REPORT ON GEOPHYSICAL SURVEY

BRANSTON BOOTHS

Report number 93/79

Work commissioned by :

HERITAGE

LINCOLNSHIRE

incorporating the

Trust for
Lincolnshire Archaeology

GEOPHYSICAL SURVEYS
Bradford

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SITE SUMMARY SHEET

93 / 79 Branston Booths

NGR: TF 06 68 TF 051 696

Location, topography and geology

The survey area, which is part of Heighington Fen, lies immediately to the east of Double Dyke Road, Branston Booths and approximately 3.5km northeast of Branston, Lincolnshire. The survey occupied an area of level fenland that was set aside at the time of the survey. The geology comprises alluvium and clay.

Archaeology

Although there is no information on possible archaeological remains within the development area itself, the site is adjacent to a Roman canal known as Carr Dyke.

Aims of Survey

In response to a planning application to expand an existing water treatment plant, a gradiometer survey was undertaken as part of a wider archaeological evaluation being carried out by **Heritage Lincolnshire**. The object of the survey was to try to locate archaeological features surviving within the application area that might be associated with the nearby canal.

Summary of Results*

The gradiometer survey recorded a dense network of anomalies, most of which are considered to reflect drainage patterns and agricultural trends. However, potential archaeological responses were detected indicating the remains of part of a possible ancient field system or enclosure. In addition, a pair of parallel linear anomalies are tentatively interpreted as being associated with a Roman road.

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

SURVEY RESULTS

93 / 79 Branston Booths

1. Survey Areas

1.1 An area measuring approximately 90 x 120m was surveyed with the gradiometer. The southern corner of the site was excluded due to the presence of an existing water pumping station. The diagram in Figure 1 shows the location of the survey area, reproduced at a scale of 1:2500.

1.2 The survey grid was set out by **Geophysical Surveys of Bradford**. Detailed tie-in information has been lodged with the client.

2. Display

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

2.2 Detailed data plots and interpretation diagrams are produced at a scale of 1:500 (Figures 2 to 5).

2.4 Letters in parentheses refer to anomalies highlighted on the interpretation diagram (Figure 5).

3. General Considerations - Complicating factors

3.1 In general, conditions were suitable for survey, the site being flat and relatively free of obstruction. However, occasional patches of dense vegetation made walking difficult at times.

3.2 Magnetic interference in the area adjacent to the pumping station has significantly disturbed the results. It is possible that responses generated by archaeological features will have been masked by this disturbance, if they are present in this area.

4. Survey Results (Figures 2 to 5)

4.1 The results show several groups of linear responses in a variety of orientations. The majority of these responses are considered to reflect modern drainage patterns and agricultural trends, defined by regularity of form and spacing. Those anomalies thought to be responses from modern field drains are aligned east-west, while the cultivation trends are indicated by magnetically weak responses running northwest to southeast (see interpretation diagram Figure 5).

4.2 Superimposed on the pattern described above are two further sets of linear responses. Toward the northern end of the survey area are three approximately parallel linear responses. It is possible that these represent ditches that form part of an ancient field system or part of an enclosure. However, their consistent spacing suggests that these responses may have been produced by field drains.

4.3 The second potential archaeological responses are two parallel, weak linear anomalies aligned approximately east-west. These responses may be interpreted as ditch type anomalies suggesting the course of a possible Roman road. However, it is more likely that these anomalies were generated by yet another set of drainage features or agricultural practises.

4.4 A substantial area of magnetic disturbance in the southern part of the survey is due to the adjacent pumping station and perimeter fence. Extending northward from this area is an intermittent linear response. This anomaly is likely to have been produced by a buried pipe although the response does not have the usual strong negative responses commonly associated with ferrous pipes.

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6. Conclusions

The fluxgate gradiometer revealed a network of responses which are likely to relate to modern drainage and cultivation trends. Superimposed on these patterns are a series of anomalies that may be archaeologically significant, indicating the presence of part of a possible field system or enclosure. A pair of ditch like responses were also recorded that may suggest the route of a possible Roman road. However, the archaeological interpretations remain tentative.

Project Co-ordinator: D Shiel
Project Assistants: S Lancaster and A Shields

16th July 1993
Geophysical Surveys of Bradford

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) 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.

(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 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.

(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 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.

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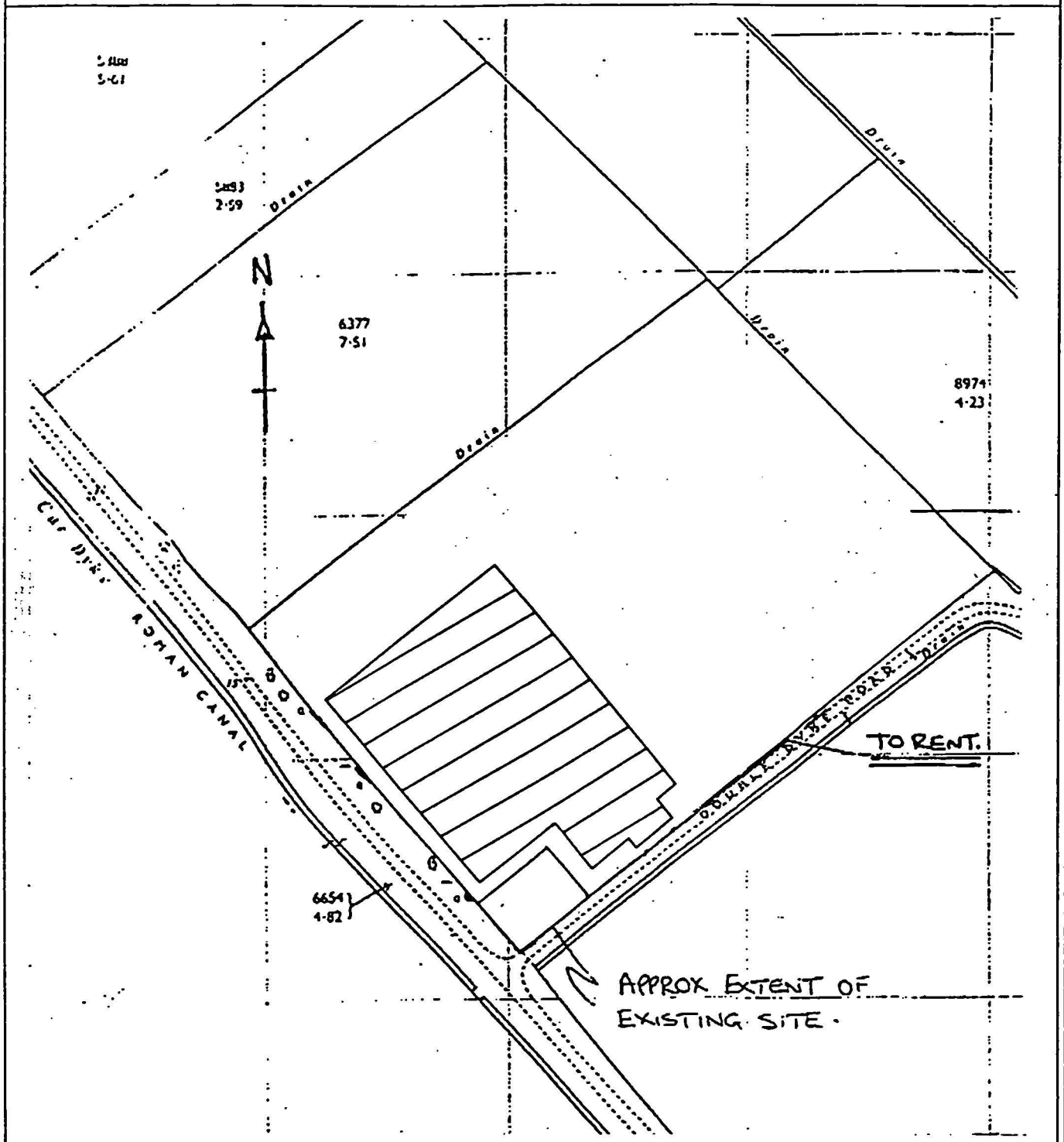
Location of Survey Area



1:2500

Figure 1

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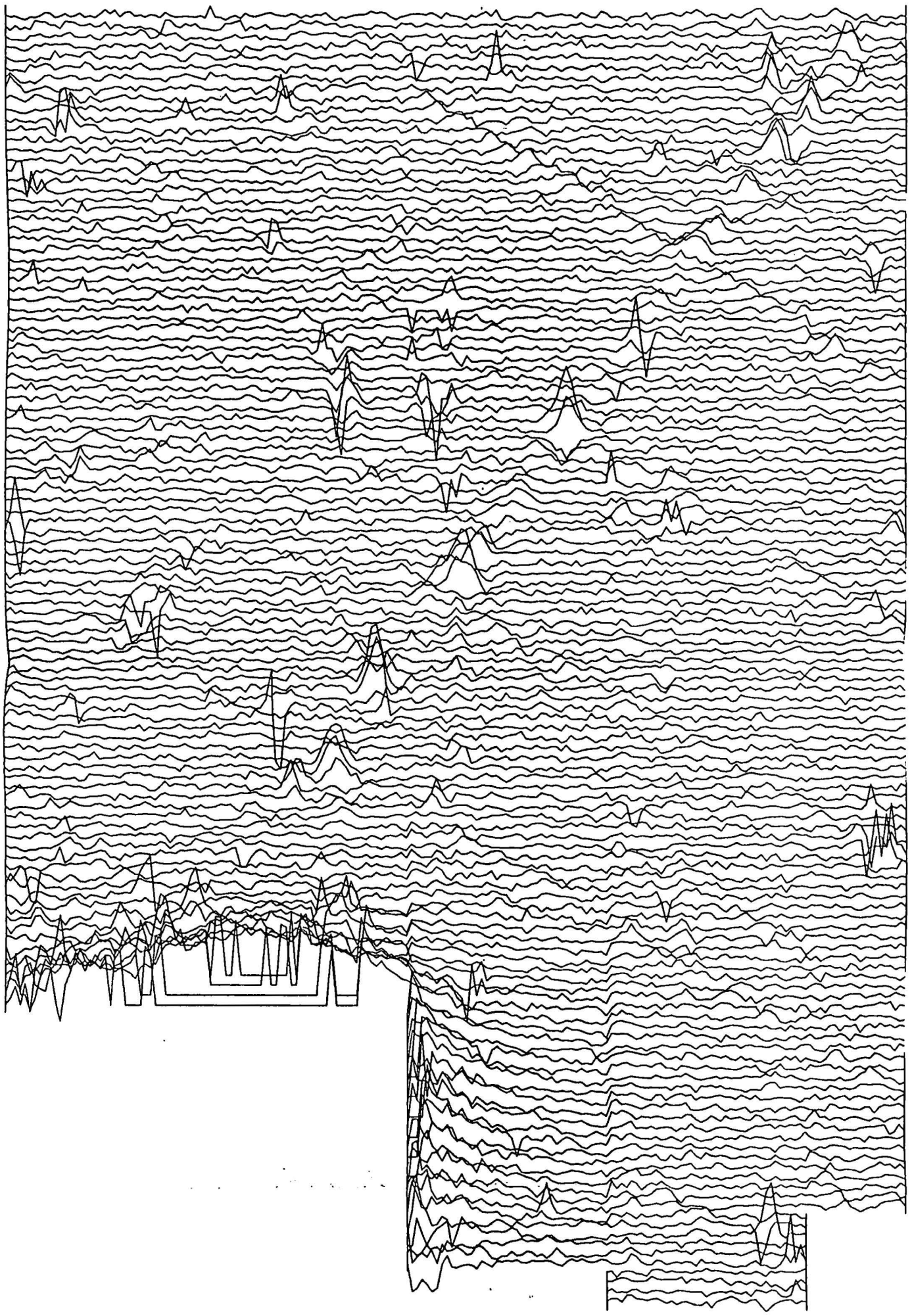

