

**Land to the east of
A5064, Shrewsbury
Geophysical Survey
Report**

Client: EARTHWORKS ARCHAEOLOGY

AB Heritage Project No: 10702

Date: 25/01/2016

Land to the east of A5065, Shrewsbury Geophysical Survey Report

Client Earthworks Archaeology Ltd
Project Number 10702
Prepared By Glenn Rose
Illustrated By Zoe Edwards
Approved By Hannah Rose

Rev Number	Description	Undertaken	Approved	Date
1.0	DRAFT	GR	HR	25/01/2016

This document has been prepared in accordance with AB Heritage standard operating procedures. It remains confidential and the copyright of AB Heritage Limited. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited

Enquiries To:

AB Heritage Limited (Head Office)
Caerus Suite, 150 Priorswood Road
Taunton, Somerset, TA2 8DU
Email: info@abheritage.co.uk
Tel: 03333 440 206



CONTENTS

1. NON TECHNICAL SUMMARY	4
2. INTRODUCTION	5
2.1 Project Background	5
2.2 Site Location & Description.....	5
2.3 Geology & Topography.....	5
3. AIMS & METHODOLOGY	6
3.1 Aims of Survey Works	6
3.2 Methodology of Survey Works Summary.....	6
3.3 Known Constraints	7
4. RESULTS.....	9
5. INTERPRETATIONS AND DISCUSSION	10
6. CONCLUSION	11
7. FURTHER RECOMMENDATIONS	12
8. ARCHIVE	13
9. REFERENCES.....	14

FIGURES

Figure 1: Site Location	
Figure 2: Geophysical Raw Data Area 1	
Figure 3: Geophysical Raw Data Area 2	
Figure 4: Geophysical Processed Data Area 1	
Figure 5: Geophysical Processed Data Area 2	
Figure 6: Interpretation of Geophysical Data Area 1	
Figure 7: Interpretation of Geophysical Data Area 2	

PLATES

Plate 1 Electricity Substation taken at the north of the site facing east	7
Plate 2 Electricity Pylon taken from the north of the site facing south	7
Plate 3 Borehole found close to the northern boundary of the site.....	8

1. NON TECHNICAL SUMMARY

- 1.1.1 AB Heritage Limited (herein AB Heritage) undertook a programme of geophysical survey from Monday 11th January 2016 to Tuesday 12th January 2016 on land to the east of the A5064, Shrewsbury, Shropshire, ahead of a proposed development.
- 1.1.2 The detailed magnetic geophysical survey concluded that there is a low potential for the survival of significant archaeological remains, within both areas surveyed.

2. INTRODUCTION

2.1 Project Background

- 2.1.1 AB Heritage has been asked to undertake a geophysical survey on behalf of Earthworks Archaeology Limited, ahead of a proposed development on land to the east of A5064, Shrewsbury, Shropshire.
- 2.1.2 The purpose of this work is to identify any potential surviving below ground archaeological remains.

2.2 Site Location & Description

- 2.2.1 The proposed development incorporates two areas of land located approximately 2km south east from the centre of Shrewsbury town, east of the A5064 close to Robertsford Farm. The closest postcode to site is SY2 5PW.
- 2.2.2 Area 1 is approximately centred at NGR SJ 51483 12016 and is currently used as pasture and arable farmland. To the north, south and west the area is bounded by a metal fence boundary due to an electricity substation, to the east the site continues as arable farmland. The total area is approximately 4.37ha of which 3ha was surveyed on the clients request.
- 2.2.3 Area 2 is approximately centred at NGR SJ 51634 11634 and is currently used as arable farmland. To the north, south and west is bounded by hedgerows. To the west the area continues as arable farmland. Also within the centre of the site is a pylon, which carries overhead cables. The total area is approximately 6.95ha of which 3ha was surveyed on the clients request.

2.3 Geology & Topography

- 2.3.1 The British Geological Survey (BGS) indicates the bedrock geology of the site comprises of a Salop Formation – mudstone, sandstone and conglomerate, sedimentary bedrock which formed approximately 271 to 309 million years ago in the Permian and Carboniferous Periods. The local environment previously dominated by rivers. BGS further indicates a superficial deposit of Devensian glacio-fluvial deposits of sand and gravel formed up to 2 million years ago in the Quaternary period, on the area to the south (BGS 2016). No superficial deposit is present within the north area.
- 2.3.2 The overlying soils are freely draining slightly acid loamy soils (Cranfield Soil and Agrifood Industry 2016).
- 2.3.3 These forms of geology and soils are not likely to have an effect on the results of the geophysical survey, with the response being good to average.
- 2.3.4 The topography of the site has a gentle slope running down from the eastern side of the site towards the River Severn is at a height of c.73m Above Ordnance Datum, with a drop to the south and east by c.8m. The average height of the site is c.69m AOD.

3. AIMS & METHODOLOGY

3.1 Aims of Survey Works

3.1.1 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.

3.2 Methodology of Survey Works Summary

Site Specific Information

3.2.1 A geophysical survey covering c. 6 hectares (ha), c. 3ha in Area 1 and c.3ha in Area 2, was undertaken on Monday the 11th and Tuesday the 12th of January 2016.

