T H A M E S V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

SOUTH WEST

Land at Hewas Farm, Ladock, Truro, Cornwall

Geophysical Survey (Magnetic)

by Marta Buczek and Tim Dawson

Site Code: HFC 12/202

(SW 9169 5348)

Land at Hewas Farm, Ladock, Truro, Cornwall

Geophysical Survey (Magnetic) Report

For ROC Energy

by Marta Buczek and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code HFC 12/202

December 2012

Summary

Site name: Land at Hewas Farm, Ladock, Truro, Cornwall

Grid reference: SW 9169 5348

Site activity: Magnetometer survey

Date and duration of project: 7th-16th December 2012

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: HFC 12/202

Area of site: 17.5 ha

Summary of results: Several magnetic anomalies were recorded during the survey. These include features likely to be archaeological in origin. Of particular note are the curvilinear anomalies and the clusters of discreet positive anomalies that may indicate the presence of discrete subsoil features. Additionally, several modern services were identified as well as possible trackways and field boundaries of unknown date.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Report edited/checked by:	Steve Ford✓ 19.12.12 Andrew Mundin✓ 19.12.12

TVAS (South West),Unit 21, Apple Business Centre, Frobisher Way, Taunton TA2 6BB
Tel. (01823) 288 284; Fax (01823) 272 462; email: southwest@tvas.co.uk; website : www.tvas.co.uk

Land at Hewas Farm, Ladock, Truro, Cornwall
A Geophysical Survey (Magnetic)

by Marta Buczek and Tim Dawson

Report 12/202

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at land at Hewas Farm, Ladock, Truro, Cornwall (SW 9169 5348) (Fig. 1). The work was commissioned by Mr Stan Dominey of ROC Energy, Satra Innovation Park, Rockingham Road, Kettering, NN16 9JH.

Planning consent (PA10/08675) has been gained from Restomel District Council for the development of a new solar farm on agricultural land at Hewas Farm. This is subject to a condition which requires the implementation of a programme of archaeological work.

This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012) and the District's policies on archaeology. The field investigation was carried out to a specification according to a brief provided by Mr Dan Ratcliffe, Historic Environment Planning Advice Officer at Cornwall Council. The fieldwork was undertaken by Marta Buczek, Aiji Castle, Nicholas Dawson and Tim Dawson on 7th, 8th, 10th-14th and 16th December and the site code is HFC 12/202.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located along the eastern edge of the parish of Ladock, at its border with the parish of St Stephen in Brannel, *c*.13km northeast of Truro (Fig. 1). It lies *c*.400m east of Lower Hewas Farm and 3km northeast of Ladock village and is bounded by Melbur China Clay Works to the north and Tresillian river valley to the west. The site lies at between 85m and 115m above Ordnance Datum (aOD) on land sloping down to the south and west totalling an area of approximately 17.5 hectares. It is situated in a landscape bisected by river valleys to the east and west, rising to a plateau interspersed with operational china clay workings to the north. The site itself was subdivided into six fields (A to F, Fig. 2) planted with grass and clover. The underlying geology is described as Meadfoot Beds (calcareous slate, grit and thin limestone) (BGS 1982).

The site and weather conditions during the survey period were mainly dry with strong winds (Plates 1-4). However, the area was subjected to a few prolonged periods of overnight rain and some heavy showers during the day. Despite this the ground remained firm with water only temporarily pooling on the surface.

Site history and archaeological background

Part of the site may have a potential for remains of round barrows dating to the Bronze Age. This potential is suggested by the historic field name 'burrow close' and also by the historic landscape character of the eastern parts of this site. This land can be described as 'Early Modern Enclosed Land' (Ratcliffe 2012) and is likely to represent intensification of land formerly characterised by rough ground used in the medieval period as common grazing. Such areas have an elevated potential for prehistoric ritual features such as round barrows, standing stones, later prehistoric settlements and earlier medieval field systems. The western parts of the site are characterised by 'Anciently Enclosed Land' (Ratcliffe 2012), i.e. land enclosed during the medieval period or earlier. The existing field boundaries in this area suggest medieval enclosure of former common strips of land. The Cornwall Historic Environment Record indicates at least two probable Iron Age settlements to the south and east of the site area.

Methodology

<u>Sample interval</u>

Data collection required a temporary grid to be established across the survey area using wooden pegs at 30m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 3600 sampling points across a full 30m × 30m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. An initial grid plan was drawn up to cover the entirety of the site with the grid in each field being aligned to the field's long axis. The plan was largely followed (Fig. 2) although several adjustments were made to overcome obstacles encountered on site. These obstacles included flooding in the south-western corners of Fields A and C, the thickness of the hedgerows which divided the various fields, and heavy farm traffic along the boundaries of Fields B, D, E and F. These all had the effect of reducing the area available for survey.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations set out by both English Heritage (2008) and the Institute for Archaeologists (2002).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for fast yet detailed survey of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seem from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble GeoXH 6000 handheld GPS system with sub-decimetre accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the ArcheoSurveyorLite software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	Effect
De-stagger all grids by -2 intervals	Removes the staggering effect caused by variations in speed resulting from obstructions (e.g. wind, gradient) in the surveyor's path.
De-stripe all grids using median values	Corrects for the striped effect caused by changes in sensor setup.
Clip from -20.00 to 20.00 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

Once processed, the results are presented as a greyscale plot shown in relation to the site (Figs 3, 4 and 5), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 6). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2, Appendix 2) is prepared in EasyCAD v.7.22.01, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from ArcheoSurveyorLite in portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is rotated to orientate it to north and combined with grid and site plans in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

The magnetic data from all six fields indicate a level of disturbance by ploughing. This can be seen in the strong positive, and in some places negative, parallel lines along the long axis of each field. These have not been included within the interpretation, to highlight other more significant archaeological, rather than agricultural anomalies.

Field A

A large number of strong positive anomalies were recorded during surveying. These are more likely to be of archaeological origin. Two curvilinear features located in the northern part of the survey area roughly are aligned east-west parallel to each other and represent ditch-type anomalies **[Fig. 6: A1]**. A second set of linear positive anomalies, located in the southern part of the field, also aligned east-west parallel to each other giving the appearance of a trackways **[A2]**. It may also suggest an extension of the field boundary that separates Fields B, C and D to the southeast (Fig. 6). Another ditch-type positive anomaly **[A3]** located in the centre of the field traverses both **[A1]** and **[A2]** . To the north, **[A3]** turns sharply to the west to form **[A4],** another ditch-type positive anomaly with an associated negative response. They may represent part of an enclosure **[A4]**.

A strong bipolar anomaly (composed of alternating positive and negative responses) located in the northern part of the field running roughly in a northwest-southeast direction represents a modern ferrous pipeline **[A5]**.

Other weak background variations can be seen to the southeast of the field. They appear slightly curvy and sinuous in form and are likely to be result of natural features such as soil creep **[A6]**.

Unidentified weak negative anomalies occur in the south and north of the field, appearing as a pair of dotted parallel lines. These are possibly of archaeological origin although they more likely represent modern vehicle tracks **[A7]**.

Parallel to the northern and to the southern boundaries there are two weak positive anomalies which may represent archaeological features but it is more likely that they just signify the presence of old field boundaries **[A8]**.

The site is sparsely scattered with spots of strong positive magnetic disturbance which caused by ferrous debris.

