ARCHAEOLOGICAL SERVICES WYAS

Land at Churcher's Common
Chandlers Ford
Hampshire

Geophysical Survey

Report no. 2727

February 2015

Client: British Solar Renewables

REGISTERED ORGANISATION CIfA

Land at Churcher's Common
Chandlers Ford
Hampshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey covering approximately 12 hectares was carried out on land at Churcher's Common, near Chandlers Ford, to inform an application for the development of the site. Several rectilinear anomalies of unknown origin have been recorded. Possible causes include backfilled extraction pits (sand or clay), or activity associated with charcoal working; map regression has shown that the site was wooded from at least the late 19th century until the mid-20th century. A post-medieval to modern origin is considered most likely. No anomalies of archaeological potential correspond with the recorded cropmarks, other than areas of geological variation. Therefore, the cropmark is not thought to be the result of archaeological remains. Consequently, on the basis of the survey, the archaeological potential of the site is considered to be moderate to low.

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Report Information

Client:	British Solar Renewables
Address:	Higher Hill Farm, Butleigh Hill, Butleigh, Glastonbury, Somerset, BA6 8TW
Report Type:	Geophysical Survey
Location:	Chandlers Ford
County:	Hampshire
Grid Reference:	SU 406 220
Period(s) of activity:	Modern
Report Number:	2727
Project Number:	4372
Site Code:	CCE15
OASIS ID:	archaeol11-205454
Planning Application No.:	
Museum Accession No.:	n/a
Date of fieldwork:	February 2015
Date of report:	February 2015
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Photography:	
Research:	n/a

Authorisation for distribution: ----------

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Contents

List of Figures

List of Plates

1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by Matt Morgan of Environmental Dimension Partnership (the Consultant) on behalf of British Solar Renewables, to undertake a geophysical (magnetometer) survey of land to 6km north-west of Chandlers Ford, Hampshire (see Fig. 1). The work was undertaken in order to inform a planning application for the proposed development of the site. The work was undertaken in accordance with policy contained within the National Planning Policy Framework (DCLG 2012), in line with current best practice (CIfA 2014; David *et al.* 2008) and to a Project Design (Harrison 2014) approved by the Consultant and David Hopkins of Hampshire County Council. The survey was carried out on February 17th and February 18th 2015 to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The proposed development area (PDA) is located at Churcher's Common to the north-west of Chandlers Ford, centred at NGR SU 406 220. It comprises two arable fields surrounded, and separated by, woodland (see Fig. 2) with a railway line bordering the site to the northern side. The PDA is relatively flat at approximately 40m above Ordnance Datum, although there is a break of slope down to the east in Field 2.

Soils and geology

The underlying bedrock geology comprises Wittering Formation (sand, silt and clay). No superficial deposits are recorded (British Geological Survey 2015). The soils are classified in the Wickham 3 association, characterised as slowly permeable, seasonally waterlogged fine loams (Soil Survey of England and Wales 1983).

2 Archaeological Background

No detailed archaeological background was available at the time of writing but research on the Hampshire County Council Historic Environment Record website shows the presence of two sets of cropmarks, identified from aerial photographs, within the PDA. In the easternmost field two parallel curvilinear cropmarks have been interpreted as the remains of a double ditched enclosure of possible prehistoric date. In the westernmost field a series of broadly parallel linear cropmarks aligned north-east/south-west are identified. Both sets of these cropmarks have been plotted on Figure 2.

Basic map regression has revealed that the site was wooded from at least the late 19th century until after World War II.

3 Aims, Methodology and Presentation

The general objective of the geophysical survey was to provide information about the presence/absence, character, and extent of any archaeological remains identified within the PDA and to help inform further strategies, should they be required.

Specifically, the objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). Bartington Grad601 magnetic gradiometers were used during the survey, taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further details are given in Appendix 1.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. A large scale (1:4000) survey location plan, showing the processed data, is provided as Figure 2 with an overall interpretation of the data at the same scale included as Figure 3. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 4 to 12 inclusive, at a scale of 1:1000.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1 and Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the OASIS form is in Appendix 4.

The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 4 to 12 inclusive)

Generally, the survey has identified a variable magnetic background across the site. In places, such as around the boundaries between Sector 1 and Sector 2 and between Sector 2 and Sector 3, the magnetic background is extremely homogenous resulting in a uniform grey tone to the data. In other parts of the site the reverse is true with several areas of very perturbed readings resulting in a speckled appearance to the data. This geological variation is not thought to have a detrimental effect on the results outlined below. Against this variable background several anomalies have been identified by the survey which are discussed below and cross-referenced to specific examples depicted on the interpretative figures, where appropriate.

