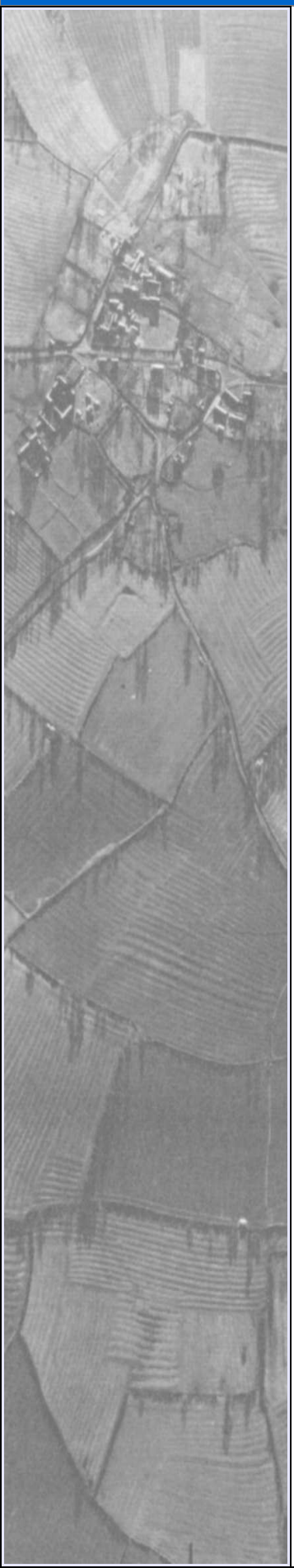

Stourscombe
Launceston
Cornwall

MAGNETOMETER SURVEY REPORT

for

Bovis Homes Ltd

Kerry Donaldson & David Sabin

September 2016

Ref. no. J683

OASIS ID: archaeol20-264273

ARCHAEOLOGICAL SURVEYS LTD

Stourscombe
Launceston
Cornwall

Magnetometer Survey Report

for

Bovis Homes Ltd

Fieldwork by David Sabin BSc (Hons) MCIfA
Report by Kerry Donaldson BSc (Hons)
Report checked by David Sabin
Primary archive location - Archaeological Surveys Ltd, Yatesbury, Wiltshire

Survey dates – 6th to 8th September 2016
Ordnance Survey Grid Reference – **SX 34360 83360**

OASIS ID: archaeol20-264273

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SUMMARY

Magnetometry was carried out by Archaeological Surveys Ltd within two pasture fields near Stourscombe, Launceston in Cornwall. The results indicate the presence of a series of enclosures at the head of a shallow combe within the eastern part of the site. A number of pits and linear features are also located within the enclosures. The movement of magnetically enhanced material downslope from the enclosures into the combe can also be seen. Elsewhere the site contains numerous weakly positive linear, rectilinear and some curvilinear responses and while these may relate to soil filled cracks within the underlying geology, some appear to extend towards and join the enclosures and cut features should be considered for some of the anomalies. Evidence of curving strip field boundaries can also be seen within the western field and these are associated with ridge and furrow cultivation. In the eastern field there are two series of ridge and furrow separated by a former field boundary.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Bovis Homes Ltd to undertake a magnetometer survey of an area of land at Stourscombe, Launceston, Cornwall. The site has been outlined for a proposed residential development and the survey forms part of an archaeological assessment of the site.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2016) and approved by Charles Johns, Senior Archaeologist for Cornwall Council, prior to commencing the fieldwork.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed prior to development of the site. The methodology is considered an efficient and effective approach to archaeological prospection.

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* and Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site lies on the south eastern edge of Launceston, to the south and west of the A388 Tavistock Road and to the north of Newton Farm. It is centred on Ordnance Survey National Grid Reference (OS NGR) SX 34360 83360, see Figs 01 and 02.

1.3.2 The area covered by the site is approximately 9ha within two pasture fields. The southern parts were very steep in places and included the bottom of a combe that could not be surveyed due to dense patches of thistle, rushes, etc. The site slopes down towards the south although the eastern field contains a very shallow dry valley with a north south orientation; its northern end lies close to the northern boundary field boundary and its southern opens out into the base of the combe that is generally orientated east west.

Plate 1: Survey Area 2 looking south

1.3.3 The base of the combe contained some evidence of recent dumping and/or dilapidated agricultural machinery. Some possible soil dumping may also have occurred. The north western corner of the site contained bales, fencing and other steel objects. Construction activity immediately west of the site boundary presented several additional sources of magnetic disturbance.

1.3.4 With the exception of the base of the combe, the ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Weather conditions during the survey were mainly fine and considered unlikely to influence the sensors.

