GEOPHYSICAL SURVEY REPORT G1381

Land at Ferry Road Felixstowe

Client:

On behalf of:

Optima Land and Property

GSB PROSPECTION Ltd

Celebrating over 25 years at the forefront of Archaeological Geophysics

sumo Survey Services

GSB Survey Report No. G1381

Land at Ferry Road, Felixstowe

Contents

List of Figures (Printed and on CD)

List of Archive Figures (on CD only)

Survey Personnel

Field Co-ordinator: Emma Wood BSc MIfA

Report Author: Emma Wood BSc MIfA

Project Assistants: James Lawton BSc MSc, Kathryn Ormston BSc MSc, Emma Watson BSc

Dates

Fieldwork: 2 - 3 December 2013
Report: 13 December 2013

Report Approved: Dr John Gater MIfA FSA

Background Project Details

NGR	TM 315 363
Location	The site is located approximately 17km southeast of Ipswich, on the northern outskirts of Felixstowe, adjacent to Ferry Road.
HER/SMR	Suffolk
District	Suffolk Coastal District
Parish	Felixstowe CP
Topography	Generally flat
Current Land Use	Arable with overgrown areas and stubble.
Soils	Newport 2 association (551e): deep well drained sandy often ferruginous soils (SSEW 1983).
Geology	Red Crag Formation - Sand (BGS 2013).
Archaeology	A WWII pillbox is situated in the east of the site. The desktop study indicates potential for Bronze Age remains (CgMs 2011).
Survey Methods	Detailed magnetometer survey (fluxgate gradiometer)
Study Area	4.5 hectares

Aims

To locate and characterise any anomalies of possible archaeological interest within the study area. The work forms part of a wider archaeological assessment being carried out by **CgMs Consulting** on behalf of **Optima Land and Property**.

Summary of Results

No anomalies of definite archaeology have been recorded within the magnetic data. Sinuous responses throughout the dataset have been categorised as *Uncertain* as they may have an anthropogenic origin but could equally be associated with geological features.

An extant WWII pillbox is located in the east of the site resulting in a strong positive and negative magnetic shadow. Extending eastwards and northwards are negative linear responses which could be associated with service trenches connecting to the pill box.

Method

All survey grid positioning was carried out using Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS equipment. The geophysical survey area is georeferenced relative to the Ordnance Survey National Grid by tying in to local detail and corrected to the OS Mastermap provided by the client. These tie-ins are presented in Figure T1. Please refer to this diagram when re-establishing the grid or positioning trenches.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

All survey work is carried out in accordance with the current English Heritage guidelines (EH 2008).

Data Processing

Data processing was performed as appropriate using an in-house software package (GeoSuB) as outlined below.

Magnetic Data

Zero Mean Traverse, Step Correction (De-stagger) and Interpolation (on the Y axis).

Interpretation

When interpreting the results several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to very specific known features documented in other sources, this is done (for example: *Abbey Wall*, *Roman Road*). For the generic categories levels of confidence are indicated, for example: *Archaeology – ?Archaeology*. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification *?Archaeology*. Details of the data plot formats and interpretation categories used are given in the Appendix: Technical Information at the end of the report.

General Considerations

In the north of the site ground cover consisted of stubble, whilst in the south the area was overgrown grassland. The instruments were slowed down to aid in safe data collection.

1.0 Survey Results - Magnetometer Survey

1.1 No anomalies characteristic of definite archaeology are visible in the magnetic results; sinuous responses are present throughout the dataset but they have been categorised as having *Uncertain Origin*. Whilst an anthropogenic origin is possible, the nature of the anomalies suggests that they are more likely to be geological in nature.

1.2 A large ferrous response [**1**], with both strong positive and negative elements, has been caused by an extant WWII pillbox. A negative linear trend [**2**] appears to lead from the structure on a northwest alignment for approximately 90m and then turns to head north. A second negative trend [**3**], similar in magnetic strength to [**2**], follows the line of an old footpath before veering northwards. It is possible that these are former service trenches, perhaps for telecommunications, linked to the pillbox.

1.3 A handful of trends, categorised as *Uncertain Origin*, could be agricultural in origin or associated with localised variations in the soils.

1.4 The footpath that runs through the centre of the site can be clearly seen in the data. Ferrous responses along the limits of the survey are due to the road, nearby dwellings and metal fencing. Smaller scale ferrous responses are probably due to modern debris within the topsoil or on the surface. These can best be seen in the XY trace plots located on the Archive CD.