Field B

A ditch-type positive anomaly roughly aligned across the field in a northeast-southwest is possibly of archaeological origin **[B1]**. To the southeast of this there is another strong magnetic signature anomaly which slightly curves to the north **[B2]**. Another positive anomaly with a weaker signal can also be identified in the southern part of the surveying field **[B3]** and is parallel to **[B1]**. On the field side to the southwest edge there is a strong positive ditch type anomaly which can also be seen continuing in Field A **[A1, B4]** (Fig. 6).

From the southeastern corner of the field on a northwest-southeast axis runs a linear bipolar anomaly which seems to be a modern pipeline **[B5]** and which can also be seen in Field A **[A5]**. More strong positive magnetic anomalies can be seen in northern and western part of the field forming a line that is aligned roughly north-south and may be of archaeological (pits, tree boles) or geological origin **[B6]**. A series of unidentified anomalies occur in the southern and in the northern part of the field. These are similar to these found in Field A and also appear as a dotted paralleled lines, and may also suggest a trackway **[B7]**.

Parallel to the northern and southern boundaries are two weak positive anomalies which may represent archaeological features, but are more likely to just signify the presence of old field boundaries **[B8]**. Magnetic scatters can be identified in the northern part of the field and may be caused by ferrous objects.

Field C

The primary feature of Field C is a pair of strong negative linear anomalies with a strong positive anomaly located in the space between **[C1]**. This is aligned on a north-south axis and is likely to represent an old boundary system as it appears to be a continuation of the existing boundaries between Fields C and D (Fig. 4).

An irregular linear positive anomaly aligned roughly east-west is most likely to be of geological origin, e.g. a channel or soil creep **[C2]**. It is probably a continuation of the similar feature identified in Field A **[A6]**.

The unidentified negative track-like anomalies also appear in this field forming a regular half oval shape that curves down from the northern boundary **[C3]**. As with the previous examples, these could be of archaeological origin but are more likely modern.

To the east and west end of the field occur weak positive anomalies forming regular lines which suggest movement of the field boundaries **[C4]**.

Magnetic scatters can be identified in the eastern and western part of the field and may be caused by ferrous objects.

Field D

An intersecting group of four strong positive linear anomalies were recorded within Field D. One ditch-type anomaly is aligned northeast-southwest **[D1]**, a possible continuation of **[B1]**, and a second cuts across it in a northwest-southeast direction before turning to a more southerly course **[D2]**. These may both be of archaeological origin and might represent ancient enclosures but more likely they just signify the presence of old field boundaries. These are both intersected by a continuation of the ditch-type anomaly from Field B **[B2, D3]**, which continues to curve around to the north. Another short section of positive anomaly **[D4]** runs parallel to **[D3]** before crossing **[D2]**. A final set of positive linear anomalies can be seen running parallel to the extant field boundary along the eastern, western and southern edges of the field **[D5, D6, D7]** and most likely represent an alteration to the hedgerows.

The distinctive features of Field D are the clusters of discreet positive anomalies *c*.2m in diameter that can be seen particularly in the north and southeast of the field **[D8, Fig. 7: D9]**. These might be caused by discrete subsoil anomalies, such as pits or tree boles, or naturally occurring depressions in the ground (solution hollows). An alternate, more detailed, explanation for the anomalies, particularly those that form overall linear shapes, is that they may be pits dug for mining shallow mineral deposits. The signals in the north of the field **[D8]** appear to be more regular in shape forming an oval and suggest a structure with its entrance from the north side. A tight group of strong localised bipolar and negative magnetic responses can be seen within the oval and suggest either built-up or fired structures such as ovens, furnaces or hearths.

Several other discreet positive anomalies are dotted around the field, not appearing to form part of any larger groupings.

Field E (Fig. 7)

A linear positive anomaly can be seen clearly aligned northeast-southwest has potential to be of archaeological origin **[Fig. 7: E1]**. However, excavations occurring on site during the survey to reroute a water pipe showed that this anomaly was in fact the water pipe that was being rerouted. A second strong positive linear anomaly is orientated parallel to the first in the southeast corner of the field **[E2]**. This one, however, is much wider and is more likely to be archaeological in origin. Another strong positive anomaly can be seen in south-western corner of the field **[E3]** and appears to be an extension of the probable geological feature also seen in Fields A and C **[Fig. 6: A6, C3]**.

Further positive anomalies but with weaker magnetic signatures can be seen to the south of the field aligned on east-west axis **[E4]** and to the north of the field aligned north-south **[E5]** and are possibly archaeological in origin.

A single strong localised magnetic response can be seen on the eastern boundary of the field, its appearance suggesting magnetic disturbance caused by a near-by ferromagnetic object **[E6]**. A series of parallel lines similar to those found in Fields A, B and C also occur in Field E, again suggesting vehicle tracks **[E7]**.

Field F

Field F is characterised by two sets of linear positive anomalies which are broadly aligned north-south along the field's long axis. The first of these is a single strong anomaly accompanied by several sections of weaker parallel linear anomaly **[F1]** which can be interpreted as possible field boundaries or a trackway and are potentially of archaeological origin. To the east a second pair of stronger positive anomalies forms a more convincing trackway leading northwards from the field's south-eastern corner **[F2]**. Both of these sets of features are crossed by several fragmentary positive linear anomalies. In the west **[F3]**, an apparent continuation of **[E2]**, crosses **[F1]** and then possibly appears again in the north joining **[F2]**. A second linear anomaly **[F4]** leads from the western boundary eastwards across the field, crossing **[F1]** but disappearing before it reaches **[F2]**. In the north a curved anomaly **[F5]** appears to respect the line of **[F2]** but a second, slightly weaker anomaly **[F6]** cuts perpendicularly across it curving northwards into the magnetic disturbance caused by a modern pipe **[F7]**.

Elsewhere in the field, several discreet positive anomalies *c*.2m in diameter and similar to those noted in Field D can be identified across the area. Of particular interest is the linear concentration of these anomalies **[F8]** to the south of the centre of the field. Again, these may be archaeological pits or tree boles or they may represent pits dug for mineral extraction.

Along the eastern edge of the field along its edge there is a distinctive linear bipolar anomaly signifying the presence of a modern pipe **[F7]**. A similar area of disturbance can be seen in the south-western corner of the field **[F9]**. This was caused by the close proximity of parked plant during the survey. Several ferrous spikes can also be identified; these appear to be a sparse scatter of iron objects across the field, either of archaeological or modern in origin.

Conclusion

The survey undertaken across the six fields at Hewas Farm successfully identified anomalies representing several cut features that are possibly of archaeological origin. These primarily consist of linear features which occasionally intersect each other to suggest several phases of land use. Those less likely to be archaeological in origin represent more modern changes in field layout. Of interest are the concentrations of positive anomalies that indicate the presence of pit-like features. These clusters, particularly those in Field D, may signify archaeological activity or structures or, alternately, mineral extraction operations. An organic-looking positive anomaly was recorded in the lowest area of site and might represent a naturally occurring buried channel or change in geology. The survey area is crossed by several modern pipelines, the magnetic signatures of which will have had a masking effect on and near-by anomalies, particularly along the site's eastern boundary. Other anomalies of modern origin include what are likely to be vehicle tracks crossing several of the fields.

