

**Hawkers Farm, Theale,
Somerset**

Geophysics Report

Client: SMITHS GORE

AB Heritage Project No: 10410

Date: 22/10/2014

Hawkers Farm, Theale, Somerset Geophysics Report

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Project Number 10410
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Rev Number	Description	Undertaken	Approved	Date
1.0	DRAFT	AB	GR	22/10/2014

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1. INTRODUCTION

1.1 Site Location & Description

- 1.1.1 The site is situated approximately 1.2 km north of Theale, in Wedmore Parish, Sedgemoor, Somerset, with a centre point of NGR ST 46750 47751.
- 1.1.2 The entirety of the site lies in agricultural fields with mature hedgerows and rhynes dividing the fields into discrete individual plots. The majority of the development site lies to the south and west of the River Axe, which meanders across Yeo Moor. There is also a triangular plot of land to the east of the River Axe, which is demarcated along its eastern boundary by the Hixham Rhyne. 'Crossing Drove' road lies to the south of the site, with further agricultural fields to the north, east and west of the site (Gilmore, 2014).

1.2 Geology & Topography

- 1.2.1 The scheme is located in an area of low lying topography (the Somerset Levels), at approximately 10m Above Ordnance Datum (aOD).
- 1.2.2 The underlying geology of the Site is Mercia Mudstone Group, overlain with superficial Tidal Flat Deposits (BGS Geology of Britain Viewer). This form of alluvial geology has the potential to mask archaeological features, especially when relatively deep in nature.

2. AIMS & METHODOLOGY

2.1 Aims of Works

2.1.1 Geophysical survey is a programme of non intrusive archaeological work. The aims of this geophysical survey were to:

- Identify any geophysical anomalies of possible archaeological origin within the specified survey area;
- Accurately locate these anomalies and present the findings in map form; and
- Provide recommendations for any further archaeological work(s) necessary to contribute to the mitigation of the impacts of proposed development on these potential features.

2.1.2 The results of the geophysical survey are provided in this report, along with an interpretation of findings.

2.2 Methodology of Works Summary

Site Specific Information

2.2.1 A magnetometry survey was undertaken across the site of proposed development from, Thursday the 15th of September to Wednesday the 24th of September 2014, covering an area of c. 46ha hectares.

2.2.2 The AB Heritage staff members who undertook the works were John Pykett, Sam O'leary and Paul Blockley. The weather conditions for the work were mainly dry and sunny throughout the survey, although this would have had no material impact on the survey.

2.2.3 The work was undertaken and concluded within 9 working days, with all data capture downloaded periodically on site for data quality check.

Equipment

2.2.4 The magnetic survey equipment used was two Bartington Grad-601 (fluxgate magnetometers). Please see Appendix A, which contains a detailed methodology for the works undertaken; however, briefly, Table 1 (below) shows site specific information on how the magnetometer was set up:

Table 1: Setting Parameters of Magnetometer

Grid Size	30x30 metres
Data Capture Distances	0.25
Sensors	2
Sensitivity	0.1nT

2.2.5 A GPS was used to setup and reference the survey site using a Trimble GeoXR, which has a sub-centimetre accuracy suitable for this survey.

2.3 Known Constraints

- 2.3.1 The known constraints that are likely to inhibit the survey are the fields bounded by drainage ditches with occasional hedgerows growing within them; this creates a degree of difficulty accessing the fields,
- 2.3.2 Throughout the site there are pylons running across the site which in some instances can cause magnetic disturbance within c. 3m - 5m from the pylon.

3. RESULTS & INTERPRETATIONS

3.1 Results

3.1.1 The results of the survey are documented in Figures 2 – 5. Of these Figures 2 and 3 show the raw and processed geophysical data recorded at Hawkers Farm respectively, while Figures 4 and 5 show the interpretations made from the results. The [AB] numbers provided in this section refer to numbers correlating to Figures 4 and 5.

