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*Engineering Archaeological Services Ltd*

# E O L O G Y

98/3

*Kirkstead  
Geophysical Survey*

*March 1998*

EVENTS 418761 418762 418763  
SOURCE 418413  
Negative

*Survey Commissioned  
by  
Archaeological Project Services*

*Surveyed  
by  
John Price  
Engineering Archaeological Services Ltd.*

*registered in England  
Nº 2869678*

**Lincolnshire County Council**  
Archaeology Section

1 7. MAR 98

12 Friars Lane

LINCOLN LN2 5AL

Tel: 01522 575292 Fax: 01522 550004

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## *Contents*

### *Introduction:*

*NGR*

*Location And Topography*

*Archaeological  
Background*

*Aims Of Survey*

*Summary*

### *Survey Results:*

*Results*

*Conclusions*

### *List Of Illustrations*

*Figure 1 Location Map*

*Figure 2 Area 1*

*Figure 3 Area 2*

*Figure 4 Area 3*

*Figure 5 Area 4*

*Figure 6 Area 5*

*Figure 7 Interpretation*

*Figure 8 Interpretation*

### *Technical Information:*

*Techniques Of  
Geophysical Survey*

*Instrumentation*

*Methodology*

*Copyright*

# **Kirkstead Geophysical Survey - Introduction:**

*NGR*

*Centred On TF 194 615 & TF 206 618*

## ***Location And Topography***

*Two areas were surveyed one immediately to the south east of Kirkstead Abbey, the other adjacent to Hogg Wood and the airfield. The area near the abbey was under stubble with a slight slope to the southern boundary. The second area had been ploughed and weathered and was flat.*

## ***Archaeological Background***

*Field 1 lies adjacent to Kirkstead Abbey and aerial photographs suggest the possibility of linear features extending into this area.*

*Field 2 again has some aerial photographic evidence for linear features..*

## ***Aims Of Survey***

*It was hoped that a combination of scanning and detailed magnetometry would detect any archaeological features and help to clarify their nature and extent.*

## ***SUMMARY OF RESULTS***

*No archaeological features were detected.*

# Kirkstead Geophysical Survey -Results:

## **Survey Results:**

### **Area**

An area of 12.8 Ha. was scanned and then 10% in 5 blocks was surveyed in detail.

### **Display**

The results are displayed as Grey Scale Image and as X-Y Trace Plots.

## **Results:**

### **Complicating Factors**

Field 1 - close to the southern boundary there is evidence for a layer of iron pan beneath the topsoil. Normally iron pans exist as "ferric oxide" which is non-magnetic, however close to the ditch on the southern boundary the pan layer is directly on top of a blue clay deposit which would seem to have reacted as a reducing agent converting some of the iron pan to "triferric tetroxide" which is ferro-magnetic.

Field 2 had been ploughed but was well weathered as a result the surface was uneven this can give rise to a noisy signal at times. Some evidence for iron pan was seen on the surface .

### **Scanning**

No features were detected during scanning. The area close to the ditch to the south east of the abbey had some very large ferro-magnetic anomalies but these were consistent with the effects of the pan deposits mentioned above, there was no evidence of archaeological features.

### **Detailed survey:**

Five blocks were surveyed across the area.

### **Area 1**

This area is fairly quiet. Towards the centre of this strip a number of feint anomalies can be seen, illustrated in green on the interpretation (figure 7). These correspond to a large depression in the field which may mark the position of a former

pond, the anomalies probably represent tree pits. There are a number of small ferro-magnetic anomalies, illustrated in Blue, which are consistent with agricultural debris e.g. horse shoes and plough points.

### **Area 2**

This area is fairly quiet. A single ferro-magnetic anomaly can be seen in the data, illustrated in blue on the interpretation (figure 7) this is caused by a power cable pole.

