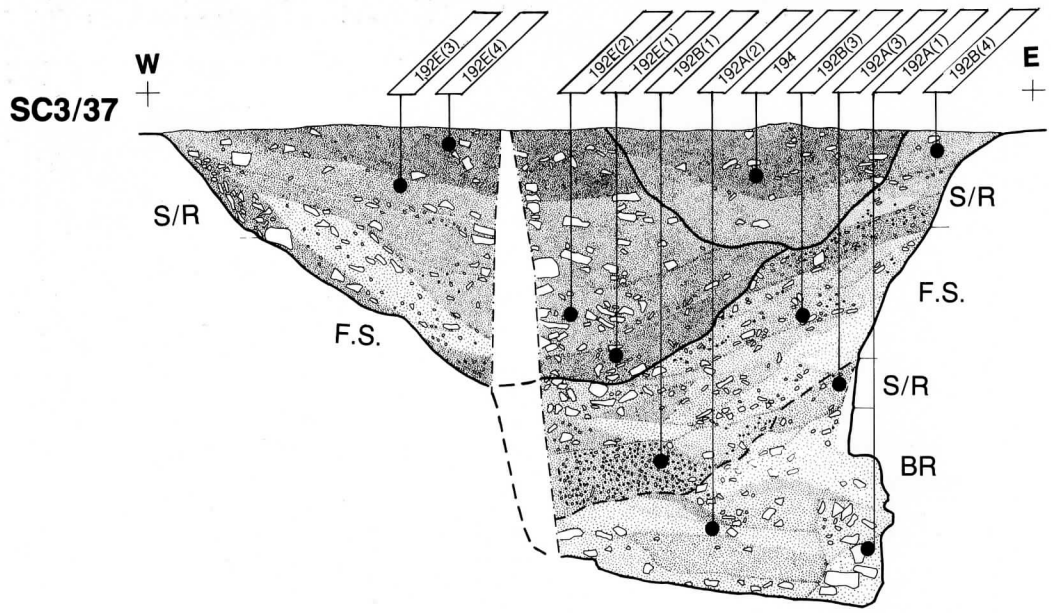
Scale 1:30 Fig 7:2

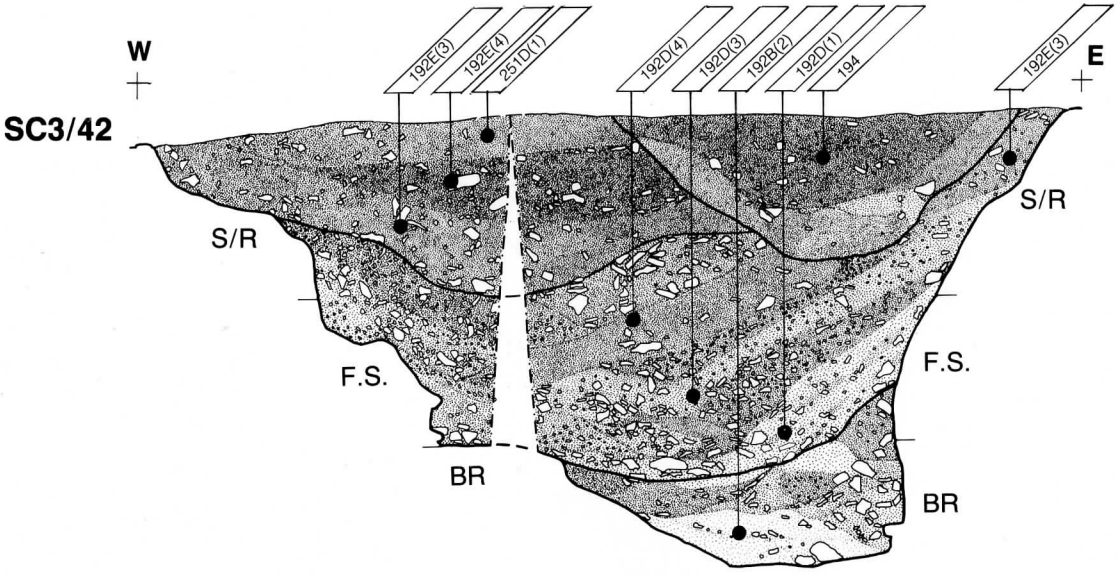
res: 228, 256, 258, 300, 303



Scale 1:160

Fig 8:1

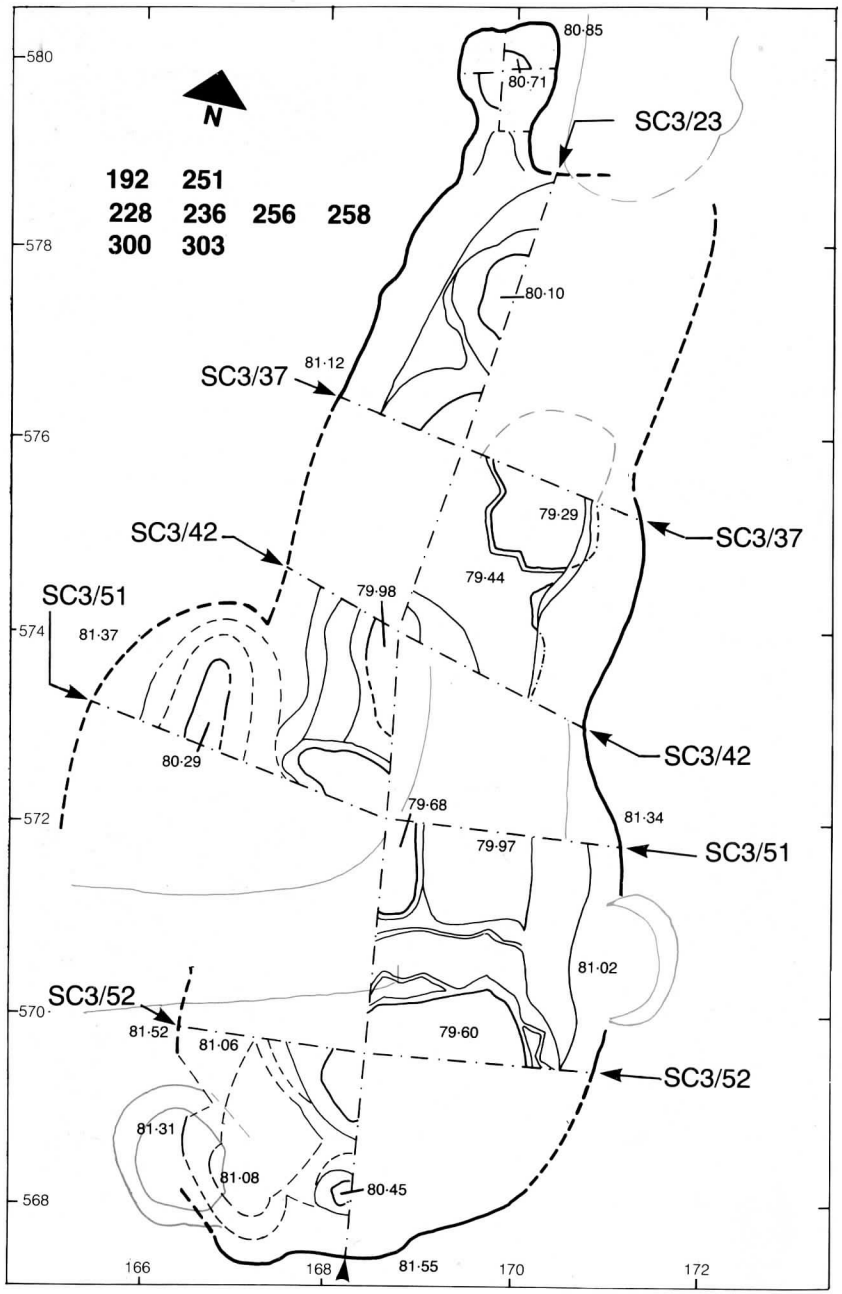




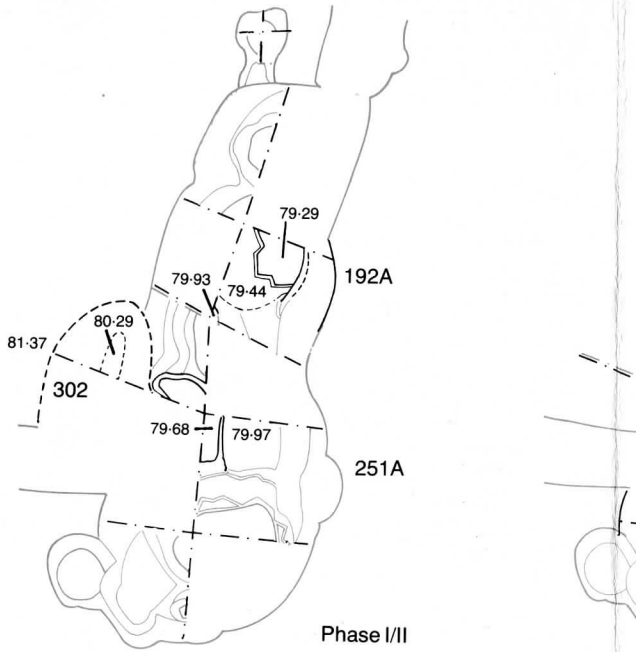
Scale 1:30

metres 0 1 2

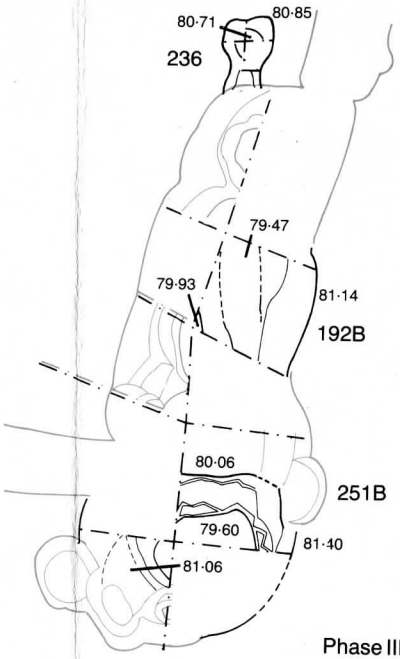
Inner Ditch Circuit: 192A–E, 251A–C, 236, 302 Later Neolithic Features: 228, 256, 258, 300, 303



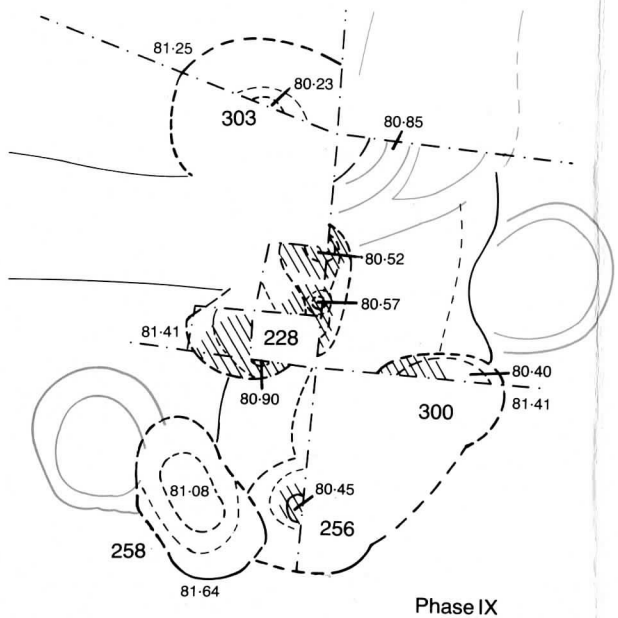
Scale 1:80



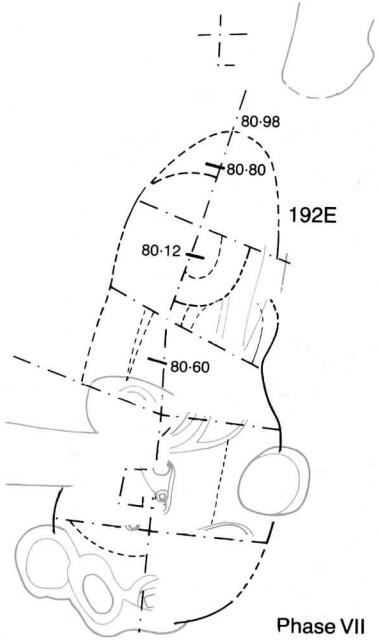
Phase I/II



Phase III



Phase IX



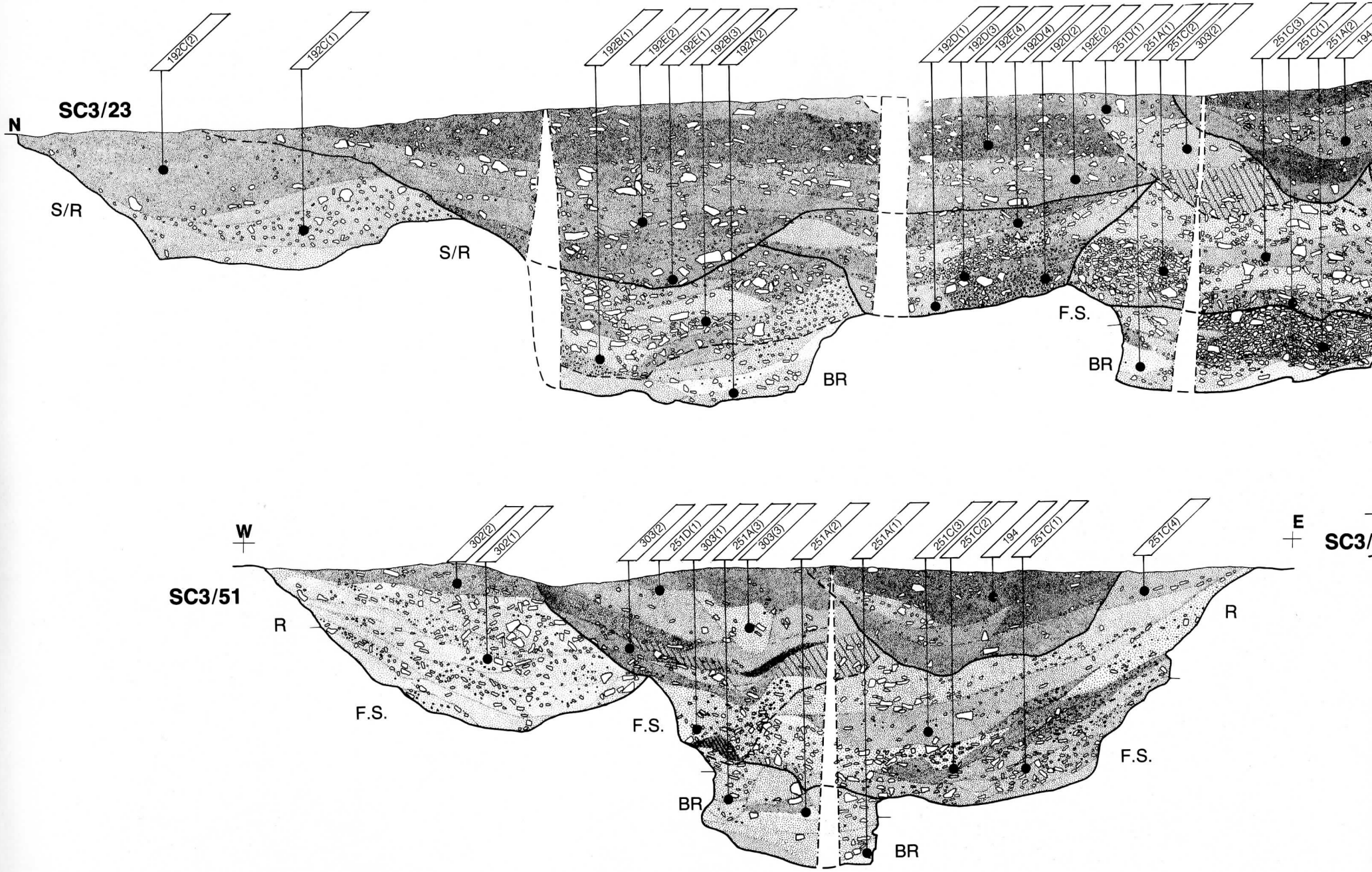
Phase VII

metres 0 1 2 3 4 5

m 0

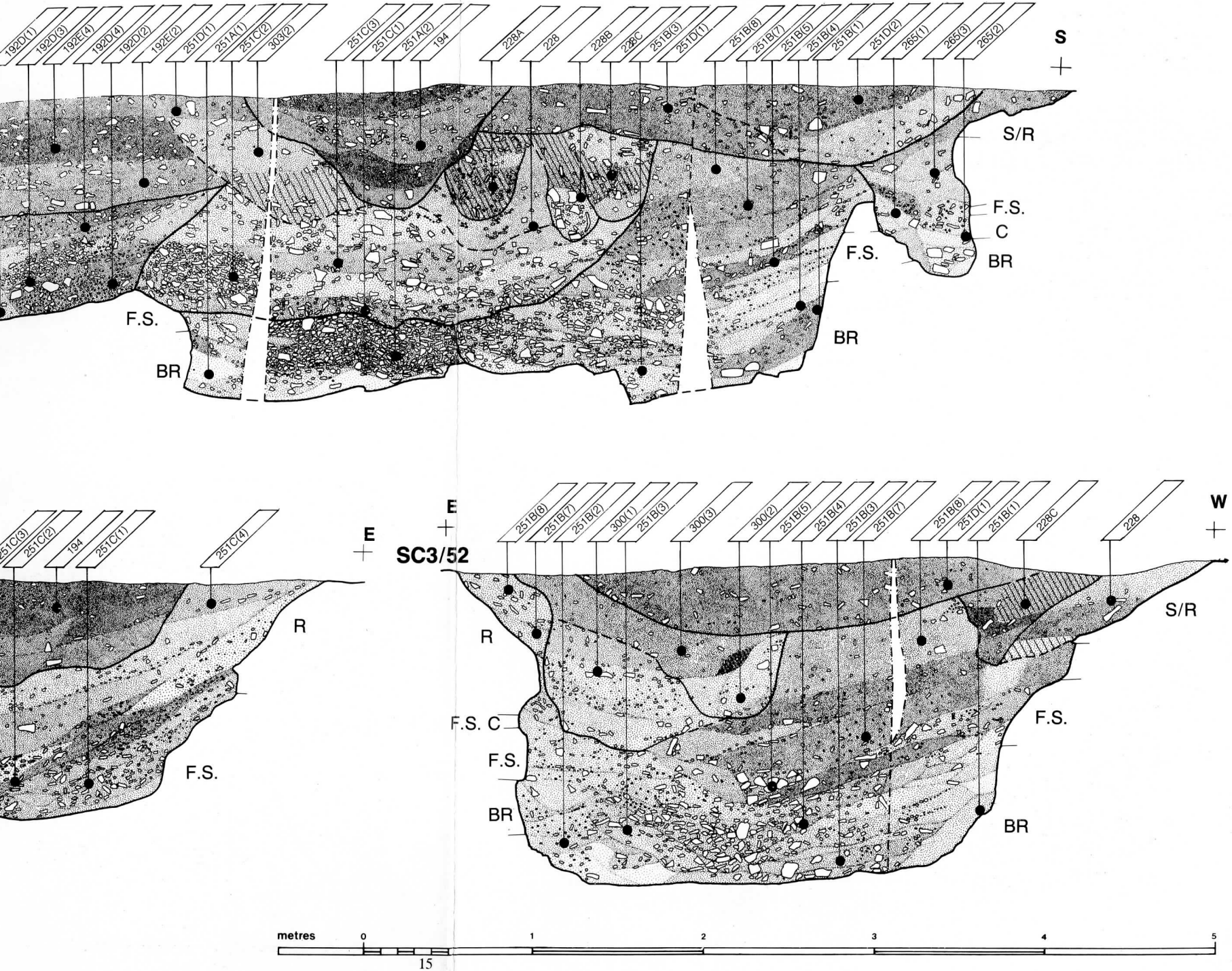
Scale 1:160

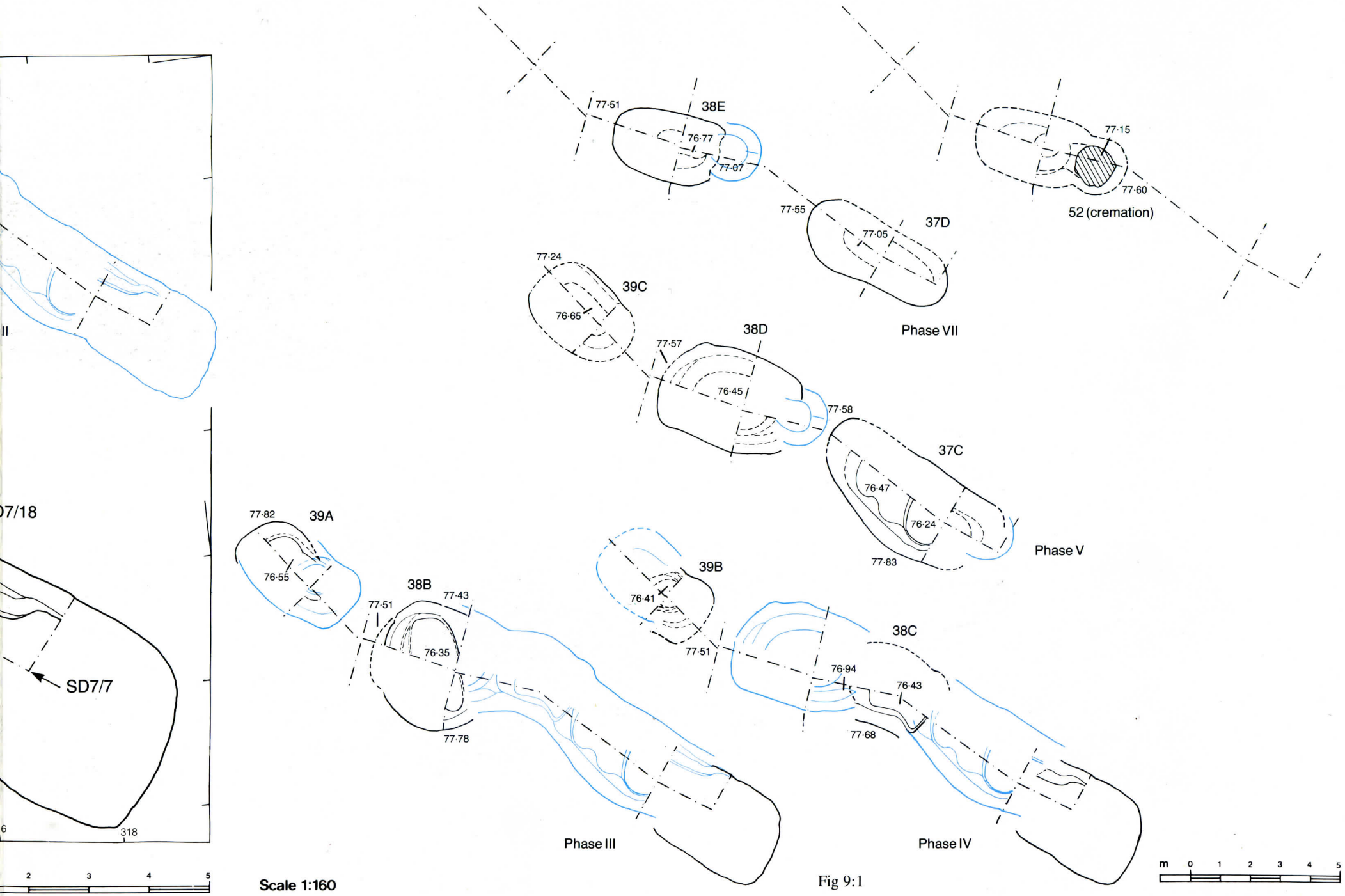
Fig 8:1



Scale 1:30

Fig 8:2

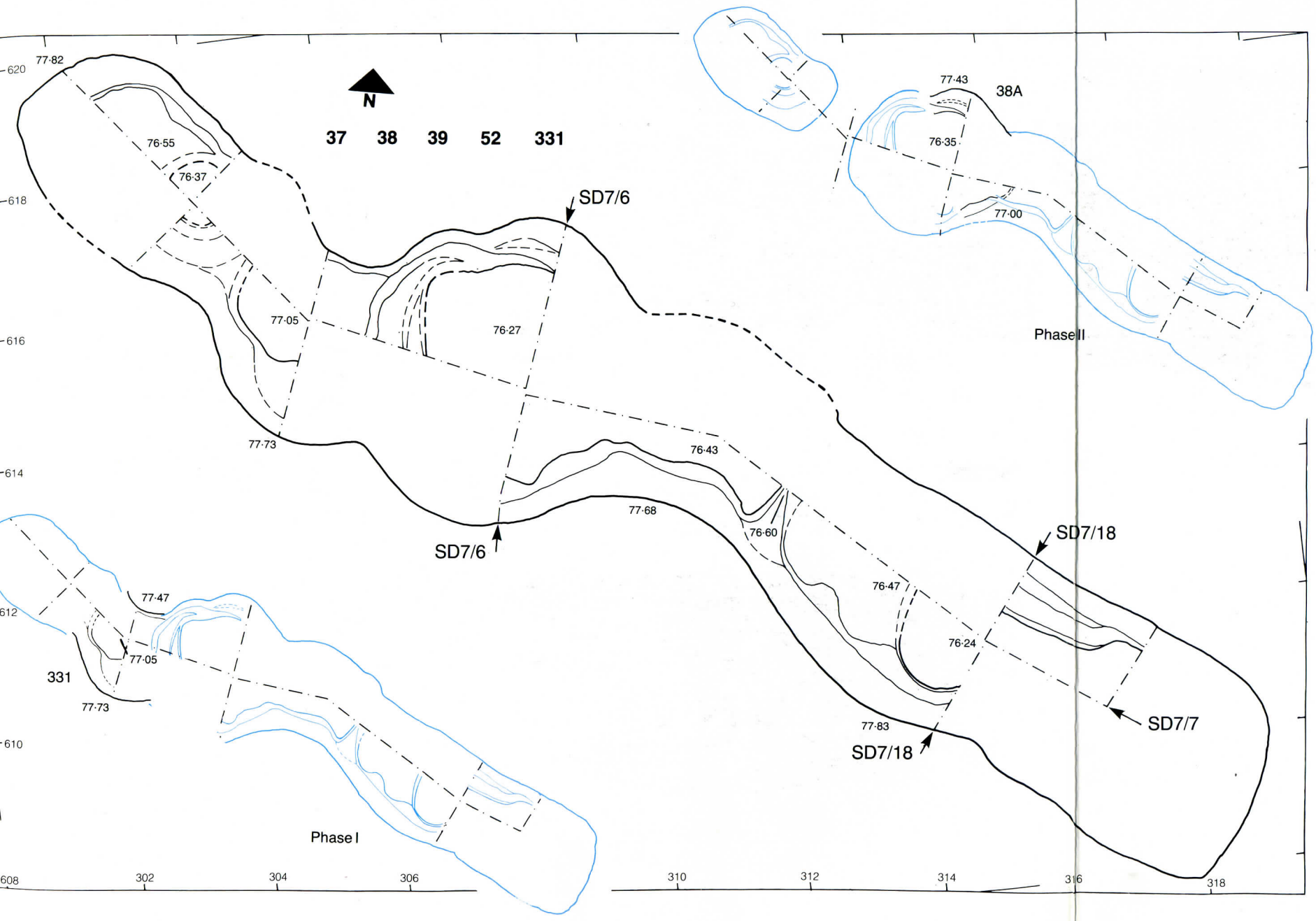

192D(1)
192D(3)
192E(4)
192D(4)
192D(2)
192E(2)
251D(1)
251A(1)
251C(2)
303(2)
251C(3)
251C(1)
251A(2)
194
228A
228
228B
228C
251B(3)
251D(1)
251B(8)
251B(7)
251B(5)
251B(4)
251B(1)
251D(2)
265(1)
265(3)
265(2)
S
S/R
F.S.
C
F.S.
BR
F.S.
BR
BR
251C(3)
251C(2)
194
251C(1)
251C(4)
E
R
F.S.
E
SC3/52
251B(8)
251B(7)
251B(2)
300(1)
251B(3)
300(3)
300(2)
251B(5)
251B(4)
251B(3)
251B(7)
251B(8)
251D(1)
251B(1)
228C
228
W
S/R
R
F.S. C
F.S.
BR
F.S.
BR
metres
0
1
2
3
4
5

