

**Old Mixon Road,
Weston-Super-Mare,
Somerset**

**Geophysics Survey
Report**

Client: GRASSROOTS PLANNING LTD

AB Heritage Project No: 10501

Date: 30/04/2015

Old Mixon Road, Weston-Super-Mare, Somerset Geophysical Survey

Client GRASSROOTS PLANNING LTD
Project Number 10501
Prepared By Glenn Rose
Illustrated By Zoe Edwards
Approved By Andy Buckley

Rev Number	Description	Undertaken	Approved	Date
1.0	DRAFT	GR	AB	30-04-2015

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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 Grassroots Planning Ltd, at Old Mixon Road, Weston-Super-Mare, Somerset.
- 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 covers an area of approximately 23 hectares, centred at ST 33957 58813, on the western edge of the Mendip Hills in North Somerset. The proposed development site straddles Old Mixon Road, with 16 hectares located to the north of Old Mixon Road and 7 hectares situated to the south.
- 1.2.2 The northern section of the proposed development site is bounded by modern industrial estates to the north and north - west, a modern residential development to the south and south – west and agricultural fields to the east.
- 1.2.3 The southern section of the proposed development site is bounded by Old Mixon Road to the north, a single track road to the east, woodland to the south and an agricultural field immediately to the west, with modern residential development further to the west.
- 1.2.4 For the purpose of this report, the fields have been labelled 1 – 7 (see Figures). Fields 1 – 6 are referred to in this report as the northern section, and field 7 is referred to as the southern section.

1.3 Geology & Topography

- 1.3.1 The underlying solid geology comprises Mudstone and Halite Stone of the Mercia Mudstone Group, laid down approximately 251 – 200 million years ago in an environment dominated by desert conditions.
- 1.3.2 Superficial tide flat deposits in the form of clay silt and sand deposits are present across the northern section of the proposed development site. These were formed in a shoreline environment up to 2 million years ago (BGS 2015). This geology can in some instances mask archaeological remains. No superficial geological deposits are recorded as present in the southern section of the proposed development site.
- 1.3.3 The field to the east of the northern section of the site rises to a mound at the height of 16-18m AOD. The field to the west of the site in the northern section also slopes up to the south west to a height of 12m 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. 23ha hectares.

2.2.2 The AB Heritage staff members who undertook the works were Glenn Rose (Senior Project Archaeologist), Hannah Simpson (Assistant Consultant), Kerry Kerr-Peterson (Assistant Project Archaeologist), Tom Cloherty (Archaeological Technician) and Zoe Edwards (Archaeological Technician) .

2.2.3 The weather conditions for the work were variable from sunny to rainy conditions to rain, however did not cause any problem with data collection.

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	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 irrigation channels surrounding the fields in the north section of the site, making the full extents of the fields inaccessible. In addition the irrigation channels appear to have been recently cleared and the debris has been piled in a few locations.
- 2.3.2 The southernmost area of the south field in the northern section of the site had mounds of manure making the data collection difficult.
- 2.3.3 Multiple man-hole covers with associated utilities exist throughout the site, which is likely to create a magnetic disturbance within c. 1m – 2m.
- 2.3.4 The footpath strip of land to the south of the northern section will be unsuitable for surveying.
- 2.3.5 The fields of the southern section (Field 7) were divided by electric fences, which may have affected the geophysical data when they approached the instruments during traverses (Plate 1).



Plate 1 – View facing North of obstructions in Field 7

3. RESULTS & INTERPRETATIONS

3.1 Geophysical Survey Results

- 3.1.1 Interpretation of feature types within the survey data has been labelled with **[GP]** numbers and split into Fields, all results are shown in Figures 2 and 3 with interpretations shown in Figures 4 to 6.

Northern Area

Field 1

- 3.1.2 Low negative features with positive outlines run **[GP 2]** through the field mainly from north to south, with the longest of the features reaching up to c.60m in length. The feature consists of fairly low average readings of between -3nt (nanoteslas) and +3nt.
- 3.1.3 Magnetic disturbance **[GP 5]** is located around; the northern, western, and southern boundary, with areas of Di-polar anomalies **[GP 3]** mainly located centrally within the site.

