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GEOPHYSICAL SURVEY REPORT 2003/07

HOLLAND PARK
Spalding

Client:

JSAC JOHN SAMUELS ARCHAEOLOGICAL CONSULTANTS

EVENT L14208 MAGNETOMETRY
L14210 RESISTIVITY
SOURCE SLI 8725
8726
PRN 25630

SITE SUMMARY SHEET

2003 / 07 Holland Park, Spalding

NGR: TF 231 216

Location, topography and geology

The site lies on the southwestern outskirts of Spalding, Lincolnshire, approximately 2km from the town centre. The area investigated covers part of a flat field currently under 'set aside'. The area is defined by Horseshoe Road to the north, houses to the east and open fields to the south and west. The soils of the area comprise calcareous coarse silty soils of the Wisbech soil association overlying marine alluvium (SSEW 1983).

Archaeology

There is no known archaeology within the evaluation area.

Aims of Survey

The whole of the evaluation area was investigated by detailed gradiometer survey with the aim of identifying anomalies of archaeological interest and, if possible, determining their nature and extent. This survey forms part of a wider evaluation by **John Samuels Archaeological Consultants** (JSAC) prior to development of the site by **Broadgate Homes Ltd**.

Summary of Results *

The data are generally quiet, although there is magnetic disturbance along the northern and eastern edge of the survey area due to a pipe and fence, respectively. A broad curving ditch-type anomaly has been identified within the data that may be of archaeological interest. However, the response is weak and diffuse and could be agricultural or natural in origin. A more diffuse linear response has been recorded and is thought to be probably natural. Elsewhere a few pit-type responses and weak trends have been identified but an archaeological interpretation for these is tentative. Many of the trends are aligned north-south which is consistent with recent cultivation.

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

SURVEY RESULTS

2003 / 07 Holland Park, Spalding

1. Survey Area

1.1 An area of approximately 1.5ha was investigated by detailed gradiometry as shown on Figure 1 at a scale of 1:2500.

1.2. The survey grid was set out by ***GSB Prospection*** and tied in to existing boundaries using tapes. Markers were left at boundaries to facilitate relocation of the grid. Detailed tie-in information has been lodged with the client.

2. Display

2.1 The results are displayed as a summary greyscale image in Figure 2 at a scale of 1:1250. An accompanying interpretation diagram is provided in Figure 3, at the same scale.

2.2 The results are also displayed as X-Y traces and dot density plots, with digitised interpretation diagrams, in Figures 4 - 9. These display formats and the interpretation categories used are discussed in the *Technical Information* section at the end of the text.

2.3 For ease of display in Figures 4 – 9 the area has been subdivided as indicated in Figure 1, however the results are discussed as a whole.

3. General Considerations - Complicating factors

3.1 Conditions for survey were good with the field being level and having a short grass cover.

3.2 Within the data, numerous isolated ferrous responses are apparent. These are most likely due to modern ferrous debris on the surface or in the topsoil. A relatively large amount of modern rubbish and brick was visible on the surface particularly adjacent to the road marking the northern limit of the site and the eastern limit of the site near the houses. Only the most prominent of these have been noted on the interpretation diagrams and they are not referred to in the text unless considered particularly relevant.

4. Results of Detailed Survey

4.1 The data collected along the northern limit of the site is particularly noisy. This is largely due to a pipe that runs along side the road, but also to a concentration of modern ferrous debris near to the road. Similarly, the eastern edge of the survey area is noisy due to ferrous material in the adjacent fencing.

4.2 In the west of the survey area a broad curving anomaly has been identified. While an archaeological origin cannot be ruled out, its approximate north-south alignment is consistent with recent cultivation suggesting a possible modern origin, such as a former drainage ditch. Also given the underlying geology of alluvium, a natural origin is plausible.

4.3 In the eastern half of the field, an indistinct linear response has been detected and a natural explanation is thought to be more credible.

4.3 Several weak parallel trends are visible in the data. These are on a north-south alignment and almost certainly reflect past cultivation.

4.4 Near the eastern limit of the survey area a short ditch-type response has been noted. Although relatively clear, an archaeological interpretation is cautious given the amount of ferrous material in the vicinity.

4.5 Elsewhere, isolated pit-type responses have been recorded. While these could be significant, they lack any clear context and a natural or modern origin is equally likely.

5. Conclusions

5.1 Overall, the magnetic response of the site was quiet, although there were zones of disturbance due to pipes and housing along the northern and eastern edge of the survey area.

5.2 A broad curving ditch-type anomaly had been detected that may be of archaeological interest. However, the response is weak and poorly defined and could be agricultural or natural in origin. A more diffuse linear response in the eastern half of the field is thought to be natural, although other explanations, such as it being a former drainage ditch, cannot be dismissed. Elsewhere, a few pit-type anomalies and weak trends have been identified but an archaeological interpretation for these is tentative. Many of the trends are orientated north-south which is consistent with recent cultivation.

