WYAS Archaeological Services

Land at Holt Road

Edgefield

Norfolk

Geophysical Survey

Report no. 2762
June 2015

Client: NPS Archaeology

Land at Norwich Road, Edgefield, Norfolk

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 1 hectare, was carried out on land within the northern part of the village of Edgefield, Norfolk located between Rectory Road and Norwich Road. The survey was undertaken prior to the proposed development of the site. Large areas of magnetic disturbance were present caused by modern above ground ferrous objects features. Within the northern part of the site only anomalies consistent with the underlying geology were identified. Consequently the archaeological potential of this site is deemed to be low.

WYAS
Archaeological Services

Report Information

Client:	Niall Oakey
Address:	NPS Archaeology, Scandic House, 85 Mountergate, Norwich NR1 1PY
Report Type:	Geophysical Survey
Location:	Edgefield
County:	Norfolk
Grid Reference:	TG 09582 34841
Period(s) of activity:	Modern
Report Number:	2762
Project Number:	4413
Site Code:	HRA15
OASIS ID:	Archaeol11-221450
Planning Application No.:	N/A
Museum Accession No.:	N/A
Date of fieldwork:	May 2015
Date of report:	June 2015
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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 Niall Oakey of NPS Group (the Client), to undertake a geophysical (magnetometer) survey off land at Norwich Road, Edgefield, Norfolk to inform a proposed planning application. The work was undertaken in accordance with the Generic Brief for Archaeological Evaluation by Magnetometer Survey (Norfolk County Council 2014), a written scheme of investigation (Oakey 2014) provided to and approved by James Albone, Planning Archaeologist at the Historic Environment Service of Norfolk County Council and a Project Design (Richardson 2015). Guidance contained within the National Planning Policy Framework (DCLG 2012) was also followed, in line with current best practice (CIfA 2014; David *et al*. 2008). The survey was carried out on 21st May 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 towards the northern end of the village of Edgefield, 5 km to the south-west of the market town of Holt, North Norfolk, centered at TG 095 348 (see Fig. 1). The village of Edgefield comprises two main areas of occupation with housing located along Rectory Road and Norwich Road. The PDA is located between the two, just to the north of the houses clustered along Norwich Road and to the east of the houses along Rectory Road.

The PDA comprises three separate fields (Fields 1-3), Field 1 is located within a large rectangular field and contained playground equipment. Field 2 contains agricultural machinery and chicken sheds. Field 3 is located to the north forming a triangular piece of land set within a large arable field. The PDA forms a small inset of land surrounded by both current housing and agricultural fields. The total size of the site was 1 hectare and was generally flat, located around 80m above Ordnance Datum (aOD).

Soils and geology

The underlying bedrock comprises Wroxham Crag Formation, sand and gravel. Superficial deposits are glaciofluvial deposits of mid-Pleistocene sand and gravel (British Geological Survey 2015). The soils in this area are classified as glaciofluvial and aeolian drift and till, characterised by deep, well drained coarse loamy soils that are often stoneless with a risk of water erosion. A band of glaciofluvial drift runs through the surrounding soils characterised by deep, well drained sandy and acidic soils with a risk of wind erosion (Soil Survey of England and Wales 1983).

2 Archaeological Background

No known archaeological remains are recorded within the PDA although the surrounding landscape does contain archaeological and historical remains. The following archaeological background has been taken from the Norfolk Heritage Explorer (2015).

Several prehistoric finds have been recovered from the surrounding landscape including flint scrapers (NHER 34499) and a Neolithic spear (NHER 6645). Further early prehistoric material was also recorded during an evaluation 1.5km to the north-west of Edgefield where five pits were investigated, two of which could be dated to the Early Neolithic and the Late Neolithic/Early Bronze Age (NHER 56173) (Hogan *et al.* 2011).