Field 2

- 3.1.4 Majority of low negative features **[GP 2]** are situated within the centre of the field with no clear pattern or direction.
- 3.1.5 A negative linear is located in the south west corner of the field and runs in a south east to north west direction **[GP 4]** to a length of c. 90m. There is also associated magnetic disturbance **[GP 5]** around the negative linear **[GP 4]**. Magnetic disturbance is also situated around the field mainly along the edges of the field.

Field 3

- 3.1.6 Multiple low negative features **[GP 2]** run throughout the field in no regular pattern with the longest feature up to c.80m in length.
- 3.1.7 A negative linear runs through the centre of the site in a north east to south west direction with a length of c.90m with associated magnetic disturbance **[GP 5]**.
- 3.1.8 Di-Polar anomalies **[GP 3]** run along the eastern boundary of the field in a amorphous pattern

Field 4

- 3.1.9 Multiple positive linear anomalies **[GP 1]** are situated within the northern half of the field with the longest feature at a length of c.90m. A possible rectangular feature is situated within the northern side of the field with a length of 60m and width of 10m with a variation of reading between 1nt and 6nt.
- 3.1.10 Magnetic disturbance **[GP 5]** is situated along the eastern and western boundary with Di-Polar anomalies **[GP 3]**

Field 5

- 3.1.11 The majority of the field appears to be disturbed with a the majority of magnetic disturbance **[GP 5]** locate within the southern end of the field

Field 6

- 3.1.12 Negative linears [GP 2] run in an east to west direction with the longest of the features measuring up to c.150m in length with an average reading of -1nt.
- 3.1.13 Multiple Di-Polar anomalies [GP 3] are situated throughout the field in an amorphous pattern with minimal magnetic disturbance [GP 5] located in small dispersed areas.

Southern Area

Field 7

- 3.1.14 Positive linears [GP 1] run in a north to south direction and are situated within the centre and close to the southern boundary with an average reading of 1nt .
- 3.1.15 Also multiple positive curvilinear features [GP 1] run from the southern boundary to the northern boundary with an average reading of 1nt and the longest feature is c.100m in length.
- 3.1.16 Magnetic disturbance [GP 5] is situated throughout the site mainly along the western edge of the fields, while Di Polar anomalies [GP 3] are situated throughout the field.

3.2 Geophysical Survey 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 2: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
GP 1	Positive Linear Features	Possible Archaeology
GP 2	Low negative linears with positive outlines	Geological Features
GP 3	Di-polar Anomalies	Amorphous magnetic debris
GP 4	BI-Polar Anomaly	Modern Service
GP 5	Disturbed negative area	Ground disturbance / metallic debris

- 3.2.2 Features of possible archaeological origin [GP 1] have been identified within the geophysical survey, these are situated mainly within the northern side of Field 4 and south eastern side of Field 7. The linears in Field 4 are likely to relate to a previous change in the northern field boundary; however, the rectangular feature in Field 4 has no clear identifying features.

- 3.2.3 Features identified in Field 7 [**GP1**] mostly have the pattern of previous field divisions with clear right angle and rectangular shapes. In the north east corner of Field 7 is a sub-circular feature that is broken due to electric fences, the full nature of this features is unclear.
- 3.2.4 The majority of the northern end of the site is covered in likely previous river terraces [**GP 2**], with them running across the majority of the site from north to south into Field 2. These features could mask archaeology within this area due to their sporadic nature and likely heavy alluvial deposits in this area.
- 3.2.5 Magnetic disturbance [**GP 5**] is mostly associated with the edges of fields, which likely contain metallic fencing; However, there are areas of magnetic disturbance [**GP 5**] associated with modern services, which run through Field 2 and 3. Also Field 7 was split by multiple electric fencing which has created small areas of magnetic disturbance throughout this Field.
- 3.2.6 Di- polar anomalies [**GP 3**] are located throughout the site with the majority located within Field 4 and 6, likely associated within a larger degree of magnetic debris within these fields.

4. CONCLUSION

- 4.1.1 A geophysical survey was undertaken by AB Heritage Limited at Old Mixon Road, Weston-Super-Mare, Somerset. 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 **[GP 1]** within the boundaries of the site in Fields 4 and 7. The majority of these features are most likely related to previous changes in field boundaries. However, a rectangular feature within Field 4 and a sub-circular feature in Field 7 would require further archaeological investigations to determine their origin.
- 4.1.3 The majority of the northern end of the site is covered by likely previous waterways **[GP 2]**, which could possibly mask archaeological features in this area. Magnetic disturbance **[GP 5]** is also situated predominately along the boundaries of the fields within the site due to metallic fencing.