Project Co-ordinator: Dr S Ovenden-Wilson
Project Assistants: M Saunders, C Stephens & Dr D Weston

Date of Survey: 3rd-4th February 2003
Date of Report: 13th February 2003

References:

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 / FM256 and Bartington *Grad*601-2

Both the Geoscan and Bartington instruments comprise of two fluxgate magnetometers mounted vertically apart at a distance of 500mm and 1000mm, respectively. The gradiometers are 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 logged at 0.5m intervals along traverses 1.0m apart, unless stated otherwise in the report. Having two gradiometer units mounted laterally with a separation of 1.0m, the Bartington instrument can collect two lines of data per traverse. The *Grad*601-2 has marginally greater sensitivity afforded by the increased fluxgate separation, unfortunately this also increases the instrument's susceptibility to external sources of interference.

(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 logged at 1.0m x 1.0m intervals, unless stated otherwise in the report.

(c) Magnetic Susceptibility

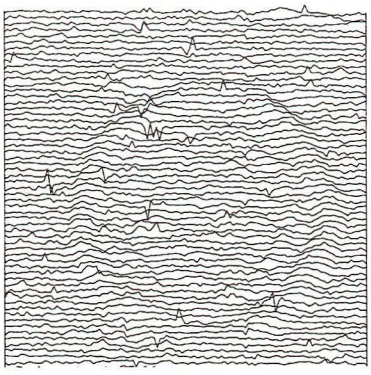
Variations in the magnetic susceptibility of subsoils and topsoils occur naturally, but greater enhanced susceptibility can also be a product of increased human/anthropogenic activity. This phenomenon of susceptibility enhancement can therefore be used to provide information about the "level of archaeological 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. Readings are made using an AC-coil and susceptibility bridge, with results being expressed either as SI/kg x 10^{-8} or m^3/kg.

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.

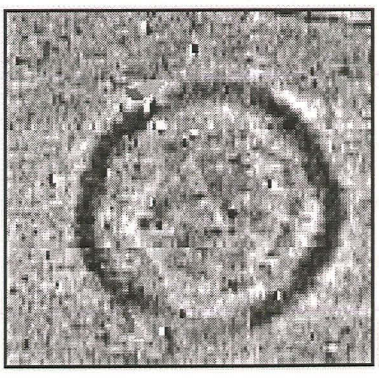
(a) Dot Density

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.

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 or very probably 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, isolated or obscured 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.

NB This is by no means an exhaustive list and other categories may be used as necesssary.

