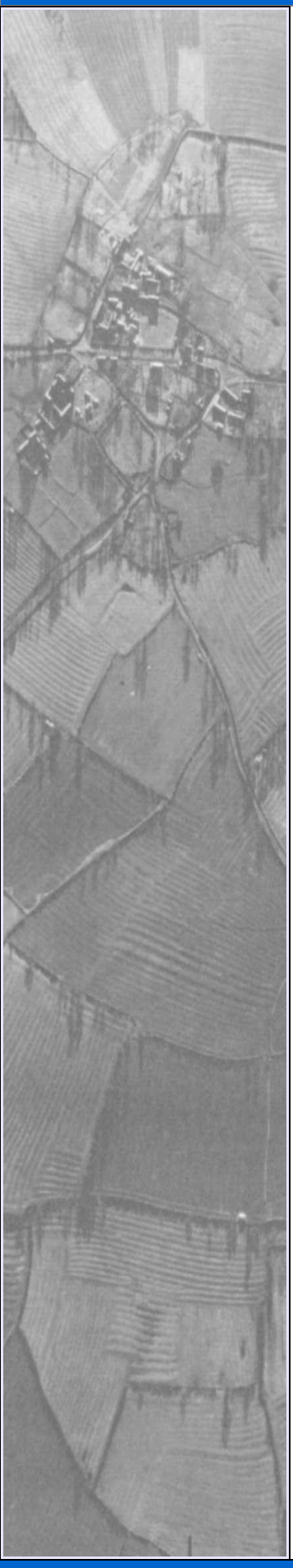

Land adjacent to Hanborough Station
Long Hanborough
Oxfordshire

MAGNETOMETER SURVEY REPORT

for

Orion Heritage Ltd

Kerry Donaldson & David Sabin

September 2015

Ref. no. 629

ARCHAEOLOGICAL SURVEYS LTD

Land adjacent to Hanborough Station
Long Hanborough
Oxfordshire

Magnetometer Survey Report

for

Orion Heritage Ltd

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

Survey dates – 10th & 14th September
Ordnance Survey Grid Reference – **SP 43220 14140**

Archaeological Surveys Ltd
1 West Nolands, Nolands Road, Yatesbury, Calne, Wiltshire, SN11 8YD
Tel: 01249 814231 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

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SUMMARY

A detailed magnetometer survey was carried out by Archaeological Surveys Ltd, at the request of Orion Heritage Ltd, within an area of land to the south of Hanborough Station in Oxfordshire. The results of the survey indicate zones of magnetically variable responses, that appear to relate to naturally formed features. A number of weakly positive linear and some negative linear responses have been located; however, it is not possible to determine if they relate to cut features. Several clusters and a small number of isolated discrete positive responses have also been located. These have a stronger response than the majority of the natural features, and while they may too have a natural origin, it should be considered that they may relate to cut, pit-like features. Evidence for ridge and furrow and also a series of possible land drains has also been located.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Orion Heritage Ltd to undertake a magnetometer survey of an area of land adjacent to Hanborough Station in Oxfordshire. The site has been outlined for a proposed new access road from the A4095 Main Road and a residential development with associated infrastructure. 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 (2015) and issued to Hugh Coddington, Principle Archaeologist at Oxfordshire County Council by Rob Bourn of Orion Heritage, 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 is located on land to the south of Hanborough Station and the railway line at Long Hanborough in Oxfordshire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SP 43220 14140, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 5.5ha of agricultural land within a large arable field which contained stubble and a smaller area of pasture land, split into two sections by fencing. Generally the land slopes down gently towards the south and south east.

Plate 1: Survey Area 1 looking towards the south east

1.3.3 The ground conditions across the site were generally considered to be suitable for the collection of magnetometry data. The south western part of Area 1 contain numerous ruts, and Area 2 was covered in ant hills that resulted in very uneven ground. Weather conditions during the survey were fine and warm.

1.4 Site history and archaeological potential

1.4.1 A Heritage Desk-Based Assessment has been carried out by Orion Heritage (2015), which outlines that there are no designated or undesignated heritage assets within the site. In the wider vicinity there are a small number of prehistoric sites and findspots and a Roman villa 1.2km to the north west and a possible Roman settlement 1.1km to the south west. The site was away from the medieval core of the nearby villages and the field boundaries have remained unchanged since the 1876 Ordnance Survey map. The site lies south of the Blenheim Palace World Heritage Site, which includes the Palace

built between 1705 and 1722 and the Park designed by Lancelot 'Capability' Brown, which is 300m to the north of the site.

1.4.2 Although there are a lack of heritage assets directly within the site, the location of prehistoric and Roman sites and findspots within the wider vicinity may indicate that there is some potential that the geophysical survey may locate previously unrecorded archaeological remains, should they be present within the site.

