5653

SITE SUMMARY SHEET

2000 / 76 Money Field, Brettenham, Norfolk

NGR: TL 9405 8420 (approximate centre of field)

Location, topography and geology

Brettenham is a small village located approximately 6km east of Thetford, Norfolk. The survey area comprises a field known as the Money Field, which is situated 1km northeast of Brettenham between the Kilverstone to Bridgham road and the River Thet. The majority of the field is under short grass and gently slopes down towards the recently formed marshes adjacent to the River Thet in the south. The local soils are shallow sandy brown rendzinas, often found with similar deeper soils resulting in a striped pattern, overlying chalk and chalky drift (SSEW, 1983).

Archaeology

The presumed line of the Roman road known as Peddars Way passes through the centre of the area of investigation. Although mapped in part using earthworks and cropmarks the exact course of the road through the Money Field and the River Thet crossing is unknown. Evidence from aerial photographs, trial excavations, field walking and metal detector finds indicates a Romano-British settlement alongside the road and river crossing. The Sites and Monuments Record lists many coins, bronze ornaments, building fragments and pottery sherds which have been found in the Money Field suggesting it was the core of the Roman settlement of Brettenham. Immediately to the north of the study area several refuse pits some up to 5m in diameter have been excavated which contained roofing tiles, iron objects, pottery and igneous rocks which confirmed Roman settlement in the area (Clarke, 1936). Earlier settlement is also possible as Iron Age burials and coins have been uncovered in the vicinity.

Aims of Survey

The objectives of the survey were to use gradiometer scanning to locate concentrations of anomalies of interest. These were then targeted by detailed survey to determine their nature and origin. In particular the survey was designed to locate the Roman road and associated settlement.

Summary of Results *

Gradiometer scanning found numerous discrete responses of archaeological potential, with a distinct concentration in the northern quarter of the Money Field.

Detailed gradiometer survey was undertaken in two blocks to target all the scanned anomalies and to investigate the course of the Roman road. Many strong rectilinear and amorphous pit-type responses were detected which are of archaeological interest. A grid pattern can be seen in the results which can be interpreted as a planned settlement, although there is no evidence for the Roman road. The level of magnetic enhancement confirms occupation at the site and in some areas very strong responses suggest small-scale industrial activity. The results suggest that the core of settlement has been detected but archaeology is likely to continue further to the north, east and south.

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

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SURVEY RESULTS

2000 / 76 Money Field, Brettenham, Norfolk

1. Survey Area

1.1 The entire field, comprising *c.*8 hectares, was investigated using gradiometer scanning, followed by a 30% sample of detailed recorded survey totalling approximately 2.4 hectares. The limits of the scanning and the locations of detailed survey blocks are shown in Figure 1 at a scale of 1:2500. For ease of display, the two blocks of detailed survey have been subdivided into three (Areas A-C).

1.2 The survey grids were set out by **GSB Prospection** and tied-in to mapped features using an EDM. Detailed tie-in information has been lodged with the client.

2. Display

2.1 Figure 2 presents the results of the detailed survey as a summary greyscale image at a scale of 1:1250. An interpretation of the entire site is also shown at the same scale in Figure 3.

2.2 Figures 4 to 10 display the data for Areas A-C as XY traces and dot density plots with accompanying interpretation diagrams, all at a scale of 1:500. These display formats are discussed in the *Technical Information* section at the end of the text.

2.3 Numbers in parentheses in the text refer to specific anomalies noted on the interpretation diagrams.

3. General Considerations - Complicating factors

3.1 At the time of the field work the conditions were ideal for gradiometer survey with the majority of the area under short grass and free from obstructions. However, immediately adjacent to the River Thet the ground was marshy and the vegetation taller which impeded scanning to some extent.

3.2 The soils of the site are sandy which make detecting archaeological features using gradiometer survey complicated. This is because features cut through sandy soils will infill quickly with similar soils resulting in little or no magnetic contrast between the feature fill and the surrounding subsoil. The exception will be where sections of ditches or pits have been infilled with magnetically enhanced materials, such as burnt material or industrial by-products.

3.3 Numerous isolated ferrous responses are noted in the data which probably reflect ferrous debris within the soil. However, given their context they may reflect objects of archaeological interest, although a modern origin is more likely. The most prominent of these are noted on the interpretation diagrams, but are not discussed in the report unless they are felt to be particularly relevant.

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4. Results of Scanning

4.1 With gradiometers in scanning mode, the Money Field was examined along traverses spaced approximately 10m apart. During this operation, fluctuations in magnetic signal were observed on the instruments' display panel. Any significant variations were investigated more closely to determine their likely origin and those anomalies considered to have archaeological potential were marked with canes for detailed recorded survey.

4.2 Scanning detected a large number of discrete anomalies and areas of increased magnetic response. These appeared to be concentrated in the northern quarter of the field and to continue to the south and east. Fewer anomalies were located towards the west of the study area.

4.3 A zone of ferrous disturbance produced by a pipeline was encountered halfway along the northwestern field boundary. This response continued in a south-southeastern direction, bisecting the field, and would mask any weaker anomalies of archaeological potential.

4.4 Alongside the River Thet there was a very low level of magnetic response. This may be as a result of alluviation which could also mask archaeological type anomalies or more recent floodplain formation that may post-date settlement.

5. Results of Detailed Survey

Area A

This survey block was positioned to examine an isolated response and to sample the quieter background levels noted during scanning.

5.1 Several irregular anomalies have been detected which may represent short sections of ditches or pits of archaeological interest.

5.2 Two weak trends can also be seen in the results from this area which may be of archaeological significance. However, it is more likely that they are as a result of natural variations in the subsoil or modern agriculture practice.

5.3 No clear archaeological patterns have been detected and the responses do not appear to be very magnetically enhanced. Although this is a small sample block, it would suggest that the core of the settlement does not extend into the west of the Money Field.

Areas B & C

Detailed survey was carried out in one continuous sample block to target numerous discrete scanning responses and also to cover the proposed course of the Roman road.

5.4 Numerous strong responses can be seen in the results that show high levels of magnetic enhancement which almost certainly reflect archaeological remains. The weaker, less distinct, anomalies that have been detected probably also represent potential archaeology, although they could be caused by natural variations in pedology or geology.

5.5 An orthogonal arrangement of linear anomalies has been detected oriented approximately with the cardinal points of the compass. Several rectilinear patterns can be discerned in the data which probably represent ditched enclosures, building remains and streets.

5.6 A rectilinear enclosure (1) measuring approximately 15x25m with possible internal divisions or structures can clearly be seen in the results. Two more fragmentary enclosures have been located in the east of Area C (2 & 3). Enclosure (2) is of similar proportions to (1) whereas the other 'enclosure' (3) is less defined and the responses may represent a range of buildings.