3.2.2 The AB Heritage staff members who undertook the works were Tom Cloherty (Archaeological Technician) and Peter Bonvoisin (Archaeological Technician).

3.2.3 The weather conditions for the work were wet and clouded throughout the survey; these conditions had no material impact upon the survey.

Equipment

3.2.4 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	1m x 0.25m
Sensors	2
Sensitivity	0.1nT

3.2.5 A Trimble GeoXR GPS was used to setup the geophysical survey. This has sub-centimetre accuracy suitable to this survey.

3.3 Known Constraints

- 3.3.1 The known constraints within the survey area consisted of an electricity substation, to the north of Area 1 and associated pylons running north south through the centre of the site which could cause magnetic disturbance in the data within 2-5m (Plate 1 and 2).
- 3.3.2 Also associated metallic fences situated around both areas site have caused magnetic disturbance c.1-2m from the boundary.



Plate 1 Electricity Substation taken at the north of the site facing east



Plate 2 Electricity Pylon taken from the north of the site facing south

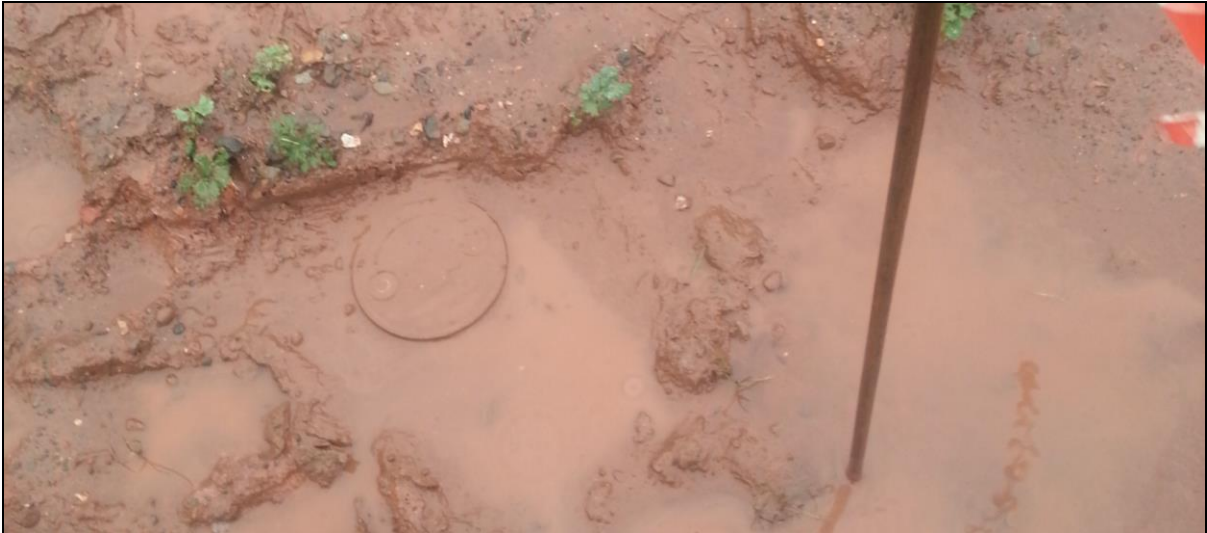


Plate 3 Borehole found close to the northern boundary of the site

4. RESULTS

4.1.1 For the purposes of this detailed magnetic survey, results for the geophysics data have been shown within Figure 2 to 5, with interpretations shown in Figures 6 and 7.

4.1.2 Below is a factual account of the results.

Area 1

*Positive Features **GP1 (a-b)**, **GP2***

4.1.3 A linear situated within the south west corner of the surveyed Area 1 [**GP 1 a**] extends to a distance of c. 65m in a north to south direction. The linear feature has reading of between 1nt to 5 nanotesla (nt) with the highest reading located towards the southern end.

4.1.4 Also small, mainly linear features [**GP 2 b**] located in the south western corner, appear in an unregulated pattern with readings of between 2nt to 14nt.

*Magnetic Disturbance **GP3** and Di-Polar anomalies **GP4***

4.1.5 Located throughout Area 1 there is varying negative and positive results [**GP 3**] over large areas related to magnetic disturbance.

4.1.6 Modern utilities also are situated throughout running across the site in an east to west direction.

Area 2

*Positive Features **GP1 (c)***

4.1.7 A positive linear [**GP 1 c**] extends c. 60m long in a north to south direction with a reading of 0.5 to 2nt.

*Magnetic Disturbance **GP3** and Di-Polar anomalies **GP4***

4.1.8 Areas of magnetic disturbance [**GP 3**] are situated mainly around the standing pylon located within the centre of Area 2. A rectangular strong positive area with a reading of 2 to 6nt covers c.100m² and is situated within the western edge of the surveyed area.

4.1.9 A number of small di-polar anomalies [**GP 4**] have been identified within an amorphous pattern throughout the area.

5. INTERPRETATIONS AND DISCUSSION

- 5.1.1 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.
- 5.1.2 GP numbers have been used to place interpretations into categories. Below is a discussion of the results.

