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*Engineering Archaeological Services Ltd*

E O L O G Y

*Long Bennington  
Geophysical Survey*

*August 1998*



Lincolnshire County Council  
Archaeology Section

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EVENT L14359 - Scanning survey  
EVENT L14360 - Detailed survey  
Source L18935

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*Survey Commissioned  
by  
Gablestock Limited*

*Surveyed  
by  
John Price  
Engineering Archaeological Services Ltd.*

*registered in England  
Nº 2869678*

*Long Bennington  
Geophysical Survey*

*August 1998*

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# **Long Bennington Geophysical Survey - Introduction:**

**NGR**

***Centred On SK 8265 4565***

## ***Location And Topography***

*Parts of two fields were surveyed in an area immediately to the north of Valley Lane.*

*The site which was flat and under stubble lies on river gravels.*

## ***Archaeological Background***

*A desktop study has identified a linear boundary and associated enclosures.*

## ***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***

*A number of magnetic features were detected which confirm the findings of the desktop study.*



# Long Bennington Geophysical Survey -Results:

## **Survey Results:**

### **Area**

*An area of c. 6 Ha. was scanned and then a block of c. 1 Ha. was surveyed in detail.*

### **Display**

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

## **Results:**

### **Scanning**

*A number of features were detected during scanning, illustrated in red on the interpretation (Figure 7) these were largely confined to the area where the aerial photographs indicate the presence of archaeology. However, the main boundary of the cropmark complex could not be traced as a continuous feature, it was detected in some places but not elsewhere.*

*To the west of the track a number of features were detected in the northern half of the field but these were not very clear.*

*To the east of the track an area with a number of features was detected in the north-west corner of Field 7164. In the south east corner of the area scanned, close to the road and the power cables scanning detected ferro-magnetic noise over a fairly large area.. The same area also exhibited a significant amount of surface debris including brick, tile and iron fragments, all fairly modern. The brick and tile exhibited fairly strong magnetic properties. The distribution of noise and debris would be consistent with the ploughing of a former track or hard standing.*

*No other features were detected.*

### **Detailed survey:**

*Five areas were surveyed in detail to test both the presence and absence of archaeology.*

*Areas 1 and 2 were positioned to test the northern and southern limits of the features detected during scanning. Area 3 was positioned to evaluate the*

*area where both the aerial photographs and scanning indicated the most significant archaeology.*

*Area 4 and 5 were positioned to test the area where the main buildings are planned.*

### **Area 1**

*A single linear feature was detected in the south eastern corner of the area, illustrated in red on the interpretation (Figure 7). This is likely to be associated with the cropmark complex observed on aerial photographs.*

### **Area 2**

*To the eastern end of the area two of well defined features can be observed, illustrated in red on the interpretation (Figure 7). In addition there is a faint east west feature running the full length of the area. This could possibly be archaeological in origin but as it is aligned with the road to the south and field boundaries to the north it could be agricultural e.g.. a former field boundary or headland furrow.*

### **Area 3**

*The western end of the area shows parts of a group of enclosures, illustrated in red on the interpretation (Figure 7), there is also a fairly prominent ferro-magnetic spike, illustrated in blue on the interpretation which is caused by a near surface iron object consistent with a plough point or horse shoe.*

### **Area 4**

*Two features can be observed in the data, illustrated in red on the interpretation (Figure 7). that to the east is very well defined but does not appear to extend outside of the survey area and was not detected during scanning. The feature to the west is not very prominent, it may relate to the cropmark complex. A ferro-magnetic feature, illustrated in blue, is likely to be caused by a surface or near surface object.*



## Long Bennington Geophysical Survey -Results:

### Area 5

*A large ferro-magnetic feature, illustrated in blue on the interpretation (Figure 7) is caused by a combination of an underground cable and a ground anchor for a pole.*

*No Archaeological features were detected.*

### Magnetic Susceptibility

*Soil samples were taken from the area of detailed survey in order to assess the magnetic susceptibility of the soils. A sub-soil sample were obtained for comparison .*

