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REPORT ON GEOPHYSICAL SURVEY

DYNEVOR HOME FARM, LLandeilo

Report number 94/06

Work commissioned by :

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DYFED ARCHAEOLOGICAL TRUST LTD

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SITE SUMMARY SHEET

94/06 Dynevor Home Farm
Llandeilo

NGR: SN 623 228

Location and topography

The survey areas lie to the west of the A 40 trunk road, immediately to the north of Dynevor Park, on the western outskirts of Llandeilo, Dyfed. Survey work was carried out in three areas, Areas 1 to 3, in neighbouring fields. The arable field occupied by Areas 1 and 2 slopes gently down hill to the north, while Area 3 lies in undulating pasture. The underlying geology consists of limestone.

Archaeology

Llandeilo is known to have been an important town in the Medieval period, but it is thought that the area was of strategic significance in the Roman period. Several Roman roads are known to converge on Llandeilo and a fort might have existed here on the line of communication between Carmarthen and towns to the east. Recent field walking by **Dyfed Archaeological Trust (DAT)** has recovered quantities of Roman pottery.

Aims of Survey

Survey work was carried out to attempt to find the remains of a possible Roman fort and/or any other archaeological features that may exist within the areas sampled by the survey. The work forms part of a research project being carried out by **DAT** to record the course of the road.

Summary of Results *

Gradiometer survey identified anomalies suggesting the presence of archaeological features in three of the four survey areas. In particular, Area 3 produced a group of responses indicating possible settlement and industrial activity. Due to the size and shape of these survey areas, it has not been possible to recognise a pattern in the responses and their likely extent. Resistance survey - with two minor exceptions - did not record any anomalies that could clearly be interpreted as archaeological. The results are considered to reflect surface drainage patterns and geological/topographical effects. Unfortunately none of the results indicate the presence of a Roman fort.

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

SURVEY RESULTS

94/06 Dynevor Home Farm
Llandeilo

1. Survey Areas

1.1 Three survey areas, Areas 1 to 3, totalling 2.16ha, were surveyed using both magnetic and resistance techniques. For the purpose of presentation Areas 2 and 3 has been divided into two parts Areas 2A and 2B and Areas 3A and 3B.

1.2 The position of the survey areas can be seen in Figures 1 and 2, reproduced at a scale of 1:2500.

1.3 The survey grid was set out by **Geophysical Surveys of Bradford** along baselines positioned by staff of **DAT**.

2. Display

2.1 The results are displayed as dot-density plots, X-Y traces and grey scale images. These display formats are discussed in the *Technical Information Section*, at the end of the text.

2.2 Figures 1M1 to 3M8 show data plots and an interpretation diagram for the gradiometer surveys.

2.3 Figures 1R to 3R4 show data plots and an interpretation diagram for the resistance surveys.

3. General Considerations - Complicating factors

3.1 Waterlogged and muddy ground conditions at the time of the survey may have affected the responses recorded by the resistance meter in all four areas.

3.2 The presence of a pond in the centre of Area 3B and disturbance caused by its construction and partialy backfilling has effected the quality of the data collected in this area.

3.3 Responses from a pipe in Area 3A and the presence of a trackway in Areas 3A and 3B have further complicated interpretation of the magnetic data.

4. Survey Results Area 1

4.1 Gradiometer Survey

4.1.1 The noisy nature of the data from this area is due to responses from ferrous material in the plough soil. Some of the anomalies have been produced by bricks from buildings that once existed in the field near the survey area. A stone track or path running across the field and recorded on Ordnance Survey maps may also account for some of the disturbance detected in this area.

4.1.2 Several possible pit type anomalies have been recorded and these are indicated on the interpretation diagram (Figure 1M2). However, given the extent of disturbance an archaeological interpretation for these responses remains in doubt.

4.2 Resistance Survey

4.2.1 A number of linear responses where detected in Area 1 and these are likely to have been produced by a pipe and field drains.

4.2.1 The variations in resistance readings are considered to be mainly due to differences in the extent of surface waterlogging at the time of the survey and topographic effects.

5. Survey Results Area 2

5.1 Gradiometer Survey

5.1.1 The results from the northern end of Area 2 (see Figure 2M1) are disturbed by quantities of ferrous debris. However, within this area are a number of short ditch lengths and pit anomalies were recorded. The three parallel ditch responses may be due to ruts produced by recent cultivation or construction of a pond immediately to the north of the survey area.

5.1.2 A cluster of possible pit like responses were recorded in the southern part of Area 2 (see Figure 2M2).

5.2 Resistance Survey

5.2.1 Topographic effects and surface drainage are the likely origins of the anomalies recorded by resistance survey. The high resistance response at the northern end of Area 2 is at the steepest part of the survey area where drainage would be expected to be at its best.

5.2 2 The high resistance readings at (A) may be due to the remains of the track or path encountered in Area 1, (Figure 2R1).

5.2.3 The striped appearance in the data sets is due to the direction of recent cultivation which has left the ground surface rutted.

6. Survey Results Area 3A

6.1 Gradiometer Survey

6.1.1 The strongest response recorded in this area is due to the presence of a pipe, crossing the site from north to south. At the southernmost end, ferrous debris associated with a boundary and trackway has added to the interference in the results.

6.1.2 Several anomalies of archaeological potential were recorded in this area, including several ditch lengths and groups of pit/hearth type responses. The latter are magnetically very strong, which suggests their fills are highly enhanced and possibly associated with industrial activity.

6.1.3 Due to the shape and limited extent of the survey area it is not possible to ascertain whether these features form part of an enclosed settlement. Neither is it possible to determine the limits of the site.

6.2 Resistance Results

6.2.1 An area of high resistance recorded at the eastern end of Area 3A represent disturbance associated with an existing field boundary and trackway. The main high resistance area has almost certainly been produced by a geological/topographical effect. The low resistance readings at the western extreme of the survey area is once again due to surface water effects.

6.2.2 A low resistance linear response detected in the northernmost part of the survey corresponds to a ditch type anomaly recorded in the gradiometer survey.

6.2.3 A series of linear trends, orientated north-south, are likely to be due to cultivation processes, possibly ridge and furrow.

7. Survey Results Area 3B

7.1 Gradiometer Survey

7.1.1 The results show increased magnetic activity in the southern and eastern parts of the survey area. Whilst there are anomalies of archaeological interest throughout Area 3B, the results give the impression that the eastern edge is near or in an area of increased anthropogenic activity. This area has recently been disturbed by the digging of and partial in-filling of a pond. Such landscaping operations will have disrupted archaeological deposits if present in this area and produced the magnetic responses recorded.

7.1.2 A group of three strong magnetic anomalies situated in the western corner of the survey area may be responses from kilns or pits containing strongly enhanced fills. However, because of the 'jagged' appearance of the anomalies, a modern origin, such as buried ferrous debris, should not be ruled out.

7.1.3 A linear response detected in the northern corner of the survey area was produced by an existing field boundary and trackway.

7.2 Resistance Survey

7.2.1 As with the previous areas the majority of responses are considered to reflect the prevailing ground surface conditions at the time of the survey. Areas of low resistance surrounding the pond correspond to areas of standing water and disturbance caused by landscaping (described in 3.2 above).

7.2.2 A low resistance anomaly (B), coincides with a ditch type responses recorded in the gradiometer survey, (Figure 3B4).

7.2.3 The course of the modern boundary and trackway detected by the magnetic survey was also recorded.

8. Conclusions

8.1 The fluxgate gradiometer survey identified possible archaeological features in three of the four survey areas. The most promising results were recorded in Area 3, where groups of strong magnetic responses may indicate possible settlement and industrial activity. However, due to the size and shape of the survey areas a clear indication of the archaeological significance of these responses cannot be determined. Several archaeological responses were recorded in Area 2, though interpretation is complicated by magnetic responses from other sources. Anomalies interpreted as of archaeological significance in Area 1 are the least convincing.

8.2 The majority of the results of the resistance survey have been interpreted as reflecting variations in surface drainage and geological/topographical effects. However, low resistance anomalies corresponding to ditch responses in the gradiometer survey were detected in Area 3.

8.3 The results from Area 3 suggest that the remains of settlement and possibly industrial activity extend beyond the survey areas. However, none of the ditch type responses are characteristic of the defences associated with a Roman fort.

Project Co-ordinator: D Shiel
Project Assistants: N Nemcek, A Shields, C Stephens & A Wilson

February 1994

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".

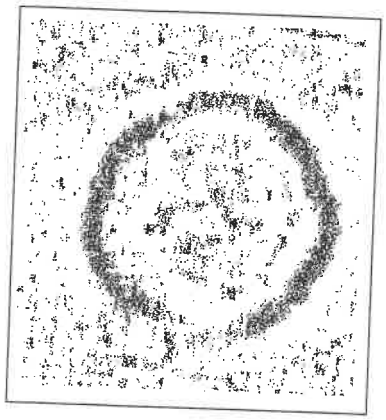
(c) Magnetic Susceptibility

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.

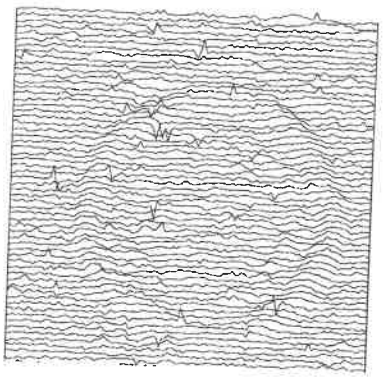
Display Options

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



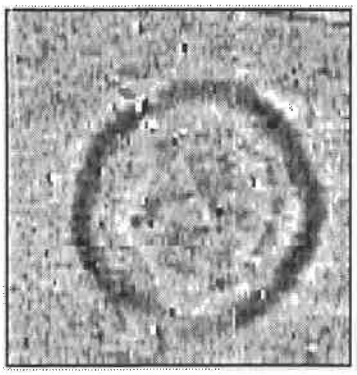
In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut-off value will appear white, whilst any value above the maximum cut-off value will appear black. Any value that lies between these two cut-off levels will have a specified number of dots depending 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 indiviual anomalies. Results are produced on a flatbed plotter.

