AB HERITAGE
ARCHAEOLOGICAL CONSULTANCY

Land at Doniford Road, Watchet

Geophysics Survey Report

Client: Grass Roots Planning Ltd

AB Heritage Project No: 10500

Date: 23/04/2015

Land at Doniford Road, Watchet,

Geophysical Survey

Client	**Grass Roots Planning Ltd**
Project Number	**10500**
Prepared By	**Glenn Rose**
Illustrated By	**Zoe Edwards**
Approved By	**Hannah Simpson**

Rev Number	Description	Undertaken	Approved	Date
1.0	DRAFT	GR	HS	23/04/15

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

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1. INTRODUCTION

1.1 Project Background

1.1.1 AB Heritage has been asked to undertake a geophysical survey on behalf of Grass Roots Planning Ltd, at Doniford Road, Watchet (See Figure 1).

1.1.2 The purpose of this work is to identify any potential surviving archaeological remains.

1.2 Site Location & Description

1.2.1 The proposed development site coverd by pasture is an area of c. 14.2 hectares, centred at approximately ST 08054 42730 to the south of Doniford Road. The majority of the boundary is defined by field boundaries, between Doniford Road and Liddymore Farm, and the surrounding modern developments at Watchet to the west, and Normandy Avenue to the east. The Taunton to Minehead branch of the Great Western Railway passes between the edge of the proposed development site and Doniford village, c.100m to the east.

1.3 Geology & Topography

1.3.1 The geology of the proposed development site consists of mudstones, including those of the Langport Member, Blue Lias Formation, Charmouth Mudstone Formation, Westbury Formation, Cotham Member, Mercia Mudstone Group and Anchor Formation. These were formed primarily from the sediments of shallow and fluctuating seas and lakes, while the mudstone of the Mercia Mudstone Group were formed in hot deserts (BGS 2015). This not likely to cause any affect in the geophysical data.

1.3.2 The highest point of the site is within the northern end of the site stands at 40m above ordnance datum (AOD) with the lowest part of the site dropping to 18m AOD.

2. AIMS & METHODOLOGY

2.1 Aims of Survey 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.

2.2 Methodology of Survey Works Summary

Site Specific Information

2.2.1 A magnetometry survey was undertaken covering an area of c. 14.2ha hectares.

2.2.2 The AB Heritage staff members who undertook the works were James Dunn (Archaeological Technician) Tom Cloherty (Archaeological Technician) Glenn Rose (Senior Project Archaeologist).

2.2.3 The weather conditions for the work were mainly dry and sunny throughout the survey; these conditions had no material impact on the survey.

Equipment

2.2.4 The magnetic survey equipment used was one 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

2.2.5 A GPS was used to setup the geophysical survey was a Trimble GeoXR 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 geophysical survey were the areas of electric fencing located within Field 3 and 4 which are likely to create a magnetic disturbance of around 1-2m.

2.3.2 The majority of the fields that make up the proposed development site are bounded by metallic fences which are likely to create a magnetic disturbance within 1-2m of the boundary.

2.3.3 Dense vegetation within Field 6 along with an area of quarrying has reduced the area survey can be undertaken within this field (see Figure 4).

2.3.4 Power/phone lines run north east to south west through Fields 4 and 5 and create a disturbance in the data around the pylons of c.3-5m.

2.3.5 A metallic trailer and wheel barrow is situated within Field 4 created a disturbance of c.10m around the object (see Figure 4).

3. RESULTS & INTERPRETATIONS

3.1.1 The results have been divided into Fields 1-6, with interpretations classified by [**GP**] numbers. All raw and processed data results have been displayed in Figures 2-3, with interpretation of results in Figures 4-5.

3.2 Geophysical Survey Results

Field 1

3.2.1 Positive linears [**GP 1**] have been identified within Field 1 running in multiple directions; the longest of these linear runs in an east to west direction c.100m in length, with a reading of between -5 nanoteslas(nt) to + 5nt.

3.2.2 Magnetic disturbance [**GP 2**] associated with a negative linear runs through the centre of the site in a north-south direction. Also multiple Di-Polar [**GP 3**] anomalies are located throughout the site with the majority in an amorous pattern.

Field 2

3.2.3 Field 2 is very disturbed with only a varied magnetic disturbance [**GP 2**], shown throughout.

Field 3

3.2.4 Bi-Polar linear anomalies [**GP 4**] run through the site, with one located running in a north to south direction, and one curvilinear running centrally in a north west to south east direction. Lots of areas of magnetic disturbance [**GP 2**] and Di-Polar anomalies are located throughout the field, with the main concentration located within the southern end of the field.

Field 4

3.2.5 Two positive linears [**GP 1**] are located in the northern end of the site in a regular 'T' shape, with the northern most features running in an east to west direction, and the southern feature running in a north to south direction.

3.2.6 Also three positive linears [**GP 1**] are identified within the centre of the field running in an north west to south east direction.

3.2.7 Magnetic disturbance [**GP 1**] is distributed mainly in the south east of the site, with a few di-polar anomalies [**GP 3**] situated within the north western side of the site.

Field 5

3.2.8 Two positive linears [**GP 1**] are identified running in a north east to south west direction c.50m in length, with a reading of 0nt to 15nt.

3.2.9 An area of strong negative polarity [**GP 1**] is located within the south western side of Field 5 with a reading in excess of 100nt.

3.2.10 Multiple negative linears have been identified running in multiple directions [**GP 4**] with associated magnetic disturbance [**GP 2**]

Field 6

3.2.11 Magnetic disturbance [**GP 2**] is situated within multiple areas of the field, with a depression within the field showing an area previously quarried.

3.3 Geophysical Survey Interpretation

3.3.1 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 2: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
GP 1	Positive Linear Features and high negative area	Possible Archaeology, and possible thermoremanent feature
GP 2	Negative area	Disturbed ground
GP 3	Di-polar Anomalies	Amorphous magnetic debris
GP 4	Bi-Polar Anomaly	Modern Service

3.3.2 Features of possible archaeological origin have been identified within the geophysical survey. These consist mainly of positive linear features [**GP 1**], which are most likely related to previous field boundaries. One singular linear feature located in Field 1 runs along the same line as a field boundary, which is shown on the second edition 1904 OS Map.

3.3.3 Other linear features [**GP 1**] are noted within Field 4 in a regular 'T' shape, which are likely related to previous field boundaries due to the regular shape.

3.3.4 An area of a possible kiln site (thermoremanent feature) [**GP 1**] located close to a known kiln area could be shown within Field 5 due to a high reading above 100nt; However, it could also be an area of high magnetic disturbance, with the majority of Field 5 covered in extensive modern utilities.

3.3.5 Fields 3 and 4 are covered in large areas of magnetic disturbance [**GP 2**], this is likely due to previous building activity that could possibly relate to the WWII Liddymore Camp (Somerset Historic Environment Record, No.15840), which used to cover the majority of Fields 3 and 4 in the 1950's.

3.3.6 Mining activity within the site boundaries can also be seen on site; and shown in the geophysical survey through magnetic disturbances [**GP 2**] and through Di-polar anomalies [**GP 3**] with the majority of activity shown in Field 5 and 6.

3.3.7 Modern utilities run throughout the majority of the site, with associated magnetic disturbance [**GP 2**], creating disturbances within the geophysical data.

4. CONCLUSION

4.1.1 A geophysical survey was undertaken by AB Heritage Limited at Land at Donniford Road, Watchet. The purpose of this work 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.

4.1.2 The geophysical survey identified possible archaeological features within the boundaries of the site, which are likely to relate to; previous field boundaries, possible known kiln site and quarrying activity.

4.1.3 Large areas of magnetic disturbance identified within Fields 3 and 4 are likely to correlate with Liddymore camp identified on the 1904 OS map.

5. ARCHIVE

5.1.1 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

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) 2015.*Geology of Britain viewer.* http://mapapps.bgs.ac.uk/geologyofbritain/home.html.

Edwards, Z. 2015 Land at Doniford Road Archaeological Desk Based Assessment

IFA, 2011.Standard and Guidance for archaeological geophysical survey.

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.

1905 OS Map Second Edition

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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.