The village of Edgefield was recorded in the Domesday Book of 1085 as Edisfelda. Located 150m to the north-west of the PDA is The Old Hall (NHER 20532) a 16th-century house, with a porch, stair turret and an east wing dating from around 1600. Wall-paintings have been found on the upper floor of the Hall, depicting a flower vase and two figures. There are also traces of a possible medieval moat in the grounds of the Hall, suggesting that it was built on a medieval manorial moated site. Approximately 1.4km to the south-east of the PDA is a medieval wood, with boundary banks and ditches. In the early 17th century, these earthworks were referred to as already 'ancient'.

Cropmarks of unknown date are located 800m to north-west, and comprise linear features, most likely the remains of former field boundaries (NHER 36396).

3 Aims and Methodology

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of the development on potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended. To achieve this aim, a magnetometer survey covering all amenable 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 VRS differential Global Positioning System (Trimble 5800 model). As the survey areas proved to be unsuitable for survey with a Sensys

Magneto®MXPDA cart based magnetometer system, the survey was undertaken using a 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. A large scale (1:3000) survey location plan is provided. 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 1:1000.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1 and Appendix 2. Appendix 3 shows the Data Repeatability, while Appendix 4 describes the composition and location of the archive.

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 3 to 5)

Summary

Fields 1 and 2 of the survey area are dominated by large areas of magnetic disturbance caused by above ground remains associated with the chicken sheds and playground equipment. The magnetic background within Field 3 is very variable resulting in a 'speckled' appearance to the data. This is due to the superficial sand and gravel deposits.

Ferrous anomalies

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 to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Areas of ferrous disturbance within Field 2 are due to the presence of iron chicken sheds, whereas in Field 1 they relate to the playground equipment. The areas of disturbance within Field 3 are the product of ferrous material within the field boundary.

Geological anomalies

The magnetic background is very variable throughout the survey area resulting in a 'speckled' appearance to the data. This is due to the undifferentiated nature of the superficial sand and gravel deposits.

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.

5 Conclusions

The survey has not detected any anomalies that can be considered archaeological. The large areas of magnetic disturbance have been caused by above ground features. Within Field 3 where there was less magnetic disturbance, only responses consistent with the underlying geology have been identified. Consequently the archaeological potential of this site is deemed to be low.

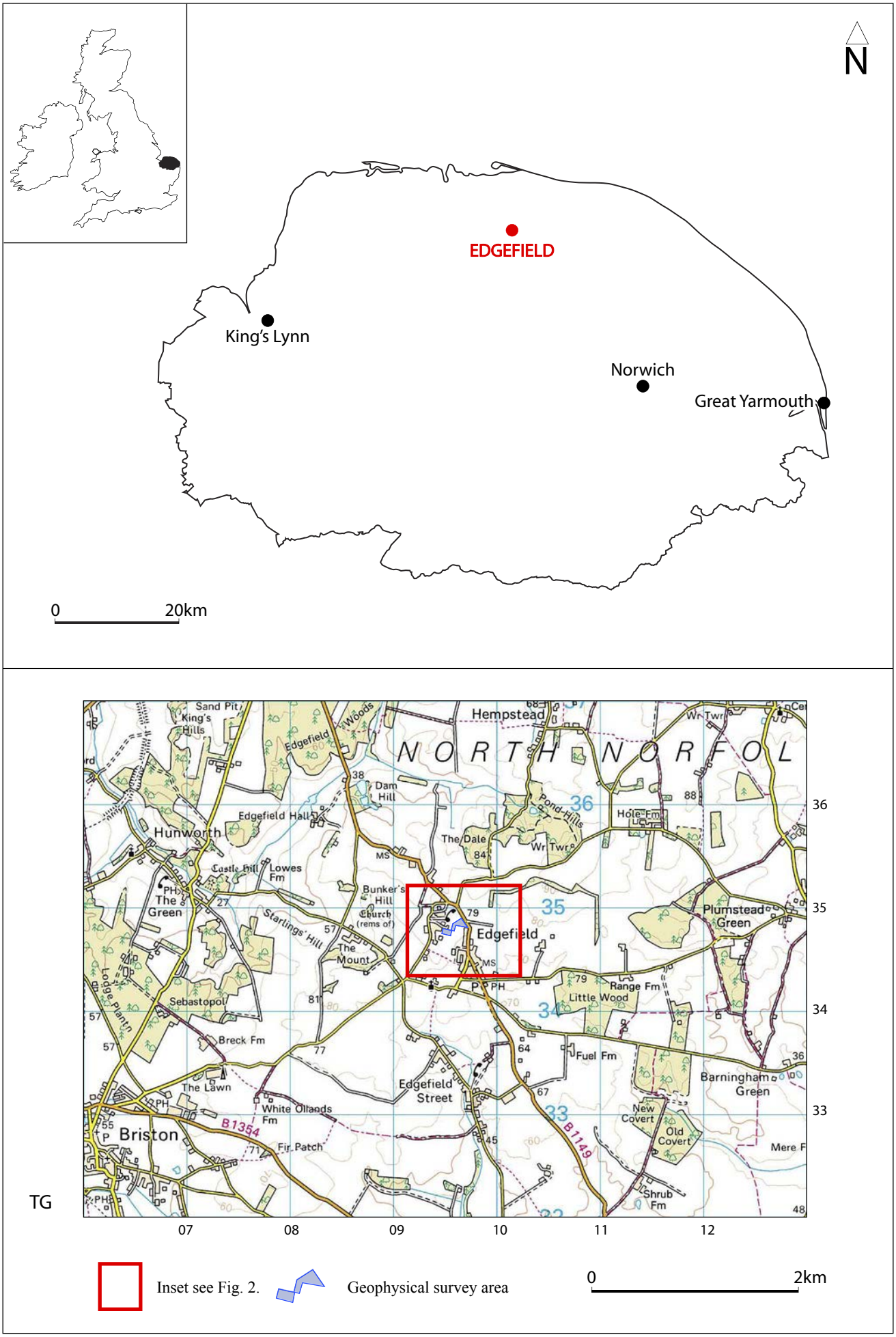

Fig. 1. Site location

PROPOSED DEVELOPMENT BOUNDARY

LOCATION AND DIRECTION OF PLATES

N

3352 00

3350 00

3348 00

3346 00

6092 00

6094 00

6096 00

6098 00

6100 00

6102 00

FIELD 1

FIELD 2

FIELD 3

Old Hall Farm

Track

Pond

Rectory

Road

Abbeyfield

Greenacres

Ninrod

Moorgrass

The Pightles

Hillside

Redgate

Fields View

Allesworth

Victoria Cottage

Hill House

Tobermory House

Dunelin

Edgedfield

80.0m

78.0m

2.0

-1.0

nT

0 50m

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Fig. 2. Survey location showing greyscale magnetometer data (1:3000 @ A3)

