RPS Planning, Transport and Environment

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A19 THORMANBY BYPASS

REPORT OF STAGE 2
ARCHAEOLOGICAL INVESTIGATIONS

REVISION	ORIGINATOR	CHECKED	APPROVED

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A19 THORMANBY BYPASS

REPORT OF STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS

CONTENTS

1 EXECUTIVE SUMMARY

1.1 An archaeological desk-top survey carried out along the route of the proposed A19 Thormanby bypass identified two areas of possible archaeological interest.

1.2 Between April and May 1993, a programme of non-destructive archaeological investigation was carried out in these two areas with the aim of assessing the importance of recorded archaeological features and determining the presence or absence of unrecorded archaeological deposits. The investigation works comprised a combination of archaeological fieldwalking, geophysical survey and earthwork survey.

1.3 For those sites of recorded archaeological interest, appropriate mitigation measures were adopted, namely the re-alignment of the road corridor away from one site (physical preservation) and the recording of a set of ridge and furrow earthworks (preservation by record).

1.4 The other elements of the archaeological investigations were able to show that, although some features were identified, no significant archaeological deposits lay within the proposed road corridor.

1.5 It is therefore recommended that no further archaeological work is required in advance of the construction of the A19 Thormanby bypass. However, an archaeological watching brief should be carried out during the initial period of development so that any additional items of archaeological interest that might be uncovered can be recorded. This work can be undertaken as part of a standard watching brief programme which should apply to the whole of the proposed road corridor.

2 INTRODUCTION

2.1 In February 1993, an archaeological desk-top survey was carried out by Anthony Walker and Partners on behalf of Kirkpatrick Engineers and the Department of Transport to assess the possible archaeological implications of the proposed A19 Thormanby bypass in North Yorkshire (see figure 1).

2.2 Following the recommendations contained in that report, a programme of non-destructive archaeological investigation (stage 2 works) was carried out in two areas along the route of the proposed bypass between April and May 1993.

2.3 These two areas comprised a large field to the south-west of Thormanby village and a smaller field between the present A19 and Highfield House. For the purposes of this report, these two areas are identified as Area A and Area B (see figure 2).

3 AREA A

3.1 Physical characteristics

3.1.1 Area A lies to the south-west of Thormanby village centred on NGR SE49407440 (see figure 2). The British Geological Survey record the area as being Lower and Middle Jurassic shales and sandstones overlain by Lacustrine clay while the soils are classified by the Soil Survey of England and Wales as a typical stagnogley soil (Dunkeswick Association). The landscape rises in height from approximately 35m AOD in the south to approximately 50m AOD in the north. At the time of the survey, the area was covered in recently planted winter wheat.

3.2 Results of the desk-top survey

3.2.1 The archaeological desk-top survey had revealed that this area originally comprised a number of smaller fields whose boundaries have since been removed. Those fields in the southern part of the survey area formerly contained the earthworks of ridge and furrow, which is indicative of medieval open field agriculture, while those on the western boundary were named "Brick Kiln Close" on a late 17th century map (see figure 3). No earthworks or other features of archaeological interest associated with these sites were identified during an initial walkover survey which was included within the desk-top survey.

3.2.2 The desk-top survey also identified a known archaeological site in the north-west corner of a field called "Dodsworth Garth" in the late 17th century and in 1843; this location now corresponds to the north-east section of the present large field (see figure 3). Significantly, the field in which the site was located was devoid of ridge and furrow.

3.2.3 The archaeological site was a circular stone foundation which was discovered in 1960 approximately 0.3m below the surface of the field. Subsequent excavation showed it to have an external diameter of 6.5m and an internal diameter of 4.2m, and that it consisted of facing stones and a rubble core; part of the circle had been destroyed by ploughing. Four sherds of pottery were also found, one fragment in the wall pitching being "not unlike Roman pottery". The landowner had reputedly dug out the centre of the foundation, finding only bones which were thought to be human. Medieval potsherds and a portion of Roman tegula were found elsewhere in the field. Despite these isolated finds, however, the excavations did not provide any positive evidence for a date and/or function of the structure (Hayes, R H 1965 "A Circular Foundation at Thormanby, N. R. Yorks" Ryedale Historian, vol 1, 40-42). At the time of the walkover survey, the site was marked by a scatter of stone, some of which appeared to be burnt. The scatter appeared to be located on a slight terrace above an apparently

natural depression. Most pieces were small with no apparent shape or tooling but one stone was almost 0.3m square and 0.2m thick. Given the "Brick Kiln" field names to the south, this feature might have been part of a brick or corn drying kiln, although the base for a windmill cannot be ruled out.

3.2.4 On the lower ground to the south, corresponding to the approximate centre of the present large field, a feature exposed by drainage operations was described at the time of the excavations as being a "moat" at least 5ft deep. It had a dark peaty filling in which two or three oak posts were set upright. No obvious man-made features were visible in this area during the walkover survey and it is possible that this "moat" represented a ditch associated with a former field boundary which is shown in this position on early maps.

3.2.5 A small 1.5m diameter brick-lined circular well was also identified in the large field during the walkover survey; its position is indicated on figure 3. It was felt that this was not a significant archaeological feature and so it was not included within the desk-top survey report.

3.2.6 Using the results from the desk-top survey, the proposed road corridor was deliberately diverted away from the site of known archaeological interest. However, its presence, together with the suggestive field names to the south, led to a programme of non-destructive archaeological survey work being carried out. The aim of the survey was to determine whether any features of archaeological interest extended into the proposed road corridor.

3.2.7 After consultation with North Yorkshire County Council's Archaeology Department, it was decided that this survey work should comprise a co-ordinated programme of archaeological fieldwalking, earthwork survey and geophysical survey, the results of which would be combined to form a stage 2 archaeological assessment report.

3.3 Archaeological fieldwalking

Introduction

3.3.1 The archaeological fieldwalking was sub-contracted to MAP Archaeological Consultancy Limited who have some expertise in the archaeology of North Yorkshire. The work was carried out under the supervision of, and to a specification prepared by, the Director of Archaeology at Anthony Walker and Partners. This specification forms Appendix 1.

Methodology and techniques

3.3.2 The fieldwalking was undertaken using a standard Line Walking Method, utilising a 40m grid which was accurately laid out by Anthony Walker Land Surveys using EDM total station optical equipment. This grid was tied into local features, existing survey stations and the Ordnance Survey National Grid.

3.3.3 The field was walked and material collected along lines positioned at 10m intervals within the 40m base grid. To improve spatial control, the lines were walked in an east-west direction, along the shortest axis. North-south lines were lettered from A to X and east-west lines were numbered from 1 to 47 (see figure 4).

3.3.4 All ceramic, lithic and metal artefacts were collected and logged. Artefacts which were considered to be of more than general importance were individually bagged and their positions accurately surveyed using EDM total station optical equipment by Anthony Walker Land Surveys.

Fieldwalking results

3.3.5 The fieldwalking exercise produced only a small assemblage of finds.

3.3.6 The pottery assemblage consisted of 90 sherds of which 4 were of possible Roman date, 50 were medieval, 11 were post-medieval and 24 were modern. The range of medieval fabrics ran from the 11th century through to the end of the medieval period and encompassed Northern gritty ware, Brandsby type ware, York glazed ware, Humber ware and Hambleton ware; this assemblage reflects access to the major local kilns of the period. No sherds from outside the county and no imported material were identified. The catalogue of recorded finds appears as Appendix 2.

3.3.7 The distribution of pottery sherds would appear to be fairly random (see figure 5). An increased number occur towards the north-east part of the survey area but there are no noticeable concentrations, although there is a slightly increased frequency of medieval potsherds in the north-east part of the field, particularly around squares 30A to 33A. Many of the sherds are abraded, suggesting deposition through manuring and subsequent damage from agricultural activity.

3.3.8 Stone finds are represented by sandstone slabs and cobbles, a high proportion of which were shattered (see figure 6). Two concentrations were noted: one appears as a sub-rectangular concentration in the centre of the field (squares 36K & 36L and 37J & 37K); a second appears in squares 37C and 37D. The size of some of the stones prevented them being weighed on site.

3.3.9 The distribution of brick and tile is also largely random, although there is generally less in the northern part of the field (see figure 7). Most of the assemblage consists of small fragments of abraded and shattered material although some half or whole modern bricks were found.

3.3.10 There is one area near the south end of the field (squares 7E to 9H) where there is an increased frequency of both stone and brick/tile. The overall quantities, however, are so small that it is unlikely to be of any significance.

3.3.11 No particular concentrations of other material (bone, glass, flint, clay pipe, iron work or slag) were recorded.

3.3.12 The nature of the finds assemblage and their random distribution means that fieldwalking results are best classified as a background scatter of material without archaeological significance.

Statistical analysis

3.3.13 Although it is often useful to undertake a statistical analysis of any fieldwalking finds, the results from this particular exercise are too poor to provide any meaningful results.

3.3.14 However, a brief comparison of other similar background scatters might be of use for future reference. At Thormanby, 90 sherds of pottery were located over an area approximately 8 hectares, giving an average of 11.25 sherds per hectare. This compares with other scatters recovered in North Yorkshire, for example the work associated with the proposed A1 improvements revealed ratios of 12.95 and 11 sherds per hectare.

3.4 Earthwork survey

Introduction

3.4.1 The earthwork survey work was carried out by Anthony Walkers Land Surveys under the supervision of the Director of Archaeology at Anthony Walker and Partners. As this work was done in house, no specification was written.

Methodology and techniques

3.4.2 The vague earthworks that were visible were surveyed as accurately as possible using EDM total station optical equipment. The results were tied into local features, existing survey stations and the Ordnance Survey National Grid.

Earthwork survey results

3.4.3 As mentioned above, the landscape of Area A rises in height from 35m AOD in the south to approximately 50m AOD in the north. The field has been subjected to continued agricultural activity for many years and so most of the earthworks appeared as breaks of slope rather than specific features (see figure 8).