1.5 Geology and soils

1.5.1 The underlying solid geology within the eastern part of the site is Cornbrash, with Kellaways Clay Member in the west (BGS, 2015). Although no superficial deposits are mapped, site observations indicate the presence of many quartzite pebbles, suggesting that a thin layer of Quaternary material overlies the solid geology.

1.5.2 The overlying soil above the Cornbrash is from the Elmton 3 association, which is a brown rendzina and consists of a well drained, calcareous silty soil. The soil above the Kellaways Clay is from the Denchworth association, which is a pelo-stagnogley and consists of a slowly permeable, seasonally waterlogged clayey soil (Soil Survey of England and Wales, 1983).

1.5.3 Magnetometry survey carried out across similar soils has produced good results, although there can be low magnetic susceptibility on pelo-stagnogley soils. However, where there has been long term occupation there can be sufficient magnetic contrast for features to be recorded in the data. 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 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 ±5nT. 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 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 5.5ha.

3.1.2 Magnetic anomalies located can be generally classified as positive and negative anomalies of an uncertain origin, linear anomalies of an agricultural origin, anomalies associated with land management, anomalies with a natural origin, areas of magnetic disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines. Anomalies located within each survey area have been numbered and are described in 3.4 and 3.5 below.

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.

3.3 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 an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE 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 LAND DRAIN	Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies.
Anomalies with an agricultural origin 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 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 and periglacial processes may be responsible for their formation within drift material and subsoil.
Anomalies associated with magnetic debris AS-ABST MAG STRONG DIPOLAR	Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies associated with magnetic disturbance AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 443262 214121, see Figures 03 & 04.

Anomalies with an uncertain origin

(1) - A group of discrete positive anomalies is located in the south western corner of the site. Although these may relate to naturally formed features, they are generally stronger at 4-8nT and more distinct than the natural features (10), and an anthropogenic origin cannot be ruled out.

(2) - Located in the north eastern corner of the site is a cluster of discrete positive responses. Some are elongated ovals, others curved or more circular. They have a response of 15nT, with some peaking at over 40nT. While a natural origin is possible, it should be considered that these relate to cut features with a magnetically enhanced fill or they may have some association with burning.

(3) - A number of discrete positive responses and a curvilinear anomaly are located adjacent to the southern edge of the survey area. It is possible that they relate to natural features, but this is not certain.

(4) - A partly positive and partly negative linear anomaly extends across the eastern part of the survey area. It is parallel with the eastern and western field boundaries; however, it is not possible to ascertain if it has a natural or anthropogenic origin.

(5) - Several positive linear anomalies can be seen in the south eastern part of the site. It is not possible to determine their origin.

(6 & 7) - A fragmented, sinuous, positive linear anomaly is located within the north western part of the survey area. It appears to bound a zone of possible naturally formed responses (10); however, a number of positive linear anomalies appear to extend towards it from the south east (7).

Anomalies associated with land management

(8) - A series of weakly positive linear anomalies are located in the south western corner of the survey area and are oriented north north east to south south west. They appear to relate to land drains.

Anomalies with an agricultural origin

(9) - A series of parallel linear anomalies are situated in the south western part of the survey area and oriented north west to south east. This type of response indicates ridge and furrow.

Anomalies associated with natural features

(10 & 11) - The survey area contains two distinct zones of magnetically variable

responses. In the east the zone contains numerous weakly positive discrete anomalies with a response of generally 2-3nT. In the north west, this zone contains more positive linear responses. The appearance of the anomalies, lacking a coherent morphology or pattern, suggests that they relate to naturally formed features.

Anomalies associated with magnetic debris

(12) - The site contains a number of strong, discrete, dipolar anomalies which are a response to ferrous and other magnetically thermoremnant objects within the topsoil.

Anomalies associated with magnetic disturbance

(13) - The south eastern corner of the site has been affected by very strongly magnetic material adjacent to it. Modern dumped material was noted within the south eastern boundary.

(14) - A strong, multiple dipolar, linear anomaly extends along the south western edge of the survey area and northwards through Area 2. This is a response to a buried service.

(15) - An irregularly shaped zone of magnetic disturbance can be seen close to the southern edge of the survey area. Another small zone is located close to the western edge. The shape of the response may indicate that it relates to lightning induced remanent magnetisation; however, a buried ferrous object is also possible.

3.5 List of anomalies - Area 2

Area centred on OS NGR 443112 214232, see Figures 03 & 04.

Anomalies with an uncertain origin

(16) - In the north eastern corner of the survey area are a number of discrete positive responses. It is not possible to determine if these relate to pit-like or natural features, or if they are associated with modern material.

Anomalies with an agricultural origin

(17) - A series of parallel linear anomalies relate to ridge and furrow.

4 CONCLUSION

4.1.1 The detailed magnetometer survey located a number of positive linear and discrete responses within the site. The linear anomalies are generally weak and lack a coherent morphology or pattern preventing them being confidently classified as cut features.