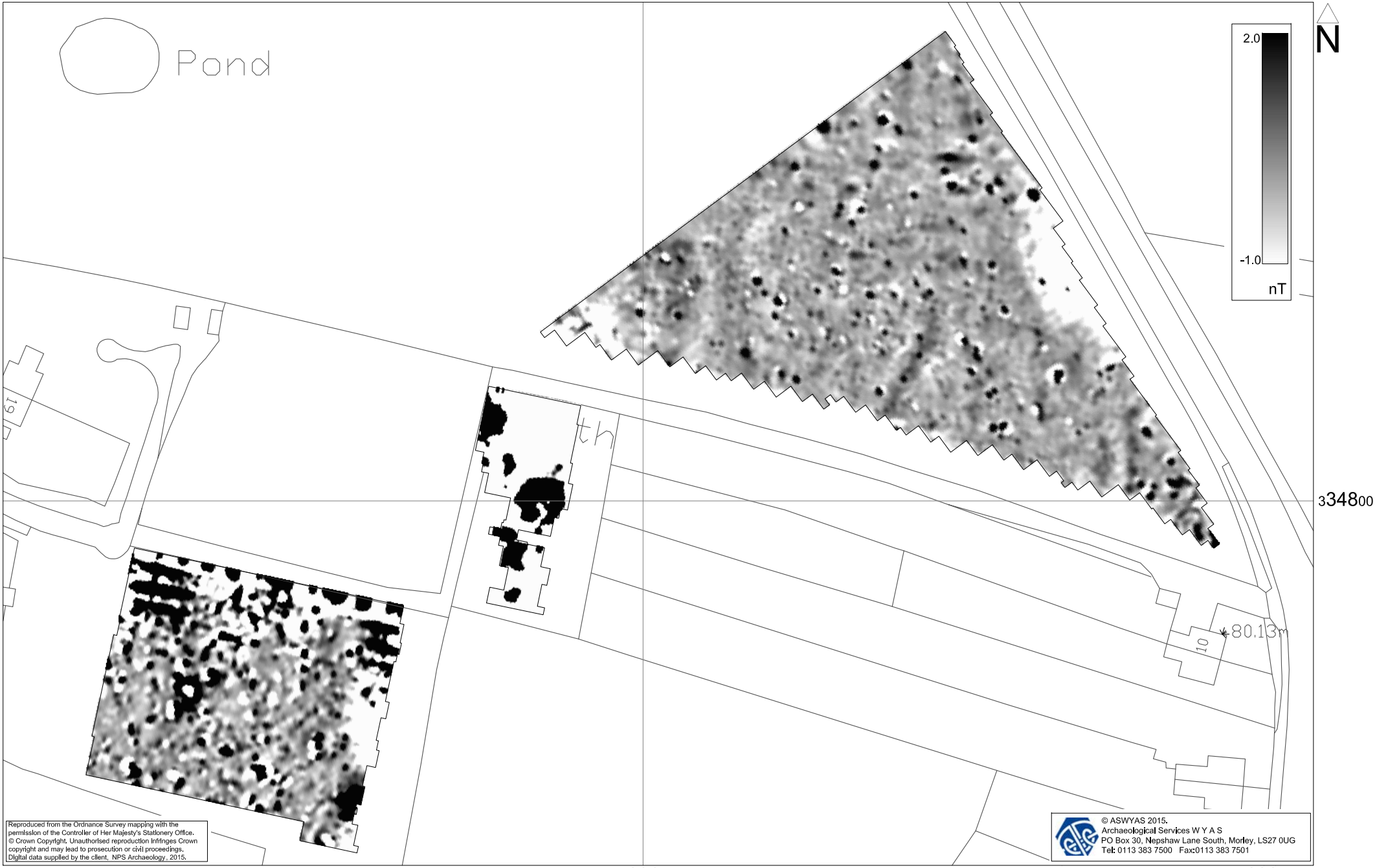


Fig. 3. Processed greyscale magnetometer data (1:1000 @ A4)

