

Proposed Solar
Photovoltaic Park at the
Former RAF
Desborough Airfield
Geophysics Survey
Report

Client: NORTHFIELD RAF DESBOROUGH LTD

AB Heritage Project No: 10496

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PROPOSED SOLAR PHOTOVOLTAIC PARK AT THE FORMER RAF DESBOROUGH AIRFIELD

Geophysical Survey

Client Northfield RAF Desborough Ltd

Project Number 10496

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Rev Number	Description	Undertaken	Approved	Date
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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 Northfield RAF Desborough Ltd, at former RAF Desborough Airfield. The purpose of this work is to identify any potential surviving archaeological remains.

1.2 Site Location & Description

- 1.2.1 The solar park site (hereinafter, referred to as the site) is situated c. 2.9km to the north-west of Desborough, and c. 3.2km to the west of the town of Corby, at site centre point SP 81716 86097. The site is currently occupied by a disused Second World War RAF airfield, and under arable crop.
- 1.2.2 The surveyed area covers approximately 107 hectares (ha) within Kettering Borough. The site boundary primarily follows the existing boundary of the disused airfield, while the northern boundary follows a former north-east to south-west orientated runway through the centre of the airfield.

1.3 Geology & Topography

- 1.3.1 The site is on a slight north-facing slope of c. 135m above OD on the southern boundary, up to c. 142m on the northern boundary (over a distance of c. 650m). The land to the north drops by c. 12m over a distance of c. 250m
- 1.3.2 The site has 4 different variations in geology; these are not likely to create feedback constraints that would impact the results of the data collection.

Table 1: Geological Composition of Site

Bedrock Geology	Description	Superficial Geology	Description
Whitby Mudstone Formation	Sedimentary bedrock, formed in shallow seas with mainly siliciclastic sediments	Mid Pleistocene Diamicton Till	Formed from the deposition of moraines of till with outwash sand and gravel deposits from melting Ice Age glaciers
Northampton Sand Formation	Ooidal ironstone, formed as above	As above	As above
Grantham Formation	Sandstone, siltstone, and mudstone, formed as above	As above	As above
Lower Lincolnshire Limestone Member	Limestone, formed in warm, shallow, carbonate seas, where carbonate deposited on slope areas	As above	As above

2. AIMS AND 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. 107 ha hectares.
- 2.2.2 The AB Heritage staff members who undertook the works were Glenn Rose (Senior Project Archaeologist), with Archaeological Technicians: James Dunn; Alex Monks; Aaron Dunn; Tom Cloherty; Zoe Edwards; and Gediminas Bijeikis.
- 2.2.3 The weather conditions for the work varied throughout with heavy rain and sunny conditions, which did not cause any problem with collection of data.

Equipment

2.2.4 The magnetic survey equipment used comprised two Bartington Grad-601 (fluxgate magnetometers). Please see Appendix A, which contains a detailed methodology for the works undertaken; however, briefly, Table 2, below, shows site specific information on how the magnetometer was set up:

Table 2: Setting Parameters of Magnetometer

Grid Size	30x30 metres
Data Capture Distances	0.25x1m
Sensors	2
Sensitivity	0.1nT

2.2.5 A GPS was used to setup the geophysical survey was a Trimble GeoXR and has a subcentimetre 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 hard standing, which are situated throughout the site separating the fields.
- 2.3.2 Areas of electrical cables with associated pylons run through the site, which cause magnetic disturbance within c. 3m 6m of a pylon.
- 2.3.3 Multiple man-hole covers with associated utilities exist throughout the site, which are likely to create a magnetic disturbance within c. 1m 2m.
- 2.3.4 Areas of current standing structures also create a magnetic disturbance within c. 3m 6m from the structure.

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 4-9.

3.2 Geophysical Survey Results

Field 1

- 3.2.1 Positive linear features [**GP 1-a**] form a sub rectangular enclosure c. 45m x 60m around a circular enclosure with a c.10m diameter. The features show a range of readings from 1 10 nanoteslals (nt), with the strongest readings of the features shown in the north-eastern corner of the enclosure. Several curvilinear features [**GP1-b**] also run to the south and north, running away from the sub rectangular enclosure [**GP1-a**], with the features having an average reading under 1 nt.
- 3.2.2 In addition, a circular positive enclosure [**AB 1-c**], identified near the southern boundary of the field, has a diameter of c. 25m, recording a range of -25nt to +25nt.
- 3.2.3 Multiple positive parallel linear features [**GP2**] are situated throughout Field 1, running in multiple directions. The longest of these features, at c. 200m in length, is situated within the centre of the field running in a north-east to south-west direction.
- 3.2.4 Magnetic disturbance [**GP 5**] is situated mainly in the centre of the field with two larger areas associated with bi-polar anomalies [**GP6**]. A large amount of Di-polar [**GP 4**] anomalies are also situated and spread relatively evenly throughout the Field.

Field 2

- 3.2.5 Two long positive linear features [**GP1-d**] have been identified within Field 2, these features stretch over c.150m in length, running in an east to west direction in the centre of the field. These have been identified in association with several smaller positive linear features [**GP1-e**], which run in an east to west direction, the longest of which is c. 10m in length.
- 3.2.6 Two areas of positive parallel features have been identified within the north-eastern end of field 2 and the north-western end, running in a north-west to south-east direction; the longest of these linear features extends up to c. 200m.
- 3.2.7 There are however only a small amount of di-polar anomalies [**GP 4**] and no strong areas of magnetic disturbance [**GP 5**] found throughout Field 2.

Field 3

- 3.2.8 In the western side of Field 3 there are multiple curvlinear features [**GP 1-f**] with a range of 2-14nt covering an area a c. 20m x 45m.
- 3.2.9 Areas of magnetic disturbance [GP 5] associated with already known airfield features [GP 2] are situated within the north-eastern side of Field 3 and cover the majority of this side of the site. Also magnetic disturbance [GP 5] and Di-Polar anomalies [GP 4] are found around the majority of the field generally associated with above ground features.

Field 4

- 3.2.10 Within the southern end of Field 4 there is a rectangular feature [**GP 1-g**] with associated linear features with a range of 1nt to 6nt. The rectangular feature covers an area of c. 30m x 30m, with associated linear features reaching a length of c.60m. Approximately 150m to the north are multiple circular features [**GP 1-h**], with a reading of 3-5nt and a diameter c. 1m 2m these are situated above the rectangular feature [**GP 1-g**]
- 3.2.11 Also positive Linear features [**GP 1- i**] are located in the northern end of the field running in a north to south direction with an average reading of 4nt. It was noted that some of these features apparently lie parallel to one another.
- 3.2.12 Known airfield features exist within the southern end of the field [**GP 2**], running in north-west to south-east direction with a length of over 200m and a width of c. 75m.
- 3.2.13 Multiple positive parallel features were identified in the field, with most running in a north-west to south-east direction, although one area of features do run in a north-east to south-west direction. The longest of these features stretches to a distance of more than c.100m, with an average reading 1-2nt.

Field 5

- 3.2.14 Three positive linear features [**GP 1- j**] were recorded running throughout the field, with two features running in a north-west to south-east direction.
- 3.2.15 Overall this field is occupied by known airfield features [**GP 2**], with Di-Polar anomalies [**GP 4**] located throughout the field

Field 6

- 3.2.16 Extensive known airfield features [**GP 2**] have been identified within the northern end of the field. In addition, positive parallel linear anomalies [**GP 3**] are located in the north-eastern side of the field, running in a north-west to south-east direction, with an average length of c. 150m 200m.
- 3.2.17 Di-polar anomalies were also identified throughout this field, with the majority of anomalies located within the southern end of the field.

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.
- 3.3.2 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 3: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
GP 1 a-j	Positive Linear and curvlinear Features	Possible Archaeological features
GP 2	Magnetic Disturbance	Known Airfield features
GP 3	Positive parallel linear	Agricultural Activity
GP 4	DI-Polar Anomalies	Magnetic Debris
GP 5	Magnetic disturbance	Modern features
GP 6	Negative and Positive Linear (Bi-polar)	Modern Utilities

- 3.3.3 It should be noted that current modern standing features within the site, including the known air raid shelters, along with the presence of modern utilities, will have resulted in areas of magnetic disturbance [e.g. **GP 5**].
- 3.3.4 However, potential archaeological features [**GP 1**] have been identified across the site, with features identified within Fields 1 [**GP1-b & c**] and Field 4 [**GP1-g**] possibly relating to previously recorded Prehistoric and/or Roman activity within the site limits.
- 3.3.5 Other identified positive linears [**GP 1-a, d-f, &h-j**] may also reflect the presence of archaeological features dating to such periods, although they could potentially be related to more modern disturbance associated with the construction and use of the World War II RAF Airfield, along with agricultural activity across the area [**GP 3**].
- 3.3.6 The RAF Airfield has undoubtedly had some impact on parts of the site [**GP 2**], with a number of areas within the site having been covered with hard-standing (e.g. tarmac / concrete / compressed aggregate) at various points in the past. These features can impact archaeology within their footprint, but also have the potential to bury, mask and protect archaeological remains that they cover on occasion.