Ferrous Anomalies

Ferrous anomalies, as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. Generally, there is no obvious pattern or clustering to their distribution on this site to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

A dipolar linear anomaly, **A**, running along the eastern boundary of Field 2 is caused by a sub-surface pipe.

Geological Anomalies

Throughout the site there is a variable magnetic background (see above). Some of this may be due to ground disturbance when the woods were cut down post-World War II but the variable nature of the bedrock geology (sand, silt and clay) is considered more likely to account for the recorded variation. Five distinct clusters of variable readings are identified, **B**, **C**, **D**, **E** and **F**. The area of variation, **B**, encompasses anomaly **G** (see below). In this case it is not clear whether the magnetic variation is associated with the activity causing anomaly **G**. It is thought that anomaly **D** is the cause of the cropmarks and are linked to base of slope or geological variation.

Agricultural Anomalies

A series of parallel linear anomalies, aligned north-west/south-east, are identified in the south-eastern corner of Field 2. These are parallel with an extant shallow ditch. It is assumed that these anomalies are also likely to be agricultural in origin, probably also infilled ditches or possibly ploughing trends. These anomalies are not considered to be of archaeological potential.

Possible Archaeological Anomalies

Five rectilinear shaped areas of extremely strong magnetic readings are identified. Anomaly **G** in Field 2 is the most clearly defined, but the other four anomalies in Field 1, **H**, **I** , **J** and **K**, all exhibit some linearity suggesting a specific area of activity rather than more general tipping or spreading of magnetic material. The origin of these anomalies is uncertain but they could be caused by the infilling of small extraction workings, possibly for clay or sand. As the site was wooded for at least 100 years the anomalies may be associated with forestry works, possibly charcoal burning or logging activities.

5 Conclusions

No anomalies of definite archaeological potential have been identified by the geophysical survey. However, five high magnitude anomalies of uncertain origin have been highlighted. A limited on-line map regression has not identified any obvious recent cause and so it is considered that the anomalies are probably due to some localised short-lived activity, possibly associated with the woodland that covered the site until the mid-20th century. Backfilled small extraction pits is another possibility.

Curvilinear cropmarks recorded in Field 2 do not manifest as magnetic anomalies. Satellite imagery of the site shows that the cropmarks look to be located at the base of a slope and it is considered possible that the anomalies are caused by geological variation or the relatively lush vegetation observed on current images may be due to increased soil-moisture levels around the base of the slope rather than sub-surface archaeological remains.

Linear cropmarks recorded in the east of Field 1 also do not manifest as magnetic anomalies. Woodland tracks shown on historic mapping are also not identified in the data which suggests that they were ephemeral.

On the basis of the survey, the archaeological potential of the site is considered to be low with a moderate potential for the high magnitude anomalies of uncertain origin which are restricted in number and very limited in extent.