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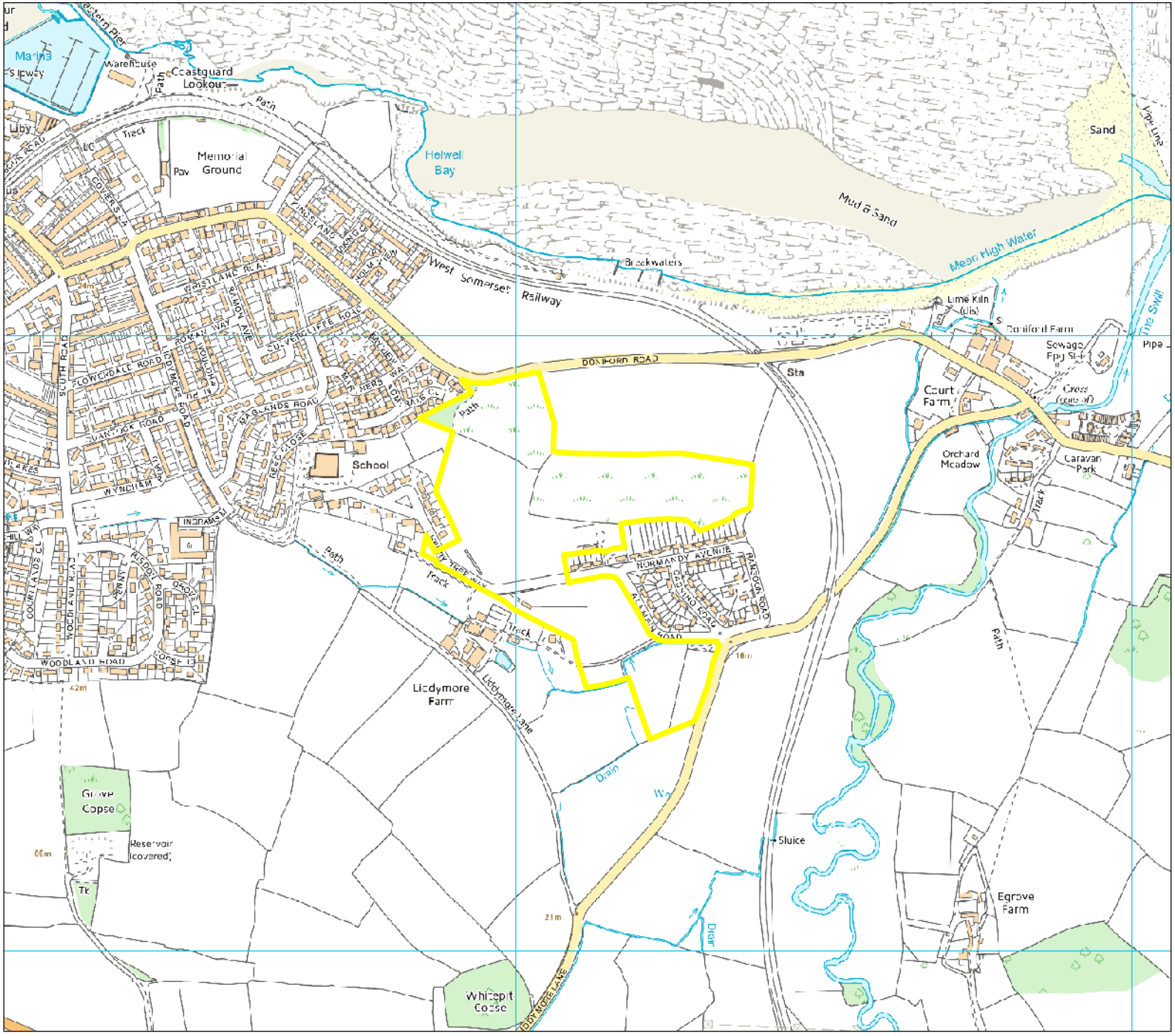
AB Heritage Limited (Head Office)
Caerus Suite, 150 Priorswood Road
Taunton, Somerset, TA2 8DU
Tel: 03333 440 206
e-mail: info@abheritage.co.uk



Legend

Site Boundary

Field Identification

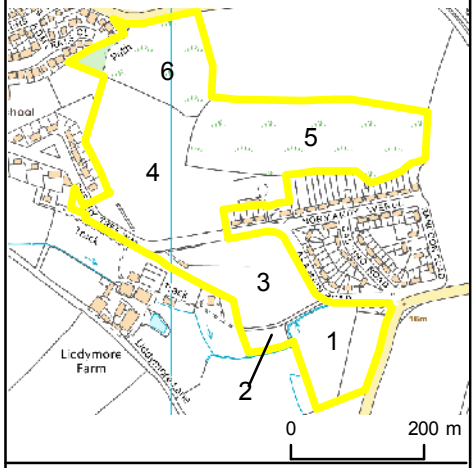


Figure 1: Site Location

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Figure 2: Raw Geophysical Data

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Figure 3: Processed Geophysical