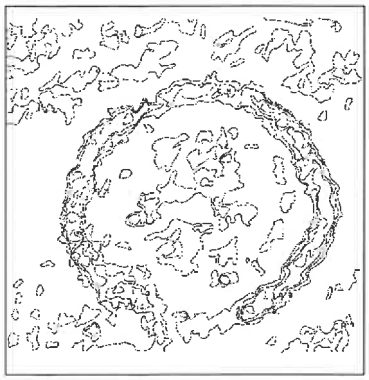
Display Options cont'd



(c) Grey-Scale

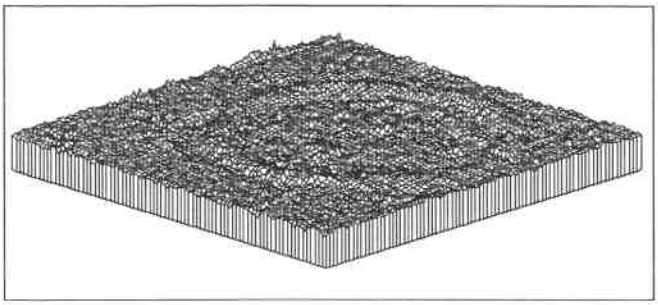
This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots or shade of grey, the intensity increasing with value. This gives an appearance of a toned or grey scale.

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

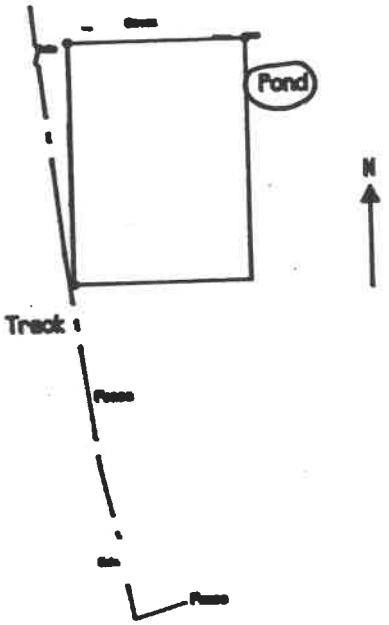
This display format is commonly used in cartographic displays. Data points of equal value are joined by a contour line. Closely packed contours indicate a sharp gradient. The contours therefore highlight an anomalous region. The range of contours and contour interval are selected manually and the display 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 (b) above).

DYNEVOR HOME FARM, Llandeilo
Location of Survey Area 1

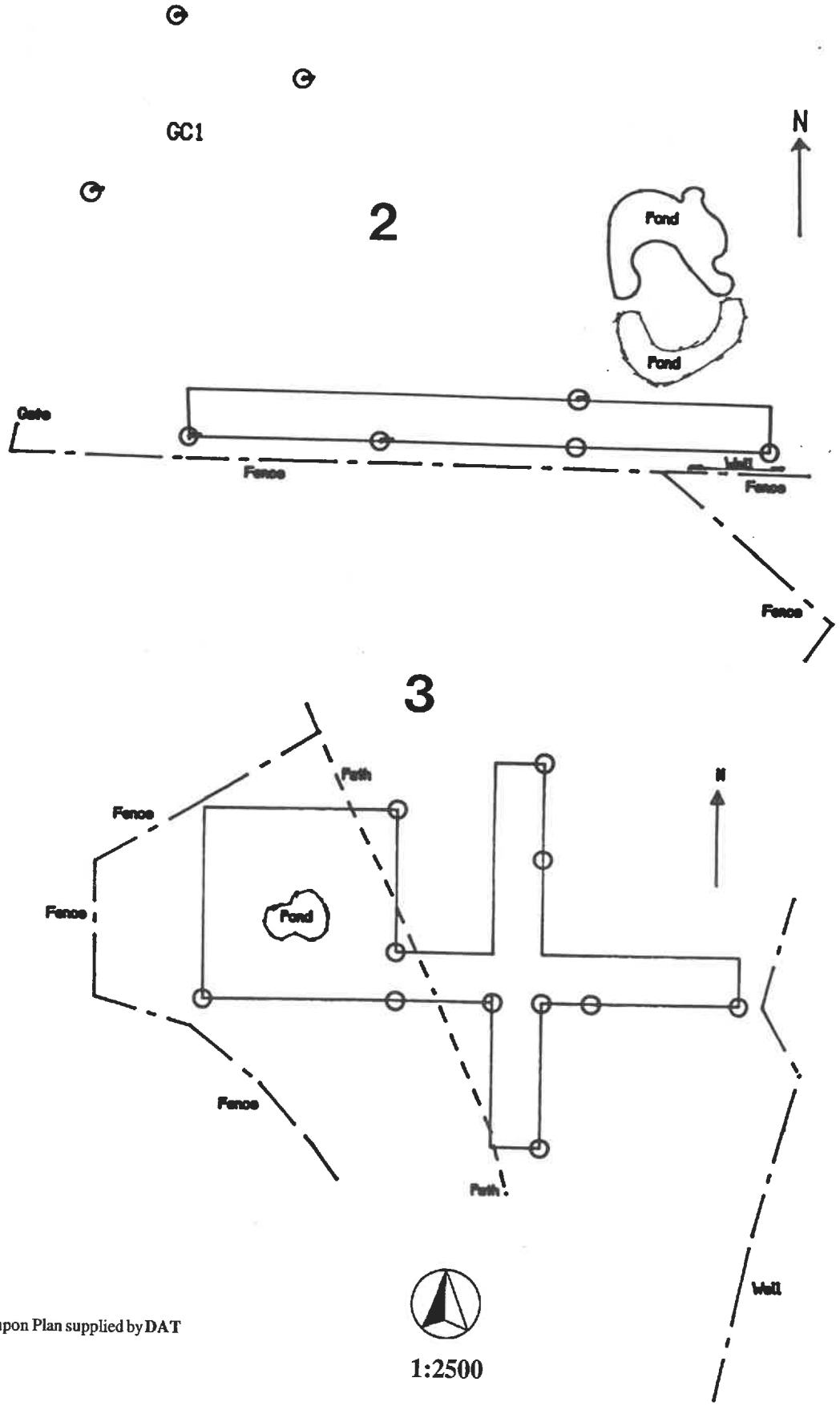


Based upon Plan supplied by DAT

1:2500

Figure 1

DYNEVOR HOME FARM, Llandeilo
Location of Survey Areas 2 & 3



Based upon Plan supplied by DAT

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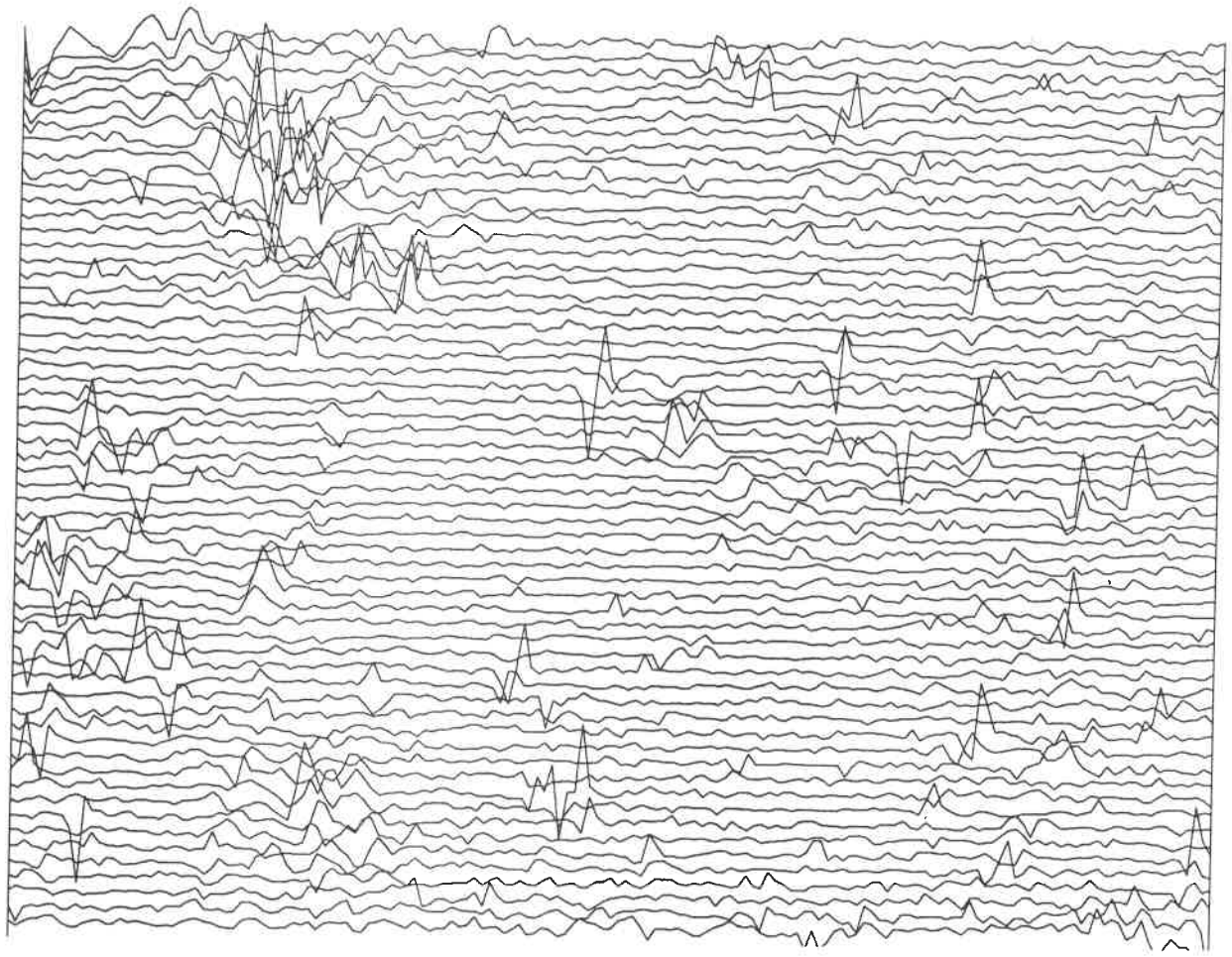
Figure 2