Figure 2

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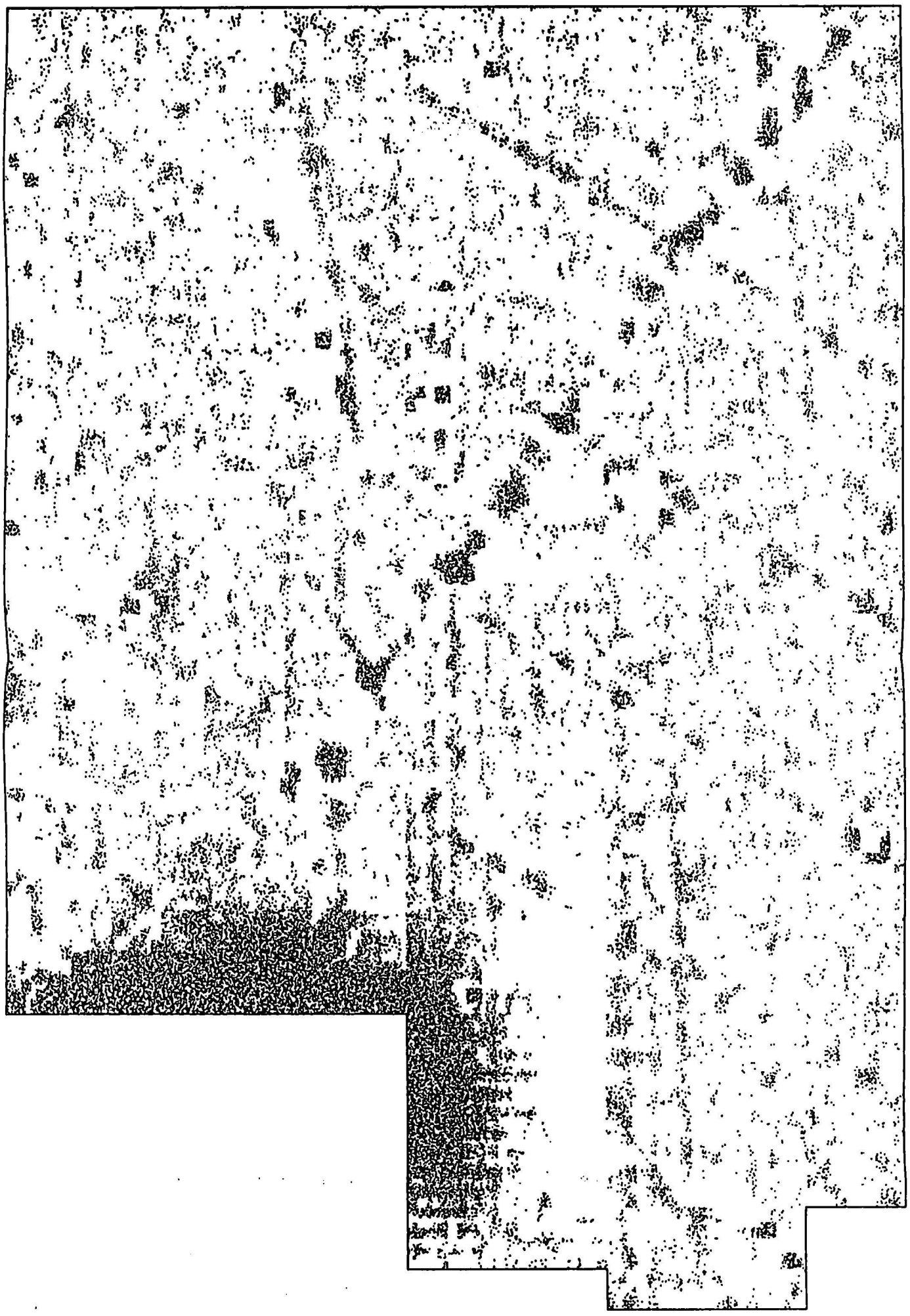