5.7 All these rectilinear anomalies (1, 2 & 3) are aligned with each other and suggest buildings and plots which front onto a street or road oriented east-west. Another possible street can be seen parallel to this range of enclosures, approximately 55m to the north. However, there is no clear evidence for a street plan as the responses are fragmentary, and the north-northwest to south-southeast line of the Peddars Way cannot be discerned.

5.8 Many isolated, strong responses can be seen throughout the data, the majority of which probably reflect pits. Several of the larger, more rectangular examples may represent concentrations of fired materials associated with the remains of buildings (4).

5.9 Two clusters of very strong anomalies towards the south of this survey block may be evidence for pits containing fired materials or industrial by-products (5). However, it is possible that they represent individual structures, such as kilns or furnaces, that may elude to small-scale industrial activity on the site. A similar pair of anomalies at the corner of enclosure (1) may also reflect hearths or ovens (6).

5.10 Numerous broad bands of slightly increased magnetic response can be seen in the results from Area C and are most likely natural in origin. It is known that the local soils are prone to striping patterns and this is confirmed by aerial photographs which show geological/pedological cropmarks that correlate with some of the geophysical responses.

5.11 A linear trend through the northwest of Area C is possibly the result of a modern feature such as a non-ferrous service or drain.

5.12 The data are dominated by a strong linear ferrous response aligned north-northwest to south-southeast which reflects a pipeline bisecting Area B. This pipe has resulted in a 20m strip of disturbance in the data which would mask any weaker anomalies of archaeological interest in the vicinity.

5.13 In the southeast of Area B a concentration of ferrous disturbance has been detected and may be associated with a break in a former field boundary or the adjacent pipeline. However, given the archaeological context it is still possible that it is associated with past settlement or small-scale industry.

6. Conclusions

6.1 Scanning located discrete anomalies and areas of elevated response which were considered to be archaeological in origin. Detailed survey confirmed the scanning results and detected many strong linear and large amorphous anomalies of archaeological potential, that can be interpreted as ditched enclosures, building remains and large pits. The strength of these responses suggest occupation and possibly small-scale industry. The continuous orthogonal arrangement is typical of a planned Roman settlement.

6.2 The absence of this grid pattern in Area A would suggest that the settlement does not extend further to the west. However, further survey could detect more detail within the Money Field, and the results show that settlement continues to the north and east outside of the present area of investigation.

6.3 There is no evidence for the Peddars Way Roman road in the detailed gradiometer survey. If the road was sited further to the west it is possible that it was not detected as the modern pipeline would mask other responses. However, the results show a planned settlement on a north/south alignment, whereas the course of the Peddars Way is shown by the Ordnance Survey as north-northwest to south-southeast.

6.4 Whilst some anomalies show a strong magnetic response, many are fragmentary and the overall pattern of anomalies is poorly defined. This may be a result of the variable levels of magnetic enhancement on sandy soils as discussed above (see Section 3.2). However, it maybe that ploughing has damaged shallow archaeological deposits and truncated the soil profile resulting in only the deeper features surviving.

6.5 The lack of clarity in the results may also be due to the nature of the buried archaeological remains. Some of the magnetic responses are likely to reflect buildings but gradiometer survey cannot always clearly define such features. It is possible that another geophysical technique such as an electrical resistance survey could provide complimentary results to further interpretation of the gradiometer responses (see *Technical Information* section).

Project Co-ordinator: C Martinez and D Weston
Project Assistants: A Shields

Date of Survey: 25th - 27th July 2000
Date of Report: 3rd August 2000

References:

Clarke, R 1936 'The Roman Villages at Brettenham and Needham and the contemporary Road System' *Norfolk Archaeology* 26, 123-162

SSEW 1983 *Soils of England and Wales. Sheet 4, Eastern England.* Soil Survey of England and Wales.

TECHNICAL INFORMATION

The following is a description of the equipment and display formats used in **GSB Prospection (GSB)** 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 **GSB.**

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.

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. Readings are normally logged at 0.5m intervals along traverses 1.0m apart.

(b) Resistance Meter - Geoscan 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". In area survey readings are typically logged at 1.0m x 1.0m intervals.

(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. Sampling intervals vary widely but are often at the 10m or 20m level. The instrument employed for measuring this phenomenon is either a field coil or a laboratory based susceptibility bridge. The field coil measures the susceptibility of a volume of soil. The laboratory procedure determines the susceptibility of a specific mass of soil. For the latter 50g soil samples are collected in the field. These are then air-dried, ground down and sieved to exclude the coarse earth (>2mm) fraction.

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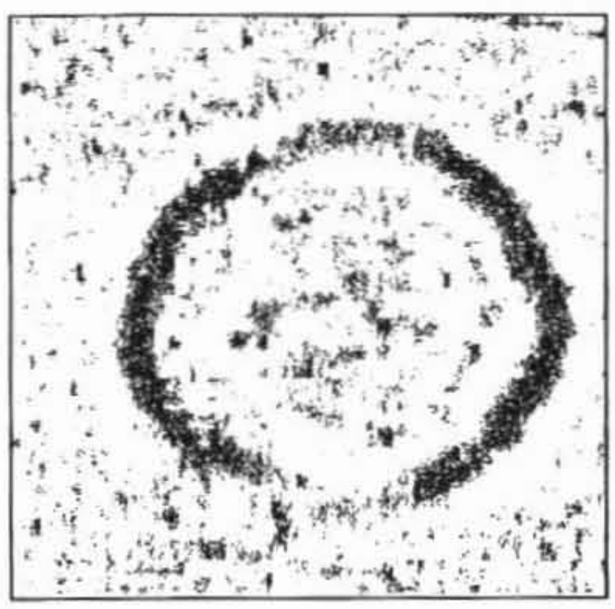
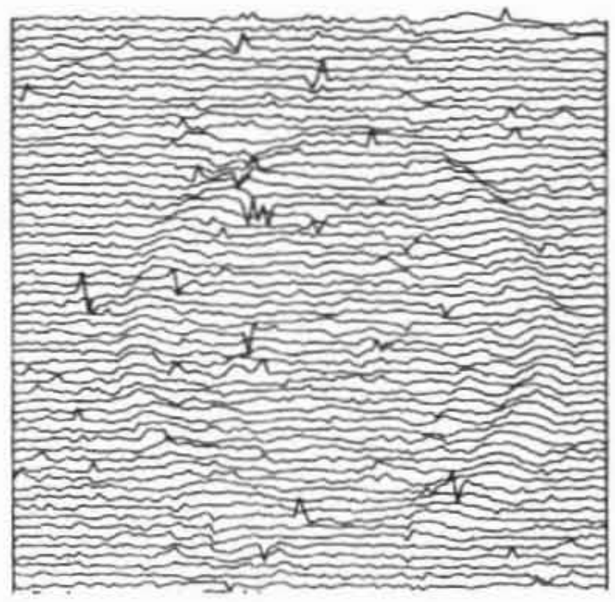
Display Options

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.