DYNEVOR HOME FARM
Magnetic Data
Area 1



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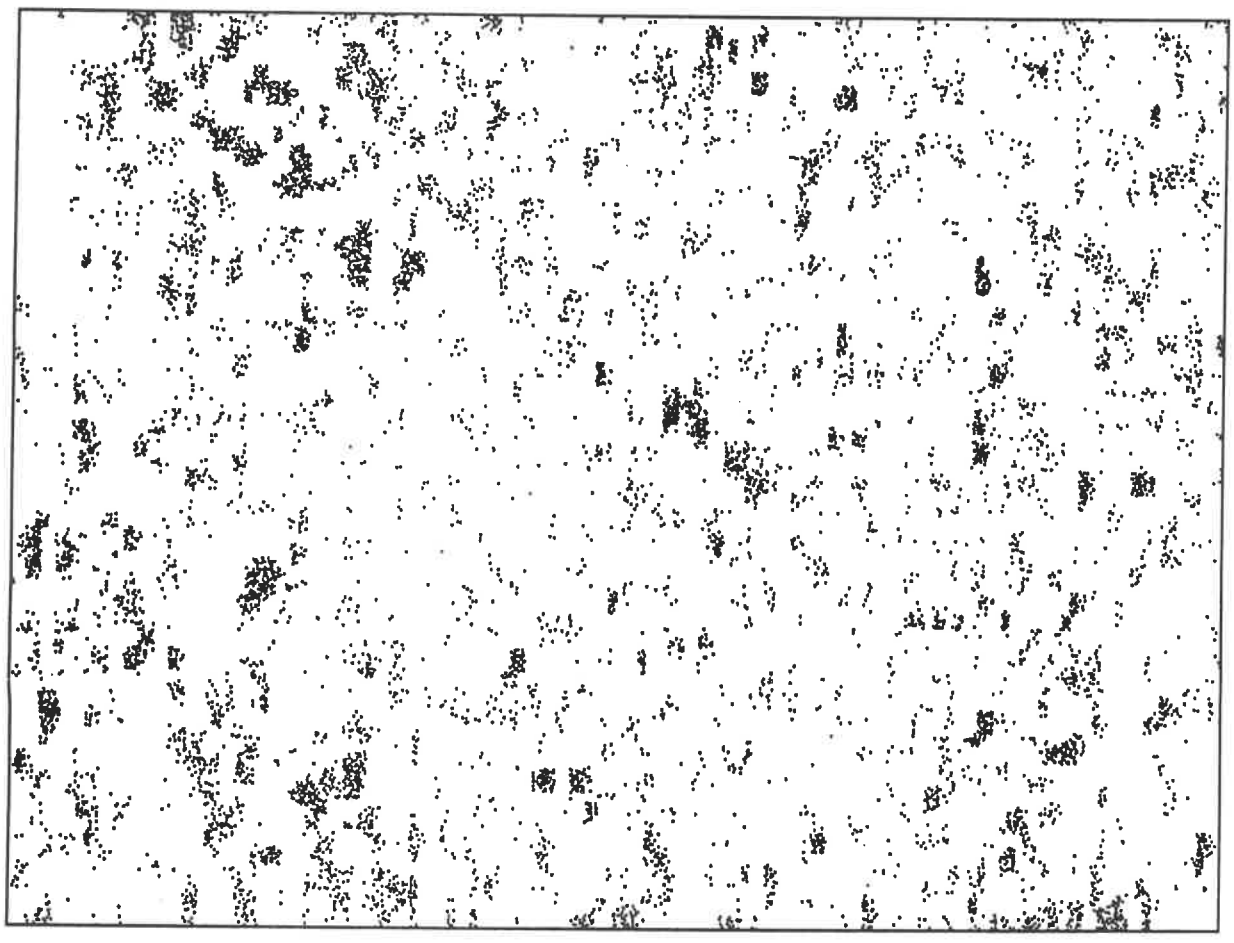
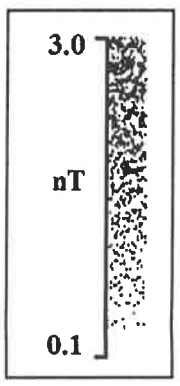
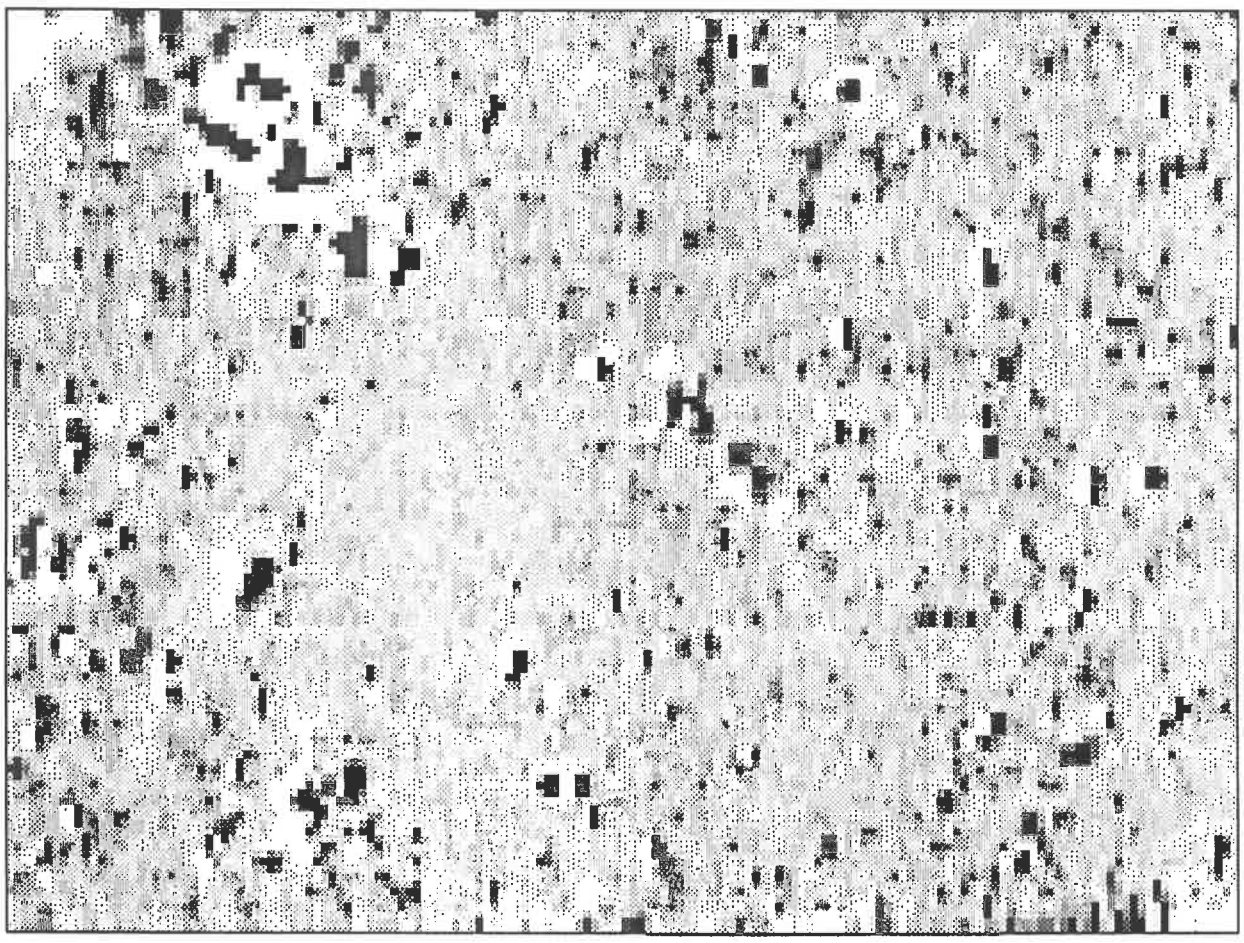


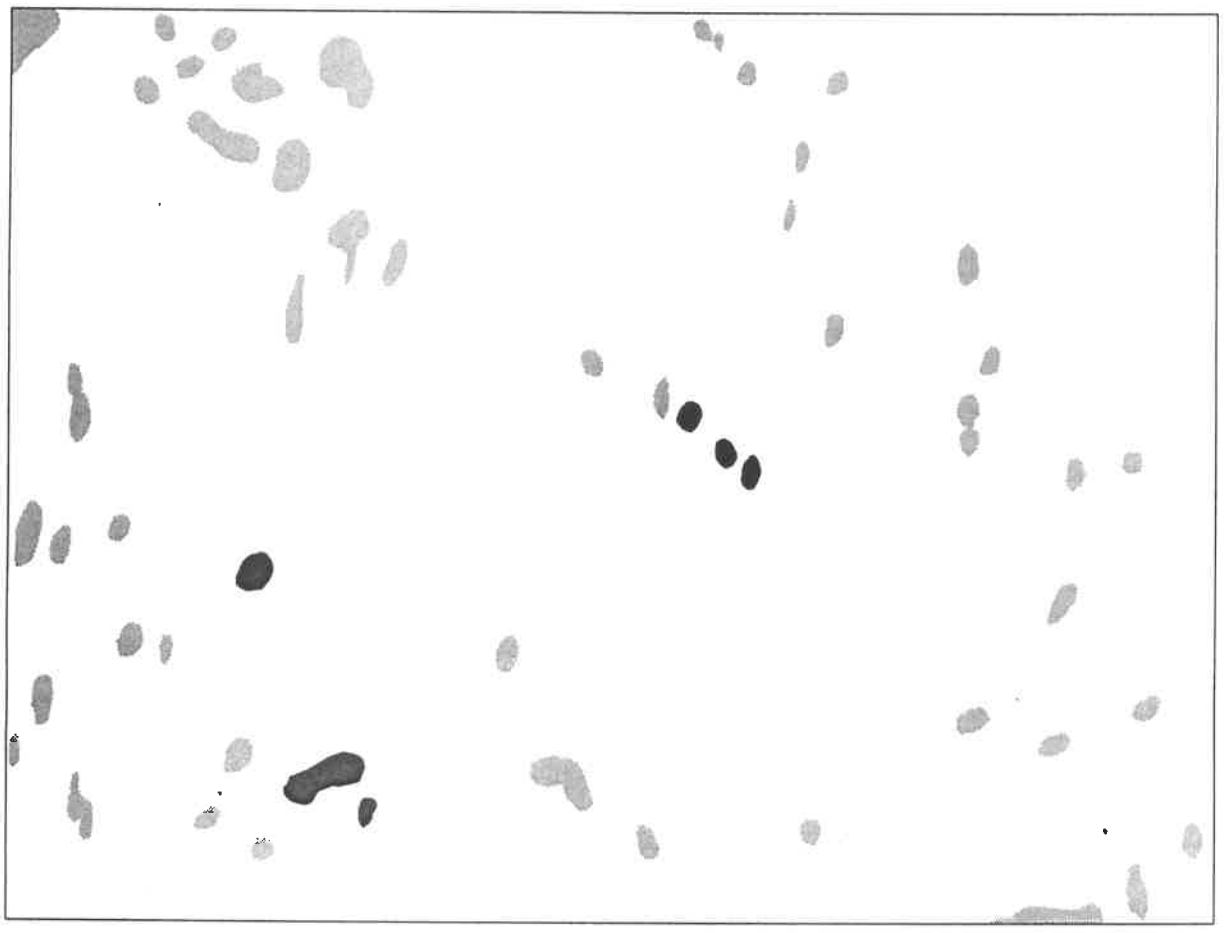


0 m 20

Figure 1M1

DYNEVOR HOME FARM
Magnetic Data
Area 1





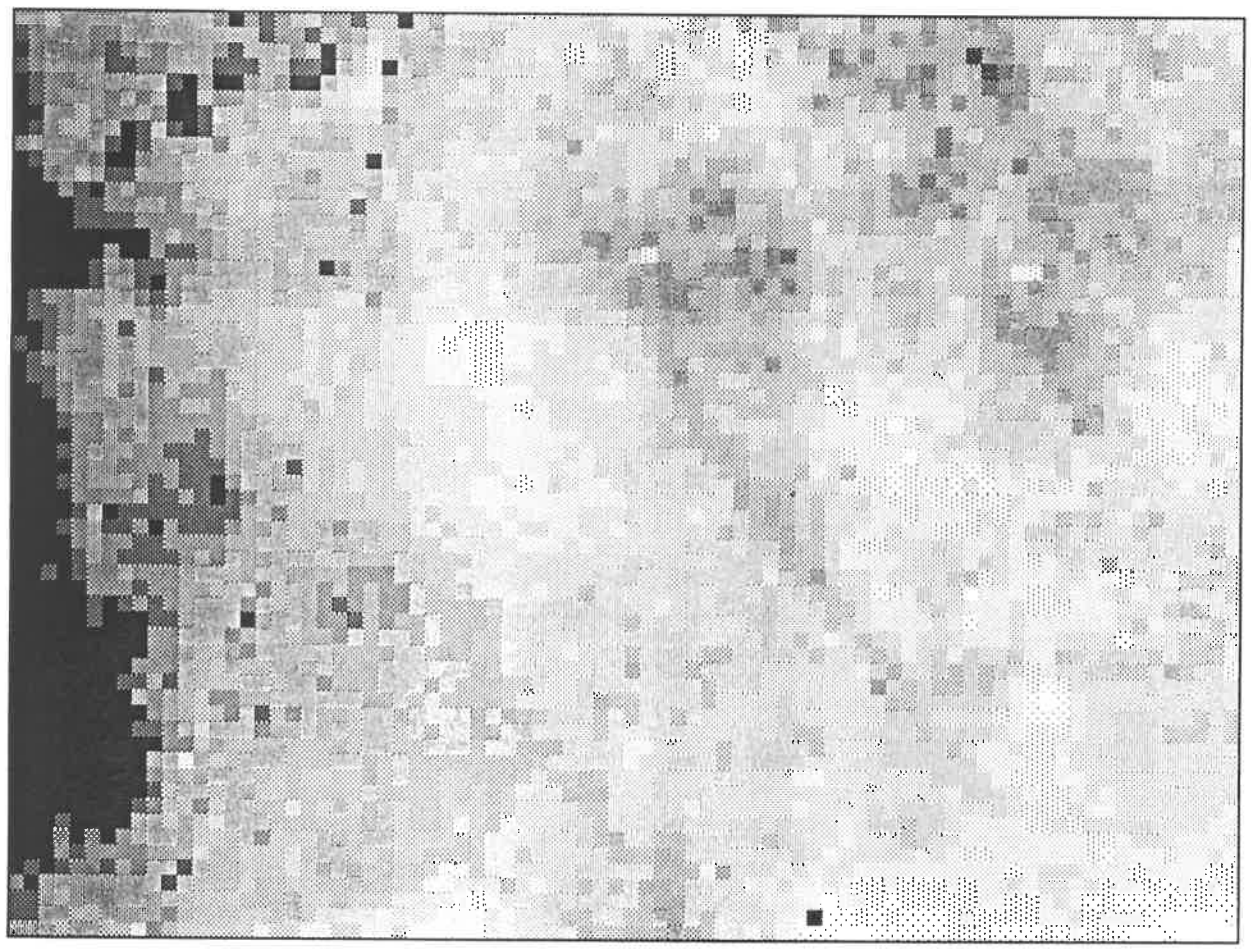
?Archaeology

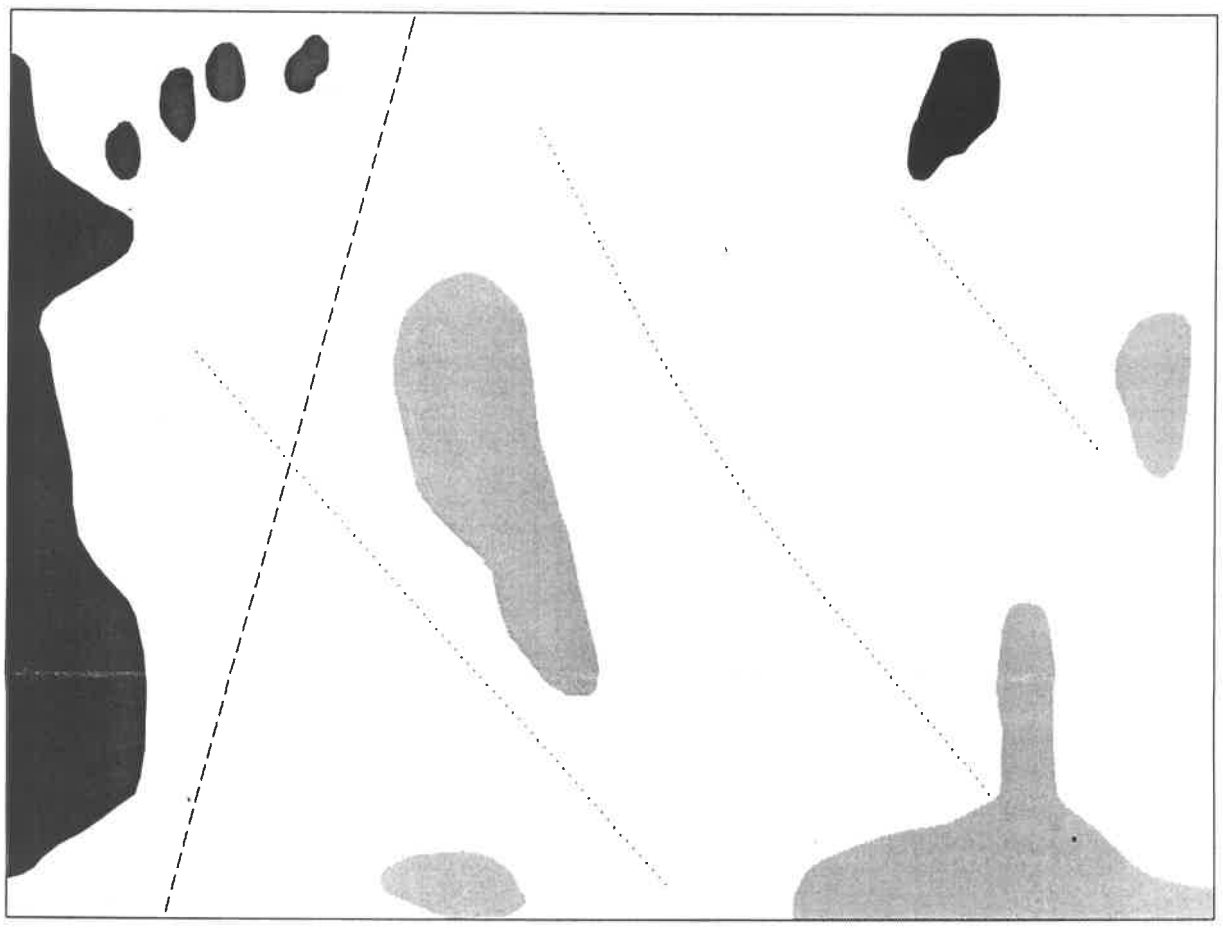
Ferrous

0 m 20

Figure 1M2

DYNEVOR HOME FARM
Resistance Data
Area 1





High Resistance

Low Resistance

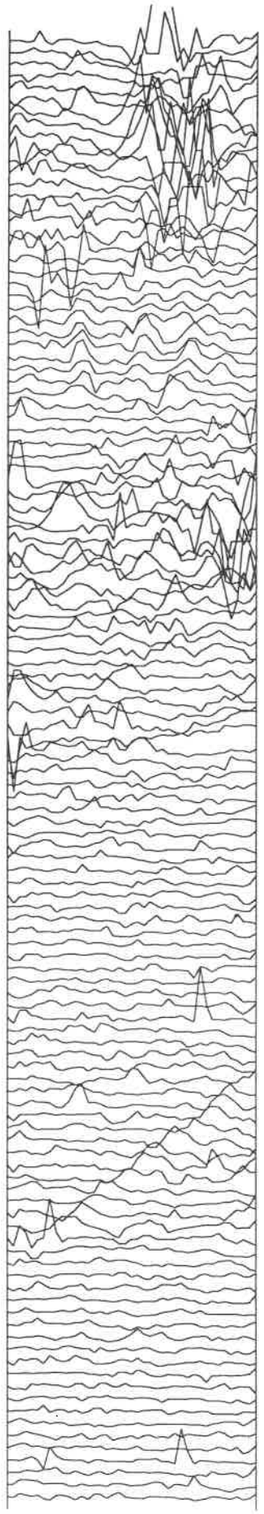
?Pipe Trench

?Field Drains

0 m 20

Figure 1R

DYNEVOR HOME FARM
Magnetic Data
Area 2A



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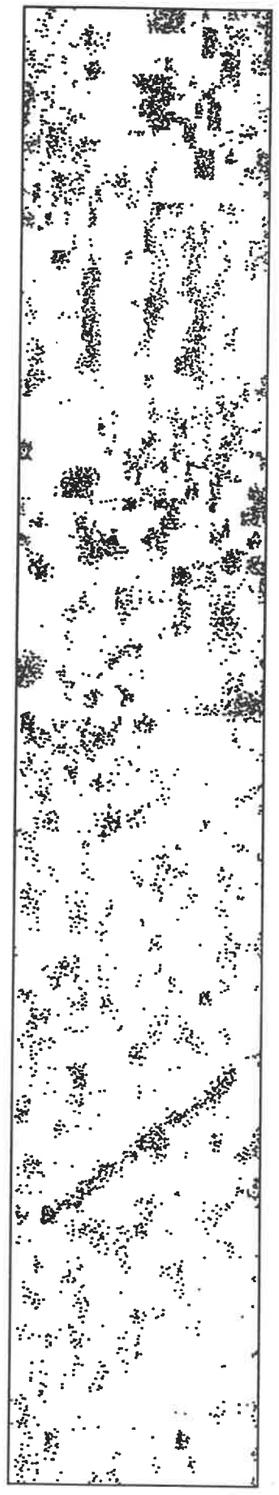
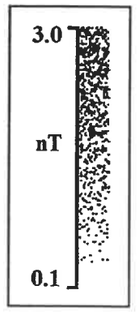
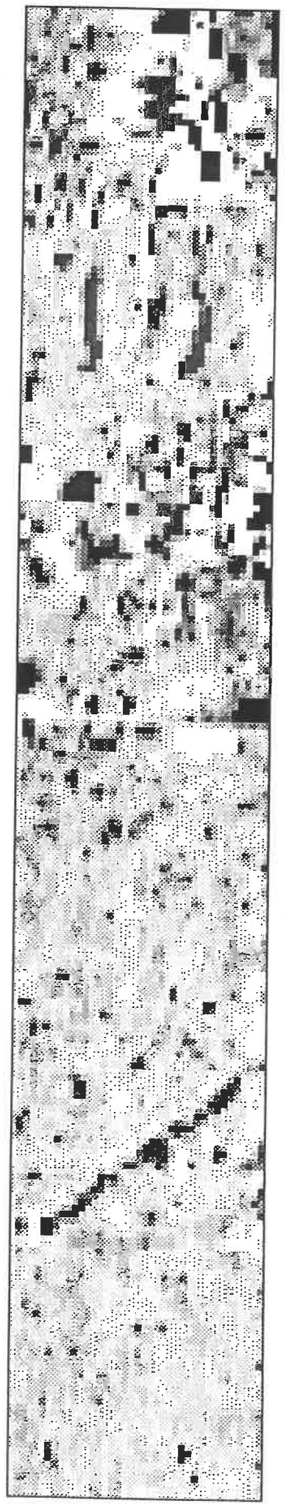
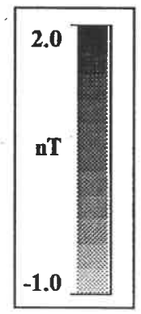