References

BGS, 1982, *British Geological Survey*, 1:50,000, Sheet 347, Solid and Drift Edition, Keyworth

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)

IFA, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading

NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

Ratcliffe, D, 2012, Brief for Archaeological Programme of work at Hewas Farm, Lacock, Truro. Cornwall Council HES, Truro

Appendix 1. Survey and data information

PROGRAMME
Name: ArcheoSurveyor
Version: 2.5.19.6

Field A
Raw data
COMPOSITE
Filename: Field 1.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Aiji Castle, Tim Dawson on 07/12/2012
Assembled by: Aiji Castle on 07/12/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 1200 x 150
Survey Size (meters): 300 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 10.62
Mean: -1.61
Median: -1.78
Composite Area: 4.5 ha
Surveyed Area: 2.0681 ha

Source Grids: 35
1 Col:0 Row:1 grids\01.xgd
2 Col:0 Row:2 grids\14.xgd
3 Col:1 Row:1 grids\02.xgd
4 Col:1 Row:2 grids\15.xgd
5 Col:2 Row:1 grids\03.xgd
6 Col:2 Row:2 grids\16.xgd
7 Col:3 Row:1 grids\04.xgd
8 Col:3 Row:2 grids\17.xgd
9 Col:3 Row:3 grids\24.xgd
10 Col:4 Row:0 grids\05.xgd
11 Col:4 Row:1 grids\06.xgd
12 Col:4 Row:2 grids\18.xgd
13 Col:4 Row:3 grids\25.xgd
14 Col:5 Row:0 grids\07.xgd
15 Col:5 Row:1 grids\08.xgd
16 Col:5 Row:2 grids\19.xgd
17 Col:5 Row:3 grids\26.xgd
18 Col:5 Row:4 grids\31.xgd
19 Col:6 Row:0 grids\09.xgd
20 Col:6 Row:1 grids\10.xgd
21 Col:6 Row:2 grids\20.xgd
22 Col:6 Row:3 grids\27.xgd
23 Col:6 Row:4 grids\32.xgd
24 Col:7 Row:1 grids\11.xgd
25 Col:7 Row:2 grids\21.xgd
26 Col:7 Row:3 grids\28.xgd
27 Col:7 Row:4 grids\33.xgd
28 Col:8 Row:1 grids\12.xgd
29 Col:8 Row:2 grids\22.xgd
30 Col:8 Row:3 grids\29.xgd
31 Col:8 Row:4 grids\34.xgd
32 Col:9 Row:1 grids\13.xgd
33 Col:9 Row:2 grids\23.xgd
34 Col:9 Row:3 grids\30.xgd
35 Col:9 Row:4 grids\35.xgd

Processed data
Stats
Max: 20.00
Min: -20.00
Std Dev: 7.39
Mean: 0.14
Median: 0.00

Processes: 4
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 DeStripe Median Sensors: All
4 Clip from -20.00 to 20.00 nT

Field B
Raw data
COMPOSITE
Filename: grids unprocessed.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Aiji Castle, Tim Dawson on 08/12/2012
Assembled by: Tim Dawson on 10/12/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 720 x 120
Survey Size (meters): 180 m x 120 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 12.04
Mean: 3.79
Median: 3.49
Composite Area: 2.16 ha
Surveyed Area: 1.4947 ha

Source Grids: 20
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\07.xgd
3 Col:0 Row:2 grids\13.xgd
4 Col:1 Row:0 grids\02.xgd
5 Col:1 Row:1 grids\08.xgd
6 Col:1 Row:2 grids\14.xgd
7 Col:2 Row:0 grids\03.xgd
8 Col:2 Row:1 grids\09.xgd
9 Col:2 Row:2 grids\15.xgd
10 Col:3 Row:0 grids\04.xgd
11 Col:3 Row:1 grids\10.xgd
12 Col:3 Row:2 grids\16.xgd
13 Col:4 Row:0 grids\05.xgd
14 Col:4 Row:1 grids\11.xgd
15 Col:4 Row:2 grids\17.xgd
16 Col:4 Row:3 grids\19.xgd
17 Col:5 Row:0 grids\06.xgd
18 Col:5 Row:1 grids\12.xgd
19 Col:5 Row:2 grids\18.xgd
20 Col:5 Row:3 grids\20.xgd

Processed data
Stats
Max: 20.00
Min: -20.00
Std Dev: 7.31
Mean: 0.39
Median: 0.00

Processes: 4
1 Base Layer
2 DeStripe Median Sensors: All
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 Clip from -20.00 to 20.00 nT

Field C
Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Marta Buczek, Tim Dawson on 11/12/2012
Assembled by: Marta Buczek on 11/12/2012
Direction of 1st Traverse: 90 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 1080 x 150
Survey Size (meters): 270 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 8.43
Mean: -1.39
Median: -1.48
Composite Area: 4.05 ha
Surveyed Area: 1.911 ha

Source Grids: 30
1 Col:0 Row:1 grids\17.xgd
2 Col:1 Row:0 grids\19.xgd
3 Col:1 Row:1 grids\18.xgd
4 Col:1 Row:2 grids\10.xgd
5 Col:1 Row:3 grids\01.xgd
6 Col:2 Row:0 grids\20.xgd
7 Col:2 Row:1 grids\21.xgd
8 Col:2 Row:2 grids\11.xgd
9 Col:2 Row:3 grids\02.xgd
10 Col:3 Row:1 grids\22.xgd
11 Col:3 Row:2 grids\12.xgd
12 Col:3 Row:3 grids\03.xgd
13 Col:4 Row:1 grids\23.xgd
14 Col:4 Row:2 grids\13.xgd
15 Col:4 Row:3 grids\04.xgd
16 Col:5 Row:0 grids\24.xgd
17 Col:5 Row:1 grids\25.xgd
18 Col:5 Row:2 grids\14.xgd
19 Col:5 Row:3 grids\05.xgd
20 Col:5 Row:4 grids\06.xgd
21 Col:6 Row:0 grids\26.xgd
22 Col:6 Row:1 grids\27.xgd
23 Col:6 Row:2 grids\15.xgd
24 Col:6 Row:3 grids\07.xgd
25 Col:6 Row:4 grids\08.xgd
26 Col:7 Row:0 grids\28.xgd
27 Col:7 Row:1 grids\29.xgd
28 Col:7 Row:2 grids\16.xgd
29 Col:7 Row:3 grids\09.xgd
30 Col:8 Row:0 grids\30.xgd

Processed data
Stats
Max: 20.00
Min: -20.00
Std Dev: 6.92
Mean: 0.27
Median: 0.00

1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 De Stagger: Grids: SubGrid (Area: Top 70, Left 480, Bottom 75, Right 599) Mode: Both By: 2 intervals
4 De Stagger: Grids: SubGrid (Area: Top 84, Left 480, Bottom 89, Right 599) Mode: Both By: -2 intervals
5 De Stagger: Grids: SubGrid (Area: Top 94, Left 480, Bottom 97, Right 599) Mode: Both By: -1 intervals
6 De Stagger: Grids: SubGrid (Area: Top 38, Left 480, Bottom 41, Right 599) Mode: Outbound By: -1 intervals
7 De Stagger: Grids: SubGrid (Area: Top 32, Left 480, Bottom 33, Right 599) Mode: Both By: -1 intervals
8 DeStripe Median Sensors: All
9 Clip from -20.00 to 20.00 nT

Field D
Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Marta Buczek, Tim Dawson on 12/12/2012
Assembled by: Tim Dawson on 12/12/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 1080 x 240
Survey Size (meters): 270 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 99.34
Min: -72.16
Std Dev: 8.14
Mean: -5.11
Median: -5.35
Composite Area: 6.48 ha
Surveyed Area: 3.3156 ha

Source Grids: 45
1 Col:0 Row:3 grids\13.xgd
2 Col:0 Row:4 grids\21.xgd
3 Col:1 Row:2 grids\07.xgd
4 Col:1 Row:3 grids\14.xgd
5 Col:1 Row:4 grids\22.xgd
6 Col:1 Row:5 grids\30.xgd
7 Col:2 Row:1 grids\01.xgd
8 Col:2 Row:2 grids\08.xgd
9 Col:2 Row:3 grids\15.xgd
10 Col:2 Row:4 grids\23.xgd
11 Col:2 Row:5 grids\31.xgd
12 Col:2 Row:6 grids\38.xgd
13 Col:3 Row:1 grids\02.xgd
14 Col:3 Row:2 grids\09.xgd
15 Col:3 Row:3 grids\16.xgd
16 Col:3 Row:4 grids\24.xgd
17 Col:3 Row:5 grids\32.xgd
18 Col:3 Row:6 grids\39.xgd
19 Col:4 Row:1 grids\03.xgd
20 Col:4 Row:2 grids\10.xgd
21 Col:4 Row:3 grids\17.xgd
22 Col:4 Row:4 grids\25.xgd
23 Col:4 Row:5 grids\33.xgd
24 Col:4 Row:6 grids\40.xgd
25 Col:5 Row:0 grids\04.xgd
26 Col:5 Row:1 grids\05.xgd
27 Col:5 Row:2 grids\11.xgd
28 Col:5 Row:3 grids\18.xgd
29 Col:5 Row:4 grids\26.xgd
30 Col:5 Row:5 grids\34.xgd
31 Col:5 Row:6 grids\41.xgd

32 Col:6 Row:1 grids\06.xgd
33 Col:6 Row:2 grids\12.xgd
34 Col:6 Row:3 grids\19.xgd
35 Col:6 Row:4 grids\27.xgd
36 Col:6 Row:5 grids\35.xgd
37 Col:6 Row:6 grids\42.xgd
38 Col:6 Row:7 grids\43.xgd
39 Col:7 Row:3 grids\20.xgd
40 Col:7 Row:4 grids\28.xgd
41 Col:7 Row:5 grids\36.xgd
42 Col:7 Row:6 grids\44.xgd
43 Col:8 Row:4 grids\29.xgd
44 Col:8 Row:5 grids\37.xgd
45 Col:8 Row:6 grids\45.xgd

Processed data
Stats
Max: 20.00
Min: -20.00
Std Dev: 6.53
Mean: 0.29
Median: 0.00

Processes: 4
1 Base Layer
2 DeStripe Median Sensors: All
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 Clip from -20.00 to 20.00 nT

Field E
Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Marta Buczek, Tim Dawson on 14/12/2012
Assembled by: Tim Dawson on 14/12/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 1080 x 150
Survey Size (meters): 270 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 6.61
Mean: 2.40
Median: 2.91
Composite Area: 4.05 ha
Surveyed Area: 2.6246 ha

Source Grids: 34
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\09.xgd
4 Col:0 Row:3 grids\18.xgd
5 Col:0 Row:4 grids\27.xgd
6 Col:1 Row:1 grids\03.xgd
7 Col:1 Row:2 grids\10.xgd
8 Col:1 Row:3 grids\19.xgd
9 Col:1 Row:4 grids\28.xgd
10 Col:2 Row:1 grids\04.xgd
11 Col:2 Row:2 grids\11.xgd
12 Col:2 Row:3 grids\20.xgd
13 Col:2 Row:4 grids\29.xgd
14 Col:3 Row:1 grids\05.xgd
15 Col:3 Row:2 grids\12.xgd
16 Col:3 Row:3 grids\21.xgd
17 Col:3 Row:4 grids\30.xgd
18 Col:4 Row:1 grids\06.xgd
19 Col:4 Row:2 grids\13.xgd
20 Col:4 Row:3 grids\22.xgd
21 Col:4 Row:4 grids\31.xgd
22 Col:5 Row:1 grids\07.xgd
23 Col:5 Row:2 grids\14.xgd
24 Col:5 Row:3 grids\23.xgd
25 Col:5 Row:4 grids\32.xgd
26 Col:6 Row:1 grids\08.xgd
27 Col:6 Row:2 grids\15.xgd
28 Col:6 Row:3 grids\24.xgd
29 Col:6 Row:4 grids\33.xgd
30 Col:7 Row:2 grids\16.xgd
31 Col:7 Row:3 grids\25.xgd
32 Col:7 Row:4 grids\34.xgd
33 Col:8 Row:2 grids\17.xgd
34 Col:8 Row:3 grids\26.xgd

Processed data
Stats
Max: 20.00
Min: -20.00
Std Dev: 4.36
Mean: 0.19
Median: 0.00

Processes: 4
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 DeStripe Median Sensors: All
4 Clip from -20.00 to 20.00 nT

Field F
Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Marta Buczek, Nicholas Dawson, Tim Dawson on 17/12/2012
Assembled by: Tim Dawson on 17/12/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 1080 x 180
Survey Size (meters): 270 m x 180 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 24.85
Mean: 0.58
Median: 0.72
Composite Area: 4.86 ha
Surveyed Area: 3.1141 ha

Source Grids: 44
1 Col:0 Row:0 grids\44.xgd
2 Col:1 Row:0 grids\43.xgd
3 Col:1 Row:1 grids\29.xgd
4 Col:1 Row:2 grids\28.xgd
5 Col:1 Row:3 grids\13.xgd
6 Col:1 Row:4 grids\01.xgd
7 Col:2 Row:0 grids\42.xgd
8 Col:2 Row:1 grids\30.xgd
9 Col:2 Row:2 grids\27.xgd
10 Col:2 Row:3 grids\14.xgd
11 Col:2 Row:4 grids\02.xgd

12 Col:2 Row:5 grids\03.xgd
13 Col:3 Row:0 grids\41.xgd
14 Col:3 Row:1 grids\31.xgd
15 Col:3 Row:2 grids\26.xgd
16 Col:3 Row:3 grids\15.xgd
17 Col:3 Row:4 grids\05.xgd
18 Col:3 Row:5 grids\04.xgd
19 Col:4 Row:0 grids\40.xgd
20 Col:4 Row:1 grids\32.xgd
21 Col:4 Row:2 grids\25.xgd
22 Col:4 Row:3 grids\16.xgd
23 Col:4 Row:4 grids\06.xgd
24 Col:4 Row:5 grids\07.xgd
25 Col:5 Row:0 grids\39.xgd
26 Col:5 Row:1 grids\33.xgd
27 Col:5 Row:2 grids\24.xgd
28 Col:5 Row:3 grids\17.xgd
29 Col:5 Row:4 grids\08.xgd
30 Col:5 Row:5 grids\09.xgd
31 Col:6 Row:0 grids\38.xgd
32 Col:6 Row:1 grids\34.xgd
33 Col:6 Row:2 grids\23.xgd
34 Col:6 Row:3 grids\18.xgd
35 Col:6 Row:4 grids\10.xgd
36 Col:7 Row:0 grids\37.xgd
37 Col:7 Row:1 grids\35.xgd
38 Col:7 Row:2 grids\22.xgd
39 Col:7 Row:3 grids\19.xgd
40 Col:7 Row:4 grids\11.xgd
41 Col:8 Row:1 grids\36.xgd
42 Col:8 Row:2 grids\21.xgd
43 Col:8 Row:3 grids\20.xgd
44 Col:8 Row:4 grids\12.xgd

Processed data

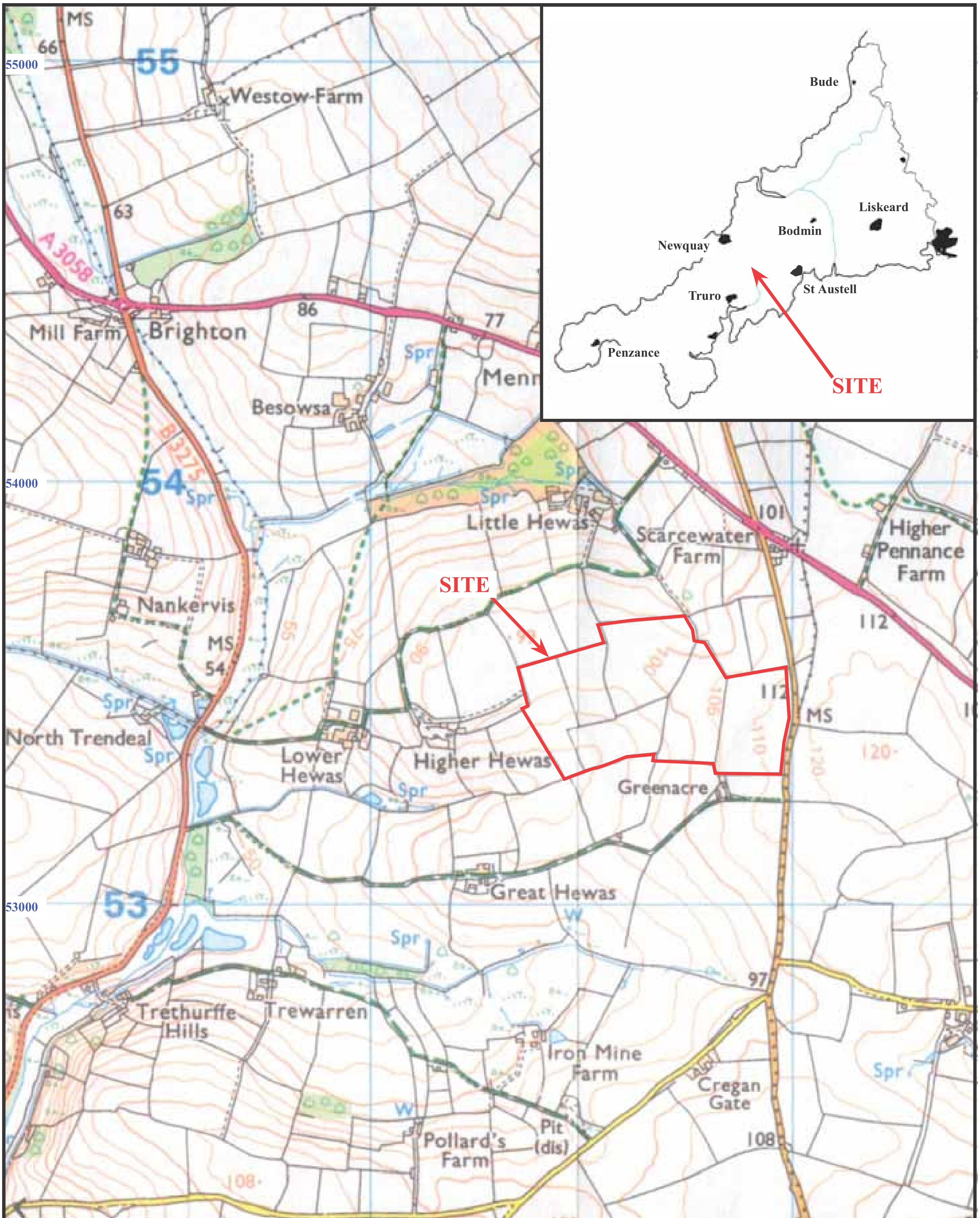
Stats
Max: 20.00
Min: -20.00
Std Dev: 7.59
Mean: 0.05
Median: -0.08

Processes: 10
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -1 intervals
3 DeStripe Median Sensors: All
4 Clip from -30.00 to 30.00 nT
5 De Stagger: Grids: All Mode: Both By: -1 intervals
6 DeStripe Median Sensors: All
7 Clip from -30.00 to 30.00 nT
8 Edge Match (Area: Top 120, Left 600, Bottom 149, Right 719) to Left edge
9 Edge Match (Area: Top 120, Left 600, Bottom 149, Right 719) to Top edge
10 Clip from -20.00 to 20.00 nT

Appendix 2. Georeferencing information

(see Fig. 2 for tie-in locations)

A1	191378.823 E	53525.129 N
A2	191433.345 E	53550.034 N
B1	191453.136 E	53557.649 N
B2	191509.566 E	53577.982 N
C1	191618.879 E	53386.267 N
C2	191676.443 E	53403.320 N
D1	191671.098 E	53557.611 N
D2	191694.696 E	53612.635 N
E1	191769.520 E	53460.127 N
E2	191829.020 E	53451.675 N
F1	191902.333 E	53444.220 N
F2	191961.752 E	53435.744 N



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Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 1. Location of site at Hewas Farm, and its location in relation to Truro, within Cornwall.

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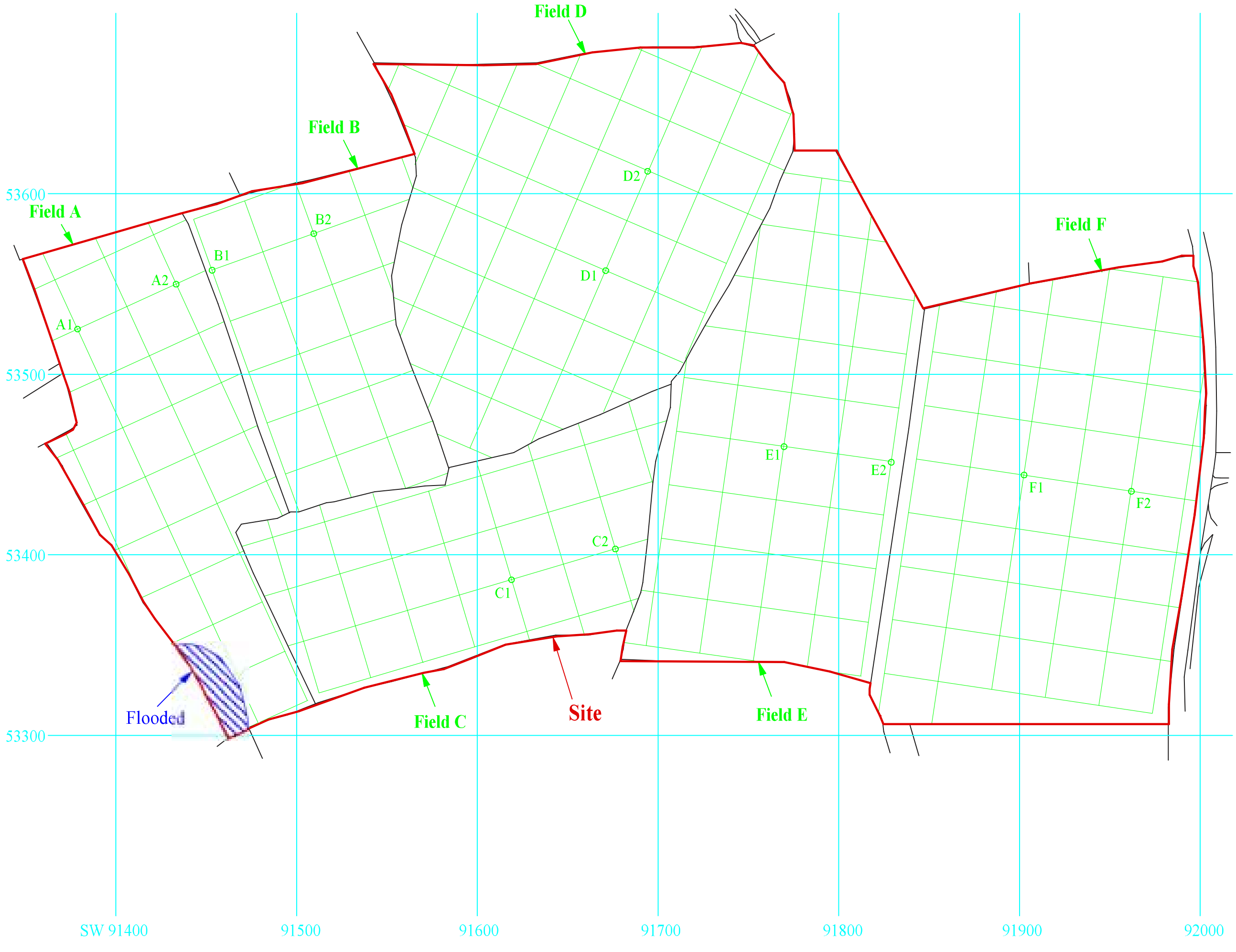