4. SUMMARY

- 4.1.1 A geophysical survey was undertaken by AB Heritage Limited at the former RAF Desborough Airfield. The purpose of this work was to inform a Cultural Heritage Environmental Statement regarding the potential for any archaeological remains to survive within the site and, where possible, identify the form, function and extent of any potential remains.
- 4.1.2 The report has identified potential archaeological features within Fields 1 [GP1-b & c] and Field 4 [GP1-g], possibly some form of enclosures in these area that may relate to previously recorded Prehistoric and/or Roman activity within the site limits.
- 4.1.3 In addition, a number of positive linear features [**GP 1-a, d-f, &h-j**], while potentially relating to more modern activity, could also reflect the presence of archaeological features dating to the prehistoric and Roman periods.

5. ARCHIVE

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

Table 4: 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

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

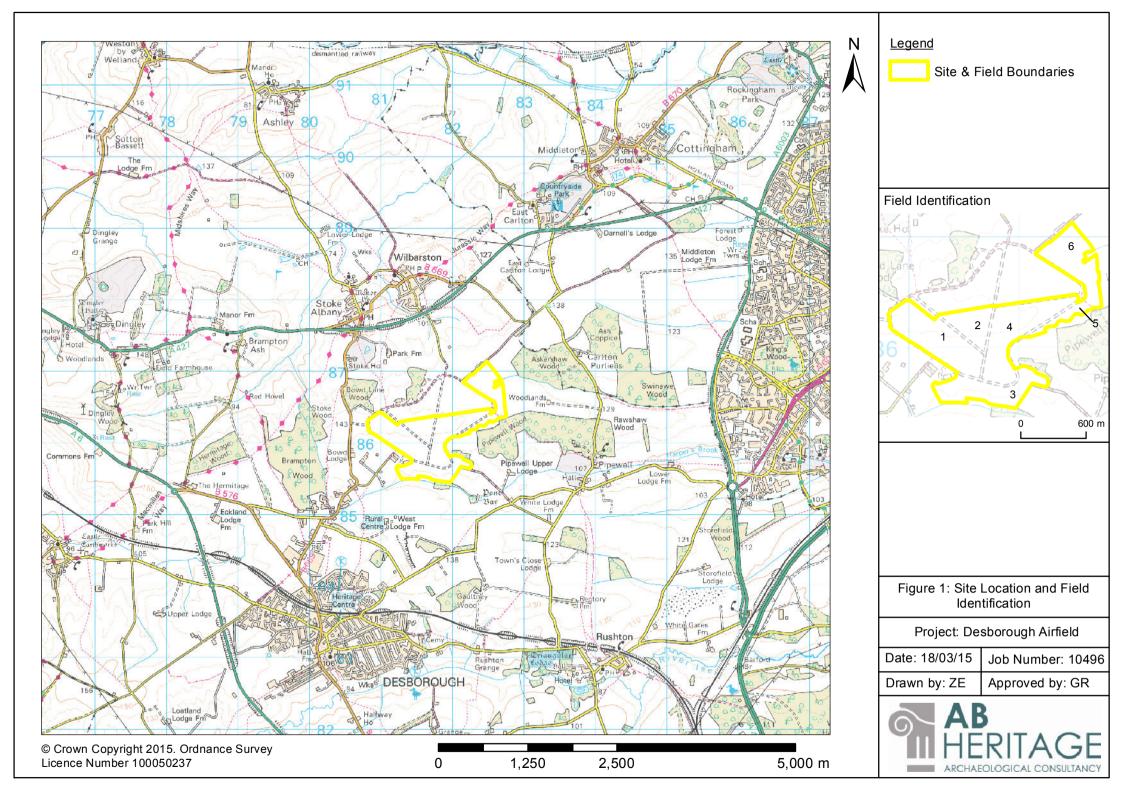
The readings are logged continually by the data logger during the survey, which is then downloaded on site to a site laptop. At the end of each job, data is transferred to the office PC's for processing and presentation.

