WYAS Archaeological Services

Somerby Top

Somerby

Lincolnshire

Geophysical Survey

Report no. 3060
December 2017

Client: RJ & AE Godfrey

Registered Organisation CIfA

West Yorkshire Joint Services

Somerby Top,
Somerby,
Lincolnshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 1.5 hectares, was undertaken on land to the east of Somerby Top Farm, Somerby Top, Lincolnshire. The magnetic survey has detected a small number of anomalies of possible archaeological origin which may be of some interest. Agricultural ploughing trends can be seen throughout the area along with small ferrous responses. Overall the archaeological potential of the site is low to medium.

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Services

Report Information

Client:	RJ and AE Godfrey
Address:	Cadas House, Wootton Road, Elsham Top, Brigg, North Lincolnshire, DN20 0NU
Report Type:	Geophysical Survey
Location:	Somerby Top
County:	Lincolnshire
Grid Reference:	TA 078 075
Period(s) of activity:	?Romano-British / ?Medieval / Modern
Report Number:	3060
Project Number:	6939
Site Code:	SOT17
OASIS ID:	Archaeol11-305529
Date of fieldwork:	December 2017
Date of report:	January 2018
Project Management:	Emma Brunning BSc MCIfA
Fieldwork:	Emma Brunning
Report:	Emma Brunning
Illustrations:	Emma Brunning
Photography:	Emma Brunning

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

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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by Ed Dennison Archaeological Services Ltd, on behalf of RJ & AE Godfrey, to undertake a geophysical (magnetometer) survey on agricultural land at Somerby Top, Somerby, Lincolnshire. Guidance contained within the National Planning Policy Framework (DCLG 2012) was followed, in line with current best practice (CIfA 2014; David *et al*. 2008). The survey was carried out on the 14th December 2017.

Site location, topography and land-use

The survey area is located to the east of Somerby Top Farm approximately 1.8km to the east of Somerby and 3.5km to the southwest of Humberside Airport, centred on National Grid Reference TA 0788 0751 (Fig. 1.) and totals approximately 1.5ha. It lies between 68m above Ordnance Datum (aOD) in the north to 62m aOD in the south. The Site is bounded to the south by Somerby Wold Lane, to the west by Somerby Top Farm and to the north and east by further agricultural land. At the time of survey the field conditions consisted of stubble.

Soils and geology

The underlying bedrock geology is upper Cretaceous chalk of the Welton chalk formation. This sedimentary bedrock formed approximately 90 to 101 million years ago in the Cretaceous period. No superficial deposits have been recorded (BGS 2017). Soils of the area belong to the Swaffam Prior association (511e) described as well drained calcareous coarse and fine loams over chalk rubble (SSEW 1983).

2 Archaeological Background

Somerby Top Farm was established by 1830, after the enclosure of the high Wold land of Somerby parish in 1811 (HER number MLI116808). Nothing of the 19th century farm complex now remains, its site now being occupied by a potato storage facility with a pig rearing complex to the east.

To the south of the survey area an old disused quarry (HER number MLI53626) is marked on OS maps dated 1880 (HG 2017).

A former field boundary is depicted on old mapping dating from 1887 which has been removed by the 1970 map. The boundary crosses through the survey area on a northwest to southeast alignment (OS 2017).

3 Aims, Methodology and Presentation

The main aim of the geophysical survey was to provide additional information on the known archaeology within the area. To achieve this, a magnetometer survey covering all available parts of the PDA was undertaken (see Fig. 2).

The general 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 R8s GNSS system. The survey was undertaken using Bartington Grad601 magnetic gradiometers. These were employed 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. Figure 2 shows a more detailed site location plan at a scale of 1:1000. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 3 to 5 inclusive at a scale of 1:750.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the completed OASIS form is included 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 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 Figs 3 to 5)

Possible archaeological anomalies

An isolated response (1) in the east of the data has given a strong magnetic response. A full interpretation is unclear for this anomaly and whilst an archaeological origin is possible it may also have a more modern one. This anomaly roughly lies on the line of a former field boundary mentioned in the Archaeological Background, and may therefore be associated with the boundary itself.