### **Area 3**

This area has a number of magnetic anomalies some of which seem to be ferro-magnetic in character, illustrated in blue on the interpretation (figure 8) and some which are not, illustrated in magenta. This area had some evidence of iron panning visible on the weathered surface, it also lies within the former extents of Hogg Wood. All of these features are probably natural in origin with a variety of factors affecting them including possible pan deposits, tree removal disturbance and possible periglacial features.

### **Area 4**

Two linear features cross this area, illustrated in green. These are probably land drains. In addition there are a number of ferro-magnetic anomalies which could be the result of panning and/or disturbance.

### **Area 5**

This area is very quiet with no features.

## Kirkstead Geophysical Survey -Results:

### *Magnetic Susceptibility*

*Soil samples were taken from random locations in both fields in order to assess the magnetic susceptibility of the soils. A number of sub-soil samples were obtained for comparison .*

Sample	Volume susceptibility $\chi_v$	Mass susceptibility $\chi_m$
Grid 2	16	12.7
Grid 4	26	19.8
Grid 5	18	14.1
Grid 9	23	17.0
Grid 12	29	25.7
Grid 17	20	17.5
Grid 20	21	17.6
Grid 21	17	13.5
Grid 25	19	17.1
Grid 26	20	18.0
Grid 32	20	18.9
Trial hole top	126	117.8
Trial hole pan	505	500.0
Trial hole ss	21	15.8
Grid 21 ss	15	10.6

*The susceptibilities as measured show fairly low levels and poor contrast with the subsoil samples. The effect of the reduced iron pan can be seen in the results from the trial hole.*

*In general the results demonstrate conditions that while not ideal for magnetic survey though which do not preclude it.*

### *Conclusions*

*It is a fundamental axiom of archaeological geophysics that the absence of features in the survey data does not mean that there is no archaeology present in the survey area only that the techniques used have not detected it.*

*No archaeological features were detected.*

# Kirkstead Geophysical Survey - Technical Information:

## **Techniques Of Geophysical Survey:**

### **Magnetometry:**

*This relies on variations in soil magnetic susceptibility and magnetic remanence which often result from past human activities. Using a Fluxgate Gradiometer these variations can be mapped, or a rapid evaluation of archaeological potential can be made by scanning.*

### **Resistivity:**

*This relies on variations in the electrical conductivity of the soil and subsoil which in general is related to soil moisture levels. As such, results can be seasonally dependant. Slower than Magnetometry this technique is best suited to locating positive features such as buried walls that give rise to high resistance anomalies.*

### **Resistance Tomography**

*Builds up a vertical profile or pseudosection through deposits by taking resistivity readings along a transect using a range of different probe spacings*

### **Magnetic Susceptibility:**

*Variations in soil magnetic susceptibility occur naturally but can be greatly enhanced by human activity. Information on the enhancement of magnetic susceptibility can be used to ascertain the suitability of a site for magnetic survey and for targeting areas of potential archaeological activity when extensive sites need to be investigated. Very large areas can be rapidly evaluated and specific areas identified for detailed survey by gradiometer.*

## **Instrumentation:**

- 1. Fluxgate Gradiometer - Geoscan Fm36**
- 2. Resistance Meter - Geoscan Rm4/D110**
- 3. Magnetic Susceptibility Meter - Bartington Ms2**
- 4. Geopulse Imager 25 - Campus**