Possible Archaeology [AB 1]

3.1.2 Two possible archaeological features have been identified within the north-western area of the site, these features are linears and run in a south-east to north-west direction. The feature situated within Field A is c. 100m in length, while the feature situated within Field B is c. 125m in length, both features have a width of c. 1m - 2m.

3.1.3 Three features have also been identified within the north-western corner of Field A, these features run in different directions and c. 20m in length, with a width of c. 1m - 2m.

Other features [AB 2 - 4]

3.1.4 The geophysical data shows the site to have multiple geological features [AB 2], spread across the whole site and running in various directions.

3.1.5 Areas of magnetic disturbance [AB 3] have been identified within the site, along with areas of small Di-polar anomalies [AB 4].

3.2 Interpretation

3.2.1 Interpretation of the results of geophysical survey is based on professional judgement as to the likely/probable cause of an anomaly or reading. For example, strong dipolar discrete anomalies of small size are often associated with ferrous debris or similarly magnetic debris. In addition, where a positive linear anomaly is recorded, which has a negative anomaly associated alongside either side of it, is often likely to relate to the line of a modern service.

Table 1: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
AB 1	Positive features	Possible archaeological remains in the form of linear ditch cuts, but possibly drainage ditches
AB2	Negative curvilinears with associated positives	Possible Paleo-environmental River Channels/ Water Channels
AB 3	Magnetic Disturbance	Ferrous objects
AB 4	Positive with associated negative (Di-Polar)	Magnetic Debris

- 3.2.2 Field A and B contain the only possible archaeological features [**AB 1**] within the site; these features are linear in nature, with a width of c. 1m - 2m. They could relate to modern drainage, due to their linear form and connection to other drainage ditches, surrounding the fields.
- 3.2.3 Geological features [**AB 2**] are likely related to paleo-environmental channels, with the geophysical survey appearing to have identified an old river channel; this ran through the majority of the northern limits of the site, in a roughly north-west to south-east direction, with lots of smaller channels running off from this. The extent of the river channel as shown on the mapping (see Figure 2) is most likely a reflection of what was once a narrower channel, which progressively migrated across the site over time. A series of curvi-linear striations within the limits of this wider Palaeo channel (see Figure 2) are likely to represent what were previous banks of the now extinct river system.
- 3.2.4 Magnetic disturbances [**AB 3**] and Di-Polar anomalies [**AB 4**] are most likely related to modern agricultural activity and modern infrastructure within the limits of the site.

4. CONCLUSION

- 4.1.1 A geophysical survey was undertaken by AB Heritage Limited at Hawkers Farm, in Theale, Somerset. The work was undertaken over a period of 9 working days between Thursday the 15th of September and Wednesday the 24th of September 2014.
- 4.1.2 The purpose of this survey works was to understand the potential for any archaeological remains to survive undisturbed and, where possible, identify the form, function and extent of any potential remains.
- 4.1.3 Five linear archaeological features [**AB 1**] were identified within the north-western corner of the site and, while possibly archaeological in nature, it is concluded that they are most likely to represent drainage features.
- 4.1.4 In relation to other features identified the survey did reveal a range of previous river channels [**AB 2**], that ran across the majority of the site. This gives an indication of a period of time prior to the draining of the site, and progressive geological changes within the site associated with gradual migration of the river channel
- 4.1.5 It should be noted that the alluvial deposits lain down during the period when the site contained an active river, and likely subsequent flood events across the site, do have the potential to mask buried archaeological features; however, based on the results of this survey, it is concluded that there is a low potential for the survival of complex/significant below ground archaeological remains within the limits of proposed development.

5. ARCHIVE

5.1.1 The Site Archive will contain the following, as a minimum:

Table 2: Site Archive Data

Archive	Format
Raw Geophysical Data files	XYZ and Text
Processed geophysical data files	JPEG, BMAP
Archaeological Interpretation	Shape Files ARC GIS
Final Report	PDF
Final Images	PDF

5.1.2 A physical and digital archive will be stored in a suitable format at AB Heritage Limited offices in Taunton, Somerset.