Table 2: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
GP 1 (a&c)	Positive Linears	Possible archaeology caused by a cut/ditch
GP 2 (b)	Positive Areas	Possible archaeological features
GP3	Area of strong negative and positive readings	Magnetic disturbance, caused by disturbed ground or nearby metallic objects
GP 4	Di-polar Anomalies	Amorphous magnetic debris

Area 1

- 5.1.3 A linear feature identified [**GP 1 a**] in the south western corner of Area 1 is likely to relate to a previous field boundary now no longer visible above ground and the boundary is likely to pre-date 1752 (CSA, 2016) based on historical mapping evidence.
- 5.1.4 Though smaller features identified [**GP 2 b**] within the south western corner of the site are likely to be related to modern disturbances, based on the high readings and irregular structure, though an archaeological origin cannot be ruled out.
- 5.1.5 Within Area 1 there are also modern utilities [**GP 3**] running throughout the site, which create a high level of magnetic disturbance.

Area 2

- 5.1.6 Features identified within Area 2 [**GP 1 c**] are likely to relate to modern disturbance due to their form and high readings.
- 5.1.7 Also within Area 2 there is a large areas of magnetic disturbance [**GP 3**] from, the pylon located within the centre of the area and overhead cables.

6. CONCLUSION

- 6.1.1 A geophysical survey was undertaken by AB Heritage Limited on land east of A5064, Shrewsbury, from the 11th to the 12th of January 2016.
- 6.1.2 The purpose of this work was to understand the potential for any archaeological remains to survive within the site, and, where possible, identify the form, function and extent of any potential remains.
- 6.1.3 The geophysical survey identified high amount of magnetic disturbance [**GP 3-4**], likely due to modern utilities running through the both areas. It also identified low archaeological potential within the site, in the form of multiple linear [**GP 1 a, c**] and sub-rectangular features [**GP2 b**], which could relate to previous field boundaries and likely modern disturbance.
- 6.1.4 Overall the geophysical survey have found the potential for survival of significant archaeological remains is low within the surveyed areas of the site.

7. FURTHER RECOMMENDATIONS

- 7.1.1 The geophysical survey has found limited potential for significant archaeological remains, further work is recommend in the form of archaeological evaluation trenching to understand the form, significance and possible date of any features, paying particular attention to linear features [GP1 a-c] identified within the site.

8. ARCHIVE

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

Table 3: 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

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

9. REFERENCES

BGS (British Geological Society) 2015. *Geology of Britain viewer*.
<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>.

CIFA, 2014. Standard and Guidance for archaeological geophysical survey.

Cranfield Soil and Agrifood Industry, 2015. *Soilscapes viewer*,
<http://www.landis.org.uk/soilscapes/>

CSa Environmental Planning. 2009. Land off London Road. Archaeological Desk Based Assessment.

Jones, D.M. (ED) 2008. Geophysical Survey in Archaeological Field Evaluation. English Heritage.

Schmidt, A. 2002. Geophysical Data in Archaeology: *a Guide to Good Practice*. Oxford. Oxbow.

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 1m 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.

