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Barton Turn Marina, Staffordshire, 1993: An Archaeological Evaluation

by

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1.0 Introduction

This report outlines the results of an archaeological evaluation carried out at Barton Turn, approximately 1km to the east of Barton under Needwood in Staffordshire (NGR SK 197 182). The evaluation was carried out by Birmingham University Field Archaeology Unit on behalf of Mr. Barry Morgan following an application to develop a marina alongside the nearby Trent and Mersey Canal. The work was carried out in two stages during September 1993. Stage One involved a geophysical survey undertaken by Geophysical Surveys of Bradford. Stage Two involved a programme of targeted trial trenching aimed at clarifying the character of those potential features suggested by cropmark evidence and the geophysical survey.

2.0 The Site

The area evaluated lies on a gravel terrace on the west bank of the River Trent (Fig. 1). The area is bounded to the west by the built up area of Barton under Needwood, to the north by the B5016, and to the east by the Trent and Mersey canal. A group of circular and linear cropmarks have been identified from aerial photographs in the eastern area of the evaluation (Staffordshire Sites and Monuments Record Number 1471). In addition, a Hadrianic sestertius has been found in the easternmost field (Fig. 2, Field A) of the evaluation (SMR No. 3567). A sewage works is located immediately to the north of the evaluation although early maps indicate that an earlier works was formerly located in the northern part of Field F.

Previous archaeological work in the area includes extensive evaluations to the north in the area of Newbold Farm (Cane and Jones 1989; Hughes 1992) and the excavation of a ring ditch at Tucklesholme Farm to the east (Hughes 1991). The majority of the cropmarks at Newbold Farm proved to be very shallow features and many had clearly not survived recent plough truncation.

3.0 Objectives

The broad objective of the evaluation was to determine the character and nature of the possible archaeological constraints on the proposed development. The proposed marina and associated landscaping would inevitably result in the destruction of any surviving archaeological deposits across substantial tracts of the development zone.

Specific objectives

i) To examine all avialable aerial photographs relating to the area of the evaluation and to interpret them for thier archaeological content.

ii) To establish whether further potential archaeological features and deposits, not so far detected by aerial survey, have survived within the area of the proposed development.

iii) To determine the character, quality of survival and date of potential archaeological features.

4.0 Method

4.1 The field inspection and geophysical survey

At the time of the evaluation Fields A and E were under pasture, Fields B, C and D had recently been harvested and Field F was still under crop. None of the fields were in an appropriate state for fieldwalking.

Four areas were selected for the geophysical survey. Two coincided with cropmarks and two were located in the western area of the evaluation where there was no cropmark evidence. Further details of the geophysical survey are given in the Appendix.

4.2 The trial trenching

On the basis of the information provided by the field inspection, the aerial photographic evidence and the geophysical survey, a programme of trial trenching across the whole evaluation area was devised. The objective of the majority of the trenches was to target potential archaeological features in order to investigate their character, date and state of preservation. In the absence of any other information, a number of speculative trenches were also excavated in the western and northern areas of the evaluation. In all cases the topsoil or ploughsoil, which varied between 0.3 and 0.4m deep, was removed by machine. Sample areas of the underlying gravel subsoils were cleaned manually and all potential archaeological features identified were sample excavated.

5.0 Results

5.1 The geophysical survey

Few anomalies of definate archaeological interest were identified during the magnetometer survey undertaken by Geophysical Surveys of Bradford. The full results are provided in the Appendix.

5.2 The trial trenches

Field A - A number of low earthworks were visible criss-crossing Field A. These took the form of shallow ditches up to 3m wide, frequently associated with low earth banks. It seems probable that some of these earthworks corresponded with the linear features suggested by the aerial photographs. Two elderly oak trees are located in the middle of the field on the line of two of these earthworks. Traces of the former ridge and furrow were visible in the northeastern area of the field.

No trace of the circular features suggested by the aerial photographs could be seen on the surface. These circular features and the visible earthworks were tested by a series of five trial trenches (Fig. 2, Trenches 1-5). No traces of the circular features were visible in any of the trenches. Several shallow linear features were recorded and partially excavated in Trench 1 (Fig. 3) but there was no suggestion that any of them were archaeological in origin. The only feature in this trench which appeared to be archaeological was a single circular posthole (F8), 0.23m in diameter and 0.28m deep.

Trench 1 was also excavated at right angles to the ridge and furrow. The distance between the peak of each ridge was approximately 6m and the difference in height between the top of each ridge and the bottom of each furrow was 0.2m. The linear ditches were tested in Trenches 2, 3, 4 and 5. They proved to be of varying depths, 0.7m (F2) - 0.9m (Fig. 3, F4) with V or U-shaped profiles. Very little dating evidence was recovered from their fills apart from occasional small fragments of brick.

Field B - The linear cropmark feature in the eastern area of the field was tested by a series of three trenches (Trenches 6-8). There was only clear evidence for a ditch in Trench 8 (Fig. 3). Several fragments of green bottle glass were recovered at a depth of 0.69m at which point excavation ceased. The only features in Trench 7 (Fig. 3) were a series of very shallow linear features orientated northwest - southeast, which may have been traces of former ridge and furrow. It is possible that these correspond with the linear features suggested by the geophysical survey (See Appendix, Area B).

Fields C, D and E - No features of archeological interest were identified in any of the trenches excavated in the western and northern areas of the evaluation.

6.0 Discussion

None of the features investigated during the evaluation appeared to be of any great antiquity. It seems highly probable that the linear features recorded in Field A correspond with former field boundaries. This interpretation appears to be substantiated by the location of the oak trees. These field boundaries do not appear on the 1925 edition of the OS 6" map so they must have been removed prior to this date. However, there is no reason to suspect that they are earlier than the post-medieval period. Recent ploughing does not appear to have taken place in the northeast sector of this field where ridge and furrow is still apparent. Large areas of the remainder of the field have been disturbed by rabbit warrens. It is probable that the find of a Roman coin in this field is associated with the proximity of Rykneld Street (Roman Road) to the east rather than being an indicator of any former settlement.

The failure to identify any archaeological features in the western and northern areas of the evaluation suggests that no significant archaeological constraint is present.

7.0 Acknowledgements

The evaluation was carried out by Gwilym Hughes, Jon Sterenberg, Amanda Bennett and Rebecca Roseff. The text of the report was prepared by Gwilym Hughes, illustrated by Nigel Dodds and edited by Simon Buteux. The project was monitored by Bob Meeson on behalf of Staffordshire County Council. Thanks to Barry Morgan for his assistance which included the provision of a JCB for undertaking the machining.

8.0 References

Cane J. and Jones A. 1989 *An Archaeological evaluation of cropmarks at Newbold Farm, Barton under Needwood, Staffordshire*, BUFAU Report No. 70.

Hughes E.G. 1991 *The excavation of a ring ditch at Tucklesholme Farm, Barton under Needwood, Staffordshire, 1990-1991: an interim report*, BUFAU Report No. 163.

Hughes E.G. 1992 *An archaeological evaluation at Newbold Gravel Pit, Barton under Needwood, Staffordshire, 1991-92*, BUFAU Report No. 197.