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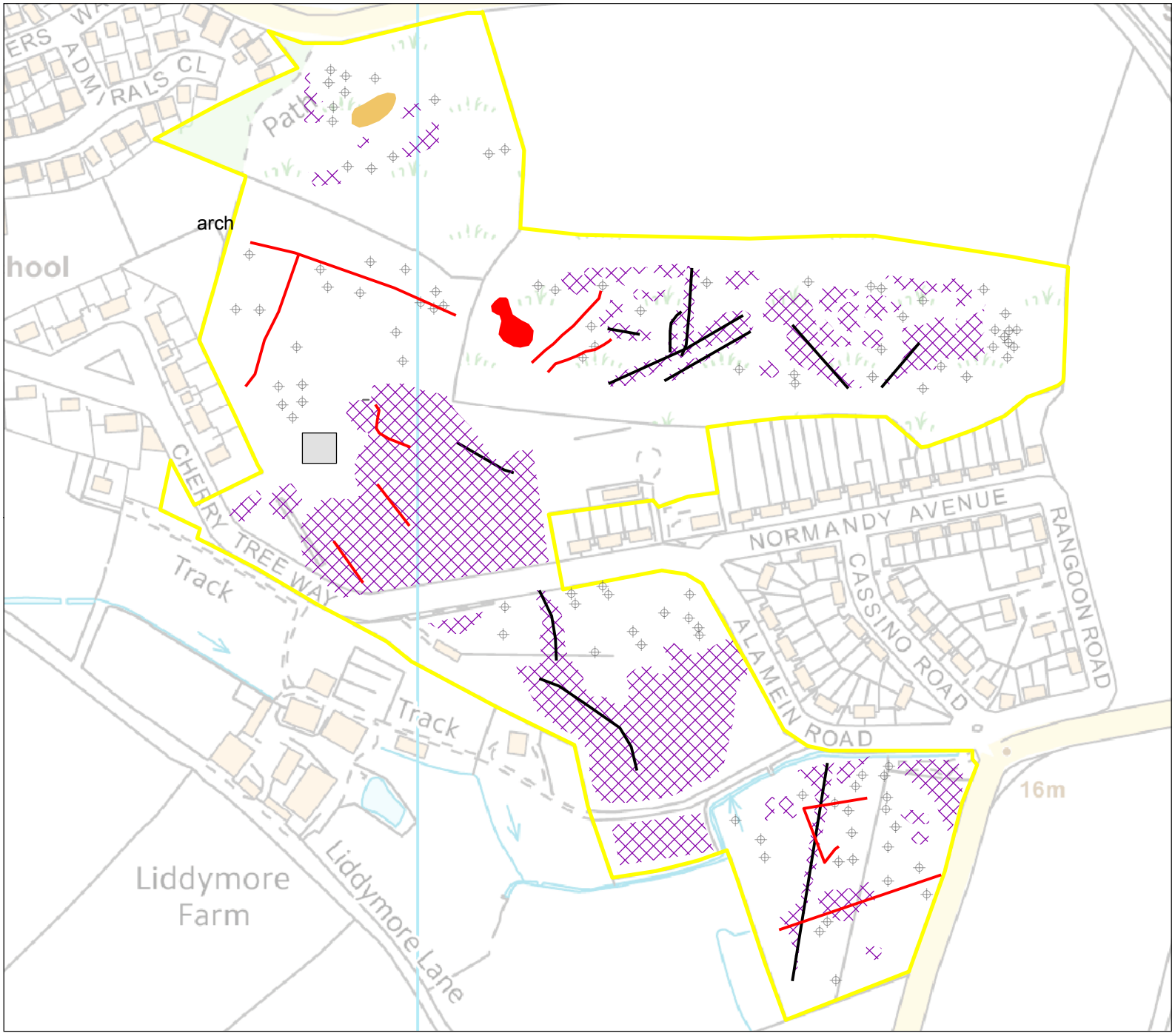

Legend

- Possible Archaeology [GP1]
- Magnetic Disturbance [GP2]
- Di-Polar Anomalies [GP3]
- Utility [GP4]
- Quarried Area
- Trailer
- Site Boundary