4.1.2 There are two distinct zones containing numerous magnetically variable responses within Area 1, more pit-like in the east and more linear in the west. However, these zones appear to relate to naturally formed features. Several clusters and isolated discrete positive anomalies with a stronger response than the majority of the natural features can be seen in the north eastern and south western corner of the site, and while these may also relate to natural features, their magnetic enhancement and morphology may indicate that they relate to cut, pit-like features.

4.1.3 The results of the survey also indicate the presence of former ridge and furrow cultivation within both of the survey areas.

5 REFERENCES

Archaeological Surveys, 2015. *Land adjacent to Hanborough Station, Long Hanborough, Oxfordshire, Geophysical Survey Written Scheme of Investigation.* Unpublished typescript document.

Aspinall, A., Gaffney, C. and Schmidt, A. 2009. *Magnetometry for Archaeologists*. Lanham (US), AltaMira Press.

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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 ±20nT 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

COMPOSITE
Filename: J629-mag-Area1-proc.xcp
Description: Imported as Composite from: J629-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 443106.099965475, 214259.184877982 m
Southeast corner: 443417.049965475, 213988.584877982 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 1515900

Dimensions
Composite Size (readings): 2073 x 1804
Survey Size (meters): 311 m x 271 m
Grid Size: 311 m x 271 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 5.53
Min: -5.50
Std Dev: 1.53
Mean: 0.04
Median: 0.01
Composite Area: 8.4143 ha
Surveyed Area: 4.6259 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 -5.00 to 5.00 nT

Area 2

COMPOSITE
Path: C:\Business\Jobs\J629 Long Hanborough\Data\Area 2\comps\
Filename: J629-mag-Area2-proc.xcp
Description: Imported as Composite from: J629-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 443051.80936837, 214282.826504873 m
Southeast corner: 443169.85936837, 214156.226504873 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702

Source GPS Points: 223000

Dimensions
Composite Size (readings): 787 x 844
Survey Size (meters): 118 m x 127 m
Grid Size: 118 m x 127 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 5.53
Min: -5.50
Std Dev: 2.62
Mean: -0.37
Median: 0.14
Composite Area: 1.4945 ha
Surveyed Area: 0.64967 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 -5.00 to 5.00 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 Oxfordshire Historic Environment Record with printed copies made available on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data Area 1 - path: J629 Long Hanborough\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
hanb1\MX\.prm,.dgb,.disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	10/09/15	D.J.Sabin
hanb1\MX\J629-mag-Area1.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 1 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	14/09/15	D.J.Sabin
Area1\comps\J629-mag-Area1.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	14/09/15	K.T.Donaldson
Area1\comps\J629-mag-Area1-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±5nT).	14/09/15	K.T.Donaldson
Geophysical data Area 2 - path: J629 Long Hanborough\Data				
hanb2\MX\.prm,.dgb,.disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA at.	14/09/15	D.J.Sabin
hanb2\MX\J629-mag-Area2.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 2 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	14/09/15	D.J.Sabin
Area2\comps\J629-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	14/09/15	K.T.Donaldson
Area2\comps\J629-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±5nT).	14/09/15	K.T.Donaldson
Graphic data - path: J629 Long Hanborough\Data				
Area1\graphics\ J629-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	22/09/15	K.T.Donaldson
Area1\graphics\ J629-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	22/09/15	K.T.Donaldson
Area2\graphics\ J629-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	22/09/15	K.T.Donaldson
Area2\graphics\ J629-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	22/09/15	K.T.Donaldson
CAD data - path: J629 Long Hanborough\CAD				
J629 version 1.dwg	ProgeCAD 2014	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	09/09/15	K.T.Donaldson
Text data - path: J629 Long Hanborough\Documentation				
J629 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	15/09/15	K.T.Donaldson

Appendix E – copyright and intellectual property

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Archaeological Surveys Ltd

Geophysical Survey
Land adjacent to Hanborough Station
Oxfordshire

Map of survey area

Survey location

Site centred on OS NGR
SP 43220 14140

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Archaeological Surveys Ltd

Geophysical Survey Land adjacent to Hanborough Station Oxfordshire

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

● 443150 214100

N

443050 443100 443150 443200 443250 443300 443350 443400 443450

214300 214250 214200 214150 214100 214050 214000 213950

A4095 Main Road

Area 2

Area 1

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 02

A4095 Main Road

N

Area 2

Area 1

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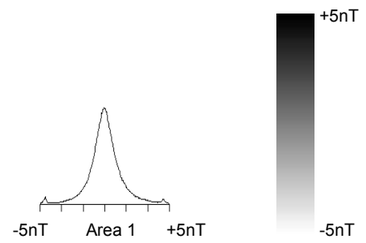
Greyscale plot of minimally processed magnetometer data



SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 03

A4095 Main Road

Area 2

Area 1

16
17
11
6
12
7
9
14
1
8
10
2
5
4
15
3
13

N

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Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible land drain
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- Variable magnetic response - of natural origin
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04