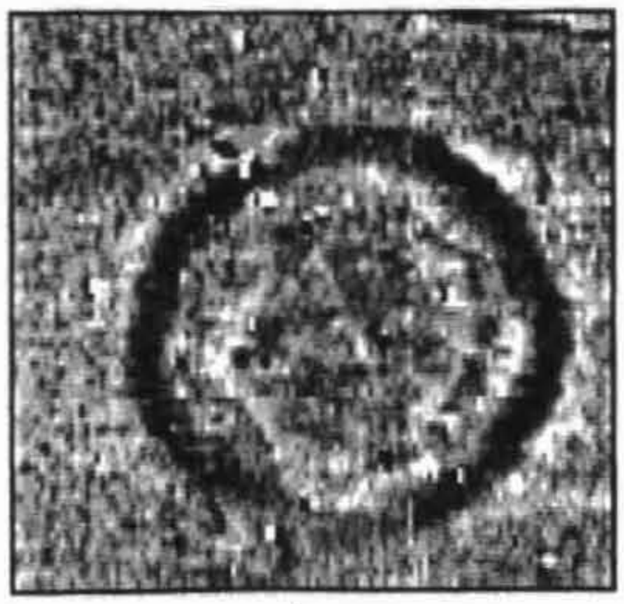
(a) Dot Density

In this display minimum and maximum cut-off levels are chosen. Any value that is below the minimum will appear white, whilst any value above the maximum will be black. Values that lie between these two cut-off levels are depicted with a specified number of dots depending on their relative position between the two levels. Assessing a lower than normal reading involves the use of an inverse plot that 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. However, this display is favoured for producing plans of sites, where positioning of the anomalies and features is important.



(b) XY 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. The 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. The display may also be changed by altering the horizontal viewing angle and the angle above the plane. The output may be either colour or black and white.



(c) Greyscale

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, greyscales tend to be more informative.

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Terms commonly used in the graphical interpretation of gradiometer data

Ditch / Pit
This category is used only when other evidence is available that supports a clear archaeological interpretation e.g. cropmarks or excavation.

Archaeology
This term is used when the form, nature and pattern of the response is clearly archaeological but where no supporting evidence exists. These anomalies, whilst considered anthropogenic, could be of any age. If a more precise archaeological interpretation is possible then it will be indicated in the accompanying text.

? Archaeology
The interpretation of such anomalies is often tentative, with the anomalies exhibiting either weak signal strength or forming incomplete archaeological patterns. They may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.

Areas of Increased Magnetic Response
These responses show no visual indications on the ground surface and are considered to have some archaeological potential.

Industrial
Strong magnetic anomalies, that due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.

Natural
These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions e.g. palaeochannels or magnetic gravels.

? Natural
These are anomalies that are likely to be natural in origin i.e geological or pedological.

Ridge and Furrow
These are regular and broad linear anomalies that are presumed to be the result of ancient cultivation. In some cases the response may be the result of modern activity.

Ploughing Trend
These are isolated or grouped linear responses. They are normally narrow and are presumed modern when aligned to current field boundaries or following present ploughing.

Trend
This is usually an ill-defined, weak or isolated linear anomaly of unknown cause or date.

Areas of Magnetic Disturbance
These responses are commonly found in places where modern ferrous or fired materials are present e.g. brick rubble. They are presumed to be modern.

Ferrous Response
This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes or above ground features such as fencelines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.

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List of Figures

GSB PROSPECTION

PROJECT: 2000/76 Money Field, Brettenham

TITLE: Tie-In Information

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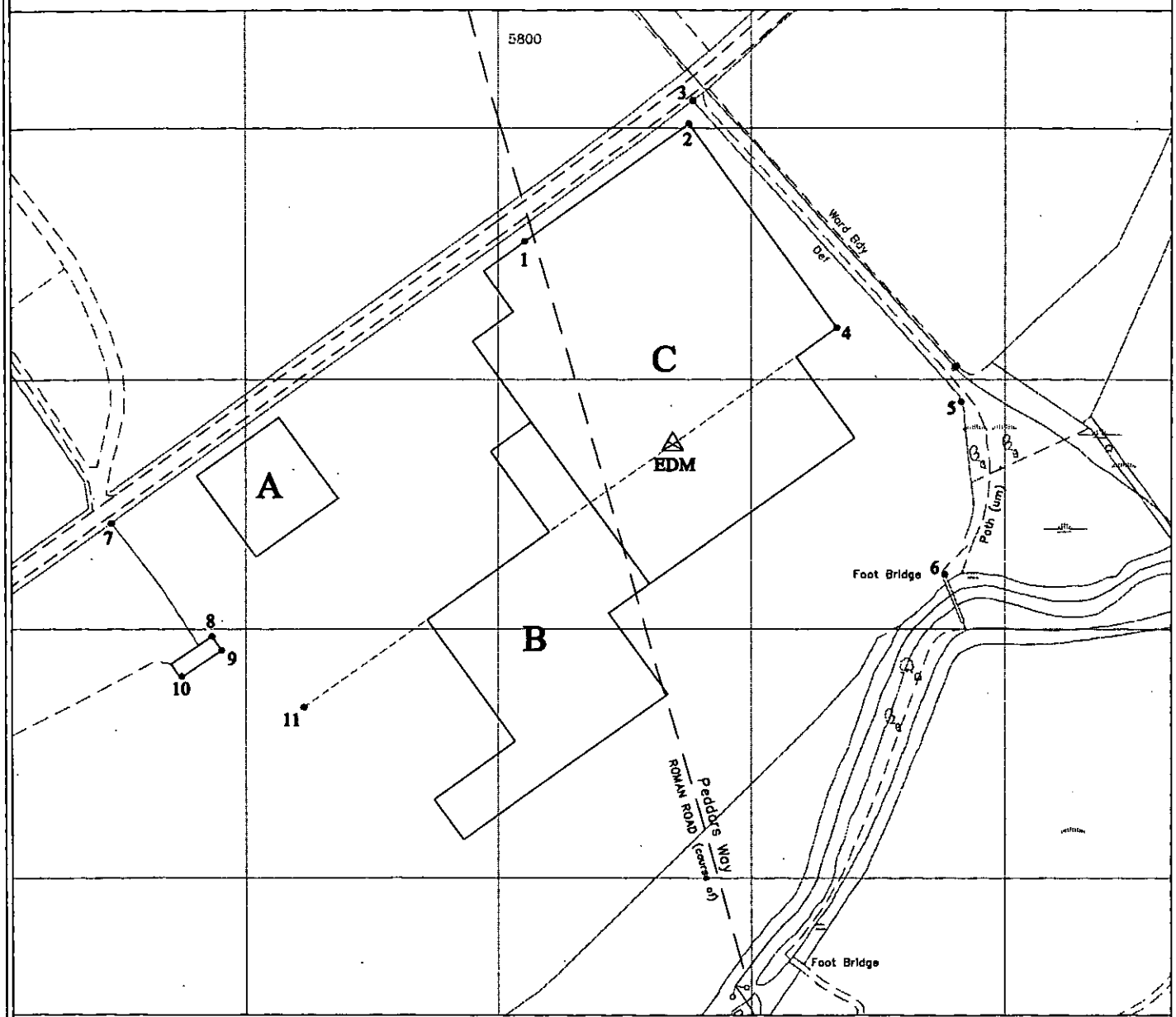
0 metres 100



Pt.	Hz. Angle (°)	Distance (m)	Notes
1	0	100	Grid Point
2	38.673	127.91	Grid Point
3	40.018	134.97	Field Corner
4	90	80	Grid Point
5	117.304	115.16	Field Boundary*
6	151.251	120.66	Footbridge*
7	297.752	224.30	Field Corner*
8	282.986	198.06	Building (N)*
9	281.135	196.90	Building (E)*
10	280.252	215.46	Building (S)*
11	270	180	Baseline
12	270	100	Baseline

* these points have been marked in the field

Figure T.1

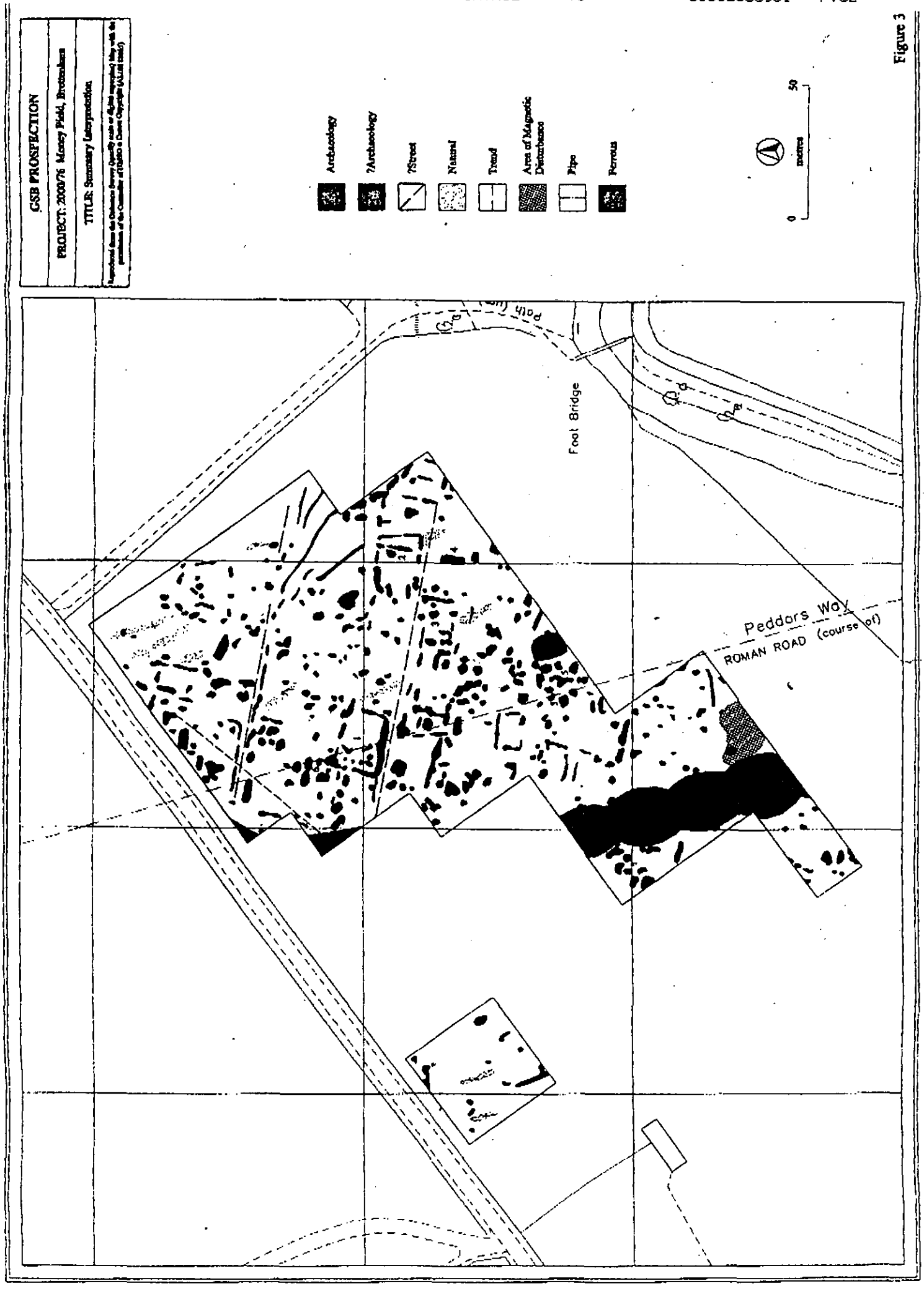

GSB PROSPECTION
PROJECT: 2000/76 Money Field, Brettenham
TITLE: Summary Interpretation
Archaeology
?Archaeology
?Street
Natural
Trend
Area of Magnetic Disturbance
Pipe
Furrow
0
50
metres
Foot Bridge
Peddars Way
ROMAN ROAD (course of)