2.0 Conclusions

2.1 The magnetic survey has detected what appears to be service trenches associated with a WWII pillbox. No clear anomalies of greater antiquity have been detected.

2.2 Spurious responses within the data are likely to be geological; however, an anthropogenic origin cannot be dismissed.

References

BGS 2013 British Geological Survey, Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html 1:50 000 scale geology, centred on 631532 236392. Accessed 12/12/2013

CgMs 2011 *Archaeological Desk based Assessment: Land at Ferry Road, Felixstowe, Suffolk*. CgMs unpublished report.

EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Portsmouth.

SSEW 1983 *Soils of England and Wales. Sheet 4, Eastern England*. Soil Survey of England and Wales, Harpenden.

N

0 metres 2000

1:50,000 @ A4

Site Location

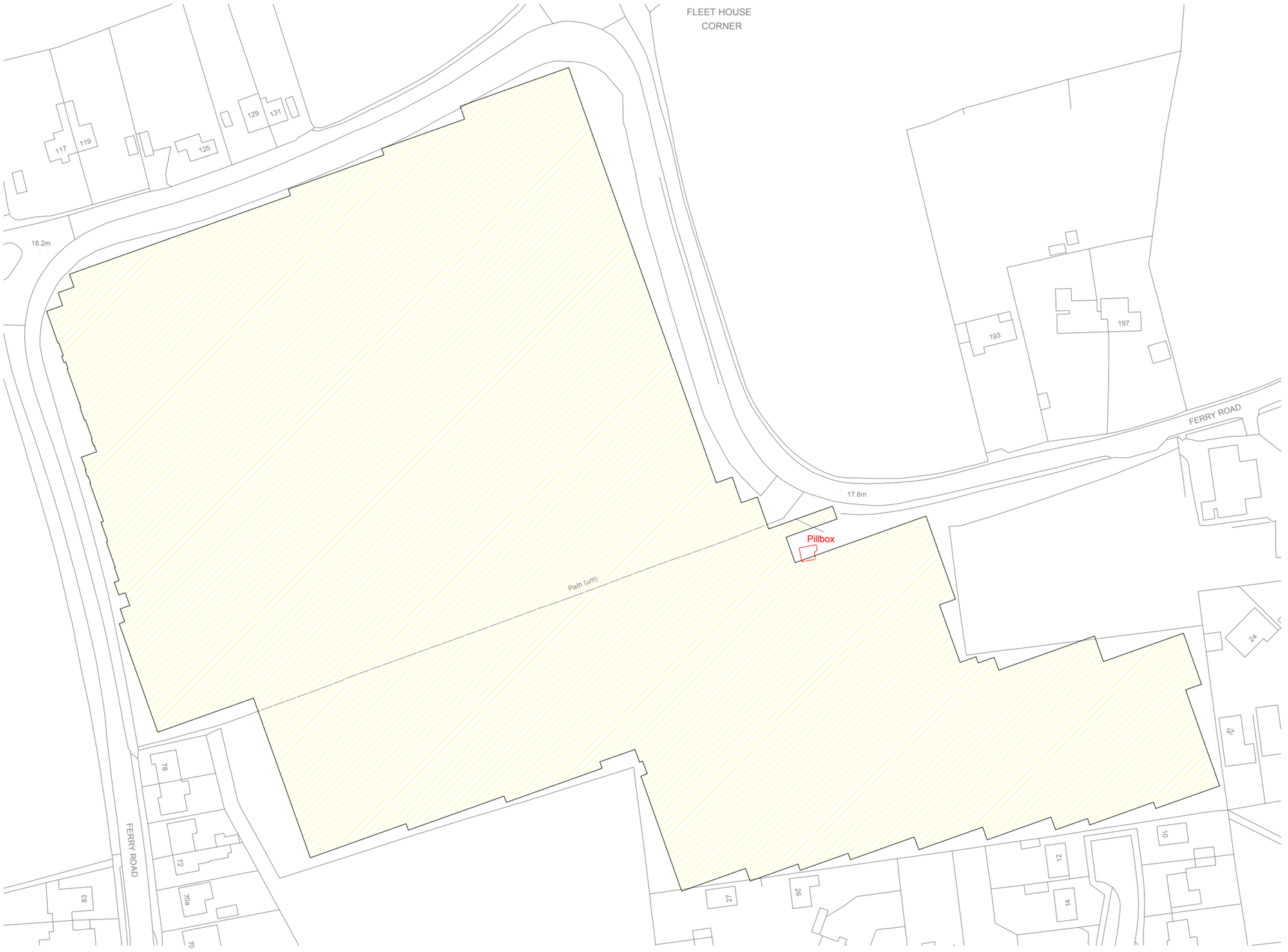
GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