6. REFERENCES

- BGS (British Geological Society) 2014. *Geology of Britain viewer*.<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>.
- EH (English Heritage) 2014. The National Heritage List for England.<http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/>
- Gilmore, R .2014. Hawkers Farm Solar Site Theale, Somerset. Archaeological Desk Based Assessment. 2014. ECUS IFA, 2011. Standard and Guidance for archaeological geophysical survey. IFA
- Jones D.M. 2008. Geophysical survey in Archaeological Field Evaluation. English Heritage.
- Schmidt, A 2002. *Geophysical Data in Archaeology: a Guide to Good Practice*. Oxford. Oxbow.

Appendices

Appendix 1 Technical Information on Geophysical Survey

FLUXAGTE MAGNETOMETRY SURVEY

The magnetic survey is carried out using a fluxgate gradiometer, which is a passive instrument consisting of two sensors mounted vertically 1 m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field, whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

Survey equipment

The Bartington Grad 601-2 dual magnetic gradiometer is capable of surveying to an accuracy of 0.1 nanotesla (nT).

Sample interval and depth of scan

The magnetometer data is collected in 30mx30m grids at a resolution of 1m x 0.25m. This sample density is recommended for site evaluation (English Heritage, 2008). This equates to 3600 points per 30mx30m grid. The magnetometer has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects are buried within the site.

Data capture and processing

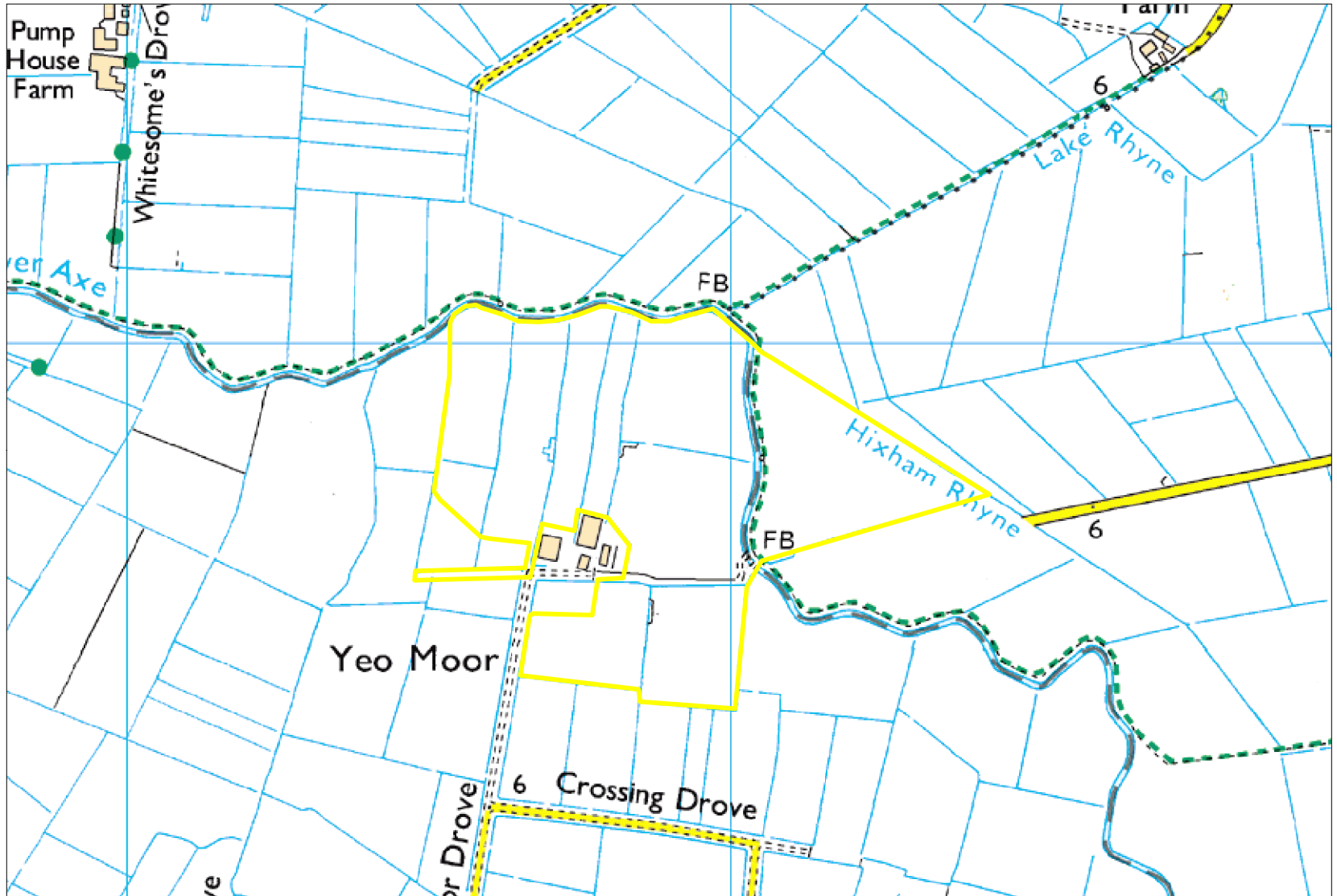
The readings are logged continually by the data logger during the survey, which is then downloaded on site to a site laptop. At the end of each job, data is transferred to the office PC's for processing and presentation.