Figure 3

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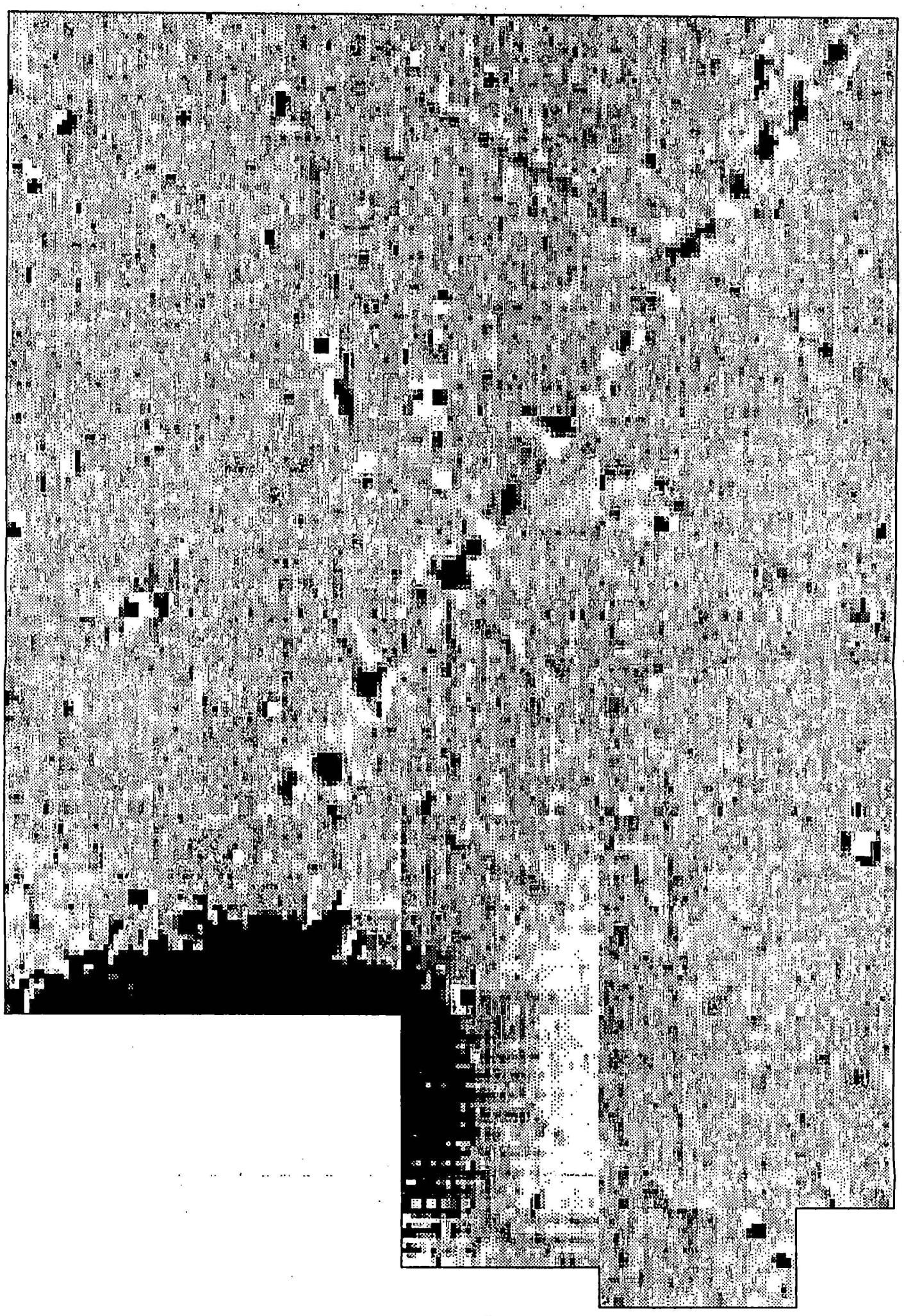

