ARCHAEOLOGICAL SERVICES WYAS

Huntingdon Gas Compressor Station Site
Kimbolton
Cambridgeshire

Geophysical Survey

Report no. 2758

May 2015

Client: Hyder Consulting (UK)

REGISTERED ORGANISATION CIfA

Huntingdon Gas Compressor Station Site
Kimbolton
Cambridgeshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey, covering approximately 0.3 hectares, was carried out on agricultural land adjacent to the Huntingdon Gas Compressor Station, prior to the proposed development of the site. Anomalies indicative of a gas pipe and a large area of magnetic disturbance have been identified. On the basis of the survey, the archaeological potential of the site is considered to be very low.

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Report Information

Client:	Hyder Consulting (UK) Ltd.
Address:	The Mill, Brimscombe Port, Stroud, Gloucester GL5 2QG
Report Type:	Geophysical Survey
Location:	Kimbolton
County:	Cambridgeshire
Grid Reference:	TL 116 693
Period(s) of activity:	modern
Report Number:	2758
Project Number:	4382
Site Code:	HGC15
OASIS ID:	archaeol11- 212070
Planning Application No.:	
Museum Accession No.:	n/a
Date of fieldwork:	April 2015
Date of report:	May 2015
Project Management:	Sam Harrison BSc MSc MCIfA
Fieldwork:	Mark Evans BA
	Rebecca Goulding
Report:	Sam Harrison
Illustrations:	Sam Harrison
Photography:	Mark Evans
Research:	n/a

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

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1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by Hyder Consulting (UK) Limited (the Client) on behalf of National Grid, to undertake a geophysical (magnetometer) survey of land surrounding the Huntingdon Gas Compressor Station. The work was undertaken in order to inform a planning application for the proposed development of the site and 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 2015) approved by the Client. The survey was carried out on April 30th 2015 to provide additional information on the archaeological resource of the site.

Site location, topography and land-use

The proposed development area (PDA) comprises of two areas around the Huntingdon Gas Compressor Station, which is 2km north-east of Kimbolton, Cambridgeshire, centred at TL 116 693 (see Fig. 1). Area 1 was located to the north and was unsuitable for survey due to the presence of a gravel car park (see Plate 1). Area 2 was situated to the south of the Gas Compressor Station and west of a Gas Valve Compound and was suitable for survey having been cleared of vegetation (see Plate 2 and Plate 3). The site is flat and situated at approximately 68m above Ordnance Datum (aOD).

Soils and geology

The underlying bedrock comprises mudstone of the Oxford Clay Formation overlain by superficial deposits of till (British Geological Survey 2015). The soils are classified in the Hanslope association, characterised as slowly permeable, calcareous clays (Soil Survey of England and Wales 1983).

2 Archaeological Background

A Cultural Heritage Assessment (Hyder 2014) concluded that the potential for unknown heritage assets to be present within the site is likely to be low. However 200m north-west of Area 2 features indicative of Iron Age activity were recorded.

3 Aims and Methodology

Magnetometer Survey

The aim of the geophysical survey as described in the Project Design (Harrison 2015) is to, as far as possible, identify the presence or absence, and extent and layout, of buried

archaeological remains across the PDA, through the interpretation of magnetic anomalies identified following the processing of data gathered during the survey.

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. Features such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the Earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney and Gater 2003). Further information on types of anomaly is provided as Appendix 1.

On this site Bartington Grad601 magnetic gradiometers were used. These instruments are calibrated to take readings at 0.25m intervals on zig-zag traverses 1m apart within a series of 30m by 30m grids resulting in 3600 readings per 30m grid square. The data is stored in the memory of the instrument before being downloaded to a lap-top computer every day in preparation for data processing and interpretation.

The survey grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model) providing an accuracy greater than 0.01m. The locations of the survey grid and anomalies are available as a DXF file. 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.

Data Processing

The 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. 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'. The data in the greyscale images has been interpolated and selectively filtered, using Geoplot 3 (Geoscan Research) software 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.

Presentation

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 shows the extent of the survey areas together with the processed data at a scale of 1:2500. Detailed data plots ('raw' and processed) and interpretative figures are presented at a scale of 1:1000 in Figures 3 to 5 inclusive.

Further information on magnetic survey and characterisation and interpretation of anomaly types are given in Appendix 1. Appendix 2 describes the composition and location of the site archive and Appendix 3 reproduces the OASIS entry.

The survey methodology, report and any recommendations comply with the Project Design (Harrison 2015) and guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014).

Disclaimers

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.

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.

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

4 Results and Discussion

Area 1 was unsuitable for survey as it was covered by rubble forming a large area of hard standing.

No anomalies of archaeological potential have been identified in the survey of Area 2. The magnetic data in Area 2 is dominated by a high magnitude, dipolar, linear trend anomaly, **A**, on the southern boundary, which is indicative of a ferrous gas pipe leading to/from the Gas Valve Compound.

Within the eastern half of Area 2 a large area of magnetic disturbance, **B**, is evident in the data. This is possibly caused by a ferrous material added to the topsoil during the

construction of the Gas Compressor Station or by the proximity of the Gas Valve Compound and Gas Compressor Station.

Other smaller 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.

5 Conclusions

The magnetometer survey has identified a gas pipe leading to/from the Gas Valve Compound in the south of the survey along with a large area of magnetic disturbance in the east. On the basis of the survey, the archaeological potential of the site is considered to be very low.