Sample	Volume susceptibility $\chi_v$	Mass susceptibility $\chi_m$
Subsoil	7	7.4
Grid 1	37	30.8
Grid 3	11	8.9
Grid 7	34	29.3
Grid 11	20	16.4
Grid 16	9	7.6
Grid 22	11	8.7

*The susceptibilities as measured show variable levels , some showing good and some showing poor contrast with the subsoil samples.*

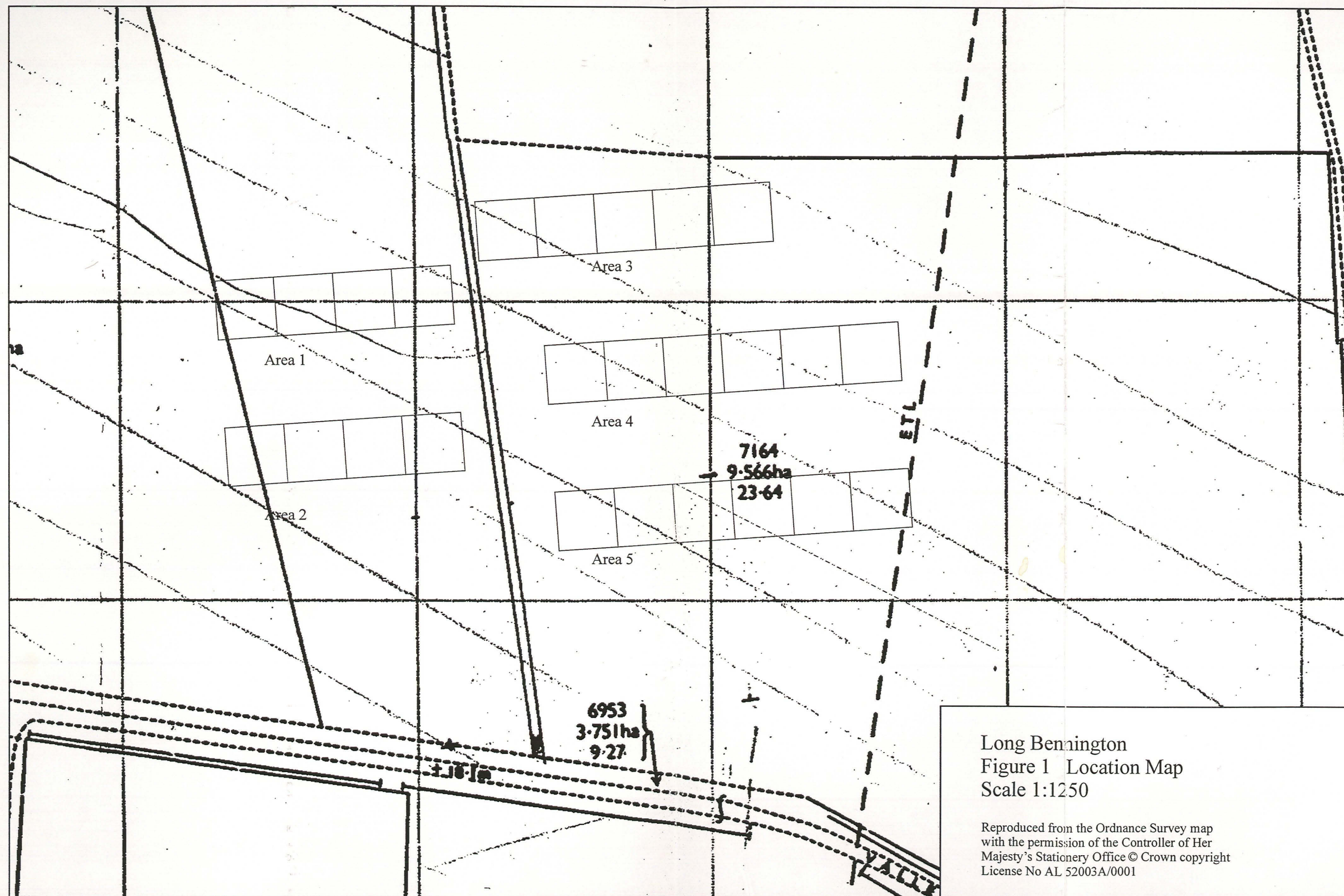
*In general the results demonstrate conditions with fair magnetic contrast across parts of the site and therefore suitable for magnetic survey.*