## **Methodology:**

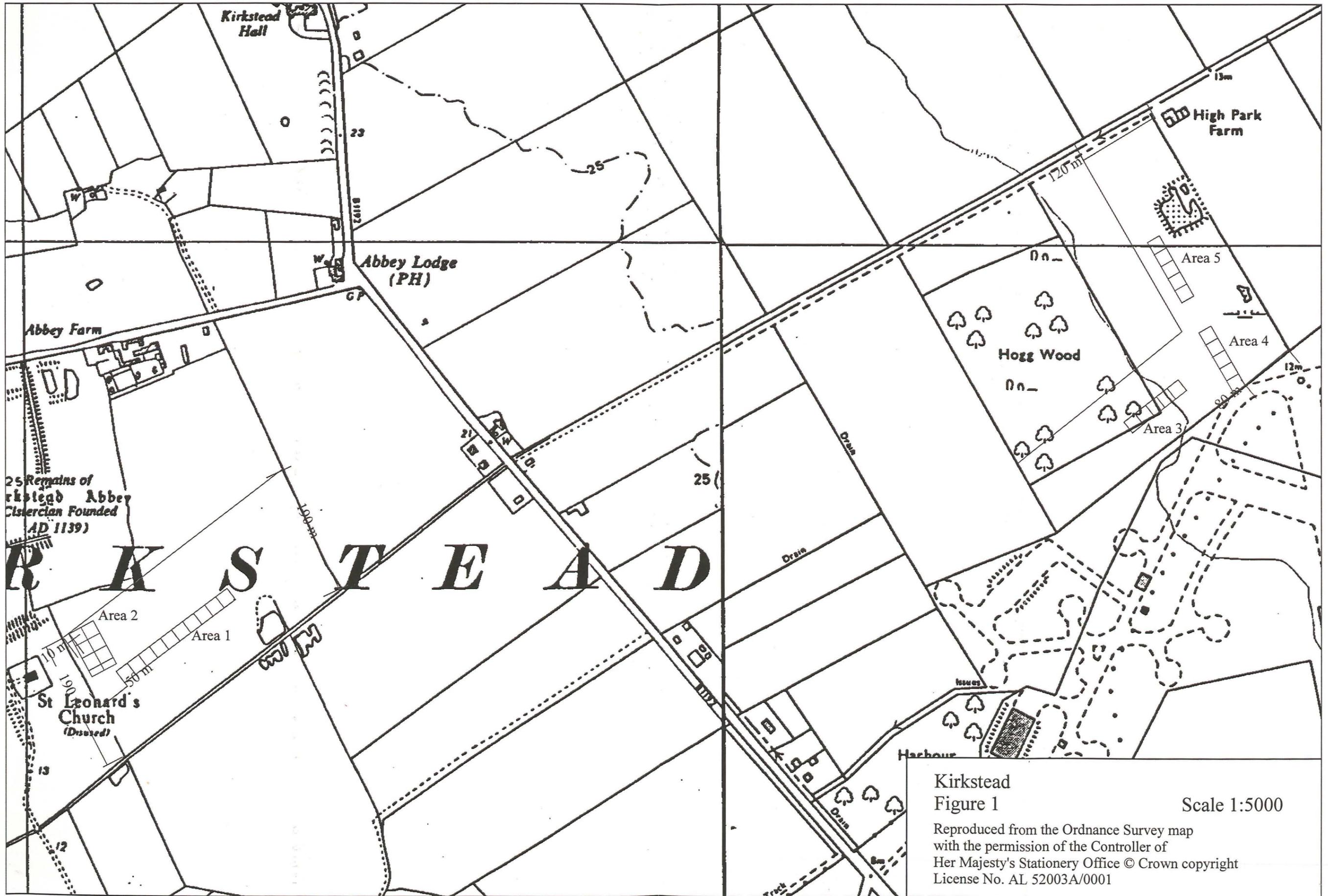
*For Gradiometer and Resistivity Survey 20m x 20m or 30m x 30m grids are laid out over the survey area. Gradiometer readings are logged at either 0.5m or 1m intervals along traverses 1m apart. Resistance meter readings are logged at 1m intervals. Data is down-loaded to a laptop computer in the field for initial configuration and analysis. Final analysis is carried out back at base.*

*For scanning transects are laid out at 10m intervals. Any anomalies noticed are where possible traced and recorded on the location plan.*

*For Magnetic Susceptibility Survey a large grid is laid out and readings logged at 20m intervals along traverses 20m apart, data is again configured and analysed on a laptop computer.*