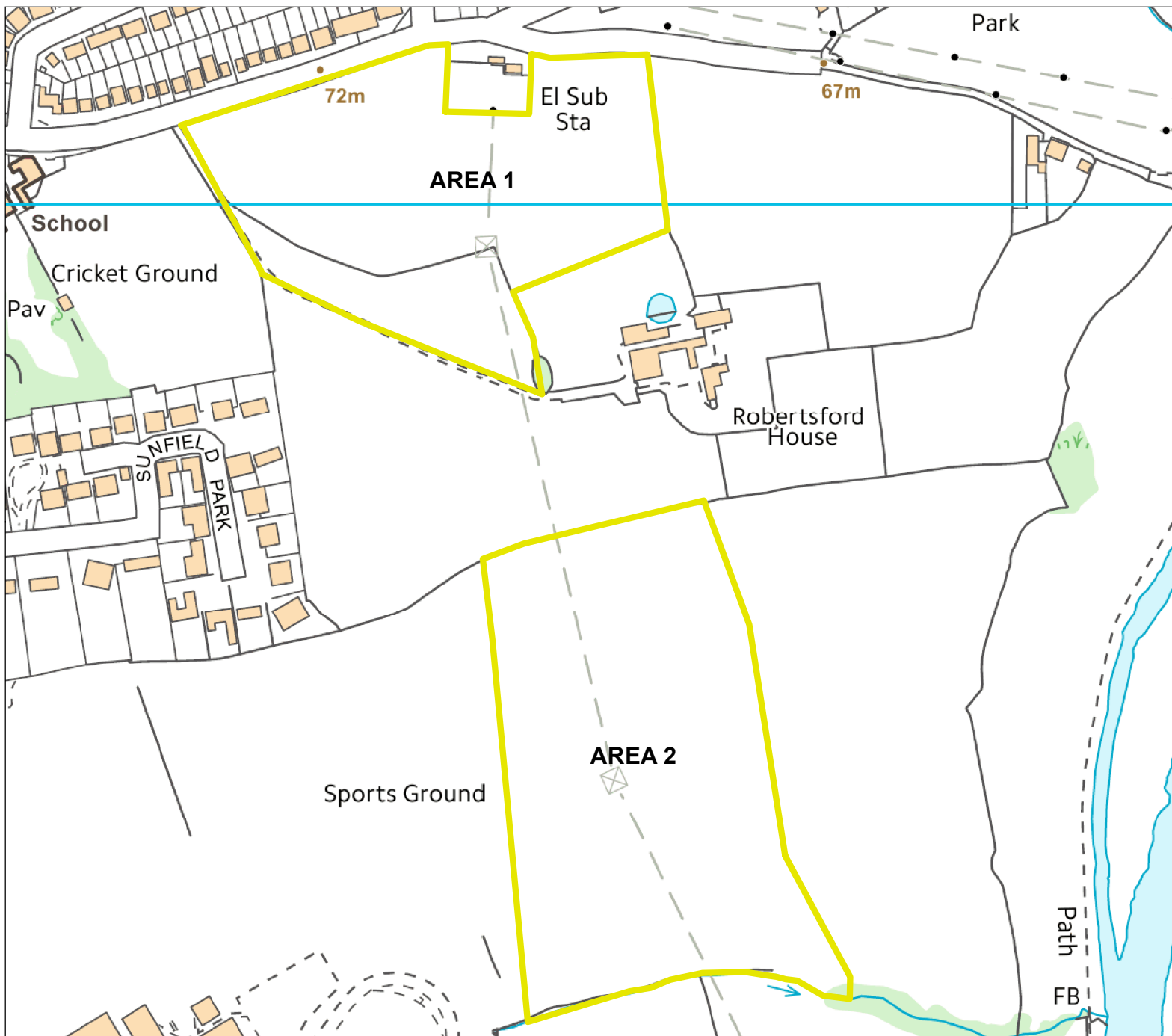
GPS METHODOLOGY

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.



AB Heritage Limited (Head Office)
Caerus Suite, 150 Priorswood Road
Taunton, Somerset, TA28DU
Tel: 03333 440 206
e-mail: info@abheritage.co.uk



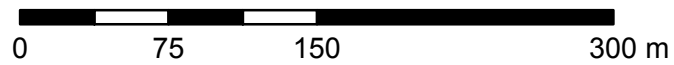
Legend
 Site Boundary

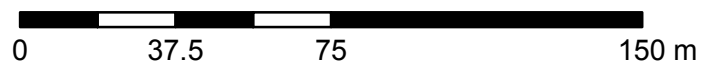
Figure 1: Site Location & Field Identification

Project: Land to the East of A5064, Shrewsbury

Date: 18/01/16 Job Number: 10702

Drawn by: ZE Approved by: GR





Legend

Site Boundary

N
↑

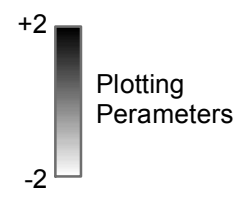
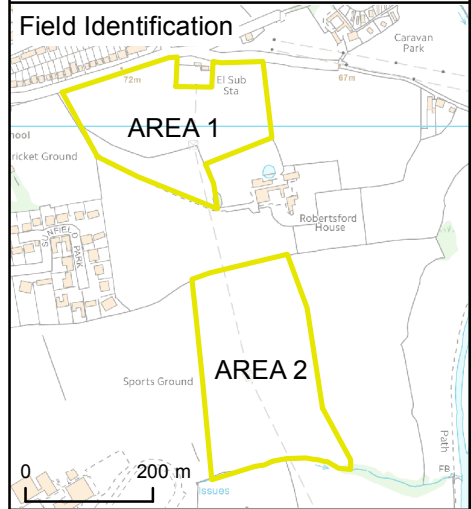