Field Identification

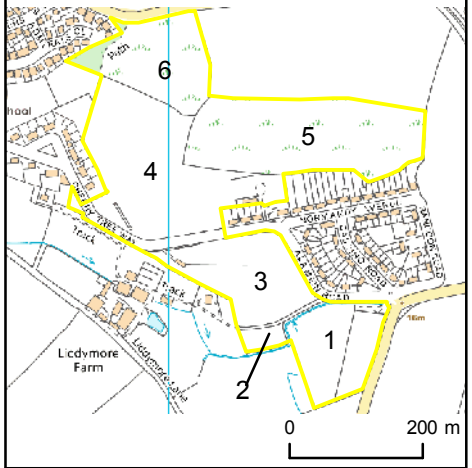

Figure 4: Interpretation of Geophysical Data

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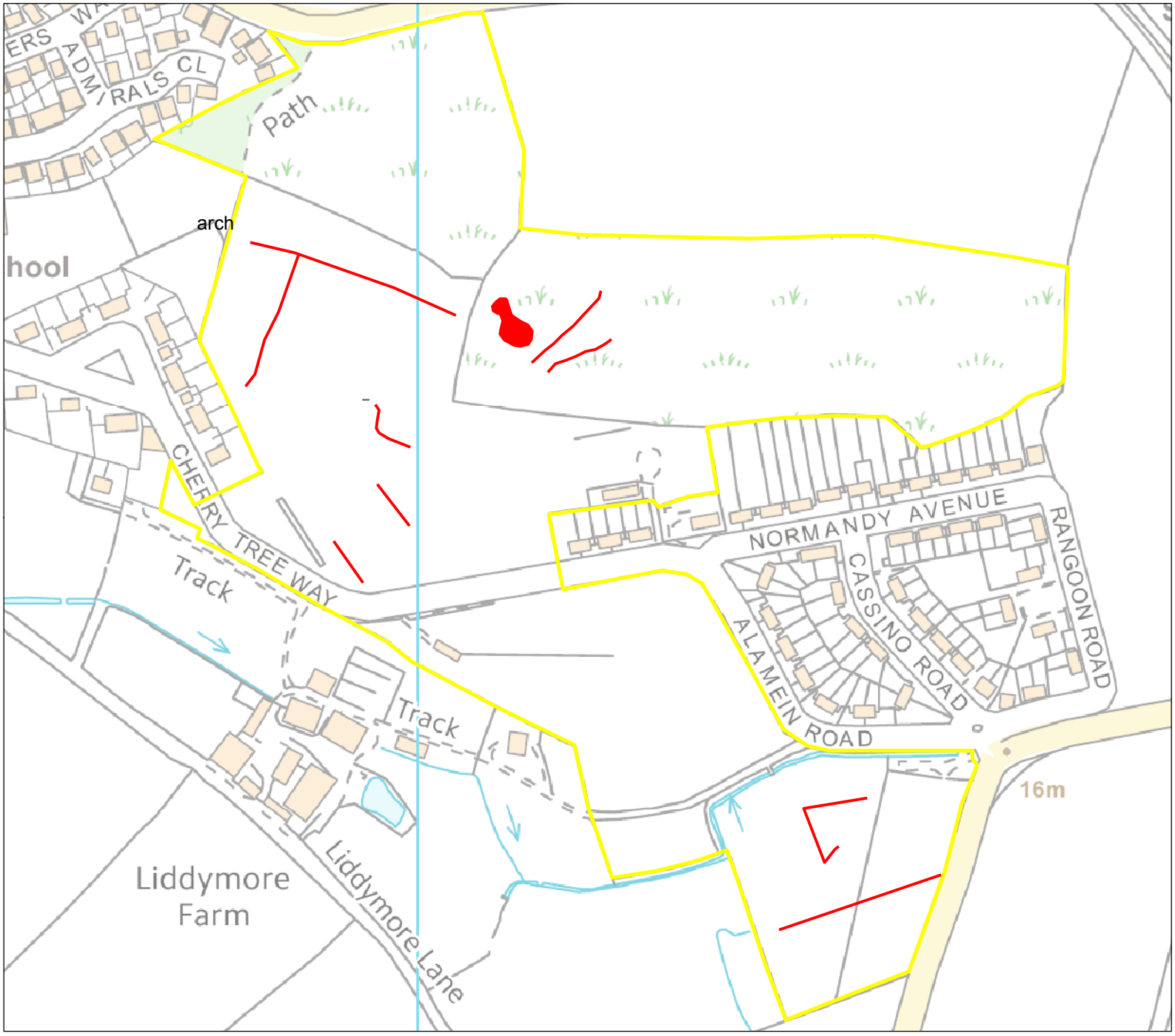

Legend

- Possible Archaeology [GP1]
- Site Boundary

Field Identification

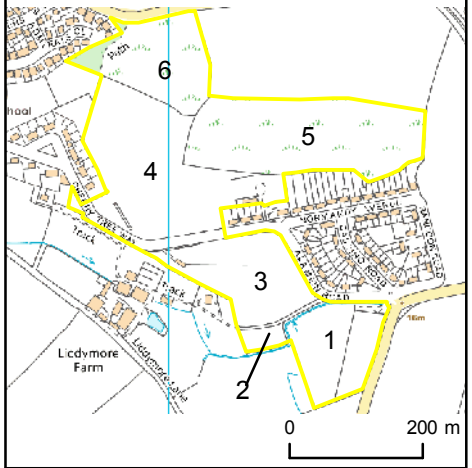

Figure 5: Interpretation of Geophysical Data

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