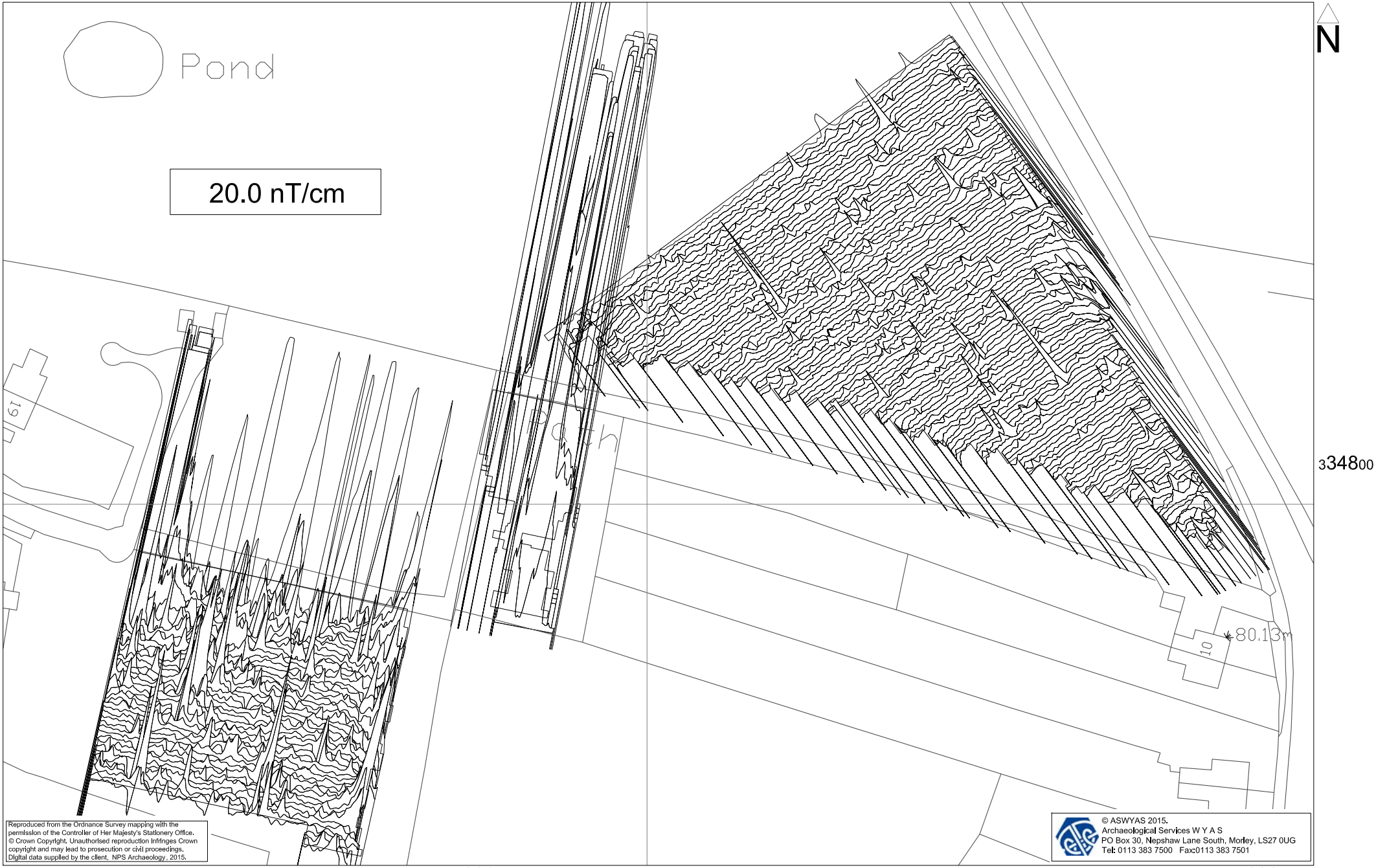


Fig. 4. XY trace plot of minimally processed magnetometer data (1:1000 @ A4)