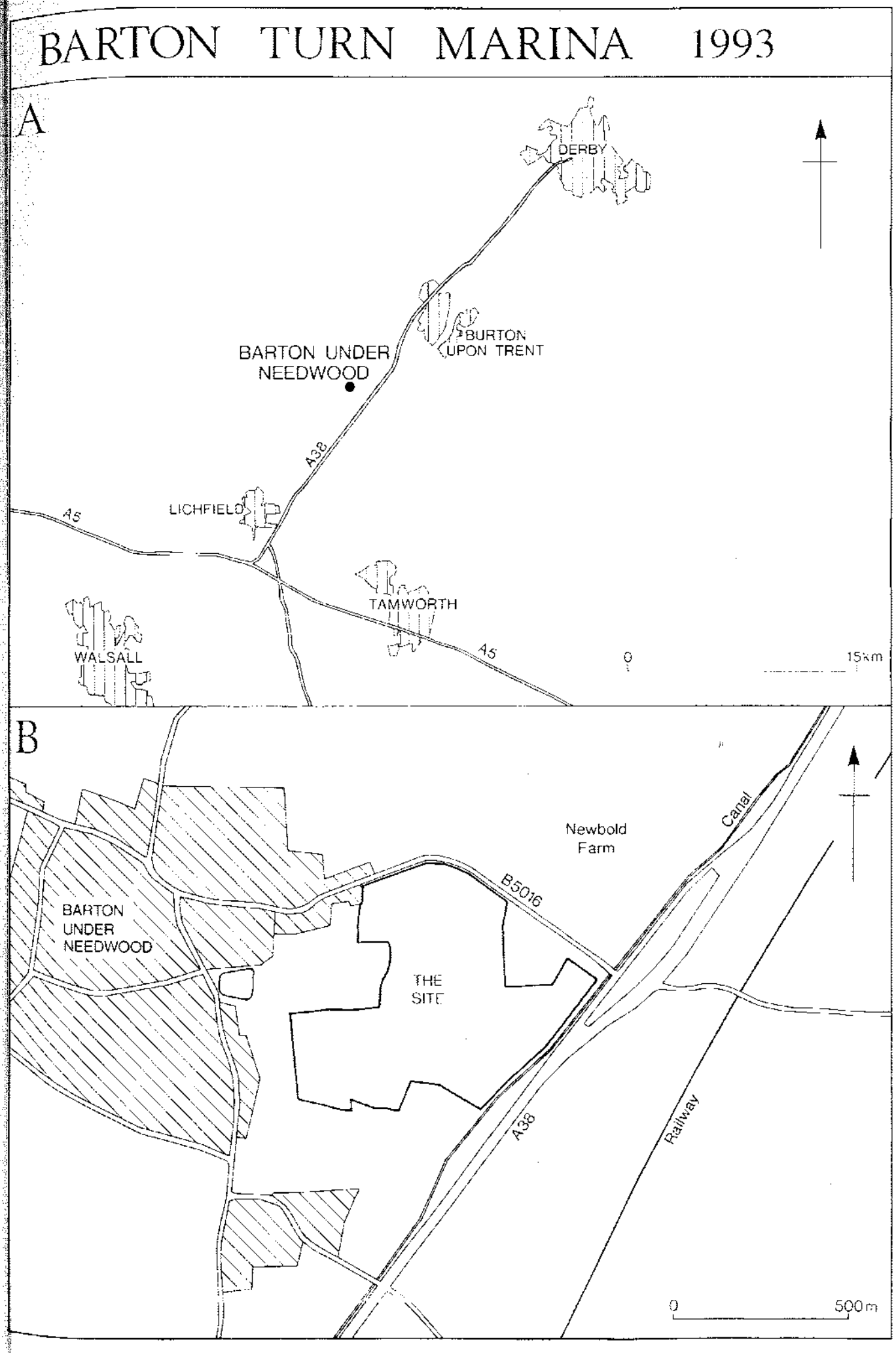


Fig. 1 Location

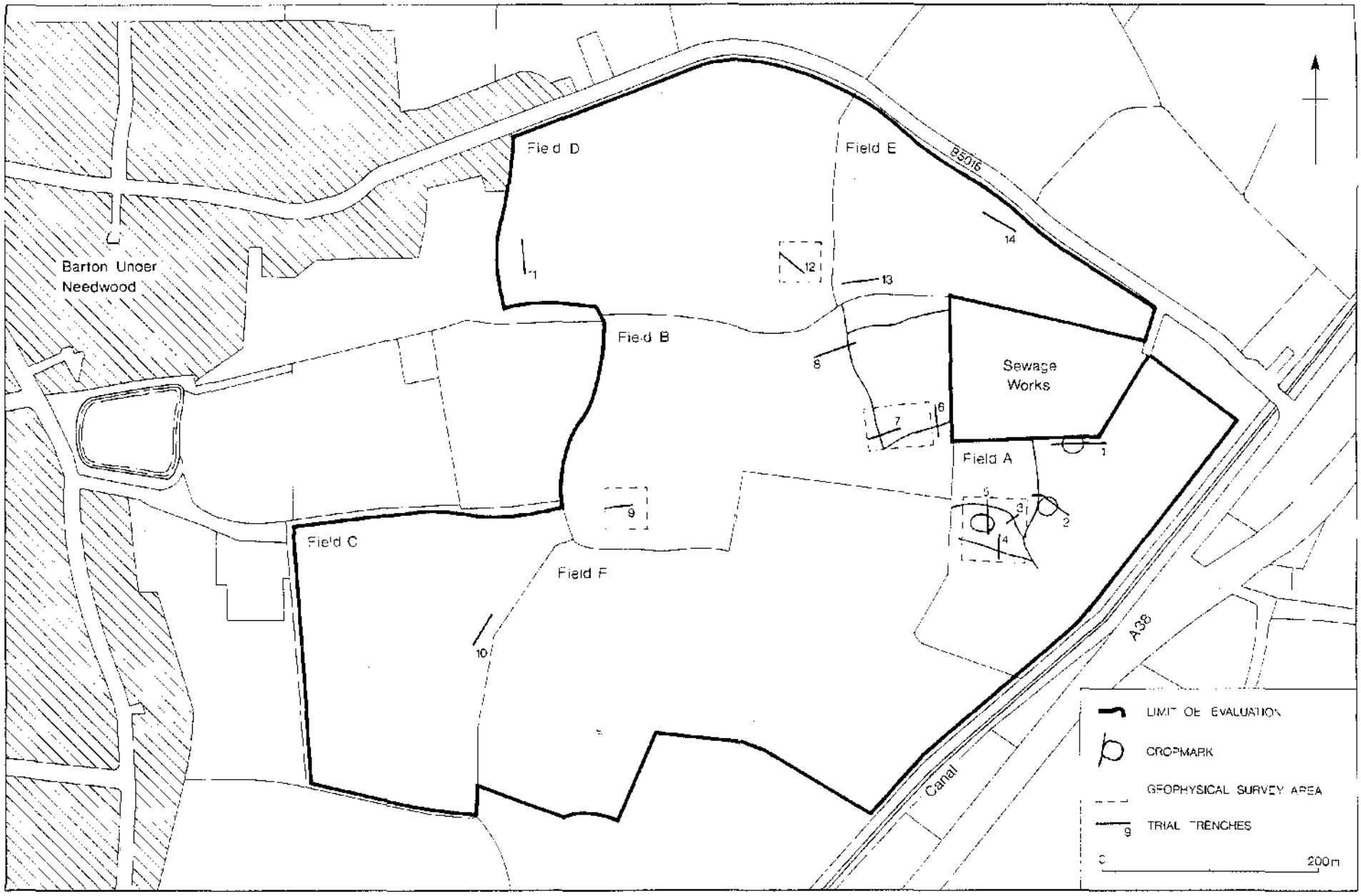


Fig. 2 Area of Evaluation at 1:5000

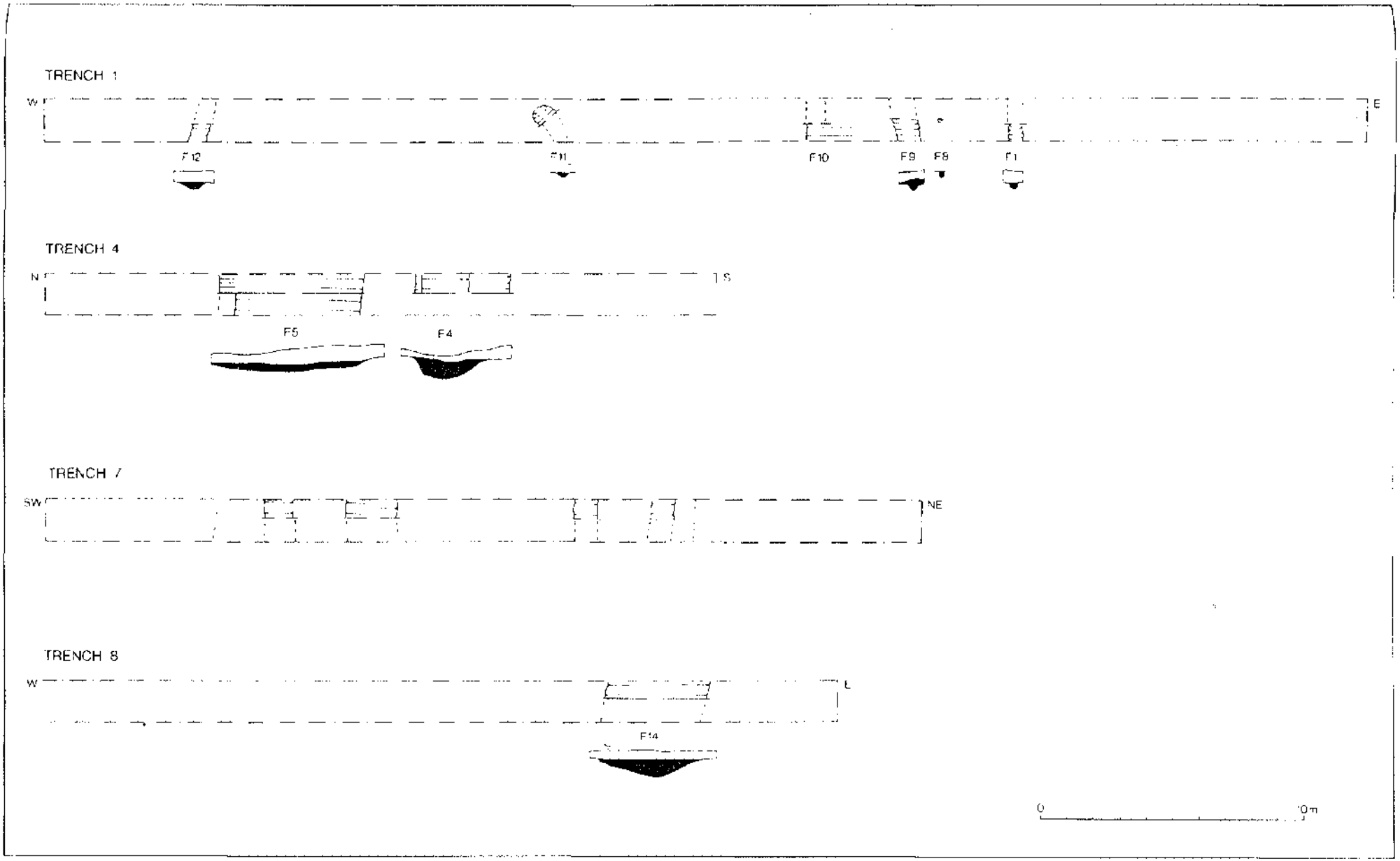


Fig. 3 Trench Plans at 1:200

Appendix

The Geophysical Survey

By

Geophysical Surveys of Bradford

SITE SUMMARY SHEET

93/106 Barton Turn Marina

NGR: SK 195 184

Location, topography and geology

The evaluation area occupies several fields lying between the A38 trunk road and the town of Barton-under-Needwood, approximately 7km southwest of Burton-upon-Trent, Staffordshire. The fields were generally flat and the ground cover at the time of survey consisted of short stubble and pasture. The underlying geology comprises sands and gravels.

Archaeology

Aerial photographs (APs) have revealed cropmarks in two fields in the eastern part of the application area. Some of these cropmarks apparently coincide with low earthwork features. Further cropmark complexes are noted in the vicinity of the site.

Aim of Survey

The geophysical work forms part of a wider evaluation carried out by **Birmingham University Field Archaeology Unit (BUFAU)** in advance of the proposed development of a marina. Several sample areas were investigated using gradiometry with the aim of *firstly:* locating the cropmark features, and *secondly:* identifying any anomalies of archaeological interest in areas apparently devoid of cropmarks. In addition, a small area of resistance survey was carried out in an attempt to clarify the nature of the earthworks.

Summary of Results*

The results are archaeologically disappointing, with none of the cropmarks being conclusively located in the gradiometer data. A few possible archaeological anomalies have been tentatively identified, but, given the weak ephemeral nature of these responses, a natural origin for these cannot be ruled out. The resistance survey has failed to add any information as to the archaeological potential of the site.

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

SURVEY RESULTS

93/106 Barton Turn Marina

1. Survey Areas (Figure 1)

1.1 Four areas (A-D) were surveyed by gradiometry. Areas A and B were placed to cover cropmarks, while blocks C and D were placed at random. A small block within Area A was surveyed using the resistance technique. The locations of the survey areas are given in Figure 1 at a scale of 1:5000.

1.2 Area A was set up by staff from **BUFAU** and the remaining blocks were laid out by **Geophysical Surveys of Bradford (GSB)**. The grids were tied in by **BUFAU** personnel.

2. Display

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

2.2 A simplified interpretation (Figure 2) is produced at 1:5000. The data plots and interpretation diagrams for each area (Figures A1-R1) are produced at 1:500.

3. General Considerations - Complicating factors

3.1 The conditions for survey were good, the ground being generally flat and free from obstruction. Several low earthworks cross Area A and some of these apparently coincide with the cropmarks. In addition there was clear evidence, in this area, of extensive burrowing activity. This made walking with the gradiometer difficult and may also have implications for the survival of archaeological features, if present.