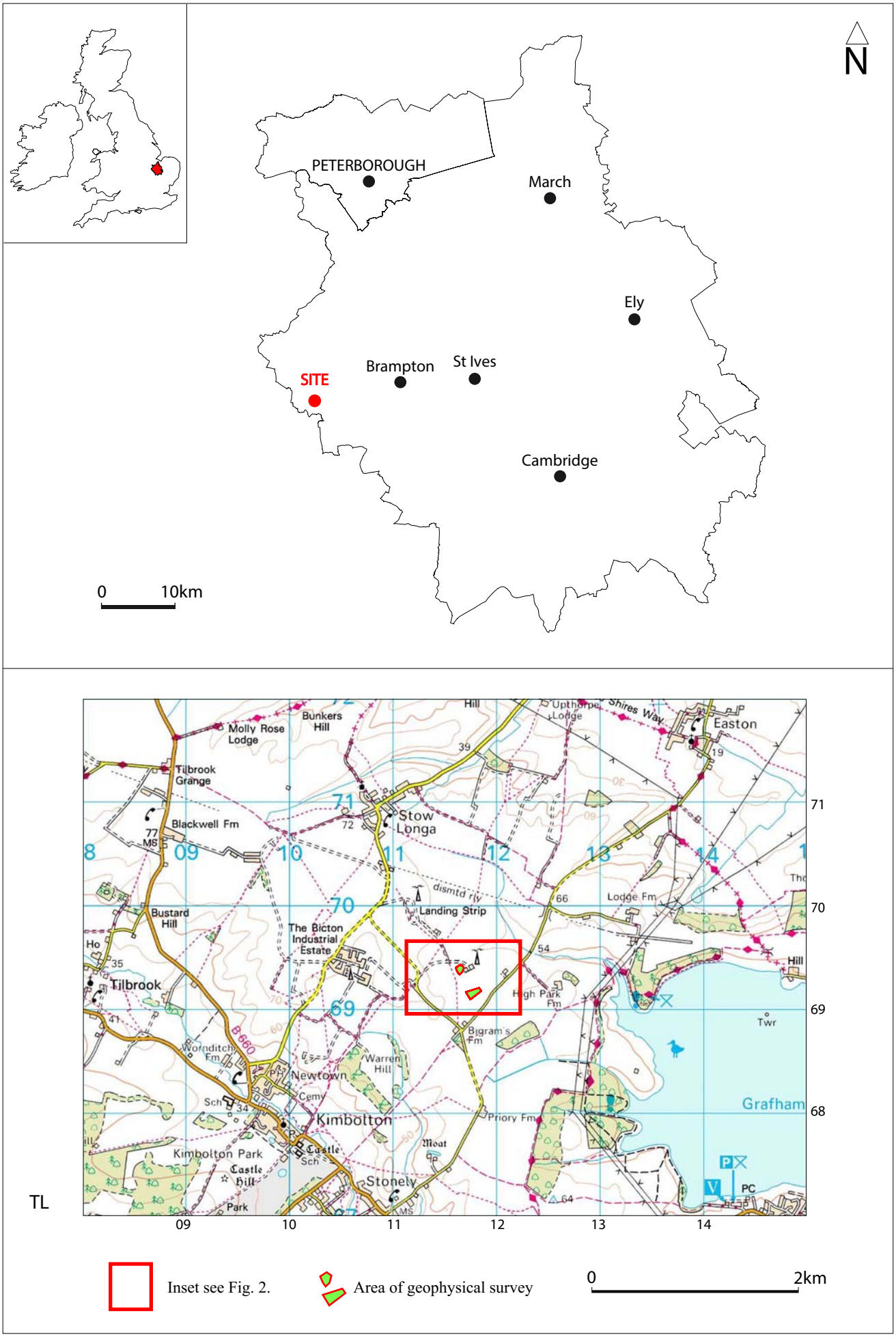

Fig. 1. Site location

	PROPOSED DEVELOPMENT BOUNDARY
1	LOCATION AND DIRECTION OF PLATES
	UNSUITABLE FOR SURVEY

N

269500

FORMER AIRFIELD

AREA 1

GAS COMPRESSOR STATION

GAS VALVE COMPOUND

AREA 2

BIGRIM'S LANE

STOCKING LANE

2.0

-1.0

nT

269000

511500

512000

0 100m

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Fig. 2. Survey location showing greyscale magnetometer data (1:2500 @ A3)