Figure 3

GSB PROSPECTION

PROJECT: 2000/76 Money Field, Brettenham

TITLE: Summary Interpretation

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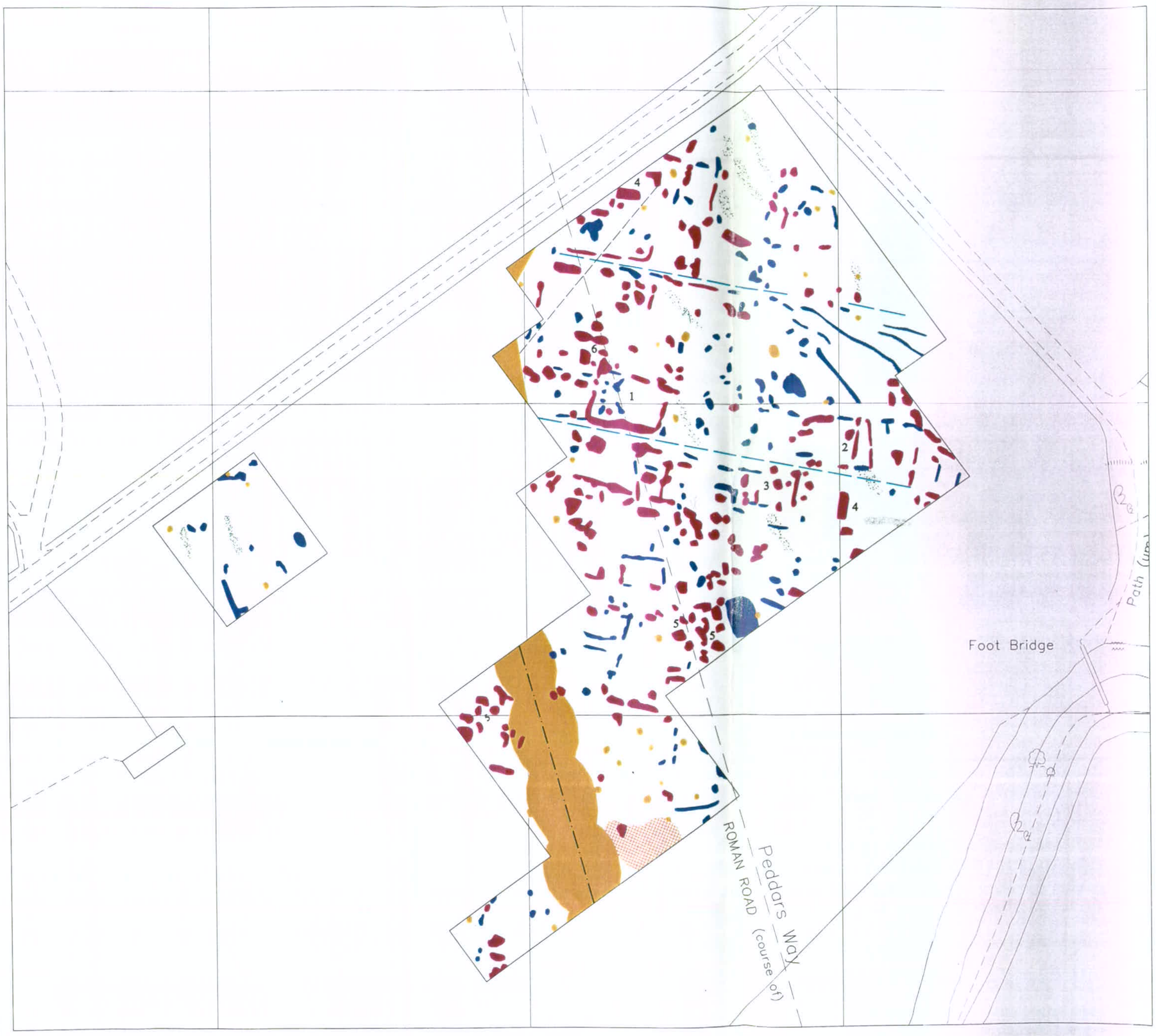