3.2 A broad range of values was obtained for the resistance survey and in addition the background levels were relatively high. It seems likely that this is due to the underlying geology. It has made interpretation of these data difficult and it may be that smaller changes, possibly associated with archaeological features, have been "masked".

4. Results - Gradiometer Survey

4.1 No anomalies clearly representing the cropmarks were noted in Area A. However, a faint linear negative anomaly apparently corresponds to one of the earthwork features and there are suggestions that it turns through 90 degrees in the southwestern corner of the grid. Despite this, an archaeological interpretation for these anomalies is tentative.

4.2 An area of increased magnetic noise is noted in the centre and southern half of the survey grid. This coincides with a low mound and several of the presumed burrows. A few of the responses may be pits, though this interpretation is uncertain, while the remainder are ferrous in nature. The latter may represent buried ferrous debris in the topsoil or small pockets of magnetic gravels.

4.3 The anomalies along the western edge of the survey area are caused by buried ferrous material, thought to be a pipe situated just outside the survey grid.

4.4 The cropmarks in Area B are believed to represent a former field boundary. They have not been clearly located by the gradiometer survey. One weak linear anomaly has been noted that may be part of this presumed feature; the remaining anomalies are the product of isolated ferrous debris in the topsoil.

4.5 Blocks C and D were placed in the western half of the application area, where no apparent cropmark evidence has been noted. A few archaeological-type anomalies have been tentatively identified; but in the absence of any wider archaeological context, a natural origin cannot be ruled out. Isolated ferrous type responses are noted in the data and on the interpretation diagrams.

5. Results - Resistance Survey

5.1 This small block, 20 x 40m in extent, covers part of the magnetic survey Area A. It was surveyed in an attempt to clarify the nature of the earthworks and the magnetic anomaly noted in 4.1 above.

5.2 Unfortunately, the results have proved inconclusive. The background resistance is high (around 200-300 Ohms) and this may be attributed to the good drainage afforded by the underlying geology. Filtering the data has highlighted the anomalies noted below but has provided no additional information.

5.3 Two broad high resistance anomalies are noted which correspond to the position of the earthwork. The resistance values for these anomalies are significantly higher than the background (up to 1000 Ohms in places) but form no discernible pattern as might be expected from building remains. In this case it is postulated that the burrowing activity may have contributed to the response.

5.4 There are hints of two low resistance anomalies, however they are broad and poorly defined. Thus it is difficult to attach clear archaeological significance to these responses.

6. Conclusions

6.1 The gradiometer survey has failed to locate the features transcribed from APs. A few anomalies of archaeological potential are noted, but their ephemeral nature would equally support a natural origin.