A handful of anomalies (**2**) on an approximate east to west alignment have been recorded. These responses do not appear on any available old mapping and may therefore have an archaeological origin. There is a possibility that they indicate a boundary ditch of some sort, perhaps associated with an underlying Iron Age/Romano-British field system, the truncated remains of which have been seen on aerial photographs in the general area. Alternatively, it may be a more modern feature.

Agricultural anomalies

Parallel linear trends can be seen throughout the dataset which are associated with modern ploughing.

Ferrous anomalies and magnetic disturbance

Ferrous anomalies, as individual 'spikes' or as large discrete areas, 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. There is no obvious pattern or clustering to their distribution in this survey to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Magnetic disturbance along the western limits of the dataset are due to the nearby farm buildings.

5 Conclusions

The magnetic data have detected a small number of anomalies which may be of some archaeological interest consisting of an isolated response and a group of anomalies along a line which may indicate a boundary ditch. Modern ploughing trends along with ferrous

responses have also been recorded. Overall, based on the geophysical survey, the archaeological potential of the survey area is deemed to be low to medium.

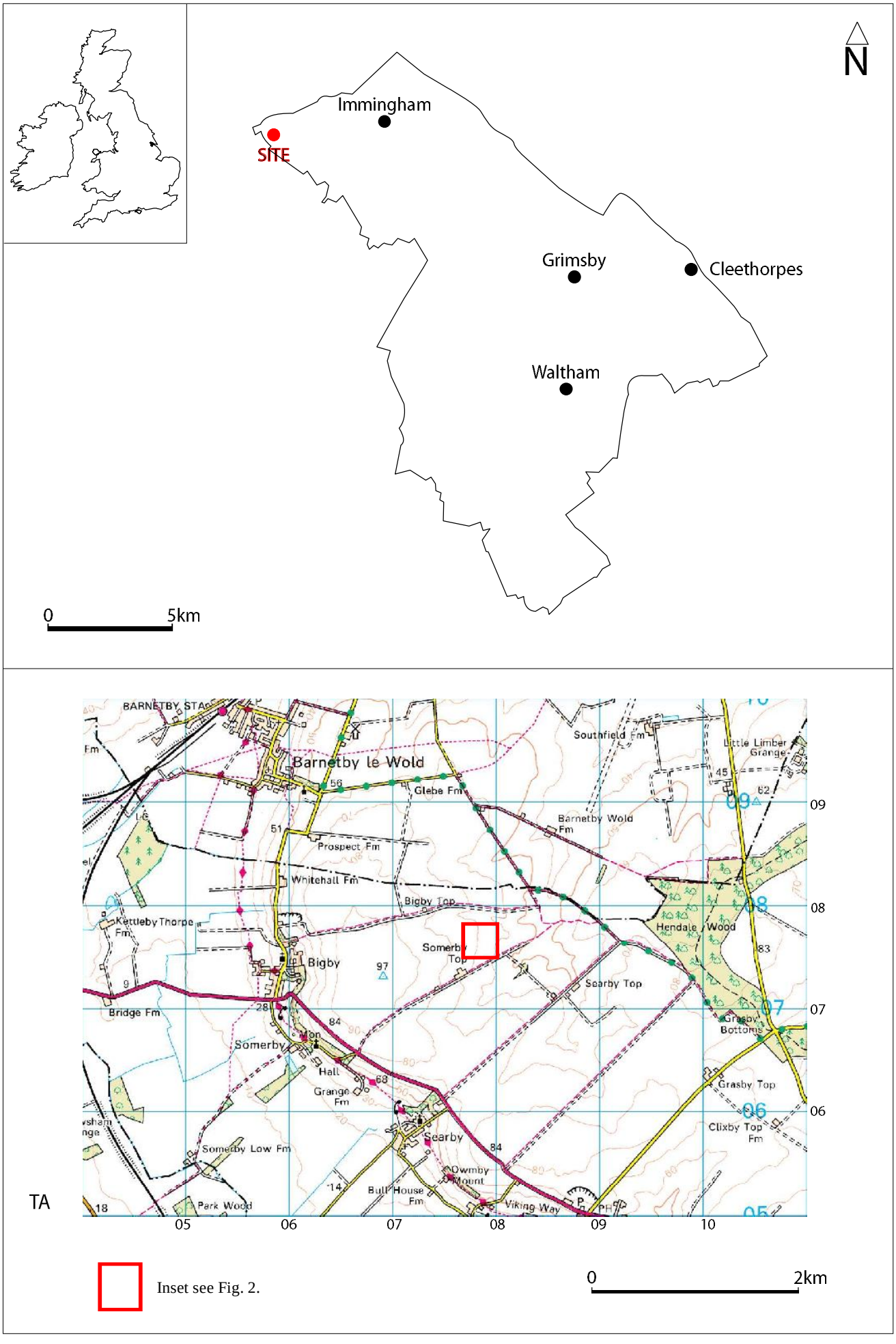

Fig. 1. Site location

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PROJECT ID: 6939_SOT17	
1	LOCATION AND DIRECTION OF PLATES

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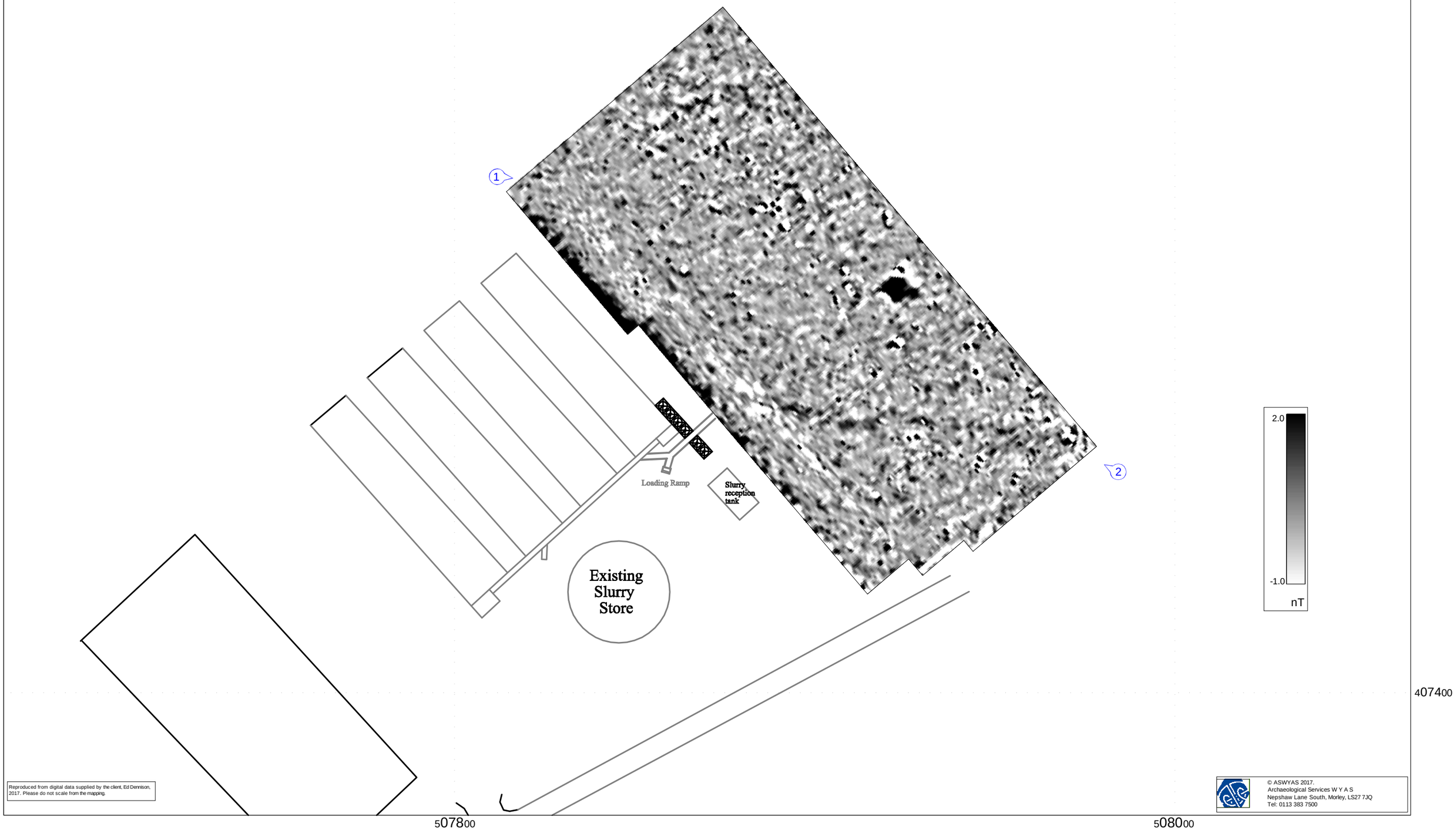

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Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 383 7500

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508000

407400

0 50m

Fig. 2. Site location showing greyscale magnemtometer data (1:1000 @ A3)

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Slurry reception tank

Existing Slurry Store

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-1.0

nT

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5078 00

5080 00

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Fig. 3. Greyscale magnetometer data (1:750 @ A3)

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20.0 nT/cm

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Tel: 0113 383 7500

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508000

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Fig. 4. XY trace plot of minimally processed magnetometer data (1:750 @ A3)

PROJECT ID: 6939_SOT17

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

N

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1

2

2

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0 50m

Fig. 5. Interpretation of magnetometer data (1:750 @ A3)

Plate 1. General view of site, looking southeast

Plate 2. General view of site, looking northwest

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.

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 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.

The gradiometer data have been presented in this report in processed greyscale format. The data in the greyscale images have 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.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

Appendix 2: Survey location information

The survey grid was set out using a Trimble R8s GNSS system with its integrated Trimble 360 tracking technology which supports signals from all existing and planned constellations and augmentation systems tracking the full range of satellite systems including GPS, GLONASS, Galileo, BeiDou and QZSS. The accuracy of this equipment is better than 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. 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 hard copies of the mapping rather than using the digital co-ordinates.

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 CS6 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 Lincolnshire Historic Environment Record).

Appendix 4: Oasis form

OASIS ID: archaeol11-305529	
Project details	
Project name	Somerby Top
Short description of the project	A geophysical (magnetometer) survey, covering approximately 1.5 hectares on land to the east of Somerby Top Farm, Somerby Top, Lincolnshire. The magnetic survey detected a small number of anomalies of possible archaeological origin which may be of some interest. Agricultural ploughing trends can be seen throughout the area along with small ferrous responses. Overall the archaeological potential of the site is low to medium
Project dates	Start: 14-12-2017 End: 14-12-2017
Previous/future work	No / Not known
Any associated project reference codes	SOT17 - Sitecode
Any associated project reference codes	6939 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	FIELD SYSTEM Iron Age
Monument type	CULTIVATION MARKS Modern
Significant Finds	NONE None
Methods & techniques	''Geophysical Survey''
Development type	Not recorded
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	Unknown

Techniques	Magnetometry
Project location	
Country	England
Site location	LINCOLNSHIRE WEST LINDSEY SOMERBY Somerby Top
Postcode	DN38 6BN
Study area	1.5 Hectares
Site coordinates	TA 078 075 53.55279230382 -0.3726104197 53 33 10 N 000 22 21 W Point
Height OD / Depth	Min: 62m Max: 68m
Project creators	
Name of Organisation	Archaeological Services WYAS
Project brief originator	Ed Dennison Archaeological Services Ltd
Project design originator	ASWYAS
Project director/manager	E. Brunning
Project supervisor	E. Brunning
Project archives	
Physical Archive Exists?	No
Digital Archive recipient	Ed Dennison Archaeological Services Ltd.
Digital Contents	''Survey''
Digital Media available	''Geophysics'',''Images raster / digital photography'',''Survey'',''Text''
Paper Archive Exists?	No
Project bibliography 1	

Publication type	Grey literature (unpublished document/manuscript)
Title	Somerby Top, Somerby, Lincolnshire. Geophysical Survey
Author(s)/Editor(s)	Brunning, E.
Other bibliographic details	Report no. 6030
Date	2018
Issuer or publisher	ASWYAS
Place of issue or publication	Morley, LEEDS
Description	PDF report of approximately 25 pages including text, figures and plates.
URL	http://archaeologydataservice.ac.uk/
Entered by	Adam Dyson (adam.dyson@aswyas.com)
Entered on	8 January 2018

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