3.4.4 However, a definite earthwork platform (a) was visible on the east side of the field, abutting the A19. This measured approximately 40m north-south and 30m east-west and was approximately 1m high above the general ground level. This feature did not correspond to any known archaeological site although there was a slight increase in the density of medieval pottery at this location.

3.4.5 Within the field were several rounded features. One, running approximately east-west, corresponded to an earlier field boundary (b) while the stone scatter representing the site of the excavated circular foundation, rested on the top of a slight terrace (c), below which was an approximately circular depression (d). No other earthworks could be easily identified.

3.5 Geophysical survey

Introduction

3.5.1 The geophysical survey work was sub-contracted to Geophysical Surveys of Bradford who have considerable expertise in archaeological geophysical prospecting and who have worked on the Easingwold bypass scheme to the south of Thormanby. The work was carried out under the supervision of, and to a specification prepared by, the Director of Archaeology at Anthony Walker and Partners. This specification forms Appendix 3.

Methodology and techniques

3.5.2 Given the likely nature of any underlying archaeological features, a magnetometer survey was carried out, using a fluxgate gradiometer. The area allocated for the survey measured 300m x 40m and was directly linked to the area of the proposed road corridor using survey information provided by the clients.

3.5.3 The area was surveyed using a 20m x 20m grid which was accurately laid out by Anthony Walker Land Surveys using EDM total station optical equipment (see figure 9). This grid was accurately tied into local features, existing survey stations and the Ordnance Survey National Grid. Magnetic readings were taken at 0.5m intervals along one axis in 1m traverses, giving 800 readings per 20m x 20m grid.

3.5.4 A survey strip measuring 300m by 20m was initially surveyed. This area was then widened to 40m in some areas to further investigate anomalies identified in the primary survey (see figure 9). In total an area of 0.9 hectares was examined.

Complicating factors

3.5.5 At the time of the survey, the field contained a cereal crop that was waist high. As a consequence, data gathering was difficult and in places this may have increased the levels of magnetic noise.

Geophysical survey results

3.5.6 For the purposes of this report, the survey area has been divided into two parts, Area 1 to the north and Area 2 to the south (see figure 9). The results are displayed in three formats:

i) X-Y trace;

ii) dot density plot;

iii) grey scale image.

These display formats are discussed in Appendix 4.

3.5.7 In Area 1 (north), a series of linear anomalies are visible, orientated approximately north-south (see figure 10). These may be evidence for earlier ridge and furrow cultivation and it is possible that the strongest of these anomalies, labelled X on the interpretation diagram, represents a former field boundary of similar alignment to those still surviving to the west of the survey area.

3.5.8 An L-shaped ditch type anomaly was recorded in the centre of Area 1 (north). The north-south part of the anomaly has a slightly different alignment to the adjacent ridge and furrow. This anomaly may be part of an enclosure, the remainder not being detected because of the high background noise levels. However, there are no pit-like signals usually associated with this type of anomaly which might suggest settlement activity.

3.5.9 In Area 2 (south), two linear responses were identified at the northern end (see figure 11). These appear to be converging toward the west of the survey area and it is possible that one or other of these ditch type anomalies reflects a former field boundary. The narrow area of survey meant that it was not possible to determine whether there is a relationship between these responses and the L-shaped anomaly seen in Area 1 (north). Towards the centre of Area 2 (south), there is a linear anomaly that is likely to have been produced by a modern drain.

3.5.10 Compared to Area 1 (north), the number of responses from ferrous debris have increased in Area 2 (south). However, it is most likely that these responses were generated by ferrous objects of modern origin rather than being of archaeological significance.

3.5.11 A summary interpretation of the results of the geophysical survey is shown as figure 12.

3.6 Conclusions

3.6.1 The fieldwalking survey produced no real evidence for any unrecorded archaeological features. The pottery assemblage that was recovered was of local production and spanned the medieval period, with only a few sherds of possible Roman and post-medieval material. Brick and tile were of largely random distribution and stone concentrations reflected the presence of the known site to the north-east while a further concentration to the north appeared to be without form or significance. The nature of the finds assemblage and their random distribution means that the fieldwalking results are best classified as a background scatter of material without archaeological significance.

3.6.2 The rounded nature of the earthworks meant that little of significance could be identified by this survey However, a possible building platform was located to the east of the survey area while a slight terrace and an approximately circular depression were seen towards the centre of the field, below the site of the excavated circular foundation.

3.6.3 The geophysical survey located several ditch type anomalies and part of a possible enclosure. However, as the survey was carried out in a field that had once been divided into several smaller enclosures containing ridge and furrow cultivation, it is likely that some of the anomalies reflect this former activity.

4 AREA B

4.1 Physical characteristics

4.1.1 Area B lies to the south of Thormanby village on the east side of the present A19 near Highfield House and is centred on NGR SE49957320 (see figure 2). The British Geological Survey record the area as being Upper Jurassic shales and sandstones overlain by Lacustrine clay while the soils are classified by the Soil Survey of England and Wales as a typical sandy gley soil (Blackwood Association). The field has an average height of 39m AOD and was pasture at the time of the survey.

4.2 Results of the desk-top survey

4.2.1 The archaeological desk-top survey had revealed that this field, as well as those surrounding it, contained ridge and furrow which is characteristic of medieval agriculture. The fields were all named as "Higher Field" on an 1843 tithe map, indicating that this area was formerly one of the open fields associated with Raskelf village which lies to the south. The walkover survey had shown that, while the other areas of ridge and furrow in the vicinity had been largely ploughed out, the field to the west of Highfield House contained well preserved earthworks.

4.2.2 The proposed road corridor was due to clip the western 20m of the site and, although the earthworks were of archaeological interest, it was felt that the physical or in situ preservation of such a small area of ridge and furrow could not be justified. Accordingly, a programme of non-destructive archaeological survey work was recommended to record the earthworks in the whole of the field in advance of their partial destruction. This approach was agreed with North Yorkshire County Council's Archaeology Department.

4.3 Earthwork survey

Introduction

4.3.1 The earthwork survey work was carried out by Anthony Walkers Land Surveys under the supervision of the Director of Archaeology at Anthony Walker and Partners. As this work was done in house, no specification was written.

Methodology and techniques

4.3.2 The earthworks were accurately surveyed using EDM total station optical equipment. The results were tied into local features, existing survey stations and the Ordnance Survey National Grid.

Earthwork survey results

4.3.3 Within the field, two sets of ridge and furrow earthworks were identified (see figure 13). The most prominent of these lay to the north of the survey area forming a series of parallel and approximately equally spaced ridges aligned in an approximate east-north-east/west-south-west direction, parallel to the northern field boundary. To the south was another set of ridges which lay parallel to the southern field boundaries.

4.3.4 The ridge and furrow in the northern section was well preserved, the ridges being approximately 8m wide and 0.5m high. The northern three ridges were divided by a low headland (a) with the ridges to the east being only approximately 0.2m high. The headland did not appear to extend southwards and the line of a drain apparently marked the western edge of the ridge and furrow.

4.3.5 To the south, the ridge and furrow was on a different alignment and was approximately 5m wide and 0.3m high. These earthworks respected, or were respected by, the adjacent field boundaries and the line of a now disused track. It is possible that the ridges extended into the apparently blank triangle to the north but no obvious features could be seen.

4.3.6 The course of a former access track leading from the A19 to Highfield House was abandoned at the time of the survey and was marked by an earthwork causeway some 10m wide and 0.2m high. A new post and rail fence had been constructed along its southern edge and a small area was marked by modern disturbance (b).

4.4 Conclusions

4.4.1 Without further archaeological investigation, it is difficult to provide a precise date for the earthworks in Area B, apart from saying that they could be medieval or post-medieval in origin. However, it is possible that those wider ridges in the north are earlier in date than those narrower and less prominent ridges to the south.

5 RECOMMENDATIONS

5.1 Area A

5.1.1 The various forms of non-destructive archaeological survey that were carried out in Area A were able to show that, although some features of interest were identified, no significant archaeological deposits lay within the proposed road corridor.

5.1.2 It is recommended that no further archaeological work is required in this area in advance of the construction of the proposed bypass.

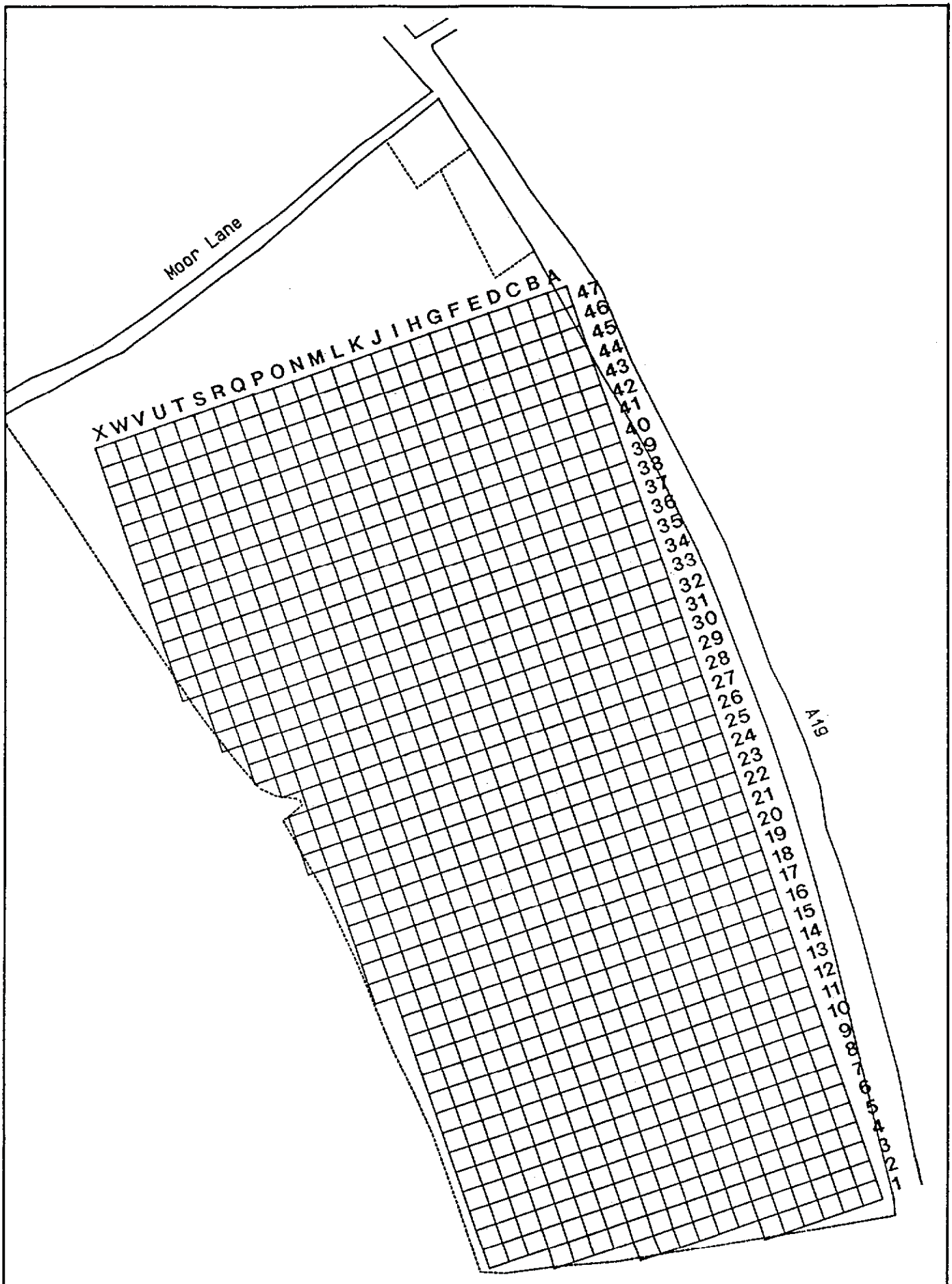
5.1.3 Those features that were identified should be observed by archaeologists during the initial period of construction work so that any additional items of archaeological interest that might be uncovered can be recorded. This work can be undertaken as part of a standard watching brief programme which should apply to the whole of the proposed road corridor.