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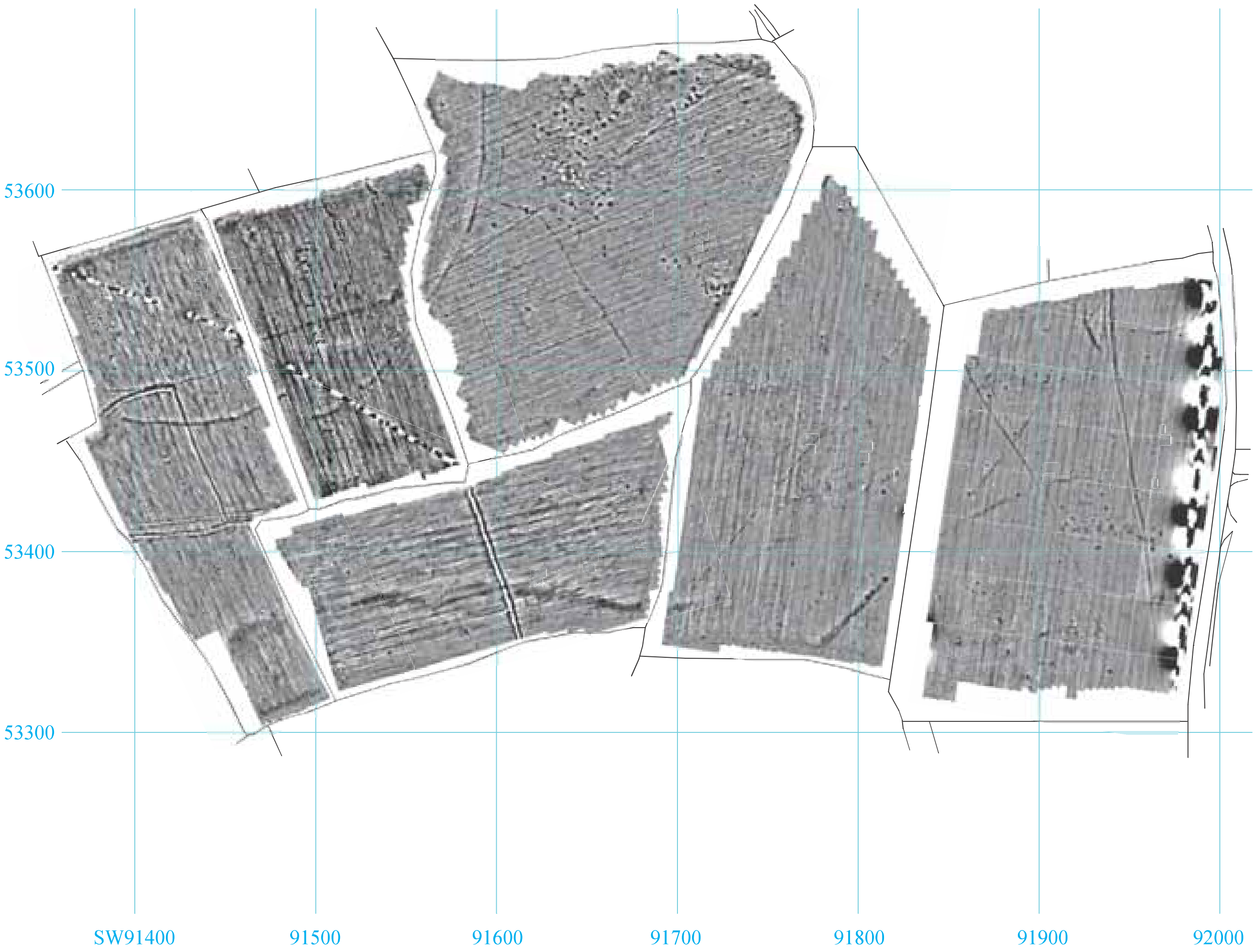
N

Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 2. Grid layout.

0 100m

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST



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N

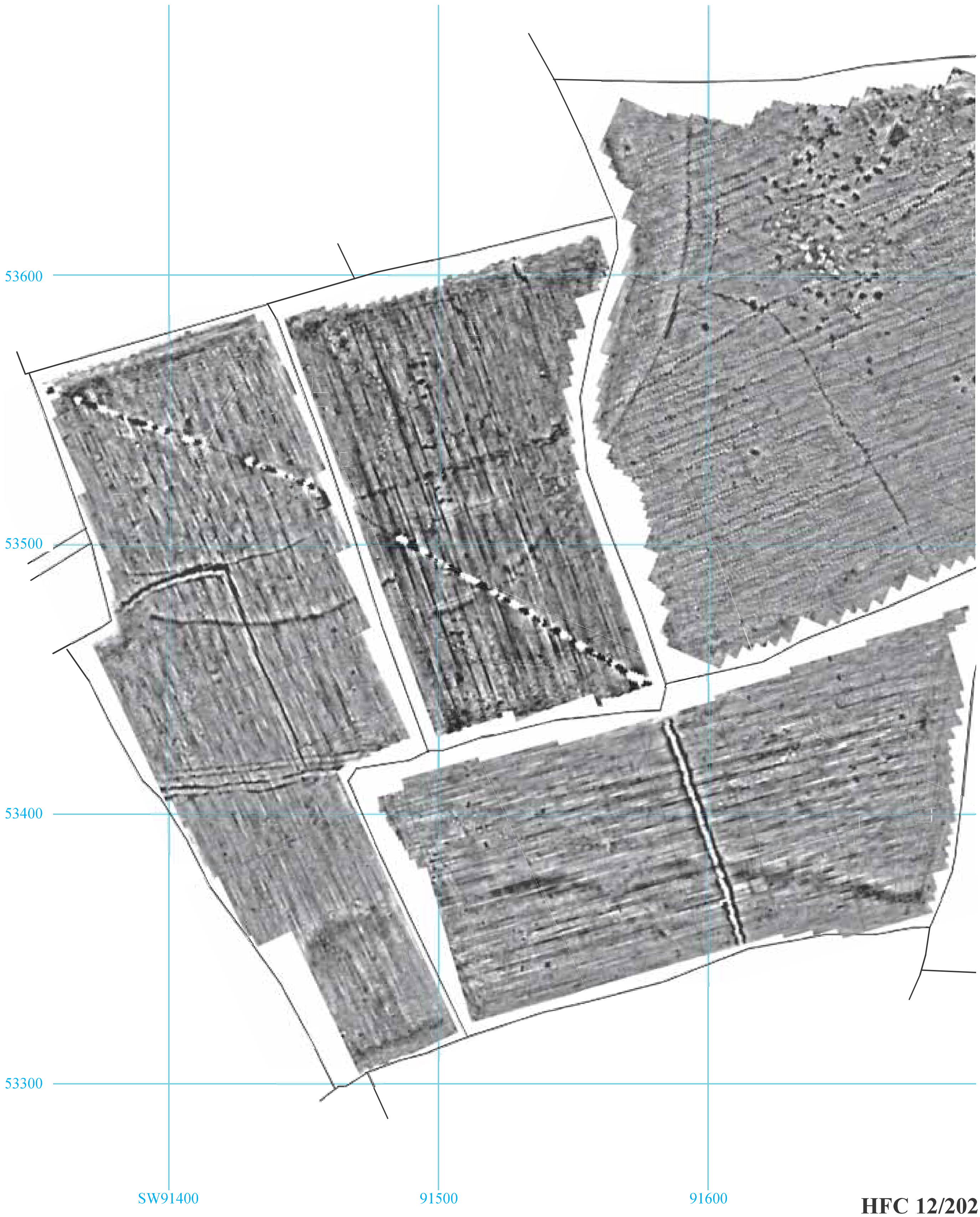
Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 3. Plot of processed data.