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Kirkstead  
Figure 1

Scale 1:5000

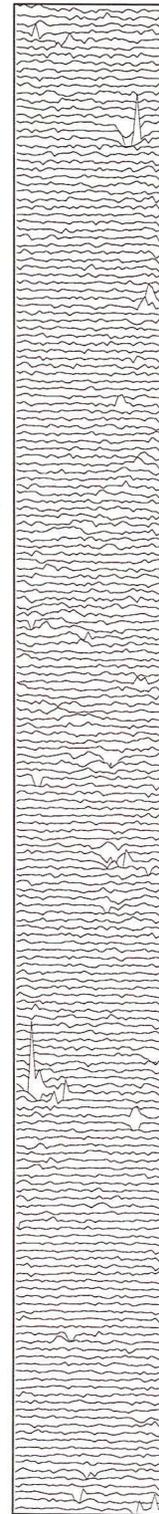
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2.0  
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1.4  
1.0  
0.7  
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nT



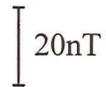
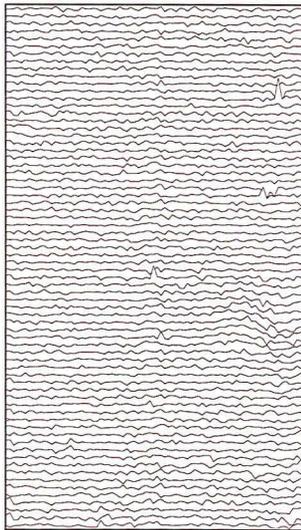
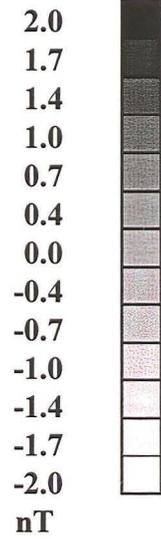
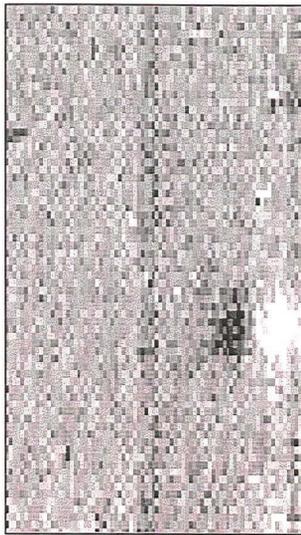
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**Kirkstead  
Area 1 - Magnetometer Data**