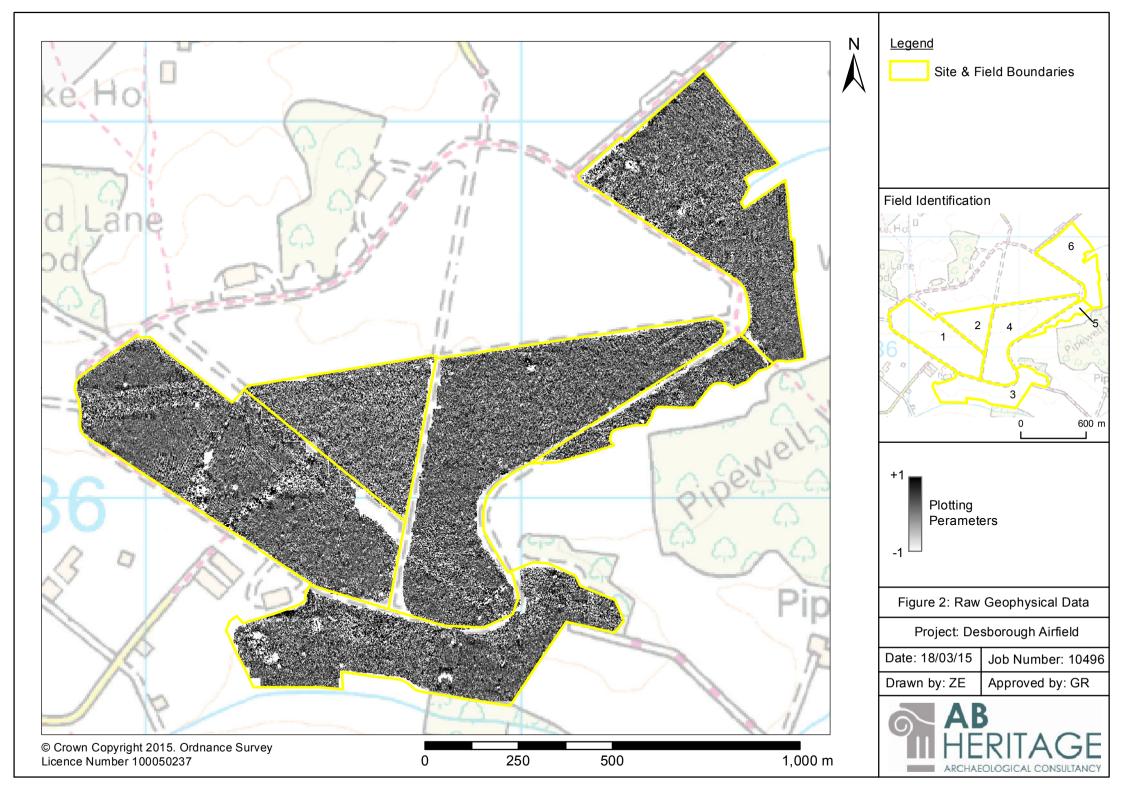
This 'regular xy' data is then downloaded into specialist data processing software, at user defined sample intervals (in this case 1 m by 0.25 m). This is processed as standard magnetometer data.