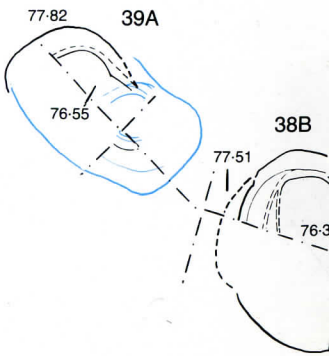


Scale 1:160

Fig 9:1

Inner Ditch Circuit: 37C–D, 38A–E, 331 Cremation: 52

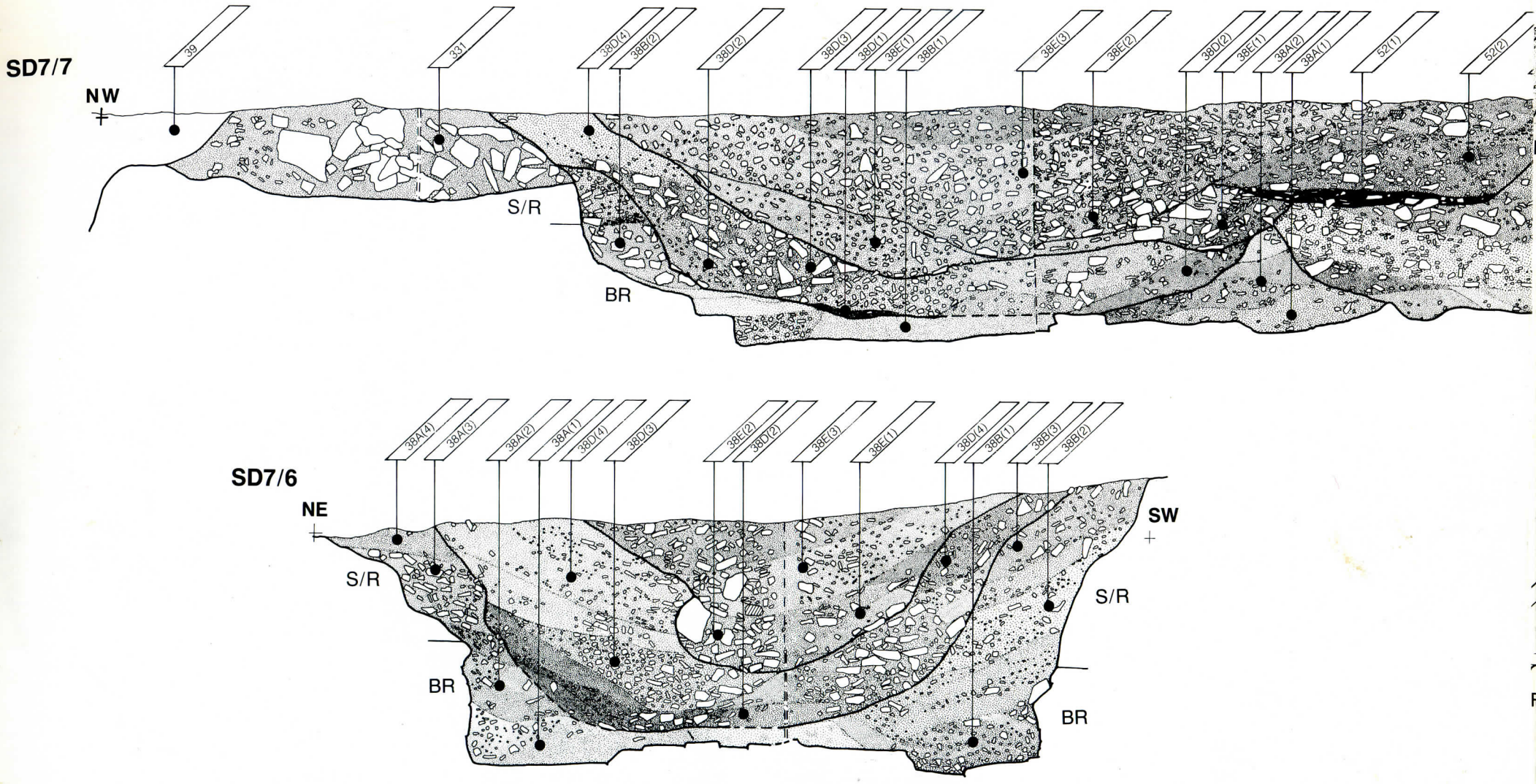




Scale 1:80

metres 0 1 2 3 4 5

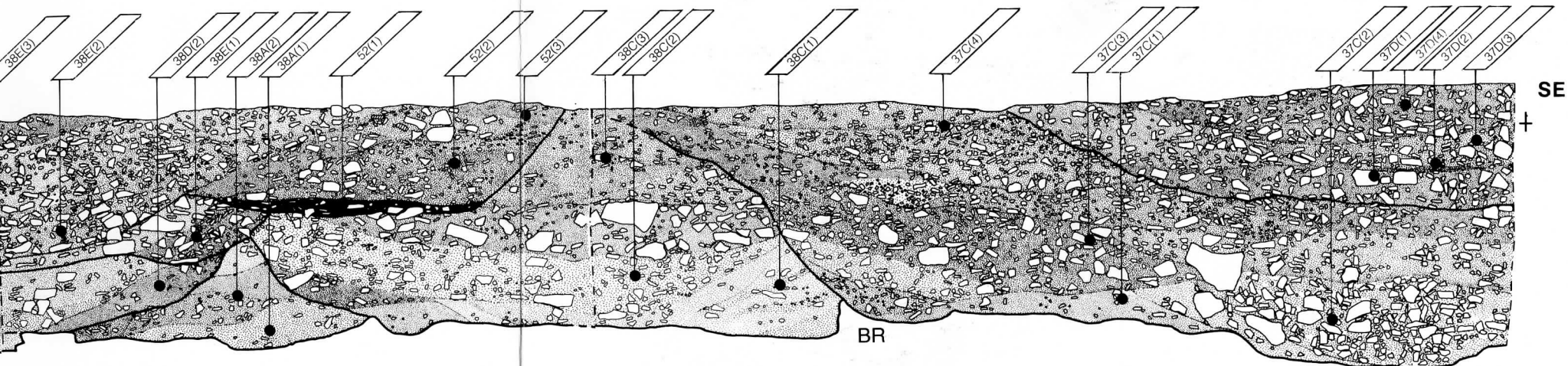
Scale 1:160

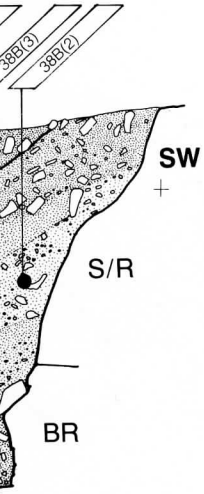


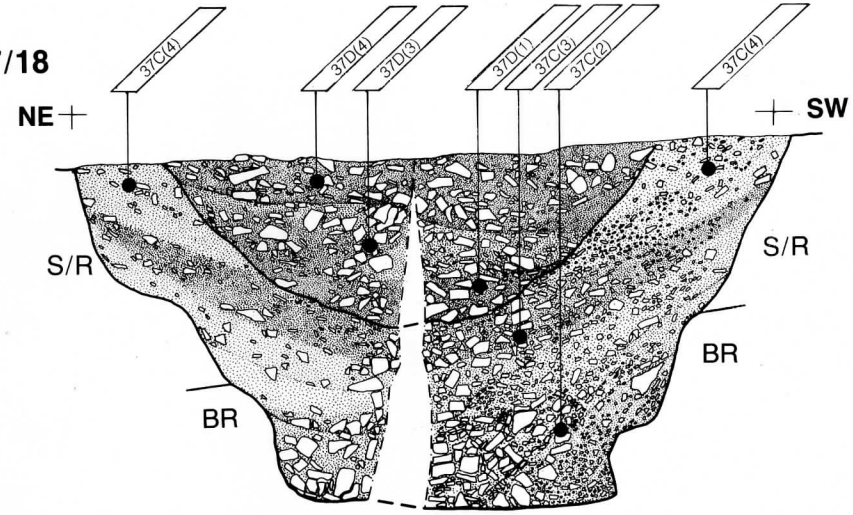
Scale 1:30

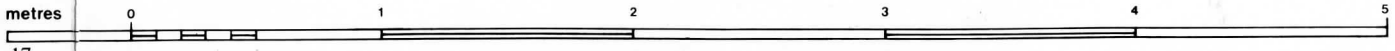
Fig 9:2

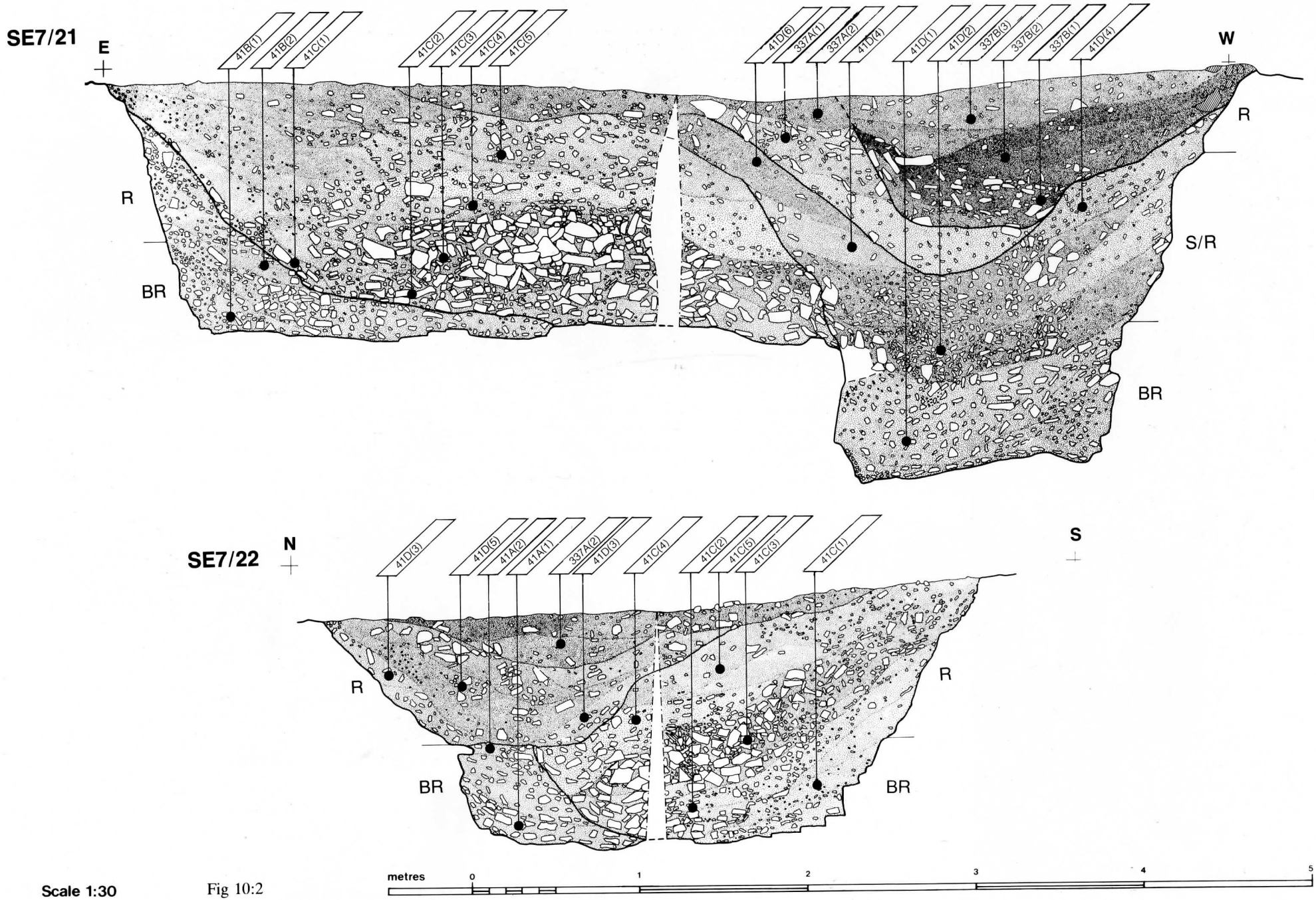
metres


38E(3)
38E(2)
38D(2)
38E(1)
38A(2)
38A(1)
52(1)
52(2)
52(3)
38C(3)
38C(2)
38C(1)
37C(4)
37C(3)
37C(1)
37C(2)
37D(1)
37D(4)
37D(2)
37D(3)
SE
BR


38B(3)
38B(2)
SW
S/R
BR


SD7/18
37C(4)
37D(4)
37D(3)
37D(1)
37C(3)
37C(2)
37C(4)
NE
SW
S/R
S/R
BR
BR

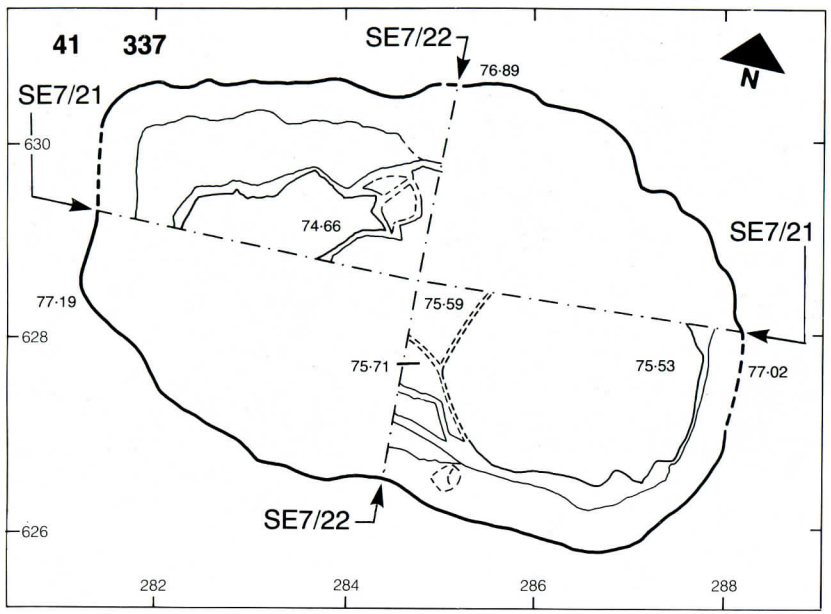

metres
0
1
2
3
4
5



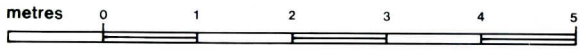
Scale 1:30

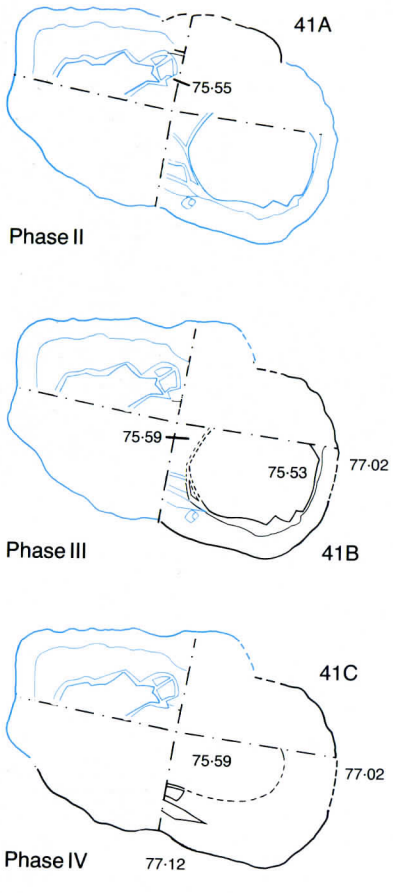
Fig 10:2

Inner Ditch Circuit: 41A–D, 337A? Later Neolithic Pit: 337B



Scale 1:80





Scale 1:160

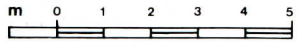
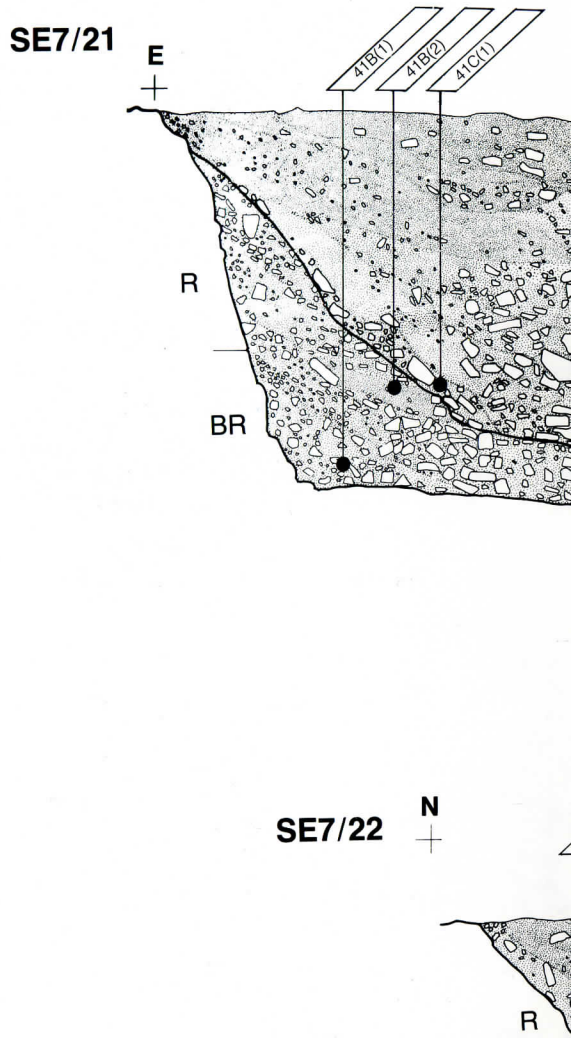


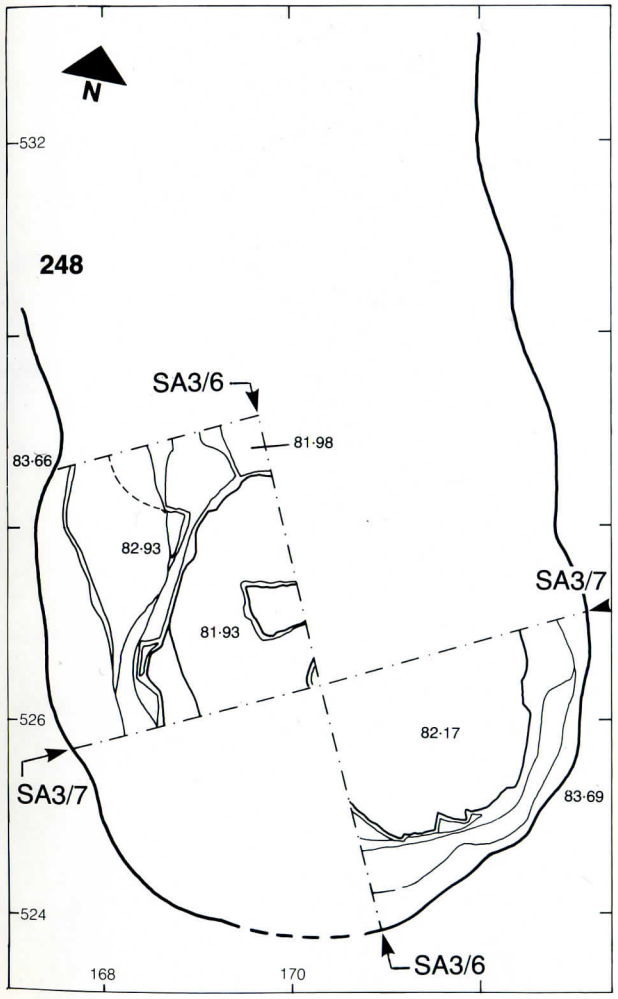
Fig 10:1



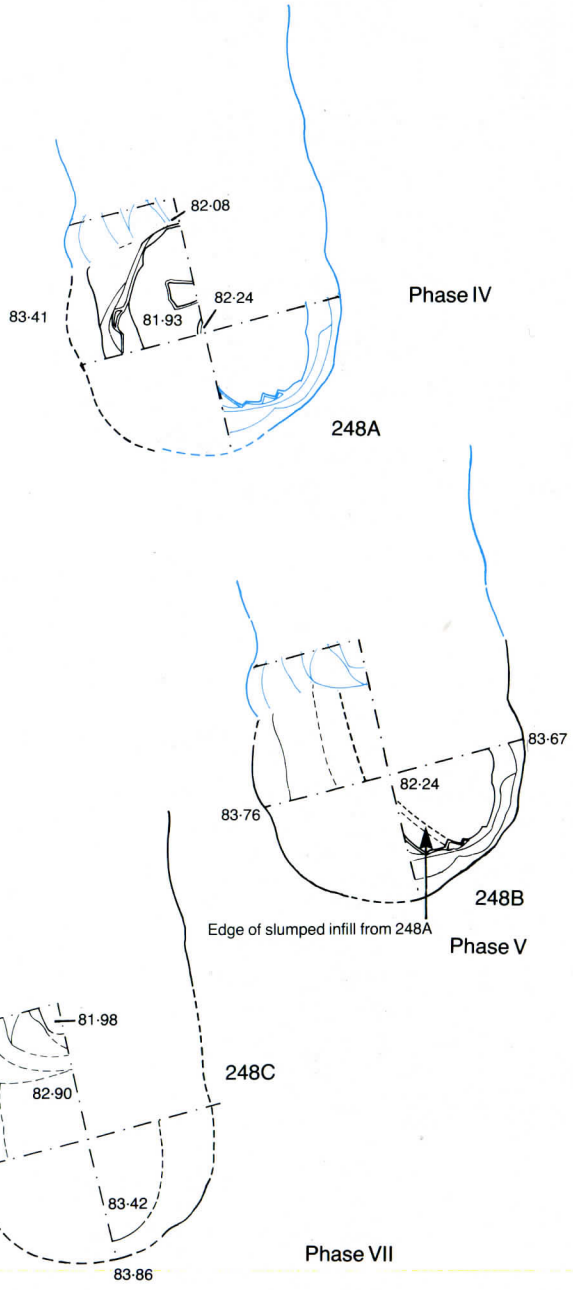
Scale 1:30

Fig 10:2

Inner Ditch Circuit: 248A–C

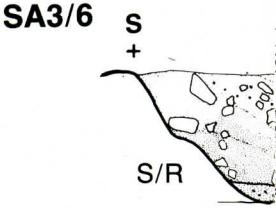


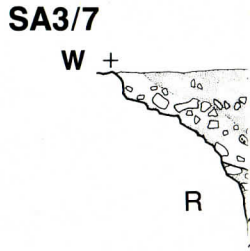
Scale 1:80 metres 0 1 2 3



Scale 1:160 m 0 1 2 3 4 5

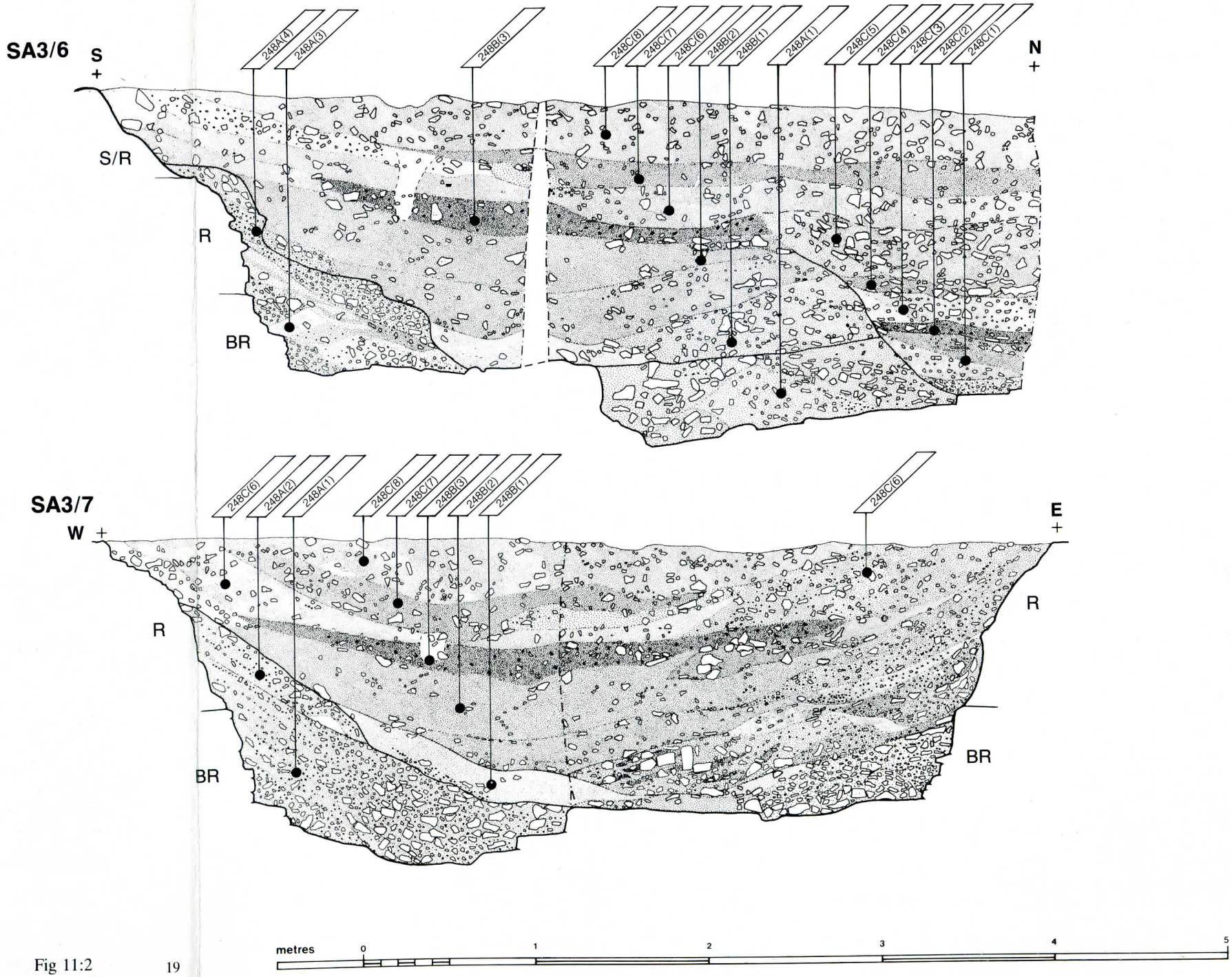
Fig 11:1





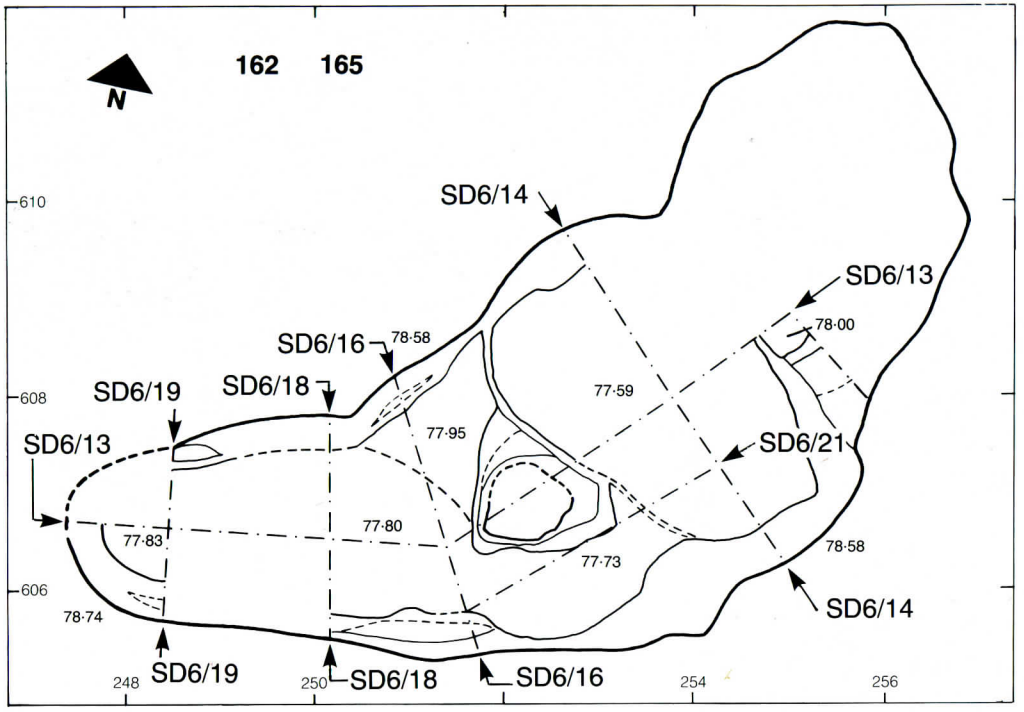
Scale 1:30

Fig 11:2

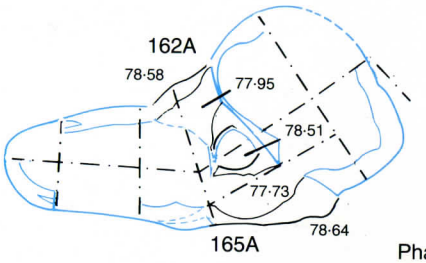


Scale 1:30 Fig 11:2

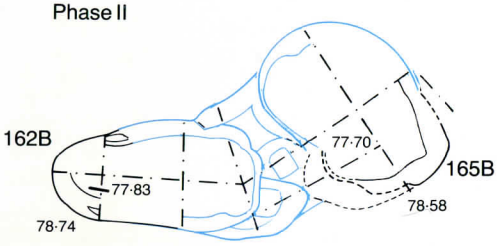
Spiral Arm of Inner Ditch Circuit: 162A–F, 165A–D



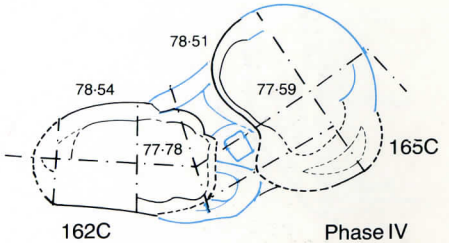
Scale 1:80



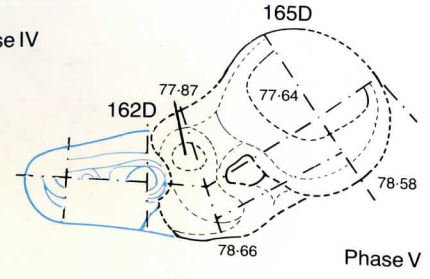
Phase II



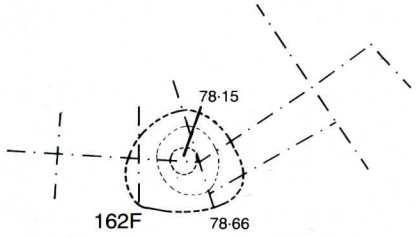
Phase III



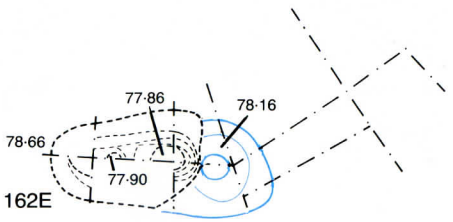
Phase IV



Phase V



Phase VII



Scale 1:160

Fig 13:1

Spiral Arm of Inner Ditch Circuit: 160, 161

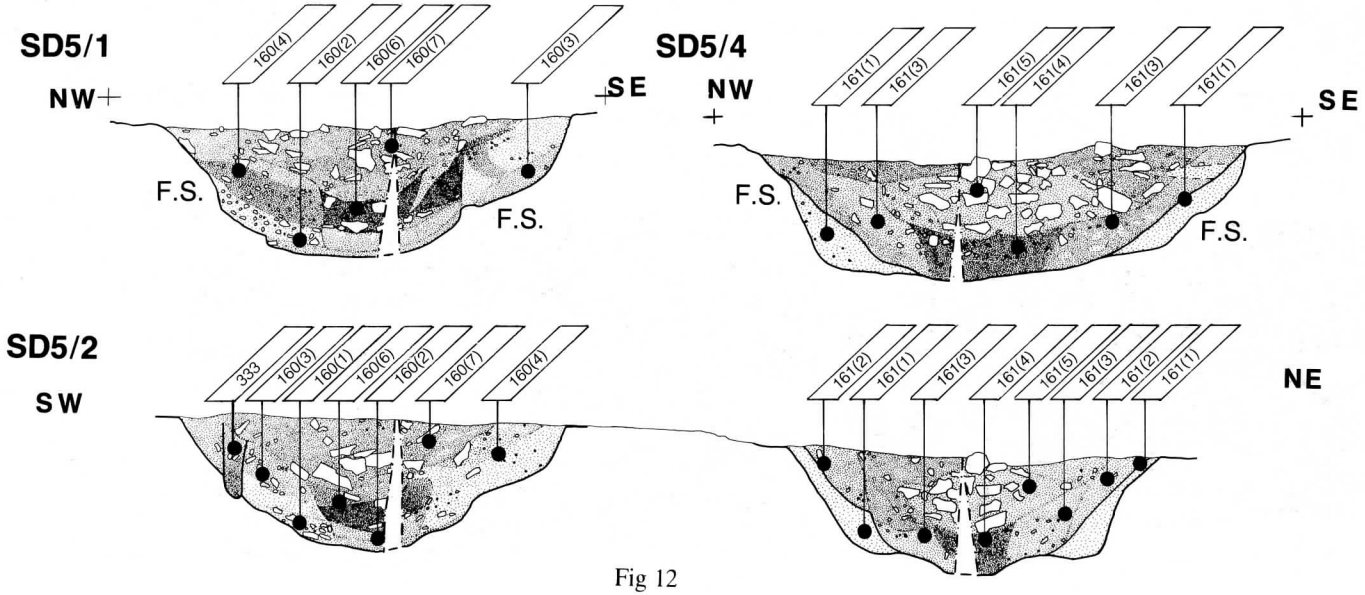
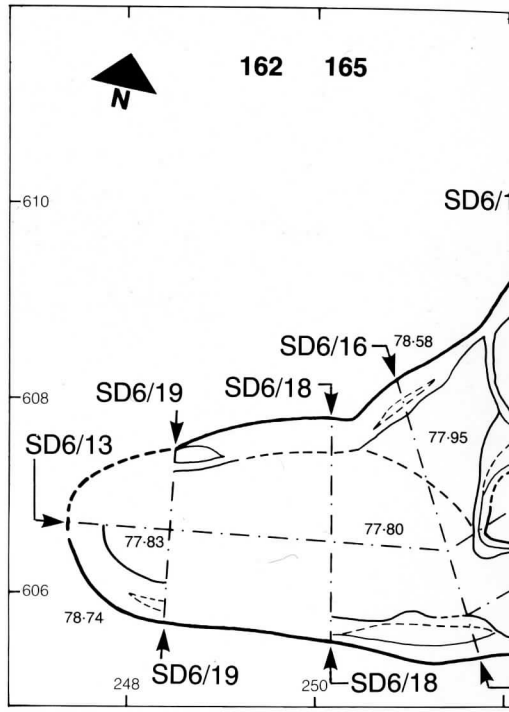