Project: G1381 Ferry Road, Felixstowe

Title: Site Location Diagram

Drawn by: JMT

Figure 1



N

0 metres 50

1:1250 @ A3

Gradiometer Survey

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW

+44 (0)1274 835016

Project: G1381 Ferry Road, Felixstowe

Title: Location of Survey Area

Drawn by: ELWood

Figure 2

N

0 metres 50

1:1250 @ A3

2
nT
-1

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

Project: G1381 Ferry Road, Felixstowe

Title: Magnetometer Survey - Greyscale Plot

Drawn by: ELWood

Figure 3

N

0 metres 50

1:1250 @ A3

- Uncertain Origin (increased response)
- Uncertain Origin (discrete anomaly / trend)
- ?WWII Service (negative response)
- ?Ploughing
- Footpath
- Ferrous

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

Project: G1381 Ferry Road, Felixstowe

Title: Magnetometer Survey - Interpretation Plot

Drawn by: ELWood

Figure 4

Appendix - Technical Information: Magnetometer Survey

Instrumentation: Geoscan FM36/256 and Bartington *Grad*601-2

Both the Geoscan and Bartington instruments operate in a gradiometer configuration which comprises two fluxgate sensors mounted vertically a set distance apart; on the Geoscan instruments this is 0.5m, on the Bartington, 1m. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried by hand, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method. Having two gradiometer units mounted laterally with a separation of 1000mm, the Bartington instrument can collect two lines of data per traverse.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (Destagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points along a traverse (the x axis) and/or between traverses (the y axis) and results in a smoother greyscale image.

Display

XY Trace Plot	This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane.
Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.
3D Surface Plot	This is similar to the XY trace, but in 3 dimensions. Each data point of a survey is represented in its relative position on the x and y axes and the data value is represented in the z axis. This gives a digital terrain, or topographic effect.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological and /or if corroborative evidence is available These anomalies, whilst considered anthropogenic, could be of any age.
?Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Increased Magnetic Response	An area where increased fluctuations attest to greater magnetic enhancement of the soils, but no specific patterns can be discerned in the data and no visual indications on the ground surface hint at a cause. They may have some archaeological potential, suggesting damaged archaeological deposits.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Old Field Boundary	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases the response may be the result of more recent agricultural activity.
Ploughing	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions. Smaller, isolated responses which do not form such obviously 'natural' patterns but which are, nonetheless, likely to be natural in origin may be classified as *?Natural*.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *? Archaeology* and *?Natural* or (in the case of linear responses) *?Archaeology* and *?Ploughing*; occasionally they are simply of an unusual form.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

N

0 metres 20

1:500 @ A0

15 nT

Y axis plot scale: 15nT/cm
Clip levels: +/-15nT

2
nT
-1

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

GSB PROSPECTION Ltd

Project: G1381 Ferry Road, Felixstowe

Title: Magnetic Data:
XY Trace Plot & Greyscale Plot

Drawn by: ELWood

Figure A1

N

0 metres 50

1:1250 @ A3

Point	Eastings	Northings	Notes
1	631433.404	236443.242	grid point
2	631546.469	236483.460	grid point
3	631483.738	236301.889	grid point
4	631596.735	236342.132	grid point
A	631634.670	236374.677	pillbox
B	631635.526	236370.474	pillbox

The above points are RAW GPS co-ordinates. If re-establishinhg the grid or positioning trenches please use points A-B for reference.

Selected GPS Points

30m Grid Division

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

Project: G1381 Ferry Road, Felixstowe

Title: Tie-in Diagram

Drawn by: ELWood

Figure T1

GSB

PROSPECTION Ltd

Celebrating over 25 years at the
forefront of archaeological geophysics

sumo Survey Services

Tel: +44 (0)1274 835016
Fax: +44 (0)1274 830212
Email: gsb@gsbprospection.com
Web: www.gsbprospection.com

GSB Prospection Ltd. Registered in England, Registration Number: 4783292. VAT Registration Number: 516177841
Registered Office: Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL