WYAS Archaeological Services

Land off Wrawby Road
Brigg
North Lincolnshire

Geophysical Survey

Report no. 3210
November 2018

Client: Harron Homes

West Yorkshire Joint Services

Land off Wrawby Road, Brigg, North Lincolnshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering 9.7 hectares was undertaken on agricultural land off Wrawby Road, Brigg, Lincolnshire. The magnetic survey has detected several agricultural responses including medieval ridge and furrow, modern field drains, modern ploughing and a possible former field boundary. No archaeological responses have been detected. Overall the archaeological potential of the site is considered to be low.

WYAS
Archaeological Services

Report Information

Client:	Harron Homes
Address:	Colton House, Temple Point, Bullerthorpe Lane, Leeds, LS15 9JL
Report Type:	Geophysical Survey
Location:	Brigg
County:	North Lincolnshire
Grid Reference:	TA 00828 08029
Period(s) of activity:	Medieval / Modern
Report Number:	3210
Project Number:	8475
Site Code:	BGG18
OASIS ID:	archaeol11- 335082
Date of fieldwork:	November 2018
Date of report:	November 2018
Project Management:	Jane Richardson PhD MCIfA FSA
Fieldwork:	Jake Freeman BA
	Amy Chatterton BSc MA
	Clare Asplin BA
	Michael Offley BA
Report:	Jake Freeman
Illustrations:	Jake Freeman

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

Nepshaw Lane South, Morley, Leeds LS27 7JQ
Telephone: 0113 535 0163
Email: admin@aswyas.com

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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by Lanpro Services, on behalf of Harron Homes, to undertake a geophysical (magnetometer) survey on agricultural land at Wrawby Road, Brigg, North Lincolnshire in advance of a proposed development. Guidance contained within the National Planning Policy Framework (MHCLG 2018) was followed, in line with current best practice (CIfA 2014; David *et al*. 2008). The survey was carried out between the 15th November and the 19th November 2018.

Site location, topography and land-use

The Proposed Development Area (PDA) covers an area of 9.7 ha to the immediate north east of Brigg (Fig. 1). It is centred on TA 00828 08029. It comprises of three, regularly-shaped arable fields off Wrawby Road. The site is bounded to the west by Brigg Recreation Ground, further arable land to the east, a residential estate and fields to the north, and Wrawby Road to the south. The site is situated on gently sloping ground from 10m AOD in the west to 6m AOD to the east.

Soils and geology

The bedrock geology of the survey area predominantly belongs to the Oxford Clay Formation which is a mudstone, a sedimentary bedrock formed approximately 157 to 166 million years ago in the Jurassic Period. Superficial deposits have been recorded as Glaciolacustrine deposits described as clay and silt formed up to 3 million years ago during the Quaternary Period (BGS 2018). The soils in the area are classified in the Wickham association (711f) characterised as typical stagnogley soils; slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (SSEW 1983).

2 Archaeological Background

The archaeological background below is drawn directly from that produced for an archaeological desk-based assessment of the site (Lanpro 2018).

Early Prehistoric Period (c. 9500 BC – c. 800 BC)

There is no recorded evidence for early prehistoric activity within the study site.

Evidence for early prehistoric activity within the search area is limited. The closest recorded evidence for this period was found over 480m to the study site's north-west, as part of a programme of fieldwalking in advance of the construction of the M180 in 1975, and comprised flint scrapers, flakes and a core (MLS 2237; ELS 193). A retouched flint blade was also discovered during an excavation at 59 Wrawby Street, situated in the historic core of

Brigg over 900m to the site's south-west in 1972-3 (MLS 1797; ELS 3217). Apart from these two sites, the only other dating evidence for the early prehistoric period comes from a peat deposit recovered from a borehole on the north-western edge of Brigg. This was radiocarbon dated to the Early Bronze Age (MLS 21652; ELS 3154) but contained no associated cultural material.

Iron Age and Roman Period (c. 800 BC – c. AD 410)

There is no evidence for Iron Age or Roman period activity within the study site.

The evidence for Late Iron Age and Romano-British settlement within the search area is largely concentrated within fields associated with Tong's Farm, approximately 700m to the south-east of the study site. Cropmark evidence, geophysical survey, fieldwalking surveys and targeted excavation have identified a settlement comprising at least one building with a hypocaust, as well as evidence of other activity (MLS 2226; ELS 2388; 2389; 2390; 2394; 2720; 3019; 3330). This work has also yielded concentrations of late Roman coins dating from the 3rd to early 5th century (ELS 2392; 3332).