List of Figures

HOLLAND PARK
Location of Survey Area

Gradiometer Survey

0 100
m

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Figure 1

HOLLAND PARK
Summary Greyscale

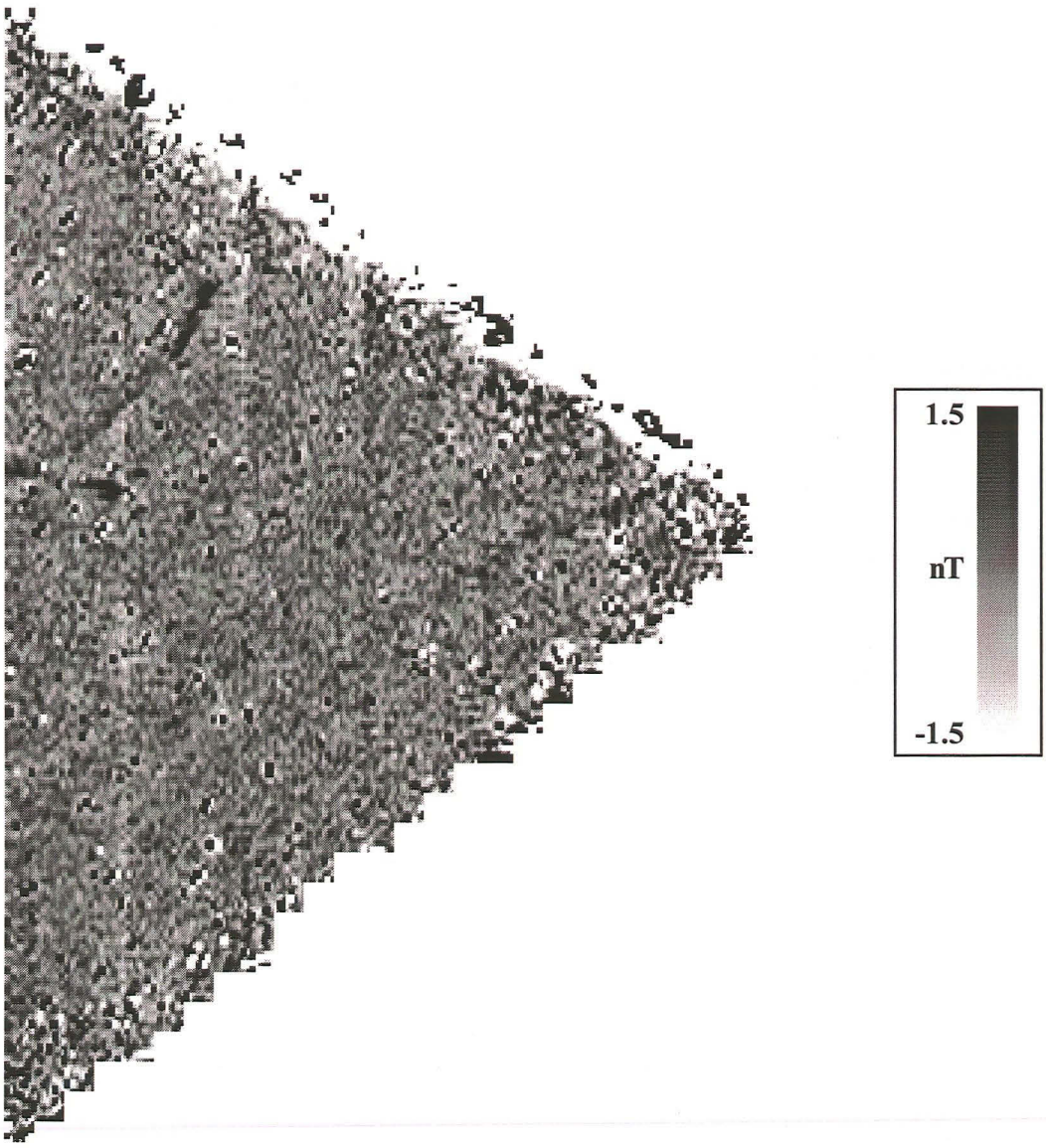

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Figure 2