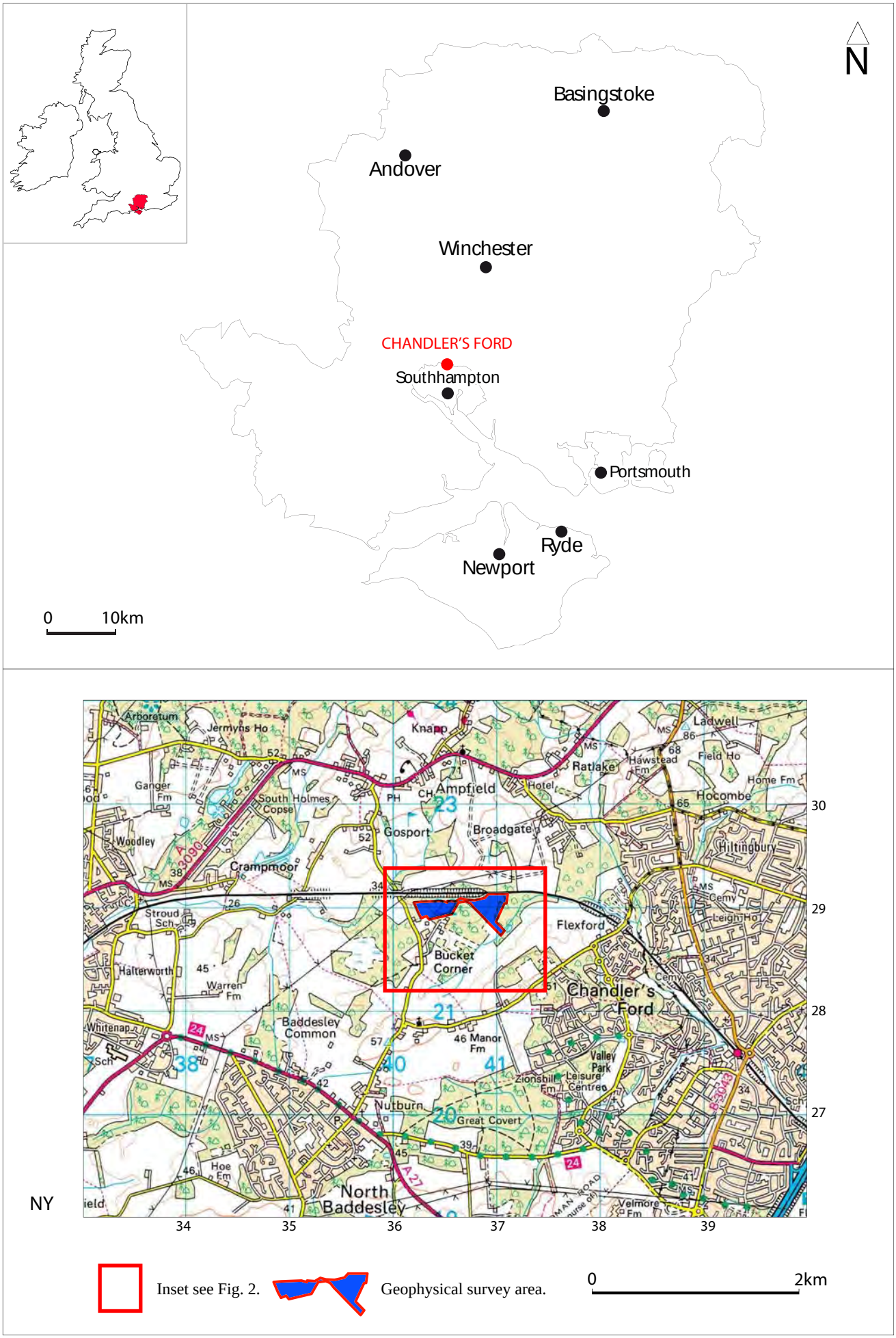

Fig. 1. Site location

PROPOSED DEVELOPMENT BOUNDARY

LOCATION AND DIRECTION OF PLATES

UNSUITABLE FOR SURVEY

SECTOR BOUNDARY

CROPMARK DETAIL (HHER 2015)

N

SECTOR 2 SEE FIGS 7-9

FIELD 2

FIELD 1

SECTOR 1 SEE FIGS 4-6

SECTOR 3 SEE FIGS 10-12

HAMPSHIRE HER 59786 POSSIBLE PREHISTORIC ENCLOSURE

Track

Drain

Tk

34m

37m

38m

Broadgate Plantation

Woodend Copse

Pine Cottage

Woodside

Green Acres

Monks Brook

Spreads

36m

urther Common Plantation

Further Common Plantation

Nursery

Newlands Copse

POUND LANE

Baddesley Common

43m

Bucket Corner

2.0

-1.0

nT

1220 00

4400 00

4410 00

0 200m

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Fig. 2. Survey location showing greyscale magnetometer data (1:4000 @ A3)

	PROPOSED DEVELOPMENT BOUNDARY
	SECTOR BOUNDARY

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
—	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
—	LINEAR TREND	AGRICULTURAL
- - -	LINEAR TREND	GEOLOGY
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?

N

SECTOR 2
SEE FIGS 7-9

FIELD 1

FIELD 2

SECTOR 1
SEE FIGS 4-6

SECTOR 3 SEE
FIGS 10-12

A
B
C
D
E
F
G
H
I
J
K

Drain
34m
Tk
Track
37m
Track
Broadgate
Plantation
Monks Brook
Woodend
Copse
Pine
Cottage
Woodside
Green
Acres
36m
urther Common
Plantation
Spreads
Further Common
Plantation
Nursery
Newlands Copse
34m
POUND LANE
Baddesley
Common
43m
Bucket
Corner
Track
Track

1220 00

4400 00

4410 00

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0 200m

Fig. 3. Overall interpretation of magnetometer data (1:4000 @ A3)

Fig. 4. Processed greyscale magnetometer data; Sector 1 (1:1000 @ A3)

SECTOR BOUNDARY

N

220 00

Pine
Cottage

Woodside

20.0 nT/cm

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4402 00

4404 00

Fig. 5. XY trace plot of minimally processed magnetometer data; Sector 1 (1:1000 @ A3)

0 50m

SECTOR BOUNDARY

N

E

H

I

F

K

J

1220 00

Pine

Cottage

Woodside

TYPE OF ANOMALY		INTERPRETATION
●	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	LINEAR TREND	GEOLOGY
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?