0m 200m

+20 nT
-20 nT

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST



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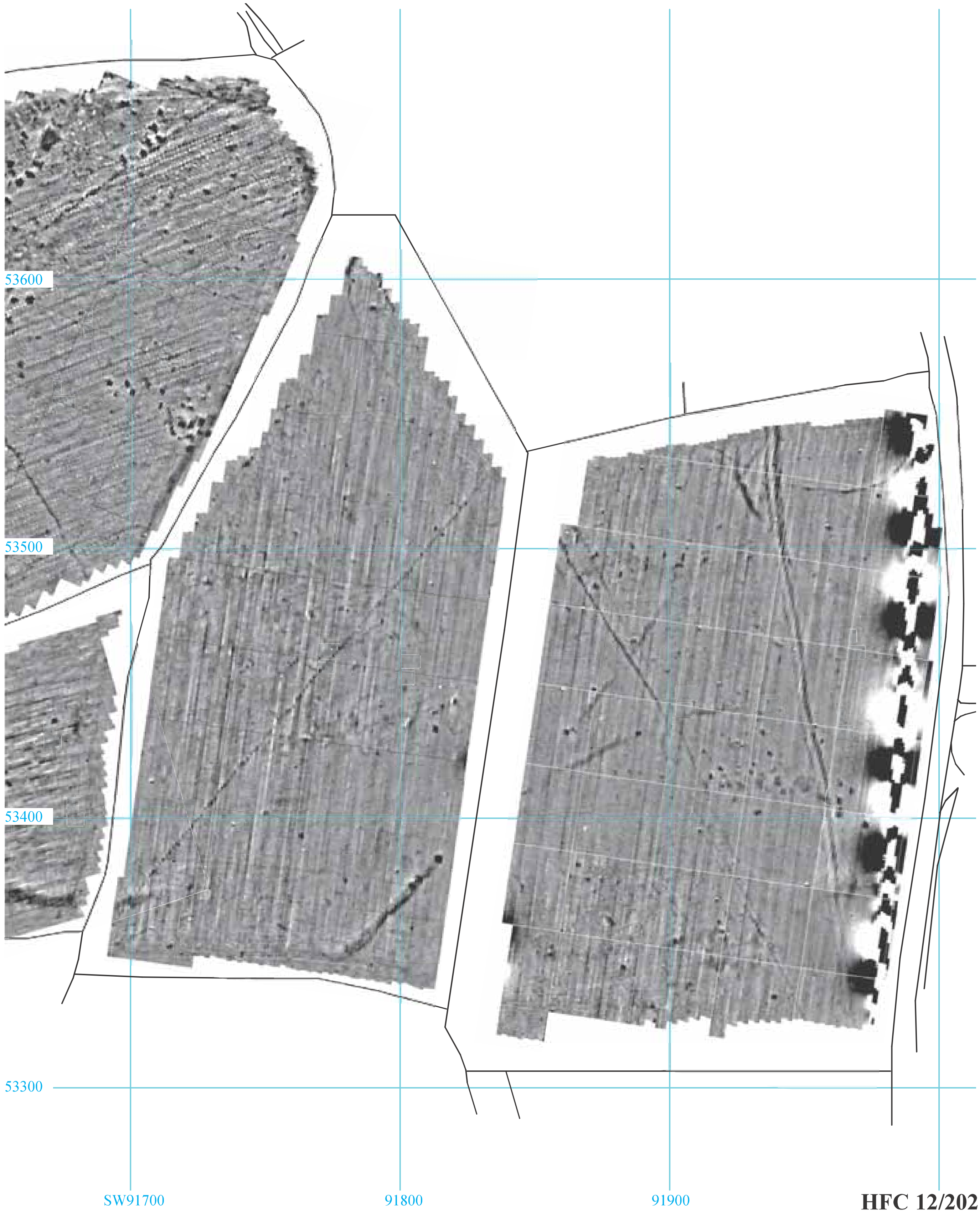
Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 4. Plot of processed data for the western half of the site.