HOLLAND PARK,
Summary Interpretation

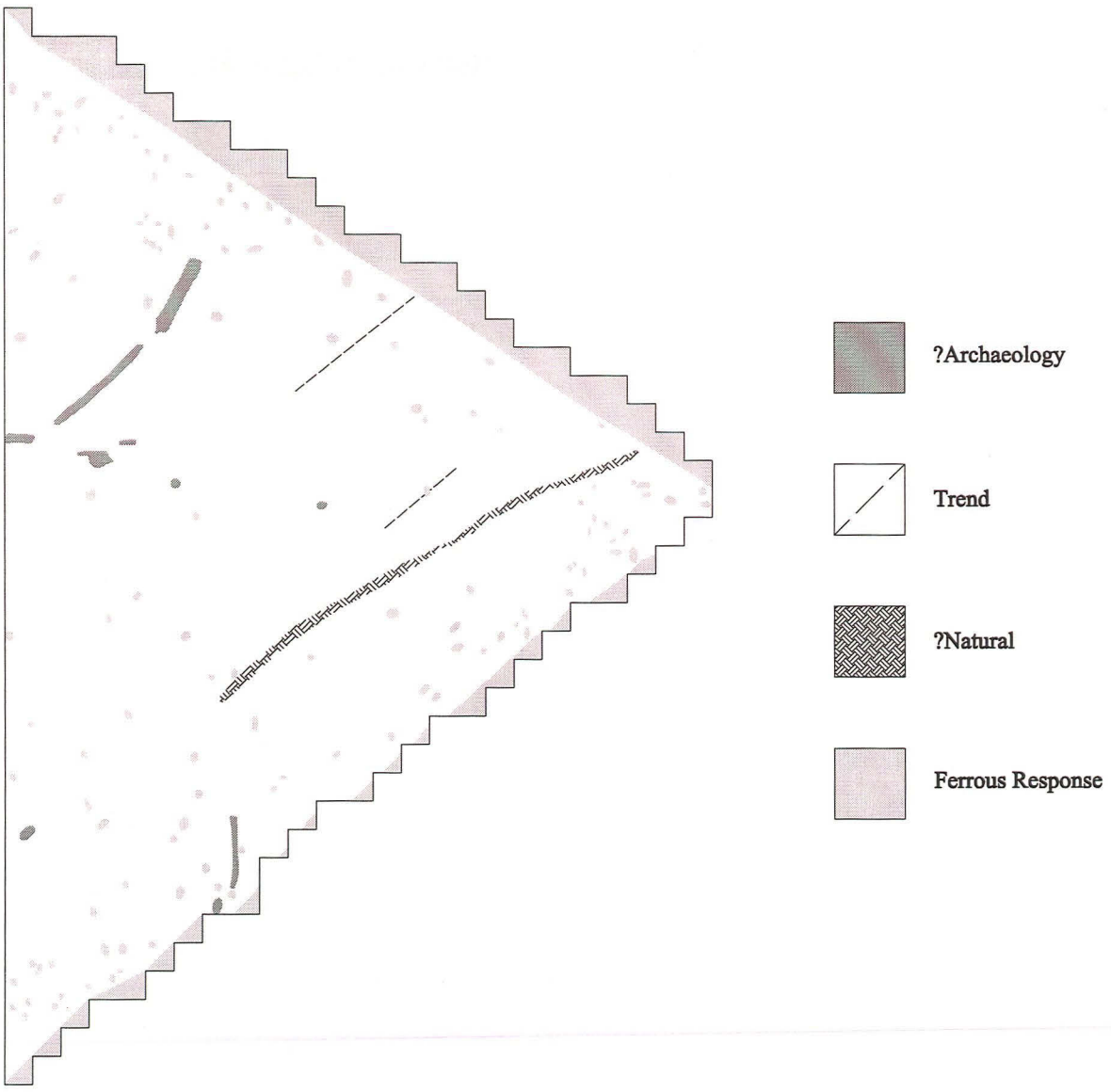

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Figure 3

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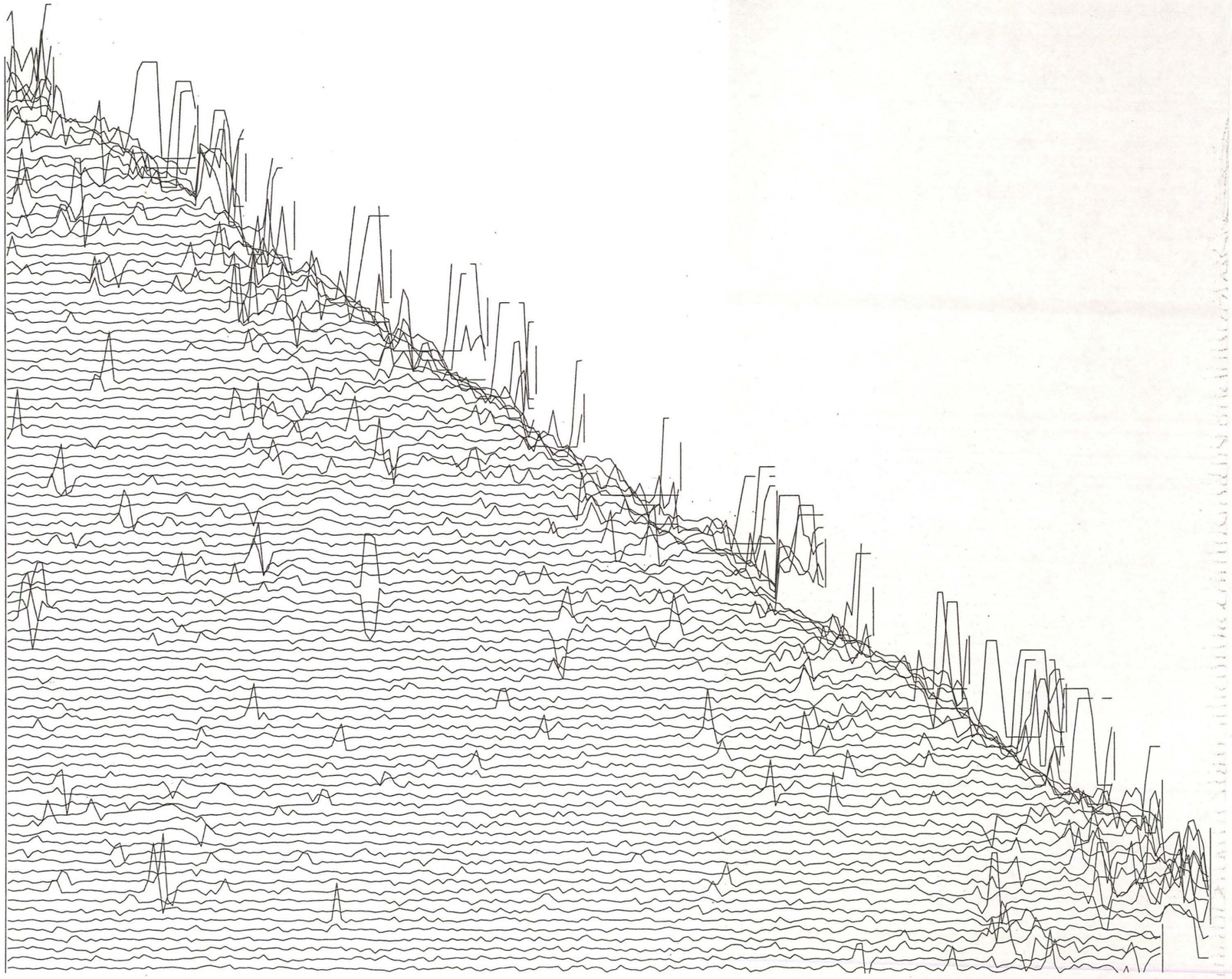
Area A