5.2 Area B

5.2.1 The non-destructive archaeological earthwork survey that was carried out in Area B is sufficient to record the ridge and furrow in advance of its destruction.

5.2.2 It is recommended that no further archaeological work is required in this area in advance of the construction of the proposed bypass.

5.2.3 The destruction of the ridge and furrow earthworks should be observed by archaeologists during the initial period of construction work so that any additional items of archaeological interest that might be uncovered can be recorded. This work can be undertaken as part of a standard watching brief programme which should apply to the whole of the proposed road corridor.



ANTHONY WALKER AND PARTNERS

PROJECT: A19 THORMANBY BYPASS STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS		SCALE: 1:2500
TITLE: AREA A : FIELDWALKING GRID		DRAWING: FIGURE 4

ANTHONY WALKER AND PARTNERS

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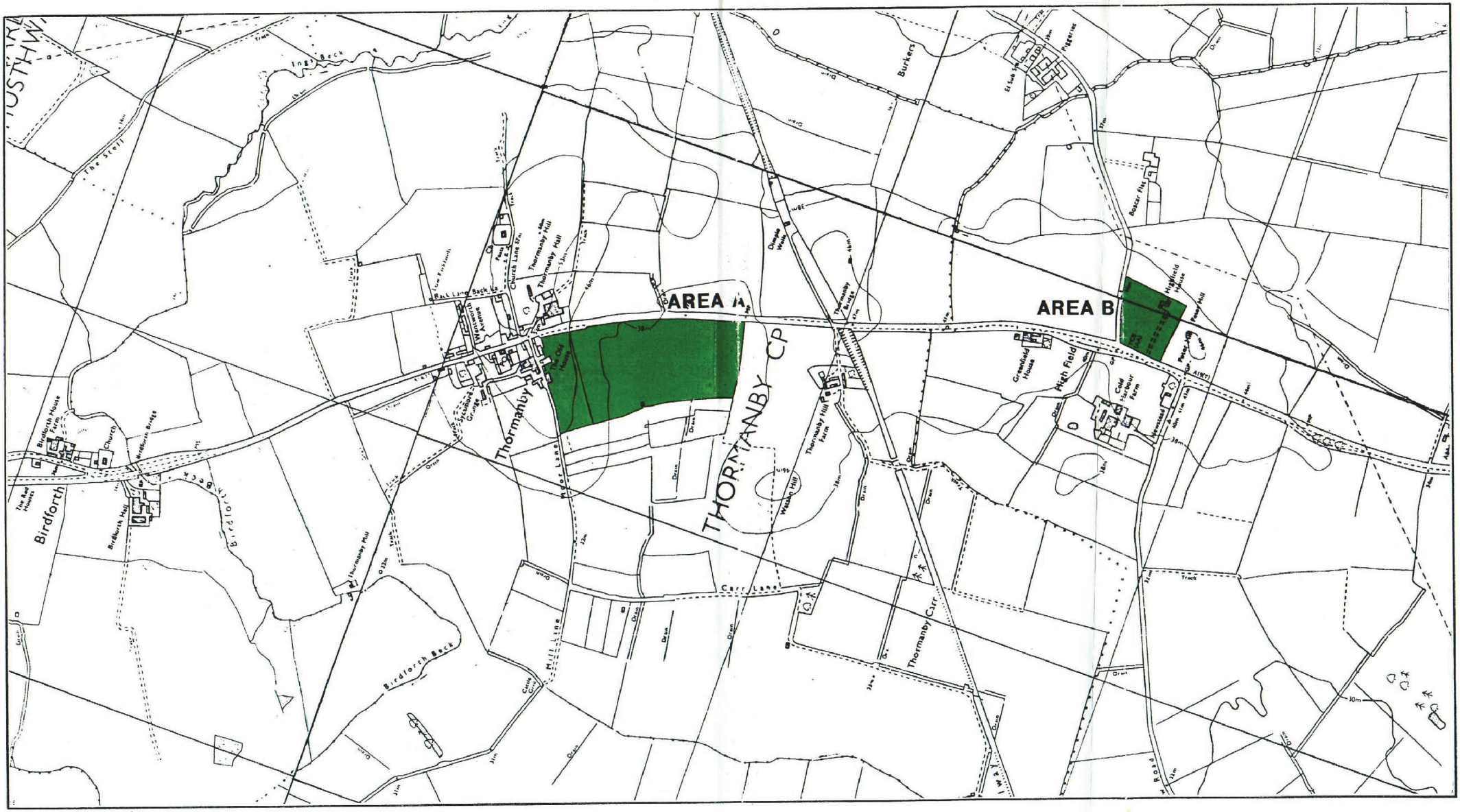
DRAWING	FIGURE 1



ANTHONY WALKER AND PARTNERS

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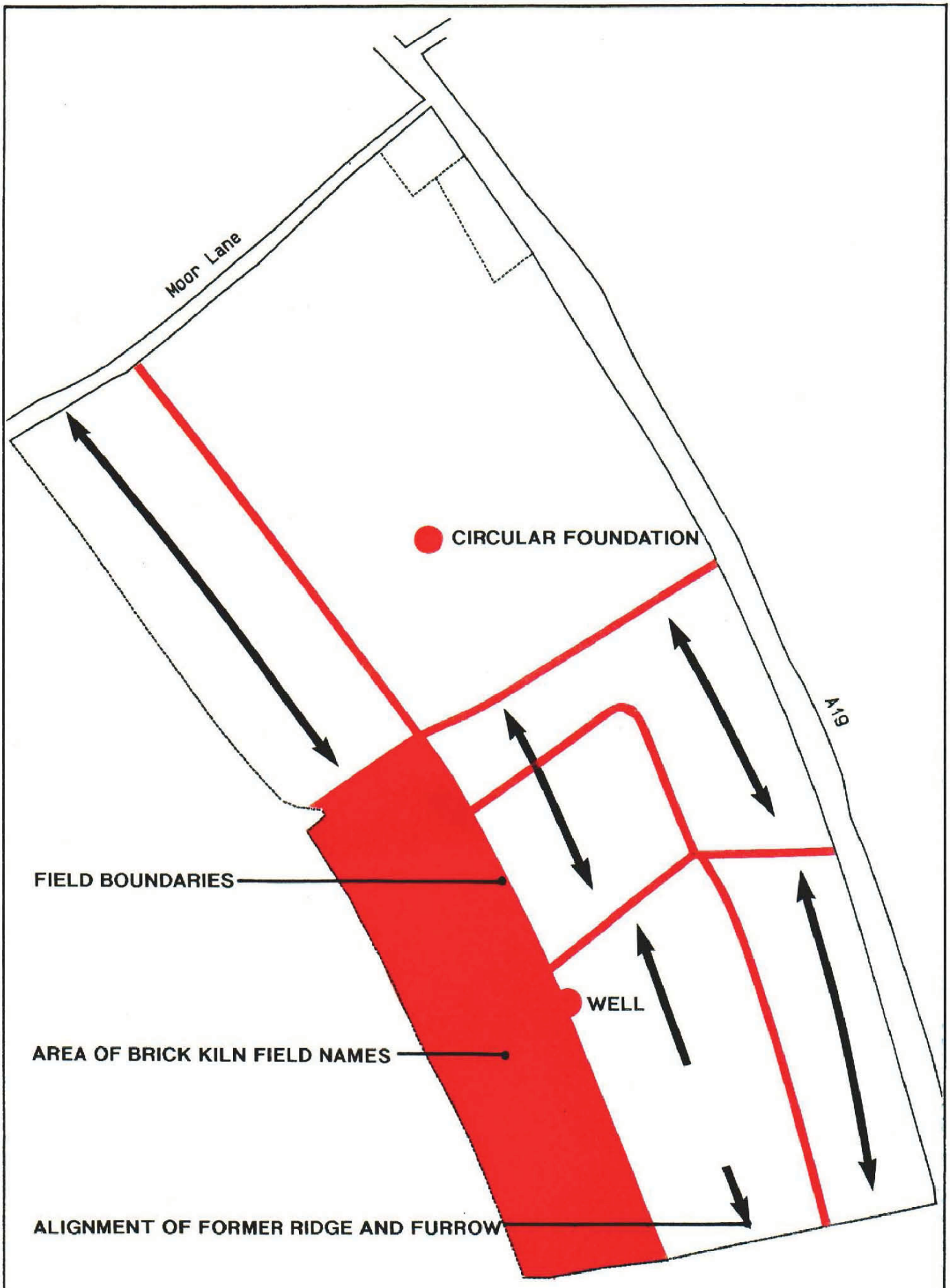
SCALE	1:10 000
DRAWING	FIGURE 2