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>.

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.

Appendix 1 Technical Information on Geophysical Survey

FLUXGATE 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.

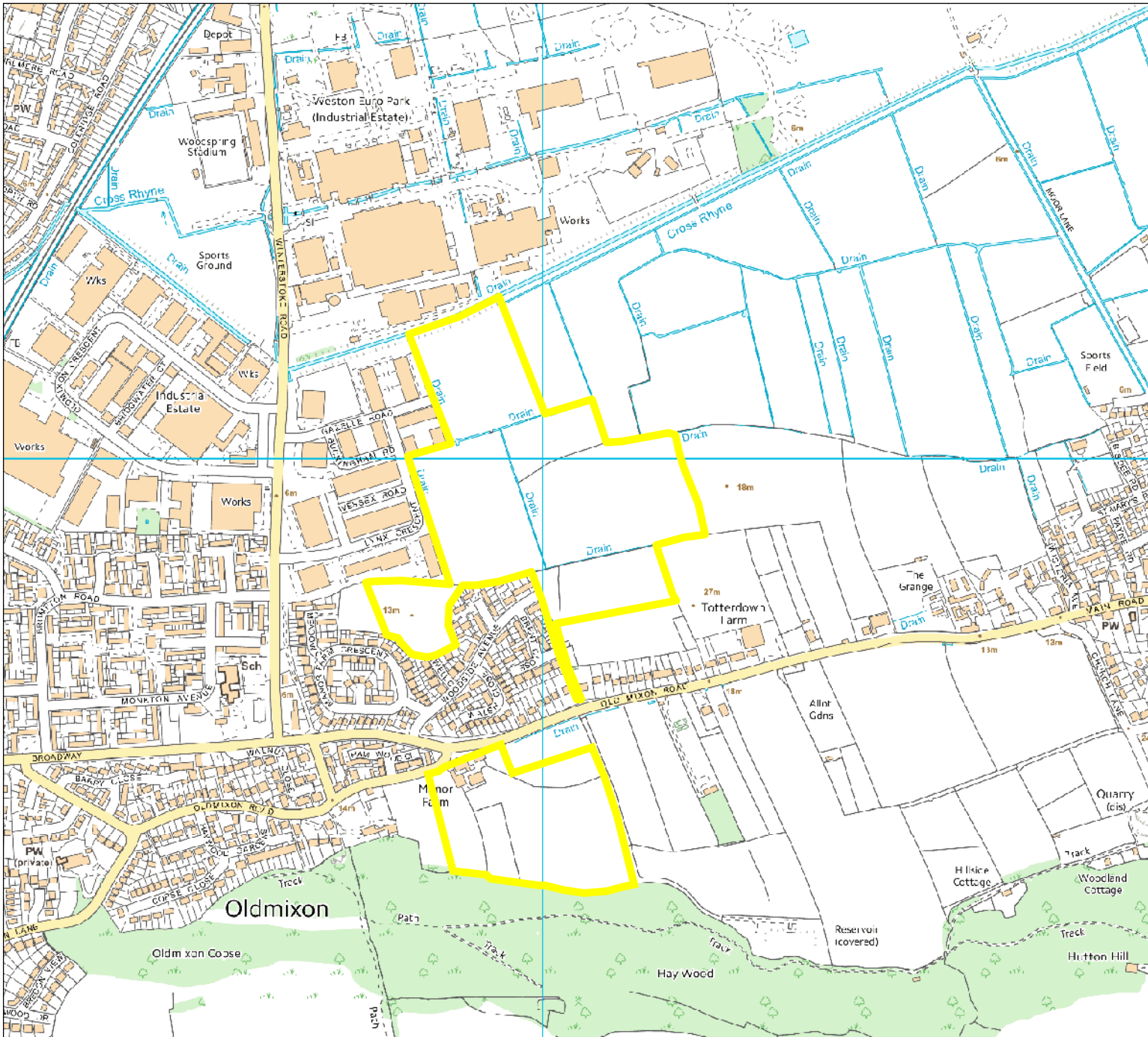
GPS METHODOLOGY

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, TA2 8DU
Tel: 03333 440 206
e-mail: info@abheritage.co.uk