1.4 Site history and archaeological potential

1.4.1 The Cornwall and Scilly Historic Environment Record (HER) indicates that there are no designated heritage assets within the site. A medieval strip field system has been recorded within the western half of the site, with first mention in 1478 (MCO22627). Two geophysical surveys have been conducted 160m to the west (Archaeological Surveys, 2010) and within land immediately to the west (ArchaeoPhysica, 2013), although the responses appear to relate to the underlying geology, former field boundaries and agricultural activity, rather than to features with archaeological potential.

1.4.2 It is possible that the survey will locate former field boundaries related to further medieval strip fields and there is always potential for the survey to locate previously unrecorded archaeological features should they be present within the site.

1.5 Geology and soils

1.5.1 The underlying solid geology across the site is interbedded mudstone and sandstone from the Crackington Formation (BGS, 2016).

1.5.2 The overlying soil across the survey area is from the Denbigh 2 association and is a typical brown earth. It consists of a well drained, fine, loamy soil over slate or slate rubble (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry survey carried out across similar soils has produced good results; however, naturally formed features within the geology are often present and it may not be possible to confidently separate them from other anomalies of anthropogenic origin. The underlying geology and soils are considered acceptable for magnetic survey.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording data between 0.1nT and 10,000nT. The sensors are not zeroed in the field, as the vertical axis alignment is fixed using a tension band system. In order to produce visible, useful greyscale images a zero median traverse process is undertaken in TerraSurveyor. The system is linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged computer.

2.2.2 Data are collected along a series of parallel survey tracks wherever possible. The length of each track is variable and relates to the size of the survey area and other factors including ground conditions. A visual display aids accurate placing of tracks and their separation.

2.2.3 Data are not collected within fixed grids and data points are considered to be random even though the data are collected in a systematic manner covering all accessible areas (Aspinall, Gaffney and Schmidt, 2009).

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display using TerraSurveyor.

2.3.2 The data are collected between limits of ±10000nT and clipped for display at ±15nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track. A zero median traverse function is required in order to remove fixed offset values present within the sensors which do not undergo a zeroing procedure in the field. The approach ensures that the gradiometer sensors are very accurately aligned and fixed to the vertical magnetic field and are not influenced by localised magnetic fields or disturbed by vibration. Although a zero median traverse algorithm can remove anomalies aligned with the survey tracks, in practice this rarely occurs due to the use of long traverses, high resolution measurement and variability within

the magnetic susceptibility of long linear features.

2.3.3 Appendix C contains metadata concerning the survey and data attributes and is derived directly from TerraSurveyor. Reference should be made to Appendix B for further information on any processes, such as clipping, carried out on the data.

2.3.4 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot.

2.3.5 The raster images are combined with base mapping using ProgeCAD Professional 2014, creating DWG (2010) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.

2.3.6 An abstraction and interpretation is also drawn and plotted for all geophysical anomalies located by the survey. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.7 A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area.

2.3.8 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model derived from Environment Agency LiDAR data and created using Surfer 10.

2.3.9 A digital archive is produced with this report, see Appendix D below. The main archive is held at the offices of Archaeological Surveys Ltd.

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of two survey areas covering approximately 8ha within the 9ha site.

3.1.2 Magnetic anomalies located can be generally classified as positive responses of archaeological potential, positive and negative anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin and strong discrete dipolar anomalies relating to ferrous objects. Anomalies located within each survey area have been numbered and are described in 3.4 & 3.5.

3.2 Statement of data quality

3.2.1 Data are considered representative of the magnetic anomalies present within the site. There are no significant defects within the dataset.

3.2.2 The data do appear to contain localised anomalies related to natural features. These are caused by colluviation within the shallow north south valley in the eastern part of the site, although this may in part be influenced by anthropogenic activity, and possible narrow fissures in the shallow solid geology in other parts of the site.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, a basic key is indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY AS-ABST MAG POS ARCHAEOLOGY AS-ABST MAG POS ENCLOSURE	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG BOUNDARY	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL AS-ABST MAG RIDGE AND FURROW	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.

Anomalies associated with magnetic debris AS-ABST MAG STRONG DIPOLAR	Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a natural origin AS-ABST MAG NATURAL FEATURES	Naturally formed magnetic anomalies are are caused by localised variability in the magnetic susceptibility of soils, subsoils and other drift or solid geologies. Anomalies may be amorphous, linear or curvilinear and may appear 'fluvial' or discrete; the latter are almost impossible to distinguished from pit-like anomalies with an anthropogenic origin. Fluvial, glacial, periglacial and pedological processes may be responsible for their formation within drift material and subsoil. Igneous and metamorphic activity can lead to anomalies within more solid geology.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 234305 83335, see Figs 03 & 04.