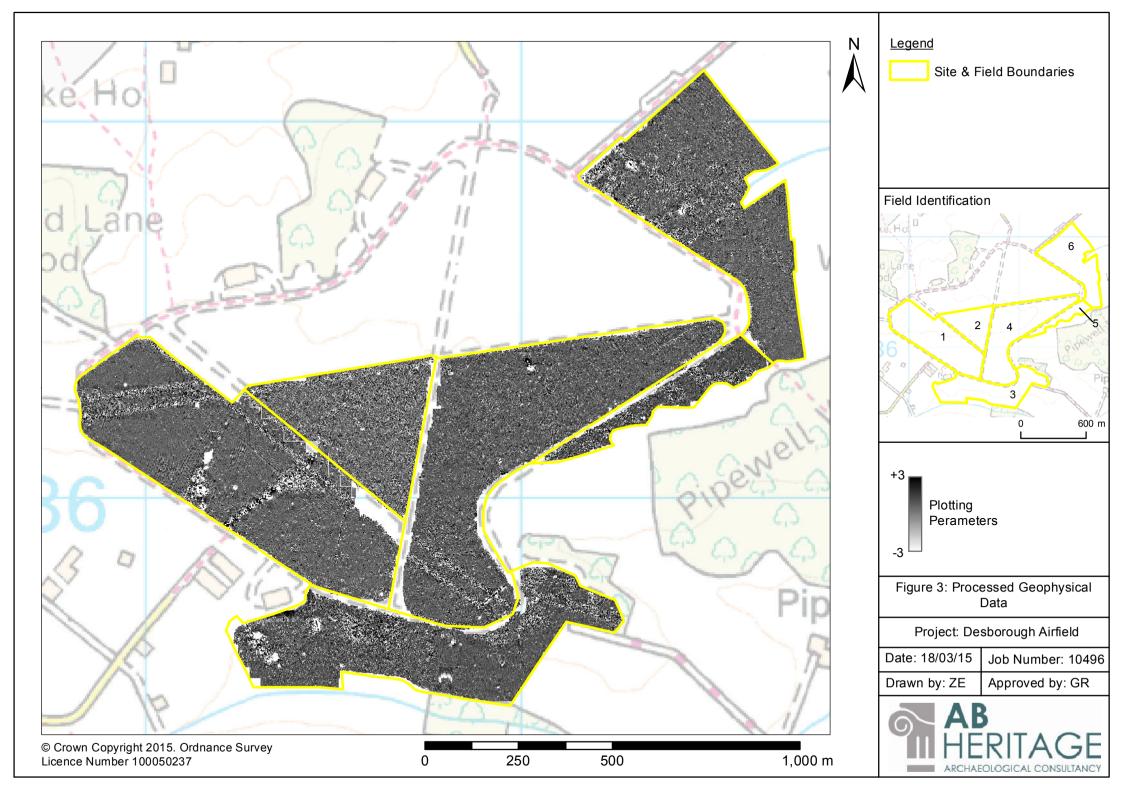
GPS METHODOLOGY

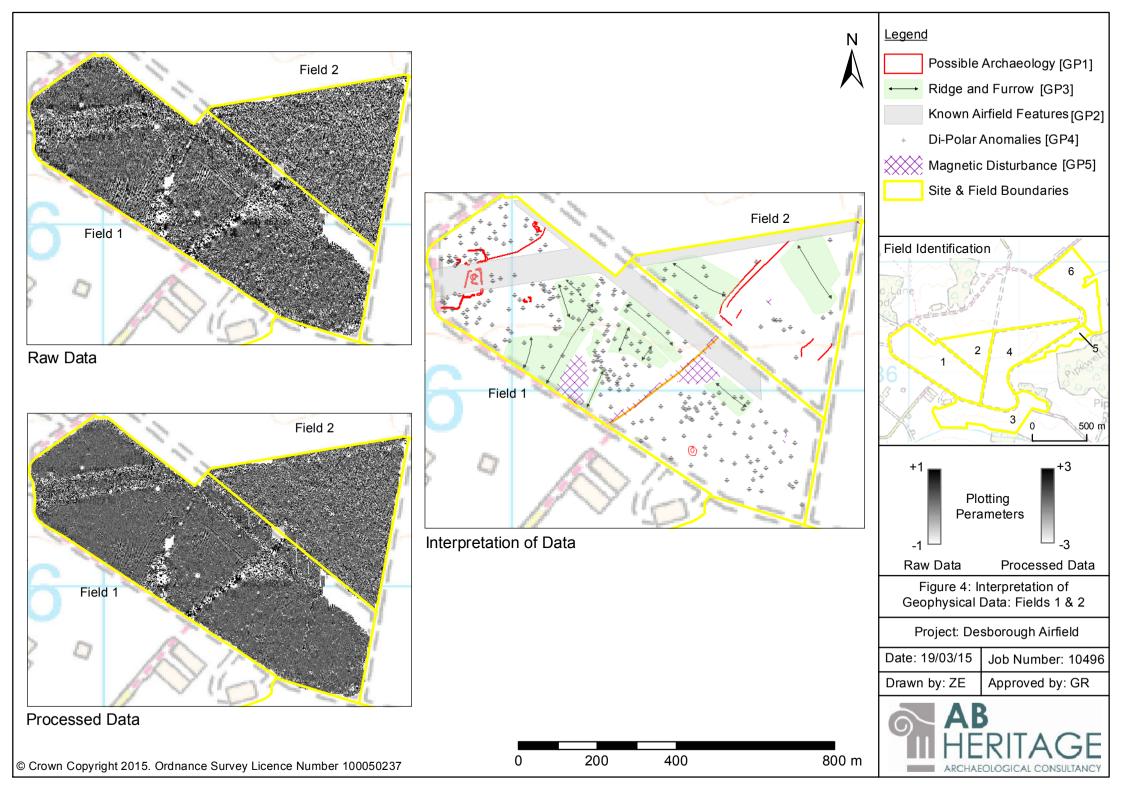
An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to sub-cm accuracy, a far greater accuracy than a standard GPS unit. An RTK system uses a base station receiver and a number of mobile units (rovers). The base station takes measurements from satellites in view 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.