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4402 00

4404 00

0 50m

Fig. 6. Interpretation of magnetometer data; Sector 1 (1:1000 @ A3)

Fig. 7. Processed greyscale magnetometer data; Sector 2 (1:1000 @ A3)

SECTOR BOUNDARY

N

Woodend Copse

20.0 nT/cm

12200

440600

440800

0 50m

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

Fig. 8. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1000 @ A3)

SECTOR BOUNDARY	

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	LINEAR TREND	GEOLOGY
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?

N

B

C

D

G

Woodend Copse

1220 00

4406 00

4408 00

Archaeological Services W Y A S
PO Box 30, Nepshaw Lane South, Morley, LS27 0UG
Tel: 0113 383 7500 Fax:0113 383 7501

0 50m

Fig. 9. Interpretation of magnetometer data; Sector 2 (1:1000 @ A3)

SECTOR BOUNDARY

N

1220 00

2.0

-1.0

nT

1218 00

4270 00

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Fig. 10. Processed greyscale magnetometer data; Sector 3 (1:1000 @ A3)

0 50m

Fig. 11. XY trace plot of minimally processed magnetometer data; Sector 3 (1:1000 @ A3)

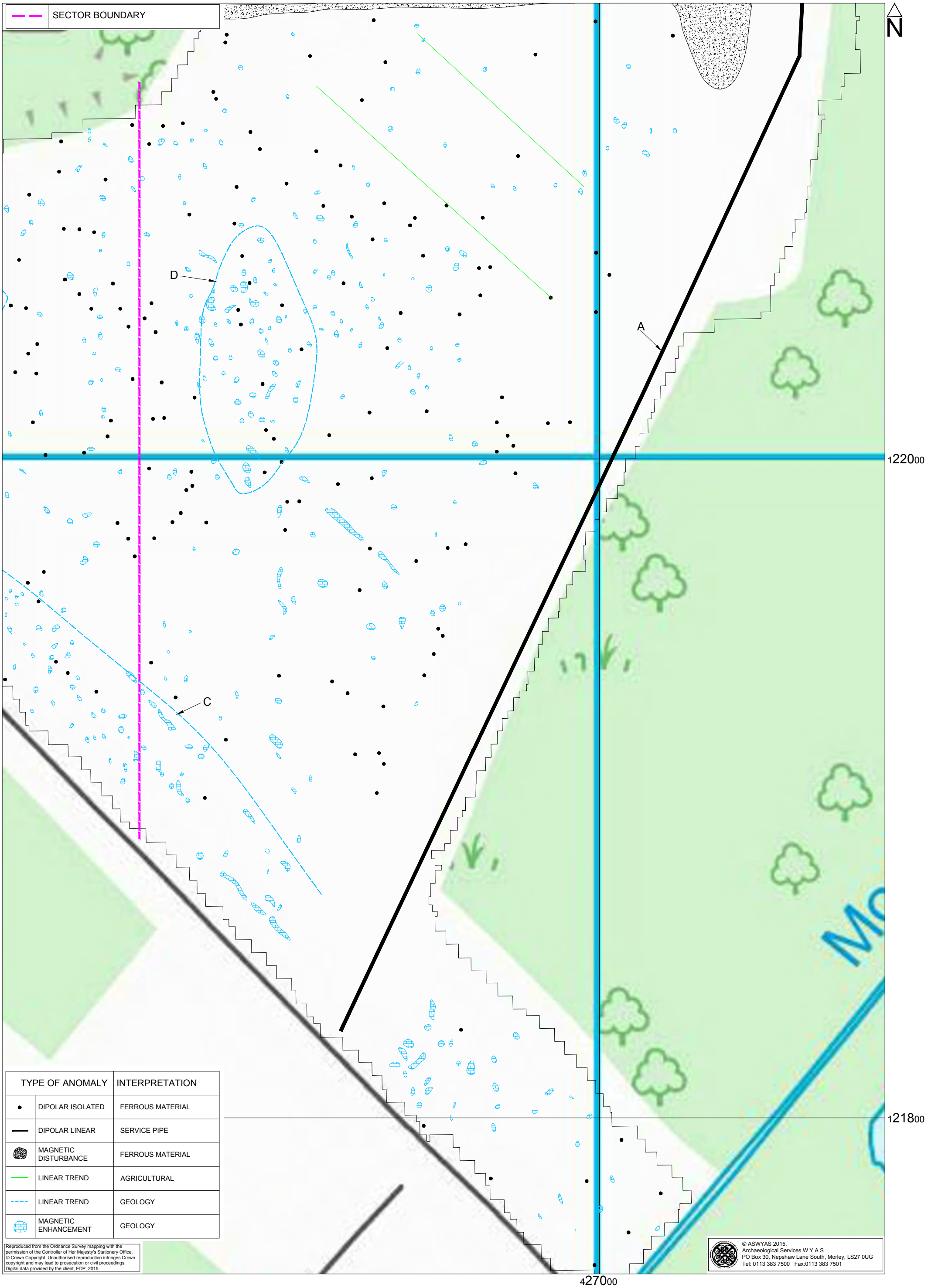

Fig. 12. Interpretation of magnetometer data; Sector 3 (1:1000 @ A3)

Plate 1. General view of Field 1, looking south-east

Plate 2. General view of Field 1, looking south-west

Plate 3. General view of Field 2, looking south-west

Plate 4. View of south-eastern part of Field 2, looking south-east

Appendix 1: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility of the topsoil because of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough. An advantage of magnetic susceptibility over magnetometry is that a certain amount of occupational activity will cause the same proportional change in susceptibility, however weakly magnetic is the soil, and so does not depend on the magnetic contrast between the topsoil and deeper layers. Susceptibility survey is therefore able to detect areas of occupation even in the absence of cut features. On the other hand susceptibility survey is more vulnerable to the masking effects of layers of colluvium and alluvium as the technique, using the Bartington system, can generally only measure variation in the first 0.15m of ploughsoil.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Gradiometer Survey

The main method of using the fluxgate gradiometer for commercial evaluations is referred to as ***detailed survey*** and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in XY trace and greyscale formats. In the former format the data shown is ‘raw’ with no processing other than grid biasing having been done. The data in the greyscale images has been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

An XY plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a ‘stacked’ plot. A hidden line algorithm has been employed to block out lines behind major ‘spikes’ and the data has been clipped. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the ‘shape’ of individual anomalies can be discerned and potentially archaeological anomalies differentiated from ‘iron spikes’. Geoplot 3 software was used to create the XY trace plots.