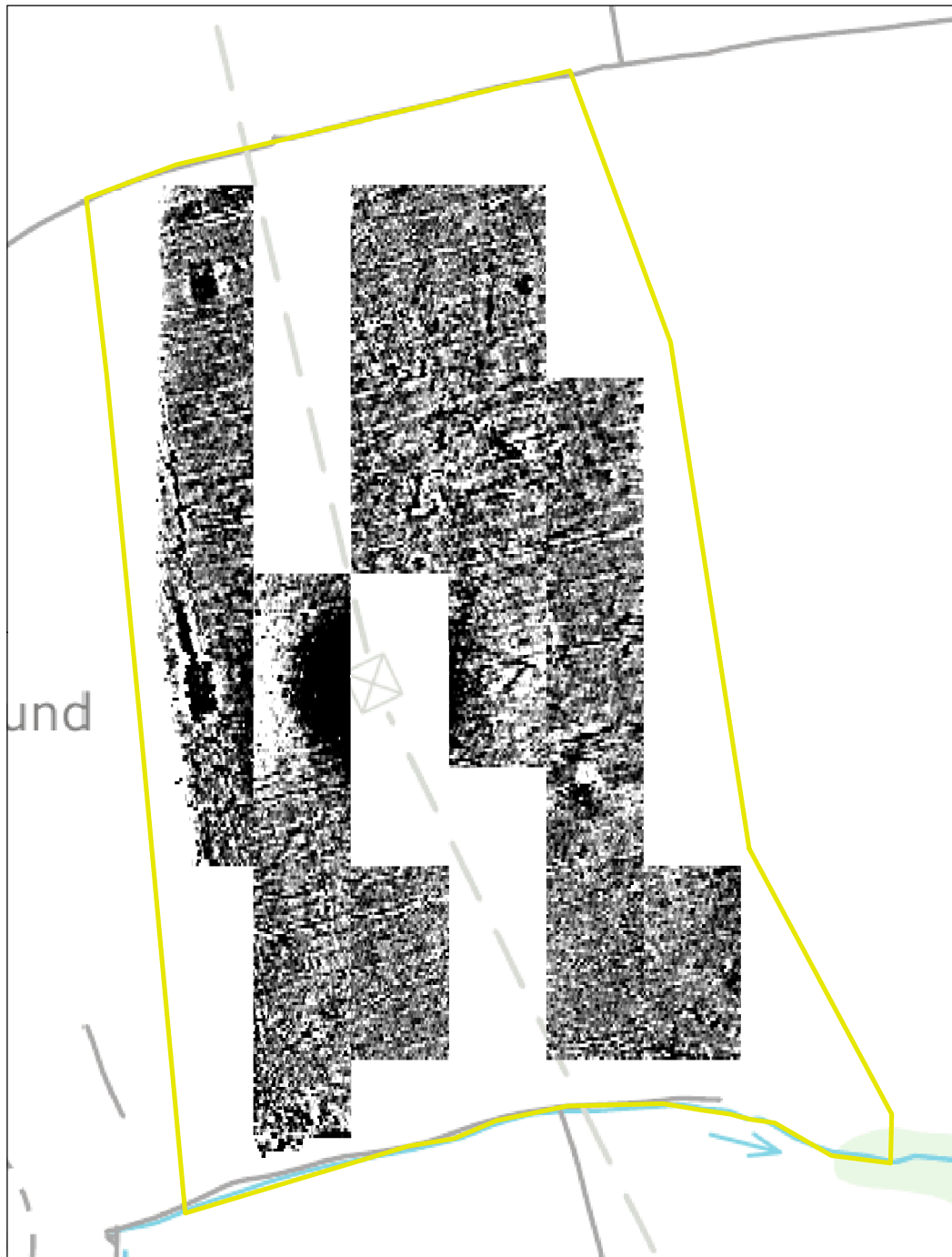
Figure 2: Raw Geophysical Data, Field 1

Project: Land to the East of A5064, Shrewsbury

Date: 18/01/16 Job Number: 10702

Drawn by: ZE Approved by: GR





Legend

 Site Boundary

Field Identification

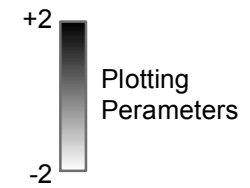
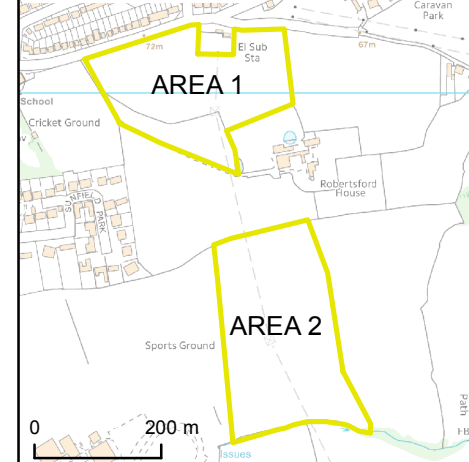