Archaeology

?Archaeology

?Street

Natural

Trend

Area of Magnetic Disturbance

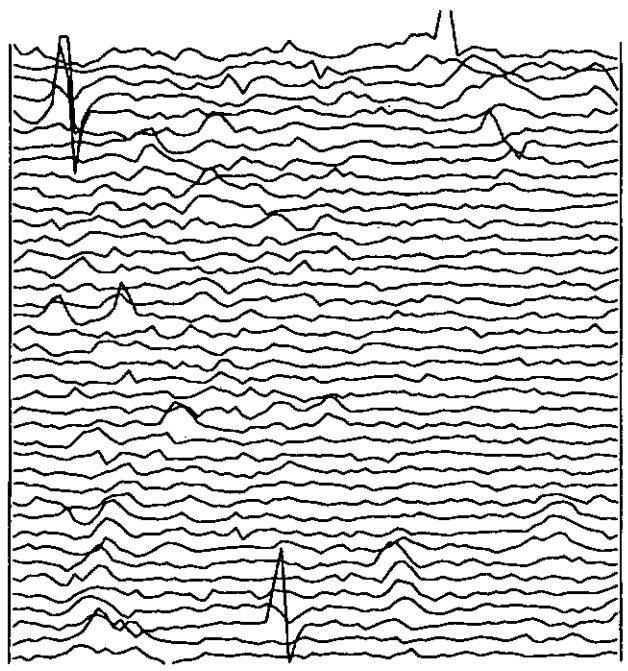
Pipe

Ferrous

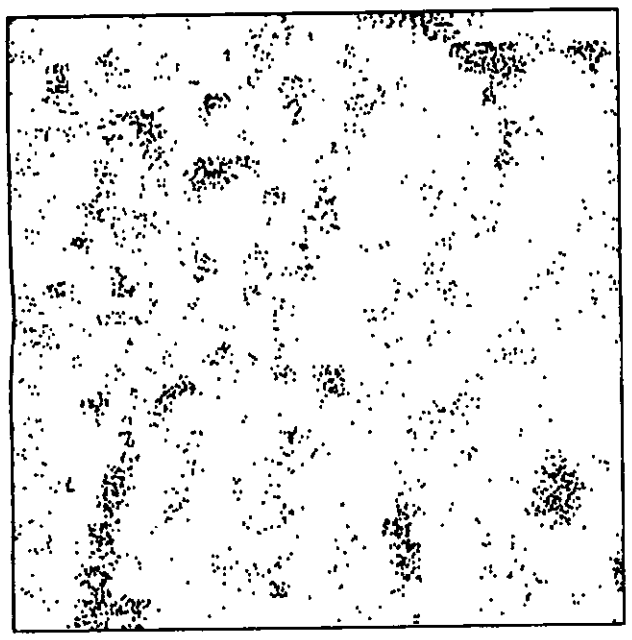
0 metres 50

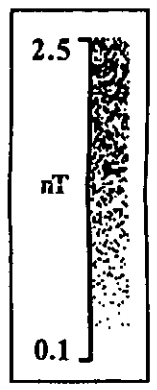
Figure 3

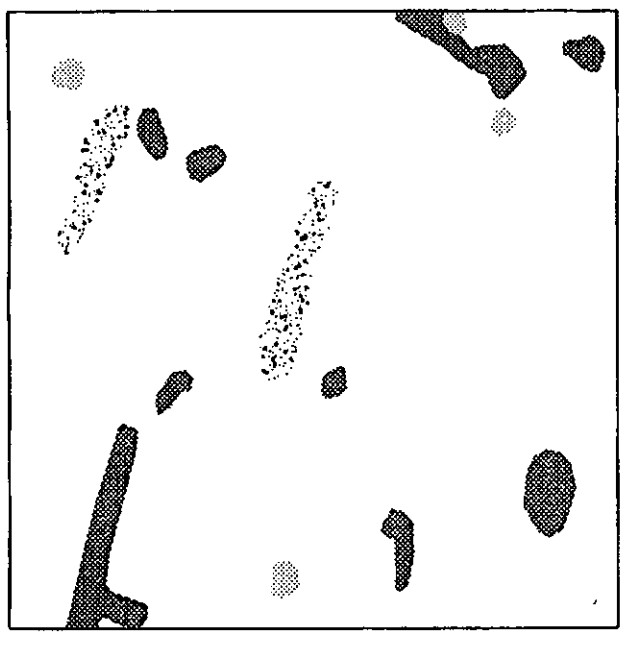
MONEY FIELD, BRETTENHAM
Area A



15 nT







?Archaeology

Natural

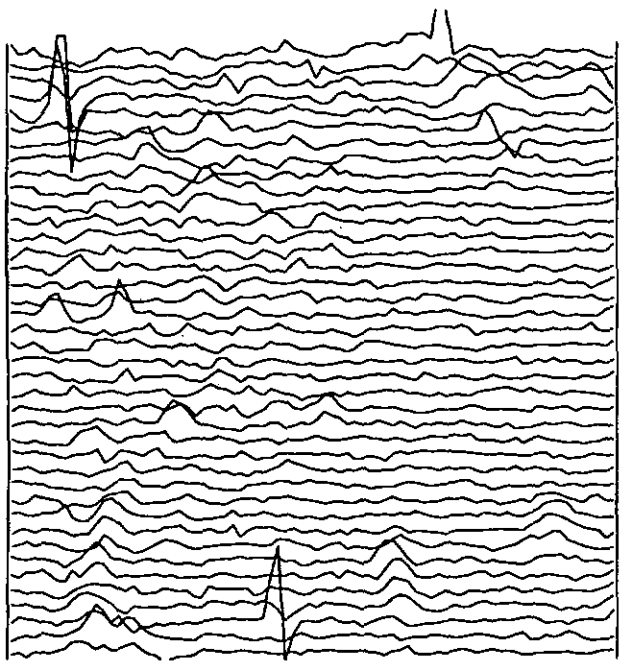
Ferrous

0 m 20

GSB Prospection 2000/76

Figure 4

MONEY FIELD, BRETTENHAM
Area A



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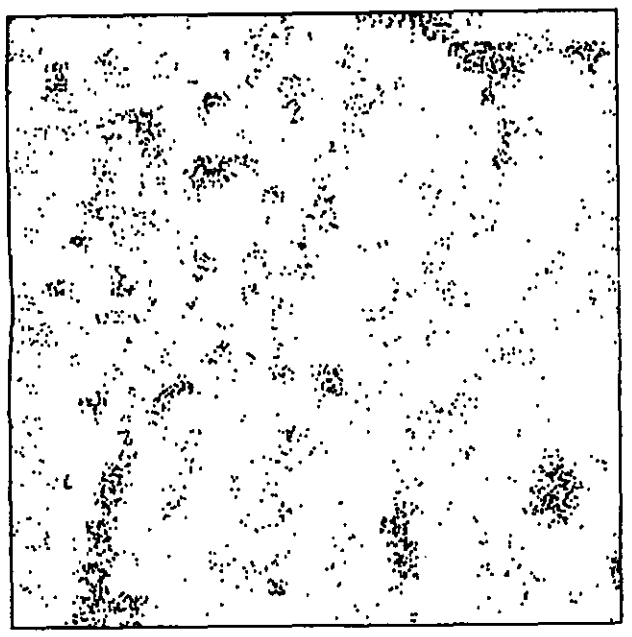
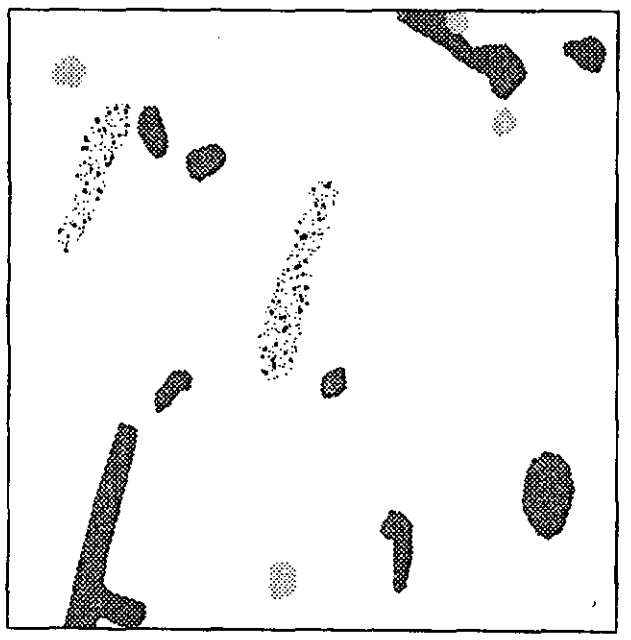