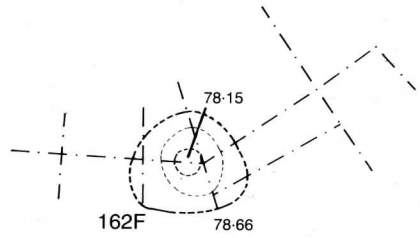
Fig 12

Spiral Arm of Inner Ditc



Scale 1:80

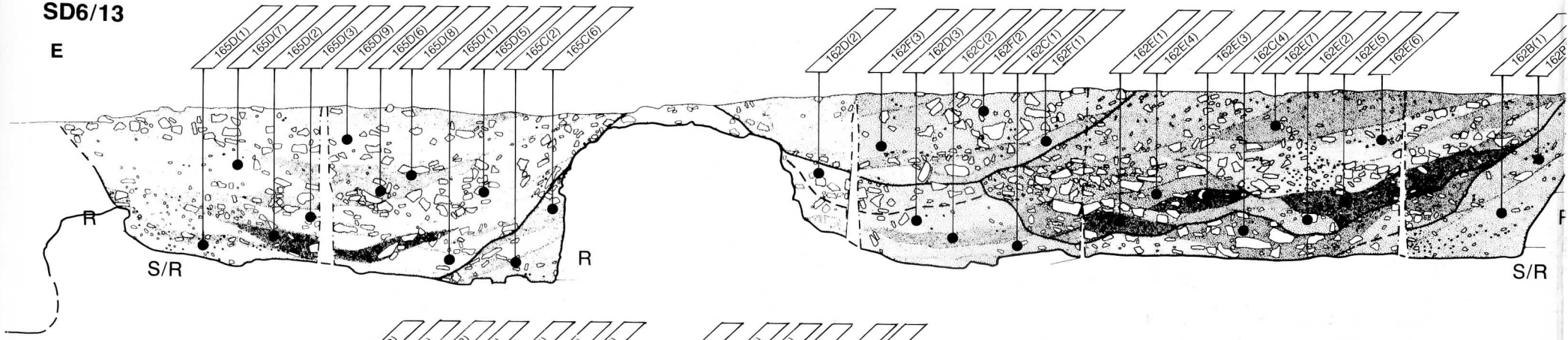
metres

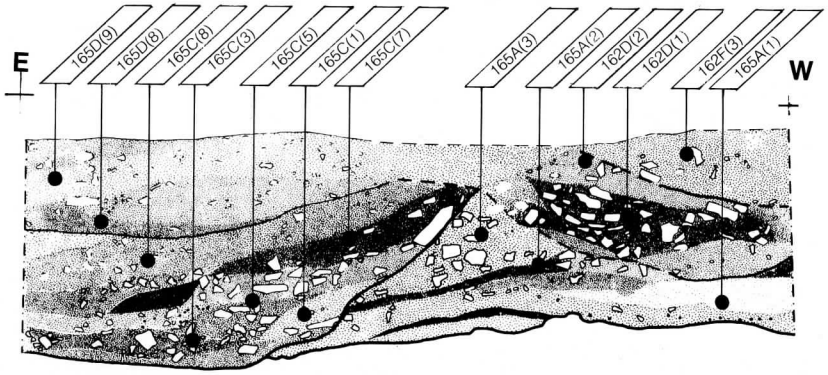


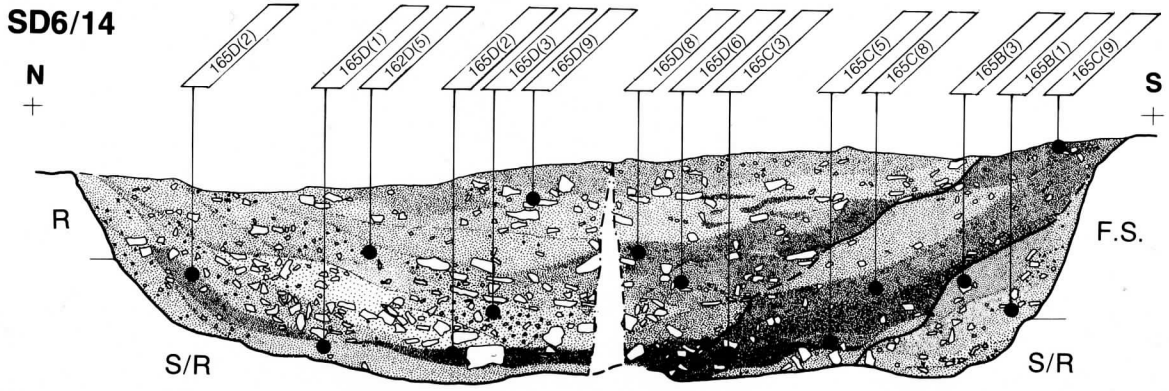
78·6

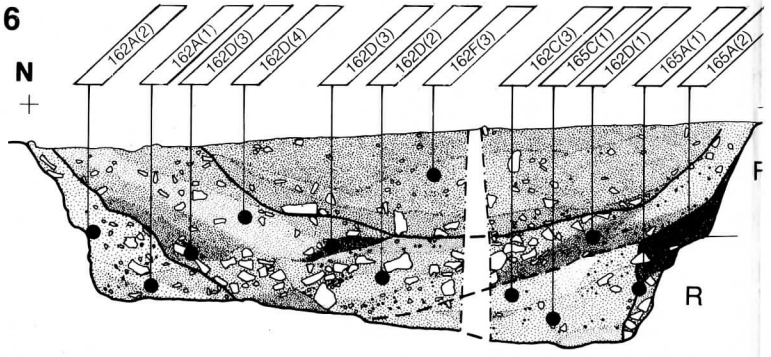
162

Scale 1:160

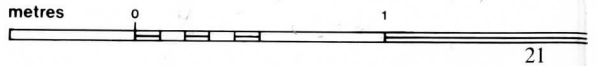

SD6/13
E
165D(1)
165D(7)
165D(2)
165D(3)
165D(9)
165D(6)
165D(8)
165D(1)
165D(5)
165C(2)
165C(6)
162D(2)
162F(3)
162D(3)
162C(2)
162F(2)
162C(1)
162F(1)
162E(1)
162E(4)
162E(3)
162C(4)
162E(7)
162E(2)
162E(5)
162E(6)
162B(1)
R
S/R
R
S/R


SD6/21
E
W
165D(9)
165D(8)
165C(8)
165C(3)
165C(5)
165C(1)
165C(7)
165A(3)
165A(2)
162D(2)
162D(1)
162F(3)
165A(1)


SD6/14
N
S
165D(2)
165D(1)
162D(5)
165D(2)
165D(3)
165D(9)
165D(8)
165D(6)
165C(3)
165C(5)
165C(8)
165B(3)
165B(1)
165C(9)
R
F.S.
S/R
S/R


SD6/16
N
162A(2)
162A(1)
162D(3)
162D(4)
162D(3)
162D(2)
162F(3)
162C(3)
165C(1)
162D(1)
165A(1)
165A(2)
R

Scale 1:30


metres
0
1

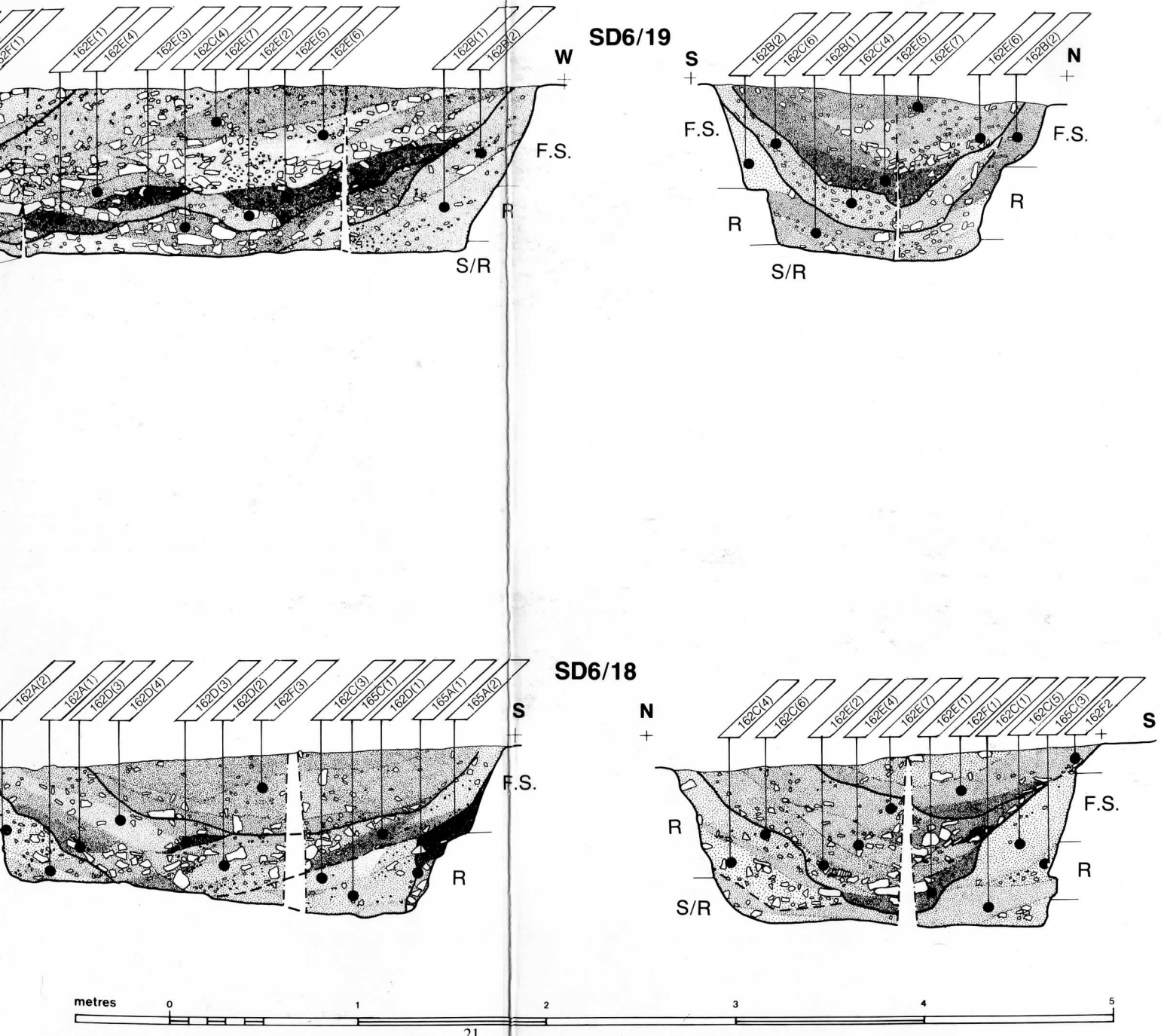
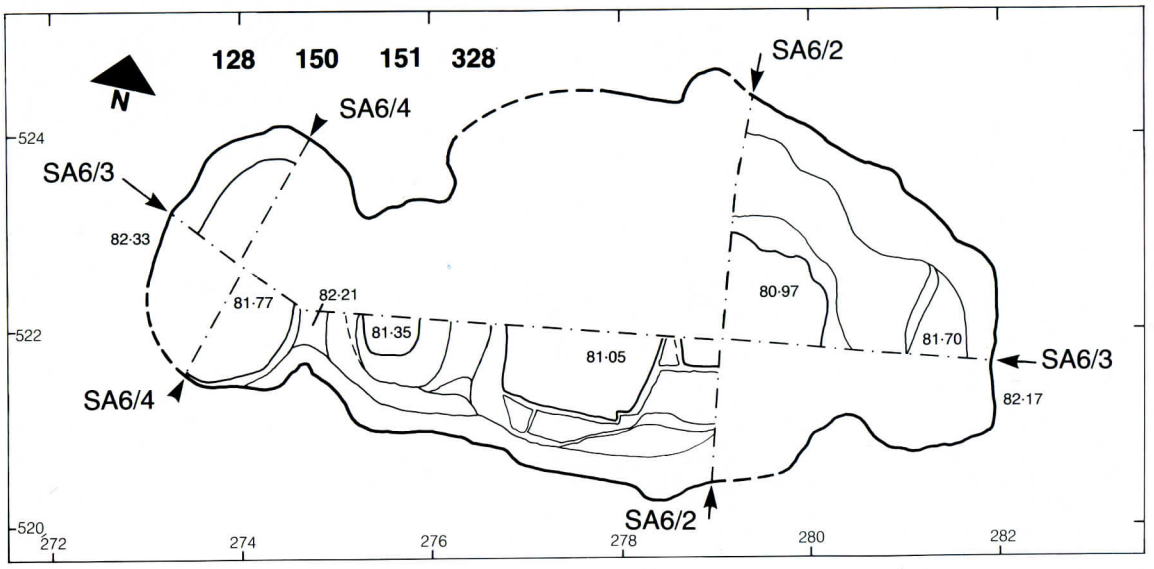
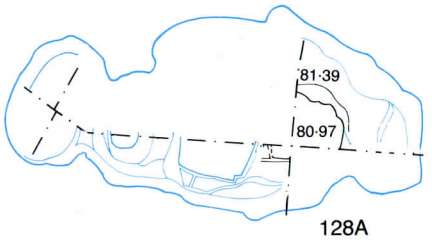

SD6/19
W
F.S.
R
S/R
162E(1)
162E(4)
162E(3)
162C(4)
162E(7)
162E(2)
162E(5)
162E(6)
162B(1)
162B(2)
S
N
F.S.
F.S.
R
R
S/R
162B(2)
162C(6)
162B(1)
162C(4)
162E(5)
162E(7)
162E(6)
162B(2)
SD6/18
S
F.S.
R
162A(2)
162A(1)
162D(3)
162D(4)
162D(3)
162D(2)
162F(3)
162C(3)
165C(1)
162D(1)
165A(1)
165A(2)
N
S
F.S.
R
R
S/R
162C(4)
162C(6)
162E(2)
162E(4)
162E(7)
162E(1)
162F(1)
162C(1)
162C(5)
165C(3)
162F2
metres
0
1
2
3
4
5

Fig 13:2

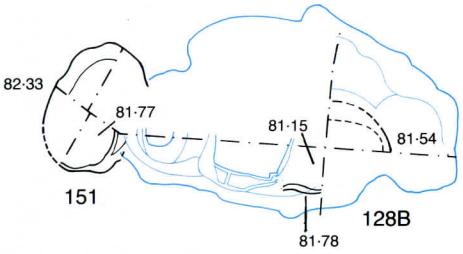
Spiral Arm of Inner Ditch Circuit: 128A–E, 150, 151, 328



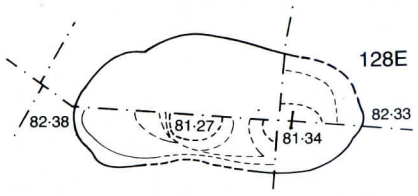
Scale 1:80



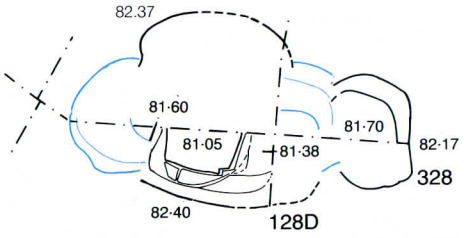
Phase II



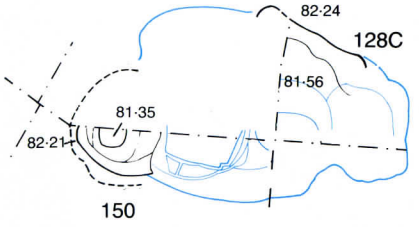
Phase III



Phase VII



Phase V

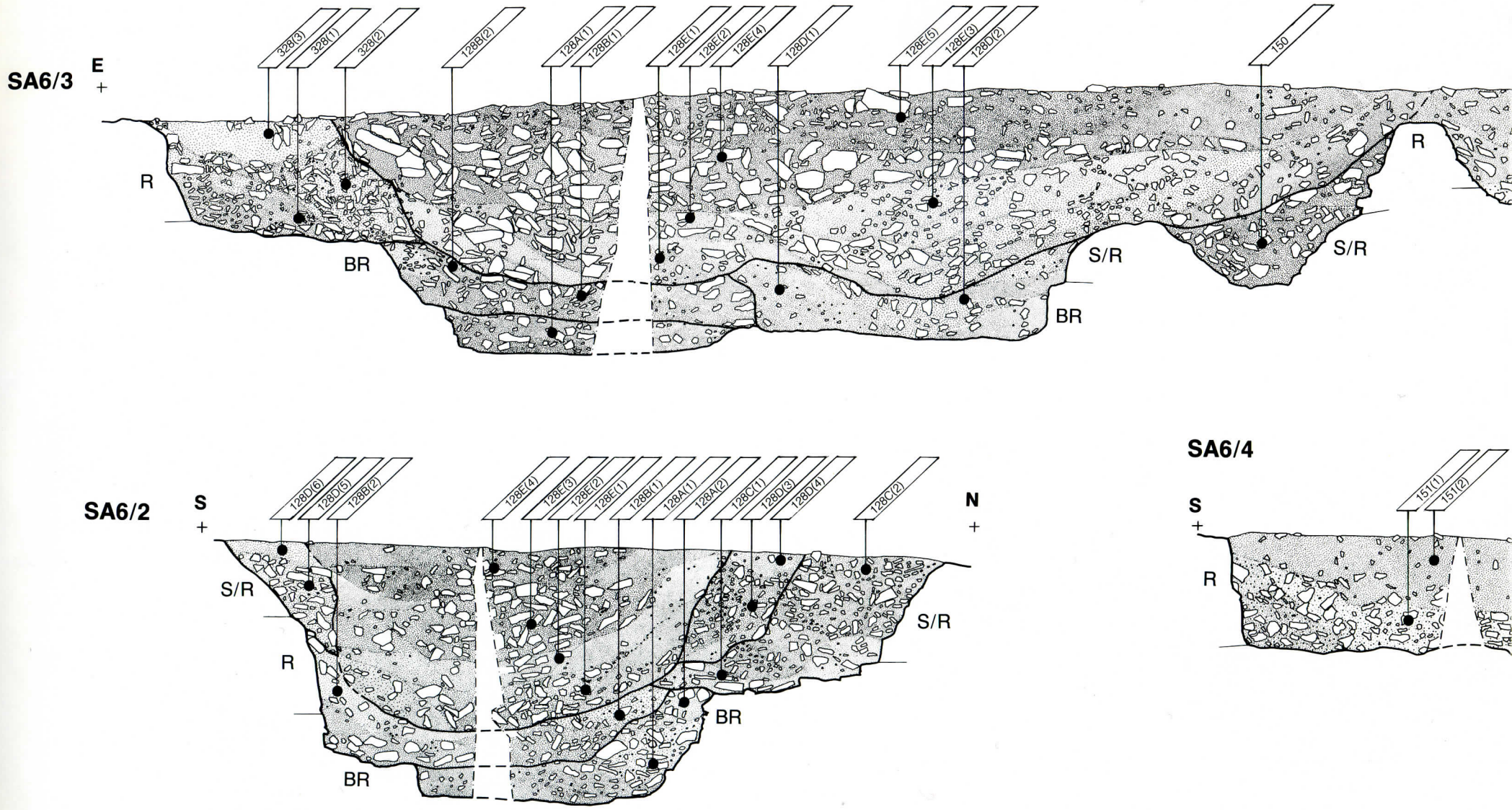


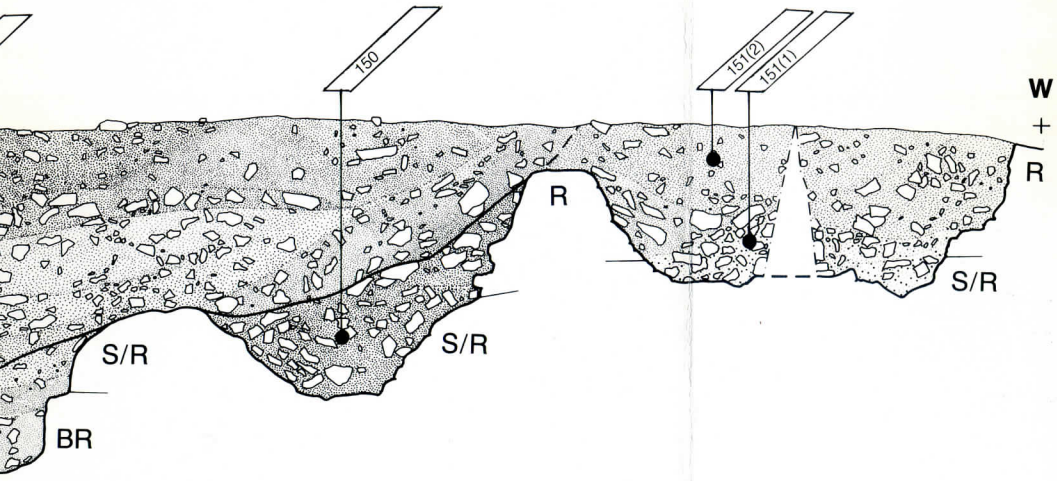
Phase IV

Scale 1:160

m 0 1 2 3 4 5

Fig 14:1


SA6/3
E
+
328(3)
328(1)
328(2)
128B(2)
128A(1)
128B(1)
128E(1)
128E(2)
128E(4)
128D(1)
128E(5)
128E(3)
128D(2)
150
R
BR
S/R
BR
R
S/R
SA6/2
S
+
N
+
128D(6)
128D(5)
128B(2)
128E(4)
128E(3)
128E(2)
128E(1)
128B(1)
128A(1)
128A(2)
128C(1)
128D(3)
128D(4)
128C(2)
S/R
R
BR
BR
S/R
SA6/4
S
+
151(1)
151(2)
R
Scale 1:30
metres
0
1
2
3



SA6/4

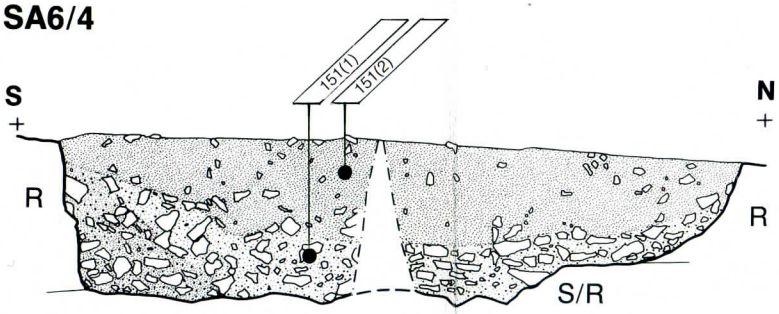
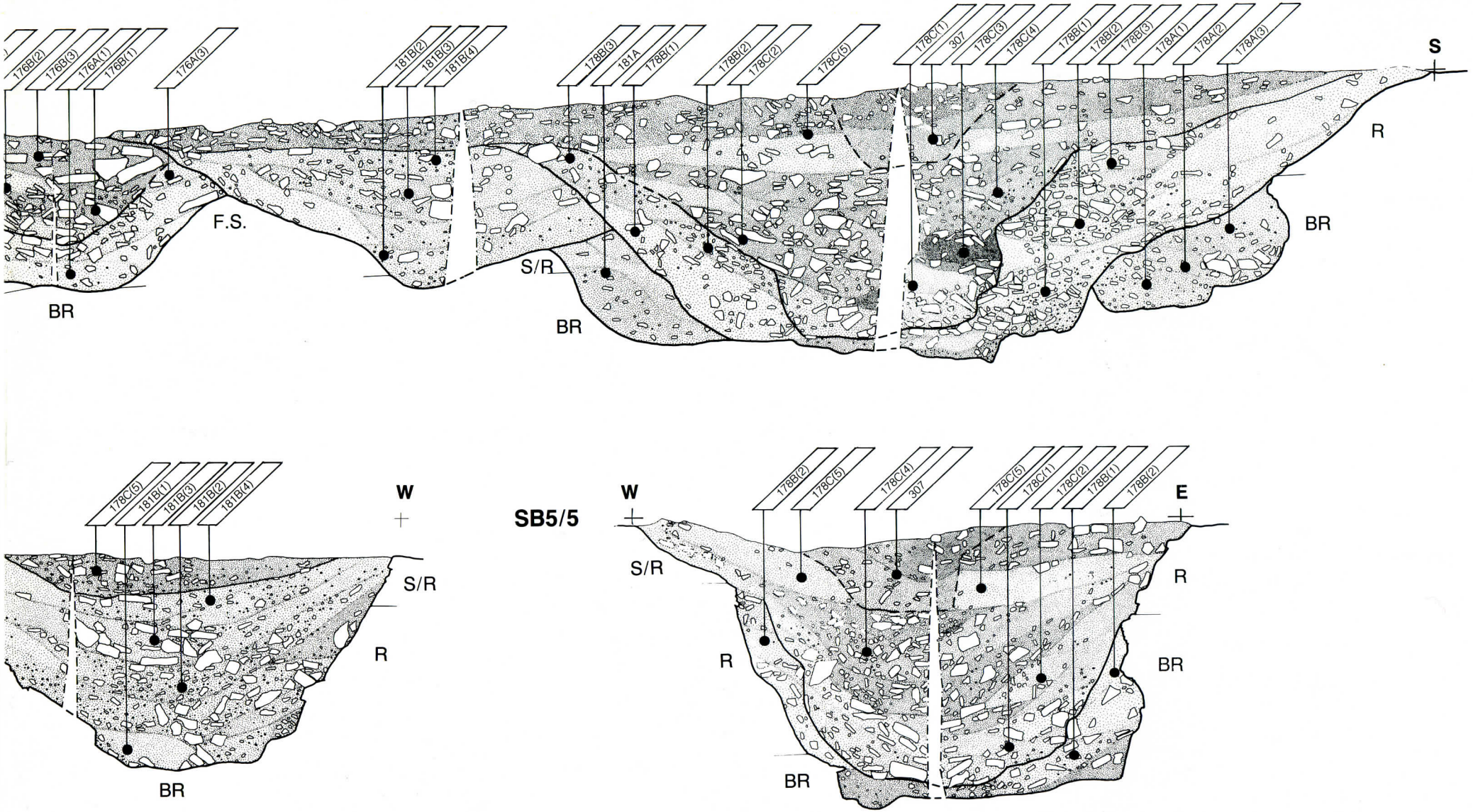
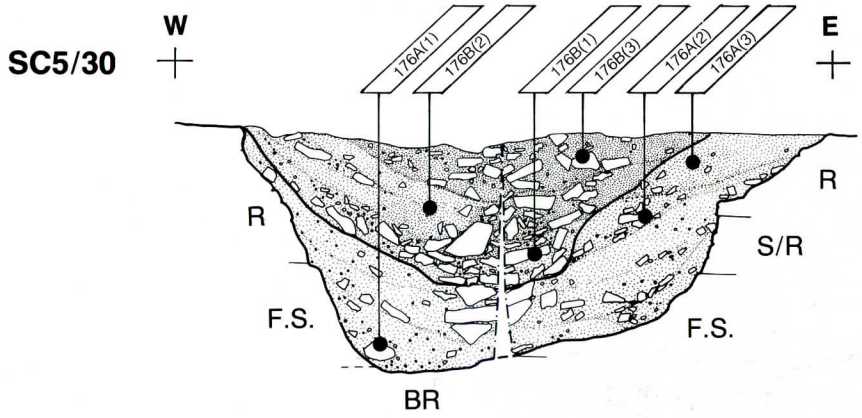
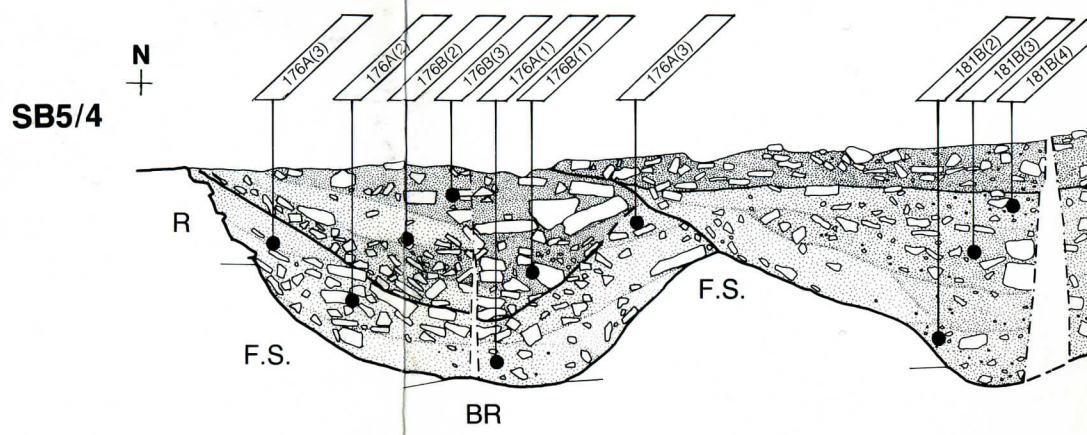
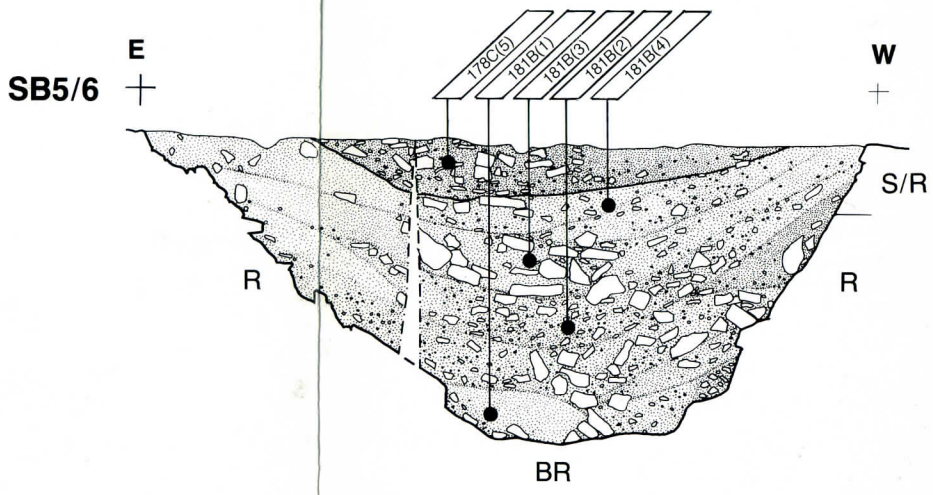


Fig 14:2


176B(2)
176B(3)
176A(1)
176B(1)
176A(3)
181B(2)
181B(3)
181B(4)
178B(3)
181A
178B(1)
178B(2)
178C(2)
178C(5)
178C(1)
307
178C(3)
178C(4)
178B(1)
178B(2)
178B(3)
178A(1)
178A(2)
178A(3)
S
R
BR
F.S.
S/R
BR
BR
178C(5)
181B(1)
181B(3)
181B(2)
181B(4)
W
S/R
R
BR
SB5/5
W
178B(2)
178C(5)
178C(4)
307
178C(5)
178C(1)
178C(2)
178B(1)
178B(2)
E
S/R
R
R
BR
BR
metres
0
1
2
3
4
5