Evidence for Romano-British activity was identified during evaluation trenching at Wrawby, over 950m to the north-west of the study site, where substantial quantities of pottery were recovered from linear boundary ditches and pits (ELS 4326). Roman pottery was also recovered from builders trenches during house building around Yarborough Road, about 650m to the south of the study site, in the late 1960s (MLS 25929).

A number of Roman coins have also been discovered as chance finds in the centre of Brigg (MLS 1785), to the north of the town centre (MLS 1787) and along the route of the M180 prior to construction (MLS 1786), dating from the 2nd to the 4th centuries.

Medieval Period (c.AD 410 – c. AD 1540)

There is no recorded evidence for medieval activity within the study site.

The only evidence for Anglo-Saxon activity from the search area is a single Anglo-Saxon coin, of an unknown type, found close to St Helen's Well, over 500m to the south-east of the study site (MLS 21535).

The earliest documentary evidence for settlement at Brigg dates to 1183, with the early form of the name being 'Glandford Brigg' which may derive from the Old English meaning 'the ford where sports are held' (Cameron and Insley 1998, 21; MLS 9552).

Archaeological evidence for the later medieval period within the search area is limited to probable ridge and furrow recorded on aerial photographs located almost 1km to the south of the study site (MLS 21280) and a small circular earthwork, which could be a mill mound or a stock pond, within the same field (MLS 22804).

Medieval pottery was also recovered during field walking along the line of the M180 between 1973-75, but this is likely to have been deposited as part of the manuring of fields rather than being representative of settlement or other activity (ELS 193).

The historic core of Brigg is situated over 750m to the south-west of the study site, and it is likely that the study site lay beyond any area of medieval settlement. It is probable that the site remained in agricultural use throughout this period, although the low lying nature of the ground and the later post-medieval drainage channels required to allow for arable cultivation suggest that this may have been marginal land.

Post-Medieval and Modern Period (c.1540 – Present)

The 2 inch scale Ordnance Survey map of the area, published in 1819, shows the study site occupying land across four enclosed fields, although the accuracy of the depiction of field boundaries on these maps, partly due to their small scale, is not precise and these boundaries do not reflect the alignments shown in later 19th century mapping.

The Ordnance Survey 25 inch map of 1887 provides the earliest large-scale depiction of the study site and surrounding area. By this time the present boundaries of the site had been laid out, with two triangular fields divided by a drainage channel forming the eastern part of the site, while to the west the current rectangular field was subdivided to form two smaller plots. The surrounding area remained predominantly farmland.

There was no significant change within the site or its immediate vicinity through the early 20th century, although by the late 1930s Brigg was expanding eastwards and new residential development had started to be constructed to the west of the site and along Wrawby Road to its immediate south-west. There was little further change to the area through the 1950s, although by the late 1960s further residential development had been constructed to the site's north-west, and the fields to the west of the site landscaped for playing fields. Around this time the boundary that sub-divided the western field of the site was also removed to create the present landscape layout.

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. Bespoke in-house 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 1:2000 with Figure 3 showing an overview of the interpretation at the same scale. The processed and minimally processed data, together with interpretations of the survey results are presented in Figures 4 to 9 inclusive at a scale of 1:1000.

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).

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 4 to 9)

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.

Several large area of magnetic disturbance close to the boundaries of Field 1 have been detected, and likely correspond to boundary fencing. In the south east corner of Field 1 and in the south west corner of Field 3, magnetic disturbance corresponds to tipping of limestone to allow access to the field by farm machinery from Wrawby Road.

Agricultural anomalies

Weak magnetic anomalies indicative of possible medieval ridge and furrow cultivation have been recorded on an east - west alignment within Field 2 of the survey area. Modern and post - medieval agricultural activity in the form of several ploughing regimes have also been recorded on a north - south, and east - west alignment within both Field 2 and Field 3. Ploughing headlands are also distinctly visible along the field boundaries of Field 2.

Modern field drains are present within Field 3 and generally follow a north - south alignment toward a curved drain that runs parallel to the southern boundary of the field. Older field drains with a much weaker magnetic signature were also detected within Field 3, following a north east - south west alignment, parallel to the existing field boundary.