Legend

 Site Boundary

Field Identification

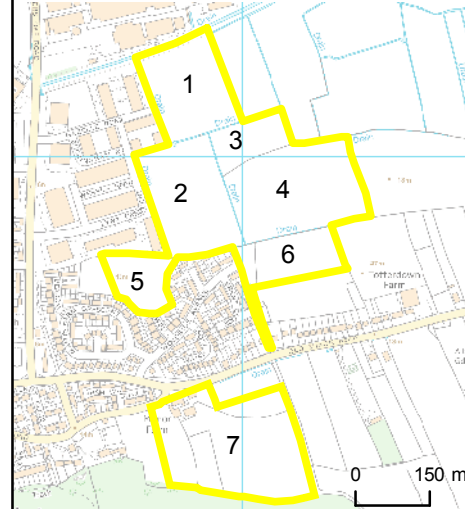
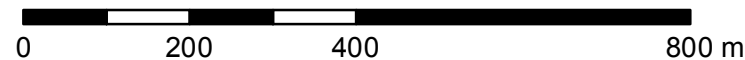


Figure 1: Geophysical Data Interpretation Fields 1 - 6


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Legend
 Site Boundary

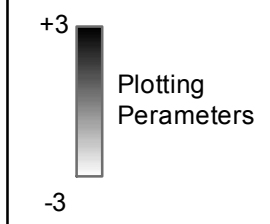
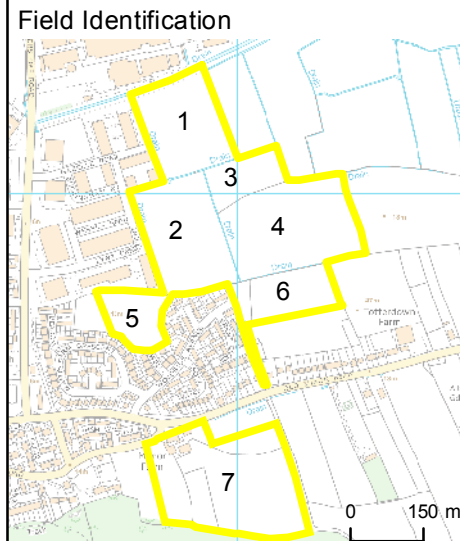
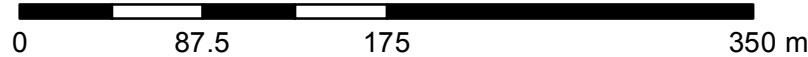