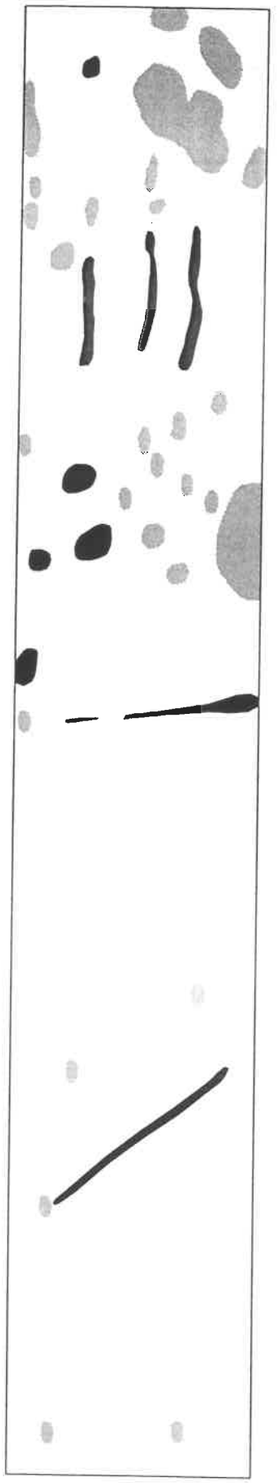




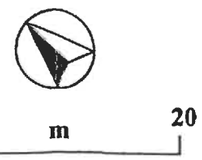






?Archaeology

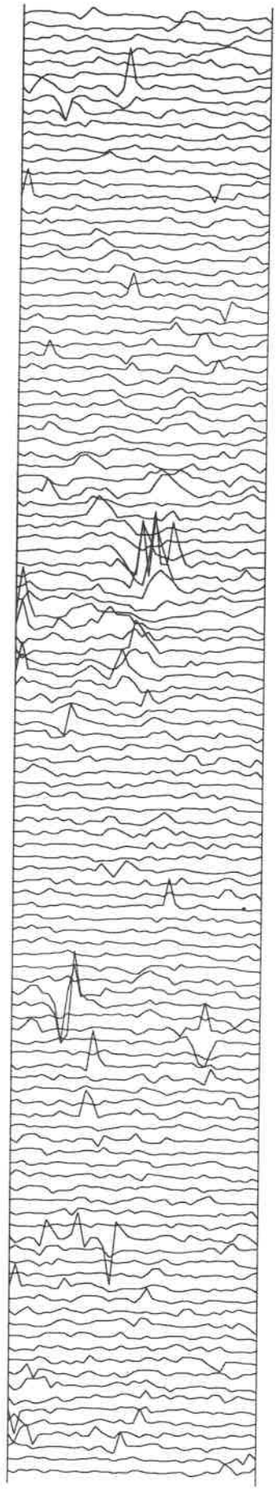
Ferrous



0 m 20

Figure 2M1

DYNEVOR HOME FARM
Magnetic Data
Area 2B



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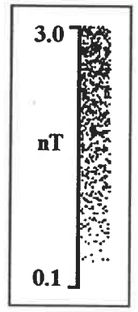

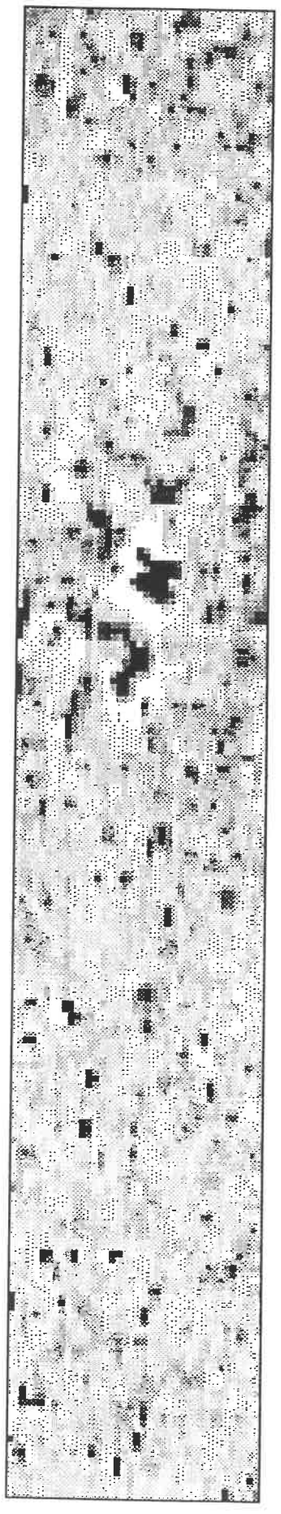

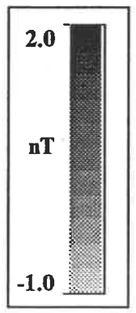

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Ferrous

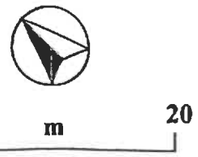
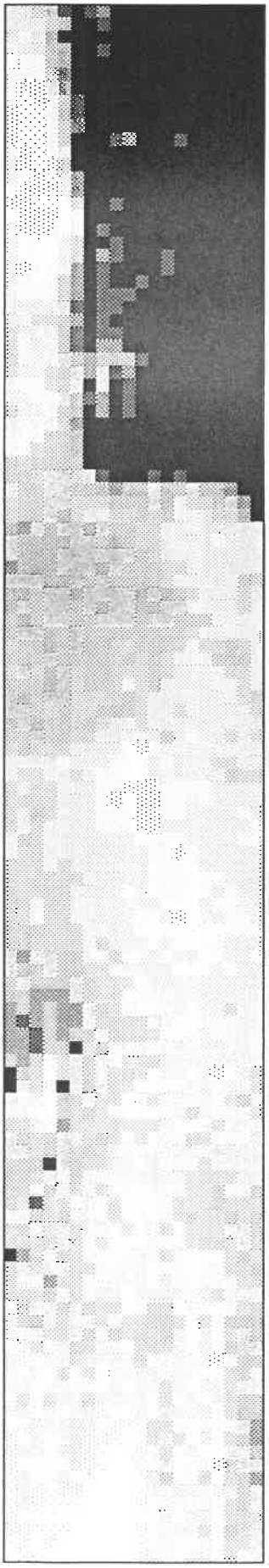


Figure 2M2

DYNEVOR HOME FARM
Resistance Data
Area 2A



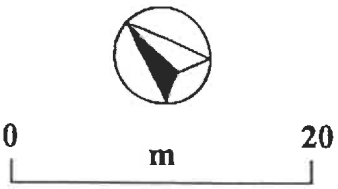
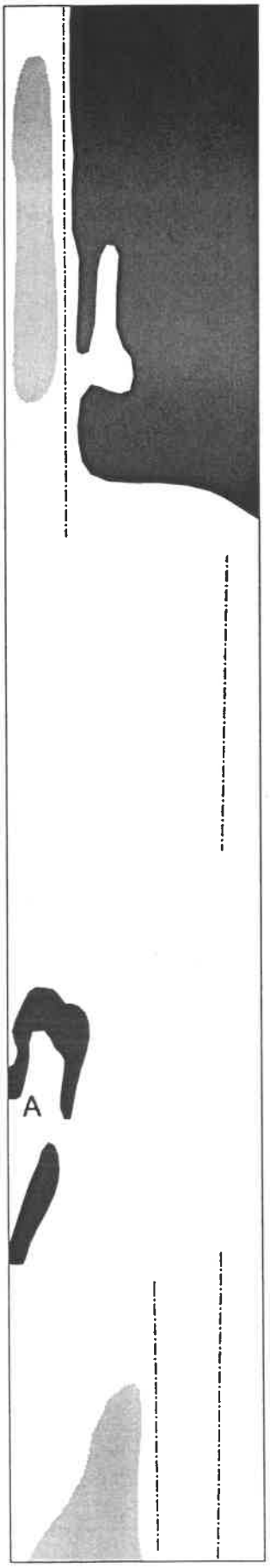