6.2 The resistance data are difficult to interpret, particularly due to the broad range of the values obtained. Both high and low resistance anomalies were noted but these were broad and provided little or no clarification of the nature of the earthwork features.

Project Co-ordinator C Stephens
Project Assistants: S Lancaster & A Shields.

Geophysical Surveys of Bradford
27th September 1993

TECHNICAL INFORMATION

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

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

Magnetic readings are logged at 0.5m intervals along one axis in 1m traverses giving 800 readings per 20m x 20m grid, unless otherwise stated. Resistance readings are logged at 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 of two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to one metre deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

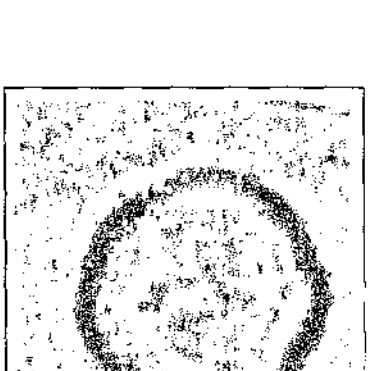
This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential.) Depending on the arrangement of these electrodes an exact measurement of a specific volume of earth may be acquired. This resistance value may then be used to calculate the earth resistivity. 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 a 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, 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 modes may be used.

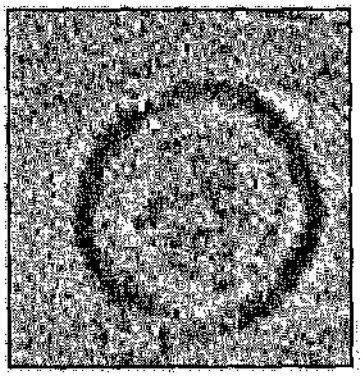


(a) Dot-Density

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 presented by more dots. In either representation, each reading is allocated a unique area dependent 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.

(b) X-Y Plot

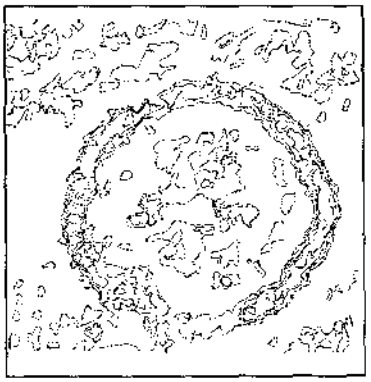
This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. Advantages of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



(c) Grey-Scale

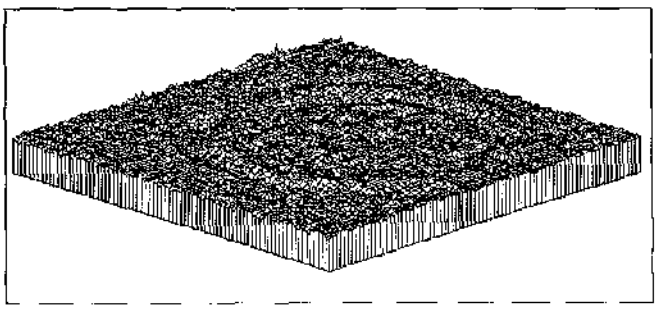
This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots or shade of grey, the intensity increasing with value. This gives an appearance of a toned or grey scale.

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.



(d) Contour

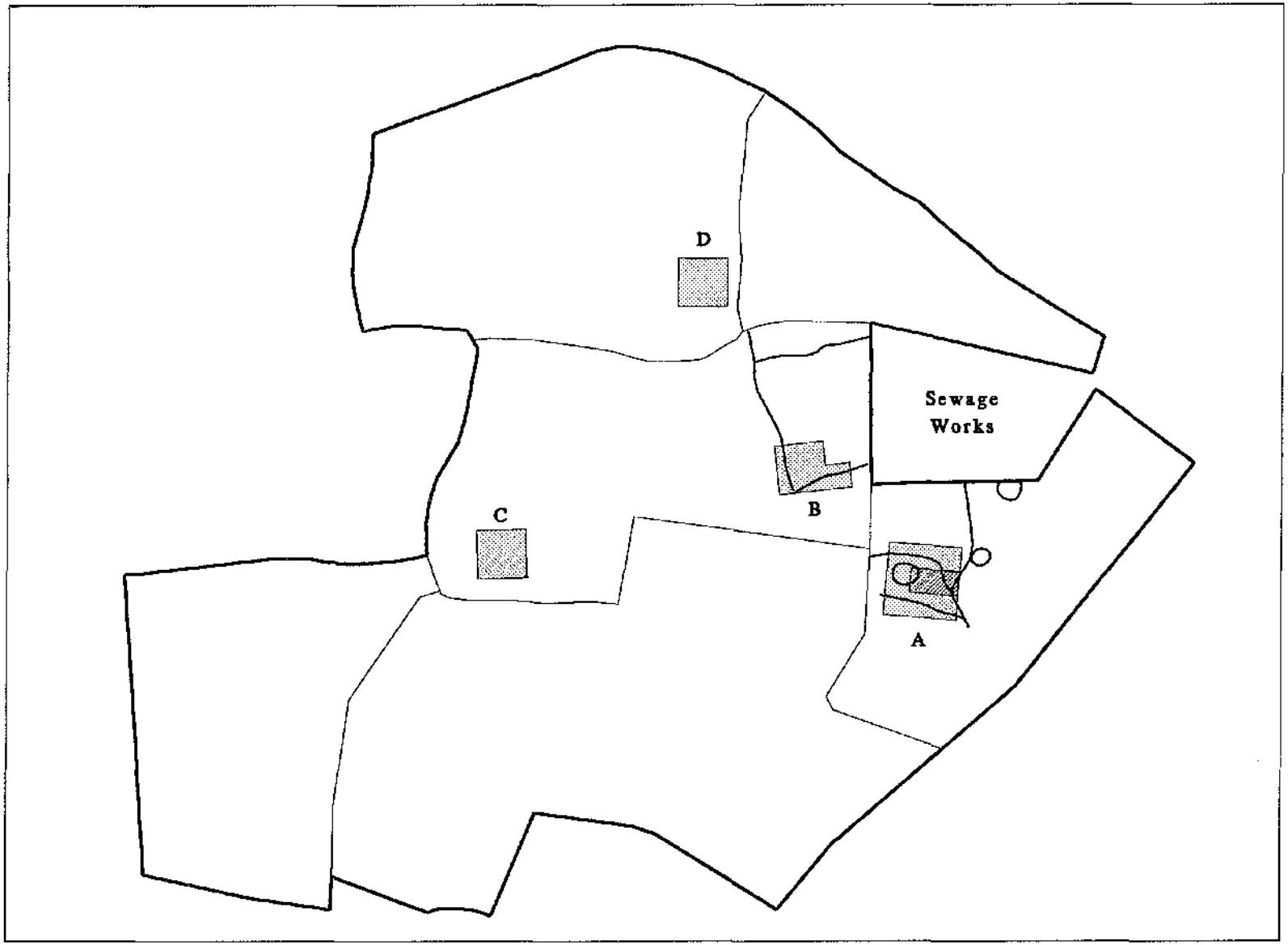
This display format is commonly used in cartographic displays. Data points of equal value are joined by a contour line. Closely packed contours indicate a sharp gradient. The contours therefore highlight an anomalous region. The range of contours and contour interval are selected manually and the display is then generated on the computer screen or plotted directly on a flat bed plotter / inkjet printer.



(e) 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).