Figure 2: Raw Geophysical Data Fields 1 - 6

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Legend
 Site Boundary

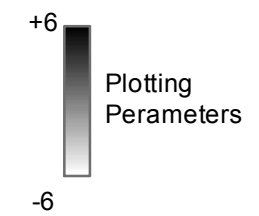
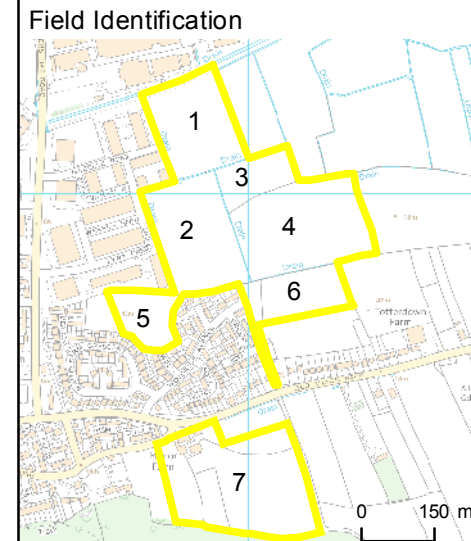
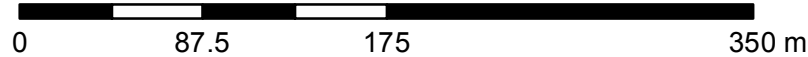
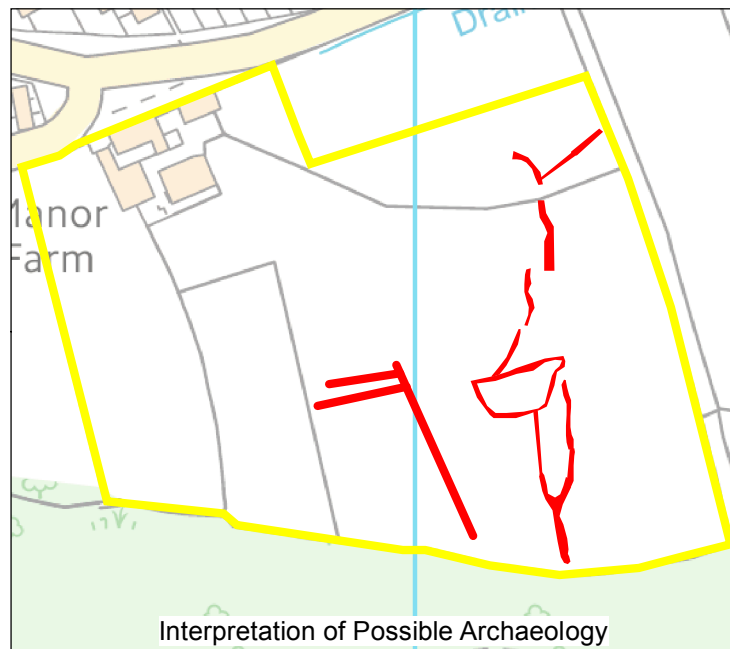
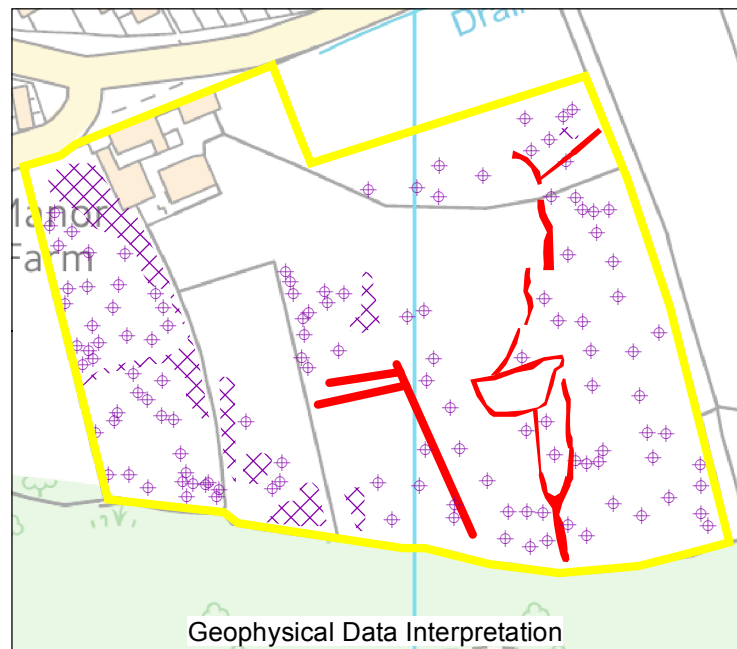
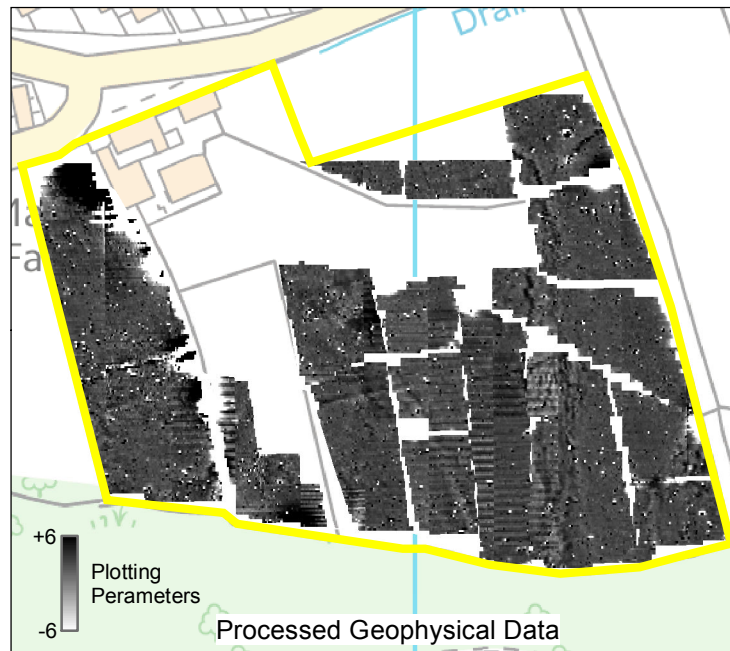
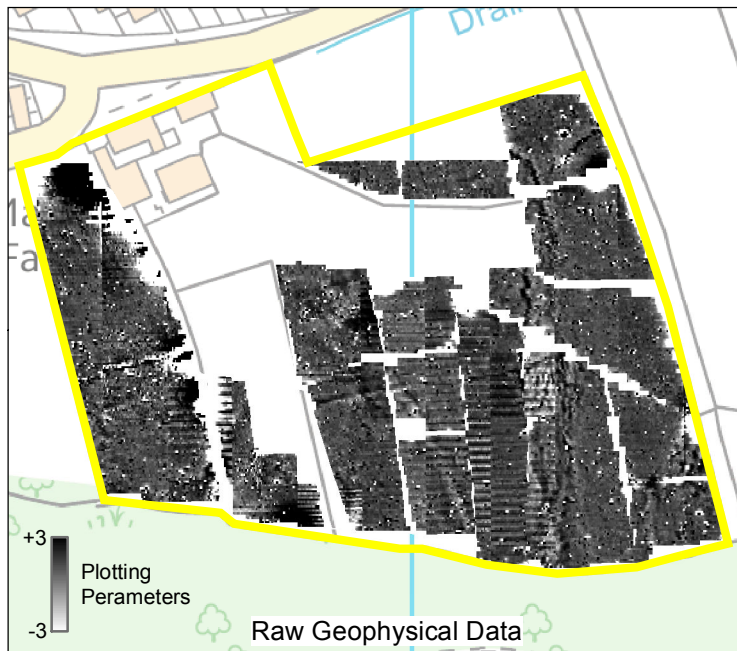