This 'regular xy' data is then downloaded into specialist data processing software, at user defined sample intervals (in this case 1 m by 0.25 m). This is processed as standard magnetometer data.

GPS METHODOLOGY

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to sub-cm accuracy, a far greater accuracy than a standard GPS unit. An RTK system uses a base station receiver and a number of mobile units (rovers). The base station takes measurements from satellites in view and then broadcasts them along with its known position to the rover receivers. The rover receiver also collects measurements from the satellites in view and processes them with the base station data. The rover then computes its location relative to the base.

During such a survey a Trimble GeoXR Differential Global Positioning System (dGPS), capable of Real Time Kinematic (RTK) is used to set out a nominal grid prior to the survey. This increases the accuracy and efficiency of the survey. The data is then downloaded from the unit on the day, using a USB stick



Legend
 Survey Area

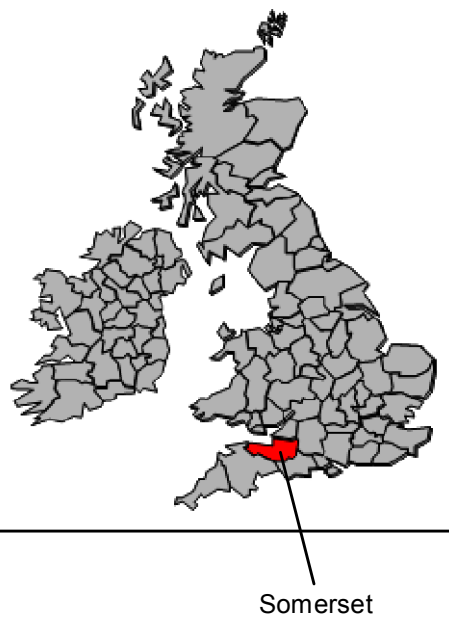
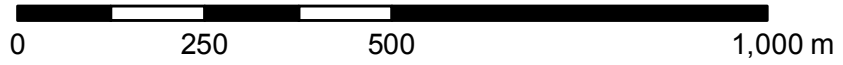


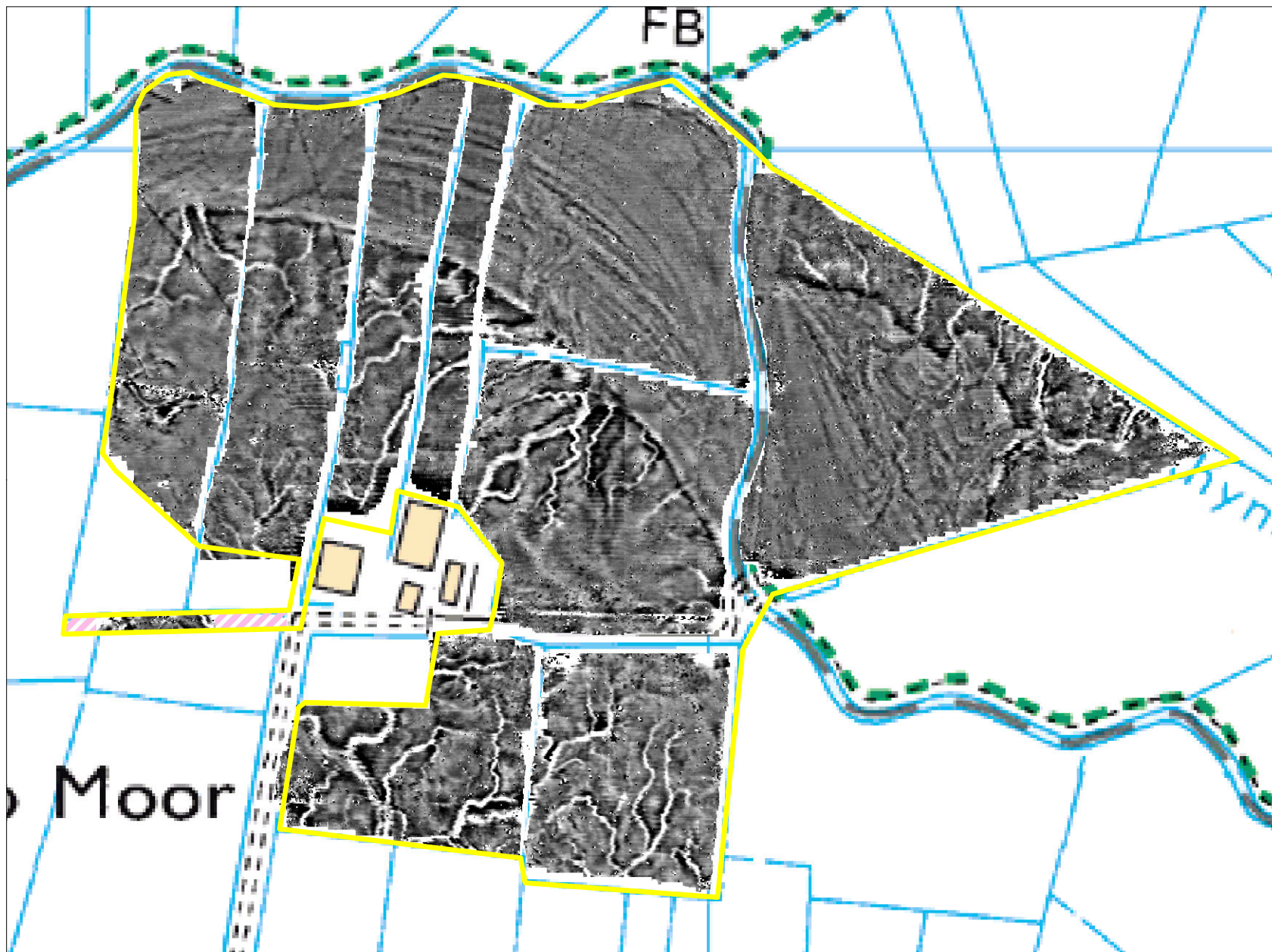
Figure 1: Site Location

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Drawn by: ZE Approved by: AB





Legend

- Unsurveyable Area
- Survey Area

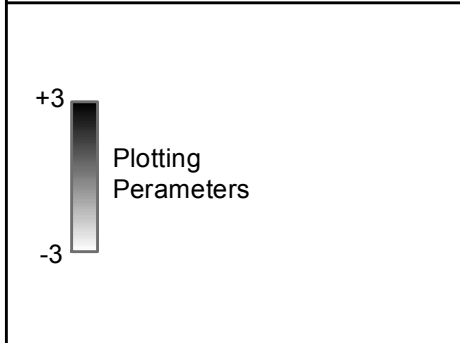
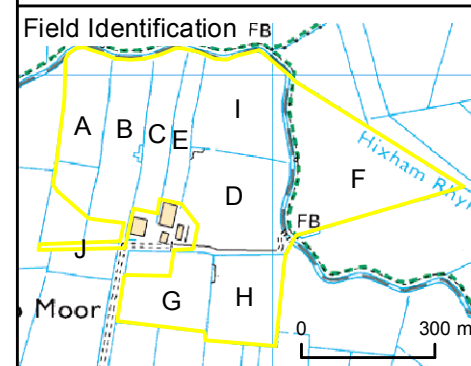
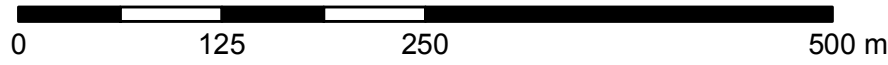
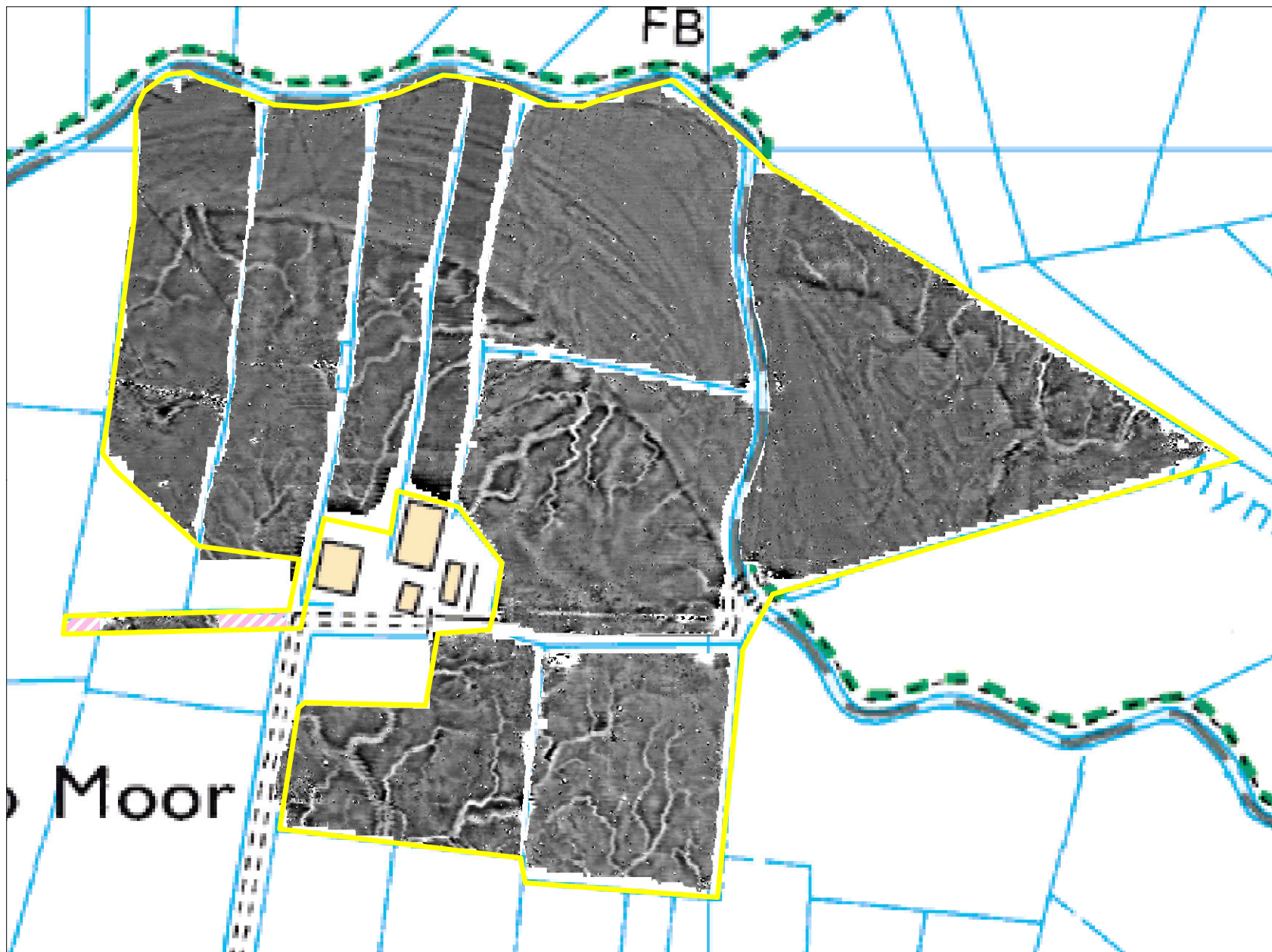




Figure 2: Raw Geophysical Data

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- Legend**
-  Unsurveyable Area
 -  Survey Area

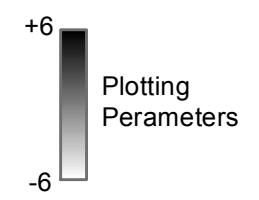
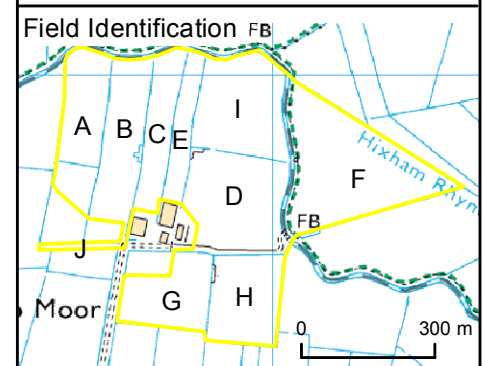
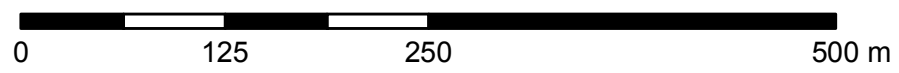


Figure 3: Processed Geophysical Data

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Legend

-  Possible Archaeology [AB1]
-  Geological Features [AB2]
-  Magnetic Disturbance [AB3]
-  Di-Polar Anomalies [AB4]
-  Former (modern) Field Boundary
-  Possible Trackway
-  Unsurveyable Area
-  Survey Area