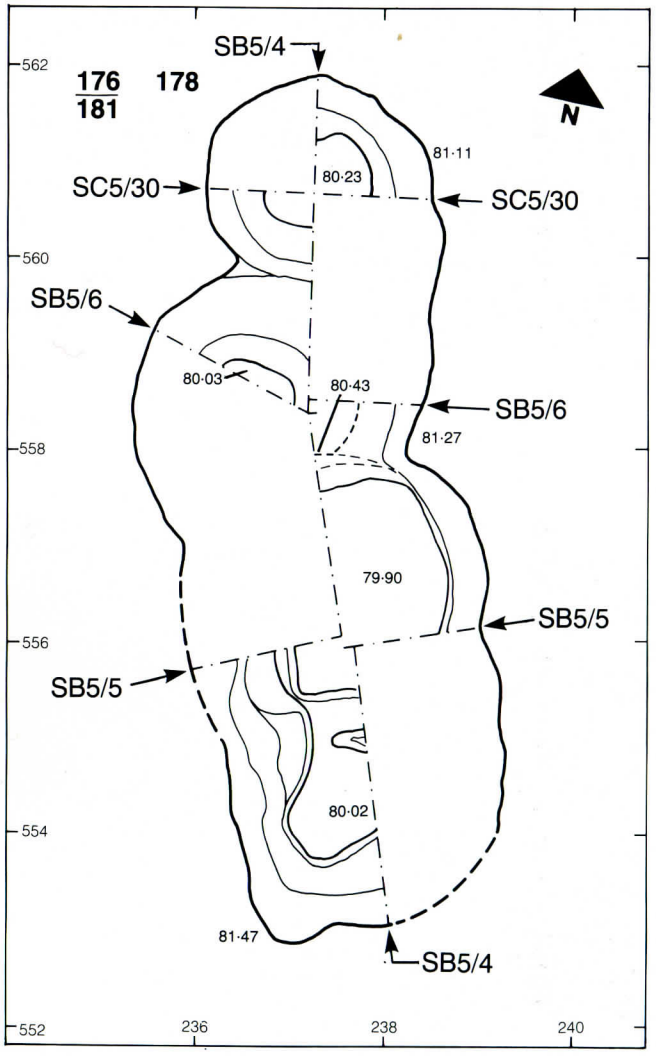


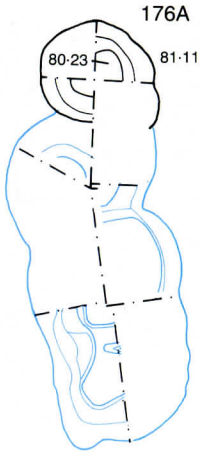


Scale 1:30

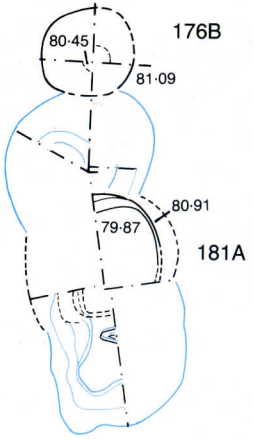
Fig 15:1

Spiral Arm of Inner Ditch Circuit: 176A, B, 178A–E, 181A, B

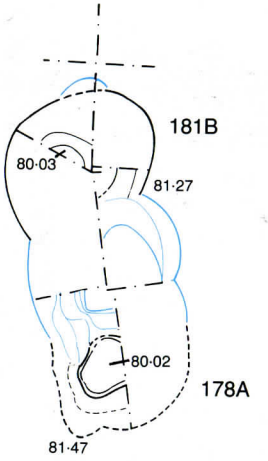




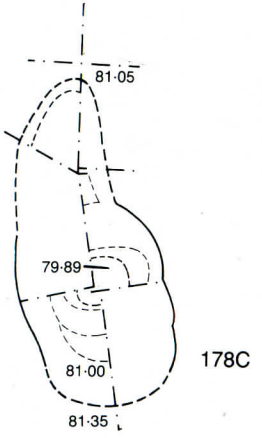
Phase II



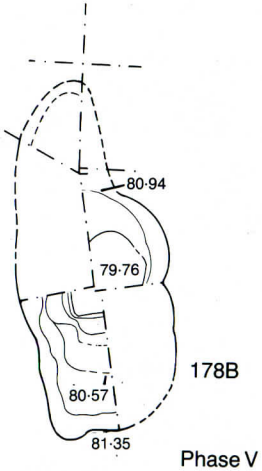
Phase III



Phase IV



Phase VII



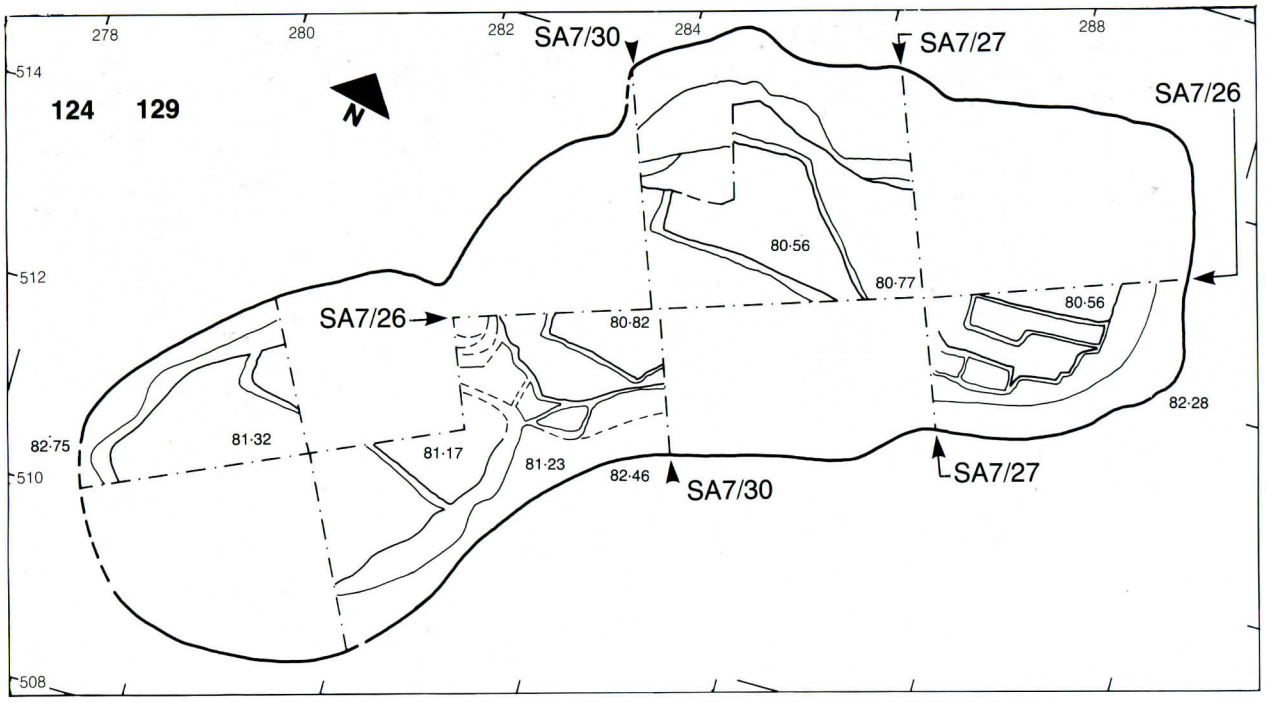
Phase V

Scale 1:80 metres 0 1 2 3 4

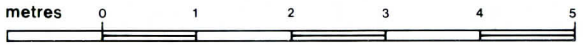
Scale 1:160 m 0 1 2 3 4 5

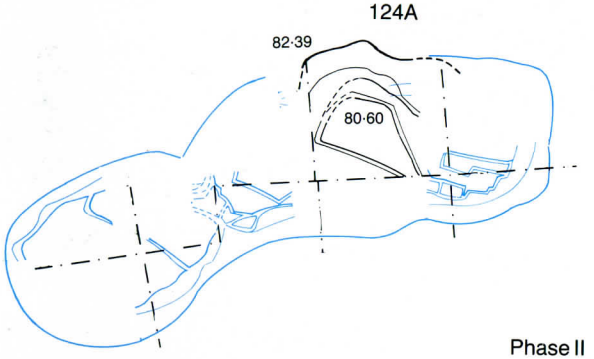
Fig 15:2

Inner Ditch Circuit: 124A–E, 129

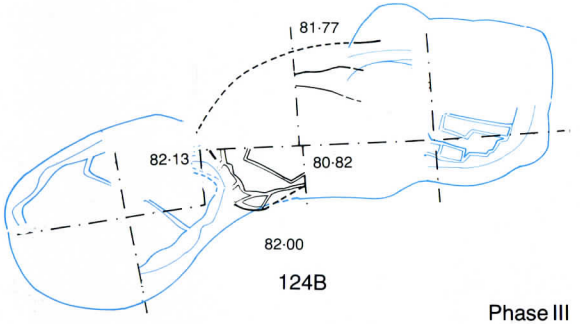


Scale 1:80

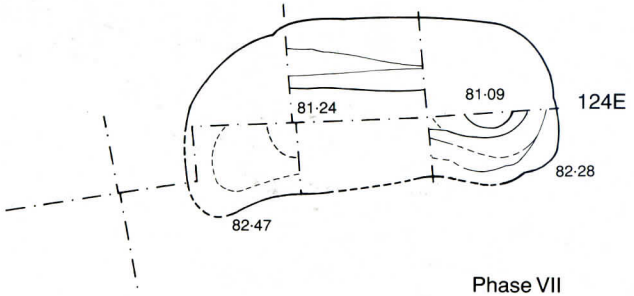




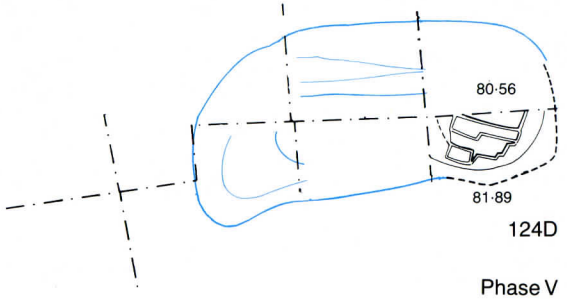
Phase II



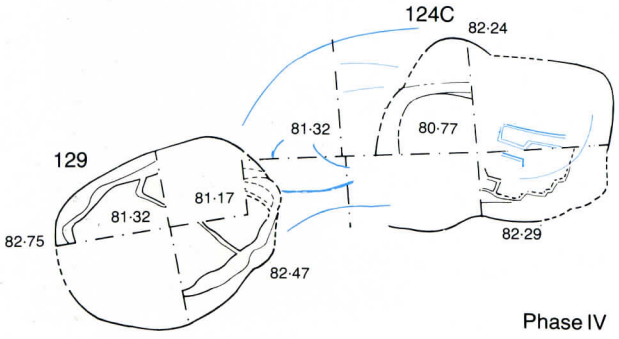
Phase III



Phase VII



Phase V



Phase IV

Scale 1:160

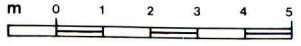
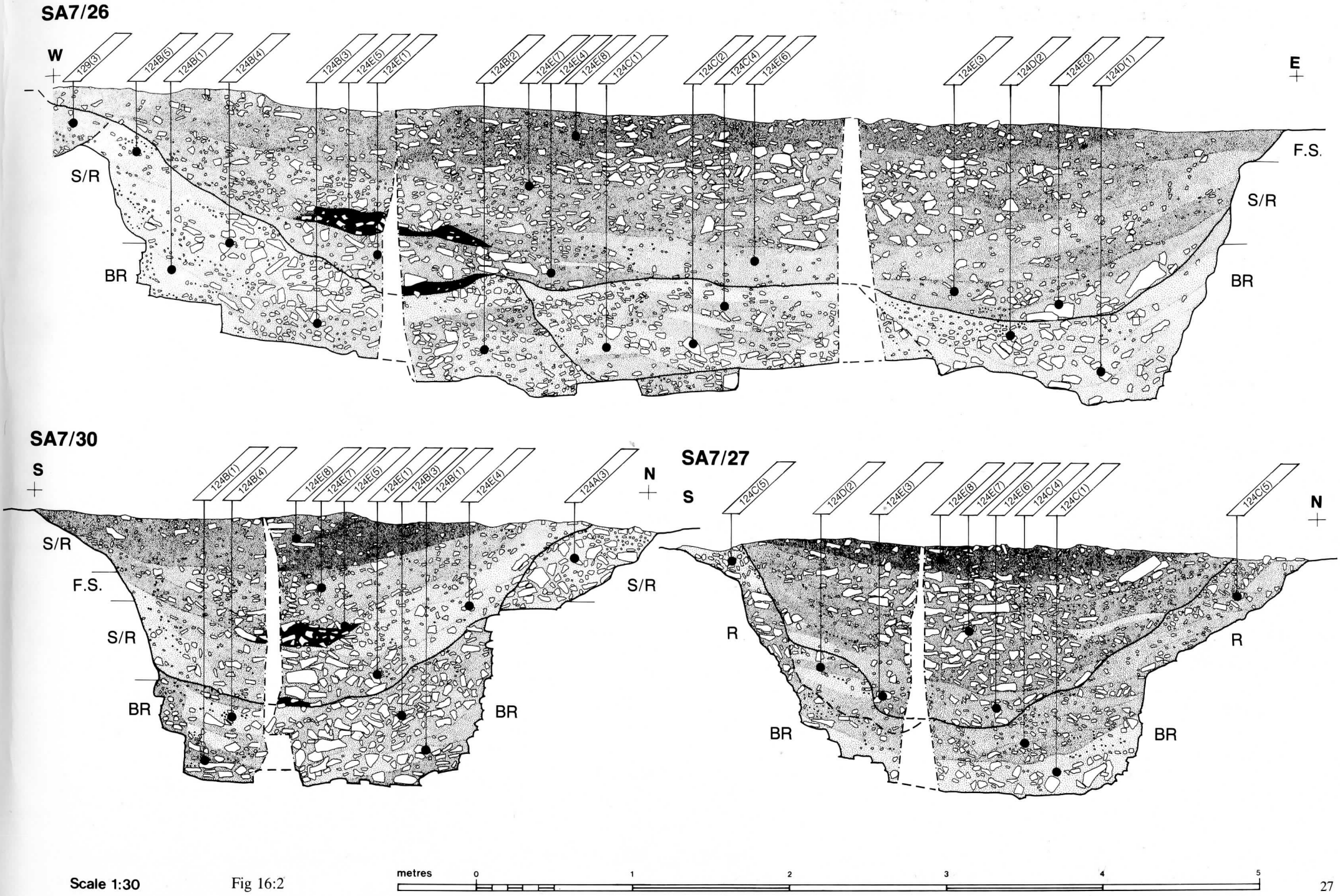


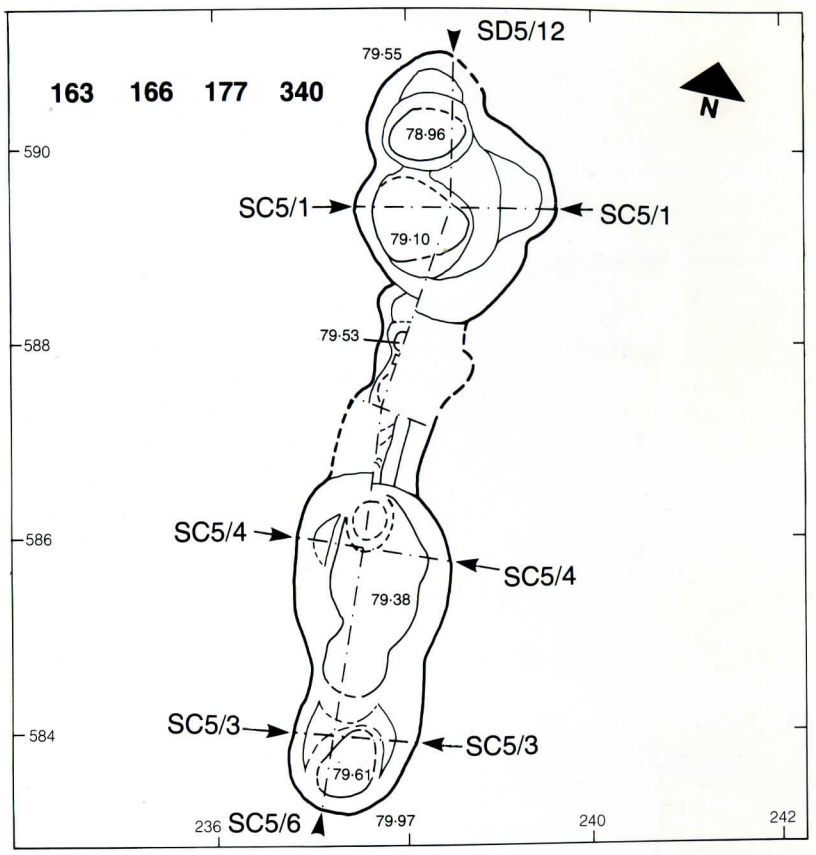
Fig 16:1



Scale 1:30

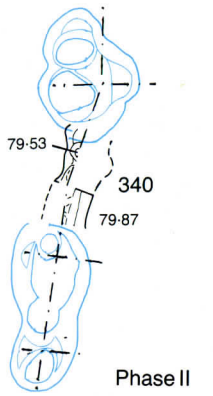
Fig 16:2

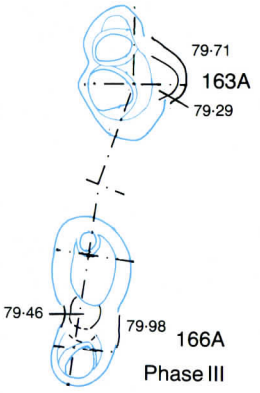
Spiral Arm of Inner Ditch Circuit: 163A–D, 166A–D, 177

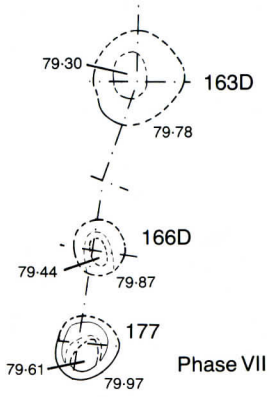


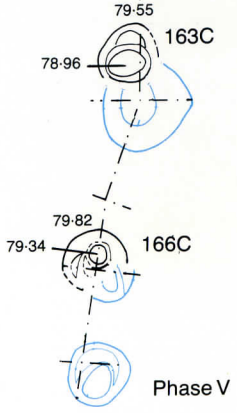
Scale 1:80

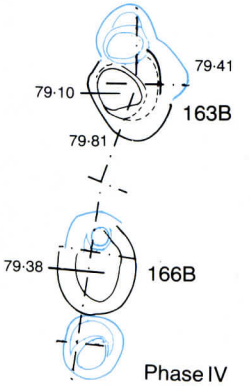
metres 0 1 2 3 4







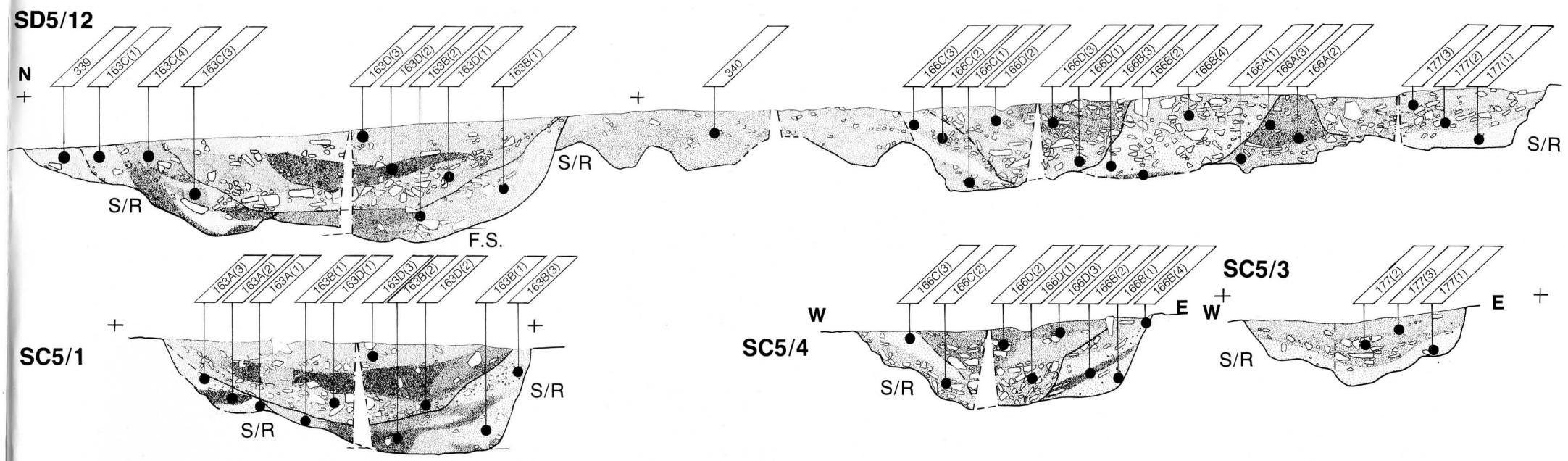




Scale 1:160

m 0 1 2 3 4 5

Fig 17:1



Scale 1:30 Fig 17:2

Inner Ditch Circuit: 82 Spiral Arm of Inner Ditch Circuit: 180

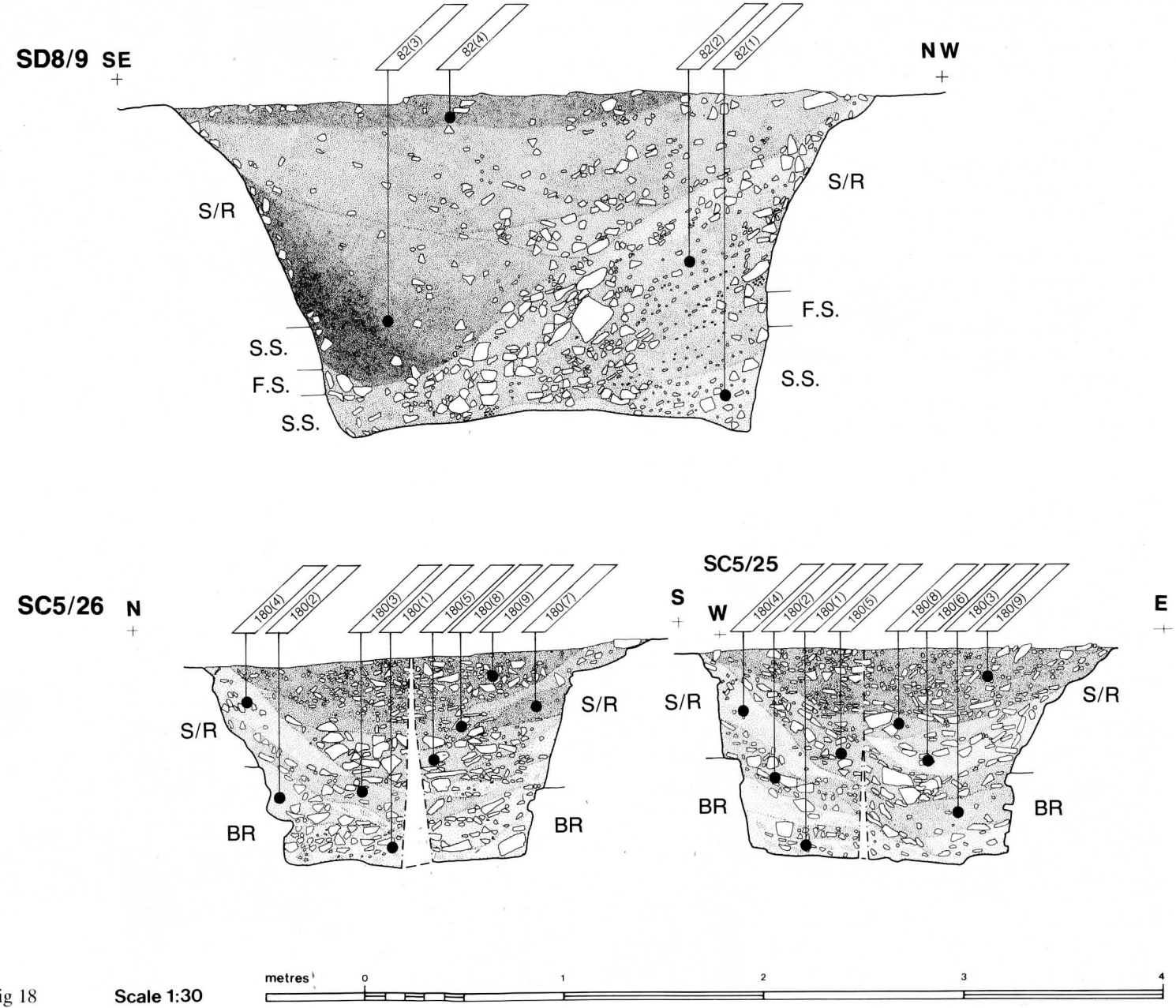


Fig 18 **Scale 1:30**

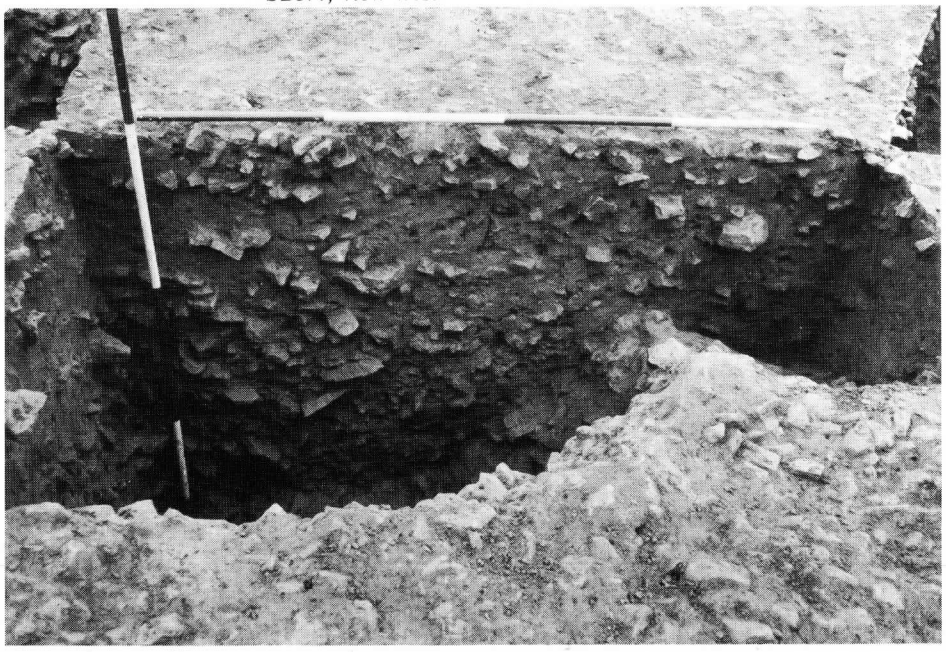
Identification

In a very few of the complex segments, such as 247 (Fig 6; Pl 7), it was possible to excavate the recuts entirely in stratigraphic order and in many others their edges were defined along a good part of their length. Some, such as 41D (Fig 10) or the north sides of 128E (Fig 14; Pl 5) and 124B (Fig 16) were easily recognised and others, including 178B and 178C were followed with reasonable precision (Fig 15; Pl 6). The identification of one fairly clear recut, 248B, was complicated by the fact that its south western edge, which was dug into the unstable rubble fill of the preceding segment 248A, had slumped almost immediately, so that a mass of material displaced wholesale from 248A underlay the normal accumulation of primary infill (Fig 11, SA3/6). Where difficulties were encountered, as for example in the definition of the south end of 251C (Fig 8, SC3/23), use was made of temporary sections to verify the position of the suspected edge.

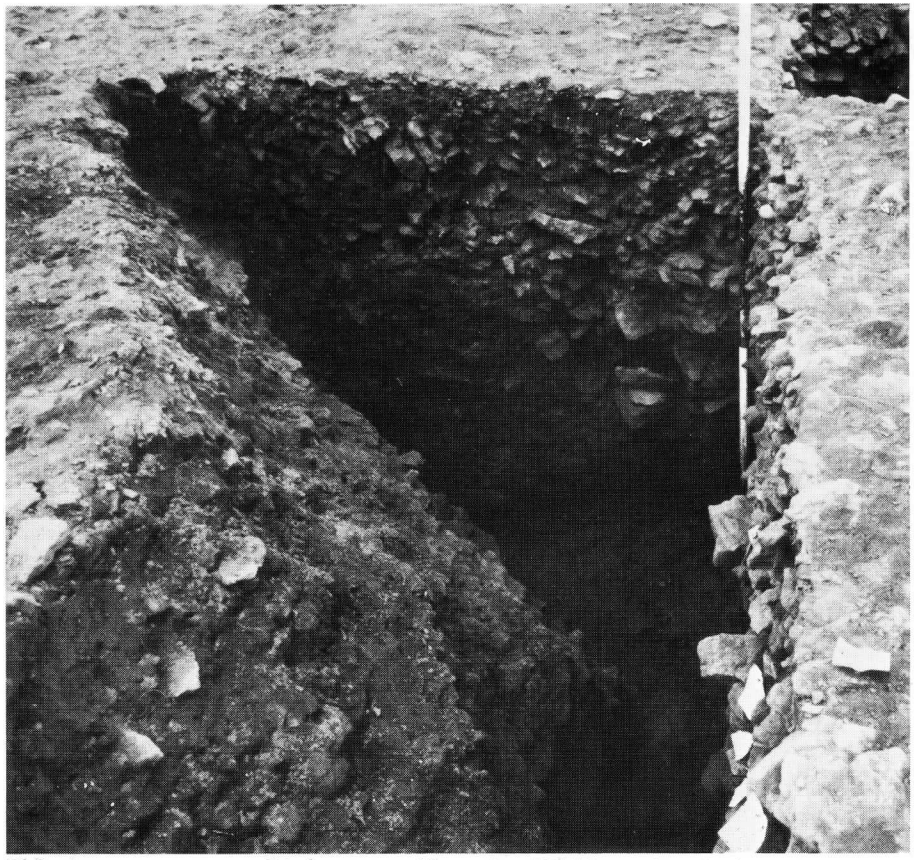
Some recuts were nevertheless seen only in section or were postulated after excavation to explain anomalies in the stratigraphy which only became apparent on more detailed analysis. In such cases the checks and controls built into the recording system proved to be of special value.

Pl 5 *Ditch segment 128: section SA6/2, north end, view west*

Pl 6 *Ditch segments 178/181, 181B not excavated: part of section SB5/4, view west*



Pl 7 *Ditch segments 247/326, view north*



Pl 8 *Ditch segment 38: section SD7/6, south end, view west*

Cuts identified in longitudinal and cross section could be compared and correlated to produce possible reconstructions of a recut segment and these, in turn, could be matched against changes in the depth, contours and alignment of the ditch. Such variations were often quite evidently the result of recutting and were found almost invariably to coincide with signs of recutting in section. In some instances a plot of the distribution of finds also provided supporting or confirmatory evidence.

The degree of certainty in the identification of any given recut, based on the relative weight of supporting evidence, is indicated in the full descriptive list of features (microfiche Appendix 1).

Interpretation

Whereas the interpretation of individual recuts may sometimes be open to argument, the cumulative body of evidence presents a thoroughly consistent picture. Approximately 80% of the separate ditch-lengths examined appeared to have been recut at least once, and the majority more than once.

According to this evidence:

In the outer ditch, out of eight separate lengths excavated wholly or in part:

Four comprised at least five successive phases
Two comprised at least three successive phases
Two comprised at least two successive phases

In the inner ditch, out of eighteen separate lengths excavated:

Seven comprised at least five successive phases
One comprised at least four successive phases
Two comprised at least three successive phases
Four comprised at least two successive phases

In the spiral extension of the inner ditch, out of nineteen separate lengths and pits examined:

Four comprised five successive phases
One comprised four successive phases
Five comprised three successive phases
Four comprised two successive phases

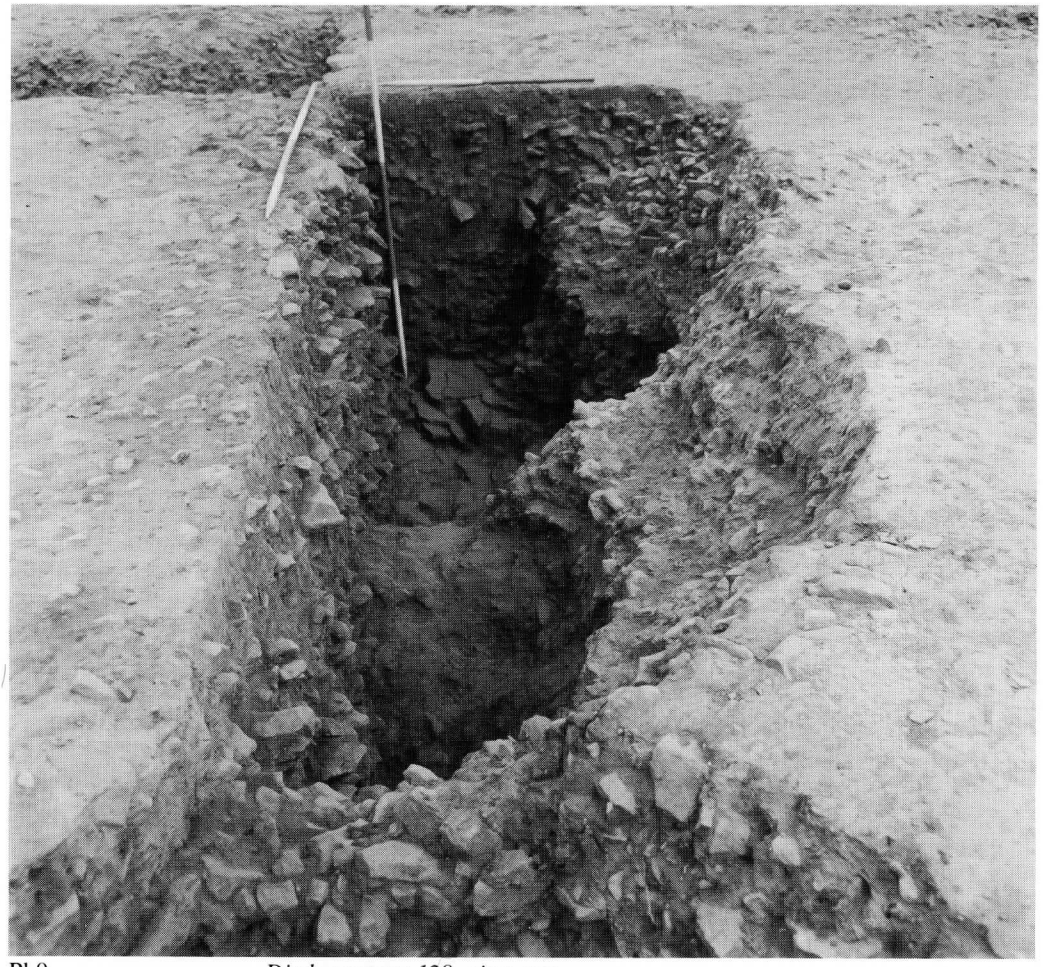
In three or four places in the inner ditch circuit and spiral extension there were signs pointing to a phase of activity or marking-out which may have preceded the main sequence. Absolute stratigraphic proof is lacking, but the small, relatively shallow pits which could belong to this phase made little sense except as features predating the first major construction. 331 is one of them. It lay between and was truncated by 39A and 38B (Fig 9), and had been filled with large blocks of ironstone to make a 'causeway' between the two segments. If not primary it was certainly a very early cut. 302, alongside 251 and 192 (Fig 8), is thought to have been early because of its position in relation to the adjacent ditch segments and because of its 'clean' fill. A later neolithic pit unfortunately obscured the stratigraphic connection. These and other features which could be contemporary contained no finds except small fragments and flecks of charcoal.