Figure 2R1

DYNEVOR HOME FARM
Resistance Data
Area 2A



High Resistance

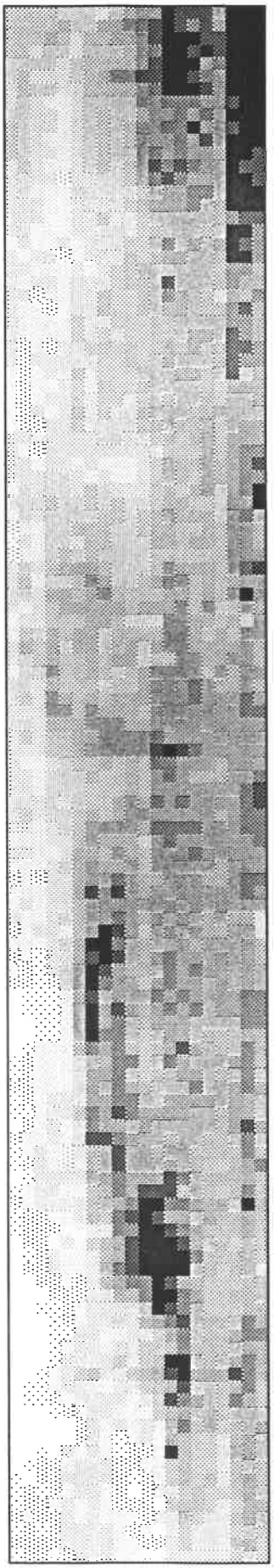
Low Resistance

Cultivation trends

0 m 20

Figure 2R2

DYNEVOR HOME FARM
Resistance Data
Area 2B



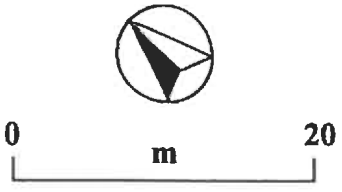
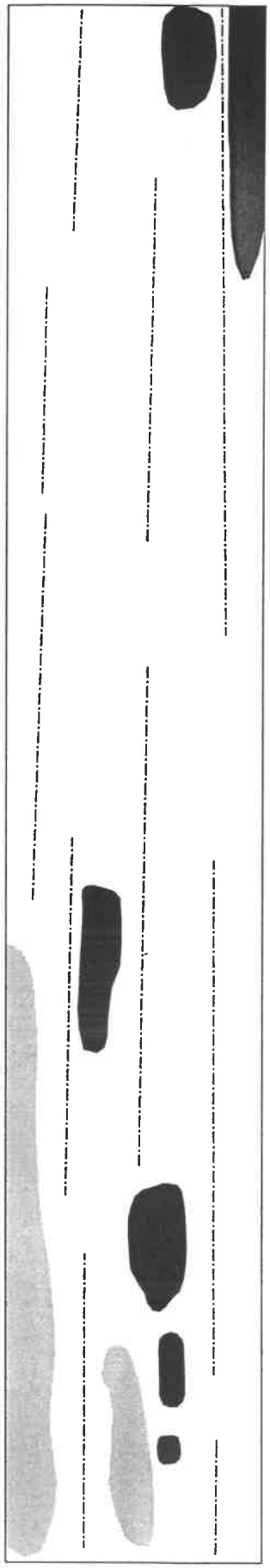


Figure 2R3

DYNEVOR HOME FARM
Resistance Data
Area 2B



High Resistance

Low Resistance

Cultivation trends

0 m 20

Figure 2R4

DYNEVOR HOME FARM
Magnetic Data
Area 3A

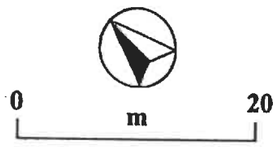


Figure 3M1

DYNEVOR HOME FARM
Magnetic Data
Area 3A

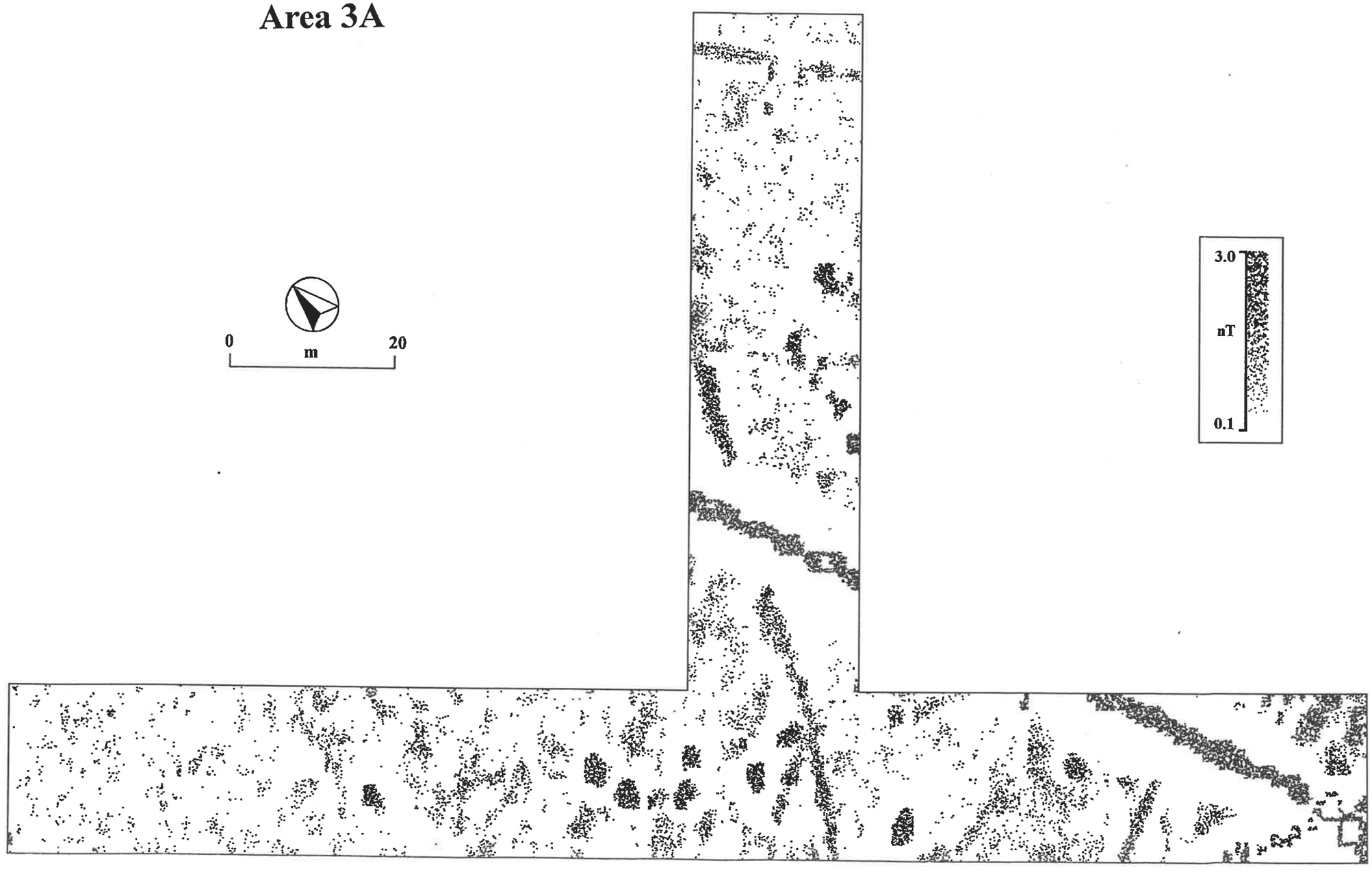


Figure 3M2

DYNEVOR HOME FARM
Magnetic Data
Area 3A

Figure 3M3

GEOPHYSICAL SURVEYS OF BRADFORD	PROJECT: DYNEVOR HOME FARM	TITLE: Area 3A Gradiometer Interpretation	SCALE: 1:500