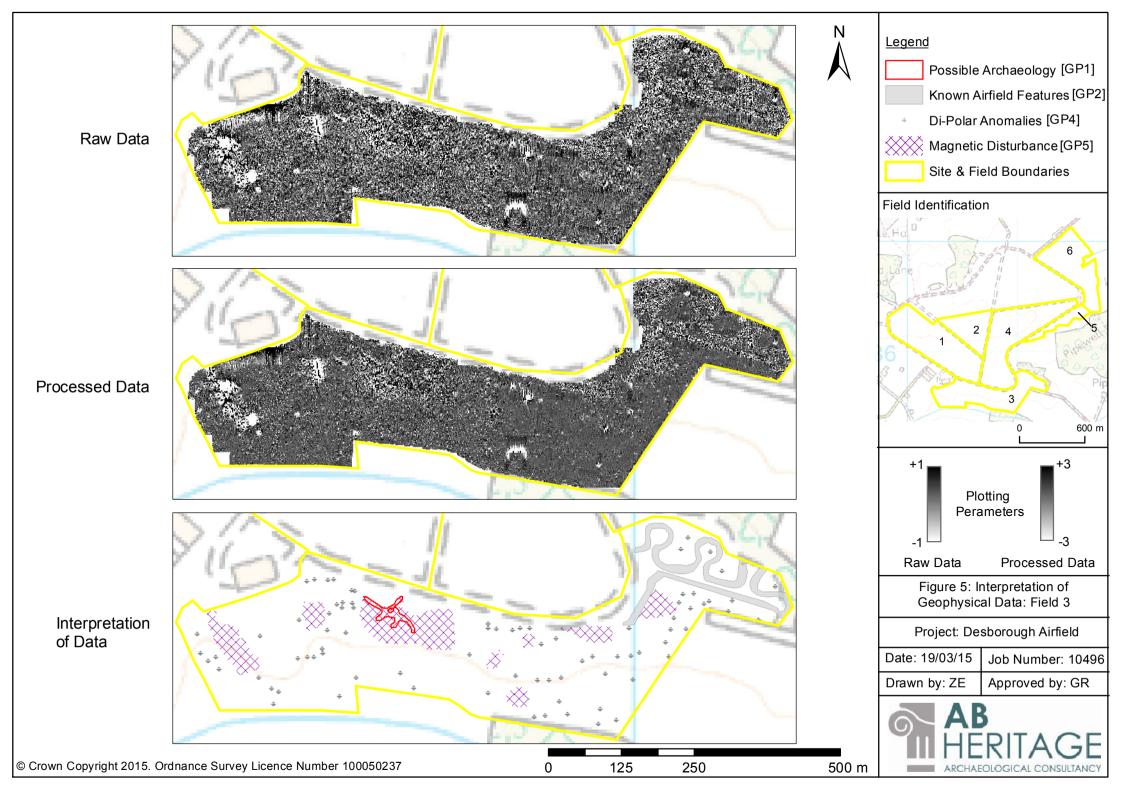
During such a survey a Trimble GeoXR Differential Global Positioning System (dGPS), capable of Real Time Kinematic (RTK) is used to set out a nominal grid prior to the survey. This increases the accuracy and efficiency of the survey. The data is then downloaded from the unit on the day, using a USB stick.

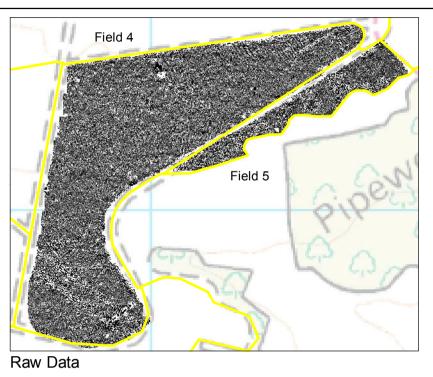


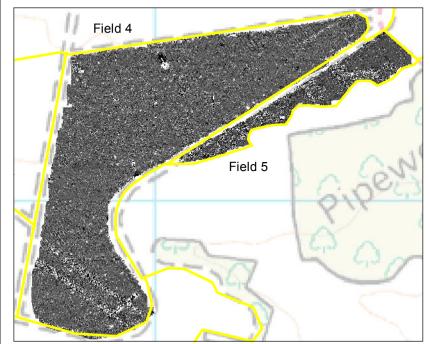






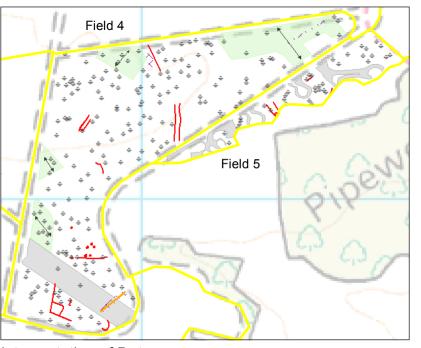






Processed Data

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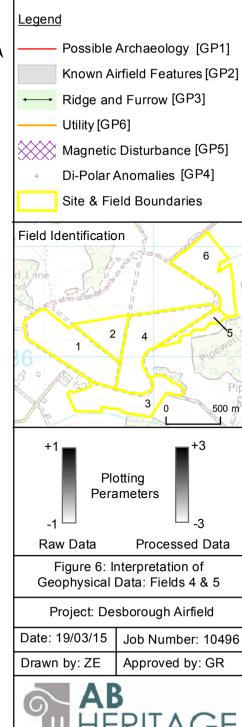
175