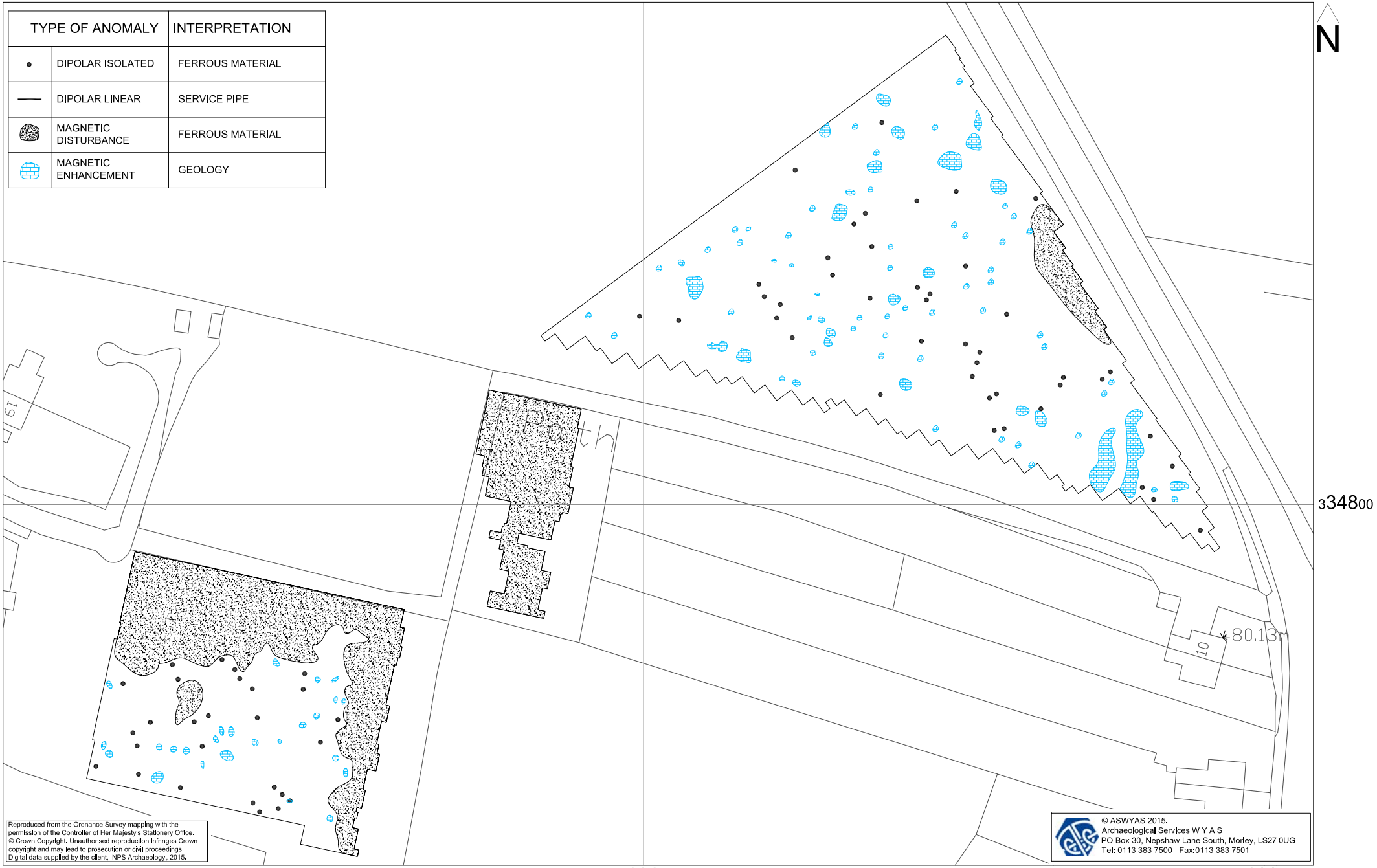


Fig. 5. Interpretation of magnetometer data (1:1000 @ A4)

Plate 1. General view of Field 1, looking south

Plate 2. General view of Field 2, looking north

Plate 3. General view of Field 3, looking 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.

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 has been presented in this report in processed greyscale format. 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.

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

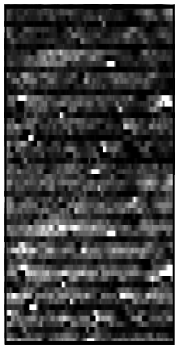
An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The cart data was geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better then 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: Data Repeatability

Data Repeatability

JOB NUMBER	4413	SITE CODE	HRA15	JOB NAME	Land at Holt Road, Edgefield



21/05/2015 Grid surveyed at 12:30 and 16:00

Appendix 4: 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 Norfolk Historic Environment Record).

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