Anomalies with an uncertain origin

(1) - The survey area contains a number of weakly positive linear and rectilinear anomalies, with the majority located in the central and northern parts. They do not have a coherent morphology, pattern or orientation and while the response could indicate cut features, it may also indicate that they relate to soil filled cracks and joints within the underlying geology.

(2) - A group of weakly positive linear, rectilinear and curvilinear responses located in the north western corner. It is possible that they relate to natural features, but an anthropogenic origin should be considered.

(3) - Located in the south western corner of the survey area a small number of positive and negative linear anomalies. It is not possible to determine their origin.

Anomalies associated with land management

(4) - Broad, parallel positive and negative anomaly in the south western part of the survey area relates to a field boundary bank which continues into Area 2 as anomaly (14).

(5) - Curving linear anomalies relate to former strip fields which are likely to date to the medieval period. These exist as low banks within the field and are similar to those previously recorded to the west.

(6) - Linear anomaly relating to a field boundary inserted and then removed in the late 20th century.

Anomalies with an agricultural origin

(7) - Linear anomalies parallel with anomalies (5) relate to former ridge and furrow cultivation within the strip fields.

(8 & 9) - Anomalies indicating two series of modern cultivation.

Anomalies associated with magnetic debris

(10) - Strong, discrete, dipolar anomalies relate to buried ferrous objects.

3.5 List of anomalies - Area 2

Area centred on OS NGR 234455 83335, see Figs 03 - 06.

Anomalies of archaeological potential

(11) - Located in the north eastern corner of the survey area are a group of sub-rectilinear enclosures. They are situated at the head of a shallow combe that is orientated north south.

(12) - A number of positive linear and discrete anomalies are located primarily within the confines of anomaly (11), although several are situated outside. They are likely to relate to linear and pit-like features of archaeological potential.

Anomalies with an uncertain origin

(13) - A group of discrete positive responses and linear anomalies are located immediately east of anomaly (11). It is possible that they relate to further archaeological features.

(14) - A number of positive linear and possible rectilinear anomalies are located primarily within the north western part of the site. Several of them appear to join anomaly (11) which may indicate they relate to cut features of archaeological potential; however, it is possible that they are associated with anomalies (1) located immediately to the west.

(15) - A sinuous positive response is located to the south east of anomaly (11) and corresponds to the higher ground at the edge of the shallow valley or combe. It is not certain if it has been formed through colluviation, or if it has an anthropogenic origin.

Anomalies associated with land management

(16) - A positive and negative anomaly along the southern edge of the survey area is a continuation of linear boundary (4).

(17) - Linear anomalies appear to relate to a former field boundary which separates two series of agricultural anomalies with different orientations (18 & 19).

Anomalies with an agricultural origin

(18) - A series of parallel linear anomalies in the northern part of the survey area appear to relate to former ridge and furrow. There is evidence that they truncate small sections of (11).

(19) - Parallel linear anomalies in the southern part of the survey area appear to relate to ridge and furrow, parallel with anomaly (17).

Anomalies associated with magnetic debris

(20) - Linear anomalies associated with more recent agricultural practices.

Anomalies with a natural origin

(21) - Sinuous positive response is located towards the base of the shallow north south combe in the eastern part of the field. It appears to have been formed by the process of colluviation, but the magnetically enhanced soil may have been derived from the archaeological features to the north.

4 CONCLUSION

4.1.1 The detailed magnetometry survey has located a number of linear, rectilinear and discrete responses in the north eastern corner of the site that appear to relate to a series of sub-rectilinear enclosures containing a number of pits and other linear cut features. The enclosures are situated at the head of a shallow combe or valley within the eastern part of the site, and natural processes appear to have transported magnetically enhanced material downslope.

4.1.2 A number of weakly positive linear, rectilinear and curvilinear linear anomalies have been located throughout the site, but with the majority in the northern half. These are fragmented, indistinct and lack a coherent morphology, preventing confident interpretation, and a natural origin should be considered. Some, however, do extend towards and appear to join the enclosures, and cut features of archaeological potential cannot be dismissed.

4.1.3 A number of field boundaries have also been located. Within the western part of the site these correspond to low linear banks and relate to former strip fields, similar to those previously recorded immediately to the west. In the eastern part of the site a former boundary also relates to a low mound separating two series of ridge and furrow with different orientations.

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Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The SENSYS gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 65cm apart. The instrument is carried about 10-20cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±15nT and ±10nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero (destripe) Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise differences between the baseline value of gradiometer sensors.

High Pass Filtering

A mathematical process used to remove low frequency anomalies relating to survey tracks and modern agricultural features.