ANTHONY WALKER AND PARTNERS

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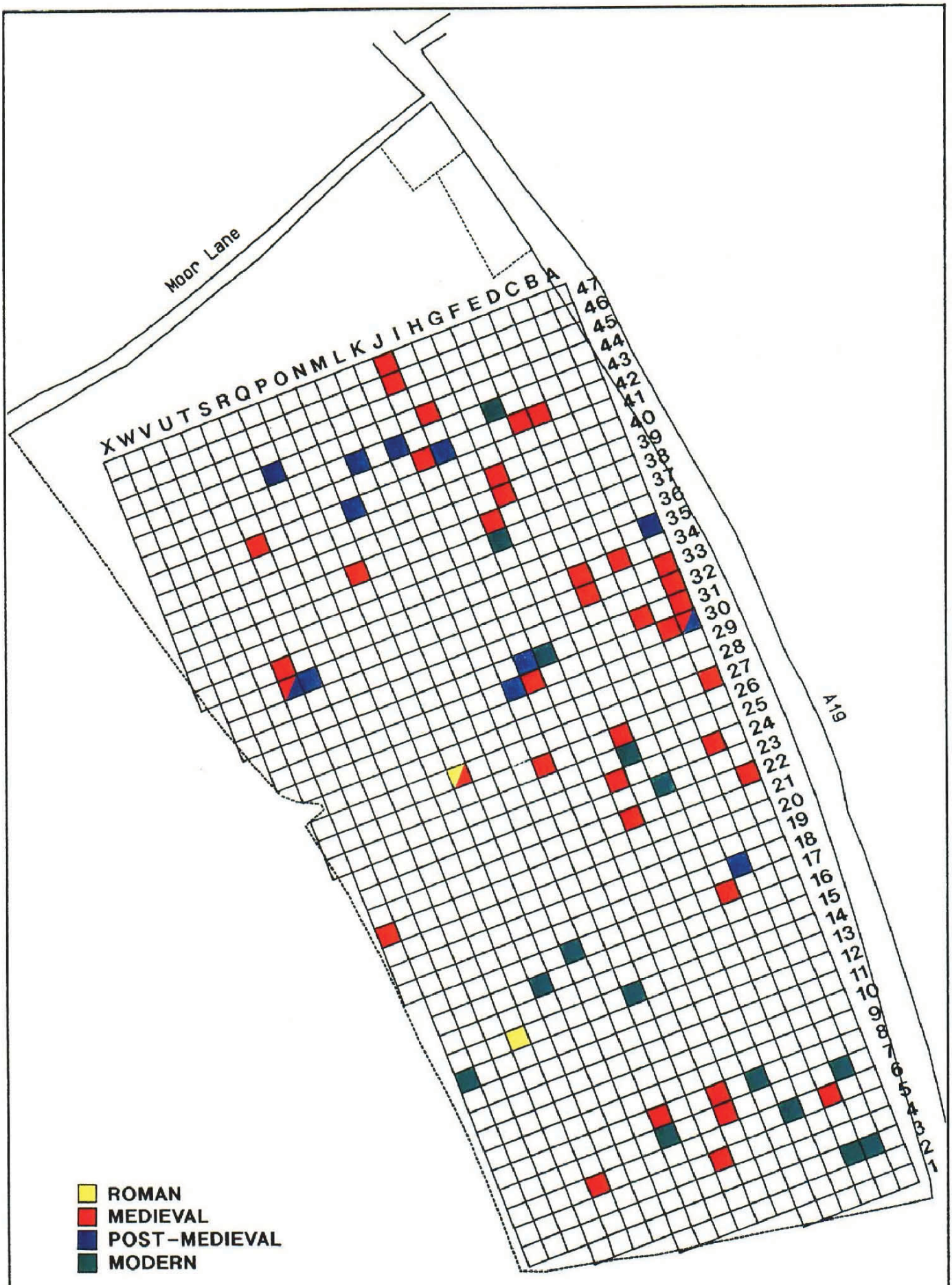

ANTHONY WALKER AND PARTNERS

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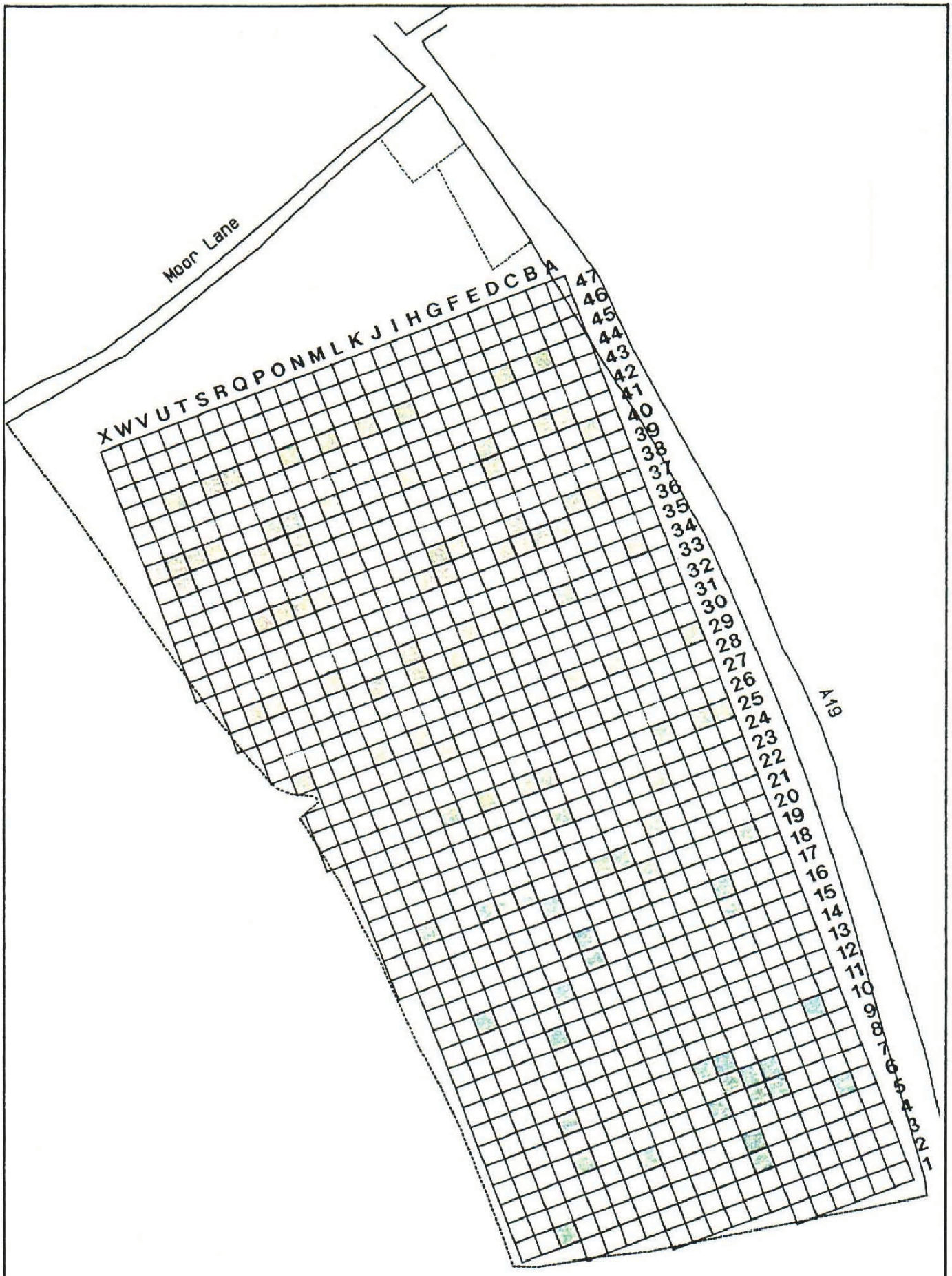