Geoplot 3 software was used to interpolate the data so that 3600 readings were obtained for each 30m by 30m grid. The same program was used to produce the greyscale images. All greyscale plots are displayed using a linear incremental scale.

Appendix 2: Survey location information

The site grid was laid out using a Trimble dual frequency Global Positioning System (GPS) with two Rovers (Trimble 5800 models) working in real-time kinetic mode. The accuracy of such equipment was better than 0.02m. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off for relocation purposes.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the Hampshire Historic Environment Record).

Appendix 4: OASIS Form

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: archaeol11-205454

Project details

Project name	Land at Churchers's Common, Chandlers Ford
Short description of the project	A geophysical (magnetometer) survey covering approximately 12 hectares was carried out on land at Churcher's Common, near Chandlers Ford, to inform an application for the development of the site. Several rectilinear anomalies of unknown origin have been recorded. Possible causes include backfilled extraction pits (sand or clay), or activity associated with charcoal working; map regression has shown that the site was wooded from at least the late 19th century until the mid-20th century. A post-medieval to modern origin is considered most likely. No anomalies of archaeological potential correspond with the recorded cropmarks, other than areas of geological variation. Therefore, the cropmark is not thought to be the result of archaeological remains. Consequently, on the basis of the survey, the archaeological potential of the site is considered to be moderate to low.
Project dates	Start: 17-02-2015 End: 18-02-2015
Previous/future work	Not known / No
Any associated project reference codes	4372 - Contracting Unit No.
Any associated project reference codes	CCE15 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	Solar Farm
Prompt	National Planning Policy Framework - NPPF
	Not known / Not recorded

Position in the planning process	
Solid geology (other)	Wittering Formation - sand, silt and clay
Drift geology (other)	Noen
Techniques	Magnetometry

Project location

Country	England
Site location	HAMPSHIRE TEST VALLEY NORTH BADDESLEY Land at Churcher's Common
Postcode	SO51 9BL
Study area	12.00 Hectares
Site coordinates	SU 406 220 50.9954191411 -1.42140128491 50 59 43 N 001 25 17 W Point

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Environmental Dimension Partnership
Project design originator	Archaeological Services WYAS
Project director/manager	Harrison, S.
Project supervisor	Schmidt, A.
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Digital Media available	"Geophysics"
Paper Archive Exists?	No
Paper Media available	"Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Churcher's Common, Chandlers Ford; Geophysical Survey
Author(s)/Editor(s)	Webb, A.
	Report No. 2727

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Entered on	6 March 2015

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