Figure 3: Processed Geophysical Data Fields 1 - 6

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- Legend**
- Possible Archaeology [GP1]
 - Magnetic Disturbance [GP5]
 - Site Boundary

Field Identification

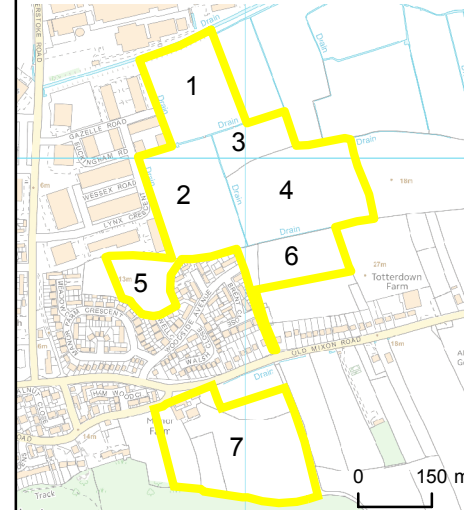
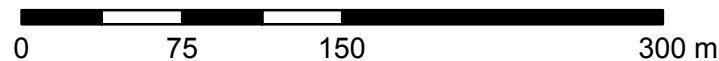


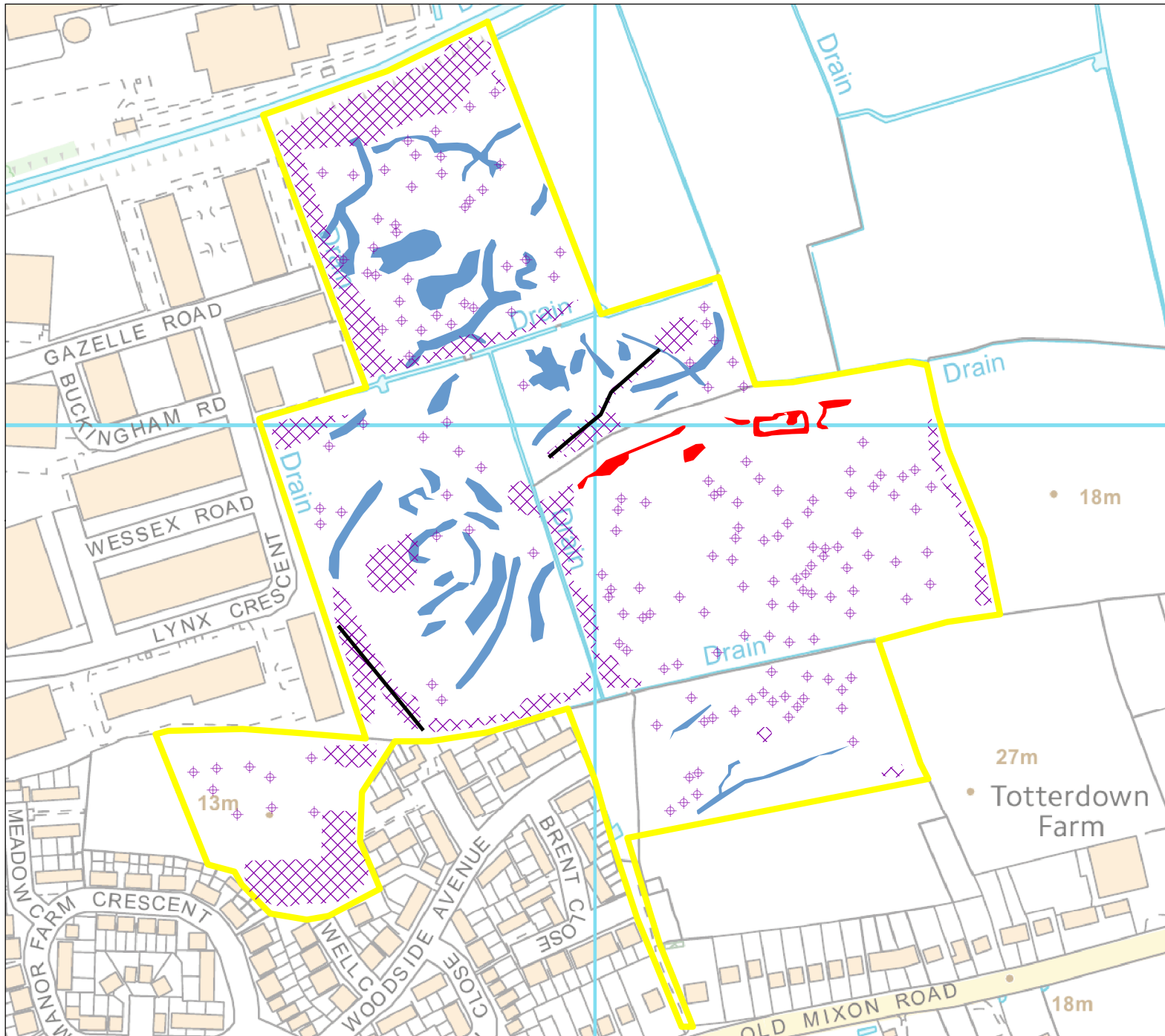
Figure 4: Geophysical Data & Interpretation
Field 7

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Legend

- Possible Archaeology [GP1]
- Possible geological Features [GP2]
- Di-Polar Anomalies [GP3]
- Modern Service [GP4]
- Magnetic Disturbance [GP5]
- Site Boundary

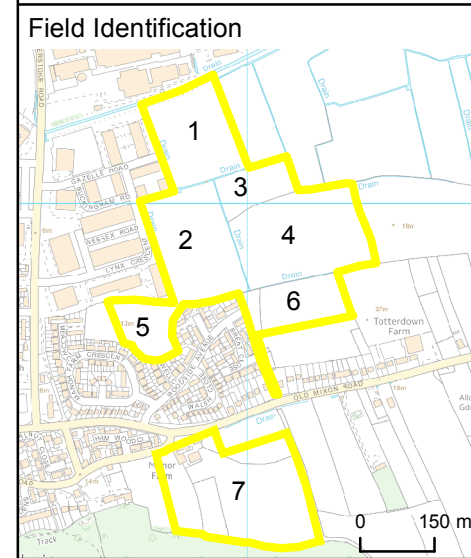
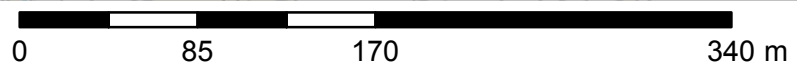