350

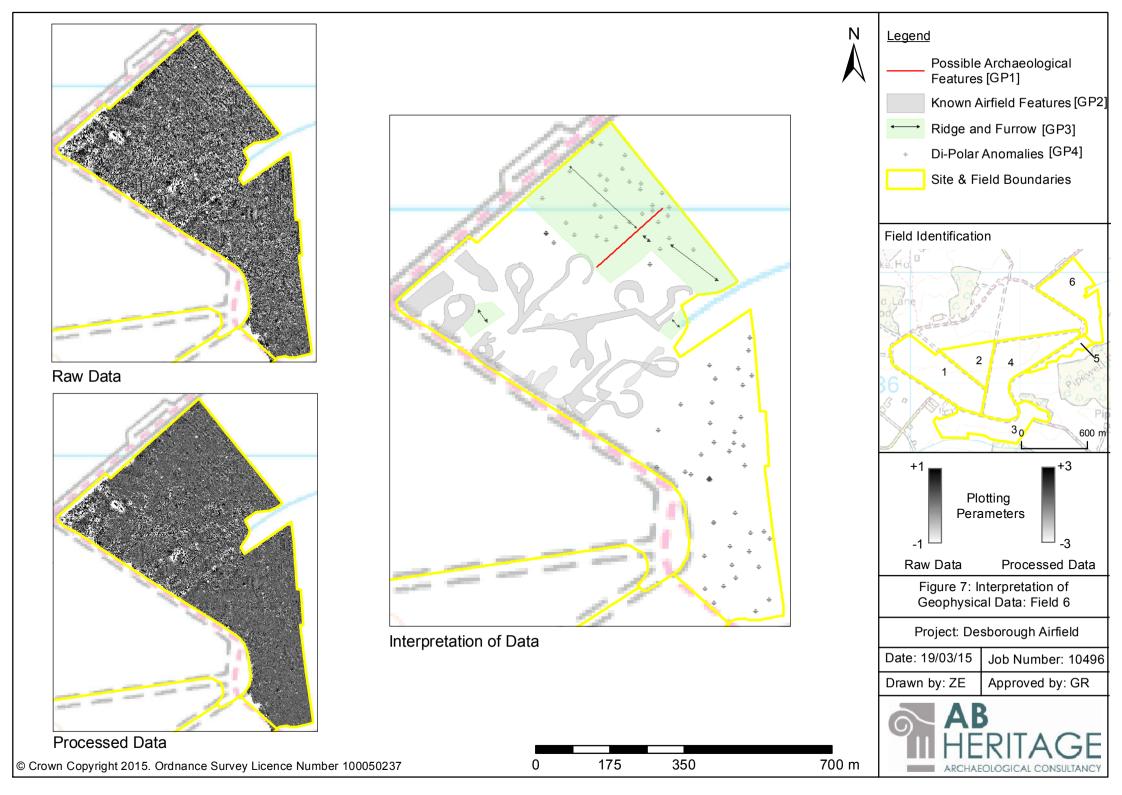
700 m

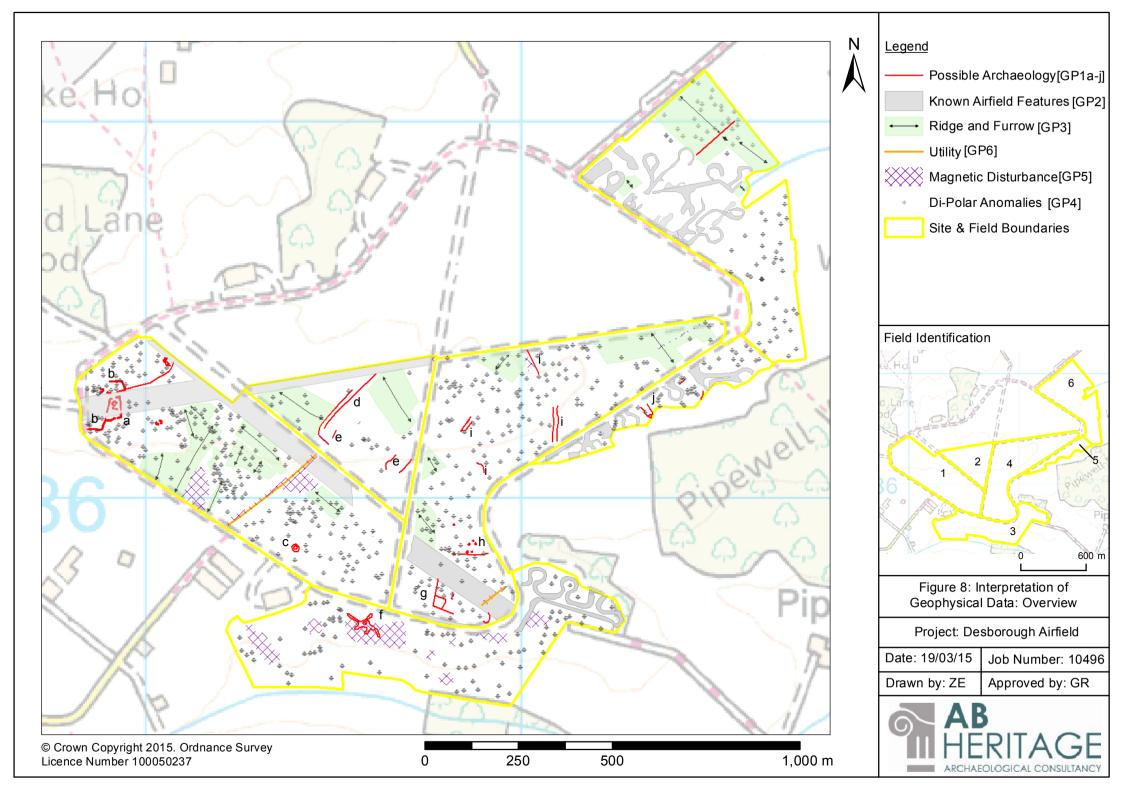