15 nT

0 m 20

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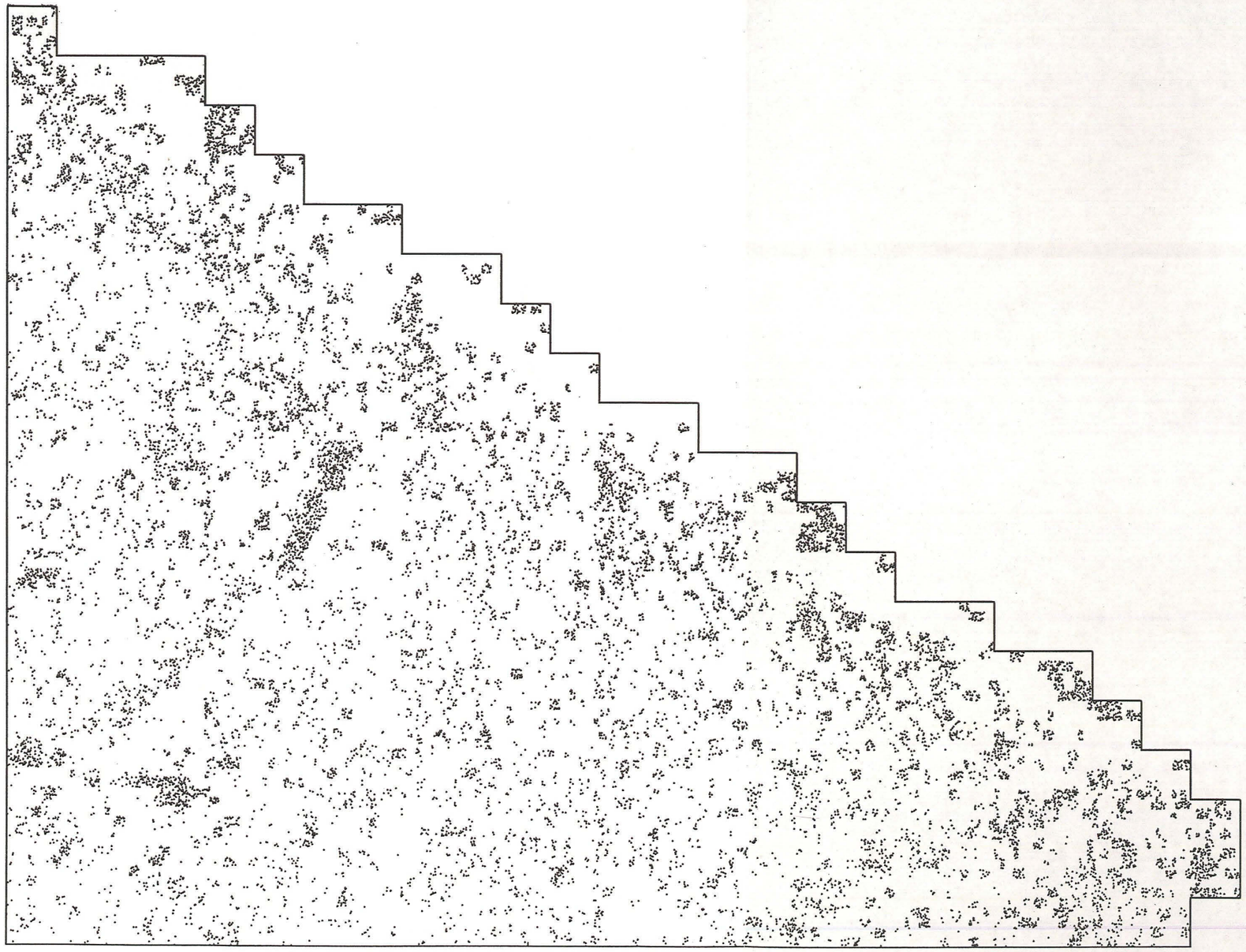
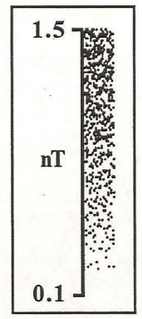
Figure 4