Appendix C – survey and data information

Area 1

Filename: J683-mag-Area1-proc.xcp
Description: Imported as Composite from: J683-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 234207.930080954, 83516.6880687993 m
Southeast corner: 234409.830080954, 83144.8380687993 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 1301800

Dimensions
Composite Size (readings): 1346 x 2479
Survey Size (meters): 202 m x 372 m
Grid Size: 202 m x 372 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 16.58
Min: -16.50
Std Dev: 3.54
Mean: 0.19
Median: 0.01
Composite Area: 7.5077 ha
Surveyed Area: 4.1501 ha

PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0

Processes: 1
1 Base Layer

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -15.00 to 15.00 nT

Area 2

Filename: J683-mag-Area2-proc.xcp
Description: Imported as Composite from: J683-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 234369.25272428, 83467.3645285183 m
Southeast corner: 234540.25272428, 83216.5645285183 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 963800

Dimensions
Composite Size (readings): 1140 x 1672
Survey Size (meters): 171 m x 251 m
Grid Size: 171 m x 251 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 16.58
Min: -16.50
Std Dev: 4.59
Mean: 0.24
Median: 0.03
Composite Area: 4.2887 ha
Surveyed Area: 3.0926 ha

Processes: 1
1 Base Layer

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -15.00 to 15.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire. Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

A PDF copy will be supplied to the Cornwall and Scilly Historic Environment Record with printed copies on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data - path: J683 Launceston\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
Launc1\MX\.prm,.dgb,.disp Launc2\MX\.prm,.dgb,.disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	06/09/16 08/09/16	D.J.Sabin
Launc1\MX\J683-mag-Area1.asc Launc2\MX\J683-mag-Area2.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey area in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	12/09/16	K.T.Donaldson
Area1\comps\J683-mag-Area1.xcp Area2\comps\J683-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	12/09/16	K.T.Donaldson
Area1\comps\J683-mag-Area1-proc.xcp Area2\comps\J683-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±15nT).	12/09/16	K.T.Donaldson
Graphic data - path: J683 Launceston\Data				
Area1\graphics\ J683-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±15nT.	12/09/16	K.T.Donaldson
Area1\graphics\ J683-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	12/09/16	K.T.Donaldson
Area2\graphics\ J683-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±15nT.	12/09/16	K.T.Donaldson
Area2\graphics\ J683-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	12/09/16	K.T.Donaldson
CAD data - path: J683 Launceston\CAD				
J683 version 2.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	12/09/16	K.T.Donaldson
Text data - path: J683 Launceston Documentation				
J683 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	19/09/16	K.T.Donaldson

Appendix E – copyright and intellectual property

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Appendix F – OASIS data collection form

OASIS ID: archaeol20-264273

Project details

Project name	Stourscombe, Launceston, Cornwall, Magnetometer Survey Report
Short description of the project	Magnetometry was carried out by Archaeological Surveys Ltd within two pasture fields near Stourscombe, Launceston in Cornwall. The results indicate the presence of a series of enclosures at the head of a shallow combe within the eastern part of the site. A number of pits and linear features are also located within the enclosures. The movement of magnetically enhanced material downslope from the enclosures into the combe can also be seen. Elsewhere the site contains numerous weakly positive linear, rectilinear and some curvilinear responses and while these may relate to soil filled cracks within the underlying geology, some appear to extend towards and join the enclosures and cut features should be considered for some of the anomalies. Evidence of curving strip field boundaries can also be seen within the western field and these are associated with ridge and furrow cultivation. In the eastern field there are two series of ridge and furrow separated by a former field boundary.
Project dates	Start: 06-09-2016 End: 08-09-2016
Previous/future work	Not known / Not known
Any associated project reference codes	J683 - Contracting Unit No.
Type of project	Field evaluation
Monument type	ENCLOSURE Uncertain
Monument type	DITCH Uncertain
Monument type	PIT Uncertain
Monument type	BOUNDARY Medieval
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology	UPPER CARBONIFEROUS UNDIFFERENTIATED
Drift geology (other)	None
Techniques	Magnetometry

Project location

Country	England
Site location	CORNWALL NORTH CORNWALL LAUNCESTON Stourscombe, Launceston, Cornwall
Study area	9 Hectares
Site coordinates	SX 34360 83360 50.625762537299 -4.342132552804 50 37 32 N 004 20 31 W Point

Project creators

Name of Organisation	Archaeological Surveys Ltd
Project brief originator	Archaeological Surveys Ltd
Project design originator	Archaeological Surveys Ltd
Project director/manager	Archaeological Surveys Ltd
Project supervisor	Archaeological Surveys Ltd

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Archaeological Surveys Ltd
Digital Contents	"Survey"
Digital Media available	"Images raster / digital photography","Images vector","Text","Geophysics"
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Stourscombe, Launceston, Cornwall, Magnetometer Survey Report
Author(s)/Editor(s)	Donaldson, K. and Sabin, D.
Other bibliographic details	Report ref J683
Date	2016
Issuer or publisher	Archaeological Surveys Ltd
Place of issue or publication	Yatesbury

Entered by	Kerry Donaldson (kerry.donaldson@archaeological-surveys.co.uk)
Entered on	30 September 2016

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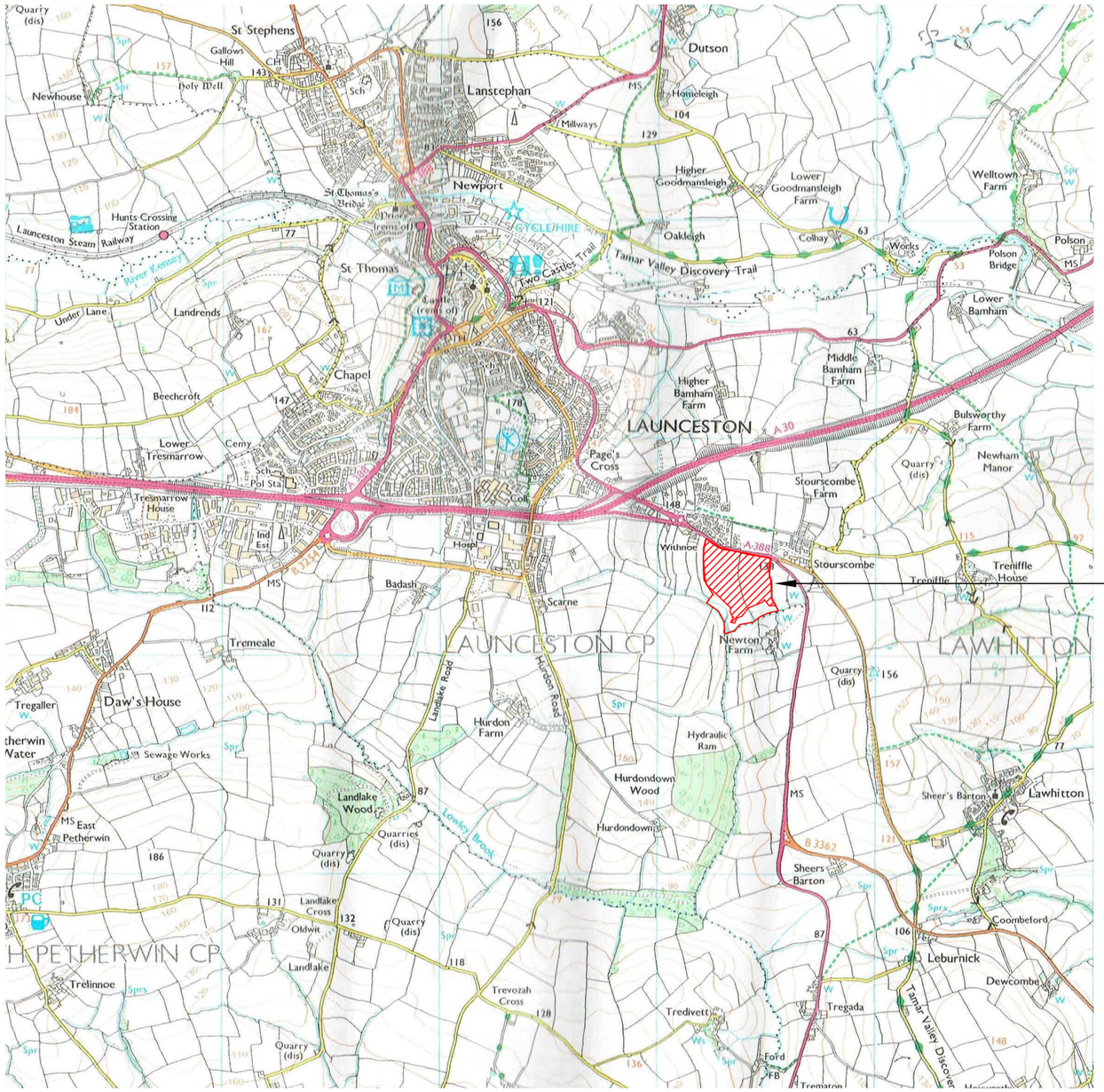
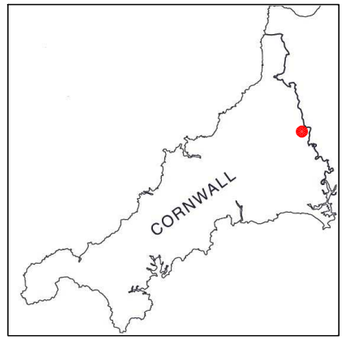
Map of survey area



Survey location



Survey location

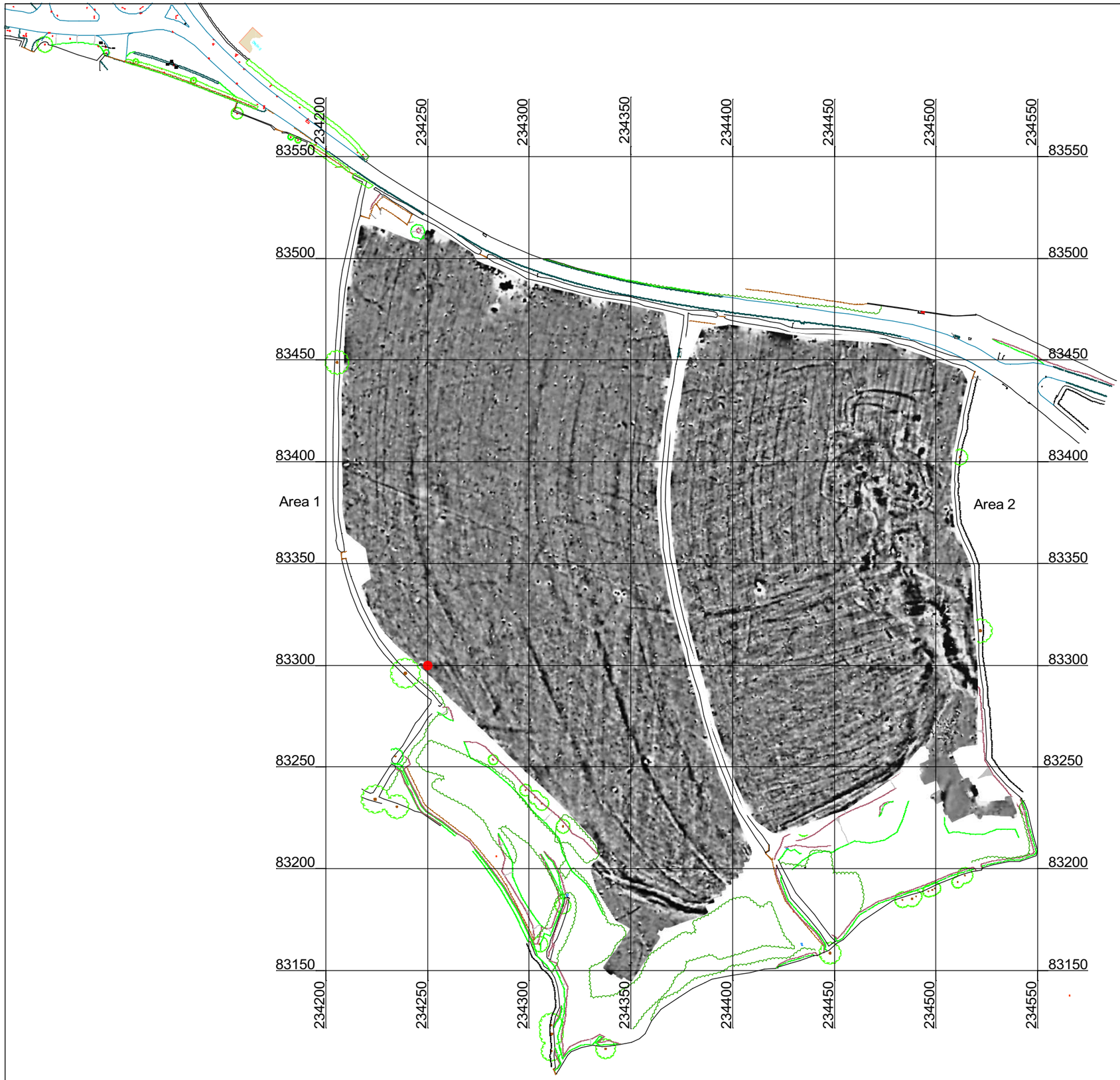
Site centred on OS NGR
SX 34360 83360

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



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Referencing information

Referencing grid to OSGB36 datum at 50m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