Interpretation of Data

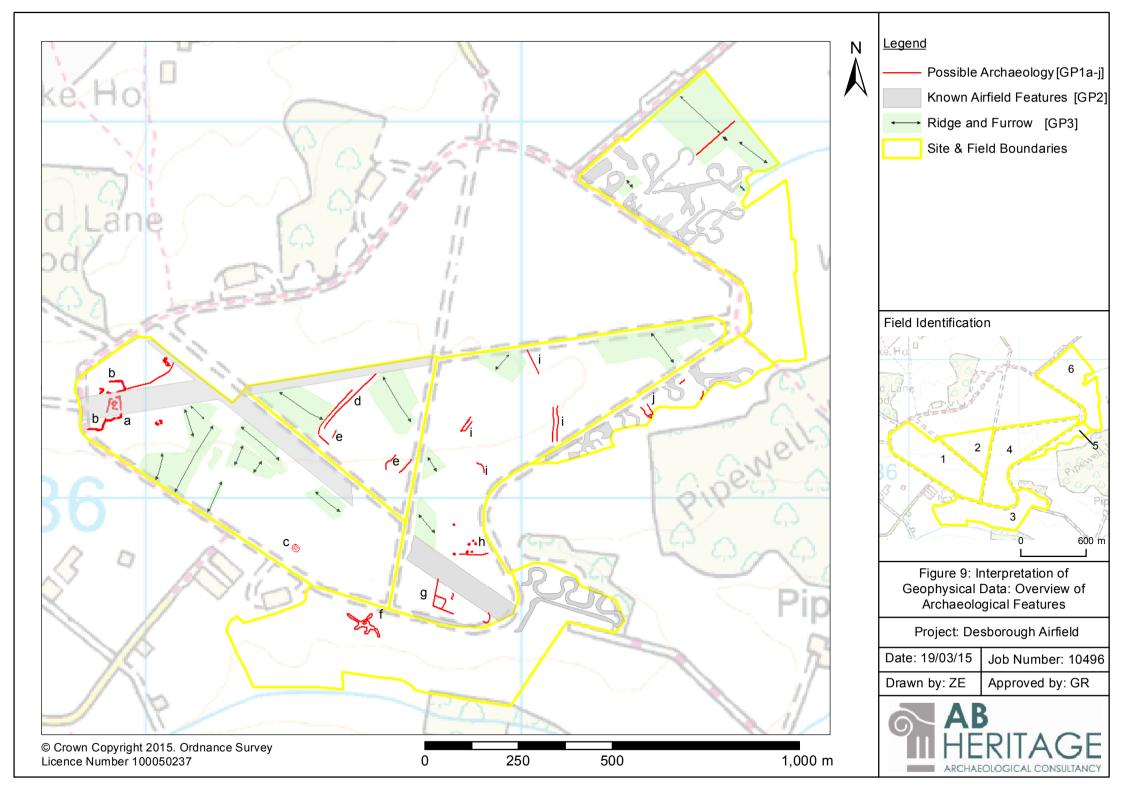
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