A weak linear anomaly is also present in Fields 2 and 3 along a north west - south east alignment. This anomaly is not aligned with any known agricultural trends, and does not correspond to any field boundaries on first edition OS mapping (NLS, 2018). This has been interpreted as a former field boundary that predates the earliest mapping of the PDA.

Curving anomalies in Field 3, and in the south of Field 2, form regular patterns that respect agricultural trends. These patterns are likely to be caused by modern agricultural machinery.

5 Conclusions

Agricultural responses can be seen within Fields 2 and 3, consisting of possible ridge and furrow ploughing, modern ploughing, and field drains. A possible former field boundary has also been detected in Fields 2 and 3.

Larger quantities of magnetic disturbance have been recorded in Field 1 due to a combination of boundary fencing and ferrous debris in the plough soil. Smaller areas of general magnetic disturbance have also been detected across the remainder of the site.

Overall, based on the geophysical survey, the archaeological potential of the site is deemed to be low.

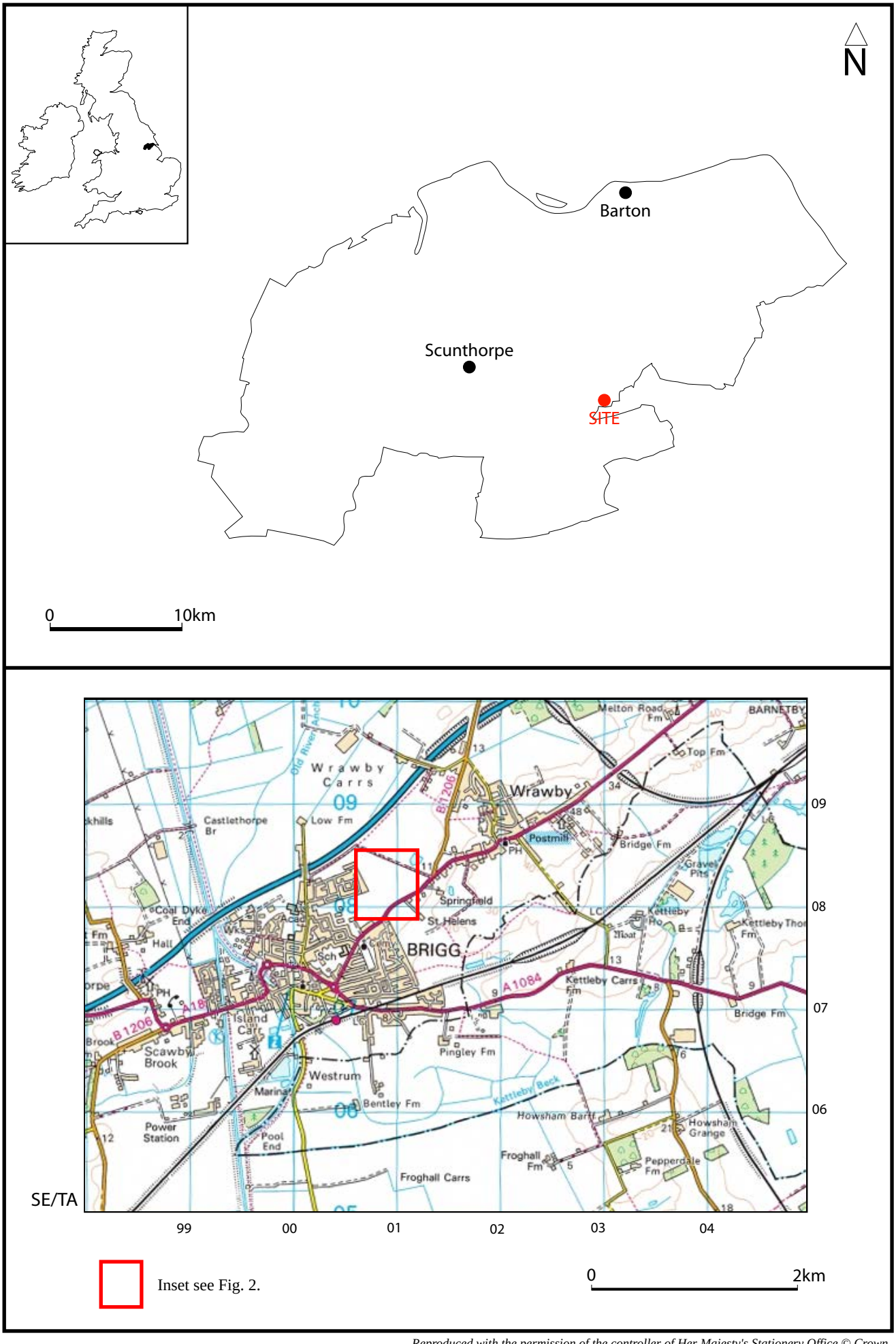

Fig. 1. Site location

PROJECT ID: 8475_BGG18	
	SURVEY BOUNDARY
	SECTOR BOUNDARY
1	LOCATION AND DIRECTION OF PLATES

N

FIELD 2

SECTOR 2
SEE FIGS 7-9

FIELD 3

SECTOR 1
SEE FIGS 4-6

FIELD 1

1

2

3

4

2.0

-1.0

nT

4082$_{00}$

4080$_{00}$

4078$_{00}$

5006$_{00}$

5008$_{00}$

5010$_{00}$

5012$_{00}$

0 100m

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Fig. 2. Survey location showing greyscale magnetometer data (1:2000 @ A3)

PROJECT ID: 8475_BGG18

N

4080 00

2.0

-1.0

nT

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Tel: 0113 535 0163

5800 00

4078 00

0 30m

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

PROJECT ID: 8475_BGG18

N

4080 00

4078 00

5800 00

20.0 nT/cm

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0 30m

Fig. 4. XY trace plot of minimally processed magnetometer data; Sector 1 (1:1000 @ A3)

PROJECT ID: 8475_BGG18

N

4080 00

4078 00

5800 00

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	RIDGE AND FURROW

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0 30m

Fig. 5. Interpretation of processed magnetometer data; Sector 1 (1:1000 @ A3)

PROJECT ID: 8475_BGG18

N

4082 00

4080 00

2.0
-1.0
nT

5008 00

5010 00