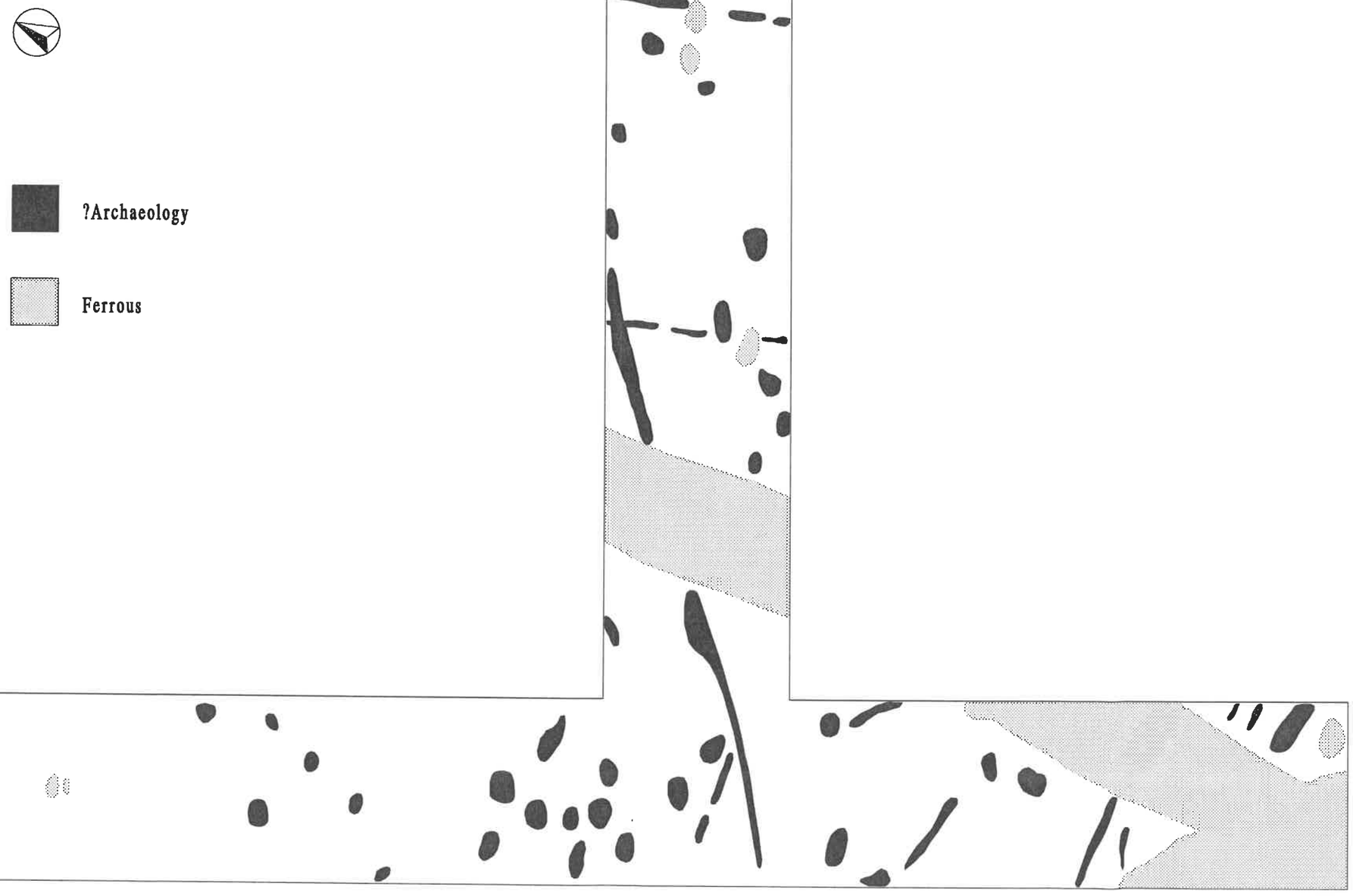
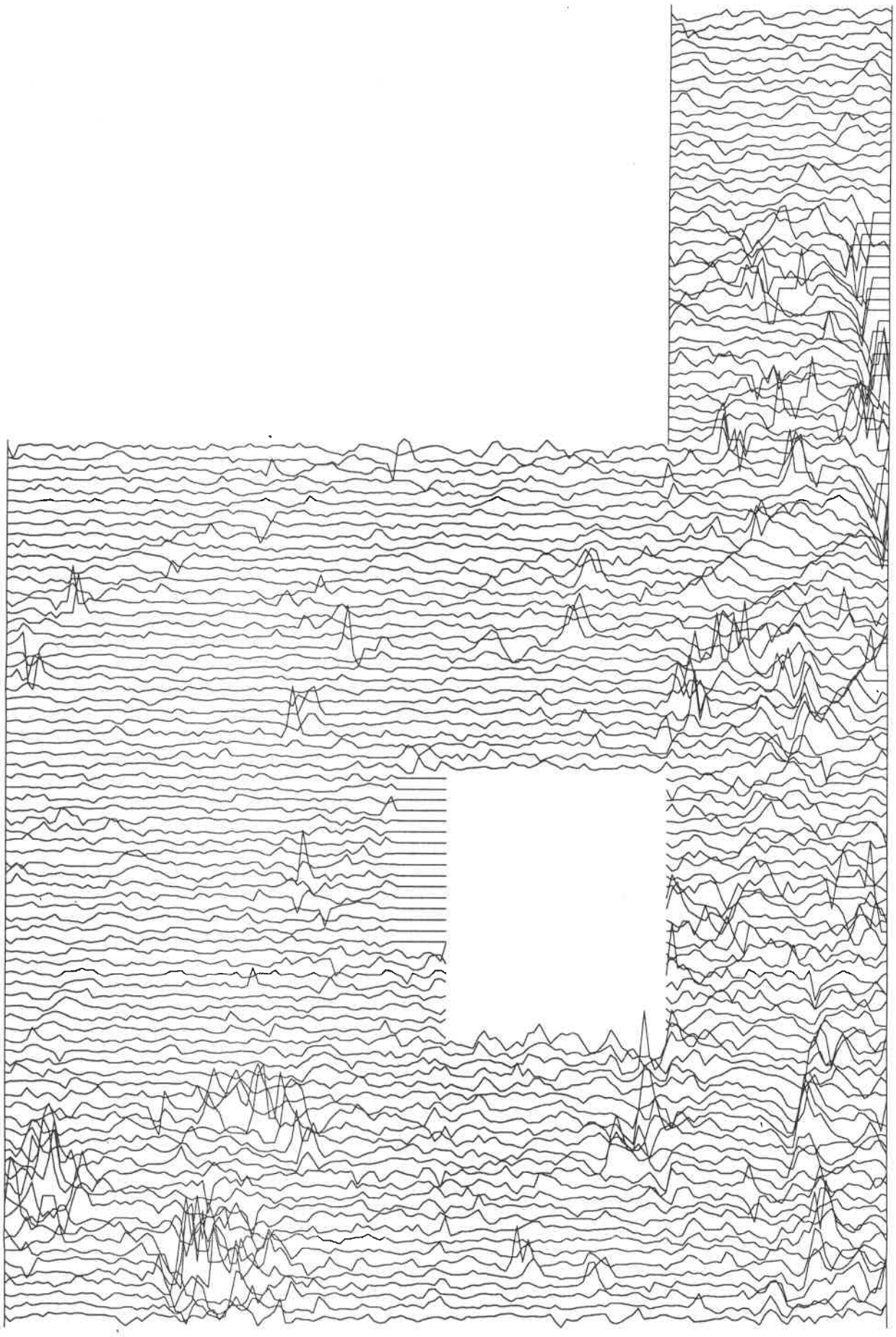


Figure 3M4

DYNEVOR HOME FARM
Magnetic Data
Area 3B



15 nT

0 m 20

Figure 3M5

DYNEVOR HOME FARM
Magnetic Data
Area 3B

Figure 3M6

DYNEVOR HOME FARM
Magnetic Data
Area 3B

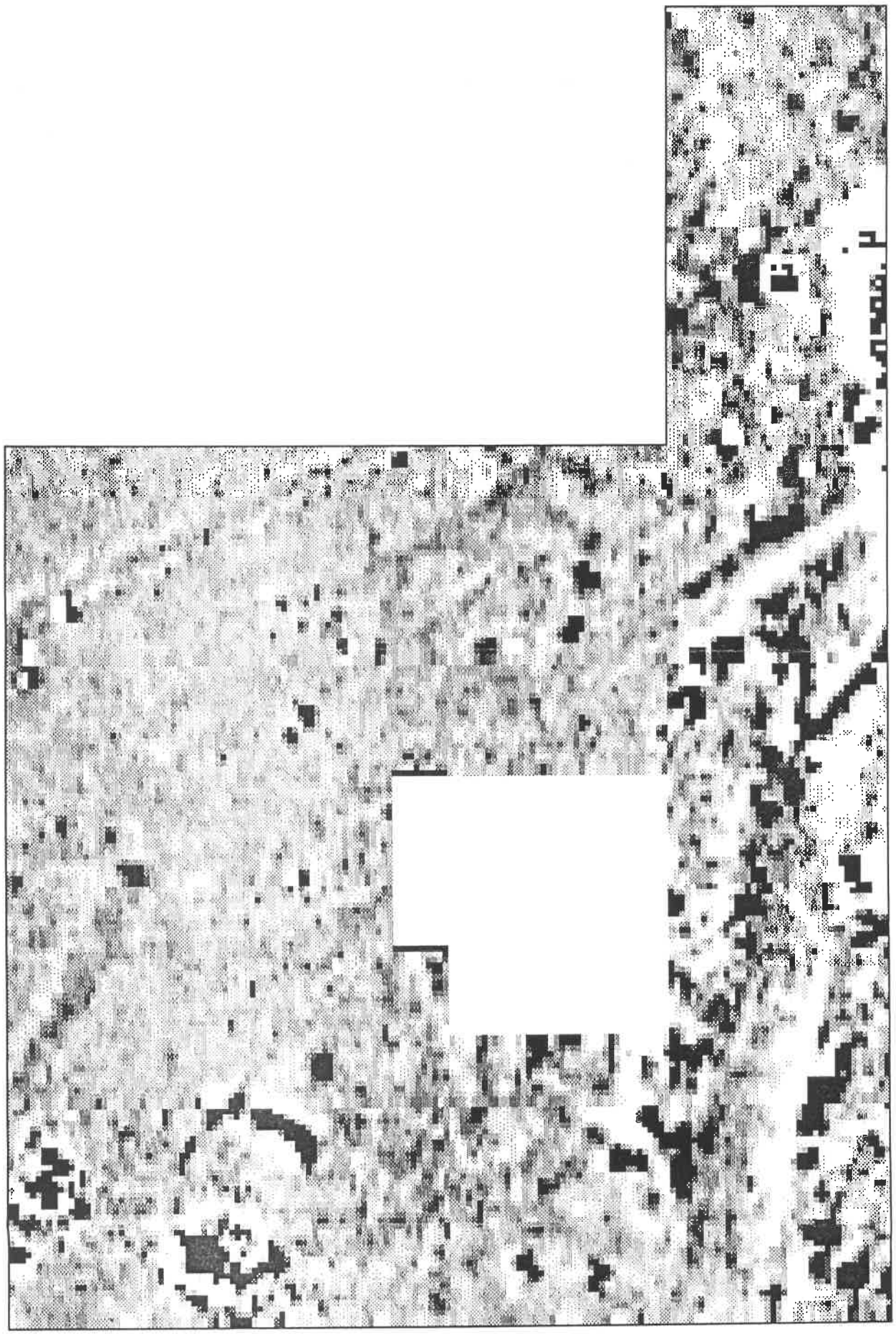


Figure 3M7

GEOPHYSICAL SURVEYS OF BRADFORD

PROJECT: DYNEVOR HOME FARM

TITLE: Area 3B Gradiometer Interpretation

Figure 3M8

DYNEVOR HOME FARM
Resistance Data
Area 3A

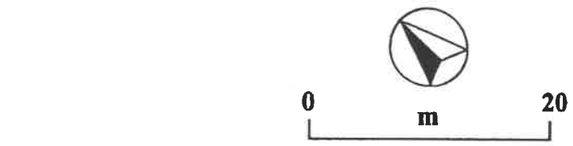


Figure 3R1

GEOPHYSICAL SURVEYS OF BRADFORD	PROJECT: DYNEVOR HOME FARM	TITLE: Area 3A Resistance Interpretation	SCALE: 1:500