### Conclusions

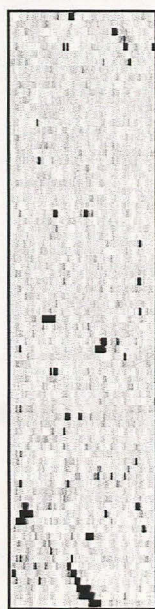
*It is a fundamental axiom of archaeological geophysics that the absence of features in the survey data does not mean that there is no archaeology present in the survey area only that the techniques used have not detected it.*

*A number of features were detected most of which are archaeological in origin. The main north south boundary identified from cropmarks could not be traced by scanning, but a number of features that are clearly associated with it were detected both by scanning and in the detailed survey.*





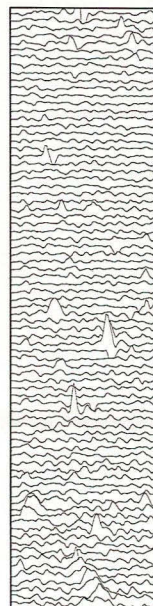




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1.3  
1.0  
0.8  
0.5  
0.3  
0.0  
-0.3  
-0.5  
-0.8  
-1.0  
nT



20nT



**Long Bennington  
Magnetometer Data - Area 1**

**Scale 1:1000**

**Figure 2**

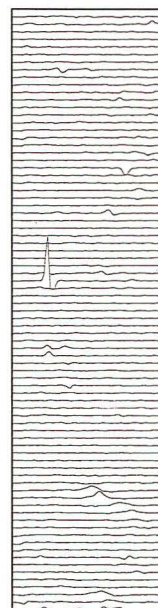




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1.5  
1.3  
1.0  
0.8  
0.5  
0.3  
0.0  
-0.3  
-0.5  
-0.8  
-1.0  
nT



100nT



**Long Bennington  
Magnetometer Data - Area 2**

**Scale 1:1000**

**Figure 3**

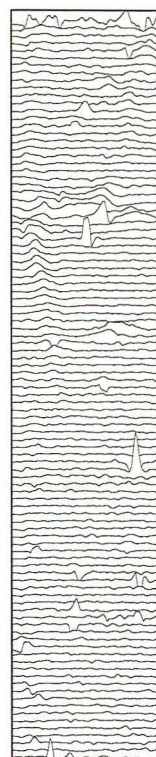




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0.3  
0.0  
-0.3  
-0.5  
-0.8  
-1.0  
nT



40nT



**Long Bennington  
Magnetometer Data - Area 3**

Scale 1:1000

Figure 4

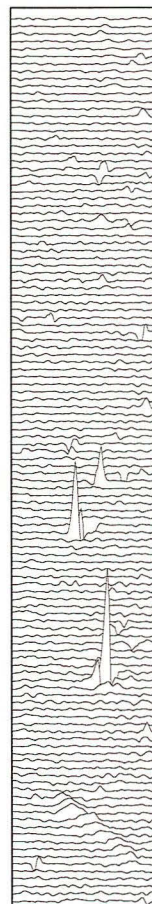




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0.0  
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-1.0  
nT