0 30m

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Fig. 6. Processed greyscale magnetometer data; Sector 2 (1:1000 @ A3)

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N

4082 00

4080 00

20.0 nT/cm

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Tel: 0113 535 0163

5008 00

5010 00

0 30m

Fig. 7. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1000 @ A3)

PROJECT ID: 8475_BGG18

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	RIDGE AND FURROW

N

4082 00

4080 00

5008 00

5010 00

Archaeological Services W Y A S
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 535 0163

0 30m

Fig. 8. Interpretation of processed magnetometer data; Sector 2 (1:1000 @ A3)

Plate 1. General view of Field 1, facing west

Plate 2. General view of Field 2, facing north east

Plate 3. General view of Field 3, facing north east

Plate 4. General view of Field 1, facing west

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 Nottinghamshire 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: archaeol11-335082

Project details

Project name	Land off Wrawby Road, Brigg, North Lincolnshire
Short description of the project	A geophysical (magnetometer) survey, covering 9.7 hectares was undertaken on agricultural land off Wrawby Road, Brigg, Lincolnshire.
Project dates	Start: 15-11-2018 End: 23-11-2018
Previous/future work	Not known / Not known
Type of project	Field evaluation
Current Land use	Cultivated Land 1 - Minimal cultivation
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology	OXFORD CLAY AND KELLAWAYS BEDS
Drift geology	Unknown
Techniques	Magnetometry

Project location

Country	England
Site location	NORTH LINCOLNSHIRE NORTH LINCOLNSHIRE BRIGG Land off Wrawby Road, Brigg
Study area	9.7 Hectares
Site coordinates	TA 00828 08029 53.558933543182 -0.477649521877 53 33 32 N 000 28 39 W Point

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Lanpro Services

Project design originator	Archaeological Services WYAS
Project director/manager	C. Sykes
Project supervisor	J Freeman

Project archives

Physical Archive Exists?	No
Digital Archive recipient	ASWYAS
Digital Contents	"none"
Digital Media available	"Geophysics","Images raster / digital photography","Survey","Text"
Paper Archive Exists?	No

Entered by	Jake Freeman (jake.freeman@aswyas.co.uk)
Entered on	27 November 2018

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