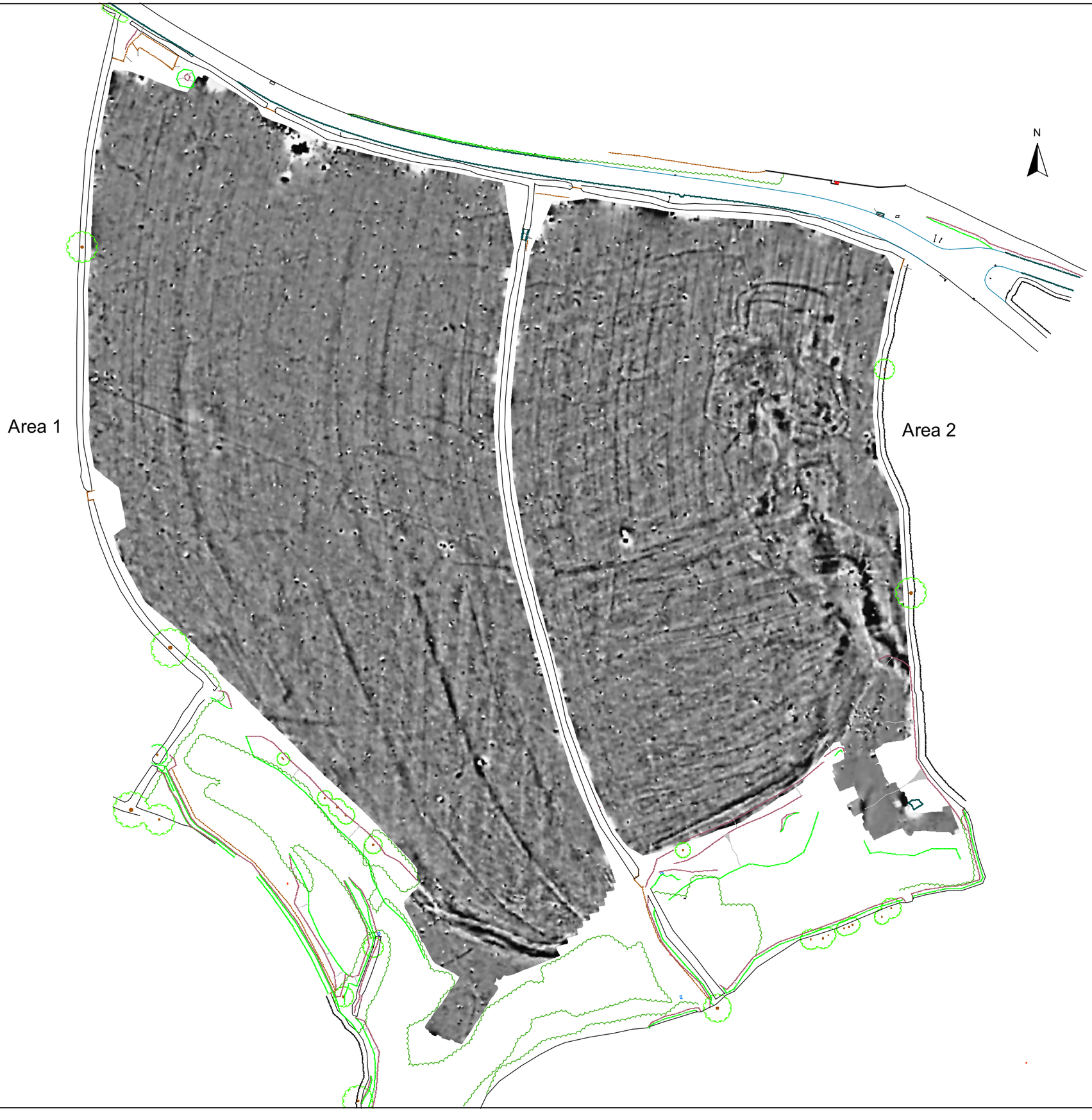
● 234250 83300

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 02



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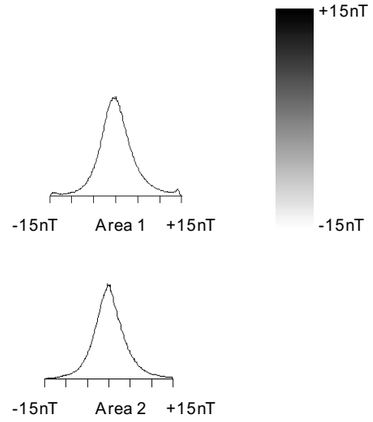
Greyscale plot of minimally processed magnetometer data



SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 03

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Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Positive rectilinear/curvilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Linear anomaly - of agricultural origin
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Positive/negative anomaly - field boundary
- Positive anomaly - magnetically enhanced material
- Positive magnetic response - colluvium
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04

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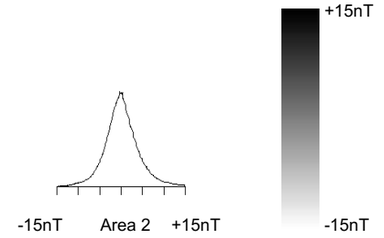
Greyscale plot of minimally processed magnetometer data - Area 2