HOLLAND PARK
Area A





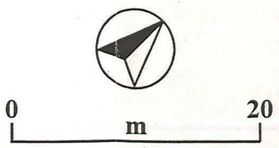
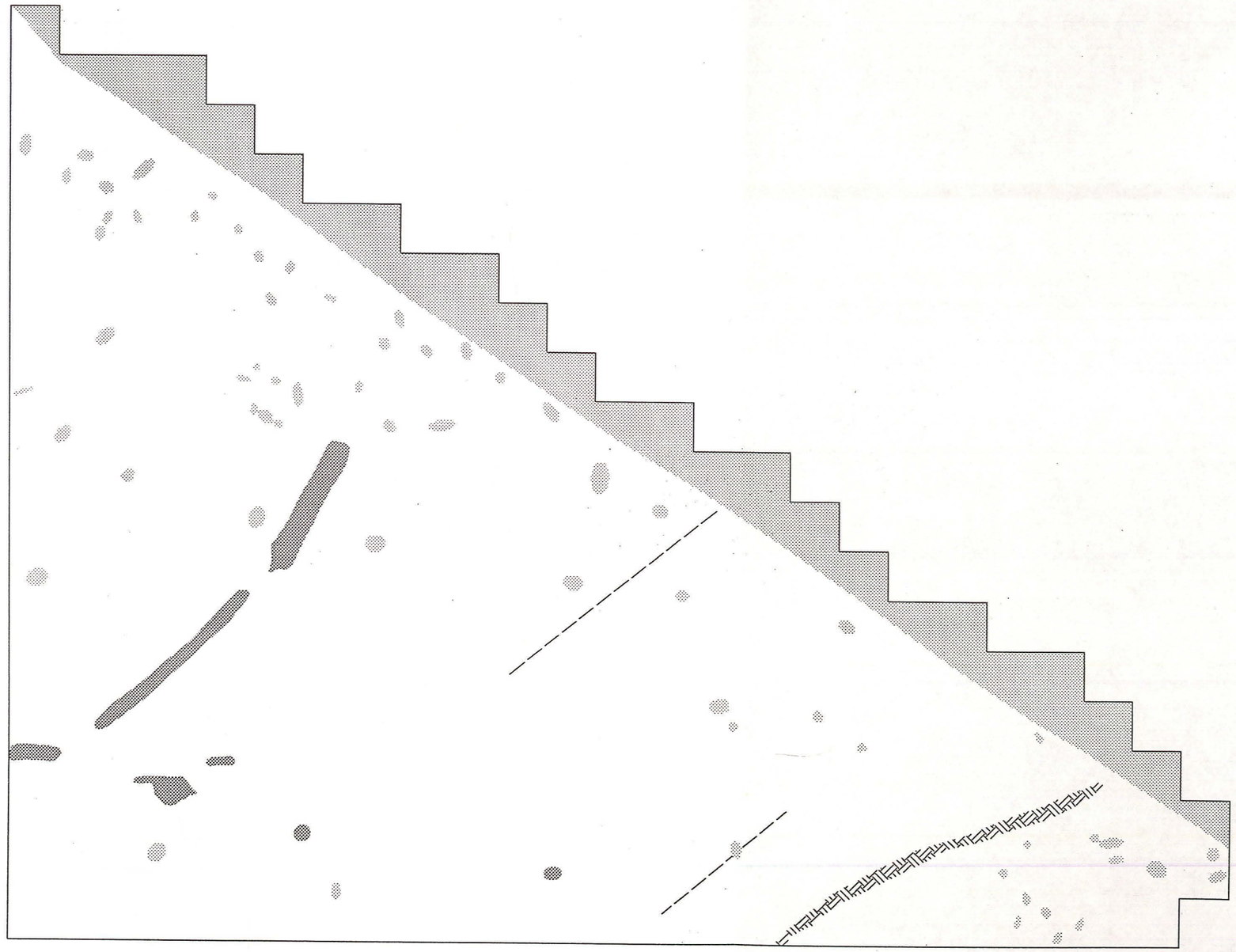


Figure 5

HOLLAND PARK
Area A