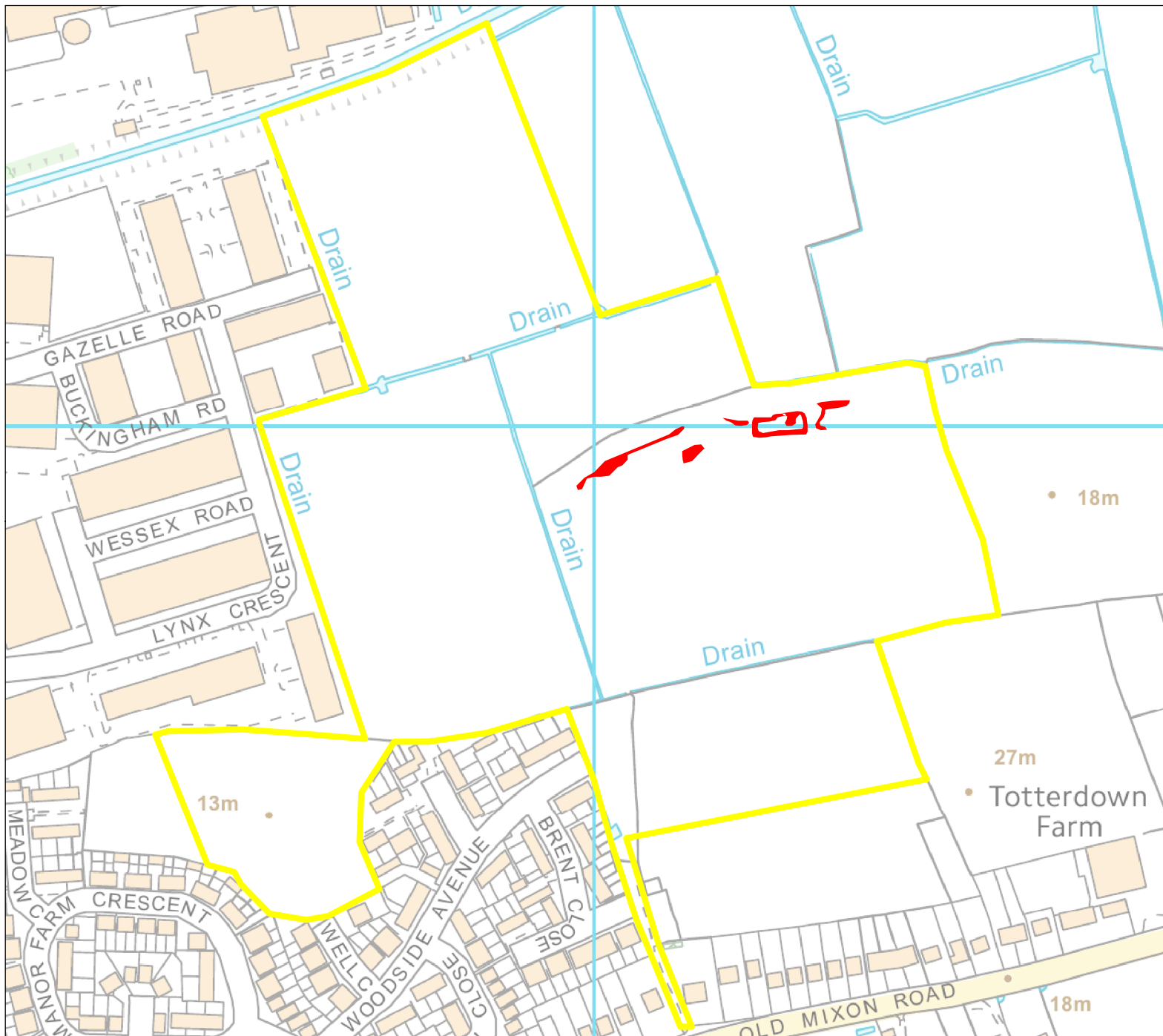
Figure 5: Geophysical Data Interpretation Fields 1 - 6

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- Legend**
- Possible Archaeology [GP1]
 - Site Boundary

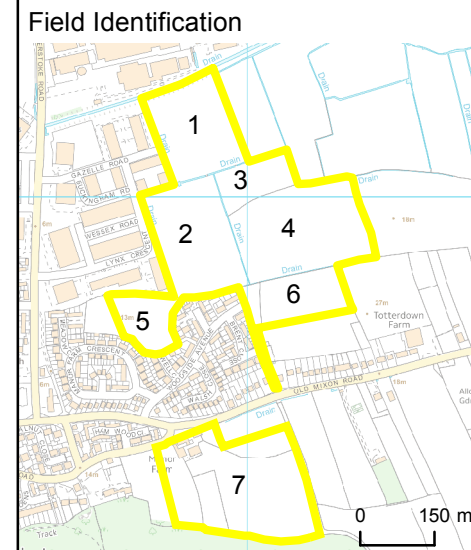


Figure 6: Interpretation of Possible Archaeological Features Fields 1 - 6

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