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TITLE: AREA A : FINDS DISTRIBUTIONS : STONE	DRAWING: FIGURE 6

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PROJECT: A19 THORMANBY BYPASS STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS	SCALE: 1:2500
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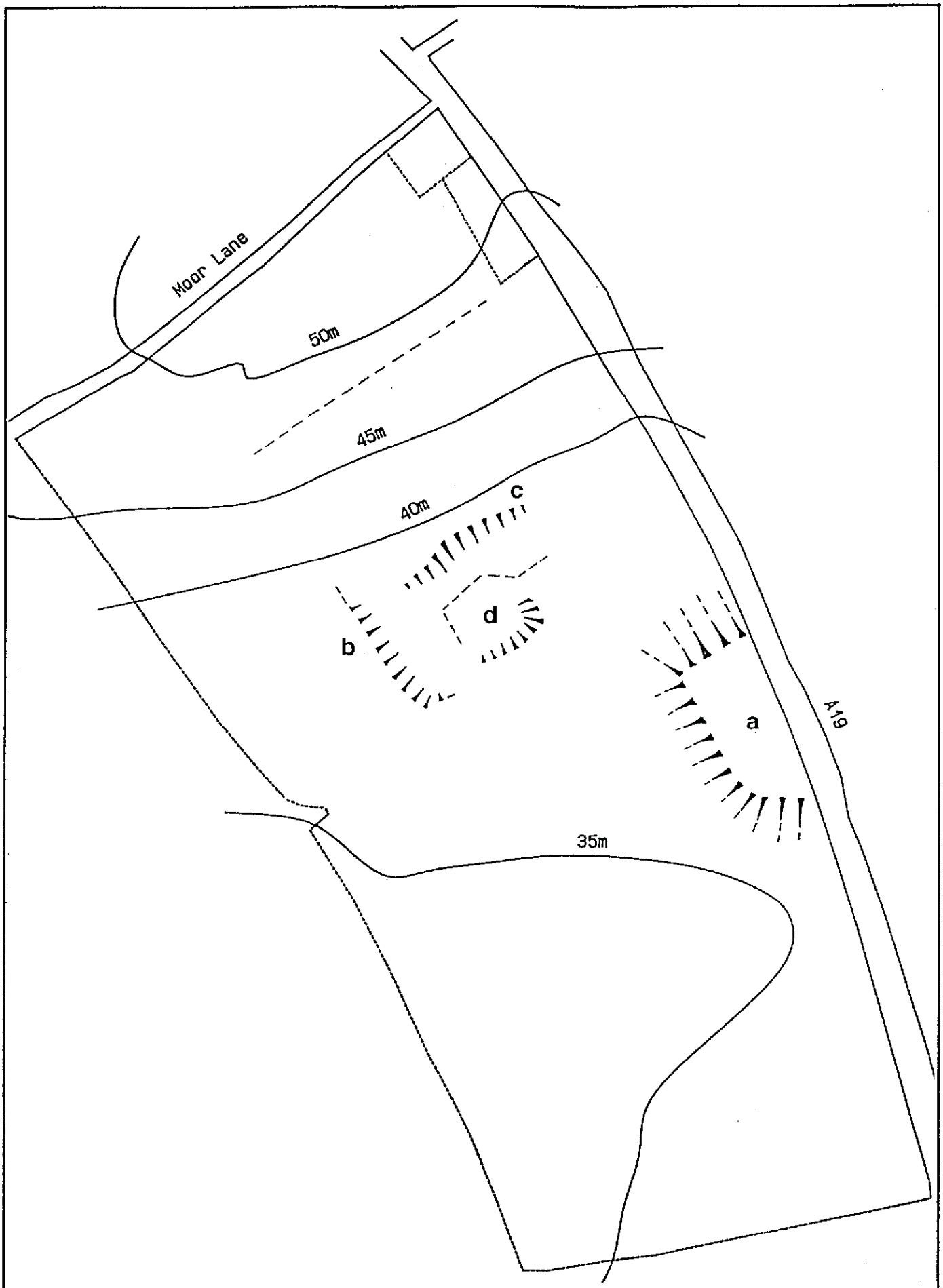

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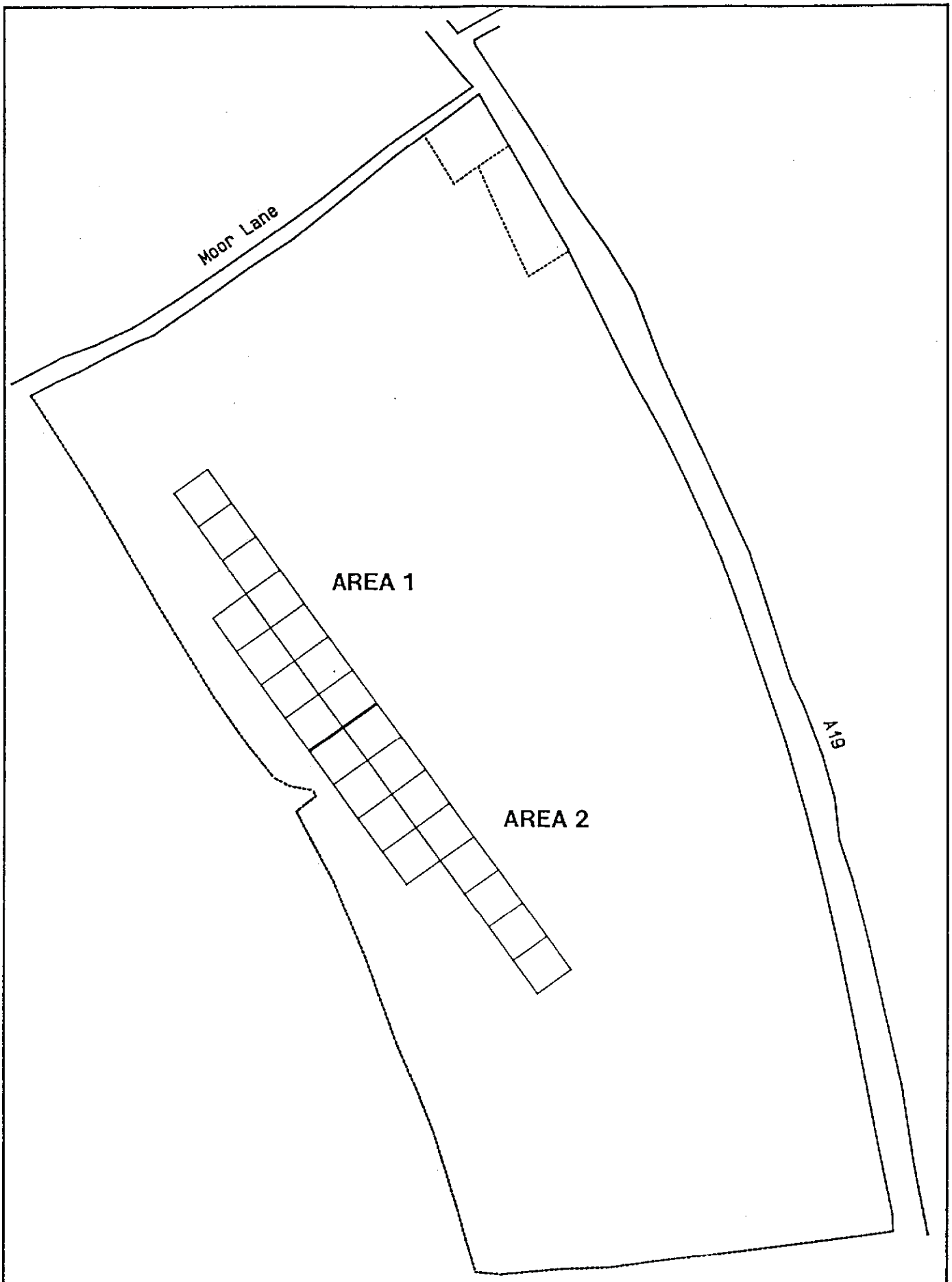
TITLE: AREA A : EARTHWORKS SURVEY	DRAWING: FIGURE 8



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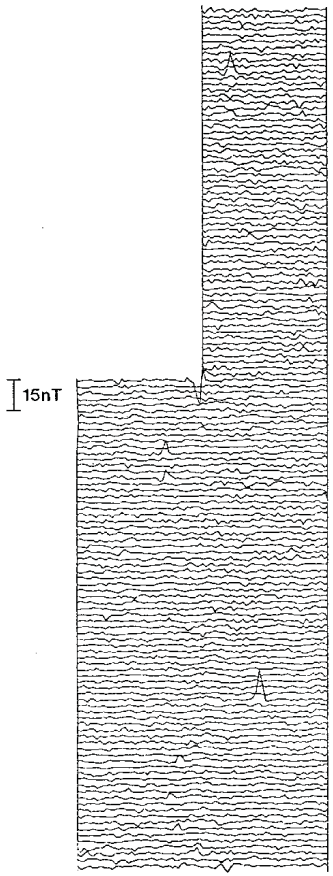