?Archaeology

Trend

?Natural

Ferrous

0 m 20

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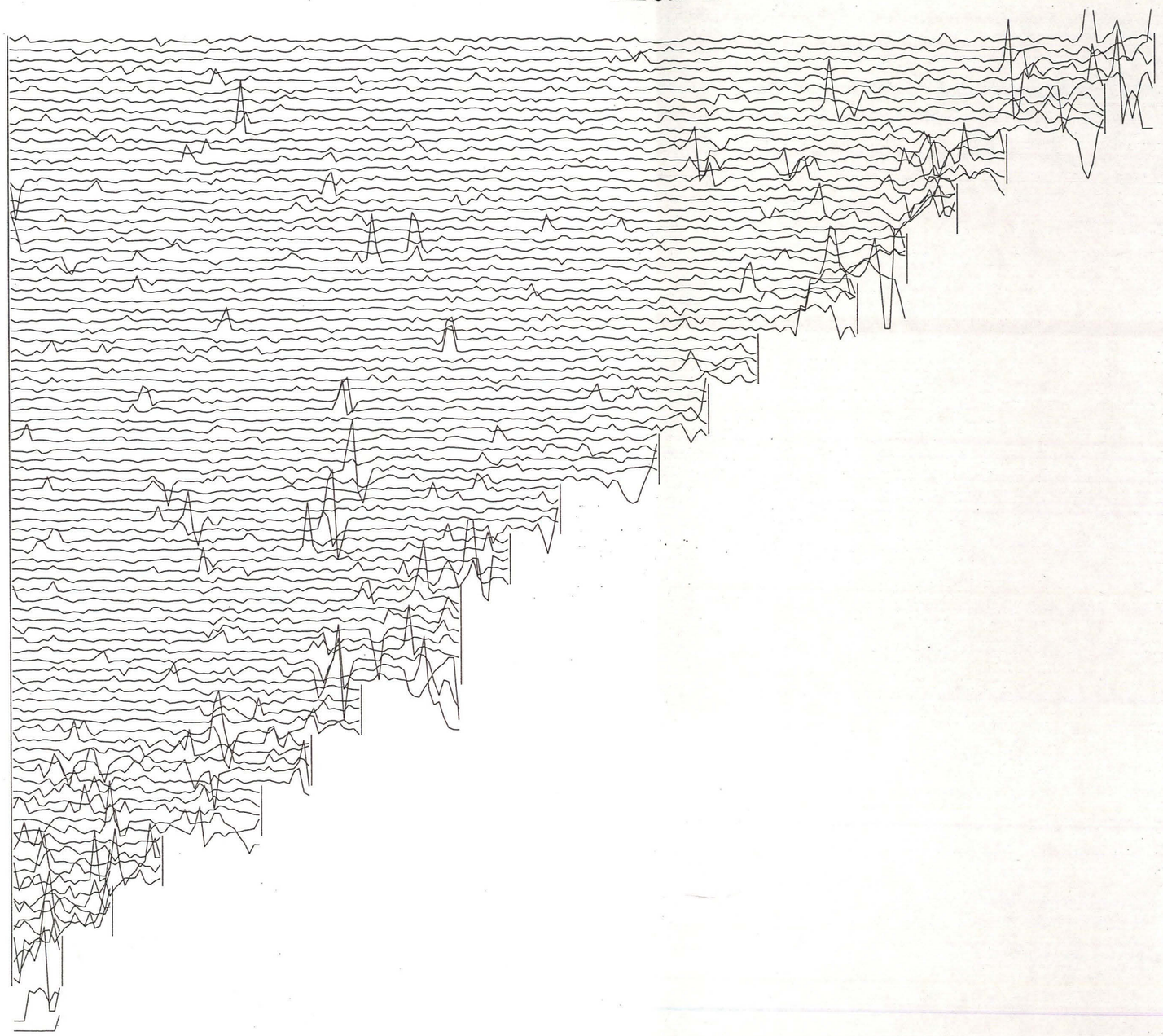
Figure 6