Simplified section drawings of the neolithic ditch segments are provided in microfiche Appendix 2. A selection of the more extensive sequences of recutting are illustrated in section and plan in Figs 6-18. They include examples from all three elements of the ditch system, taken from various points all around the circuits. It may be seen from these examples that the process of recutting was not, as a rule, a simple clearing out of a pre-existing feature: new segments were cut on the lines of the original circuits, preserving them faithfully, but rarely if ever in exactly the same positions as the segments which preceded them. Only the latest recuts of all tended to be entirely within the ditch fills.

Where the stratigraphy of earlier recuts had not been too much truncated, it was evident that the time elapsed between the digging of one segment and its successor had invariably been sufficient for the earlier of the two to have filled to between a half and two thirds of its estimated original depth. In fact, many of the recuts appeared to have been dug from what is now the surface or from a vanished level above it.

Cremation Deposit

52. One rather different 'recut' needs special mention. The primary infill of 38E, the latest recut in a sequence of five, was truncated by the digging of a platform through it and back into the eastern end of the segment. On this platform a



Pl 9 *Ditch segment 128, view east*

Pl 10 *Ditch segment 77, view east*

deposit of cremated human bone and charcoal 1·30m in diameter was carefully placed and then covered by the deliberate infilling of the whole segment (Fig 9, SD7/7). This is the only certain example observed of backfilling of any part of the ditches on a large scale, and the circumstances were clearly unusual.

Description of the Cuts

The segments or separate elements of the ditch circuits which are to be described are the individual cuts within the stratigraphic sequences of the ditch lengths and not the misleadingly irregular composite features as they appeared after excavation.

The ditch segments cut wholly or partly into subsoil and rock had, inevitably, retained more of their original characteristics than recuts dug entirely in the far less stable strata of earlier ditch fills, whose sides were more heavily eroded. Those which made up the main inner and outer ditches and, to a lesser extent, those at the southern end of the spiral extension of the inner ditch were of the general type which has become familiar from the excavation of other causewayed enclosures. In profile they were flat bottomed and the lower sides of all but the shallowest cuts were very steep, tending to the vertical. The upper edges had weathered to an angle of between 30° and 50° from the vertical, depending on the consistency of the subsoil. The sides of segments such as 41A, B and D (Fig 11), which were cut mainly into very compact ironstone rubble and solid ironstone had eroded very little. The bottoms of the segments tended to be fairly level although one or two followed inclined bedding planes in the ironstone (eg 192B, Fig 8 SC3/42; 247C, Fig 6) and others were uneven because of the way in which the rock had fissured (eg 124D, Fig 16; 77, Pl 10). Among the recut segments 197C was anomalous, in that its lower western and southern edges were hardly eroded at all, even though they were dug into the particularly soft and unstable primary fill of 197B. Either it had been filled again almost immediately by the collapse of bank material which is indicated in section (Fig 7 SC2/3) or

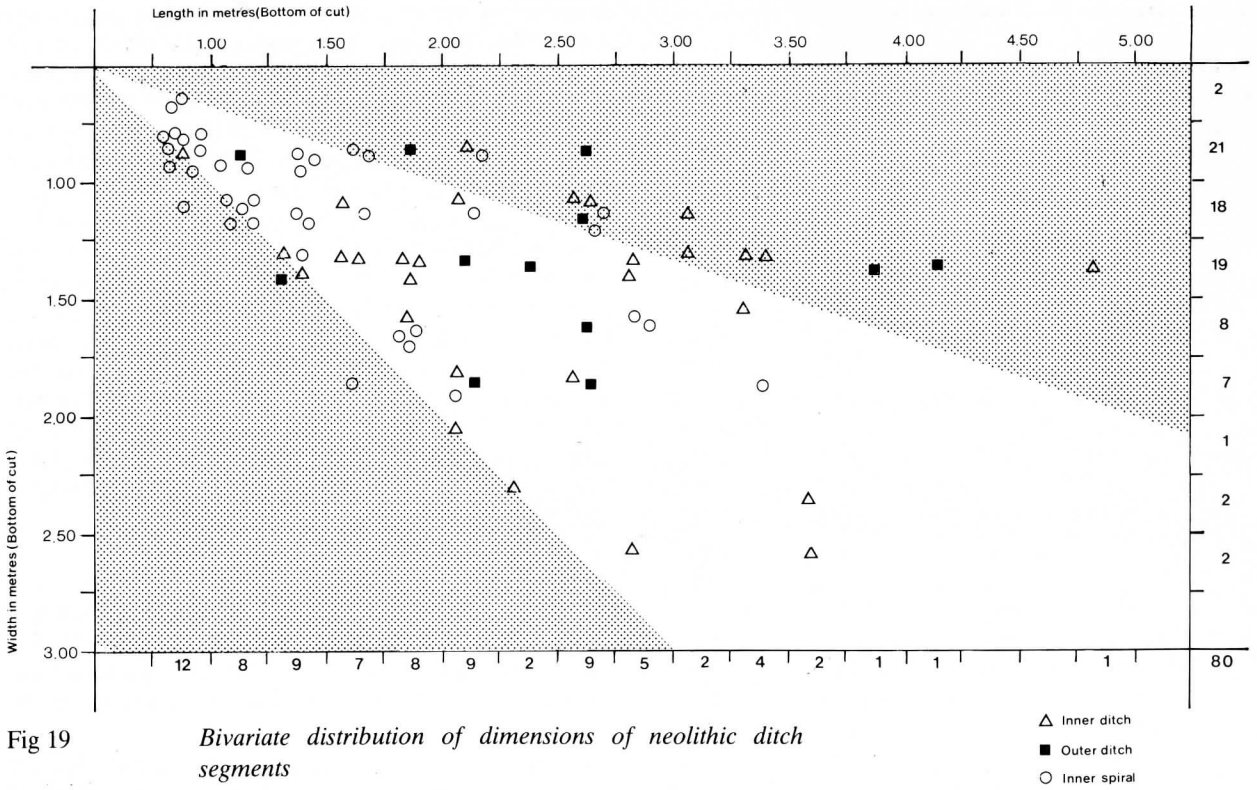


Fig 19 *Bivariate distribution of dimensions of neolithic ditch segments*

TABLE 1: Neolithic Ditch Segments. Frequency distribution of depth

Depth (M)	Outer Ditch					Inner Ditch					Spiral Arm				
	Phase II/III	Phase IV/V	Phase VII	Total	%	Phase II/III	Phase IV/V	Phase VII	Total	%	Phase II/III	Phase IV/V	Phase VII	Total	%
<0.50							1		1	1.5	2	7	5	14	19.5
0.50-0.70	1	2		3	8.8			1	1	1.5	5	15	6	26	36.1
0.75-0.95	3	1		4	11.8	2	2	2	6	8.9	4	7	5	16	22.2
1.00-1.20	5		1	6	17.7	2	8	6	16	23.9		4	3	7	9.7
1.25-1.45	2	4	5	11	32.3	7	9	2	18	26.9	3	4	1	8	11.1
1.50-1.70	1	2	1	4	11.8	4	6	3	13	18.8		1		1	1.4
1.75-1.95		5		5	14.7	8	2		10	14.9					
2.00-2.25		1		1	2.9		2		2	3.0					
Total	12	15	7	34		23	30	14	67		14	38	20	72	

the edge was retained by shuttering of some kind. Some support for this last idea is provided by the stratigraphy of the inner ditch segment 200C, a probably earlier counterpart of 197C on the north side of the presumed entrance, which suggests that some vertical barrier retaining the south end had slumped forward when the filling of the segment was already well advanced (microfiche Appendix 2 SC3/14).

In plan individual segments were usually a fairly regular oval but their dimensions varied a good deal. Fig 19 plots the bivariate distribution of the lengths and widths of the more complete ditch segments and shows quite clearly the squat proportions of most of them. Only a fifth of the total have a length more than double their width. The measurements are those of the bottom of the cuts, since these are most nearly representative of the original dimensions of the features before their upper edges had been enlarged by erosion. Furthermore, in the earlier segments the bottom of the cut is sometimes the only part to survive intact.

The plot also gives an impression of the generally much smaller size of segments and pits in the spiral arm of the inner ditch circuit, but the point is even more clearly demonstrated by comparing the frequency distribution of the depths of segments in each of the main elements of the system. Table 1 gives the figures for these, subdivided into three groups according to the probable sequence of their digging.

The main inner and outer ditches do not seem to have differed greatly from each other, although the proportion of segments over 1·50m in depth was slightly lower in the outer circuit. The mean depth of segments in the two circuits showed some variation from phase to phase and was greatest in Phases IV and V. Final recuts tended to be noticeably more shallow than those earlier in the sequence.

The spiral extension of the inner ditch can be subdivided according to the size of the component pits. On the south side of the inner enclosure, from 122 to 176, these were a little smaller on average than segments of the main inner ditch but not, for the most part, very different in kind. North of 176, the pits decreased sharply in size and, apart from some in the 162/165/179 sequence, were exceptionally small and shallow, less than 0·65m deep below the present surface of the subsoil and no wider at the surface than 2·00m. They cannot, even in the loosest sense, be described as a 'ditch' (Pl 4). Between some of them were the remains of earlier slots about one metre wide and up to 0·30m deep (eg 339/340 Fig 17). If these slots had contained posts, no trace of them remained.

Stratigraphy of the Fills

Because the stratigraphy of the separate units in the ditch circuits was a complex record of recutting and other events, and because the processes of weathering and silting had been affected by variable factors such as the composition of the subsoil and the proximity and stability of the banks which may have been adjacent, no two sequences of infilling were exactly alike. Certain consistent differences between the three main components of the ditch system can, however, be discerned.

The Outer Ditch

(Figs 6, 7)

The fill of segments examined in the outer ditch were, for the most part very stony and included layers of loose rubble with fragments of relatively unweathered ironstone. The fills of those which made up the 25/31 complex on the east side of the enclosure were slightly more compact and, in some instances, noticeably more sandy than the rest, a difference which may be connected with the fact that even the deepest cuts of this particular sequence were dug entirely in a thick deposit of ironstone rubble and clayey sand; in other parts of the circuit the earlier segments had been cut down into the solid ironstone. At least three or four stages of infill were usually visible.

Primary Fills

The primary fills of the earlier and/or deeper segments consisted of varying amounts of weathered ironstone rubble and wet sand with fans and thin spreads of clean, sorted sand, both coarse and fine. The sorted sand was presumably deposited by rain water running off the old ground surface (cf Hedges and Buckley 1978, 298ff). On the west side of the enclosure, in segments 197A and B (Fig 7) and in 195A, there were much deeper, laminated deposits of clean sand, clayey sand, sandy clay and fine gravel which in 197B had accumulated to a depth of up to 1·40m against the west and south sides. They were probably a very rapid silt washed by heavy rainstorms from unusually soft sand strata in the subsoil cut by these features. In the west side of 195A these strata had, in fact, eroded so as to undercut the more compact ironstone rubble which partly capped them (microfiche Appendix 2, SC2/8), and sections SC2/3 and SC2/9 across 197 (Fig 7) illustrate extensive weathering of the same strata where they were exposed on the surface of the subsoil. In the summer of 1975 the formation during a violent thunderstorm of similar deposits up to 0·20m deep was observed after the flooding of an excavated segment of the inner ditch (28) which also cut thick strata of relatively soft sand.

Secondary Fills

The secondary levels of fill generally included a good deal of gravity-sorted ironstone rubble, both weathered and unweathered, with sand interjacent at the sides. In later cuts, which were less often truncated so that the complete sequence of infilling could be seen, the pattern was often distinctly asymmetrical, showing a much heavier fall of material from the inner side. This was especially pronounced in 197B (Fig 7) and 247C (Fig 6) in which the second stage infill consisted of massive falls of loose, heavy, vacuous rubble. Deposits containing charcoal or other evidence of human activity were rare at this or any level in the outer ditch, the chief exception being a tip of dark sand mixed with charcoal and containing pottery sherds and worked flints which overlay the primary accumulation at the east end of 77A (microfiche Appendix 1; Appendix 2 SE8/28).

Later Fills

At a higher level the secondary fill, although still stony, tended to be compact with a good deal of clayey sand and merged, in some cases, into a final infill which was a little less stony as well as slightly more loamy in texture. There were no clearly defined buried humic horizons at any level nor, as a rule, any depth of deposit which could be interpreted as entirely humic in origin. The final recut of 197 (197D) was anomalous in that the entire infill was almost stone-free sand, more loamy near the surface but otherwise apparently homogeneous, which contrasted very sharply with the fill of the underlying segment 197C (Fig 7)

For different reasons the final infill of 79B was also anomalous (microfiche Appendix 2, SE8/30, 31). It was a homogeneous, very stony layer 0·40m thick overlying the clearly defined, hollowed surface of a slightly less stony secondary infill. It suggested that there may have been a rapid levelling up of the surface, either by deliberate backfilling or as an incidental result of some activity nearby.

Entrance Feature

(Fig 7)

219 the large pit at the south end of the 197 looks, on circumstantial evidence, to have had some structural, functional or symbolic relationship to the outer ditch and is interpreted as a large post pit. On the east side it was cut by the upper edge of 197C so that, on stratigraphic grounds, it could have been contemporary with 197A or 197B or have predated both them and the enclosure. If the latter it would have been a feature in isolation, and as such makes little sense. The fill of the pit contained much charcoal and a central anomaly which had the appearance of a post hole from which the post had been removed. If so, the post appears to have been about 0·50m in diameter. The pit was 0·60m-0·70m deep which, added to the probable depth of soil lost from the surface, would give an original depth of one metre. Assuming that the post would have been sunk at least one third of its height, it would have stood about two metres high. It seems also to have stood alone, perhaps to mark the entrance beside it. There was nothing to indicate that it could have been part of a functional gate structure, unless a corresponding feature on the south side of the gap had been obliterated by ditch segment 195A. Possible parallels for such a feature have been recorded at Orsett, beside a middle ditch terminal (Hedges and Buckley 1978, 242) and also at Whitehawk, beside a causeway in the third ditch (Curwen 1954, 78).

The Inner Ditch

(Figs 8-11, 16, 18)

The fills of the inner ditch segments were for the most part less stony than those of the outer ditch and layers of heavy rubble were comparatively rare. The pattern of infill in most instances was also more symmetrical than in the outer ditch.

Primary Fills

The first stage of infill in the earlier cuts in the sequence often consisted of layers of fairly clean, soft sand and sorted gravel with a little, mainly small-sized ironstone rubble (eg 38B(1), Fig 9; 251B(1-3), 251C(1), Fig 8; 248B(1), Fig 11). In 192A(2) (Fig 8, SC3/37) they formed a laminated and slightly convoluted deposit up to 0·60m deep, but normally they were less substantial. Overlying them and forming the second stage of infill were layers of slightly more stony, clayey sand with moderate amounts of weathered ironstone. In other instances the first and second stages of infill consisted entirely of layers of compact rubble and sand or clayey sand (eg 41B(1), Fig 10; 248A(1), Fig 11). In some later recuts (eg 38D, Fig 9; 124E, Fig 16; 192E, Fig 8) the primary infill tended not to be clearly differentiated from the subsequent accumulation, evidently because it derived more from a rapid erosion of the infill of underlying segments than from 'natural' subsoil strata. In 37C(1/2)(Fig 9, SD7/7), 28C (1/2) (microfiche Appendix 2, SC8/23) and possibly 192D (1/2) (Fig 8, SC3/23) there was some suggestion of disturbance of the lower fills which could be interpreted as evidence for a partial clearing out of these segments at an early stage.

Secondary Fills

The first and second stage fills were sometimes succeeded by a deep accumulation of fairly uniform, compact brown or dark-brown clayey sand with relatively few stones, (eg 251B(5-8), 251C(3) Fig 8; 248B(2) Fig 11). In 251B it was heavily flecked with charcoal. Such deposits had the appearance of a fairly typical secondary infill sequence (cf Limbrey 1975, 294f) although there was no detectable admixture of loam or wind-borne silt.

Some of the latest recuts such as 37C, 38D (Fig 9) and 124E (Fig 16) contained a different, more stony fill of gravity sorted weathered ironstone rubble and clayey sand, sometimes noticeably asymmetrical. This was superficially similar to fills in the outer ditch segments, but more compact as a rule, and with fewer large and un-weathered stones.

Segments containing substantial falls of loose, large rubble were exceptional among those excavated in the inner ditch circuit. 41C (Fig 10) was the most striking example, with a decidedly asymmetrical sequence of fill very like some found in the outer ditch. The heavy material in it derived from the southern, inner side. 124B (Fig 16, SA7/30) appears to have been similar, although truncation by subsequent recuts makes it impossible to be sure that it is truly comparable.

'Ashy' Layers

In the inner ditch, much more frequently than in the outer, there were small tips or dumps of discoloured sand containing charcoal and heat-reddened ironstone. These formed isolated lenses up to 1·50m in diameter in the secondary infills of at least eleven of the excavated segments (28B(2), 28C(3), 28F(2), 111(3,5), 124C(3), E(1)(5), 147C(4), 149B(3), 199D(3), 248C(2), 251B(6) (Figs 16,11; microfiche Appendix 2). In two of these segments (111 and 124E) on the south side of the enclosure the 'ashy' layers were associated especially with concentrations of worked flints. In no instance was any evidence of burning *in situ* observed in the layers surrounding these deposits even though one of them (248C(2)) contained stones burnt to the point of disintegration. In 248B, above the secondary infill, a very much larger deposit of dark sand and charcoal (248B(3)), 0·20m thick and containing many worked flints and some pottery, covered the whole width of the ditch segment. This layer was thought at first to have been cut by 248C, the latest segment in the sequence. Further consideration of the stratigraphy and internal dating evidence including radiocarbon determinations led, however, to the conclusion that 248B(3) accumulated or was dumped in the hollow of the earlier cut alongside 248C, some time after the latter had been dug but before it had filled again completely, and had then been truncated by erosion of the southern edge of 248C (Fig 11 SA3/6). The finds from it suggest that in fact it is to be equated with 248C(4) or (5). The surface of both 248C(4) and 248B(3) may have been truncated slightly.

Later Fills

The final fill layers of the inner ditch segments tended to be a little darker in colour than the secondary fills and also slightly loamy and, although there was never any well defined humic horizon, they sometimes overlay what appear to have been stable surfaces. In 124E the level was clearly marked by a scatter of worked flints and later neolithic pottery spread over the slight declivity of the surface of 124E(7) (Fig 16).

The process may have been different in one or two segments. The deliberate infilling of 37E, following the deposition of a cremation, has already been mentioned. In 124C, the third cut in a sequence of five, the upper infill (124C(5)) was more like that of the outer ditch segment 79B. Although truncated by a later recut, it appeared to have consisted entirely of compact clayey sand and stones (Fig 16 SA7/27).

The Spiral Arm of the Inner Ditch

(Figs 12-15,17,18)

Stratigraphically the pits which defined the western half of the inner enclosure were more diverse than segments of the main circuits. As stated already, those making up the northern end of the inner ditch spiral were smaller than those on the south side; they also contained a much greater volume of what could be described in general terms as 'occupation' material.

The South Side of the Inner Enclosure

In the southern group the stratigraphy of the fills in most of the larger segments and their recuts was broadly comparable to that of some main inner ditch segments. For example, the fill sequences in 128 A-D (Fig 14) and 176/178/180 (Fig 15) respectively bore some resemblance to those of 124A-E (Fig 16) at the southern end of the main inner ditch circuit, opposite 128, although the fill of 128C and the upper secondary fill of 128D were unusually stony. The fill of the shallow recut 128C was not only stony but largely homogeneous, and the segment was also unusual in having been dug slightly to the north of the main ditch alignment. In either respect it is a little like 326, a segment predating 247A on the south west side of the outer ditch (Fig 6), and both may at different times have been levelled up deliberately in order to straighten the line of the ditch or bank.

In 178C, but not in any other final recuts examined in this part of the circuit, there was a clearly defined horizon between the upper secondary and final infills.

'Ashy' layers and Burnt Deposits

Lenses of discoloured sand and charcoal and burnt stone up to 1·80m across and 0·20m thick were observed in the secondary fills of 152A(2), 152B(2), 173(2), 167D(2) (microfiche Appendix 2, SA6/1, SB6/54, SB5/2) and 178C(3) (Fig 15, SB5/4) and as a primary deposit in 152C(1). Some of the stone in the surface of the layer immediately below 152B(2) had been reddened by heat, but none of the other deposits was associated with any sign of burning *in situ*.

In 122C (microfiche Appendix 2, SA7/1) there was a deposit of blackened sand and burnt stone of a rather different type. It formed a thin, and very sharply defined layer covering the whole northern face of the recut from the surface to the top of the primary infill. This contained no carbon and was sealed beneath layers of clean, clayey sand. Some of the stones beneath it in the primary infill were slightly discoloured, but if it was the result of a large fire *in situ*, most of the ash must have been raked out and removed. If it was material tipped into the ditch segment, it must have been sealed almost at once by the clean layers above it, since otherwise the deposit would have eroded from the side of the cut.

It could be that there was some connection between this layer and 318, a large area of burnt sand and stone 5·60m × 2·00m on the surface of the subsoil to the south, alongside and parallel to the outer edge of inner ditch segment 129. This feature could not be dated except by its possible alignment with the ditch segment alongside, and it is something of a problem to interpret. If the surface of the subsoil today is at least 0·30m below the level of the neolithic ground surface and the burning was of neolithic date, it follows that either the heat must have been sufficiently intense to penetrate to that depth from the surface or, as seems more likely, the turf and topsoil had been removed, perhaps to build some kind of earth oven. There was no sign of any cut in the subsoil surface.

The North Side of the Inner Enclosure

The fills of the pits north of 176 were generally less stony than the southern group, but this is almost certainly because

the pits, being so shallow, were dug entirely within the generally sandy or sandy clay/rubble strata which capped the ironstone in this part of the site, 180 (Fig 18) was different from the rest, not only in being alongside and slightly to the west of the main alignment, but in the asymmetry of the fill sequence within it. There was a predominance of rubble and clayey sand or sand layers tipping down the outer side of the cut, so pronounced and steep as to suggest that the pit was back-filled deliberately from that direction. It is possible, however, that the effect was exaggerated by an unidentified recut.

'Ashy' Layers and 'Occupation Deposits'

The enormous increase in the number of finds of pottery, worked flints and worked stone in this part of the ditch system was most marked in the pits between and including 166 and 179. In 163 and the segments of the 162/165 complex especially, the finds tended to be associated with very substantial deposits of dark sand and charcoal which made up between a tenth and one third of the total volume of fill in most if not all of the individual and successive pits. In 162E (Fig 13; Pl 11) and perhaps also in 163B (Fig 17) the 'ashy' layers filled shallow scoops in the underlying fill, suggesting that the material had been deliberately placed or even buried.

Pl 11 *Ditch segment 162: section SD6/19, south end, view east, showing recut and 'ashy' fill*

Post Pits

160 and **161** the two probable post-pits dug 0·90m apart in the middle of the gap in the north-west side of the enclosure, each contained within the fill a somewhat eroded 'pipe' measuring 0·30m × 0·50m and 0·28m × 0·45m respectively and of oval or sub-rectangular section (Fig 12). The pipe in 160, which was the better defined of the two, overlay a shallow rectangular depression rather wider than itself in the bottom of the pit and was partly encircled by a setting of at least five stake holes in the surrounding fill (eg 333, Fig 12 SD5/2). The surviving depth of the two pits was not more than 0·50m which indicates an original depth of little more than 0·80m. It is unlikely, therefore, that the posts which the central pipes presumably contained would have been intended to stand more than two metres high above ground, even though it seems they were fairly massive in girth. The stakes in 160 could have been to prop the central post or they may have had some less obvious purpose. The funnels round the top of the post holes themselves and the manner in which they had filled suggests that the posts were removed and did not decay in position. There was nothing to suggest that any of the other, adjacent small pits in the spiral had ever contained posts.

The Evidence for Banks

Since the remnants of banks survive around several causewayed enclosures in the uplands of Southern England, it is reasonable to suppose that they once existed also on at least some of the plough-levelled sites of the Midlands; the earth and stone quarried from the ditches would have had to be put somewhere, even if the construction of banks were not the sole object of the exercise.

Predictably, on the much-ploughed site of Briar Hill no trace whatsoever remained of upstanding earthworks associated with the ditch system. Indications are that any such features must already have been levelled or at least very substantially reduced by the later first millennium bc when pits and ditches were dug into the subsoil, apparently without hindrance, across spaces between and alongside the neolithic ditches. The evidence for a bank or banks was therefore entirely circumstantial and to be found in the stratigraphy of the ditches. The most likely cause of the asymmetrical pattern of infill and associated massive falls of rubble seen in many of the ditch segments is the collapse or erosion of a bank built along the edge of the ditch. Such an explanation has already been offered, most plausibly, for a similar phenomenon at Hambledon (Mercer 1980a, 26) and at Orsett (Hedges and Buckley 1978, 234) following suggestions made by Whittle (1977b) and the evidence from Briar Hill is compatible with what has been observed on these sites and others.

The Outer Circuit

In the outer ditch this stratigraphic evidence was not everywhere as substantial as in 247C or 197C and was, as already pointed out, discernible only in the more complete segments, which were generally the later recuts in any sequence. It was nevertheless consistent in indicating a bank encircling the enclosure on the inner side of the ditch circuit. Corresponding evidence in the inner circuits was not so consistent and was absent altogether in some parts.

The Inner Circuit

In seven segments of the inner ditch (27B, microfiche Appendix 2 SC8/22); 37B, Fig 9; 41D, Fig 10; 82, Fig 18; 124B, Fig 16; 192D, Fig 8; and 248B, Fig 11), belonging to perhaps four separate episodes of recutting, a greater volume of material had plainly entered from the inner side of the cut as can be seen in the cross section. This asymmetry was associated with massive falls of loose rubble in only two instances (41D and 124B) and it may be significant that these two features, although not contemporary, occupied corresponding positions at opposite ends of the inner enclosure; 41 was opposite the northern (inner) terminal of the inner ditch spiral, and 124 formed the southern (outer) terminal. In some of the other segments in question the degree of asymmetry was much less pronounced and was not associated with any great quantity of rubble. On the south east side of the enclosure, in the only two segments in which there was a strong bias (13 and 123C, microfiche Appendix 2 SC8/18, SA7/21), it was the outer edge from which the greater volume of material had entered. The case for a separate, continuous bank associated with the main inner ditch is, therefore, not overwhelming.

The West Side of the Inner Enclosure

On the western side of the inner enclosure, in the spiral arm of the inner ditch, only four segments (122, microfiche Appendix 2, SA7/1; 178C and 181B, Fig 15; and 180, Fig 18) showed any clear degree of asymmetry in the fill, and in the case of 178C it was simply that the bulk of heavier stones appeared to be tipping from one direction. In all instances the direction was from the west (outer) side. The section of 152B may be read in the same way, although the sequence was truncated by the recut 152C (microfiche Appendix 2 SA6/1).

Interpretation

The sum of the evidence, such as it is, makes possible the following tentative reconstruction (Fig 20):

A bank was constructed around the entire enclosure between the two main ditch circuits and close to the inner edge of the outer circuit. A second bank possibly existed around the inside edge of the inner ditch on the north, west and south west sides, and almost certainly on the north east side, running between the main ditch and the north terminal of the spiral. This did not extend around the inside edge of the spiral; instead, the southern half of the inner enclosure between ditch segments 13 on the east side and 174 on the west side was probably bounded wholly or partly by a bank outside the ditch, running between the spiral arm and the south terminal of the main inner ditch. It seems very unlikely that this bank continued around the north western side, alongside the smaller pits there.

The nature of the bank construction itself can only be conjectured but there are some clues. The rapid collapse suggested by the heavy falls of rubble in some places is, as pointed out by Whittle (1977b), most consistent with a steeply angled outer face, probably revetted with stone quarried from the ditch segments and perhaps with turf also. The slope of the ground is insufficient to have caused the degree of instability in the banks which these falls suggest, even where it is not counter to the direction of fall, and on Briar Hill a bank of simple dump construction would almost certainly have consolidated very quickly and degraded very slowly. The composition of the subsoil includes sufficient clay to bind the sand effectively, and it was observed during the four years of excavation that the spoil heaps on the site, which in places were of considerable height and steepness, suffered hardly any slippage or erosion. It may have been that the need to quarry stone to reinforce or revet the bank was the reason for the frequent practice of digging new pits rather than simply emptying out the existing ones when the earthwork was repaired.

The relative absence of heavy rubble in the fill of some of the ditch segments argues nevertheless against a revetment built entirely of stone unless, of course, the stone was removed before total collapse had occurred. Avery has argued (1982,15) that a turf wall fallen into a ditch should produce a layer of loam equivalent in extent to the original height of the wall. This would depend on the local soil type and, since some degree of mineralisation and deformation would probably have taken place prior to the collapse of such a wall, the residue in the ditch might not be

The Neolithic Enclosure: Possible location of Banks

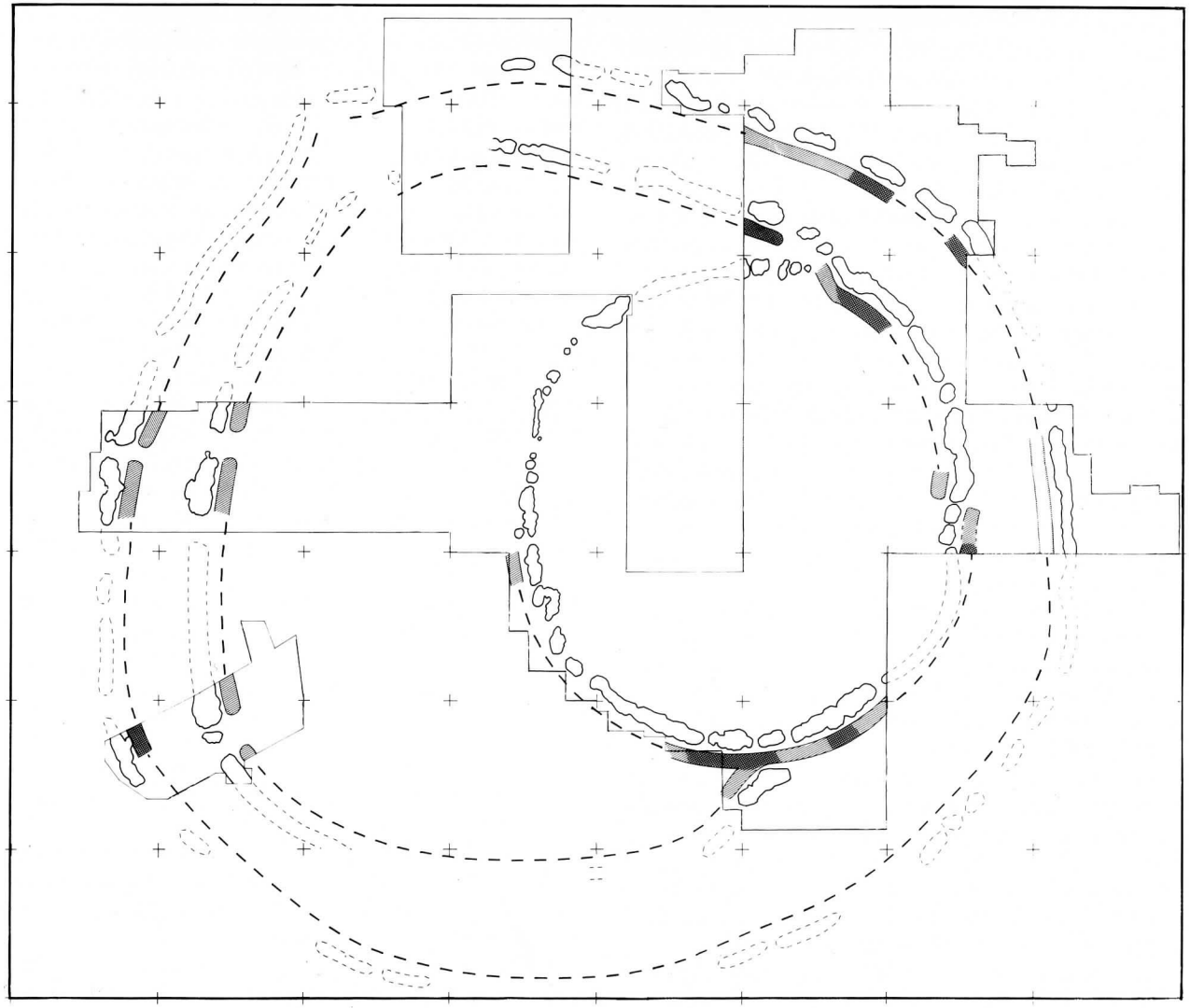


Fig 20

recognisable.