GEOPHYSICAL SURVEYS OF BRADFORD	PROJECT: BARTON TURN	TITLE: Location of Survey Areas	Reproduced from a plan provided by BUFAU



Limit of Evaluation

Cropmark

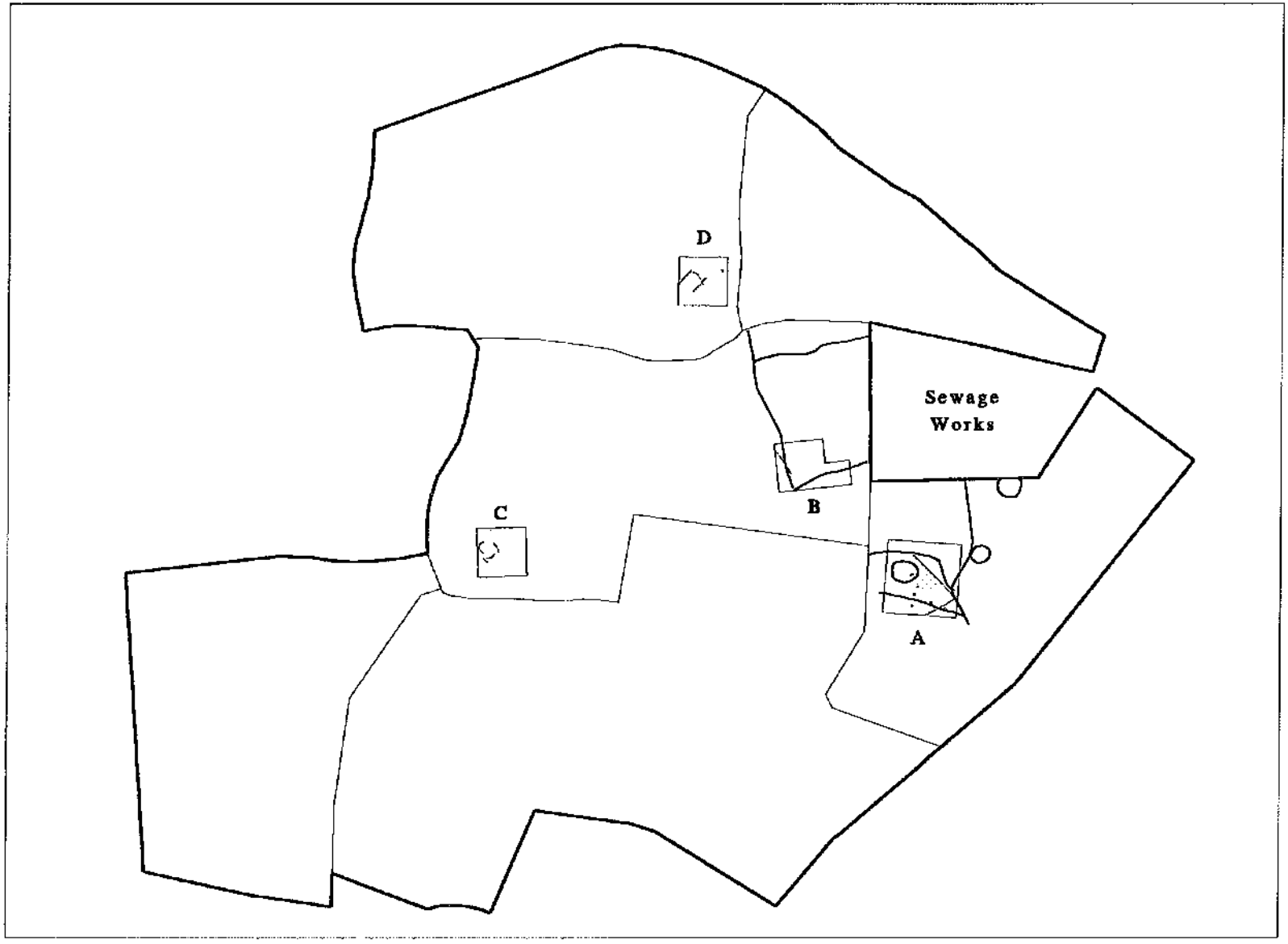
Magnetic
Survey Area

Magnetic and
Resistance
Survey Area

1:5000

Figure 1

GEOPHYSICAL SURVEYS OF BRADFORD	PROJECT: BARTON TURN	TITLE: Summary Interpretation	Reproduced from a plan provided by BUFAU