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

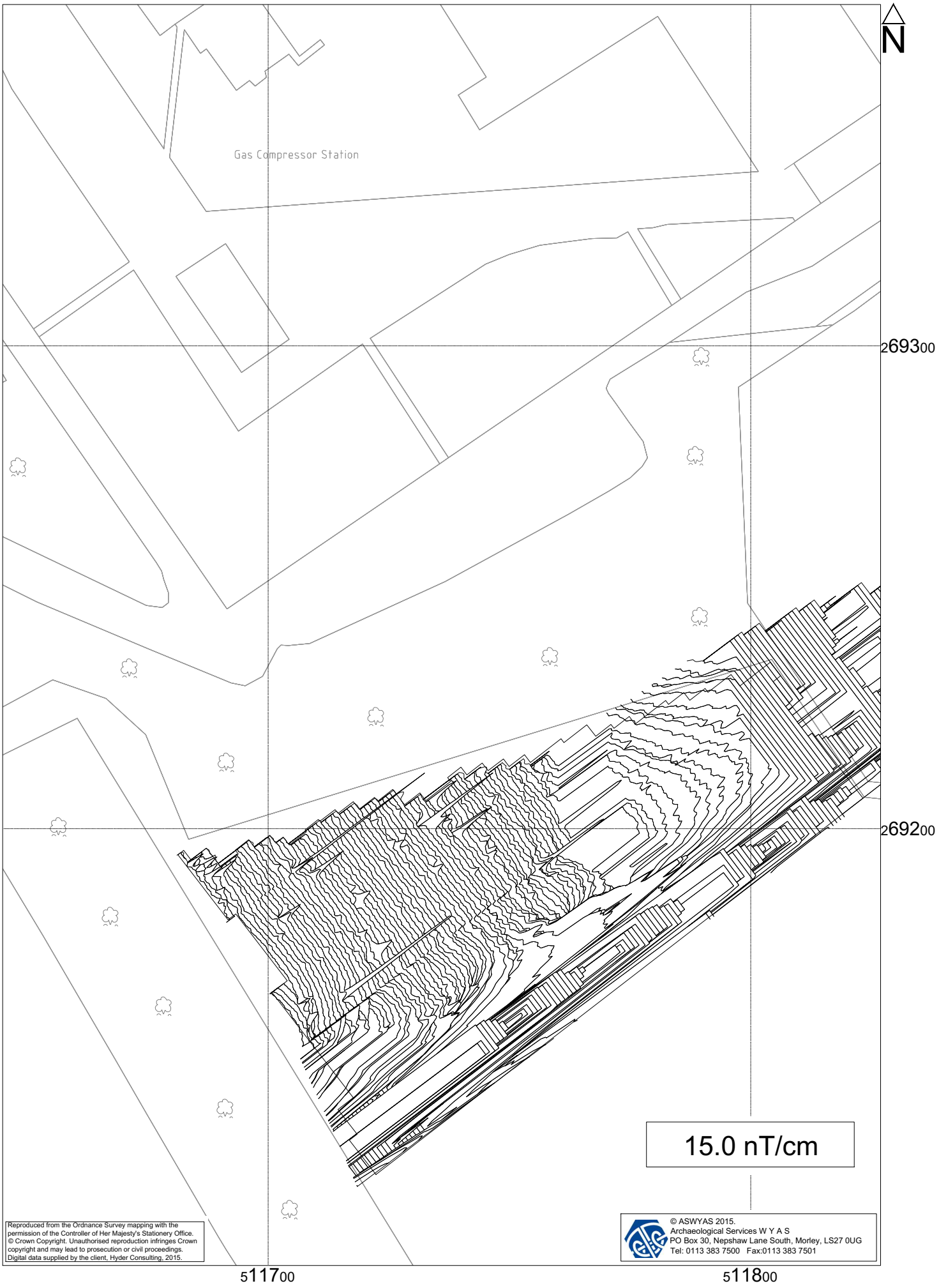

Fig. 4. XY trace plot of minimally processed magnetometer data (1:1000 @ A4)