**Scale 1:1000**

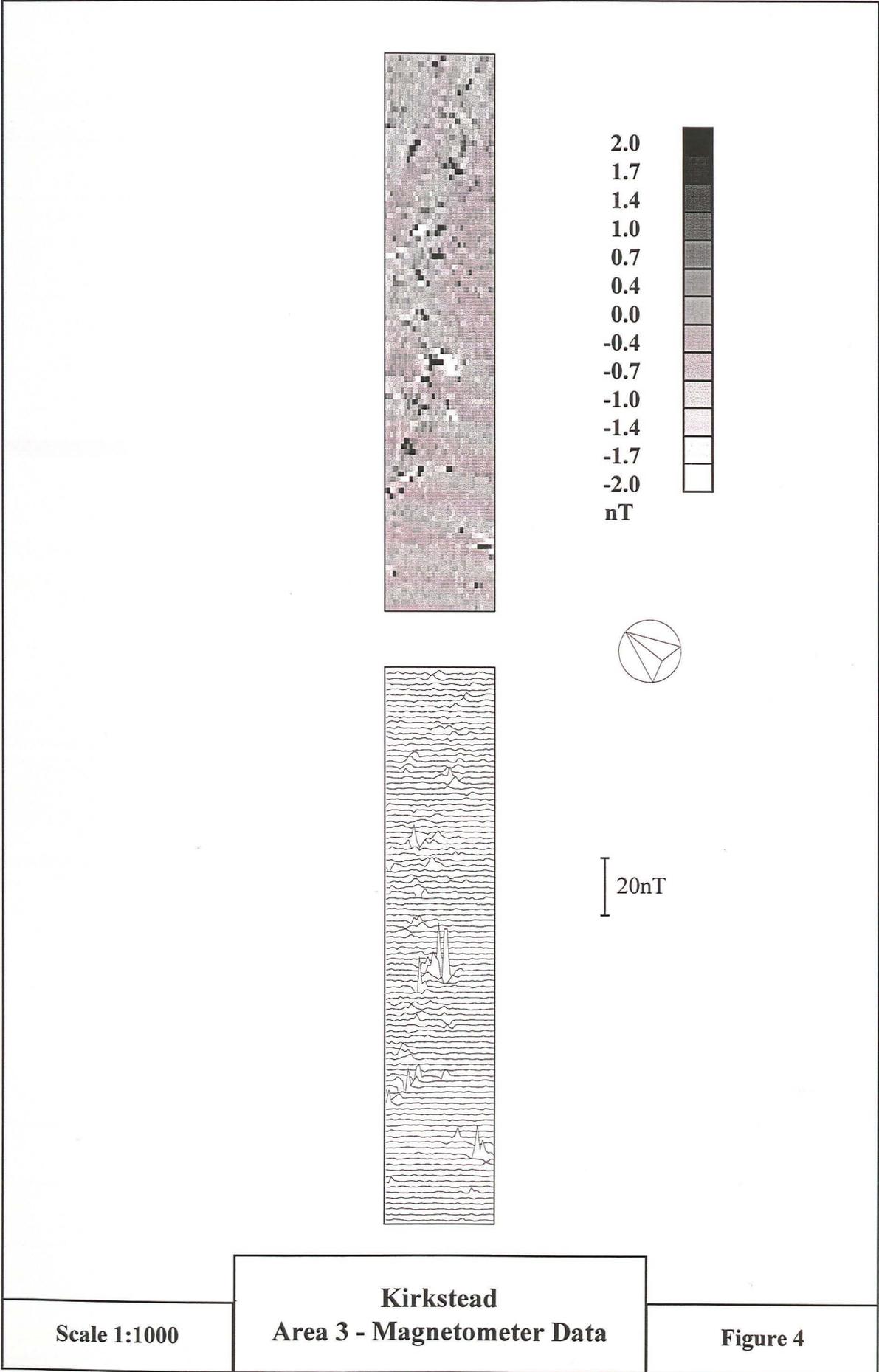
**Figure 2**



**Kirkstead  
Area 2 - Magnetometer Data**

**Scale 1:1000**

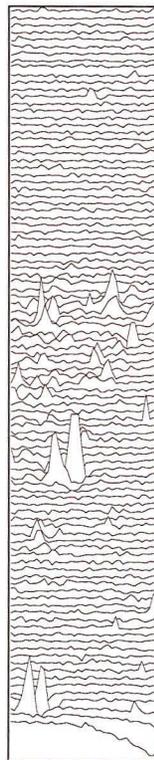
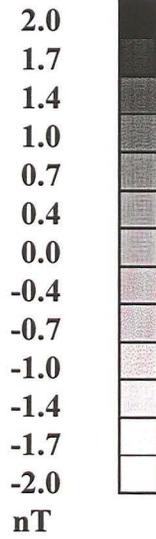
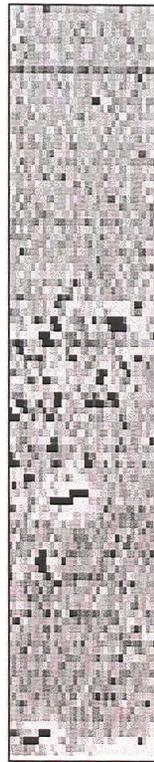
**Figure 3**



Scale 1:1000

**Kirkstead**  
**Area 3 - Magnetometer Data**

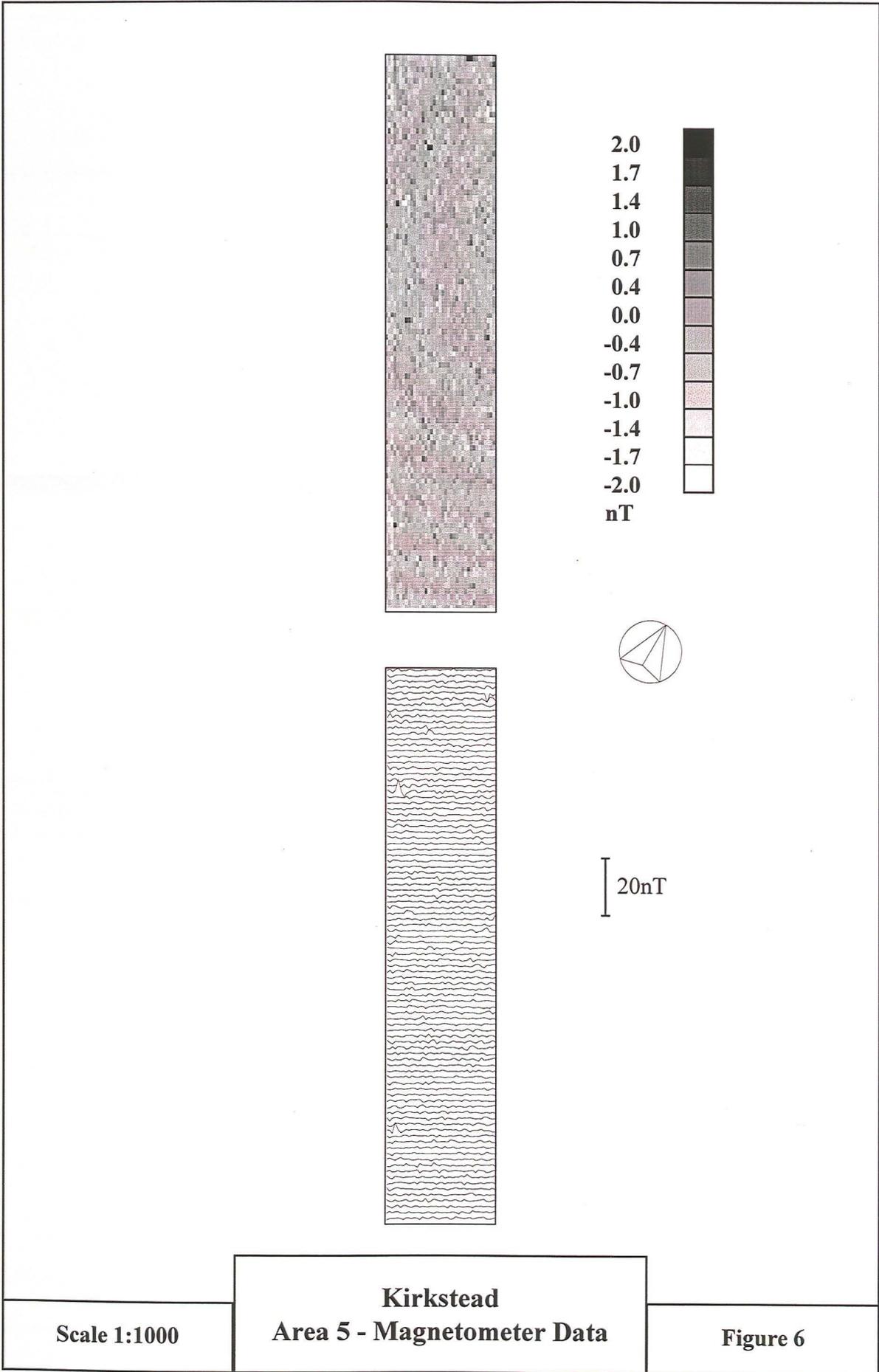
**Figure 4**



Scale 1:1000

**Kirkstead**  
**Area 4 - Magnetometer Data**

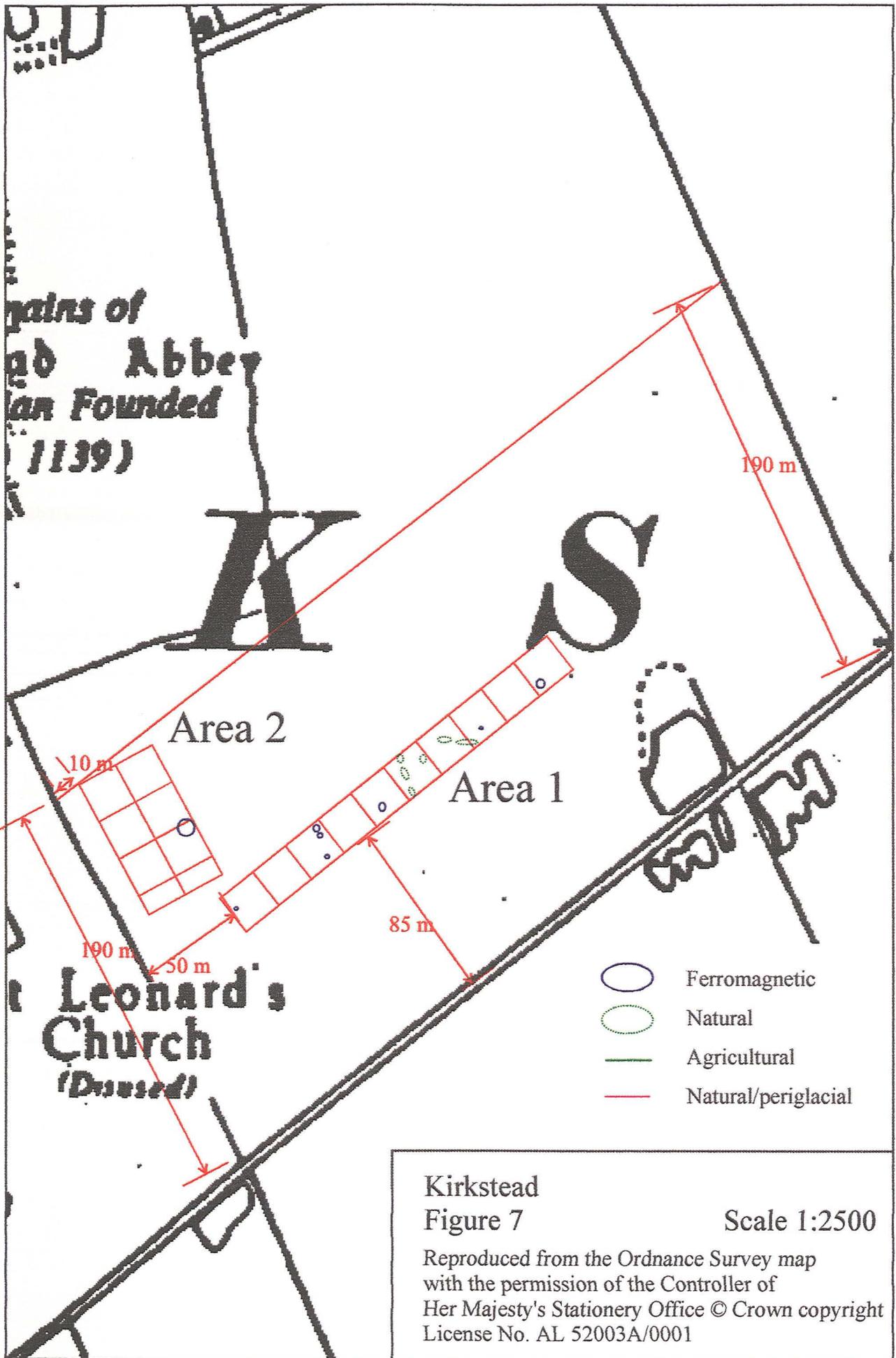
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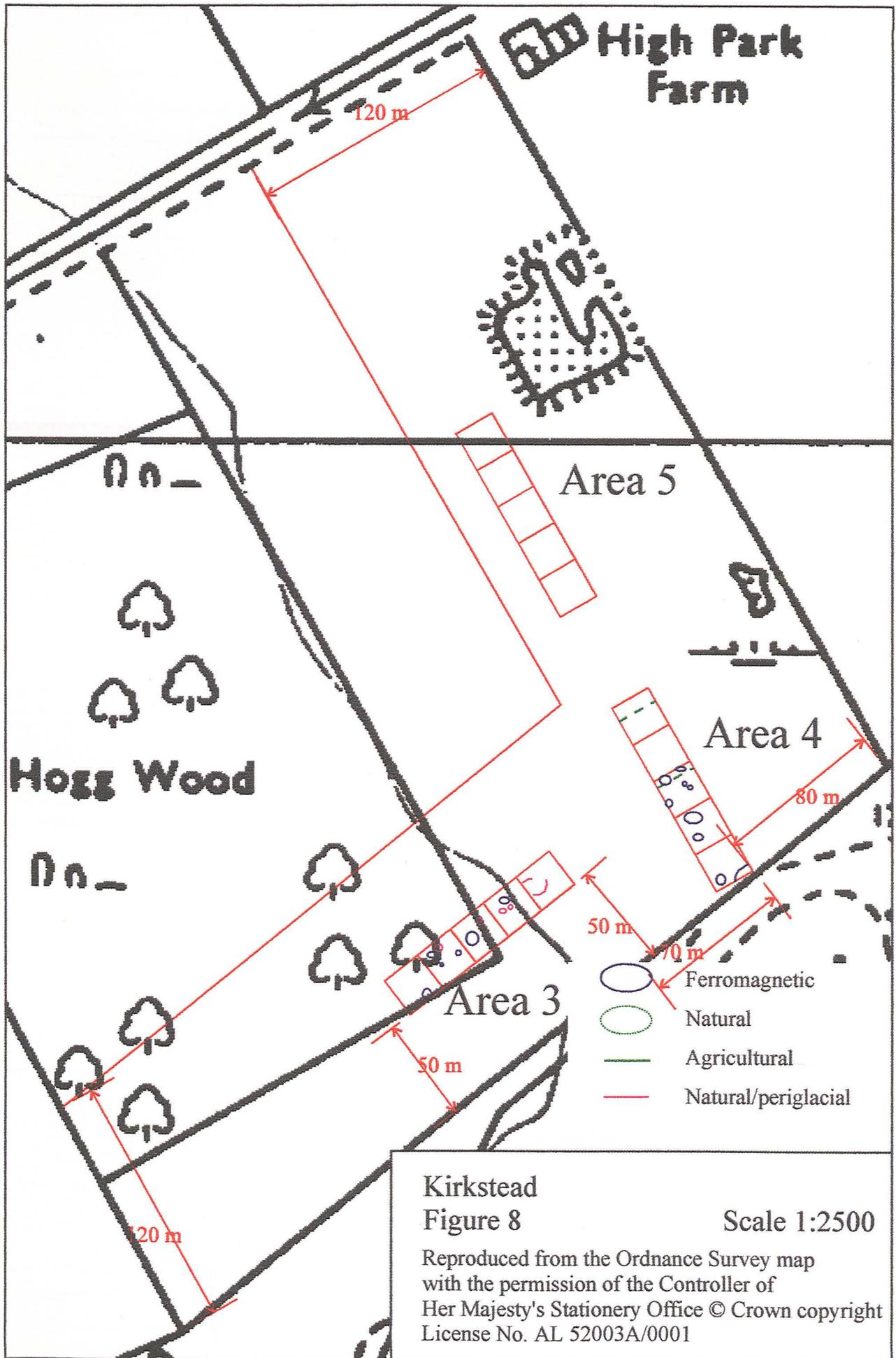


Scale 1:1000

**Kirkstead**  
**Area 5 - Magnetometer Data**

Figure 6





Kirkstead  
Figure 8

Scale 1:2500

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