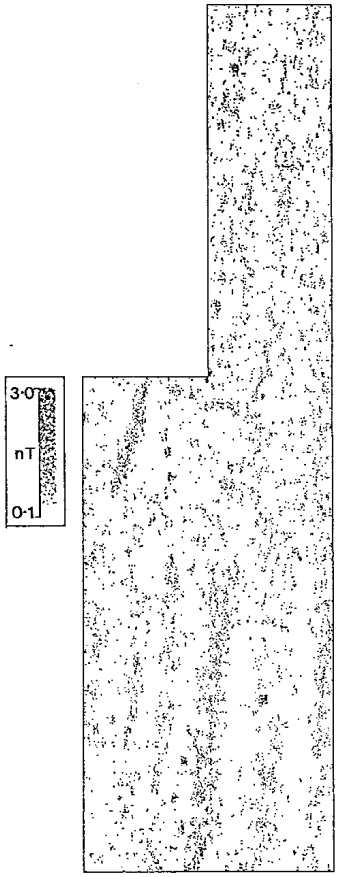

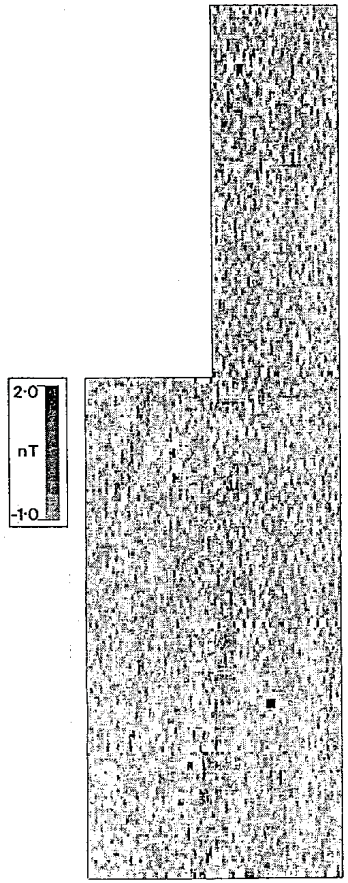

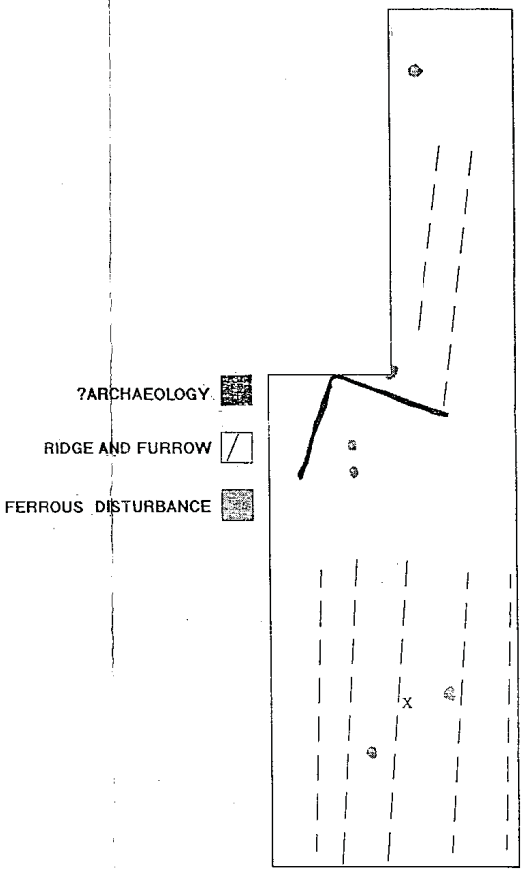

ANTHONY WALKER AND PARTNERS

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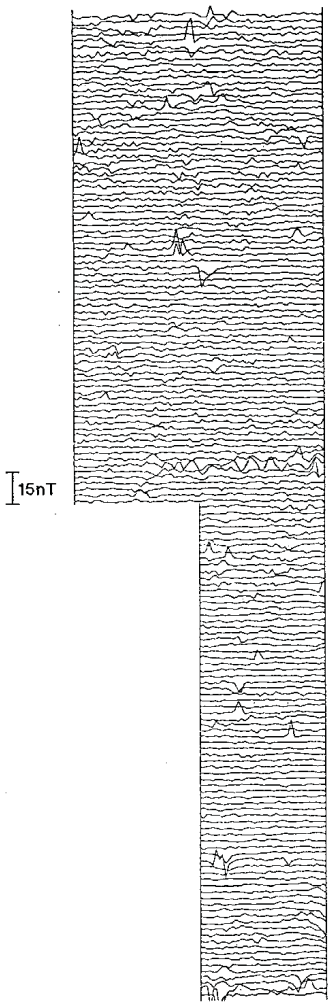
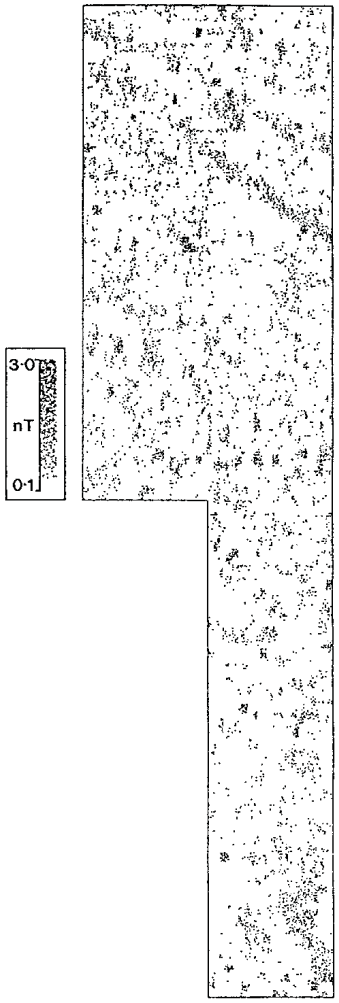
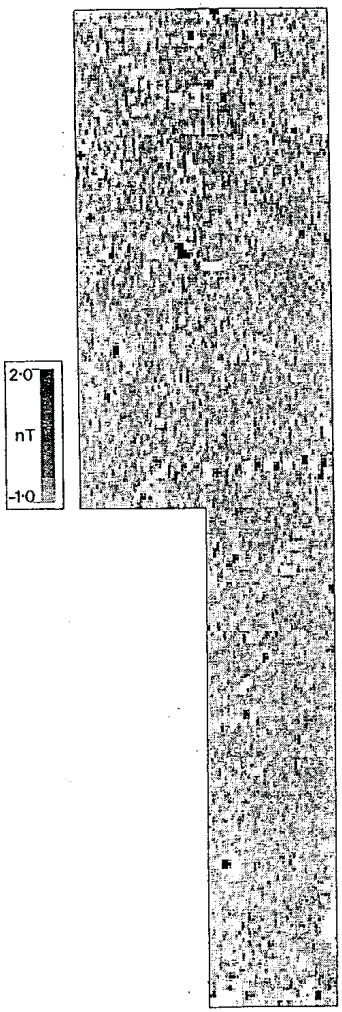
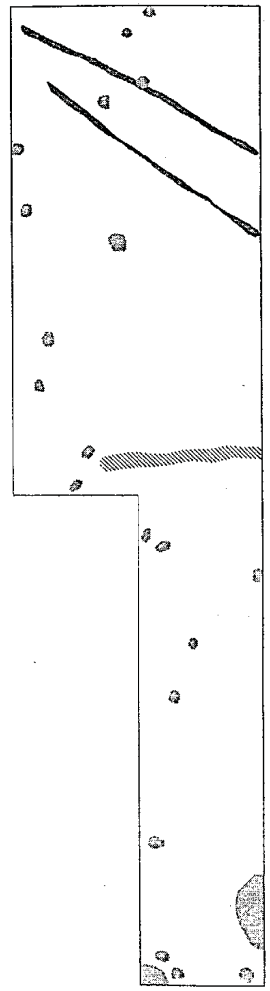
SCALE	0 M 20
DRAWING	FIGURE 10









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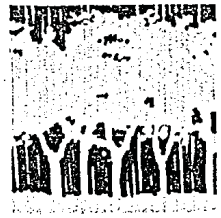
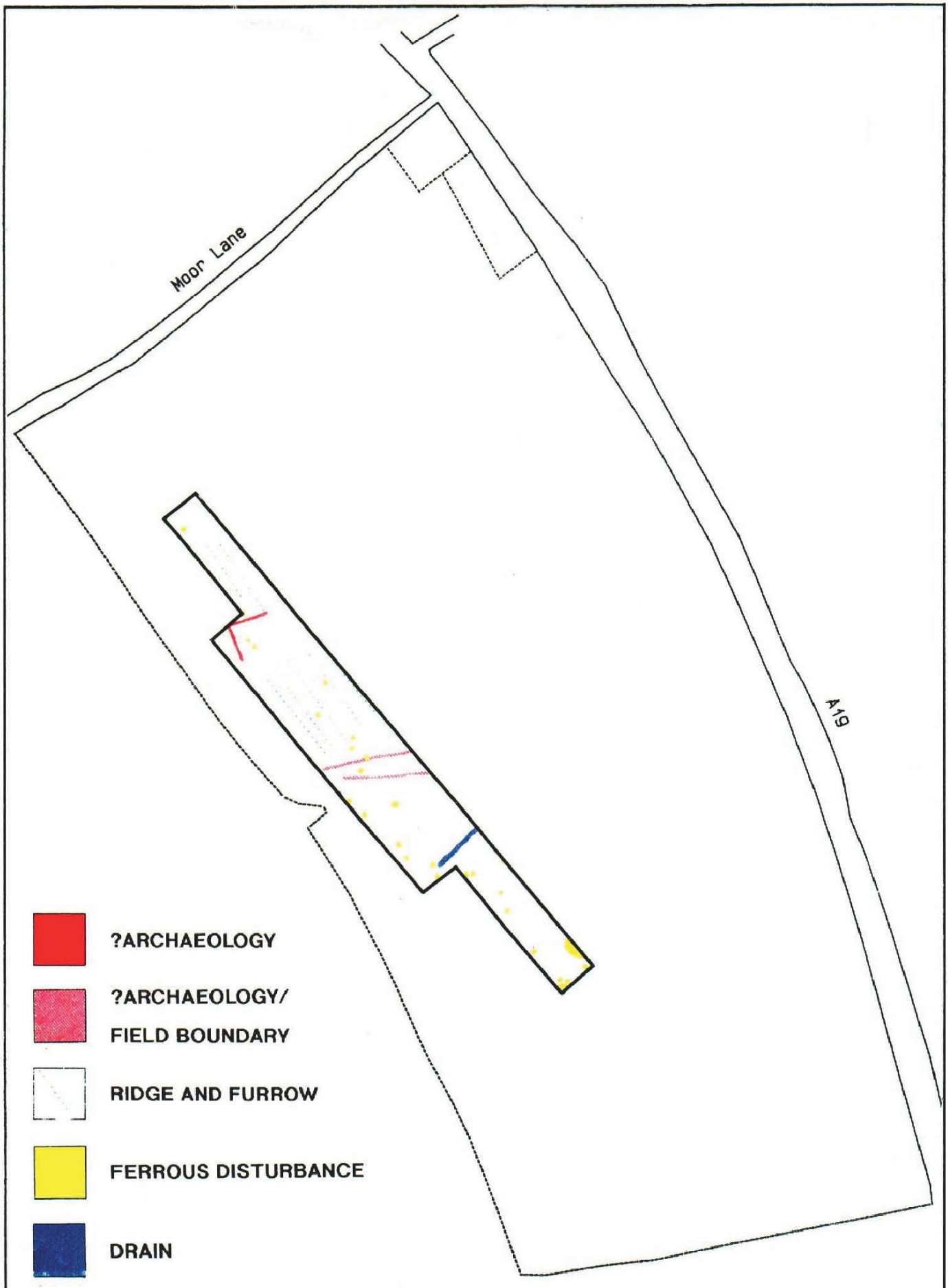
FERROUS DISTURBANCE

?DRAIN



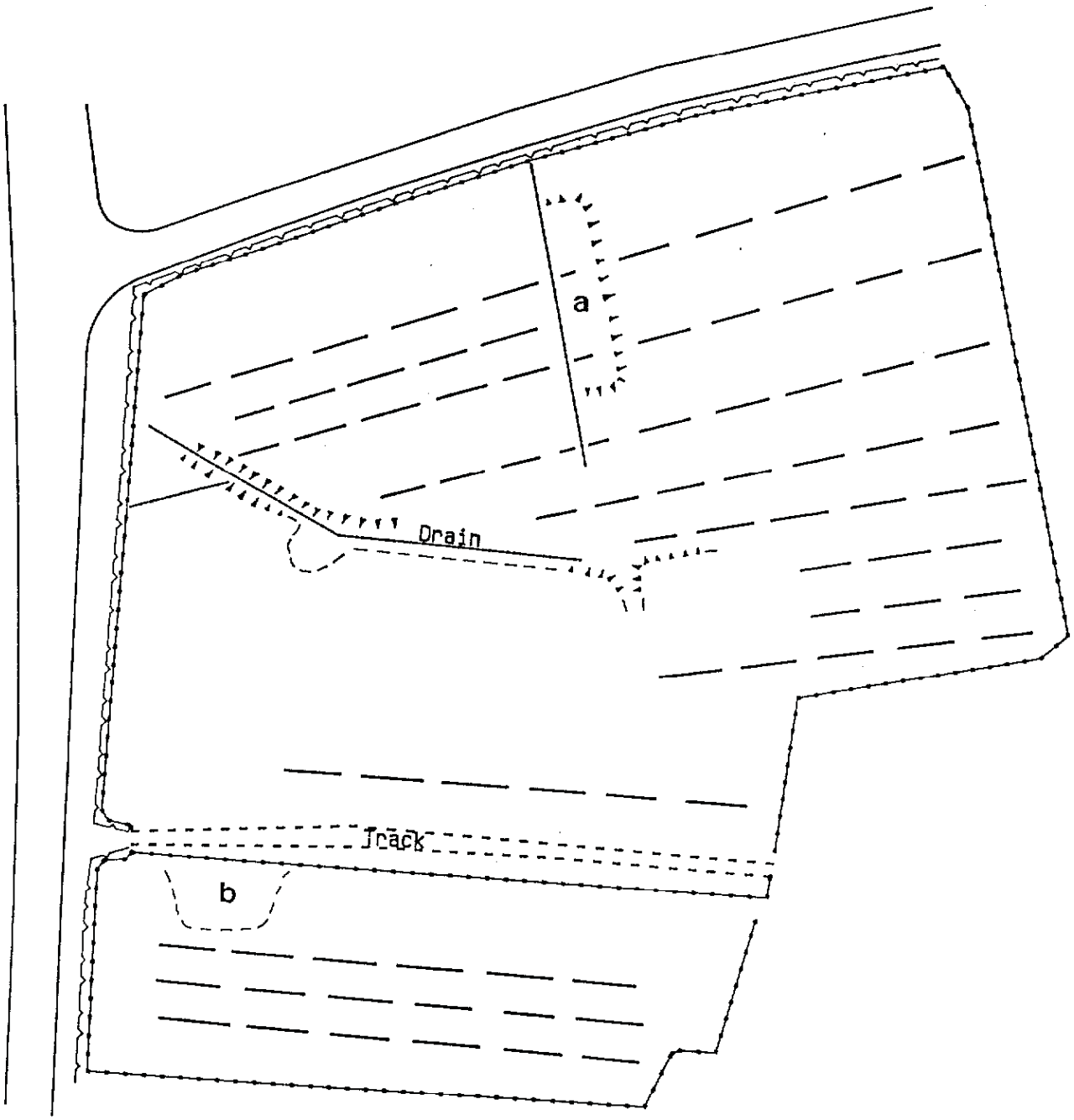
ANTHONY WALKER AND PARTNERS

PROJECT	A19 THORMANBY BYPASS STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS
TITLE	GEOPHYSICAL SURVEY : AREA 2
SCALE	0 M 20
DRAWING	FIGURE 11



ANTHONY WALKER AND PARTNERS

PROJECT	A19 THORMANBY BYPASS STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS	SCALE 1:2500
TITLE	AREA A : GEOPHYSICAL SURVEY INTERPRETATION	DRAWING FIGURE 12



ANTHONY WALKER AND PARTNERS

PROJECT: A19 THORMANBY BYPASS STAGE 2 ARCHAEOLOGICAL INVESTIGATIONS		SCALE: 1:1000
TITLE: AREA B : EARTHWORK SURVEY		DRAWING: FIGURE 13

APPENDIX 1: SPECIFICATION FOR ARCHAEOLOGICAL FIELDWALKING

1 Introduction

1.1 The area of survey lies to the south-west of Thormanby village which is located to the north of Easingwold on the A19 in North Yorkshire (see figure 1).

1.2 A bypass for the village is currently under consideration and the line of the proposed route needs to be assessed for any archaeological implications.

1.3 The fieldwalking survey team will be contracted by Anthony Walker and Partners, 5 North Hill Road, Headingley, Leeds, LS6 2EN.

2 Archaeological and Physical Background

2.1 An archaeological desk-top survey of the proposed route corridor has been completed. This has revealed that the field allocated for fieldwalking originally comprised a number of smaller fields whose boundaries have since been removed. Those fields in the southern part of the survey area formerly contained medieval ridge and furrow while those on the western boundary of the survey area are called "Brick Kiln Close" on a late 17th century map of the village.

2.2 The area allocated for fieldwalking also contains a known archaeological site located to a point marked on figure 1. This was a circular foundation of stone which had an external diameter of 6.5m. This was excavated in 1960 but no positive evidence for a date and/or function was obtained. The site of this feature is now marked by a scatter of stone.

2.3 The area allocated for fieldwalking lies within an area which is classified as a typical stagnogley soil (Dunkeswick Association). The geology is Lower and Middle Jurassic shales and sandstones overlain by Lacustrine clay. The landscape rises in height from 35m AOD in the south to approximately 50m AOD in the north. Land use is recently planted winter wheat which is currently 5-10cm high.

3 Statement of Brief

3.1 A programme of archaeological field walking will therefore be carried out to identify any sites or deposits with a view to providing information for more detailed field evaluation at a later stage.

3.2 The work shall be carried out by appropriately qualified and experienced staff to professional standards as defined within the Code of Conduct of the Institute of Field Archaeologists.

3.3 The area should be fieldwalked using lines 10m apart running east-west across the field. As the survey results may be used to target further investigation, the lines will be accurately laid out in advance of fieldwalking

by Anthony Walker Land Surveys using EDM optical equipment; a maximum tolerance of 5cm in either direction will be achieved. The lines will also be accurately tied into local features. Anthony Walker Land Surveys will on site during the fieldwalking operation to provide immediate survey support.

3.4 The archaeologist(s) undertaking the field walking programme should adopt the following methodology:

a) the field will be line walked in an east-west direction at 10m intervals, collecting and identifying any surface artefactual evidence in terms of pottery, metalwork, worked stone/flint, brick etc.

b) any finds should be bagged according to line. Notable finds and/or scatters of material should be bagged individually (or as a group) and their positions in the field marked using pegs provided. The location of these positions will then be accurately surveyed by Anthony Walker Land Surveys.

c) where appropriate, the dimensions of any identified features should be accurately recorded at a suitable scale so that form and position may be appreciated and the landscape understood; information gleaned during the desk-based assessment should be borne in mind at this stage.

d) the value and significance of any archaeological remains so recorded should be assessed.

3.5 Any finds and/or artefacts worthy of retention will be stored in appropriate conditions by the contractor until such time as their deposition in a suitable museum and/or disposal is determined.

3.6 Land access arrangements shall be the responsibility of the clients.

4 Timing

4.1 Given the current ground conditions, the on side fieldwalking programme is required to be completed as soon as possible, and before 5th April 1993.

5 The Report

5.1 The report shall include the following:-

a) A description of the methodology and techniques used.

b) A description and interpretation of any finds obtained. Any items worthy of preservation and/or future illustration should be noted.

c) A statistical analysis of any finds and a comparison shall be made between these and other fieldwalking projects in the area

d) A plot at 1:2500 scale showing the location and extent of any finds will be provided by Anthony Walker Land Surveys for inclusion in the report.

e) Discussion of the reasons why certain areas may be apparently lacking in archaeological remains, and make an assessment for the potential occurrence of unrecorded remains.

Note: The contractor are not required to make a determination of the extent and type of work likely to be involved with any detailed future assessment or the most appropriate time of year to undertake this work.

6 The quotation

6.1 When submitting their costs, the archaeologist(s) should provide the following details.

- Brief details of the organisation and/or staff proposing to carry out the work.
- The earliest date on which the work can be commenced.
- An estimate of how long the work will take, broken down by days and cost, in terms of data collection and report production.

6.2 In preparing their tender, the archaeologist(s) should note that

- all costs should be included, including travel, subsistence, printing, reporting, administration etc.
- a total of three reports will be required which should be sent with an appropriate invoice to Mr E Dennison, Technical Director (Archaeology), Anthony Walker and Partners, 5 North Hill Road, Headingley, Leeds, LS6 2EN.