2.5
nT
0.1



?Archaeology

Natural

Ferrous

0 m 20

GSB Prospection 2000/76

Figure 4

MONEY FIELD, BRETTENHAM
Area B

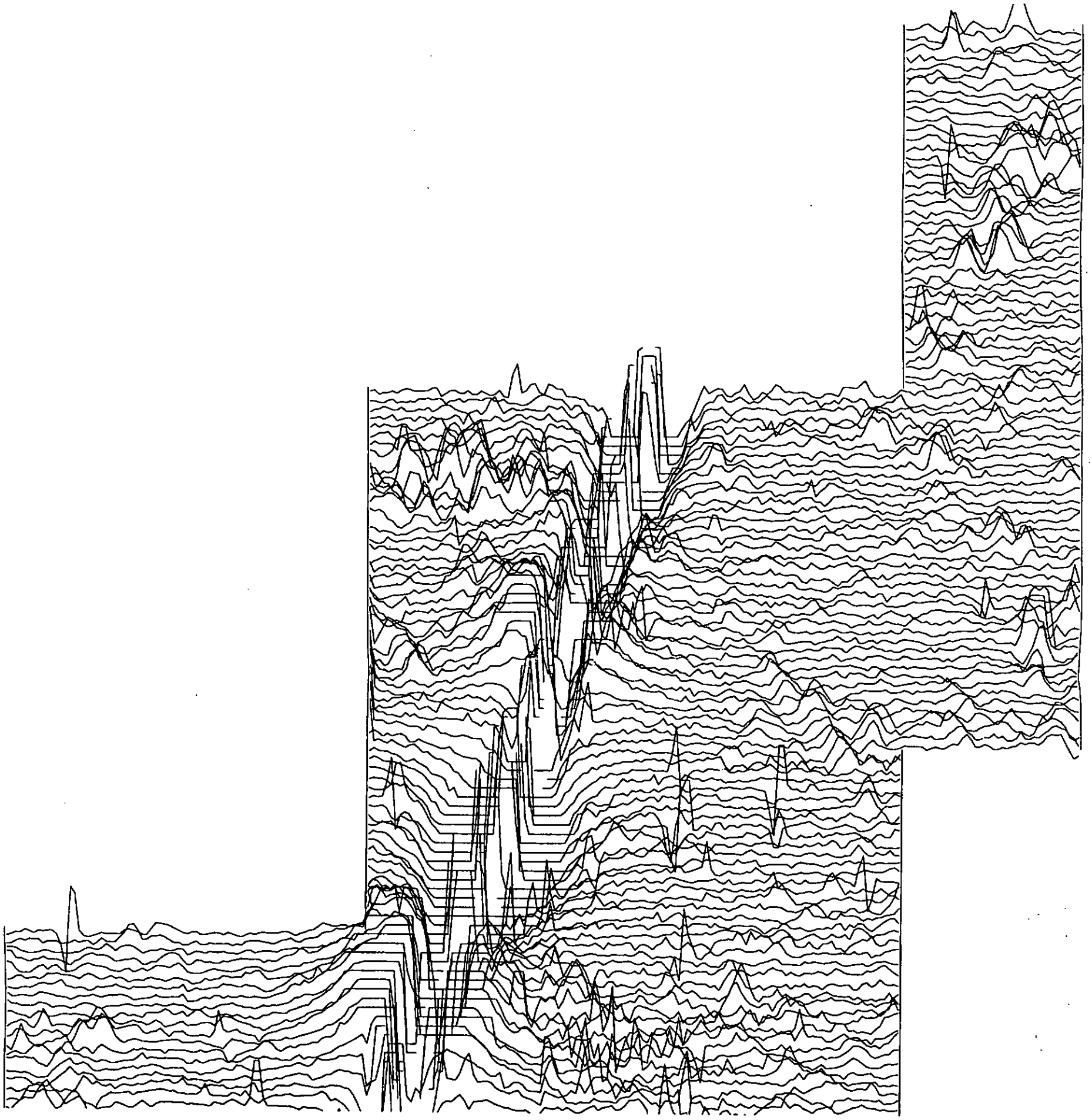


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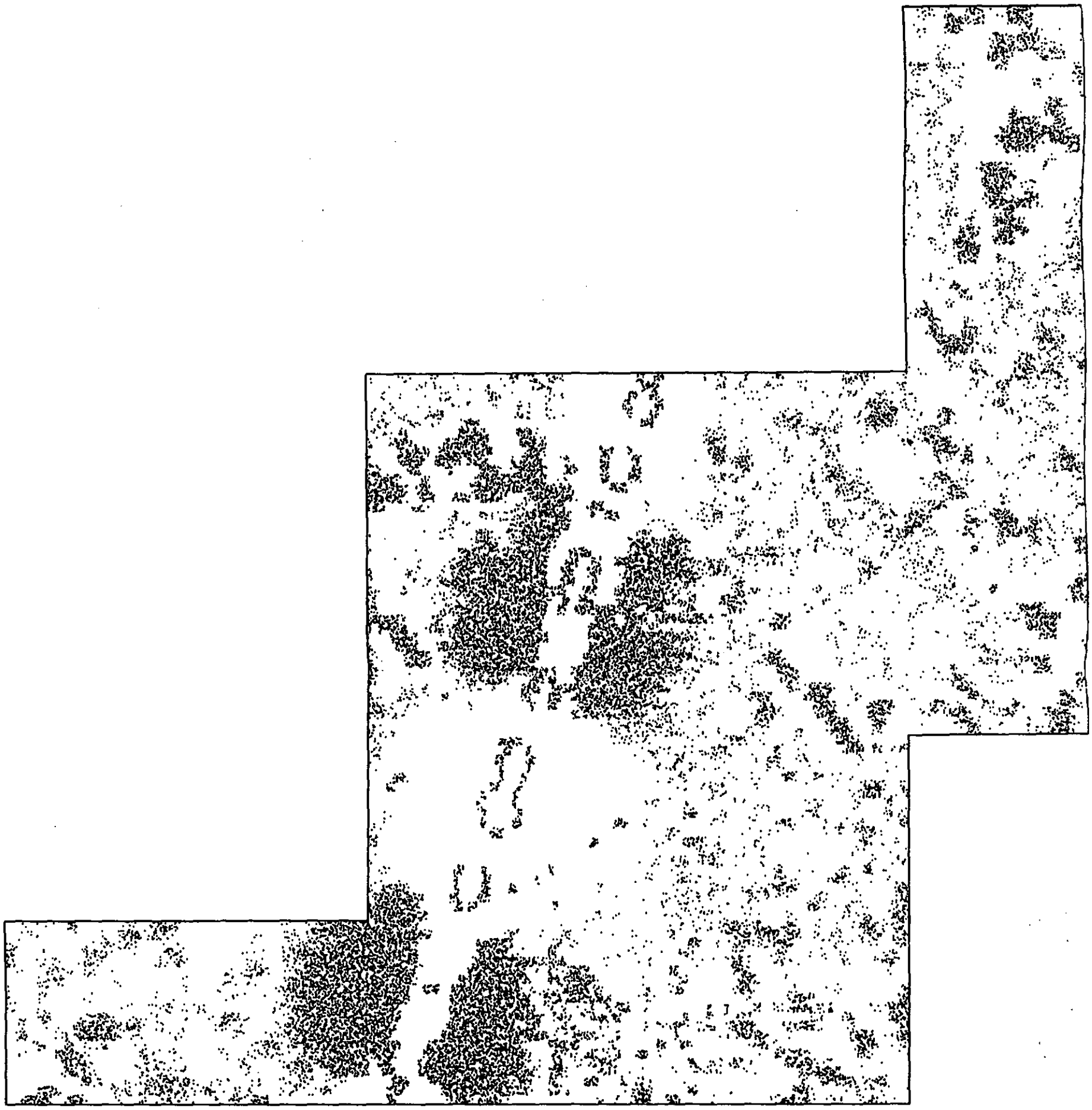
Figure 5