There was, as stated before, no clear indication of any kind of setting of earth-fast timbers around the enclosure, although recent discoveries at Hambledon (Mercer 1980b) have demonstrated that elaborate timberwork was sometimes incorporated in the banks associated with neolithic causewayed enclosures. Traces of timber posts were also found within the bank of the Whitehawk causewayed enclosure (Curwen 1954,77) and that of a different type of neolithic earthwork at Broome Heath, in Norfolk (Wainwright 1972,5ff). The negative evidence from Briar Hill is not conclusive, however, because, as was noted at Whitehawk, a 'spine' of timber uprights or other timber reinforcement included in the body of a bank need not have left traces in the subsoil beneath the bank. The only features which could be interpreted as such were three pits (83,237,283) which were found at widely different points between the inner and outer ditch, spaced at the same distance of roughly eight metres behind the inside edge of the outer ditch. This is on a line within the area which might have been covered by a bank, probably near its outer face. The pits, which were undated, were all shallow features between 0·50m and 1·00m in diameter and not more than 0·30m deep, but only one (283) contained what could be interpreted as a post-pipe about 0·50m in diameter.

The size of the banks would depend on whether there were two of them or more, or whether the material quarried from the segments of both main ditch circuits was combined in a single structure as may have been the case at the Orsett enclosure (Hedges and Buckley 1978, 236). A rough calculation based on the estimated volume of material from the ditch segments of the original construction, corrected for expansion, suggests that two revetted banks of trapezoidal section, broken only by a limited number of entrances, would each have been approximately one metre high and two metres wide at the base. (See microfiche Appendix 4). It must be remembered, however, that the ditch segments may not have been the sole source of material.

The size and depth of various phases of the ditch segments 195, 197, 192, and 200, which form the terminals of the main inner and outer circuits at the probable entrance on the west side of the enclosure, was consistently greater than average. If they were commensurate with the size of the banks adjacent, then the terminals of the banks flanking the entrance may have been higher than the rest. Evidence has been found at Hambledon to suggest that this was so at an entrance through the Stepleton outwork (Mercer 1980b).

The Structural Sequence and Chronology of the Neolithic Ditch Circuits

The first and most important step in establishing a relative chronology for the enclosure must be to determine whether or not all parts of the ditch system were contemporary in their original construction. When the site was first discovered it was assumed that the plan seen as a crop-mark and plotted by magnetometer survey was the product of more than one phase of construction and that the inner and outer enclosures, while obviously related, were of different dates (Wilson 1975, 180).

The question could not be resolved conclusively by stratigraphic means, since no stratigraphic link existed between either the different elements of the system or the several units which made up each individual circuit. The structural evidence of the plan itself, the stratigraphy of individual ditch lengths and the internal dating evidence of stratified artefacts and radiocarbon dated samples make it possible, nevertheless, to attempt an answer.

The Evidence of the Plan

The complete plan of the excavated features shows the length of ditch which defines the inner enclosure to be integral with the main inner ditch circuit in that the two form a single, continuous spiral. Geometric analysis of the plan (p57; microfiche Appendix 3) demonstrates, furthermore, that it had an internal coherence which is consistent with its having been planned and constructed at one time.

Despite this observation, it is necessary to consider whether the plan, it its final form as a composite of successive cuts, might not conceal the evidence of an earlier and simpler structure. It is possible, for example, to see the inner enclosure as earlier than the rest, and the inner ditch of the outer enclosure, the line of whose north and south ends was deflected slightly to meet the circuit around the inner enclosure, as a later addition.

In fact, it can be demonstrated that the plan probably changed very little in essentials from first to last, but to arrive at this point it is necessary first to analyse the recutting of individual ditch segments.

The Evidence of Stratigraphy

Exactly equivalent sequences of recutting were found repeatedly in segments of all the main elements of the ditch system and in most parts of each separate circuit. This, together with the magnitude of the operation in most cases and the length of the intervals between cuts, as evidenced by the accumulation of fill in the ditch segments, suggests that we are probably dealing with a series of major reinstatements of the earthwork as a whole rather than with piecemeal modification or repair. Even the pits on the north west side of the inner enclosure, which were so much smaller than the average for the site as to seem of a different order, revealed a sequence exactly parallel to that of the larger segments, and there seems no reason not to accept them as evidence of the same process.

Proceeding on this assumption it is possible to match individual sequences of recuts across the site so as to provide a series of chronological 'horizons', each one of which marks an episode in the postulated cycle of construction and successive renovations.

At least seven phases can be identified in this way.

Phase I is to a large extent conjectural. It is interpreted tentatively as the 'marking out' stage, prior to the main construction and to it are assigned those few features within the ditch circuits which are thought to have pre-dated the first major cuts.

Phase II is the primary construction of the ditches and, presumably, the banks also.

Phases III-V are three successive episodes of recutting.

Phases VI and VII mark the final recutting of the ditch segments. Three ditch lengths (31, 199, and 162), in the outer and inner circuits and the spiral arm of the inner ditch respectively, showed evidence of more than four recuts, discounting the features assigned to Phase I and later neolithic features cutting the ditches. In such instances the penultimate cuts are assigned to Phase VI and the final cuts to Phase VII, although for practical purposes they are treated as one, since there is nothing to say that it is not the latter which were afterthoughts to the general final recutting. The existence of these apparently supernumerary segments does suggest, however, that the evidence for at least one more phase of recutting may have been obscured in most parts of the circuits and that there may be a greater potential for error in assigning individual segments to phases than has been allowed for in the scheme.

The Phasing of Ditch Segments

A diagram of the suggested sequence of segments in the excavated portions of the ditch circuits is given in Fig 5.

The placing of individual segments within the basic framework is often a matter of probability rather than certainty. Where the position of individual segments in a long

sequence was obscure because later recuts had truncated the stratigraphy, spatial patterning served as a guide to the most likely order: whenever the point could be verified, the spacing of segments belonging to any given phase tended to be fairly regular and contiguous segments were never contemporary. In the case of single cuts, or 'floating' sequences of less than five observed cuts, it has been assumed as a working hypothesis that the latest recut in the sequence belonged to Phase VII unless there are positive indications to the contrary. Underlying cuts have then been placed in order in the preceding phases, but with the recognition of an increasing possibility of error in the earlier stages of the sequence.

One of the few exceptions to this procedure has been the phasing of the three segments 84, 85 and 77 of the outer circuit, on the north east side of the enclosure. None of these could be shown to have been recut more than twice at most and the regularity of their outlines and their spacing as compared with segments in other parts of the circuit, also suggested that they had not been as often renewed. It follows that either the outer ditch circuit was originally incomplete at this point and the gap was filled at a late stage, not earlier than Phase IV, or that it was complete originally and later abandoned. The second alternative seems the more logical supposition and is, in fact, consistent with what appear to have been trends in the use of the site, but a radiocarbon date for 77A provides a rather stronger reason for placing the segments early. It is possible that the two phases of segment 79, nearby, should also be placed at the earlier end of the sequence although they have been assumed to be later.

Very occasionally it has been possible to equate stratigraphically unconnected segments on the basis of the pottery they contained: the probable dating of features 160 and 161 relative to adjacent ditch segments 162 and 165 was determined by the distribution of sherds of one pot (NP15).

Analysis of the worked flints and pottery found stratified in the ditch segments cannot provide independent confirmation of the phasing in detail, since neither class of artefact is a very sensitive chronological index. It may be noted, however, that on a general level the results are consistent with the postulated sequence. The only means of obtaining more precise dating evidence has been the use of radiocarbon assay.

The Radiocarbon Date Series

Among the samples submitted for carbon 14 measurement were fifteen taken from ditch deposits of various phases and from features cutting the fills of neolithic ditches. Details of the results are provided elsewhere, but the archaeological implications are striking and require further discussion. The samples were all of charcoal and, in all but one instance (HAR 4092), were from well defined, clearly stratified deposits; usually the distinctive 'ashy' or burnt deposits in the ditch fills.

Three small groups of determinations provide the outline of a chronology consistent, at least in relative terms, with the phased sequence. They provide:

(a) A possible date for the construction of the earthwork, or at least a *terminus post quem* for this event.
(b) An approximate date for the final recutting of the ditch system.
(c) An approximate date for the final silting of the segments of the inner ditch system.

The three earliest dates, which statistically can be accepted as a single distribution, have a weighted mean of 3650±55bc, or around 4480BC in calendar years. The samples from which two of them derive were from deposits which could just post-date the initial phase of construction, although it is not possible to prove this. HAR 2282 (3490±110bc) is for a well defined layer just above the initial fill of outer ditch segment 77A. Securely stratified in the same layer were worked flints and fragments of neolithic pottery which formed a small but obviously associated group, isolated within the fill of the feature. The segment itself cannot be demonstrated purely on stratigraphic grounds to be primary in the site sequence but, as argued above, there are structural reasons for supposing that it may be primary.

The second date, (HAR 4072: 3730±70bc) is for charcoal in the fill of 219, the large post pit alongside the probable entrance gap in the outer circuit. On the stratigraphic evidence which has already been outlined this feature need be no earlier than Phase V, but structurally it fits better in phases II or III, especially if the arguments of the geometric analysis of the plan are accepted: 219 marks one of the fixed circumference points having a key relationship to the postulated structural design. The third date (HAR 4092: 3590±140bc) is from charcoal which must be regarded as having been residual in its context, which was the secondary fill (128E(4)) of a final recut in the spiral extension of the inner ditch. The recut was directly above a primary phase segment and the fill layer in question, clean rubble which may have derived from an adjacent bank (see Fig 14).

The second group, consisting of four dates, is for a series of samples from deposits well stratified in Phase VII recut segments. Three (HAR 4071, 4075, 5217) were obtained from layers in or just above the primary fill levels of segments 199D, 124E and 248C respectively and the fourth (Har 3208) from cremation 52 which cut the primary infill of 38E. The four are acceptable as a single distribution and the weighted mean is 2635±40bc, or around 3380BC in calendar years.

The third group consists of dates for samples from four later neolithic features cutting the final fill layers of inner ditch segments 251E and 41D/337A. The dates, which range from 1840±100bc to 1590±80bc (weighted mean 1700±50bc, or *c*2140BC) are consistent with associated later neolithic/early bronze age impressed wares and Beaker pottery.

Two single dates for samples from intermediate contexts are consistent with this series: a small sample, one of four measured in the small gas counter, gave a date of 2830±120bc (HAR 5271) for 28C(2), an inner ditch segment assigned to Phase III but which could possibly be Phase IV. A sample from 248B(3), measured by the standard process, gave a date of 2130±70bc (HAR 4066) appropriate to the context which is probably Phase VIII.

The other three samples measured in the small counter (HAR 4110, 5125, 5216) were all submitted in the hope of obtaining further evidence of the date of primary construction and subsequent early recutting: the results are, to a greater or lesser extent, at variance with all the archaeological evidence.

The dates of 2415±85bc for the primary infill of 176A(1) (Phase II) and of 1950±100bc for the primary infill of 165(1) (Phase III) would be acceptable only if it were supposed that the spiral extension of the inner ditch, of which these features formed a part, was substantially or entirely later in all its successive parts than the rest of the ditch system including that part of the main inner ditch which forms the opposite eastern side of the inner enclosure, dated by HAR 3208 and HAR 5271 (see above). Such an hypothesis seems fundamentally absurd and is in no way consistent with the character of the considerable body of pottery and worked flints stratified in the segments in question and in those overlying them: this is quite different from the material stratified in the later neolithic features of the interior dated between 2400bc-2000bc and includes nothing at all of specifically later neolithic type. Another date of 1460±100bc from 251B(6) is for a context of Phase III or IV, stratified well below the later neolithic features which cut

The Neolithic Enclosure: Radiocarbon Dates

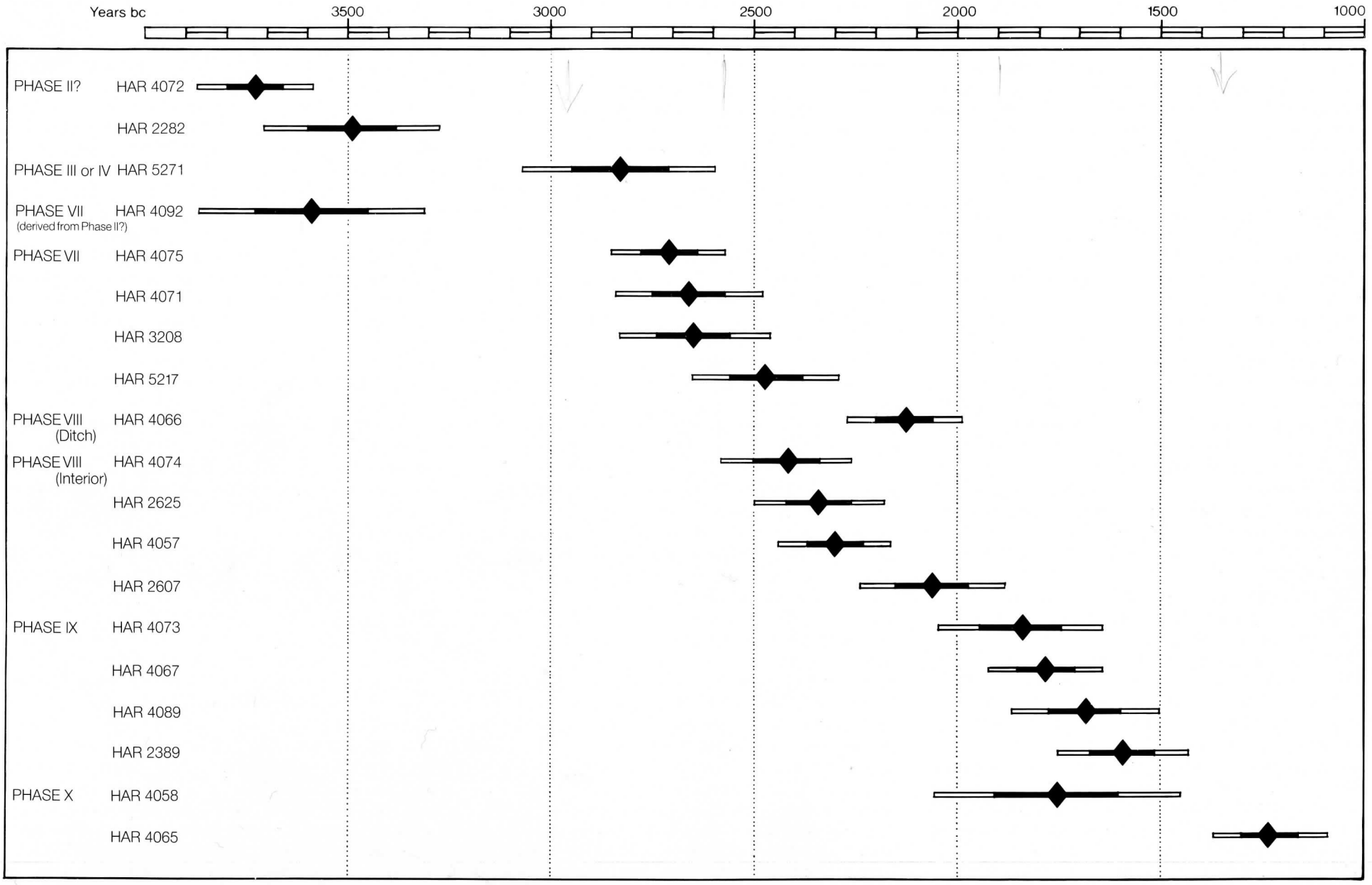


Fig 21 *Plot of radiocarbon dates at one and two sigma*

the overlying fill. It could, conceivably, be attributed to contamination from one of these features, although the burnt soil layer from which the charcoal was taken was very well defined.

Since HAR 5216 was counted twice, with consistent results, the date must be accepted for that sample at least; but contamination *in situ* seems unlikely because there was no evidence of any disturbance, and every precaution was taken in the collection and preparation of the samples.

Discussion

The date of the final recutting of the inner ditch system seems to be established within fairly close limits by the carbon 14 series.

The group of early dates may also be supposed to relate to a single event. There is no absolute proof that this event was the original construction of the enclosure, but whatever it was probably affected most or all of the site, since the charcoal samples which yielded the measurements were taken from opposite sides of the enclosure. If they were residual from activity predating the enclosure, the charcoal must have persisted in sufficiently large quantities to have been incorporated virtually unmixed in several different later contexts. No evidence was found of extensive or intensive occupation of the site prior to the construction of the earthwork, and the best alternative explanation which offers itself is the burning of woodland cover on the site, either in a forest fire or in an act of deliberate clearance.

A forest fire might have occurred at any time prior to the neolithic use of the site; or an early clearance might have been the work of mesolithic inhabitants of the area, since there is some evidence of a mesolithic presence on the site. In either case, if the burning took place very long before the building of the enclosure, the forest would presumably have regenerated and had to be cleared again. If the site was cleared by neolithic farmers for any purpose other than the construction of the earthwork, that purpose, if not settlement, was probably agriculture. Either would, in the long term, have caused disturbance of the soil and dispersal of the charcoal residue. On balance, therefore, it seems quite probable that whatever event produced the charcoal did not long predate the construction of the enclosure.

If this is accepted, at least as an hypothesis, then the possible time span during which the site was maintained, calculated according to the calibrated dates within limits of one sigma, is between 885 and 1395 years. By a process of dead-reckoning, this would allow an interval of not less than 220 years between the identifiable major phases of recutting. Can this be sustained by any other evidence; in particular by the stratigraphy?

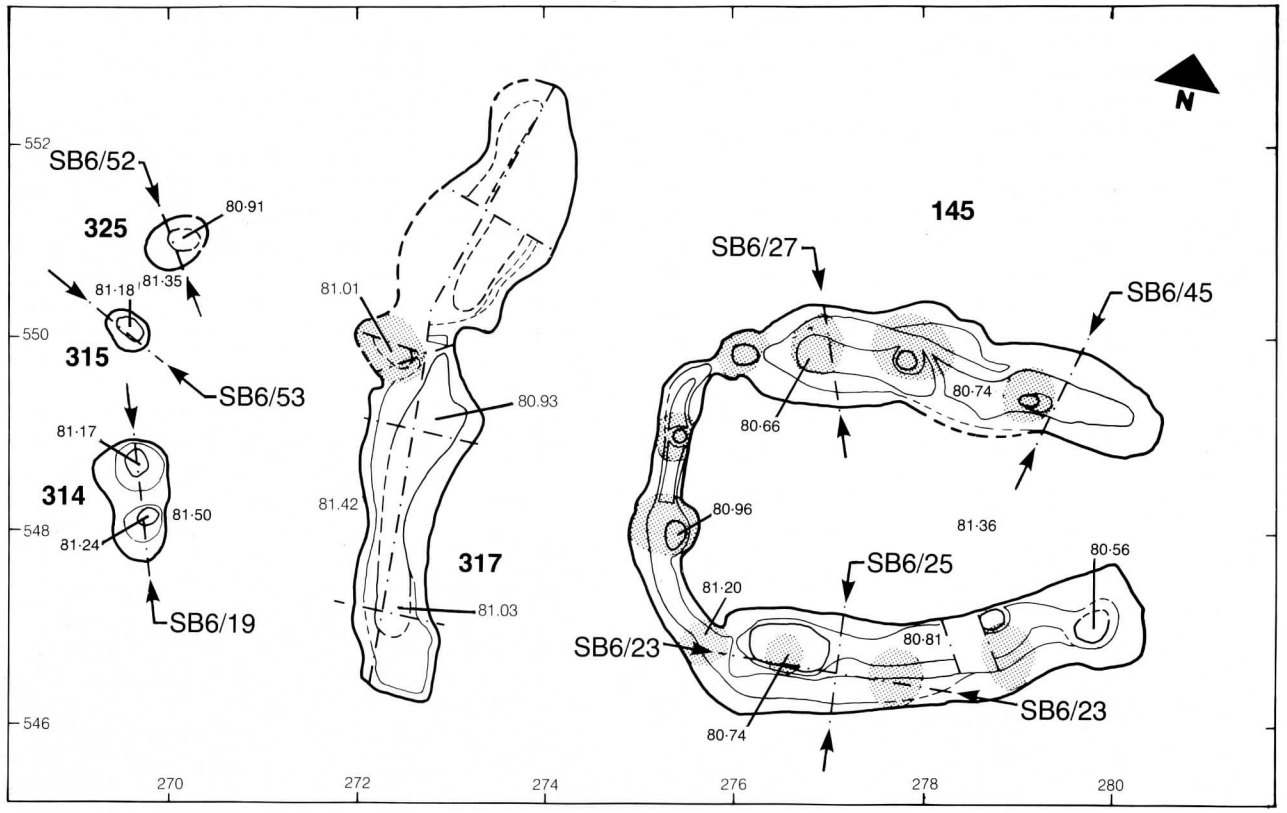
The one acceptable intermediate date, HAR 5271, does just fit such a chronology, but only within limits of two sigma. The only other measure available is the rate at which the ditch segments are likely to have filled, and calculation of this not a simple matter, since so many variables, known and unknown, are involved.

The subsoil and rock into which the segments were cut was, in general, stable and not liable to rapid erosion; less so than the chalk of Overton Down (Jewell and Dimbleby 1966) and probably less than the more closely comparable sands and clay at Wareham (Evans and Limbrey, 1974). This factor may, however, have been counterbalanced by the smaller size of the pits on Briar Hill as compared with the trenches of the experimental earthworks on these two sites. The rate of accumulation would have been accelerated locally by the collapse of the forward face of the banks, as glimpsed in some sections, as well as by deliberate dumping of material in some of the ditch pits.

As stated earlier, virtually all the earlier ditch segments filled to at least half to two thirds of their depth before being recut. At this stage the surface of the declivity would have been relatively stable and the rate of infilling would have become greatly slowed, even allowing for the effects of the erosion of the banks or of continuing human traffic across the site which might have assisted the process. The lowering of part of that surface by an overlapping recut would effec-

Pl 12 *Later neolithic structure 145: slot for timber uprights, view south*

Later Neolithic Structure 145 and Associated Features



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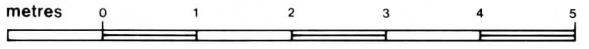
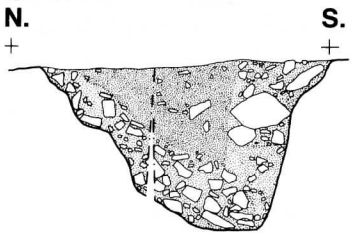


145
SB6/27



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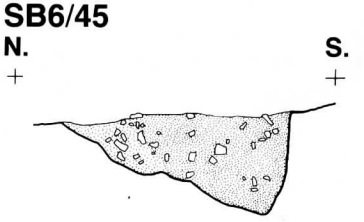

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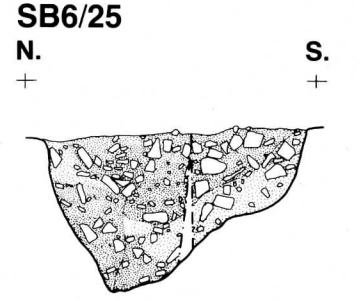

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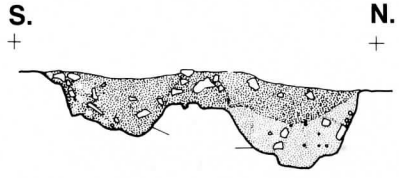

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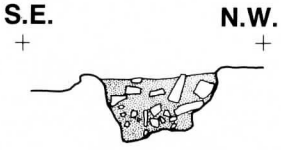

325
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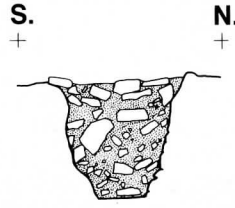

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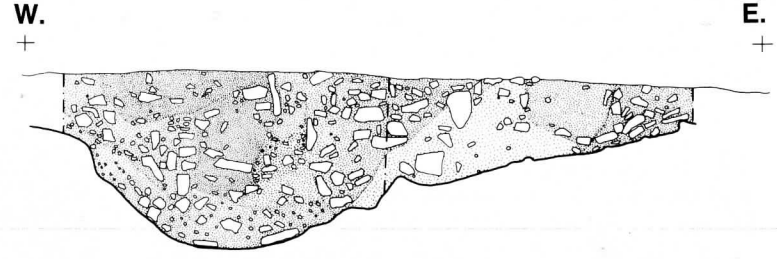


Scale 1:30

Fig 22

tively have halted further accumulation on it until the fill of the recut had reached the same level.

Paradoxically, recuts in the relatively unstable fills of earlier segments may sometimes have filled more slowly than those cut in undisturbed subsoil. The edges of the former evidently tended to slump almost immediately to a stable angle of 30°-40°, as may be seen in segments 41C (Fig 10) or 248B (Fig 11). In both of these examples, virtually all the primary fill, even below the probably bank-derived material, had come from the inside edges which were the only ones cut into subsoil. The possibility that some recut edges may have been retained or shored in some way has already been mentioned.

In the case of the latest recuts, the calibrated dates for the primary fills and the dates for the later neolithic features which cut the upper secondary or final fills suggest a maximum time elapsed of about 1000 years for the uninterrupted infilling process. During this time the site was still in use. The difference between the determinations for 248C(2) (2470±90bc) and 248B(3) (2130±70bc), set against the 0·30m maximum depth of fill seen to have accumulated in the interval between the two, also suggests how slow the later stages of silting might have been.

The conclusion must be that the stratigraphy, while proving nothing, is not by any means inconsistent with the long chronology suggested by the dates.

The Interior of the Enclosure

Within the enclosure eleven features were found which on internal evidence can be assigned to the neolithic period. They were all in the inner enclosure and most, if not all of them appeared to post-date the final recutting of the ditches. In addition to these there were six pits, including one in the outer enclosure, which contained some indication of neolithic date or resembled securely dated neolithic features very closely.

145 (Fig 22; Pl 12): The most impressive of the dated features was also probably the latest. It was sited in the middle of the southern half of the inner enclosure and was a small but substantial rectilinear structure aligned east-west and measuring 4·5m × 3·0m internally. The side walls to the north and south were defined by slots of irregular depth up to 0·70m, and the west wall by a shallower slot not more than 0·45m deep. The east end was open.

The wall slots appeared to have contained at least ten upright timber posts, three on each side, one each at the north west and south west corners, and two across the west end, but these had been removed and the packing fill had slumped (Fig 22 SB7/27). Finds from the slots included sherds of later neolithic Grooved ware and charcoal which yielded a radiocarbon determination of 2060±90bc. The surface of the area enclosed by the slots contained no other features and was clear of finds.

314, 315, 325 (Fig 22): Five metres west of this structure and roughly parallel to its end wall were three small, closely spaced pits set in a slightly curving line. They were probably the remains of shallow post holes, four in number, since 314 was double. They were between 0·25m and 0·45m deep measured from the subsoil surface and two were associated with sherds of Grooved ware.

317 (Fig 22): Parallel also to both the end wall of 145 and the setting of pits, and equidistant from either, were two elongated pits or slots 0·40m deep, 3·70m and 2·90m long respectively and conjoined end to end. There was at least one probable post hole at the junction of the two as well as anomalies in the fill which suggest the former presence of posts at either end of the southern slot. A small sherd of neolithic pottery and several worked flints were found in the southern part of this compound feature.

The spatial arrangement of these features, taken with the evidence that they were contemporary, suggests a functional relationship between 145, the western post setting and probably 317 also. Alternatively, the small post pits and 317 could be part of a second, independent structure.

156/157, 183/203, 218 (Fig 23): The most striking of the features probably predating the above-mentioned complex were three widely spaced lobed pits, each of which proved on examination to be composed of a sequence of four separate, overlapping cuts. The three together appear to form a regular setting, marking the points of a right-angled triangle, base 36m and perpendicular 26m, in the south west quadrant of the inner enclosure.

The apparent regularity of this suggests that there might have been a fourth such pit in area C7, thus completing a rectangle. Nothing of the kind was seen during excavation of the area during the first season, but a possible anomaly in the appropriate place can be seen in the photomosaic record.

156, the latest pit in the 156/157 sequence, was rectangular and almost vertical sided, measuring 0·45m × 0·87m at the bottom. The stratigraphy of the fill suggested that it contained a large post, approximately 0·30m × 0·55m in section, which had been removed, although there were also similarities with features at Broome Heath which have been interpreted as wood-lined storage pits (Wainwright 1972,18). The relatively abundant charcoal from this feature gave a radiocarbon determination of 2340±80bc.

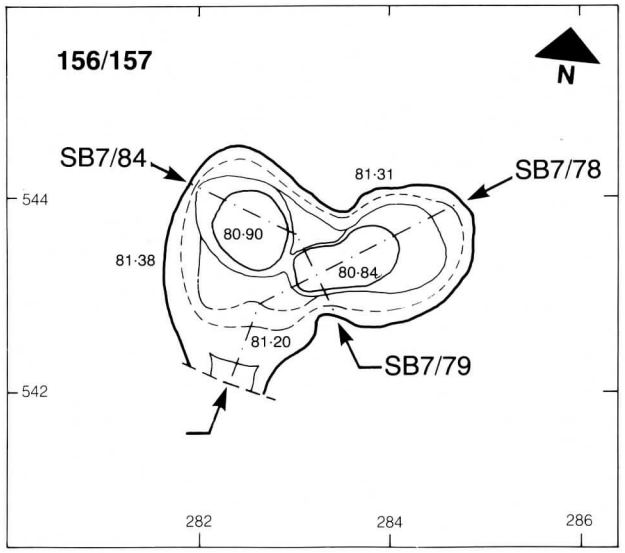
Charcoal from 218D, the latest pit in the corresponding feature 36m west of 156/157 produced an almost identical date of 2300±70bc. The pit itself seems originally to have been similar in character to 156 although the sides were more broken or eroded and there was no evidence of an internal post-hole. 183/203, the third complex located 26m to the north of 218, contained worked flints and sherds of neolithic pottery but very little charcoal and no sign of any post hole.

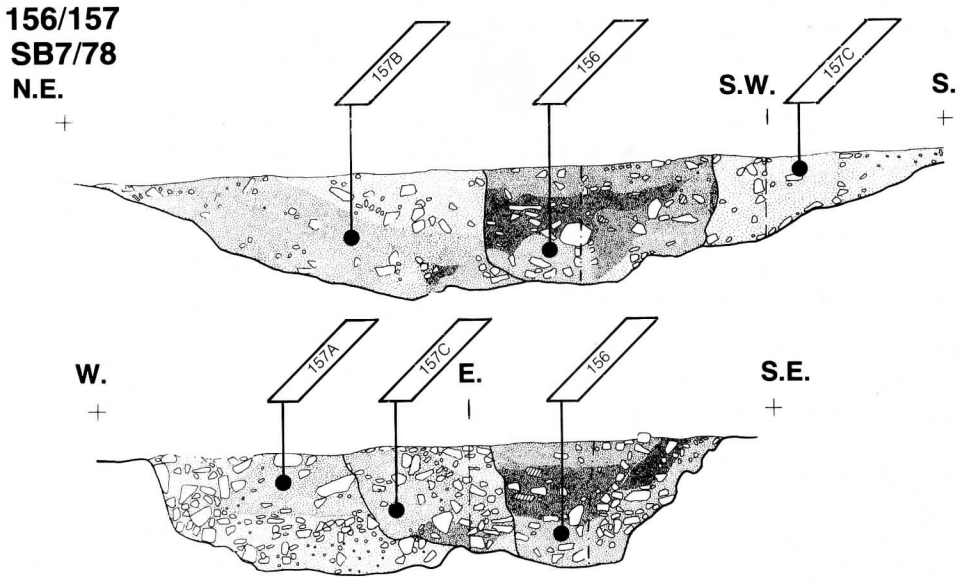
245 (Fig 24): A pit complex similar in many respects to the first three was found in the outer enclosure, 73m west of 183/203 and six metres from the inner ditch. It comprised three or possibly four successive, overlapping pits but contained no datable material. There were, however, slight indications that one or more of the cuts might once have contained an upright post in the fill.