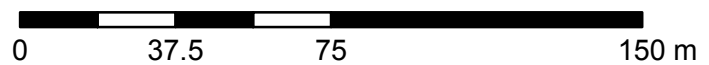
Figure 3: Raw Geophysical Data, Field 2

Project: Land to the East of A5064, Shrewsbury


Date: 18/01/16 Job Number: 10702


Drawn by: ZE Approved by: GR





Legend

 Site Boundary



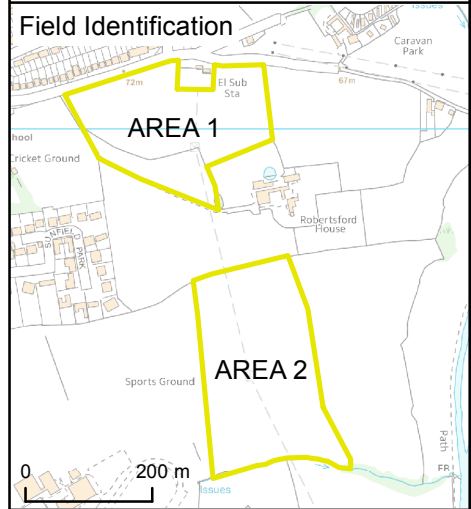


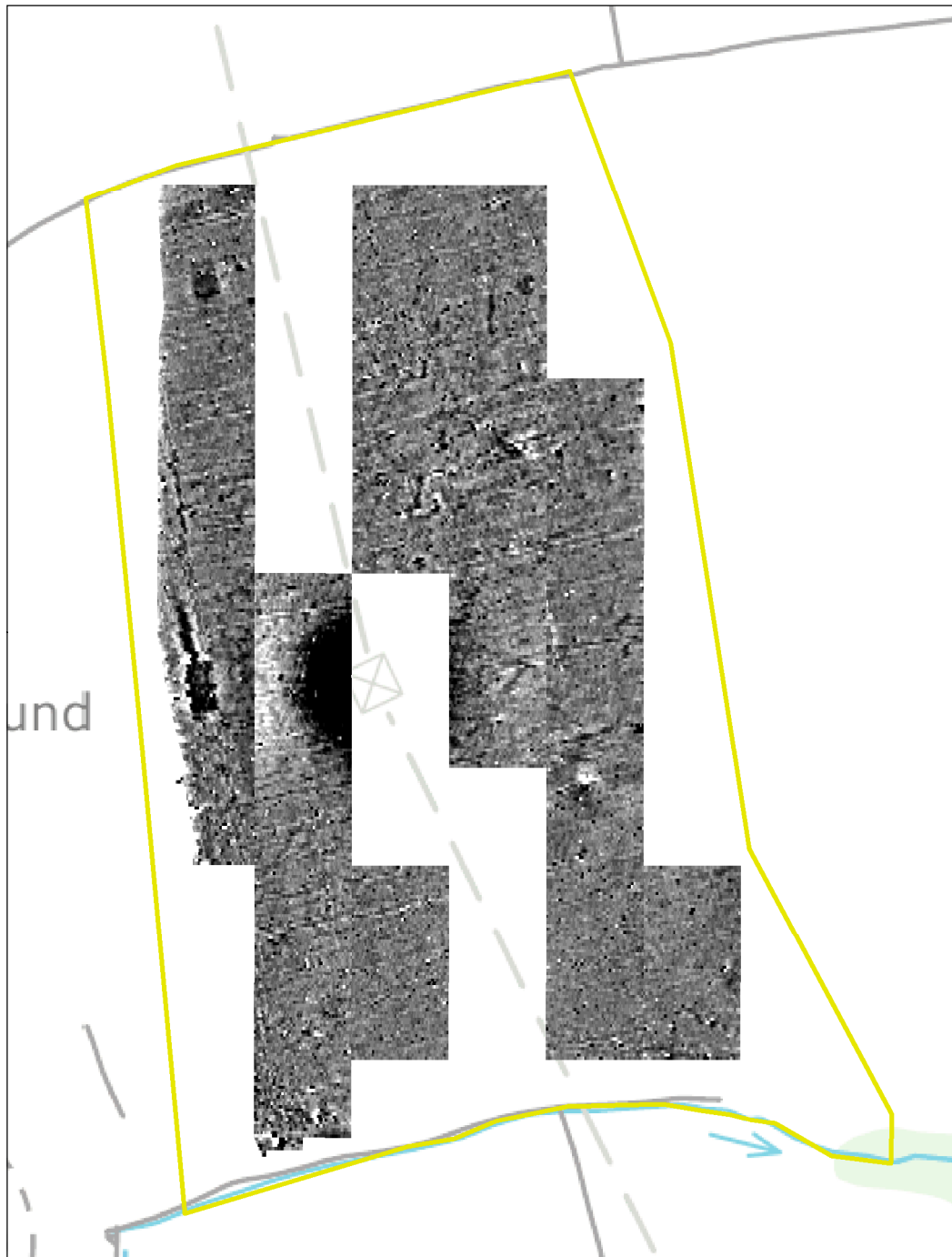
Figure 4: Processed Geophysical Data, Field 1

Project: Land to the East of A5064, Shrewsbury

Date: 18/01/16 Job Number: 10702

Drawn by: ZE Approved by: GR





Legend

 Site Boundary

Field Identification

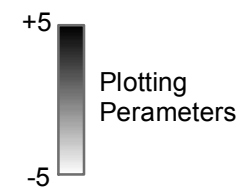
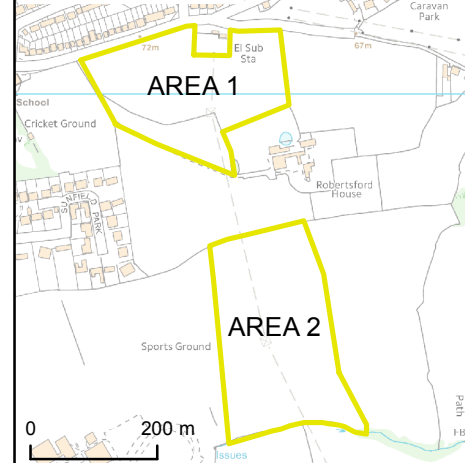
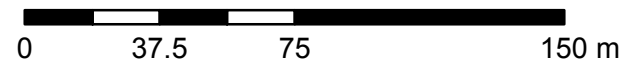


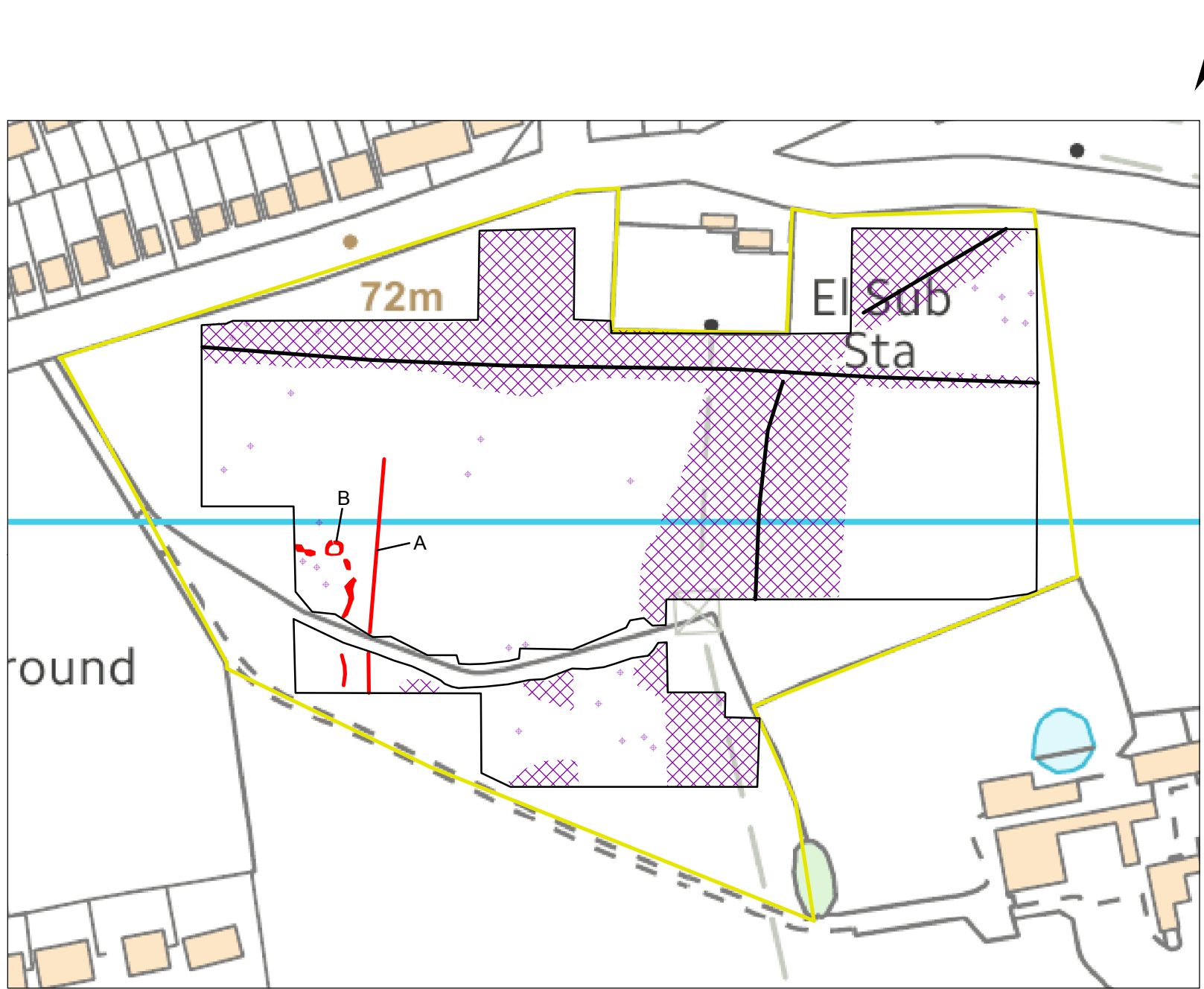
Figure 5: Processed Geophysical Data, Field 2

Project: Land to the East of A5064, Shrewsbury

Date: 18/01/16 Job Number: 10702

Drawn by: ZE Approved by: GR





Legend

- Positive Linear [GP1]
- Positive Area [GP2]
- Magnetic Disturbance [GP3]
- + Di-Polar Anomalies [GP4]
- Utilities
- Surveyed Area
- Site Boundary