MONEY FIELD, BRETTENHAM
Area B



GSB Prospection 2000/76

Figure 6

MONEY FIELD, BRETTENHAM
Area B

0 m 20

Archaeology

?Archaeology

Area of Magnetic Disturbance

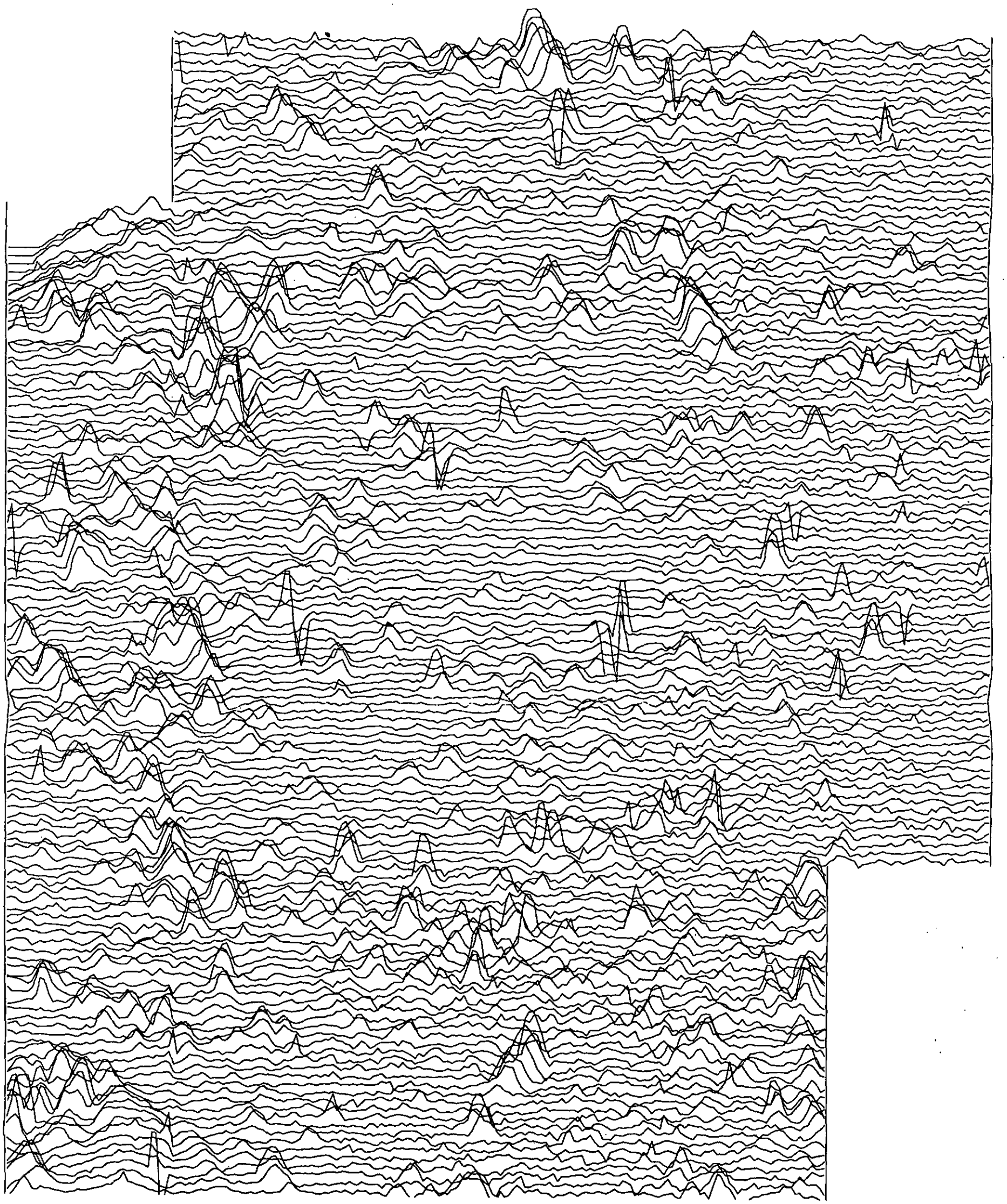
Pipe

Ferrous

GSB Prospection 2000/76

Figure 7

MONEY FIELD, BRETTENHAM
Area C



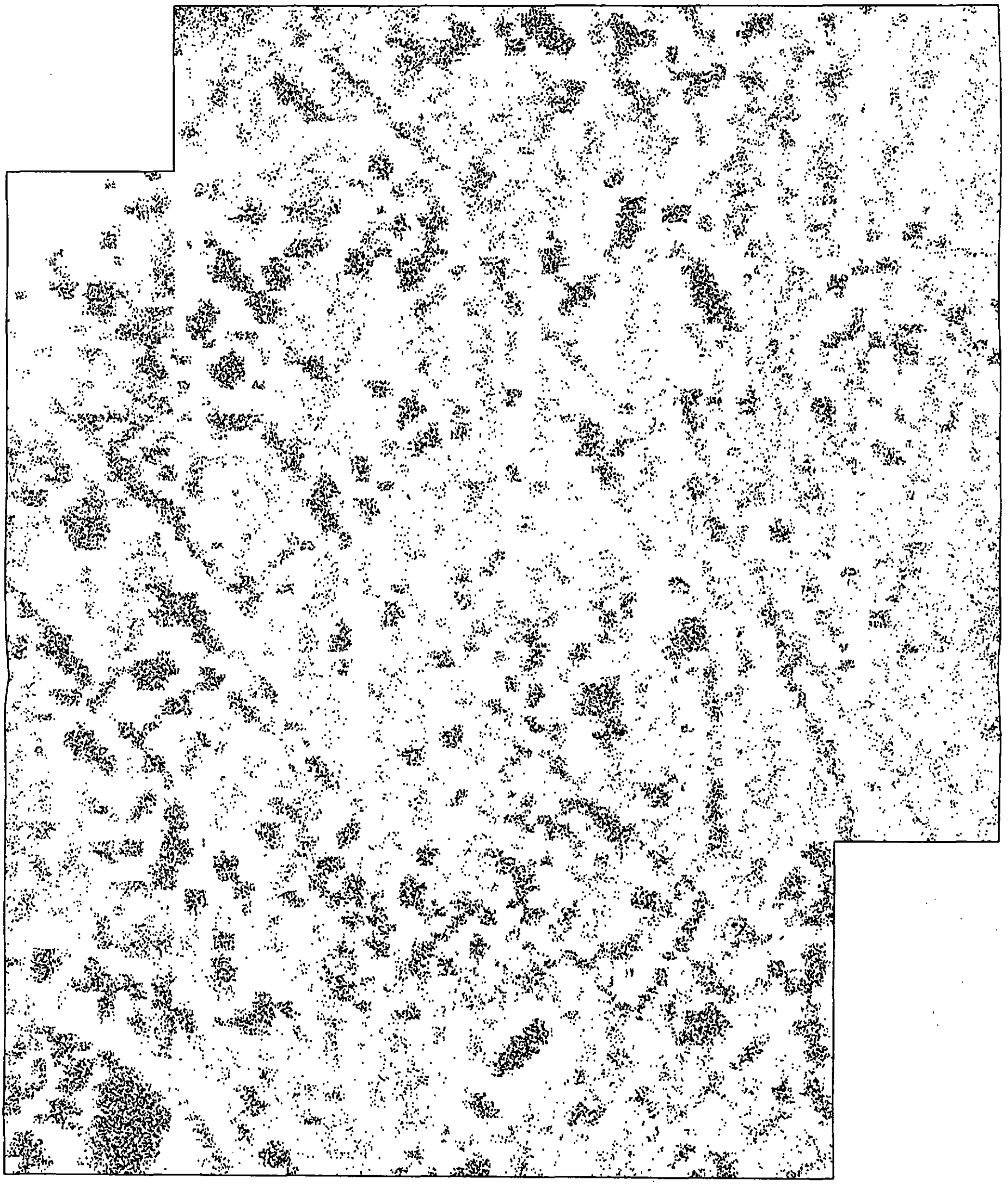
0 m 20

15 nT

GSB Prospection 2000/76

Figure 8

MONEY FIELD, BRETTENHAM
Area C



GSB Prospection 2000/76

Figure 9

NHER 5653