135, 137, 143 (Fig 24): In addition to the two more prominent groups of features there were at least four more neolithic pits of varying size and nondescript type distributed about the south western part of the inner enclosure. The largest of them (135) was elongated in plan, not more than 0·40m deep and incorporated a possible recut. The remaining three had maximum dimensions of less than 1·50m and were very shallow, all of them being less than 0·20m deep. All contained worked flints and a few sherds of neolithic pottery, but only 137 was in any way remarkable in this respect. It contained 49 worked flints in the fill and charcoal dated 2420±80bc.

22, 89, 182, 355: Four other pits contained very small fragments of neolithic pottery in the fill as well as worked flints, but the dating is in doubt because of other, later material which may or may not have been intrusive. 182 is the most debatable of these. It was an elongated pit 0·30m deep and 2·75m long with a fairly uniform sandy fill, and the finds from it included over twenty worked flints and several pieces of neolithic pottery, including a rim sherd. They also included four mediaeval sherds. It has been assumed as a general principle that neolithic pottery, having been fired at relatively low temperatures and being normally in a poor state of preservation when found, would have tended to disintegrate on disturbance or prolonged exposure on the surface, and is therefore less likely to have survived as residual material in post-neolithic contexts. Certainly it rarely seems to have done so in any of the iron age features excavated on the site, and then only in those which cut directly into neolithic deposits.

Later Neolithic Features





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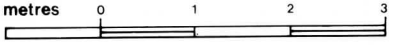

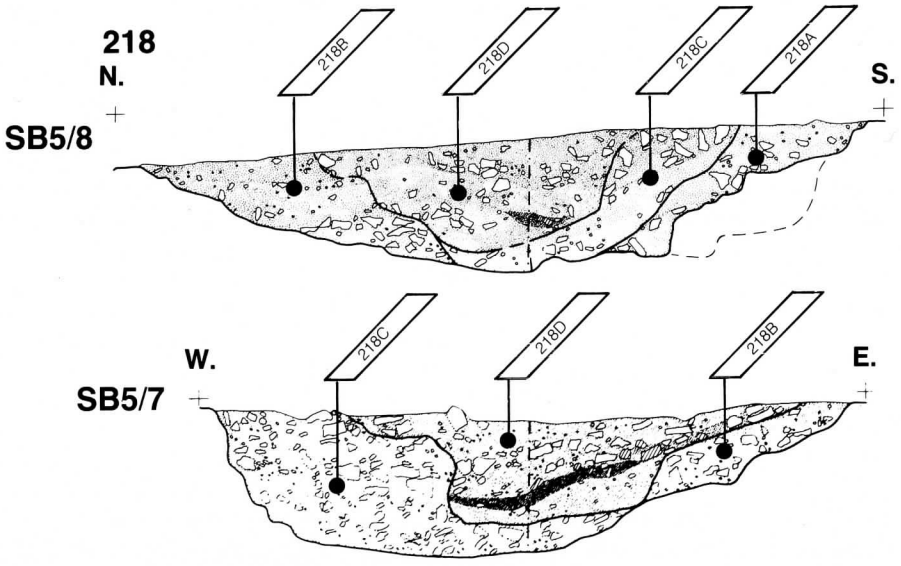

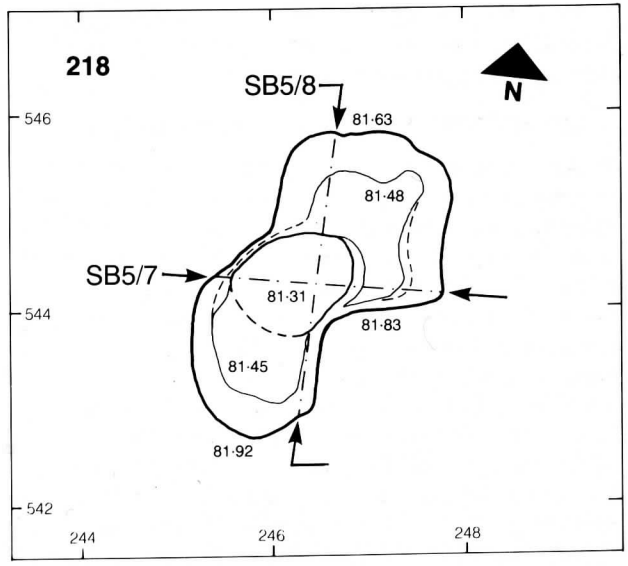

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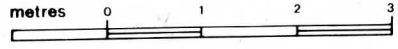
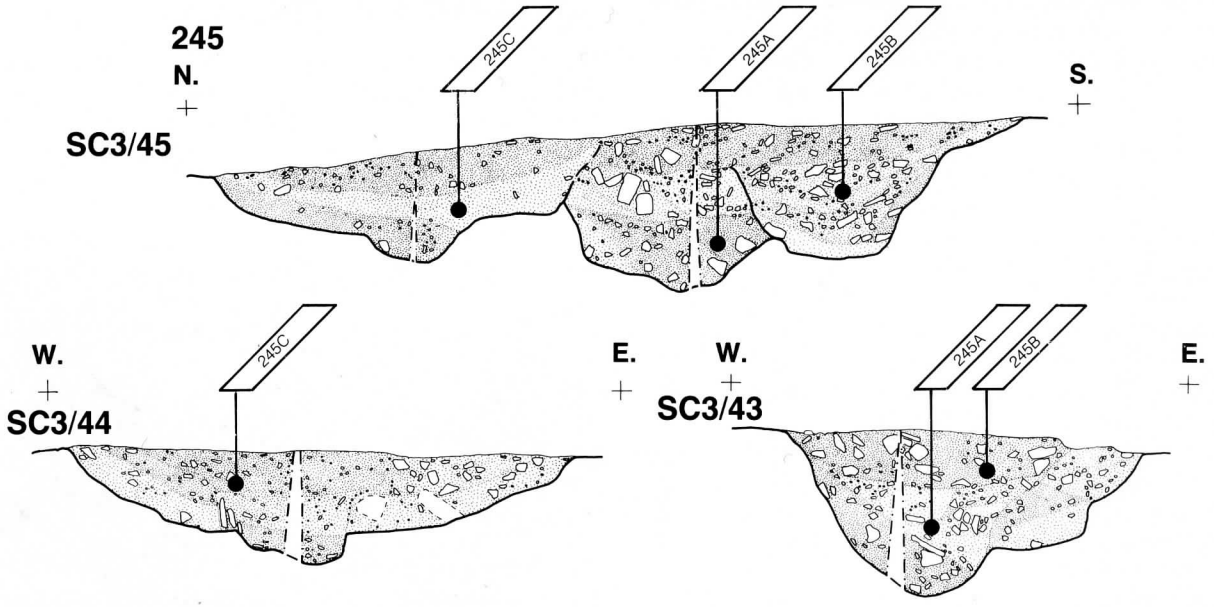
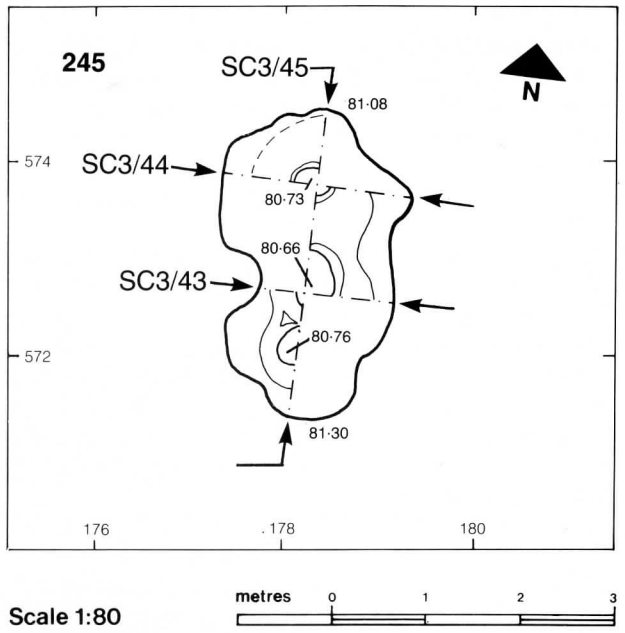


Fig 23

Later Neolithic Features





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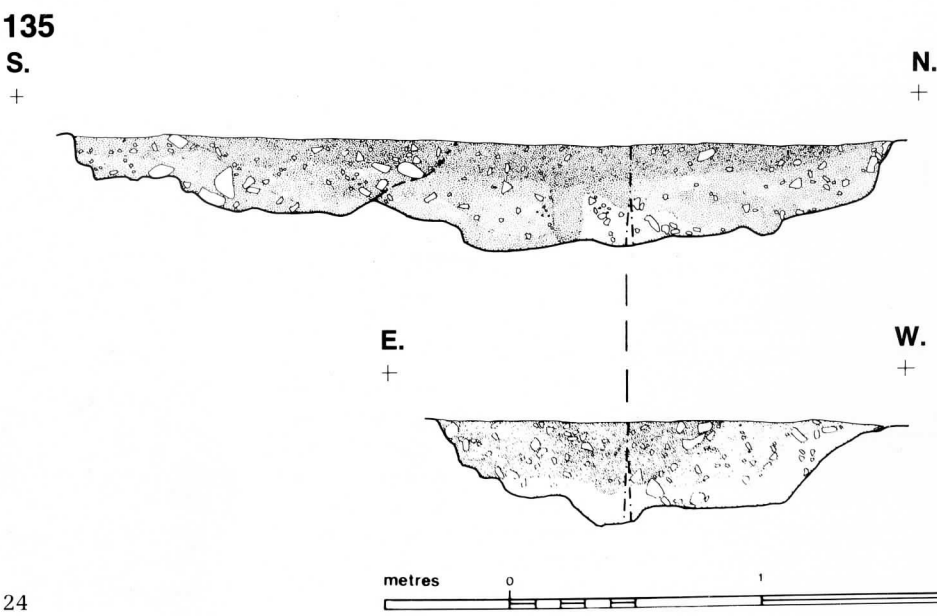

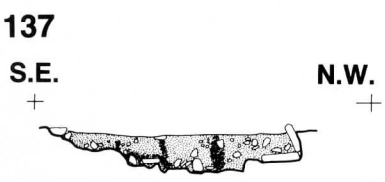

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Fig 24

Later Neolithic Features above the Ditches

When the fill of the last ditch recuts had reached a level near to or even higher than that of the modern truncated surface, pits were dug above several segments of the inner circuit and at least one segment of the outer circuit. Most of these pits contained evidence that they were of later neolithic date and all appeared to have been positioned quite deliberately in relation to the underlying ditches.

228, 258, 265, 300, 303: According to both the stratigraphic evidence and radiocarbon determinations, the earliest of them were a tightly clustered group of at least four features above segment 251C on the west side of the inner circuit, south of the probable entrance (Fig 8). They had been dug in the bottom of, or alternatively were truncated by a well defined scoop or hollow (251D) up to 0·40m deep in the upper fill of the ditch and were thus sealed by the final fill layer. They comprised:

303 (Fig 8 SC3/23 SC3/51): A large pit containing pinkish, heat discoloured sand and charcoal dated 1840±100bc.

300 (Fig 8 SC3/52): A large pit identified in section only. It appeared to contain a smaller pit or large post hole.

265 (Fig 8 SC3/23): Probably a large post-pit, dug at the southern end of 251B.

228 (Fig 8 SC3/23, SC3/52): A large pit with stepped profile, the fill of which contained four smaller pits or post-holes (228A-D), each approximately 0·40m in diameter and between 0·50m and 0·65m deep. All four were filled with pinkish, heat discoloured sand and two (228A and 228B) also contained fairly large pieces of charcoal, a sample of which, from 228A, was dated 1780±70bc. The whole was presumably some kind of structure of very large standing timbers, at least one element of which seems to have been replaced, since 228B was cut by 228C.

A fifth feature beside the south west corner of 251B was stratigraphically later than all these.

258 (Fig 8:1): A relatively shallow, oval pit, cut the fill of 251D and probably the adjacent post hole 265, also. A charcoal sample from the fill produced a date of 1670±90bc.

337B, 367, 368, 343: Four more of the later neolithic features were widely spaced around the inner ditch circuit and seem to have been of similar date to 258.

337B (Fig 10) was a large oval pit dug above the inner ditch segment 41D, to the north of the inner enclosure. It was the most clearly defined of this group of features, filled with blackened sand, burnt stone and charcoal and containing pottery sherds and worked flints of later neolithic type. The charcoal was dated 1590±80bc. It cuts a slightly longer, deeper pit designated 337A which may, in fact, have been the final recut of the ditch sequence proper.

368 was a pit of similar size on the opposite side of the inner enclosure, above 152 B/C. It was excavated, although never very precisely defined, in the trial excavation of 1973 and contained sherds of later neolithic Mortlake style pottery.

367 (microfiche Appendix 2 SC3/14) was a pit of similar size which cut segment 200D on the west side of the main inner ditch circuit. It was clearly defined in section and plan and contained sherds of Beaker pottery in the fill.

343 (microfiche Appendix 2 SC8/15, SC8/19) was a shallow, rather more doubtful feature, dated only on the basis of its stratigraphic position. It had been dug in the gap between the ends of segments 23 and 26C on the east side of the inner ditch circuit, and cut the final infill of both.

The symmetry of the spacing of these four pits in relation to the earthwork (Fig 64) is interesting, and so marked as to suggest that it was deliberate. If so, it must be assumed that all four were contemporary. They contained nothing to indicate their original purpose.

345 (microfiche Appendix 2 SC8/4, SC8/11): Four metres south of 343 was a small post-hole, 0·12m in diameter and 0·35m deep, cutting the surface of the secondary fill of segment 14 and sealed by its final infill.

347-352: Above 25E, on the east side of the outer ditch circuit and seemingly directly in line with 343 and 367 on the one hand, and 345 and 265 on the other, was another small group of features which are certainly no earlier in date than the later neolithic period.

347 (microfiche Appendix 2 SC9/1) was an oval or sub-rectangular pit containing what appeared to be a shallower post hole, 346. The remaining four post pits and possible post pits were to the south of 347, roughly in line above the ditch. 351 (microfiche Appendix 2 SC9/2) was the largest of these and contained a well-defined post pipe, 352, 0·45m deep and 0·15m in diameter. The other three were small but one of them (348) contained two sherds of Beaker pottery.

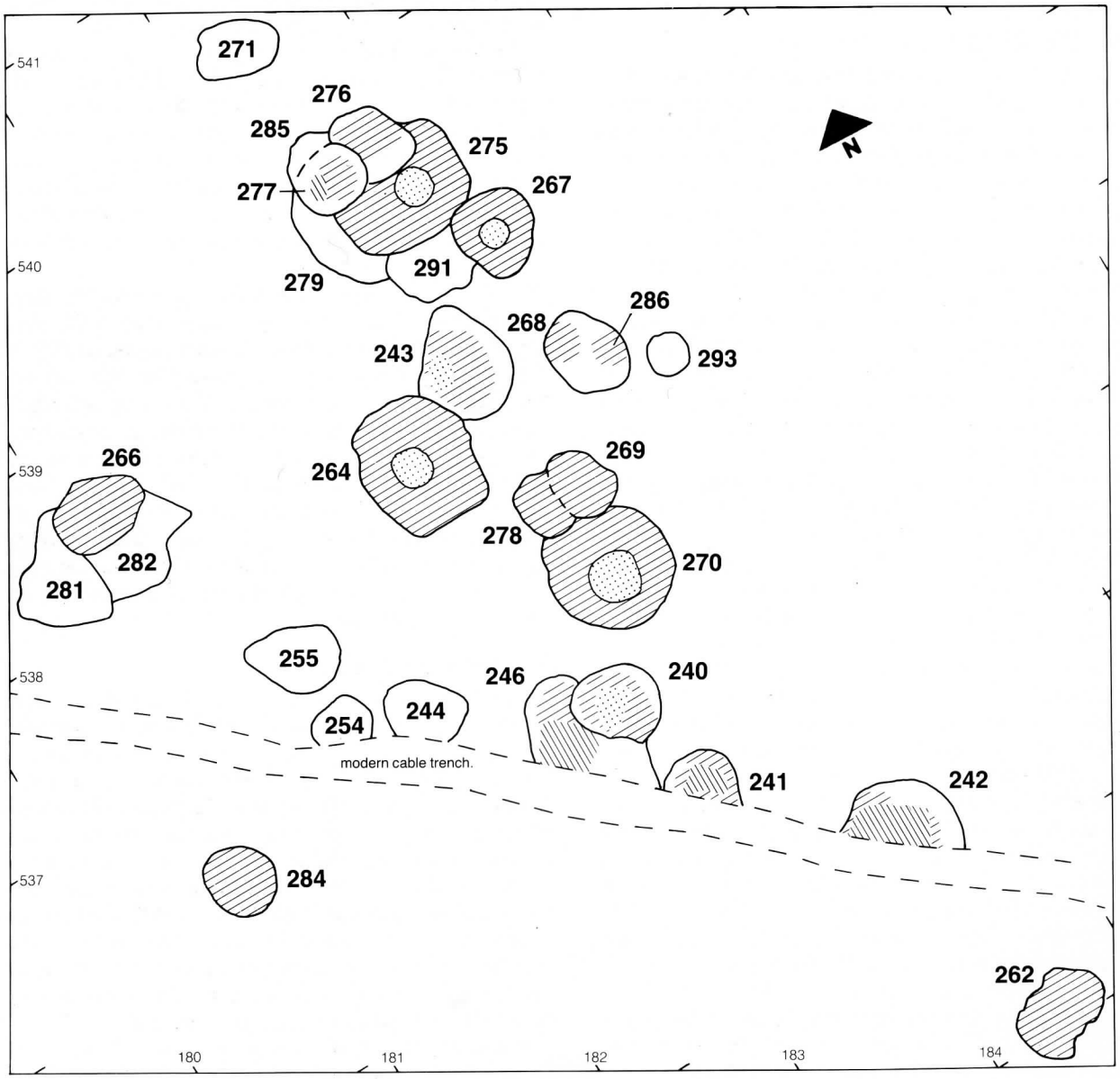
138-141 (microfiche Appendix 2 SA7/21, SA7/14-17): Four small post pits set apart in a line alongside the inside edge of inner ditch segments 123C and 146, on the south side of the inner enclosure. They are the only other features associated with the ditches which could be of later neolithic date although all that can be said for certain is that 140 and 141 cut into the final infill of the adjacent ditch, through a layer which contained sherds of Fengate style pottery.

BRONZE AGE CREMATIONS

The small cremation cemetery lay on the south west side of the neolithic outer enclosure, nine metres east of the inner ditch segment 248. It consisted of at least twenty seven small pits, tightly grouped and overlapping, within a roughly triangular area of about 17m^2.

Pl 13 *Cremation 240 with arrowhead F84*

Pl 14 *Cremation 270 in urn*



KEY

1 Urn.

2 Compact mass of burnt bone.

3 Concentration of bone fragments.

4 Scattered bone fragments.

metres 0 1 2

Scale 1:40

Fig 25

In size, the pits ranged from 0·45m to 0·80m in diameter and from 0·10m to 0·30m in depth. Four (264, 267, 270, 275) contained cremations in badly decayed, plain bucket-shaped urns set mouth upwards and surrounded by a dark fill containing charcoal and flecks of burnt bone (Pl 14). The rims of the pots had been sheared off by the plough and all of them had partly disintegrated. In two other pits (240, 243) the cremated bone had evidently been put in a container or bag of some more perishable material and was found in a compact mass within the fill. A tanged arrowhead of calcined flint was included in 240 (Pl 13). More diffuse concentrations of burnt bone were found in four pits (241, 242, 246, 277), and a dark, charcoal-bearing fill with scattered fragments of bone in seven (262, 266, 268/286, 269, 276, 278 and 284). The remainder contained charcoal but no appreciable quantity of bone at all, perhaps because the main deposit had been higher in the fill and was removed by ploughing.

The cemetery had evidently been in use for some time, judging by the way the pits were intercut. The largest of these stratigraphically interconnected groups, which included 267 and 275, contained seven pits in all, at least six of which overlapped in succession. Even so, the radiocarbon determinations obtained for two of the deposits suggest an unlikely span of time: charcoal from 275 yielded a date of 1230±70bc, and 240, the cremation with the tanged arrowhead, a date of 1750±150bc. On statistical grounds alone the first of the two would seem to be the more reliable, and it corresponds to dates of 1296±100bc and 1114±120bc (Birm 313, 314) from a similar group of cremation burials found seven kilometres away at Brampton Hall Farm, Chapel Brampton (Bull Northamptonshire Fed Archaeol Socs 5 (1971)1; Northamptonshire Archaeol 8 (1973)). A duration of 500 years is improbable for so small a cemetery, but one of 200 years, which could be accommodated with the possible range of the two determinations, is not out of the question.

The area of the cemetery is oddly restricted in view of the fact that there was no sign of a ring ditch or other boundary circumscribing the burials, nor any evidence that they had been associated with a barrow. It seems probable that the site was marked in some way which left no trace.

UNDATED FEATURES: POSSIBLY NEOLITHIC

The Pit Alignment

A length of the pit alignment immediately to the north of the neolithic enclosure was traced for 130m. At the west end of the area examined the line was cut by later features 93 and 323, but one small pit (94) showed it to continue beyond the area of disturbance. Twenty nine pits were identified and eighteen of them excavated without any evidence being found to date them precisely. Circumstantial evidence suggests, however, that they could have been later neolithic.

The individual pits were all roughly oval or circular in plan but varied in size. Where the alignment was closest to the neolithic enclosure ditch, at and immediately to either side of the point of convergence, they tended to be larger; they decreased in size to the east of this and, judging by the size of 94, probably to the west as well. The biggest excavated (59) measured 3·50m×2·70m at the subsoil surface and was 0·80m deep, although evidence seen in section suggests that it may have been recut. The smallest (55) measured 1·00×0·95×0·30m.

The larger pits were flat bottomed and generally steep sided, although sometimes the upper edges had eroded or been broken back to a wider angle. The original shape of at least one of them (63) seems to have been sub-rectangular. The smaller pits (eg 72) had a more rounded bowl-shaped profile and were evidently not just more heavily truncated examples of the larger type. There was nothing in the form or in the stratigraphy observed in any of them to suggest their original purpose.

The fill in most of them was a dark brown loamy sand with charcoal flecks and a good deal of ironstone rubble. In the larger examples there was some evidence of gravity sorting, at least in the lower and mid-levels of fill. The upper fill layers tended to be more homogeneous and stony, as in 59 (Fig 26). The only finds from any of them were some crumbs of unidentifiable pottery, a few flint flakes and a single side/end scraper which came from 59.

The spacing of the pits was fairly regular, although the intervals between the larger ones were shorter (0·40m-1·30m) than between the smaller (1·60m-1·80m).

On stratigraphic evidence alone the alignment could be any date between the later neolithic period and the later iron age. It was demonstrably earlier than the large feature 54 which was of the second century AD or later and which cut one of the pits (87) and had removed all but the very base of another. It appeared, on the other hand, to be later than segments of the neolithic outer ditch circuit whose outer edges were just clipped by the adjacent pits.

The tangential relationship of the pit alignment to the neolithic ditch is so precise as to appear deliberate, which implies at the very least that the neolithic earthwork was still a fairly prominent landmark when the alignment was constructed. Since no pits were observed actually to cut across the final infill of the ditch segments the latter may still have been partly open at the time, in which case the date of the alignment is unlikely to be later than the mid second millennium bc.

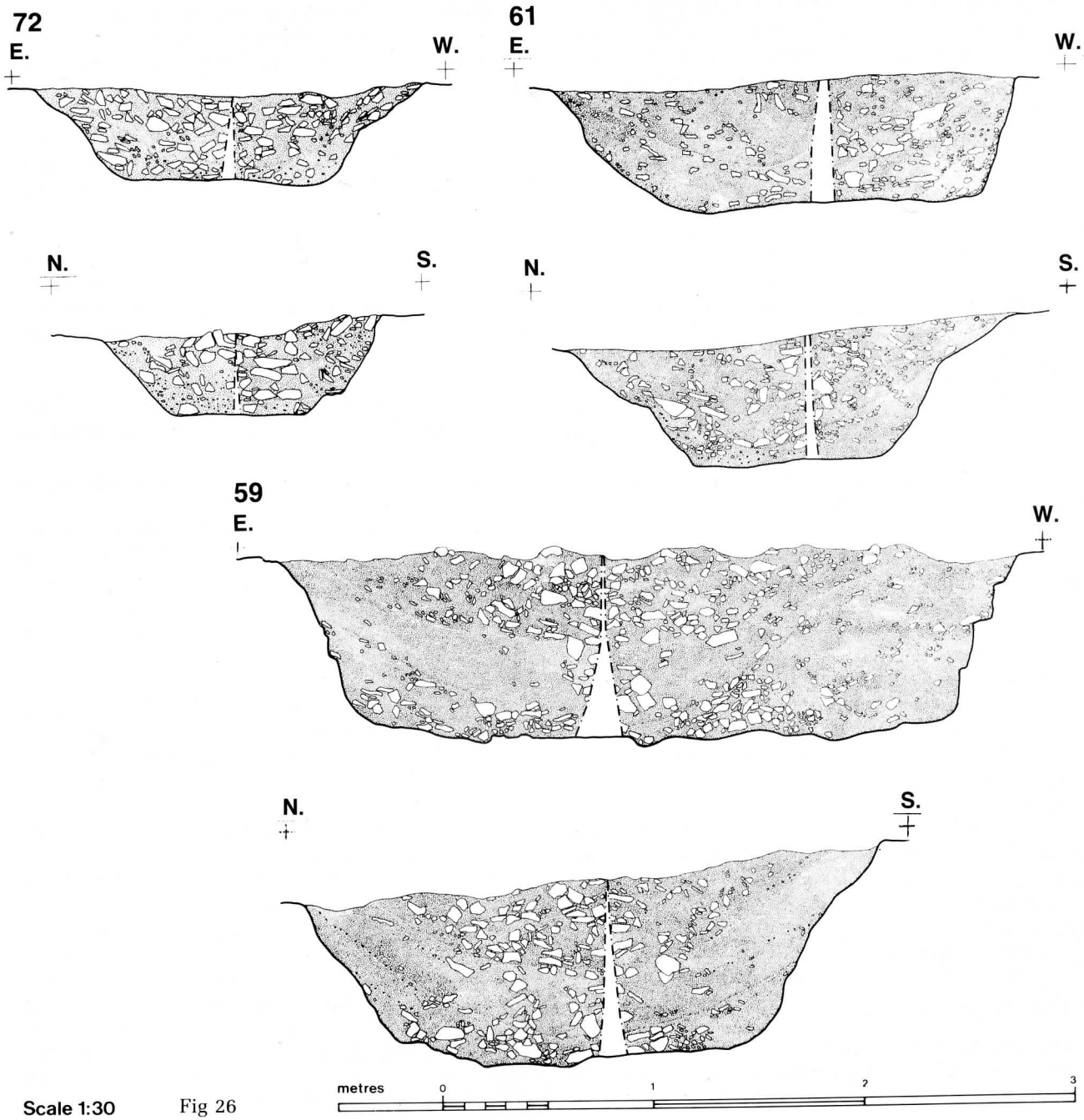
In 1969, in a previous excavation on Briar Hill another, more complex pit alignment, running parallel to this one, was investigated about 300m to the south (Jackson 1974). It is reasonable to postulate some connection between the two, although in this other instance there were two alignments, one above the other, and it is the earlier which more closely resembled the one now in question. The excavator supposed that both were probably of iron age date although, as so often, no positive evidence of this was discovered. Worked flints, including some later neolithic types, and sherds of what could be later neolithic/early bronze age pottery were present, but are thought to have been residual in the context.

Miscellaneous Pits

Within and around the neolithic enclosure 34 pits were found in addition to those discussed already, which cannot be dated satisfactorily in any way. Almost all were shallow features less then 0·30m deep; the largest (75) measured 2·70m×1·80m and was 0·66m deep. Eighteen of them were within the inner enclosure, four in the outer enclosure, and the rest between the main ditch circuits or beyond them.

Some of the pits within the enclosure were almost certainly prehistoric in date, but whether neolithic or iron age is impossible to say. Three or four of those between the inner and outer ditches as mentioned already, might have had some connection with the structure of a bank. Others in both areas were probably not man-made at all.

In this last category were several irregular hollows on the north side of the site (eg 45, 356, 357, 360, 369, 370, 371) which were very much like features interpreted on other sites as clearance holes formed by the lifting of the root-plates of trees (cf Bradley and Ellison 1975, 48ff). They were roughly kidney shaped in plan, 1·50m-3·00m long and



Scale 1:30 Fig 26

0·20m-0·40m deep, and the fills were a clayey sand with some stones, only slightly darker than the surrounding subsoil. The formation of such features is discussed by Limbrey (1975, 286ff).

IRON AGE OCCUPATION

Within the area of excavation the iron age enclosures and the associated pits had two distinct foci of distribution approximately 80m apart in the southern half of the neolithic enclosure. The structural and functional relationship of these features to one another and also to the underlying neolithic earthwork was not always entirely clear, but it is possible that they represent quite a prolonged occupation, judging by the associated pottery.

Two Linear Slots

The northern limit of both groups of features was marked by two east-west slots which seem to have had some structural reference to the neolithic outer ditch.

198 On the west side of the neolithic enclosure a linear slot extended at least 50m eastwards from the outer ditch, cutting across the inner ditch. It was not more than 0·30m deep measured from the subsoil surface, and 0·35m wide at the bottom, with a shallow U profile. The stratigraphy as seen in some sections suggested that it may have contained timber uprights, but no individual post or stake-holes were defined. Neither of its two ends was located in excavation; the west end petered out just east of the neolithic outer ditch, and the east end was obscured by a probable mediaeval or post-mediaeval field ditch (323). The pottery from the fill was all of iron age type.

49 (Fig 27): On the east side of the site, opposite 198, a narrow slot 55m long extended westwards from the neolithic outer ditch. In plan the two features appear as mirror images of one another, with a gap of 84m between the two inner ends. 49 was more substantial, however, being 0·55m wide at the bottom and up to 0·60m deep, and it had contained a fence of upright posts approximately 0·20m in diameter. It cut the fill of both main neolithic ditches from the level of the modern surface or above it, but did not continue eastwards beyond the outer ditch circuit. The spatial relationship to 198 and to other iron age features suggests that it is of iron age date, although one fairly large sherd of mediaeval pottery was recorded well down in the fill, in addition to fragments of prehistoric pottery and flints.

This was presumably intrusive, although no disturbance of the fill was noted which might account for it.

The iron age features excavated to the south of slots 49 and 198 were all within the circuit of the neolithic outer ditch. There was no sign that they extended beyond the limit of excavation on the east side of the site, but they may have done so to the south and west. The two spatially differentiated groups are described separately.

The Eastern Group

The Rectilinear Enclosures

131 The largest of the enclosures, measured 23m×30m internally. The ditch surrounding it was 1·00-1·50m deep with a V profile, approximately 2·00m wide at the top and tapering to a narrow, steep-sided slot 0·30m-0·40m wide at the bottom. This had been recut at least once as a much shallower ditch not more than 0·65m deep from the present subsoil surface. There was an entrance to the enclosure on the east side.

109 Immediately to the east of 131 and north of its entrance was a smaller enclosure measuring 11m×14m internally and also with one entrance on the east side. It was defined by a gully not more than 0·45m deep which appeared to have contained a fence or palisade. On the south side of the entrance, beside the terminal of the slot, was a small pit 117, 0·15m deep, which might have been the remains of a socket for a gate post.

The alignment of the two enclosures one with the other is so exact that there can be little doubt that they were contemporary. There was nothing in the interior of either, apart from a single shallow pit (132) within enclosure 109. Inside enclosure 131 the incidence of finds on the subsoil surface, including residual flints, was much lower than in the surrounding area (see Fig 32) as if, perhaps, the original ground surface and topsoil had been cleared deliberately. If the enclosure was used for cattle or other stock this might have been the incidental result of 'mucking out'. If, on the other hand, it is interpreted as a dwelling compound, the same result might have been obtained by regular sweeping of the area. Against the latter explanation, however, must be set the absence of any trace of post-holes or a circular gully of the kind which has been found to mark the sites of domestic buildings on iron age sites in this region (eg Twywell, Jackson 1975; Blackthorn, Williams J, 1973).

The Pits

East of enclosure 131 and north of 109 were some twenty eight pits, hollows, and post-holes distributed over a total area of 3800m², although the majority were clustered in an irregular line between the west end of slot 49 and the east side of 109. Twenty one of these features contained pottery of iron age type; the rest are considered to have been of the same period because of specific points of resemblance to dated features.