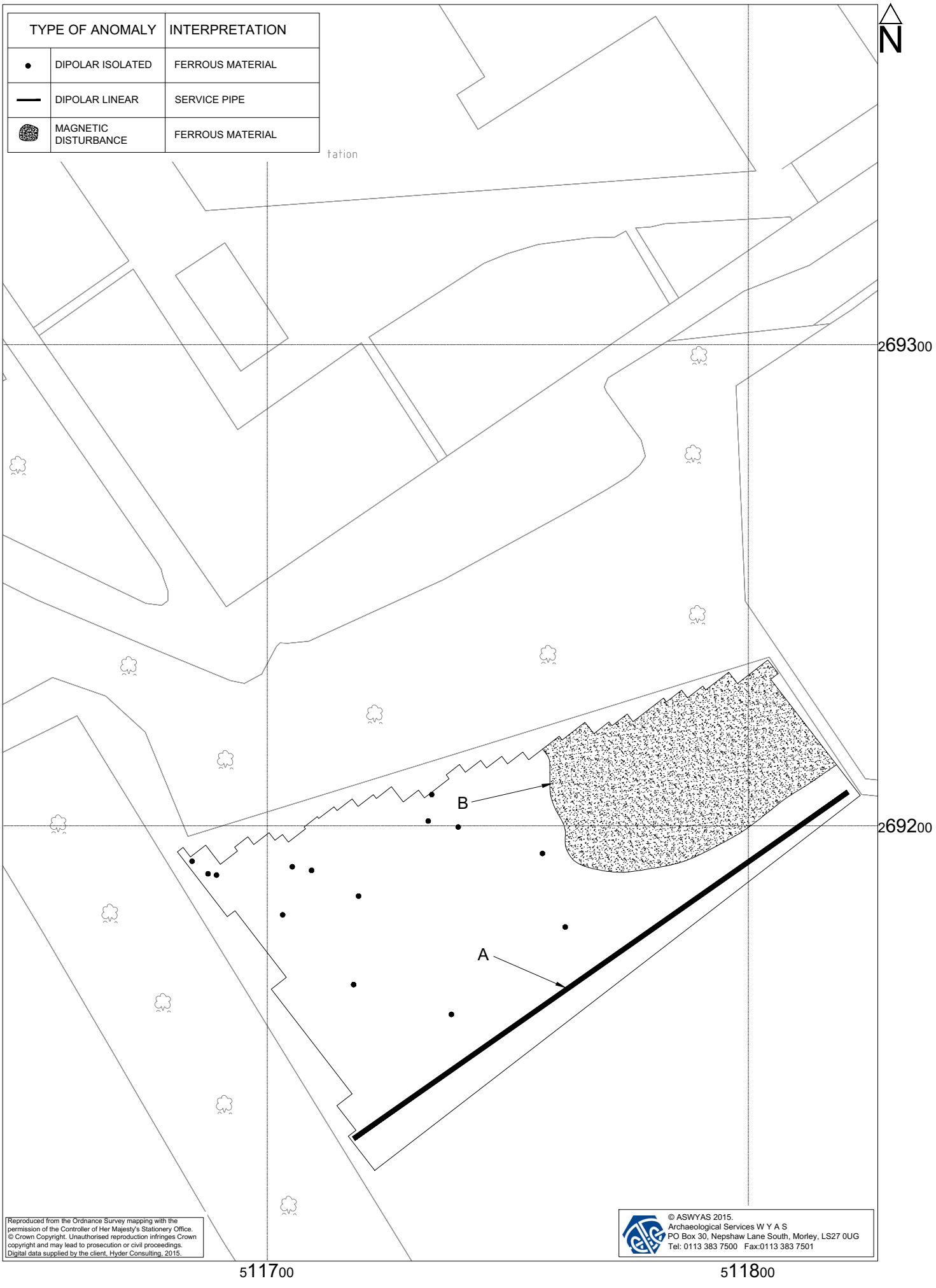

Fig. 5. Interpretation of magnetometer data (1:1000 @ A4)

Plate 1. View of Area 1 showing area unsuitable for survey, looking south-west

Plate 2. General view of Area 2, looking south-west

Plate 3. General view of Area 2, looking north-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.

Appendix 2: 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 with copies supplied to Hyder Consulting.

Appendix 3: 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: archaeol11-212070

Project details

Project name	Huntingdon Gas Compressor Station
Short description of the project	A geophysical (magnetometer) survey, covering approximately 0.3 hectares, was carried out on agricultural land adjacent to the Huntingdon Gas Compressor Station, prior to the proposed development of the site. Anomalies indicative of a gas pipe and a large area of magnetic disturbance have been identified. On the basis of the survey, the archaeological potential of the site is considered to be very low.
Project dates	Start: 30-04-2015 End: 30-04-2015
Previous/future work	Yes / Not known
Any associated project reference codes	HGC15 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Other 15 - Other
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	Pre-application
Solid geology (other)	mudstone of the Oxford Clay Formation
Drift geology	BOULDER CLAY AND MORAINIC DRIFT
Techniques	Magnetometry

Project location

Country	England

Site location	CAMBRIDGESHIRE HUNTINGDONSHIRE KIMBOLTON Huntingdon Gas Compressor Station
Postcode	PE19 5NX
Study area	7506.00 Square metres
Site coordinates	TL 116 693 52.3100578655 -0.362827912981 52 18 36 N 000 21 46 W Point
Height OD / Depth	Min: 68.00m Max: 68.00m

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Hyder Consulting
Project design originator	Archaeological Services WYAS
Project director/manager	T. S. Harrison
Project supervisor	T. S. Harrison.
Type of sponsor/funding body	Developer
Name of sponsor/funding body	National Grid

Project archives

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

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Huntingdon Gas Compressor Station Site Kimbolton Cambridgeshire Geophysical Survey
Author(s)/Editor(s)	Harrison, S
Other bibliographic details	Report No. 2758
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Entered on	26 May 2015

OASIS:

Please e-mail Historic England for OASIS help and advice

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