Limit of Evaluation

Cropmark

? Archaeology

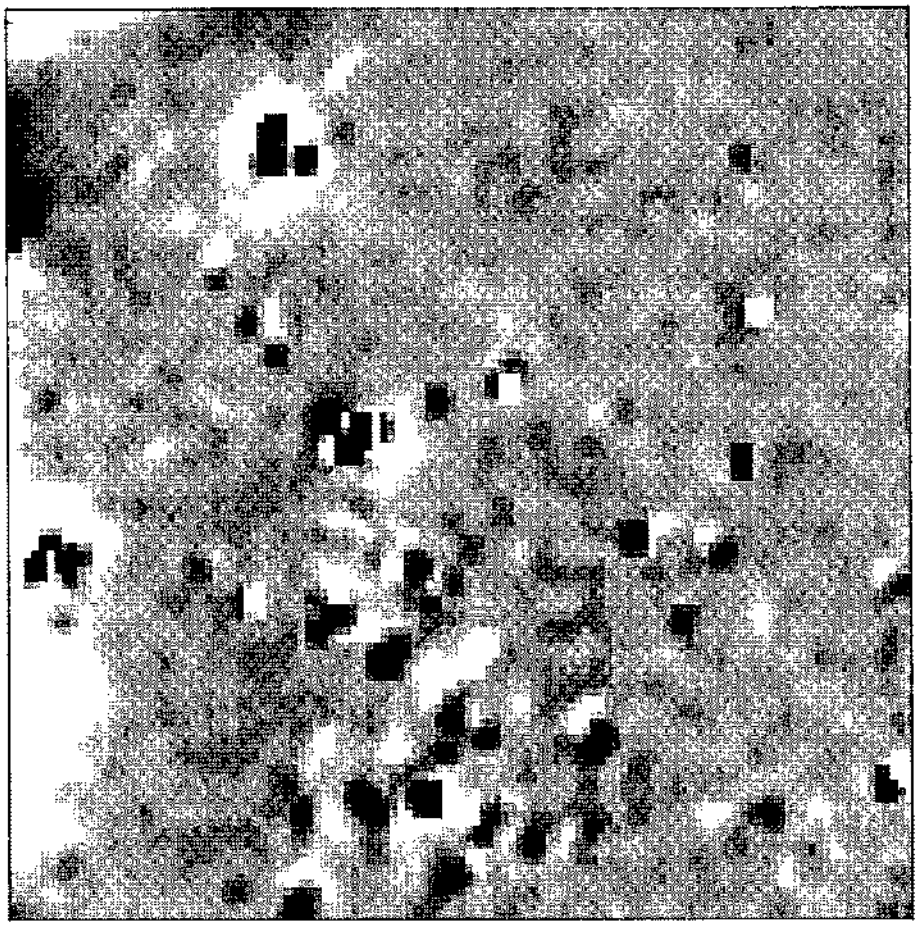
Area of High Resistance

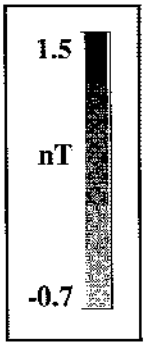
1:5000

Figure 2

BARTON TURN
Area A

Smoothed Data





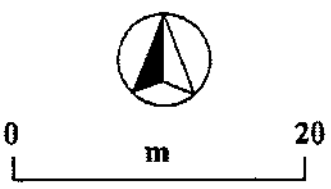
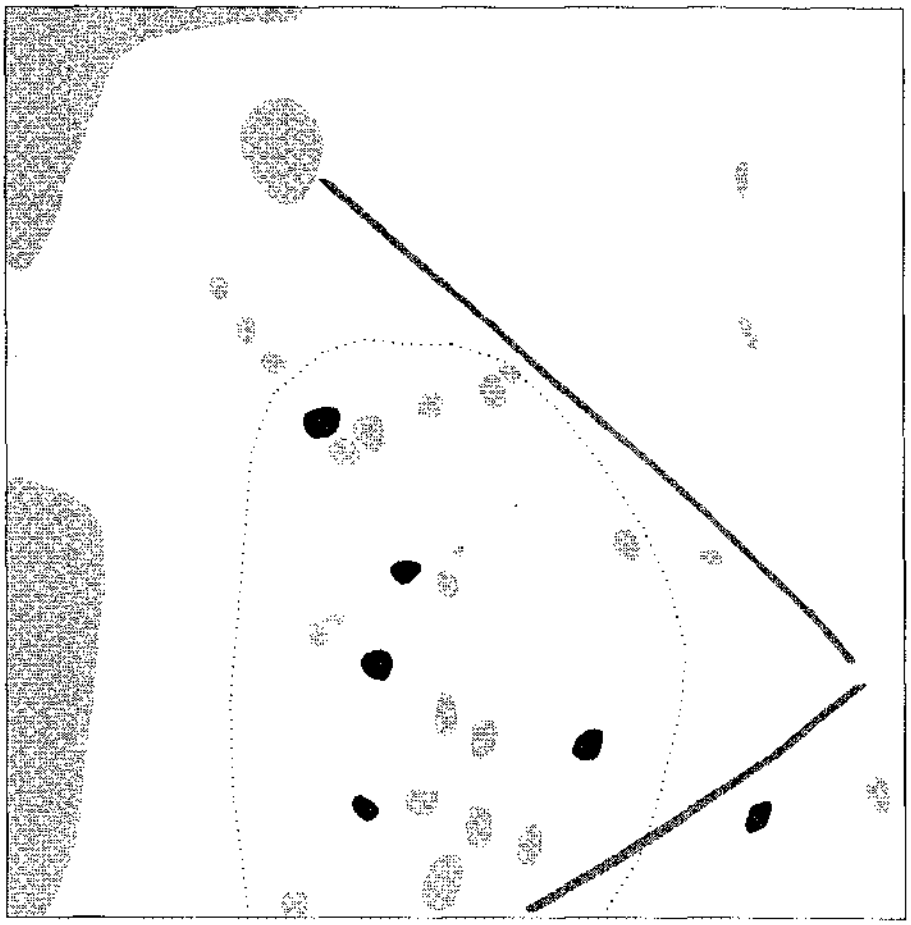


Figure A2

BARTON TURN
Area A



?Archaeology

?Negative Anomaly

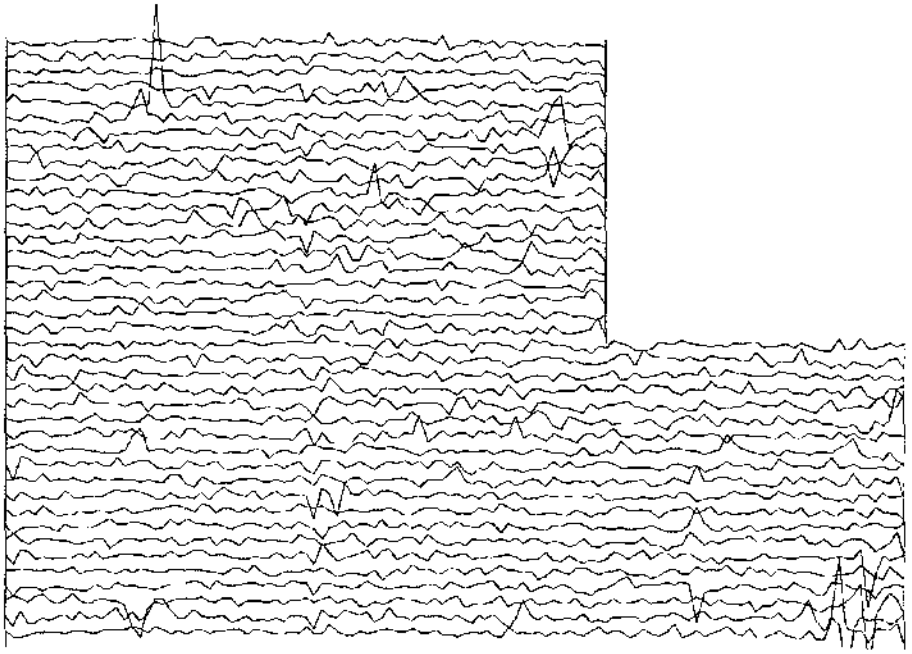
Ferrous

Area of increased noise

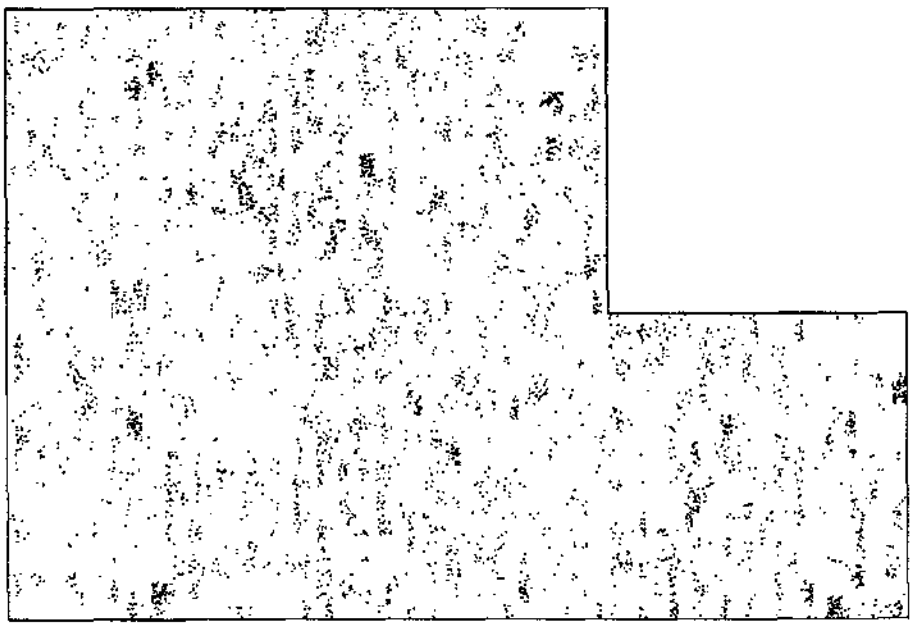
0 m 20

Figure A3

BARTON TURN
Area B



10 nT



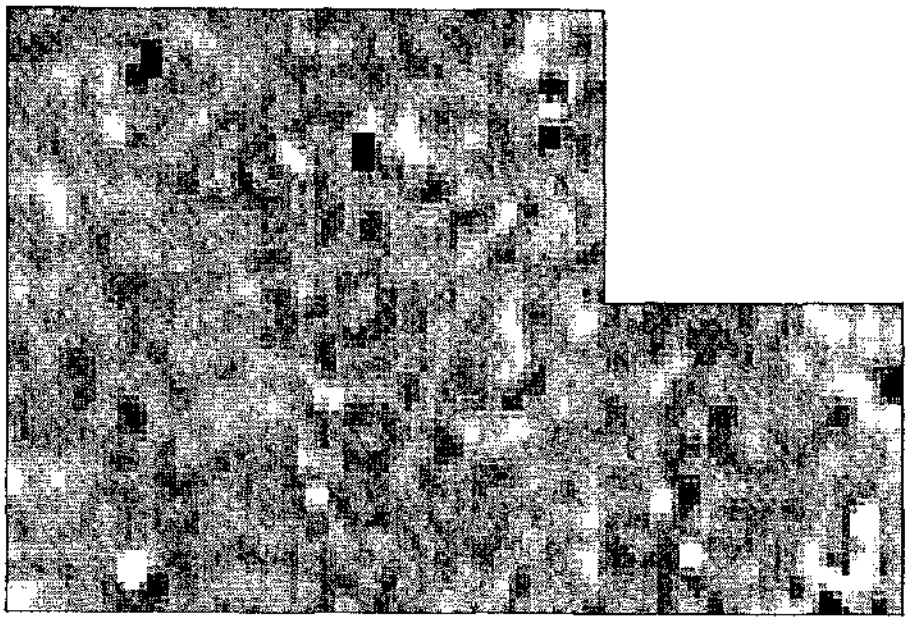
2.0
nT
0.1

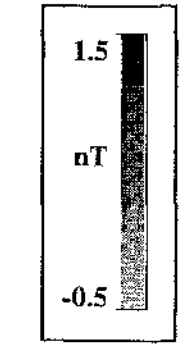
0 m 20

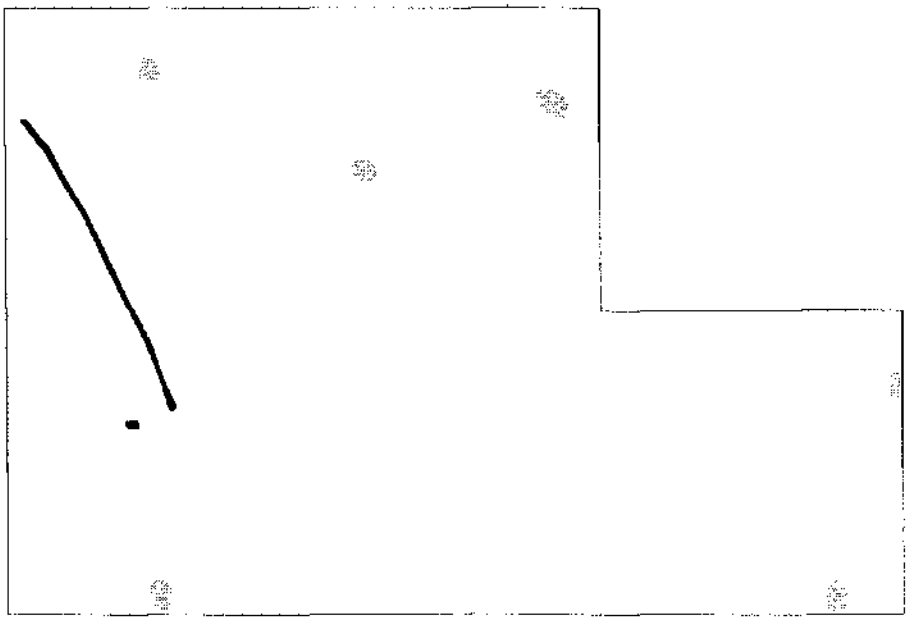
Figure B1

BARTON TURN
Area B

Smoothed Data







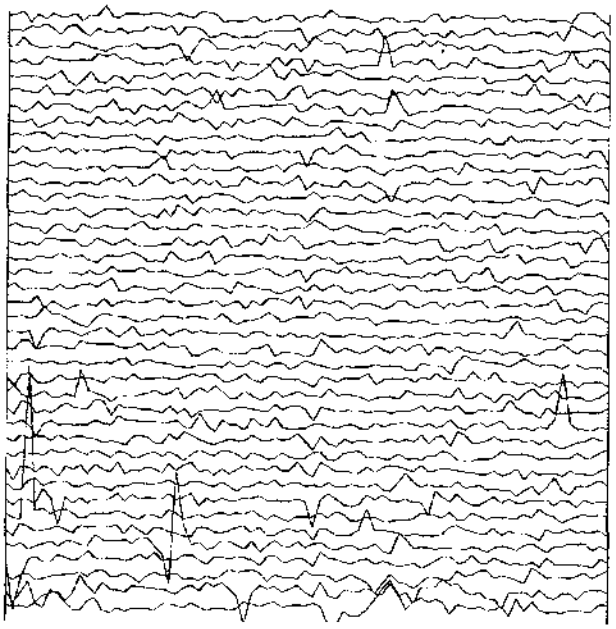
?Archaeology

Ferrous

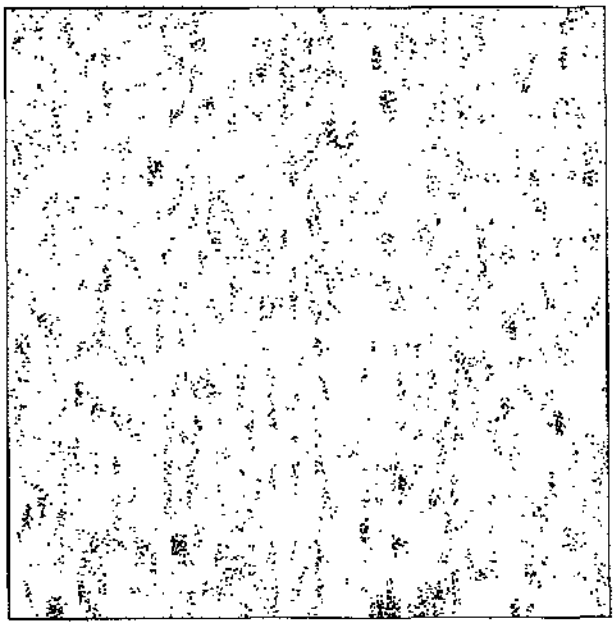
0 m 20

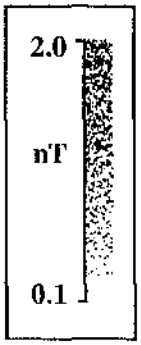
Figure B2

BARTON TURN
Area C



10 nT



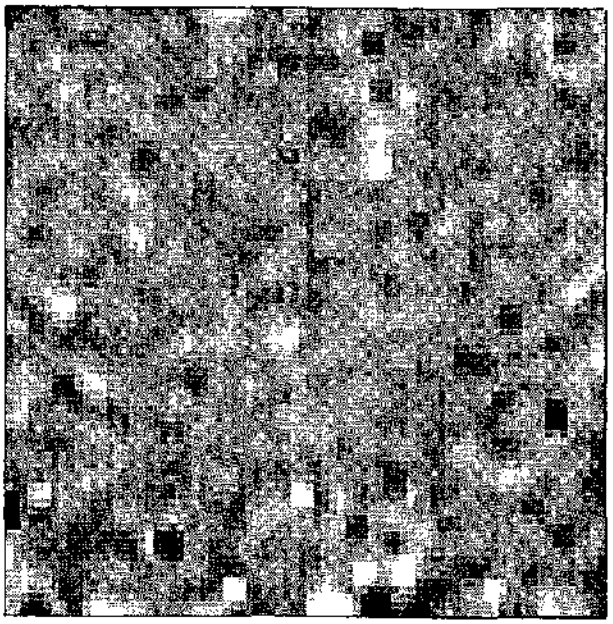


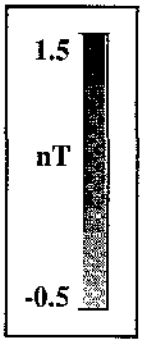
0 m 20

Figure C1

BARTON TURN
Area C