The pits, which are of various types, may be summarised as follows:

(a) A large, cylindrical storage pit
107 (Fig 28). Dimensions 2·35m×1·75m, Depth 1·42m. This evidently had a clay lining which had fallen away from the sides before and during infilling.

(b) Smaller cylindrical pits, probably for storage.
88 (Fig 28), **90, ?330** Diameter 1·20m-1·55m, Depth 0·45m-0·95m.

(c) Shallow circular or oval pits, of similar type but with sloping (weathered?) sides.
5, 6, 100, 114 (Fig 28), **116, 118, 119, 120, 130, 142, 329, ?344,** Maximum dimensions 0·75m-1·80m, Depth 0·23m-0·40m. In the fill of 114 and 120 there were lumps or lenses of unfired, plastic clay. 114 also contained fragments of fired clay and fuel ash slag.

(d) Very shallow, saucer-like oval or circular pits
16, 101, 132, 362. Maximum dimension 0·62m-1·20m, Depth 0·07m-0·15m.

(e) Very shallow depressions lined or filled with unfired clay
102, 110, 112 (Fig 28), **375.** Maximum dimensions 0·60m-0·90m, Depth 0·06m-0·13m. 102 was a double pit, one part of which consisted of a pad of clay in a hollow, the other of a slightly deeper scoop filled with stones, including large sandstone pebbles. 110 also contained pebbles.

(f) Elongated shallow depression.
99 (Fig 28). Dimensions 3·00×1·55m. Depth 0·16m. This contained a semi-circular setting, 1·00m in diameter, of large sandstone pebbles and ironstone fragments.

(g) A post pit.
153. Diameter 0·38m, Depth 0·15m with limestone packing. Possibly an iron age feature.

The Western Group

The Rectilinear Enclosure

194 (Fig 27). All the iron age features on the west side of the site were grouped closely around a small rectilinear ditched enclosure measuring 11m×11m internally. The ditch of the enclosure was 1·20m-1·70m wide at the surface and 0·55m-0·70m deep and its profile varied from a shallow V to a weathered bowl-shape. It may have been recut, although the evidence for this was only extant at the south east corner (Fig 8:2 SC3/51).

On the east side of the enclosure this ditch was dug entirely into the fill of the neolithic inner ditch segments 192E and 251D and followed their line exactly (see Fig 8). There appeared to have been an entrance on this side, but the identification was not certain.

The Pits

No features of iron age date were recognized within the enclosure, but immediately around it, chiefly on the west and south sides, were at least sixteen pits, eleven of which contained pottery of iron age type.

(a) Cylindrical pits.
186, 187, 188 (Fig 29), **191.** Diameter 1·40m-1·75m. Depth 0·25m-0·60m. 191 contained lumps of fuel-ash slag.

(b) Circular or oval pits of similar type but with sloping (weathered ?) sides.
189, 193, 196/324/327 (Fig 7:2), **235, 253, 263** (Fig 29), **273.** Diameter 1·00m-1·90m. Depth 0·35m-0·55m. Six of these pits (189, 193, 196/327, 253, 263) contained lumps of fuel ash slag, sometimes with lumps of fired clay, and two (263, 273) contained a distinct layer of large sandstone pebbles.

(c) Elongated, narrow pit.
252 (Fig 29). Dimensions 2·40m×0·42m. Depth 0·35m. This pit contained a large quantity of fuel ash slag, some of it with scorched sand adhering, but there was no indication of burning or heat discolouration within the pit itself.

(d) Elongated, sub-rectangular pit, steep sided and flat-bottomed.
185. Dimensions 1·80m×0·82m. Depth 0·28m. This pit resembled a grave but contained no trace of a body. A test for the presence of phosphates yielded an insignificant reading.

The fuel ash slag present in many of these pits is not necessarily the product of metalworking, being the result simply of intense heating of iron-rich sand and clay in the presence of fuel ash, which has acted as a flux (Justine Bailey, pers comm). It might, nevertheless have been formed in metalworking hearths nearby.

Iron Age Ditches and Slots

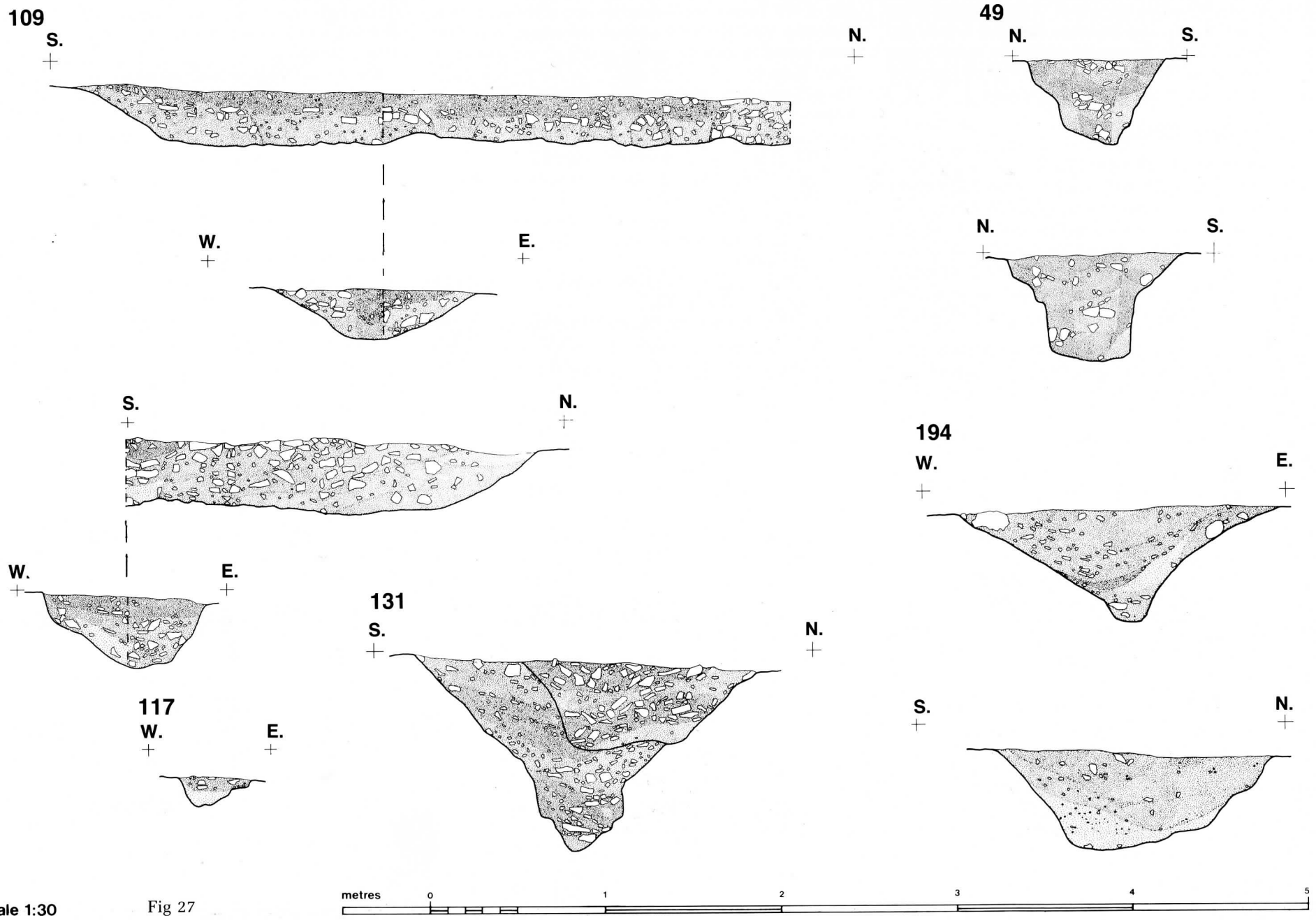


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Fig 27

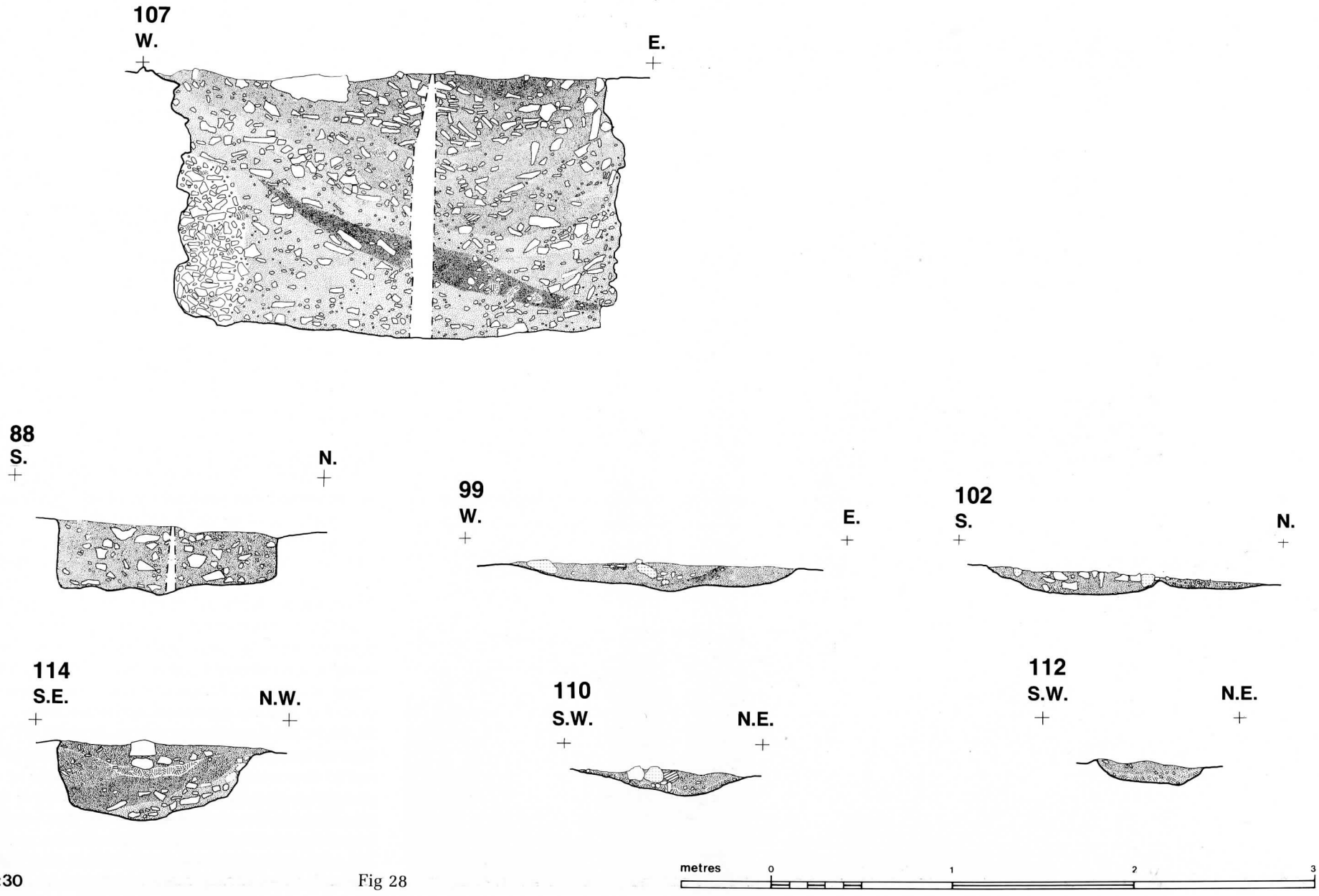

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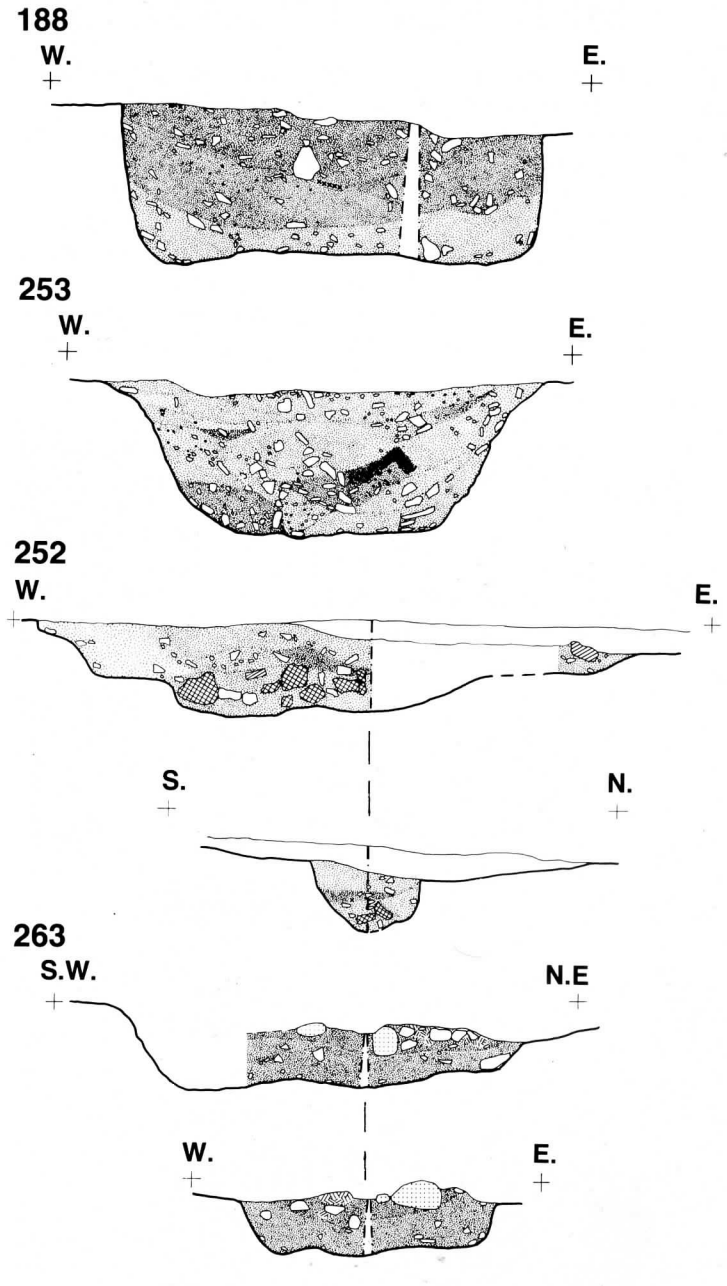
Fig 28

Iron Age Pits: The Western Group



Scale 1:30 Fig 29

metres 0 1 2 3

Post Setting

220-227, 229-234, 256, 259 (microfiche Appendix 2) Immediately east of enclosure 194, opposite and to the north of the entrance to it, was a rectilinear setting of sixteen post-pits between 0·20m and 0·45m deep. Three of them (221, 222 and 234) were double, and in nine more the post appeared to have been replaced. Post pipes between 0·15m and 0·20m in diameter were indicated in all but three of them. Pottery and other finds from several indicated that they were of iron age date.

At least nine posts, spaced at intervals of 0·80m to 1·00m defined the north, south and east sides of a rectangular enclosure or structure measuring 3·50m north-south and at least 4·00m east-west. The west end appeared to be open but further details had been obliterated by a furrow which cut across it. There was an internal post or posts (233/257) opposite the central post on the east side. The line of the east side or wall was continued 4·50m southward by two posts (229,230) spaced at wider intervals of approximately 1·80m, and three more (231, 232, 256) formed a converging line between 1·80m and 1·00m to the east of this.

The spatial arrangement of the pits and the ditched enclosure 194 suggests that they are broadly contemporary, and the position of the post-setting in relation to the latter also appears significant.

ROMAN FEATURES

To the north of the neolithic enclosure, cutting across the outer ditch and the pit alignment, were several pits of greatly varying size and mostly of irregular form. The pottery from their fill suggests that they were probably dug some time between the second and fourth centuries AD.

42, 43, 44, 46, 74, 81 and **76** were all fairly shallow features with sloping sides, ranging in size from 46, a saucer-like scoop 1·50m in diameter and 0·18m deep in the subsoil, to 44 which was 8·00m long, up to 3·30m wide and 0·60m deep. Some of these (eg 74 and 81) were intercut and demonstrated at least two separate stages of activity.

54, 65, 80, 64: Immediately north west of this first group of features was a complex of larger, interconnected pits. 54, 65 and 80 were relatively shallow and appeared to be contemporary, having apparently been backfilled all at the same time. They were irregular in profile and their depth ranged from 0·50m to 0·90m. The fill of 65 was cut by a much larger sub-rectangular pit 64 which was some 6·00m wide at the subsoil surface and up to 2·30m deep. It had evidently been

left open for some time and had flooded. Above the sandy clay and rubble of its primary fill it contained what looked like water-deposited layers of stone-free clay and clayey sand with lenses of soft, coarse sand to a depth of 1·20m. In the primary fill there were parts of the skeleton of a horse or horses.

The purpose of the smaller pits is probably impossible to determine. The complex of deeper features, including 64, had the appearance of quarry pits of some kind. The ironstone was no more than 0·40m below the surface in this part of the site but was very fissile and shaley. If the intention was to extract this, it is difficult to guess what use it could have served.

SAXON SUNKEN FEATURED BUILDINGS

Three, or possibly four sunken-featured buildings of early/middle Saxon date and a scatter of early/middle and later Saxon pottery on the subsoil surface around them were all the evidence for a Saxon settlement on Briar Hill. Post hole structures were sought but not found.

The four features were located within an area c 1000m^2 on the east side of the site.

29, the largest structure, was set slightly apart, some 34m east of the other three. It was aligned on an east-west axis and had a single post-hole placed centrally at either end. The main part of it was 0·25m deep in the subsoil, and measured 4·0m×3·10m, but there was a shallow ledge or shelf about 1·00m wide and 0·05m-0·10m deep on the south side. The whole was filled with a uniform dark brown loamy sand, flecked with charcoal and containing much animal bone as well as pottery and metalwork (Fig 61: 1-5) and a fragment of a puddingstone quern (Fig 50: S21). The metal included six nails five of which were distributed together with a rectangular-headed staple in a diagonal line across the length of the feature as if they had been in a wooden structure or beam. There was no sign of a trampled layer or otherwise distinct deposit in the bottom.

10, 20, 30 The other three features were clustered together in an area approximately 290m^2 and were aligned between north-south and north east-south west.

Though deeper than 29, they were slightly smaller in area. 10 and 12 each had a single post-hole at either end and were 0·40m and 0·35m deep respectively. The supposition that 30 may also have been a sunken-featured building is based chiefly on superficial similarity and proximity to the other two. It appeared to consist of two shallow, rectangular pits, one of which cut the fill of the other, and no post holes were identified in it for certain.

In contrast to 29, the fill of these features contained very few finds of any significance. Some pieces of pottery of the first to fourth century AD (Fig 59: RP1), presumably derived from earlier deposits, occurred in all three as in 29, but only 12 contained a significant quantity of early/middle Saxon sherds. Part of a dark blue glass bead was found in 30 (Fig 61: 6).

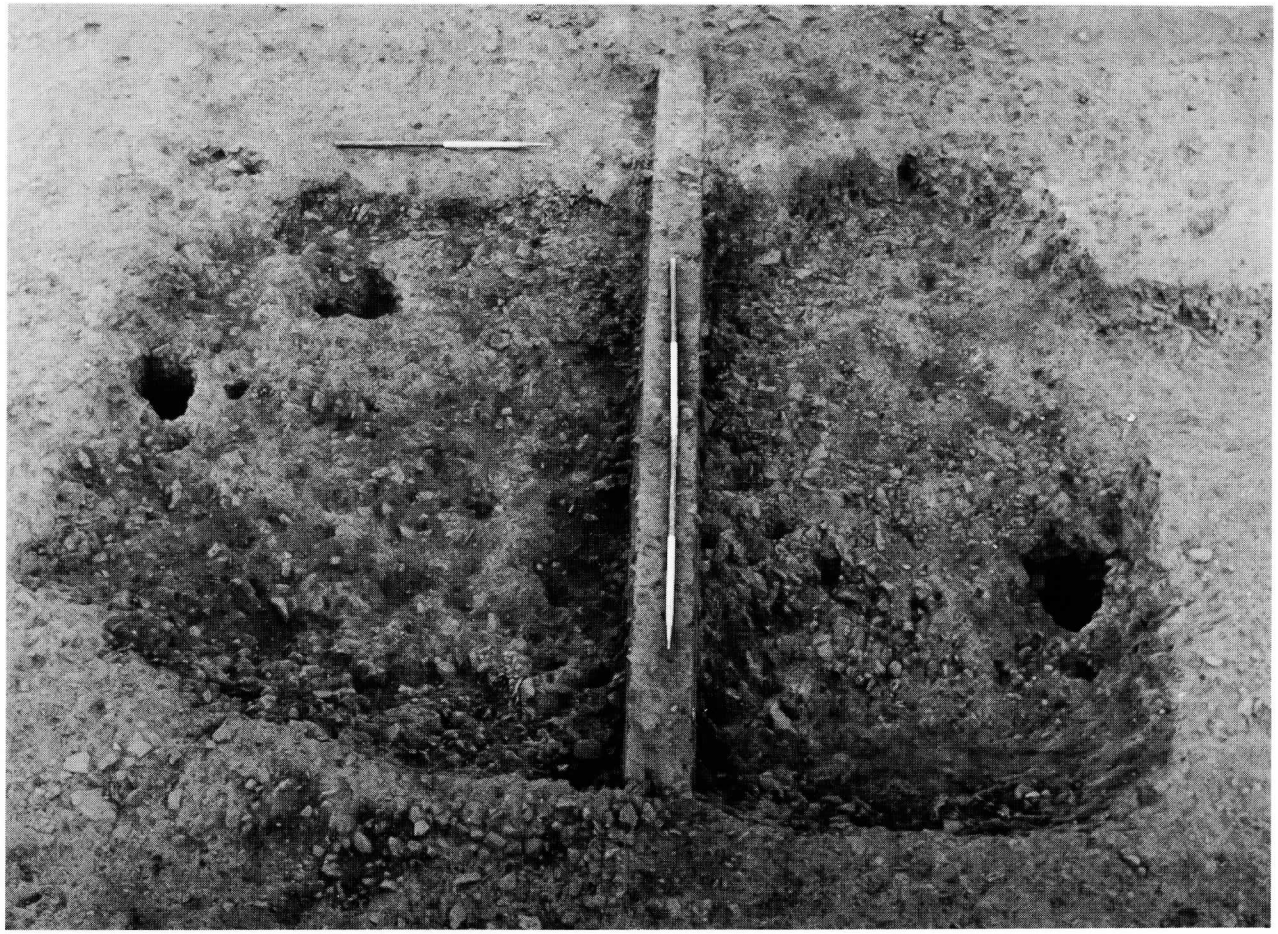
10, 12 and 29 are similar in size and type to sunken-featured buildings of early/middle Saxon and later date found in Northampton (Williams 1979; Williams and Shaw 1981).

MEDIAEVAL AND POST-MEDIAEVAL FEATURES

Two north-south parallel linear features appeared to have been associated with a pre-enclosure field boundary.

95 and **96** were broad, ditch-like features 3·20m apart. At the point where they were sectioned each was 2·10m wide at the top and up to 0·45m deep with a shallow, slightly irregular V profile. At the north end of the site they merged into a much broader feature **93,** 0·95m deep and 14·40m wide at the subsoil surface, shelving to a basal width of 5·50m. The bottom of this was flat with several parallel longitudinal ruts 0·10m-0·20m wide and up to 0·10m deep. The fill contained

Pl15 *Saxon sunken-featured building 29, view south*



Saxon Sunken-Featured Buildings

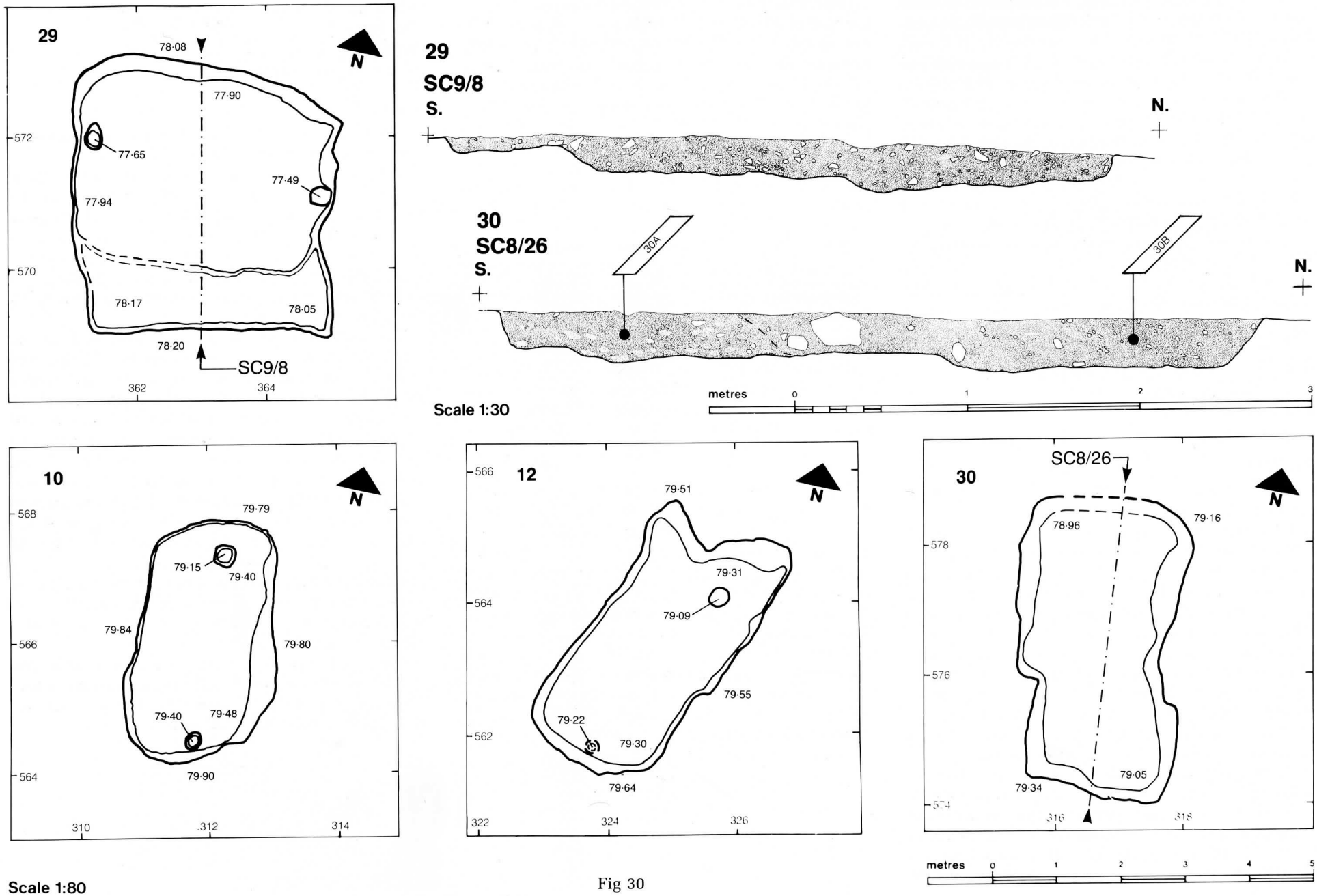


Fig 30

abraded sherds of prehistoric, Roman, 'Saxo-Norman' (Stamford ware) and mediaeval pottery, including Potterspury type (date *c*AD1250-1600). The fill was cut by north-south furrows which continued over the eastern edge of it and were more closely spaced as they approached it.

323 ran parallel to these features, between 1·00m and 7·50m to the west of them. It was a shallow, roughly flat-bottomed ditch 3·70m wide at the subsoil surface and 0·30m deep.

Both features followed the line of a field boundary shown on a parish map of 1767 (NRO Map 2665). The boundary ran from Hunsbury Camp down to the river and appears to have predated the enclosure field pattern. 93/95/96 might best be explained as a hollow way following this.

121, 164. Two large, sub-rectangular pits in the south eastern part of the site were of nineteenth century or more recent date. Both were presumed to be cattle burial pits and neither was fully excavated.

366. A smaller pit on the south west side also contained sherds of nineteenth century pottery.

THE GEOMETRY OF THE BRIAR HILL ENCLOSURE

By Andrew Chapman

Summary

(A fuller analysis and discussion is provided in microfiche Appendix 3)

The plan of the inner enclosure of the Briar Hill earthwork is elliptical in shape and symmetrical about a pair of mutually perpendicular axes aligned north-south and east-west. The enclosure as a whole, defined by the two main concentric ditch circuits, is bilaterally symmetrical about a north west-south east axis. This symmetry can be established by the simple procedure of overlaying the site plan with a second, inverted copy on transparent film and rotating until a position of close coincidence between the two is obtained. The alignments of the axes of symmetry can thus be determined within an angle range of 30°, and more exactly by reference to specific structural details.

A close approximation to the elliptical figure of the inner enclosure is provided by a pair of circular arcs of equal radii centred on the major axis at points to either side of the axis intersection. The outer ditch circuit can be encompassed by a circle although, if a perpendicular to the axis of symmetry is drawn through the centre point, it may be seen that the northern and western arcs are in fact flattened between the axial circumference points. The south eastern arc is similarly flattened, and also offset in a manner which may relate to the offset position of the inner enclosure.

The two figures can be shown to have a geometric relationship. If the north-south axis of the inner enclosure is extended southwards to meet the axis of symmetry of the enclosure as a whole, it may be seen that the three axes of symmetry intersect to form a right-angled triangle possessing sides with a length ratio of 3:4:5. The perpendicular to the north west – south east axis forms a second inverted triangle of identical proportions sharing a common vertex with the first. The proportions of these triangles can be used to define a unit length measurement which fits other dimensions of the basic figures. The radius of the circle encompassing the outer ditch circuit measures seven of these units, for example, and the radii of the two smaller circles which can be used to construct the inner enclosure ellipse, three units.

Various structural features around the enclosures can be brought into relationship with this construction, including the probable entrance on the west side, and in particular the post pit 219, the probable entrance on the north west side of the inner enclosure, marked by pits 160 and 161, and the possible entrance on the south west side. The postulated entrance on the unexcavated north west side is on the main axis of symmetry.

Analysis of other causewayed enclosures whose full plan is known demonstrates that at least ten others of varying shape can be seen as incorporating the same basic geometric techniques. They are, in general, multi-ditched enclosures on gently sloping or nearly level ground where there are no major topographical constraints on the plan.

It may be added in conclusion that, in the construction of such large earthworks, regularity of plan would have been almost impossible to achieve unless a design was formulated beforehand and executed by means of simple surveying techniques. The geometric concepts postulated are complex to describe but in fact very simple, and it is not straining credulity very far to suggest that neolithic engineers might have had some empirical knowledge of them.

THE CONSTRUCTION OF THE BRIAR HILL EARTHWORKS: A WORK STUDY

By Andrew Chapman

Summary

(A full account and discussion of this work study analysis is given in microfiche Appendix 4)

The formula used in calculating the labour requirement for the construction of the Briar Hill enclosure was that employed in the work study of the Rams Hill enclosure earthwork. (Griffiths 1975). In this, man hours = $^{1}/_{0.764} \times 4 \times \frac{1}{2} \times$ volume excavated (m^3). It was assumed for the purposes of the study that the work rate on the Briar Hill subsoil and bedrock would not have been significantly different from that on chalk.

The approximate volume of the pits which made up the original ditch system were calculated by first obtaining crude averages of the estimated original sizes of excavated pits of Phases II-V in the various different parts of the ditch system. The size estimates were derived from the basal areas and depth from the subsoil surface, suitably adjusted to allow for some outward slope of the original, unweathered sides of the pits, and for the loss of 0·30m depth as a result of truncation by the plough. The numbers of pits in each circuit were estimated by taking the phased plans and extrapolating from the pattern and spacing of Phase V pits in the excavated area, on the assumption that few if any of them would have been obliterated completely by later recutting. The volumes as calculated on this basis were inserted into the equation, and the results are summarised in Table 2.

The total labour requirement for the construction and subsequent maintenance of the enclosure, allowing for four major renovations with recutting of the ditch-pits, was estimated to be 29 000±2000 man hours.

TABLE 2: Work Study Calculation of Labour Requirement for construction of Briar Hill Enclosure.

	No. of Pits	Man Hours/Pit	Total Man Hours
Outer circuit	55-60	69	3795-4140
Inner circuit	45-50	69	3105-3450
Inner ditch 'spiral arm' (S)	10-15	35	350-525
Inner ditch 'spiral arm' (N)	10-15	13	130-195
Total	120-140		7380-8310