50nT



**Long Bennington  
Magnetometer Data - Area 4**

**Scale 1:1000**

**Figure 5**

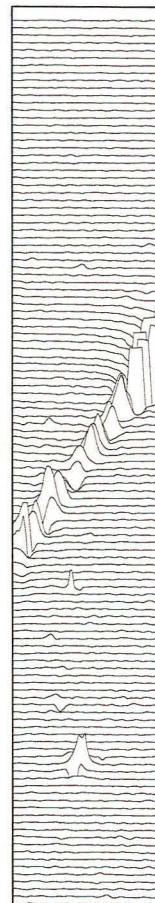




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-0.8  
-1.0  
nT



100nT

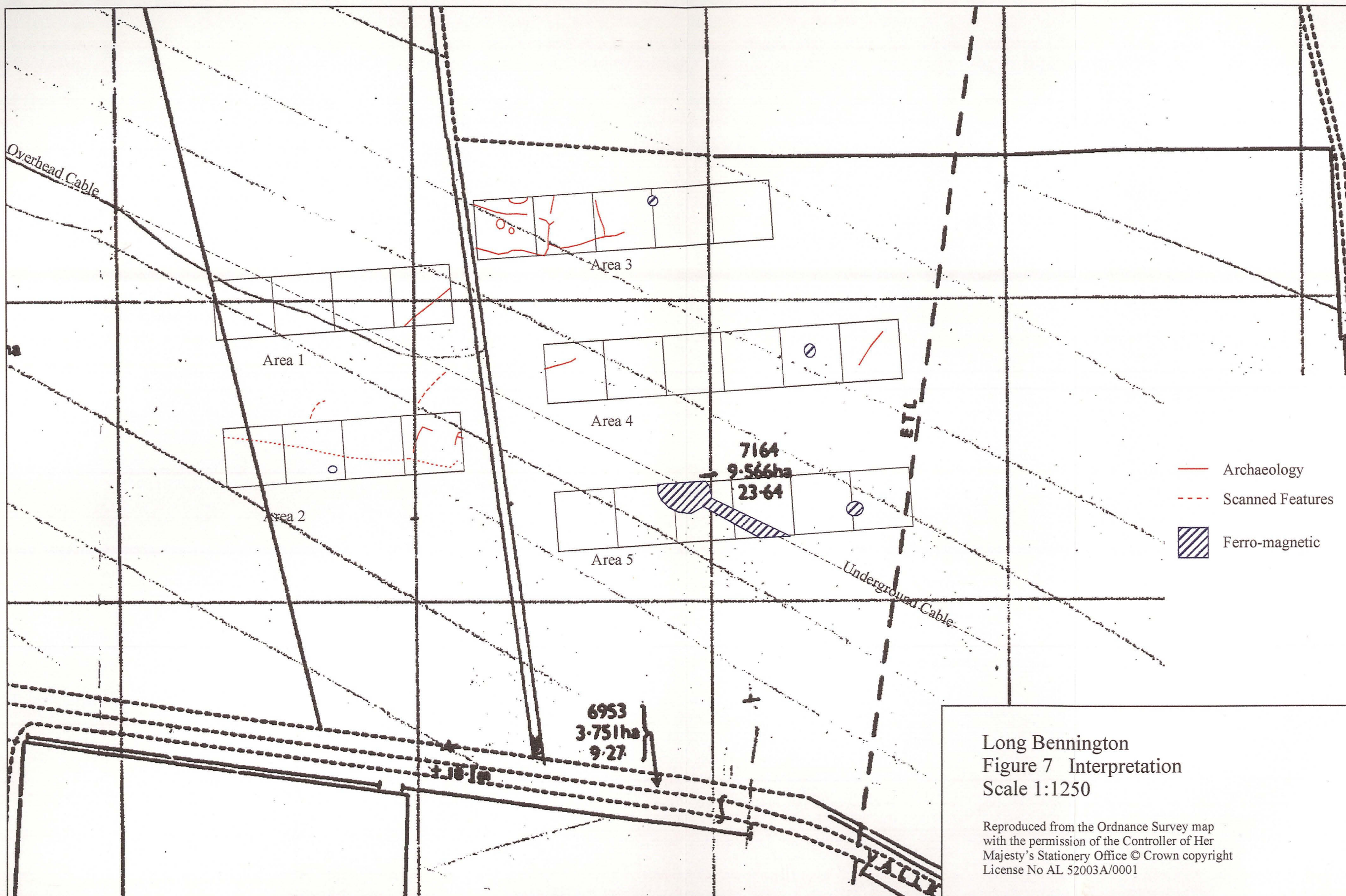


Long Bennington  
Magnetometer Data - Area 5

Scale 1:1000

Figure 6





Long Bennington  
Figure 7 Interpretation  
Scale 1:1250

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# **Long Bennington 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/DI10***
- 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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