Smoothed Data





?Archaeology

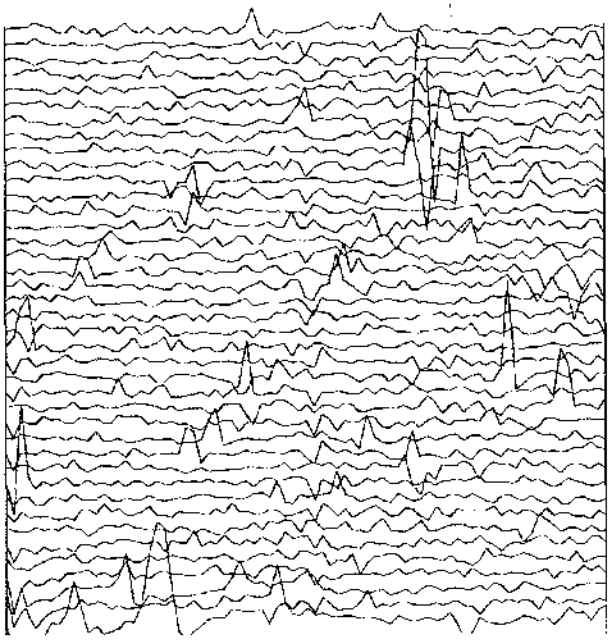
?Negative Anomaly

Ferrous

0 m 20

Figure C2

BARTON TURN
Area D



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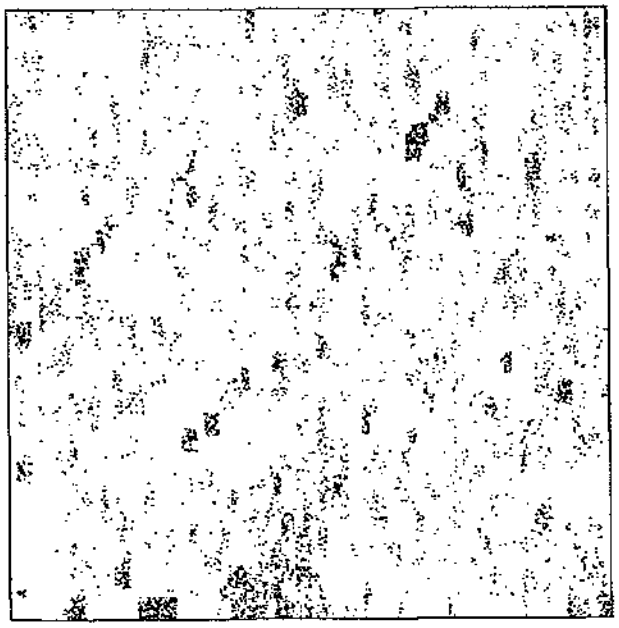
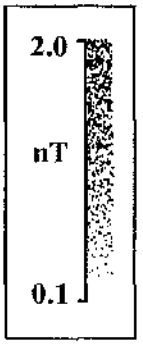


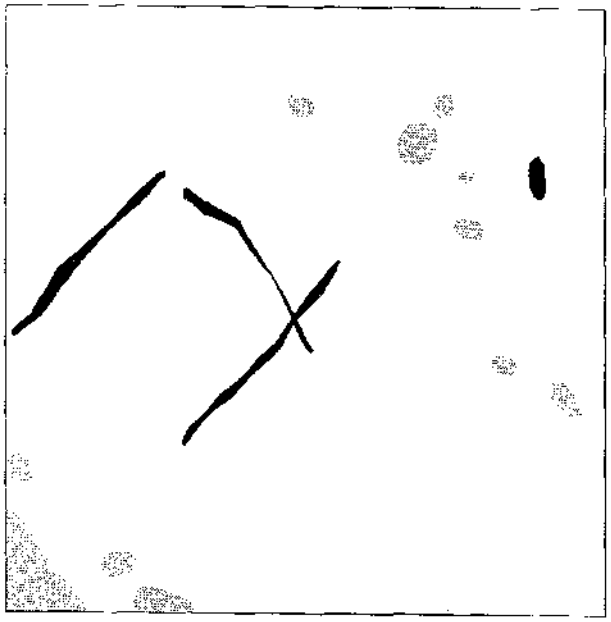


0 m 20

Figure D1

BARTON TURN
Area D

Smoothed Data



?Archaeology

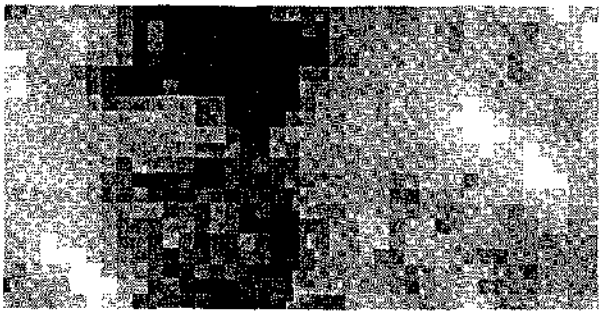
Ferrous

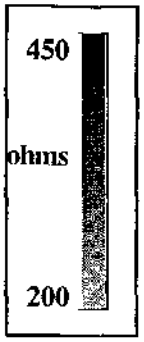
0 m 20

Figure D2

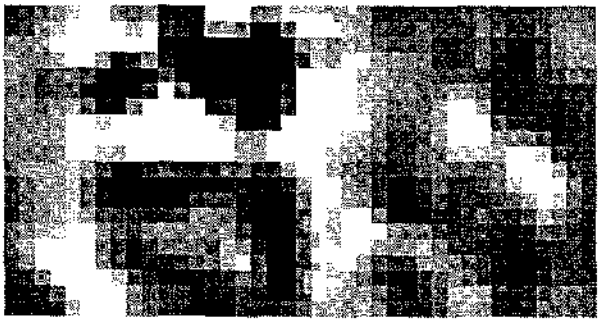
BARTON TURN
Area A Resistance

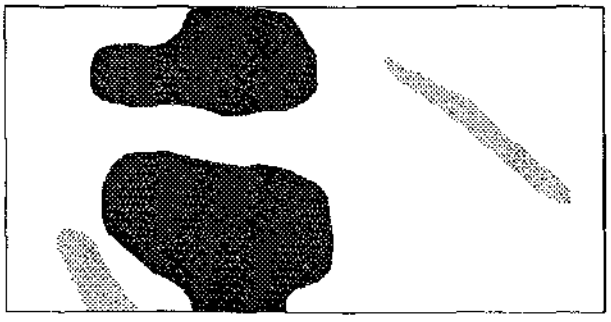
Raw Data





Filtered Data





High resistance

Low resistance

0 m 20

Figure R1

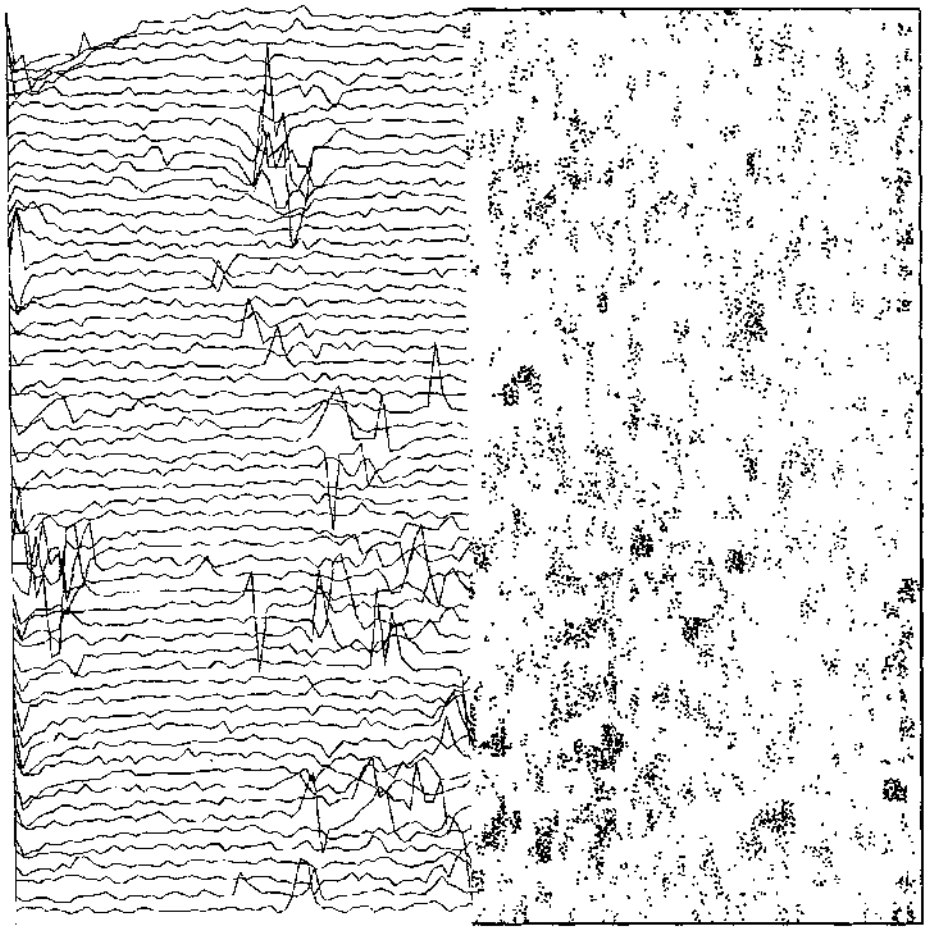


Figure A1