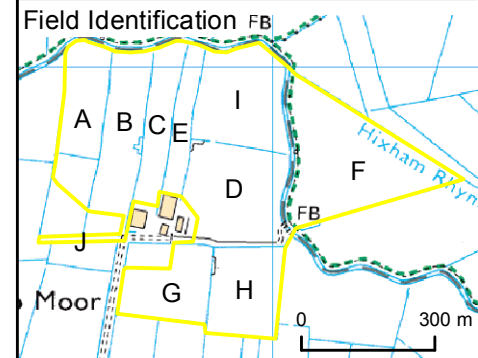
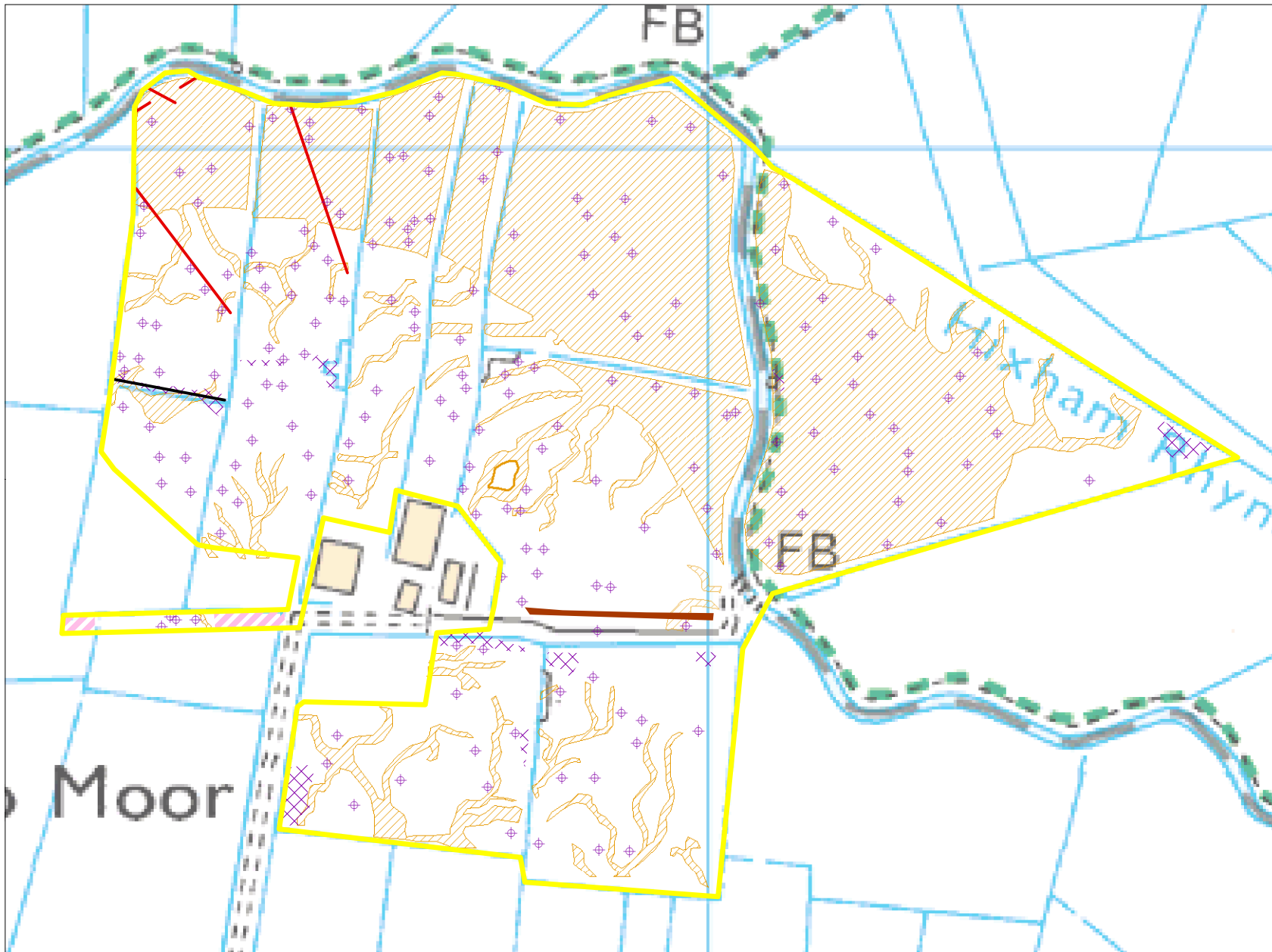
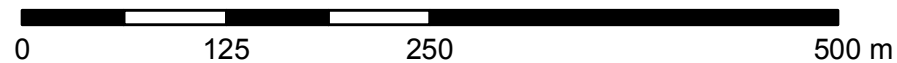


Figure 4: Geophysical Data Results Interpretation

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Legend

-  Possible Archaeology [AB1]
-  Unsurveyable Area
-  Survey Area

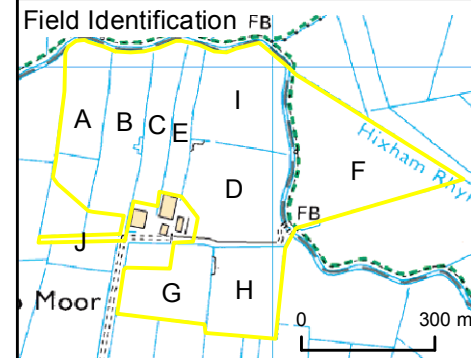
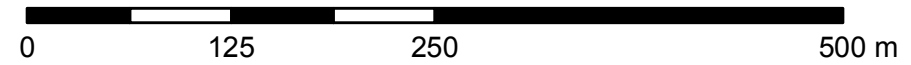


Figure 5: Interpretation of Archaeology

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