Area 2

N

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05

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Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Positive rectilinear/curvilinear anomaly - enclosure ditch
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Linear anomaly - of agricultural origin
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Positive/negative anomaly - field boundary
- Positive anomaly - magnetically enhanced material
- Positive magnetic response - colluvium
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

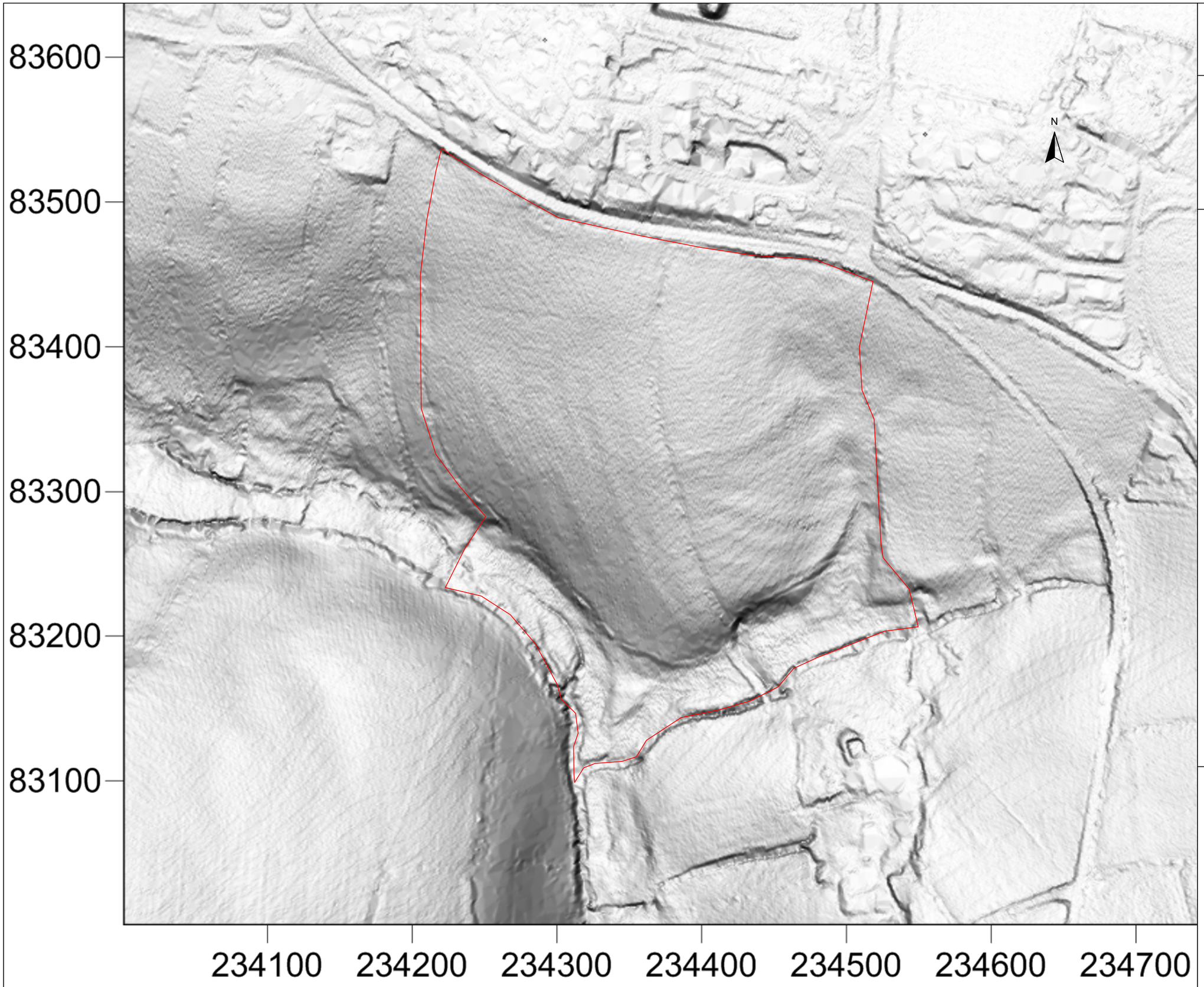
SCALE TRUE AT A3

FIG 06

Area 2

N

1 5 6 8 9 10 11 12 13 14 15 16 17 18 19 20 21



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Digital Terrain Model

Derived from Environment Agency's LiDAR data 1m resolution

SCALE 1:2500

0m 50 100m

SCALE TRUE AT A3

FIG 07