HOLLAND PARK
Area B



15 nT

0 m 20

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Figure 7

HOLLAND PARK
Area B

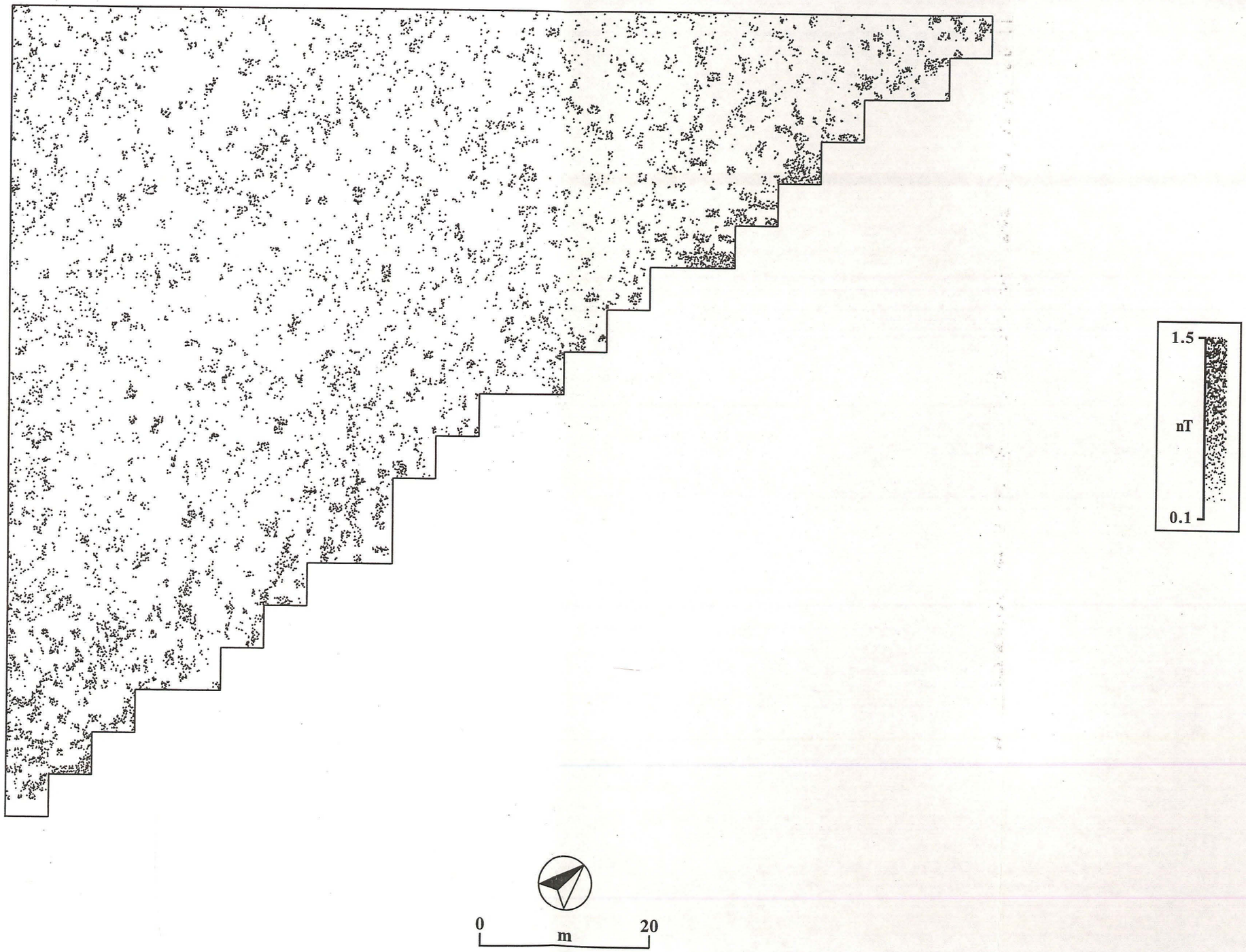

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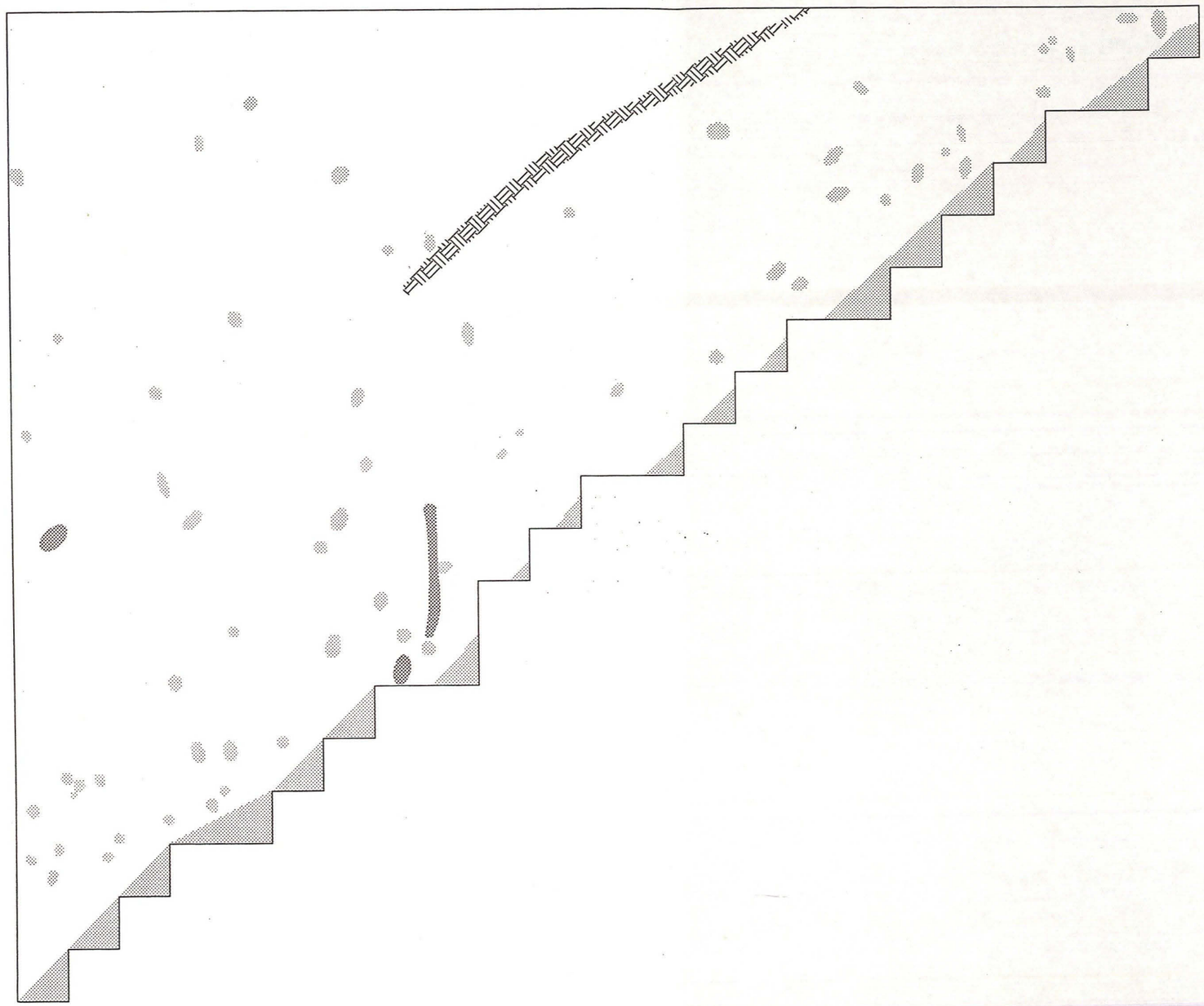
Figure 8

HOLLAND PARK
Area B



?Archaeology

?Natural

Ferrous

0 m 20

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Figure 9