Figure 4

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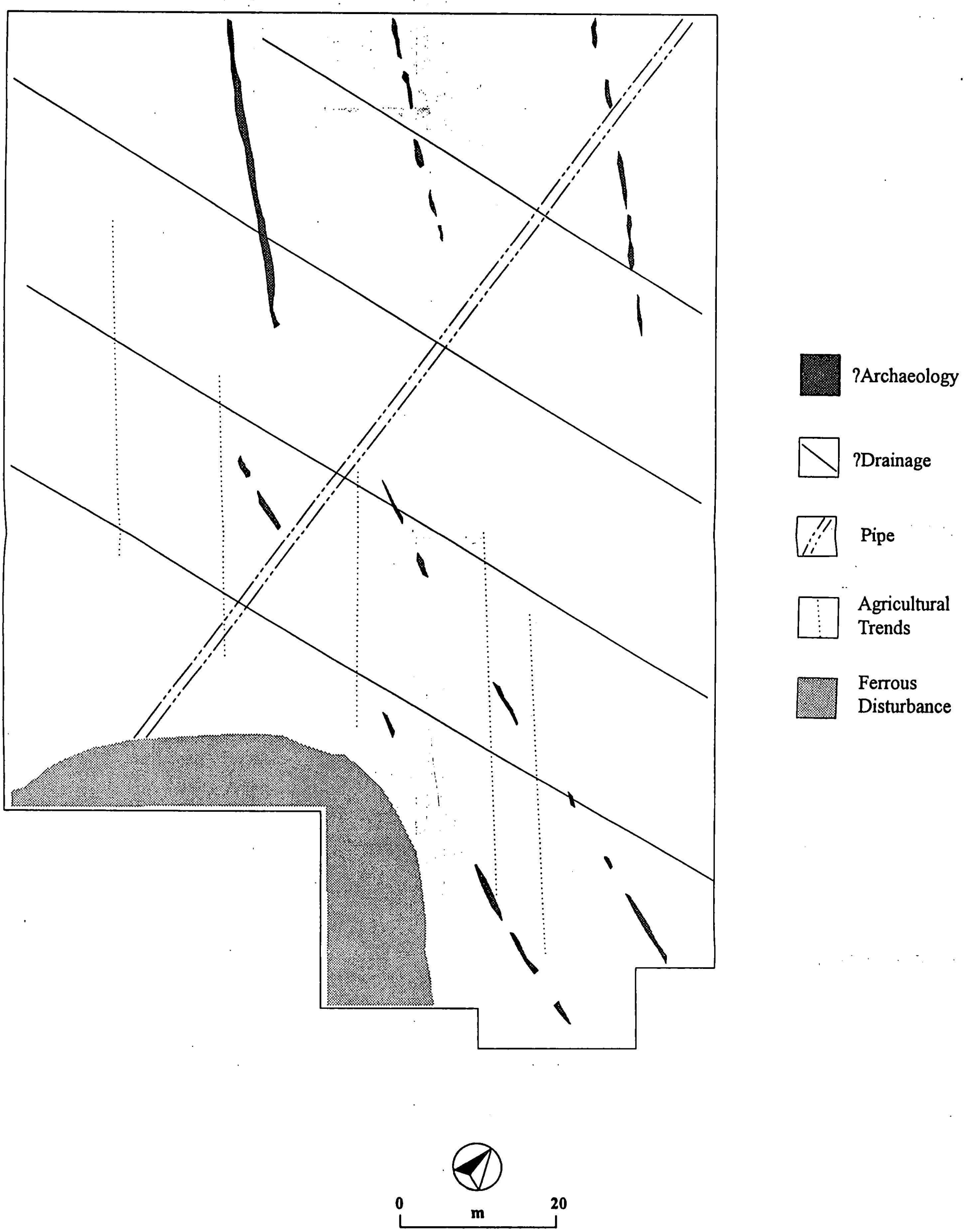

Figure 5