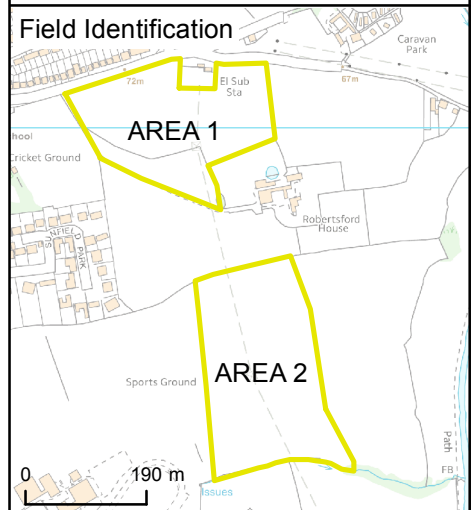
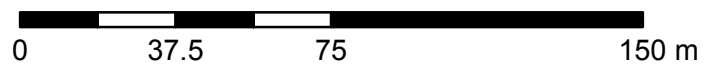
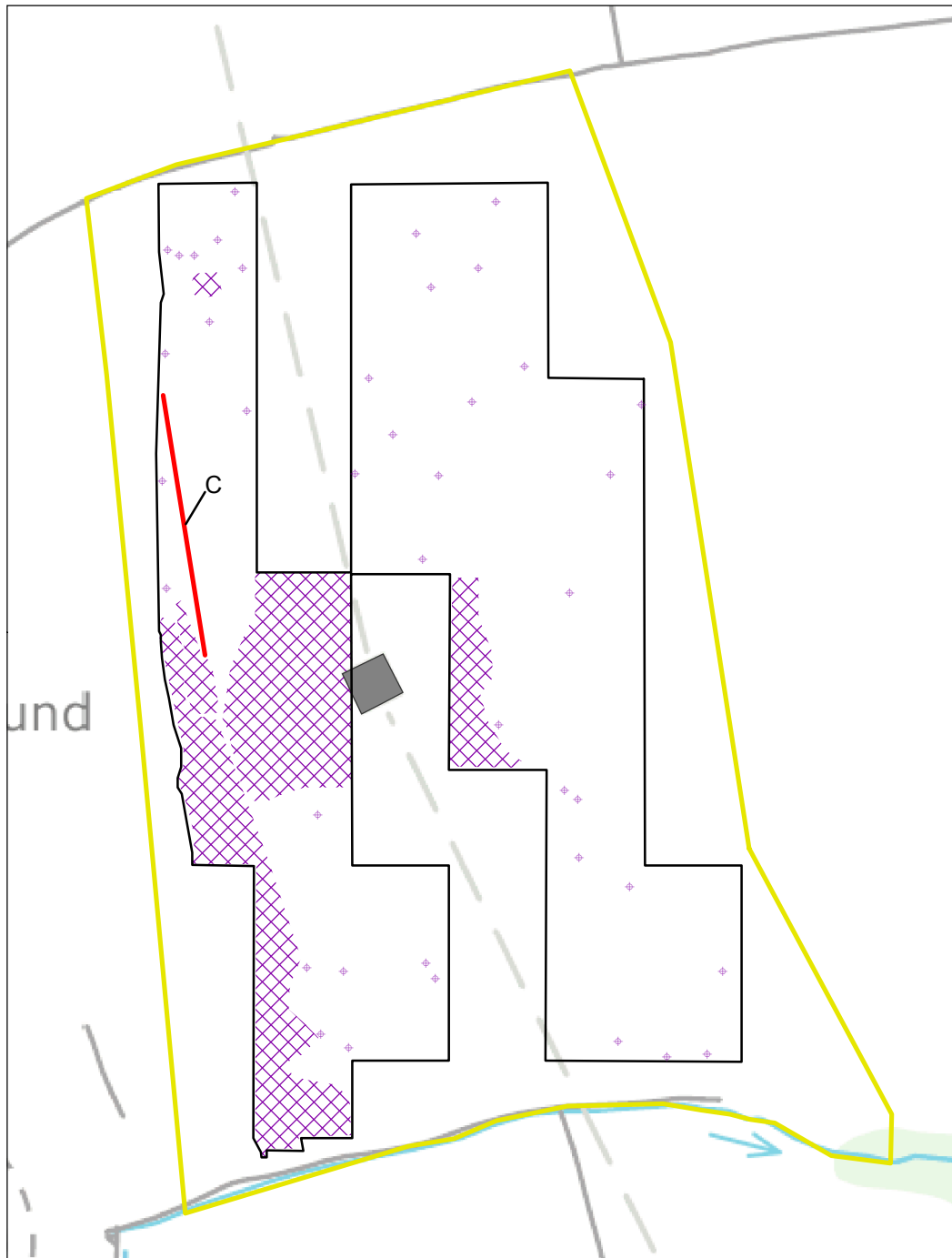


Figure 6: Interpretation of Geophysical Data, Field 1

Project: Land to the East of A5064, Shrewsbury

Date: 22/01/16	Job Number: 10702
Drawn by: ZE	Approved by: GR





Legend

- Positive Linear [GP1]
- ▣ Magnetic Disturbance [GP3]
- + Di-Polar Anomalies [GP4]
- Pylon
- Surveyed Area
- Site Boundary

Field Identification

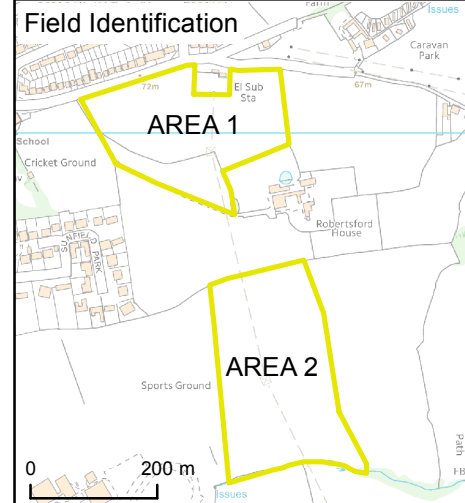


Figure 7: Interpretation of Geophysical Data, Field 2

Project: Land to the East of A5064, Shrewsbury

Date: 22/01/16 Job Number: 10702

Drawn by: ZE Approved by: GR