?Ditch

High Resistance

Low Resistance

Cultivation Trends
/Ridge and Furrow

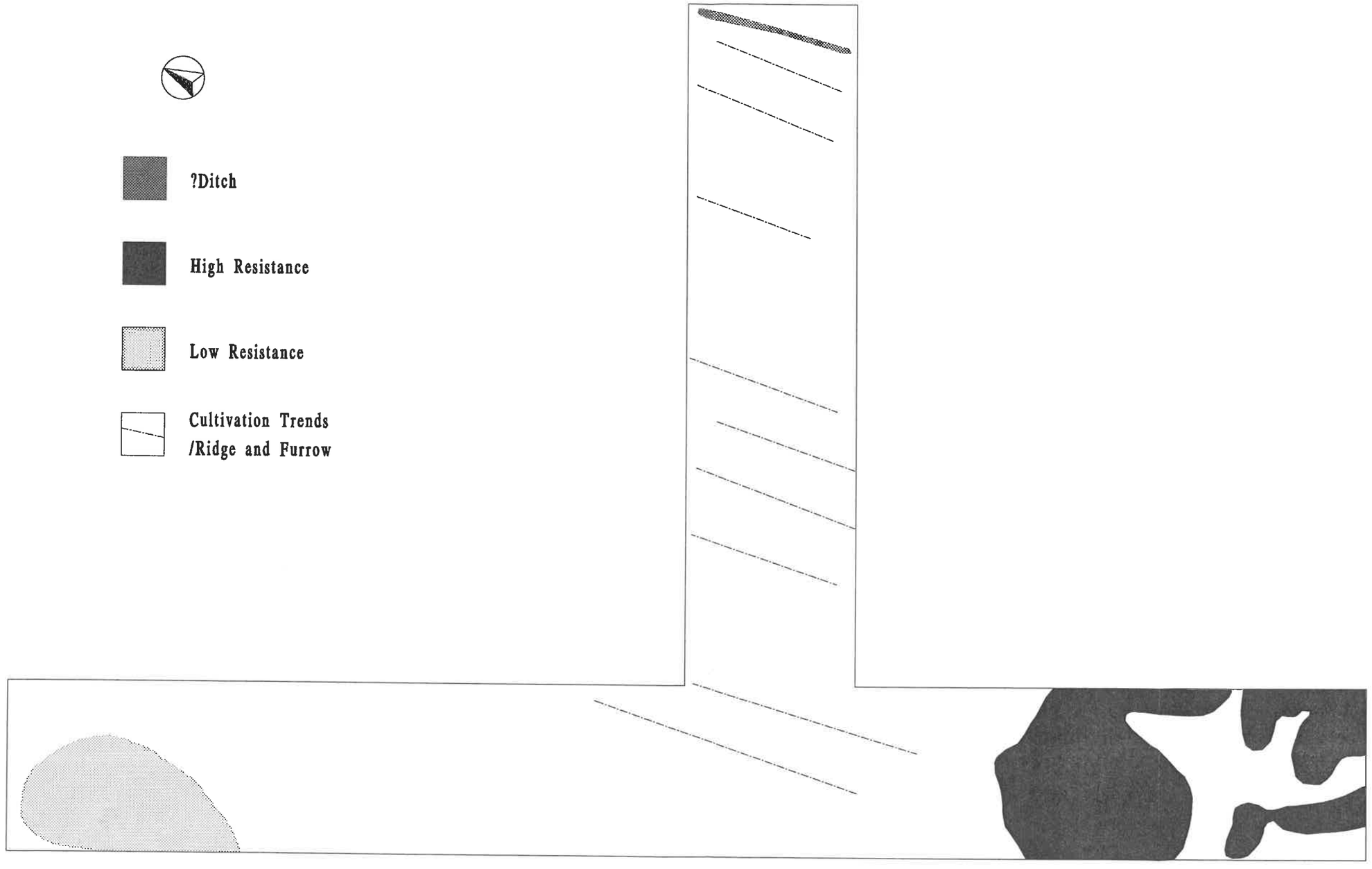


Figure 3R2

DYNEVOR HOME FARM
Resistance Data
Area 3B

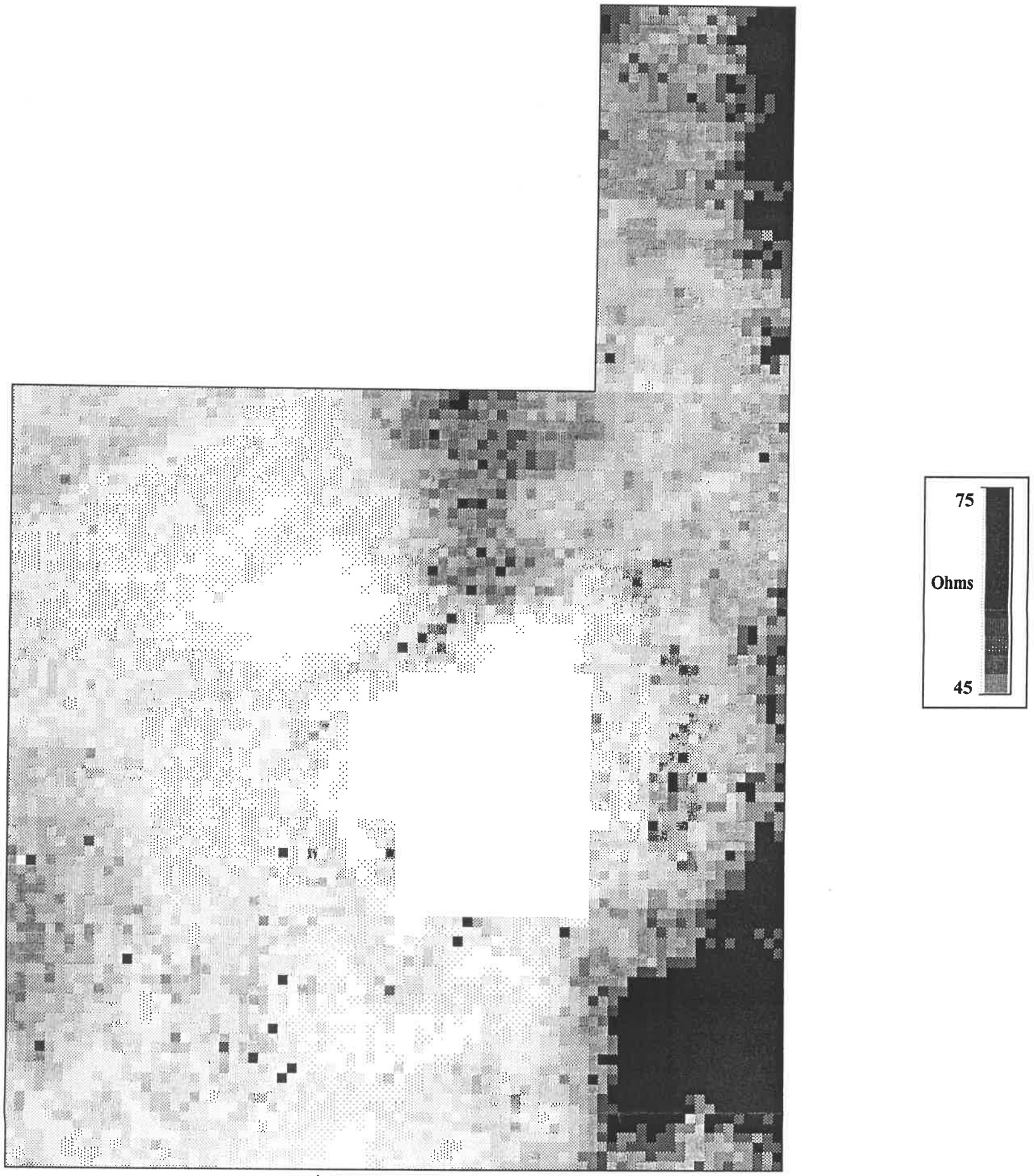


Figure 3R3

GEOPHYSICAL SURVEYS OF BRADFORD

PROJECT: DYNEVOR HOME FARM

TITLE: Area 3B Resistance Interpretation

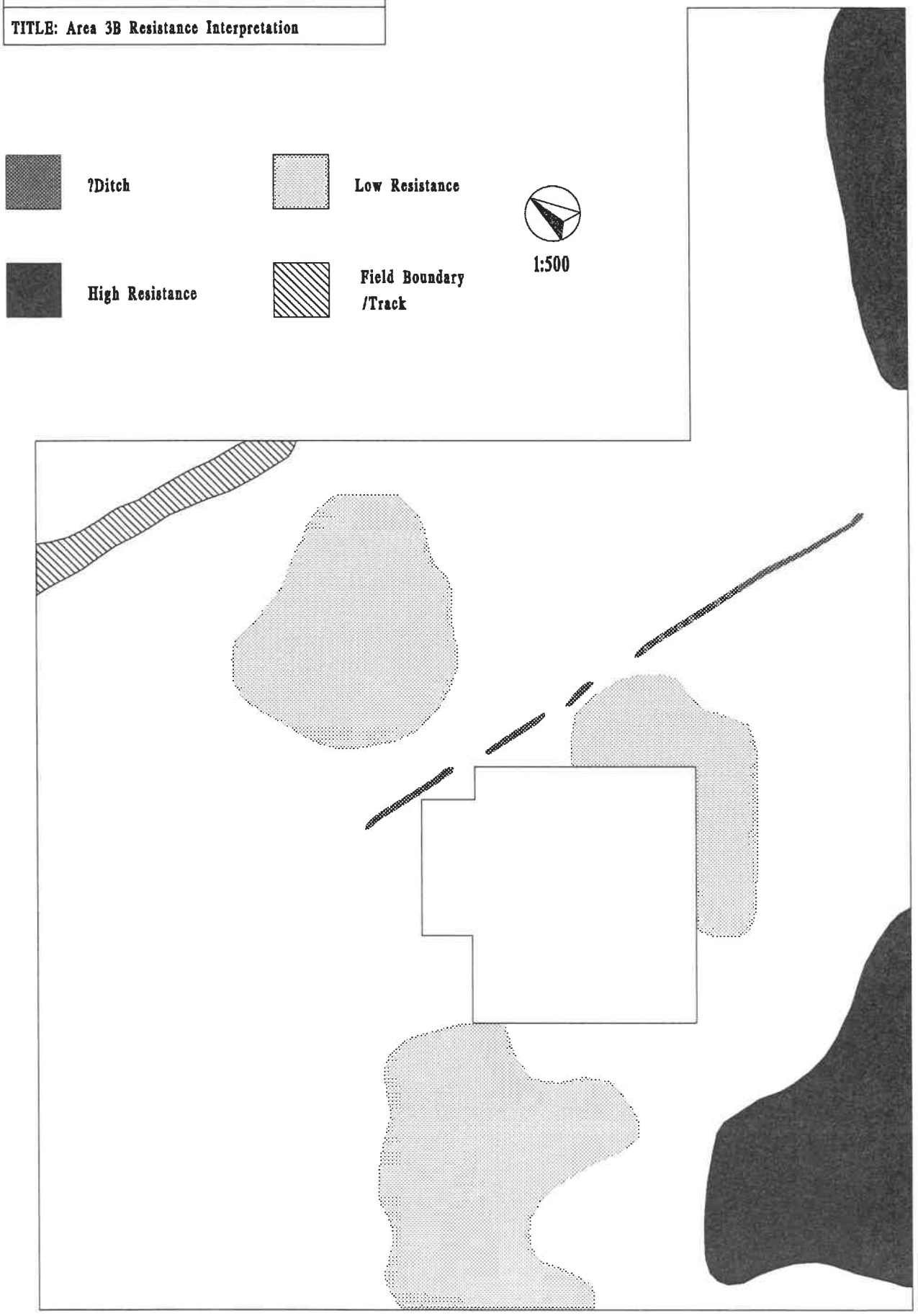


Figure 3R4