APPENDIX 2: CATALOGUE OF RECORDED POTTERY FINDS

2B	1 painted Earthenware sherd - modern
2C	1 blue and white transfer ware - modern
5I	1 Northern gritty ware sherd - 11th-12th century
5I	1 Ryedale type sherd - 16th century
6C	1 Humber ware rod handle - 13th-15th century
6E	1 unidentified sherd - modern
6O	1 Humber ware sherd - 13th-15th century
7B	1 Manganese glazed sherd - 19th century
7H	1 Brandsby ware type sherd - 13th century
7K	1 white Earthenware sherd - modern
8F	9 white Earthenware sherds - modern
8H	1 very abraded Humber ware sherd - 13th-15th century
8K	1 Humber ware sherd - 13th-15th century
8R	1 Humber ware sherd - 13th-15th century
13S	1 white Earthenware sherd - modern
14J	1 white Earthenware sherd - modern
14P	1 ?Roman sherd
16M	1 white Earthenware sherd - modern
17D	1 Brandsby type sherd - 13th century
17D	1 Brandsby ware sherd - 13th century
17L	1 blue and white transfer - modern
18C	1 sherd - ?post - medieval
21T	1 York glazed ware - 12th-13th century
22A	1 Brandsby ware type sherd - 13th century
22G	1 Northern gritty ware sherd - 11th-12th century
23E	1 blue and white transfer sherd - modern
24B	1 Brandsby jar rim sherd - c. 13th century
24G	1 Humber ware sherd - 13th-15th century
25F	1 Northern gritty ware sherd - 12th-13th century
25F	1 Stoneware sherd - modern
26F	1 Humber ware sherd - 13th-15th century
26J	1 unidentifiable sherd - medieval
27A	1 sherd - medieval
27N	1 Northern gritty ware sherd - 12th-13th century
27N	3 ?Roman sherds
30A	1 Brandsby ware type sherd - 13th century
30A	1 Staffordshire combed slip ware - early 18th century
30B	1 Hambleton ware sherd - 15th century
30I	1 Humber ware sherd - 13th-15th century
30J	1 tin glazed Earthenware - early 18th century
31A	1 abraded Humber ware sherd - 13th-15th century
31C	1 Brandsby ware type - 13th century
31H	1 Hambleton jug rim handle - 14th-15th century
31H	1 blue and white transfer sherd - modern
31I	1 Staffordshire slipware sherd - 18th century
32A	1 Northern gritty ware sherd - 11th-12th century
32E	1 Humber ware sherd - 13th-15th century
33A	1 Brandsby ware type sherd - 13th century
33E	1 Northern gritty ware sherd - 11th-12th century

34C 1 Humber ware sherd - 13th-15th century
34E 1 Northern gritty ware sherd - 11th-12th century
34E 1 Northern gritty ware sherd - 11th-12th century
34E 1 Brandsby type sherd - 13th century
34E 1 Brandsby type sherd - 13th century
34S 1 unidentifiable sherd - post medieval
34T 1 Humber ware sherd - 13th-15th century
34T 1 Staffordshire cup rim sherd - late 17th-early 18th century
35A 1 blue and white transfer - modern
35T 1 Humber ware sherd - 13th-15th century
37H 1 Pearl ware sherd - modern
38H 1 Northern gritty ware sherd - 11th-12th century
38O 1 unidentifiable sherd - medieval
39G 1 Humber ware sherd - 13th-15th century
40G 1 unidentifiable sherd, very abraded - medieval
41N 2 adjoining Staffordshire slip decorated plate sherds - early 18th century
41S 1 Brandsby jug rim sherd - 13th century
42D 1 Humber ware sherd - 13th-15th century
42E 2 small Northern gritty ware sherds - 11th-12th century
42E 1 Hambleton ware sherd - 15th century
42I 1 unidentifiable sherd - ?post medieval
42J 1 Northern gritty ware sherd - 11th-12th century
43F 1 blue and white transfer ware sherd - modern
43M 1 Staffordshire salt glazed stoneware sherd - 18th century
44I 1 Humber ware sherd - 13th-15th century
44Q 1 sherd - post medieval
46J 1 Northern gritty ware sherd - 11th-12th century
47J 1 Northern gritty ware sherd - 11th-12th century

APPENDIX 3: SPECIFICATION FOR GEOPHYSICAL SURVEY

1 Introduction

1.1 The main objectives of the geophysical survey are to:

- provide a detailed areal plot of the main below-ground archaeological features and deposits, subject to the limitations of available techniques, within the areas which may be disturbed by the construction of the A19 Thormanby bypass.

- provide information about the nature and possible interpretation of anomalies revealed by the survey.

- identify, as far as possible, any areas which are not responsive to geophysical survey techniques and which therefore require the application of other methods to determine the nature and extent of sub-surface archaeological features and deposits.

1.2 The results of the geophysical survey will be used to determine the nature and extent of the other aspects of an archaeological assessment programme.

1.3 A geophysical survey of one discrete area, centred on the proposed road alignment, is required (see figure 1).

1.4 The geophysical survey team will be contracted by Anthony Walker and Partners, 5 North Hill Road, Headingley, Leeds, LS6 2EN.

2 Archaeological and Physical Background

2.1 An archaeological desk-top survey of the proposed route corridor has been completed. This has revealed that the area allocated for geophysical survey originally comprised a number of smaller fields whose boundaries have since been removed. Those fields in the southern part of the survey area formerly contained medieval ridge and furrow while those on the western boundary of the survey area are called "Brick Kiln Close" on a late 17th century map of the village.

2.2 The area allocated for fieldwalking also contains a known archaeological site located to a point marked on figure 1. This was a circular foundation of stone which had an external diameter of 6.5m. This was excavated in 1960 but no positive evidence for a date and/or function was obtained. The site of this feature is now marked by a scatter of stone.

2.3 Subsequent archaeological fieldwalking revealed a general scatter of pottery dating from the Romano-British to post-medieval periods, as well as numerous large stones. However, none of these artefacts were in any concentration and no archaeological features are suggested.

2.4 The area allocated for geophysical survey lies within an area which is classified as a typical stagnogley soil (Dunkeswick Association). The geology is Lower and Middle Jurassic shales and sandstones overlain by Lacustrine clay. The landscape rises in height from 35m AOD in the south to approximately 50m AOD in the north. Land use is currently winter wheat which is at present approximately 30cm high.

3 The Survey

3.1 The geophysical survey is to be confined to an area to the south-west of the village of Thormanby (see figure 1).

3.2 The area should be surveyed using a 20m x 20m grid. As the survey results may be used to target further investigation, the survey grids will be accurately laid out by Anthony Walker Land Surveys using EDM optical equipment; a maximum tolerance of 5cm in either direction will be achieved. The grid will also be accurately tied into local features and existing survey stations.

3.3 Given the likely nature of the archaeological features to be encountered, a magnetometer survey should be employed, using a fluxgate gradiometer or equivalent geomagnetic sensor. Magnetic readings should be taken at 0.5m intervals along one axis in 1m traverses, giving 800 readings per 20m x 20m grid.

3.4 Quotations are invited for a 100% sample survey of the area indicated on figure 1. The specific details of the sample is to be discussed with the client in advance of any work on site.

3.5 Access (including vehicular) will be arranged by the client.

4 The Report

4.1 The report of the work should include:

- a description of the techniques, methodology and instrumentation used.
- the superimposition of the survey grids on an Ordnance Survey base, at 1:2500 scale.
- general plots of the raw and filtered data (illustrated as dot-density and X-Y plots as a minimum requirement), together with interpretative diagrams relating to each of the survey areas, at appropriate scales.
- detailed plots and interpretative diagrams of any major anomalies revealed
- descriptions of each survey area, including information on the nature and extent of sub-surface features and deposits, the

interpretation of any features revealed, and any limitations, biases or constraining factors.

5 The Quotation

5.1 When submitting their quotation, the geophysical survey team should provide the following details.

- brief details of the organisation proposing to carry out the work.
- brief details, if possible, of the staff proposing to carry out the work.
- the earliest date on which the work can be commenced.
- an estimate of how long the survey team will be on site, together with an estimate of the time taken to produce a report.

5.2 In preparing their quotation, the geophysical survey team should note that

- all costs should be included, including travel, subsistence, printing, reporting, administration etc; these items need not be specifically itemised in the quotation.
- a total of three reports will be required which should be sent with an appropriate invoice to Mr E Dennison, Technical Director (Archaeology), Anthony Walker and Partners, 5 North Hill Road, Headingley, Leeds, LS6 2EN.

APPENDIX 4: TECHNICAL GEOPHYSICAL INFORMATION

The following is a description of the equipment and display formats used by GEOPHYSICAL SURVEYS OF BRADFORD.

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

Instrumentation

(a) Fluxgate Gradiometer - Geoscan FM36

This instrument comprises two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to 1m deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential). Depending on the arrangement of these electrodes, an exact measurement of a similar volume of earth may be acquired. In such a case the amount measured may be used to calculate the earth resistivity. The "Twin Probe" arrangement involves the paring of electrodes (one current and one potential) with one pair remaining in a fixed position, whilst the other measures the resistance variations across a fixed grid. The resistance is measured in Ohms and the calculated resistivity is in Ohm-metres. The resistance method as used for area survey has a depth resolution of approximately 0.75m, although the nature of the overburden and underlying geology will cause variations in this generality. The technique can be adapted to sample greater depths of earth and can therefore be used to produce vertical "pseudo sections".

(c) Magnetic Susceptibility

Variations in the magnetic susceptibility of subsoils and topsoils occur naturally, but greater enhanced susceptibility can also be a product of increased human/anthropogenic activity. This phenomenon of susceptibility enhancement can therefore be used to provide information about the "level of archaeological activity" associated with a site. It can also be used in a predictive manner to ascertain the suitability of a site for magnetic survey. The instrument employed for measuring this phenomenon is either a field coil or a laboratory based susceptibility bridge. For the latter 50g soil samples are collected in the field.

Display Options

The following is a description of the display options used. Unless specifically mentioned in the text of a report, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report a limited number of display models may be

used.

(a) X-Y Plot

This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. Advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. Results are normally produced on a flatbed plotter.

(b) Dot-Density

In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut-off value will appear white, whilst any value above the maximum cut-off value will appear black. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). Usually the C.F. = 1, producing a linear scale between the cut-off levels. Assessing a lower than normal reading involves the use of an inverse plot. This plot simply reverses the minimum and maximum values, resulting in the lower values being represented by more dots. In either representation, each reading is allocated a unique area dependant on its position on the survey grid, within which numbers of dots are randomly placed. The main limitation of this display method is that multiple plots have to be produced in order to view the whole range of the data. It is also difficult to gauge the true strength of any anomaly without looking at the raw data values. This display is much favoured for producing plans of sites, where positioning of the anomalies and features is important.

(c) Contour

This display joins data points of an equal value by a contour line. Displays are generated on the computer screen or plotted directly on a flat bed plotter/inkjet printer.

(d) 3-D Mesh

This display joins the data values in both the X and Y axis. The display may be changed by altering the horizontal viewing angle and the angle above the plane. The output may be either colour or black and white. A hidden line option is occasionally used (see (a) above).

(e) Grey-Scale

This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots, the intensity increasing with value. This gives an appearance of a toned or grey scale.

Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. While colour plots can look impressive and can be used to highlight certain anomalies, grey-scales tend to be more informative.