0m 100m

+20 nT
-20 nT

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST



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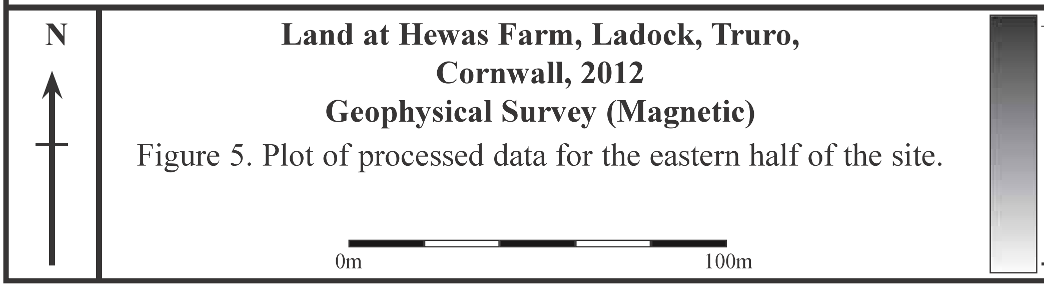
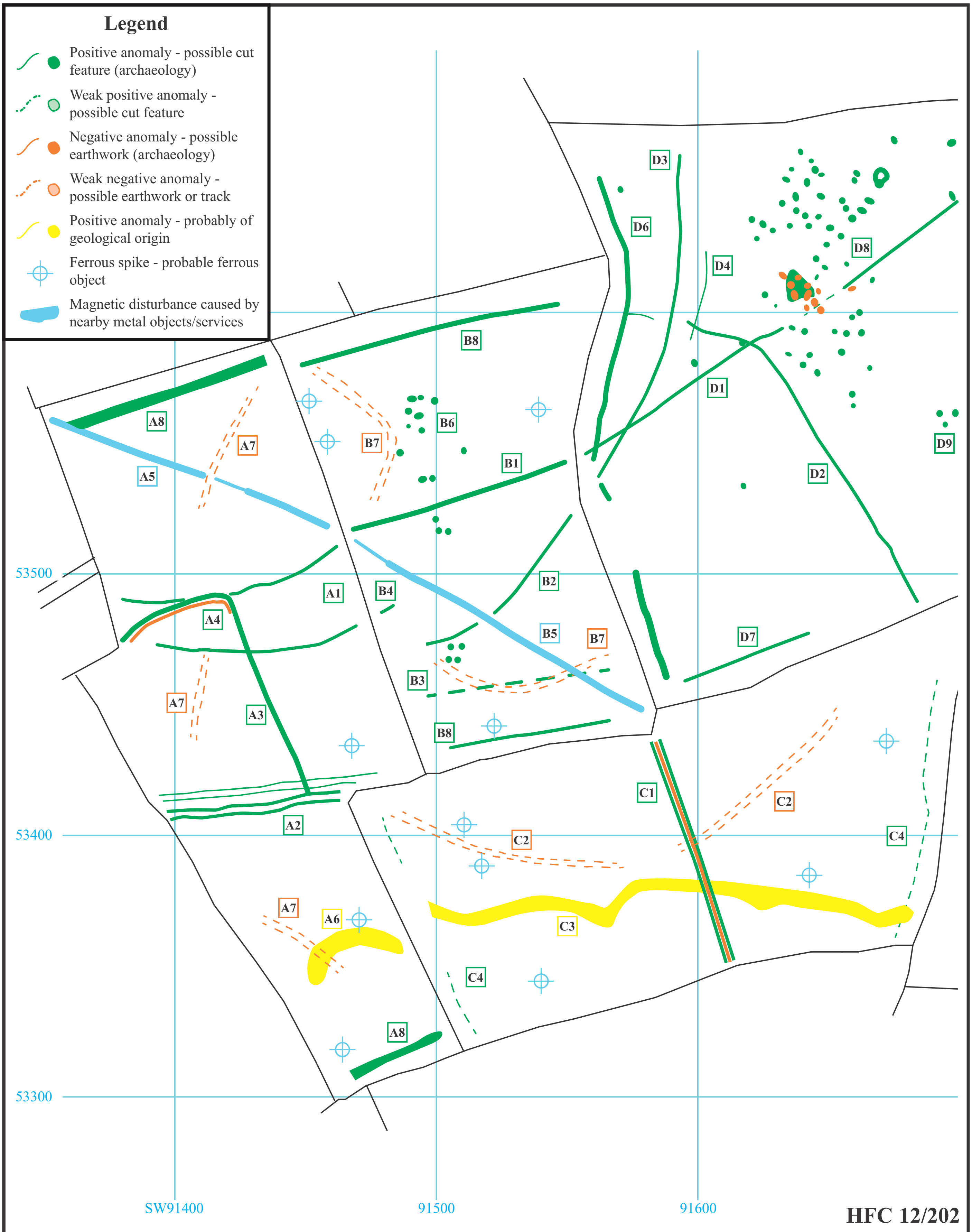
Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 5. Plot of processed data for the eastern half of the site.



THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST



N

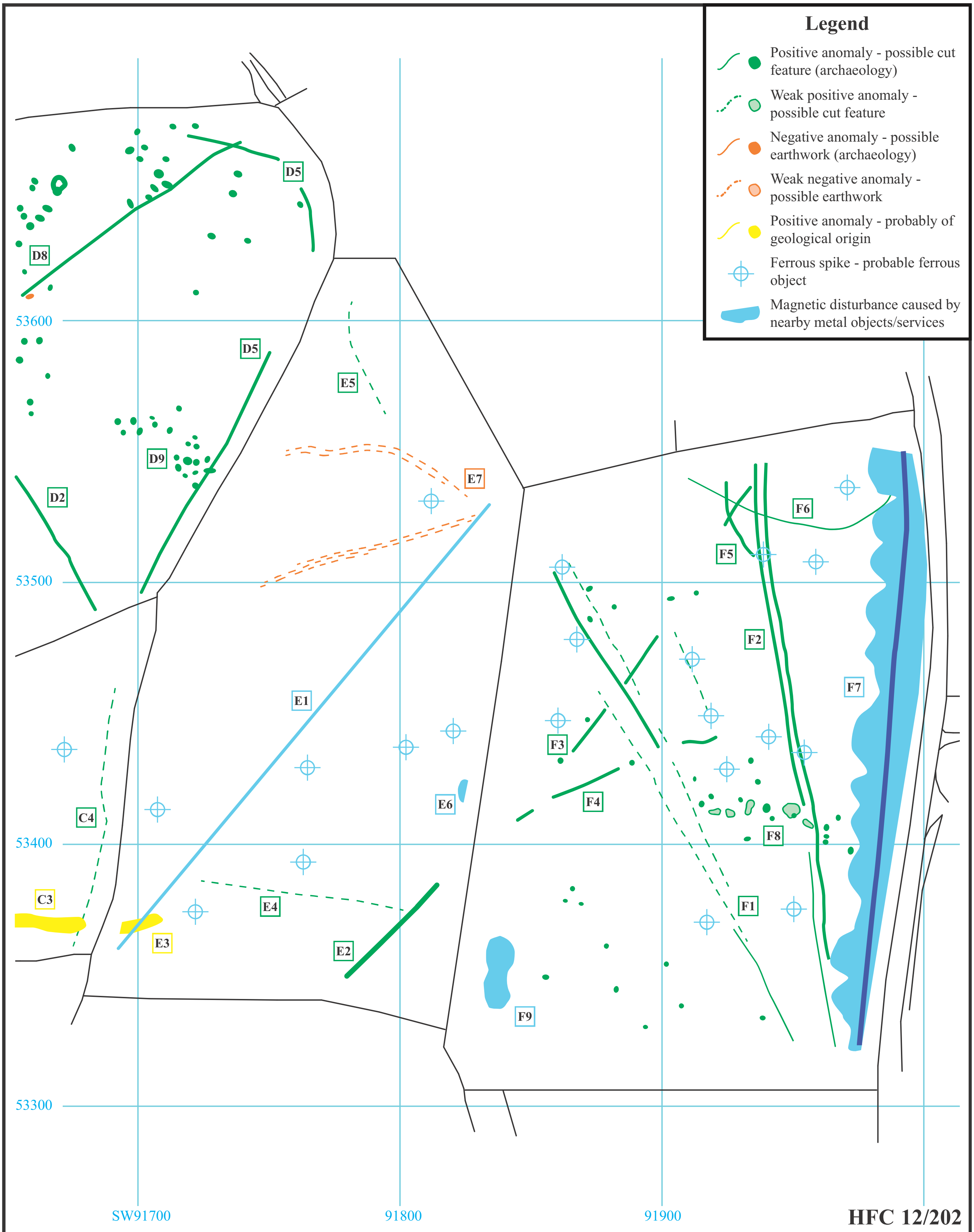
Land at Hewas Farm, Ladock, Truro, Cornwall, 2012

Geophysical Survey (Magnetic)

Figure 6. Interpretation plot for the western half of the site.

0m 100m

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST



N

Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Figure 7. Interpretation plot for the eastern half of the site.

0m 100m

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST

Plate 1. Field A in the foreground, looking southeast towards Fields C, E and F.

Plate 2. Field A in the foreground, looking east through Field B into D, E and F.

Plate 3. Field C, looking southwest with Fields A and B in the beyond.

Plate 4. Field D, looking east.

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Land at Hewas Farm, Ladock, Truro, Cornwall, 2012
Geophysical Survey (Magnetic)

Plates 1 to 4.

THAMES VALLEY ARCHAEOLOGICAL SERVICES SOUTH WEST

TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
	BC/AD
Iron Age	750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC
↓	↓

TVAS (South West),
Unit 21 Apple Business Centre,
Frobisher Way, Taunton,
Somerset, TA2 6BB

Tel: 01823 288 284
Fax: 01823 272 462
Email: southwest@tvas.co.uk
Web: www.tvas.co.uk