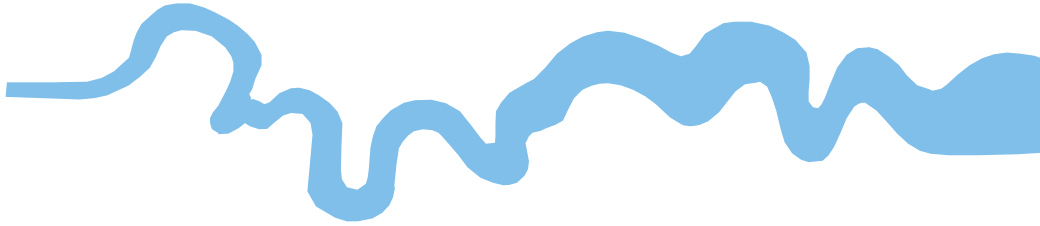


T V A S



EAST MIDLANDS

**Land off Falcon Road,
Snetterton, Norfolk**

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code:FRS22/62

(TM 0031 9032)

Land off Falcon Road, Snetterton, Norfolk

Geophysical Survey (Magnetic) Report For Boudica Developments

by Kyle Beaverstock

TVAS East Midlands

Site Code FRS 22/62

March 2022

Summary

Site name: Land off Falcon Road, Snetterton, Norfolk

Grid reference: TM 0031 9032

Site activity: Magnetometer survey

Date and duration of project: 10th of March 2022

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: FRS22/62

Area of site: c. 8ha

Summary of results: No features of archaeological interest were detected by the geophysical survey.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

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www.tvas.co.uk/reports/reports.asp.*

Report edited/checked by: Steve Ford✓ 29.03.22 Tim Dawson✓ 29.03.22
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Land off Falcon Road, Snetterton, Norfolk A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 22/62

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Falcon Road, Snetterton, Norfolk (TM 0031 9032) (Fig. 1). The work was commissioned by Lanpro on behalf of Boudica Developments.

Planning permission is being sought for the construction of two industrial units and associated facilities at Falcon Road, Snetterton, Norfolk. The fieldwork was undertaken by Kyle Beaverstock between the 16th and 17th March 2022 and the site code is FRS22/62. This has been undertaken in accordance with the *National Planning Policy Framework* (NPPF 2021).

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located in Snetterton, approximately 15km north-east of Thetford on the northwestern side of the A11. The site is bounded by arable farmland to the south and west, industrial units to the north and the A11 to the east. This relatively flat rectangular parcel of land sits at a height of 43m above Ordnance Datum and the underlying geology is stated as Glacial Sand and Gravel (BGS 1989).

Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating zig-zag pattern along a south-west to north-east orientation across the survey area. No significant obstructions were encountered during the survey other than a refuse pile in the north-west of the site. Conditions were dry and bright.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both European Archaeological Council (EAC 2015) and the Chartered Institute *for* Archaeologists (2002, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10 mounted at the rear of the cart. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	Effect
Clip from -5.50 to 5.53 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.
De-stagger: all grids, both by -1 intervals	Cancel out effects of site's topography on irregularities in the traverse speed.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 2) with the processed data then presented as a second figure (Fig. 3), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 2.18.15 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

A number of anomalies were detected by the geophysical survey. These take the form of linear features and small clusters and are represented by a bipolar and dipolar positive and negative responses with a very high amplitude. It is very likely that this indicates the presence of ferrous material being present and the linear form indicates that they are the outline of a structure or series of structures which appear to represent modern features associated with the former pig farm which occupied the site until recently. In the north of the site a large area of

magnetic debris was detected, this consisted of positive and negative responses of a relatively high amplitude in an irregular pattern over a large area, this can indicate the presence of buried debris or a highly disturbed natural geology. It is unlikely that, due to the amount and strength of these signals, these are of an archaeological nature and are likely to again relate to modern activity relating to the former pig farm.

Conclusion

The geophysical survey revealed a large number of anomalies across the site. These however mostly consist areas of magnetic debris and magnetic disturbance and suggest that the site is heavily disturbed most likely from the former pig farm that previously occupied the site. No features of archaeological interest were detected.

References

- BGS, 1989, *British Geological Survey*, 1:50,000, Sheet 175, Solid and Drift Edition, Keyworth
- CI/A, 2014, 'Standard and Guidance for archaeological geophysical survey', Reading
- EAC, 2015, *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*, EAC Guidelines 2, Namur
- IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading
- NPPF, 2021, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London

Appendix 1. Survey and data information

Programme:

Name: TerraSurveyor
Version: 3.0.25.0

Raw data

Filename: Snetterton A RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 600131.399566933, 290376.899507113 m
Southeast corner: 600479.929566933, 290184.369507113 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions

Survey Size (meters): 349 m x 193 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 145631, Recorded: 145631

Stats

Max: 107.13
Min: -109.74
Std Dev: 18.26
Mean: -0.76
Median: 0.34
Composite Area: 6.7102 ha
Surveyed Area: 4.5837 ha

Filename: Snetterton B RAW.xcp

Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 600144.949119156, 290450.00824378 m
Southeast corner: 600492.699119156, 290326.63824378 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions

Survey Size (meters): 348 m x 123 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 74383, Recorded: 74383

Stats

Max: 107.65
Min: -109.76
Std Dev: 24.39
Mean: -2.78
Median: -1.48
Composite Area: 4.2902 ha
Surveyed Area: 2.3912 ha

Processed data

Filename: Snetterton A.xcp
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.62
Mean: -0.28
Median: 0.02
Composite Area: 6.7102 ha
Surveyed Area: 4.5624 ha

GPS based Proce8

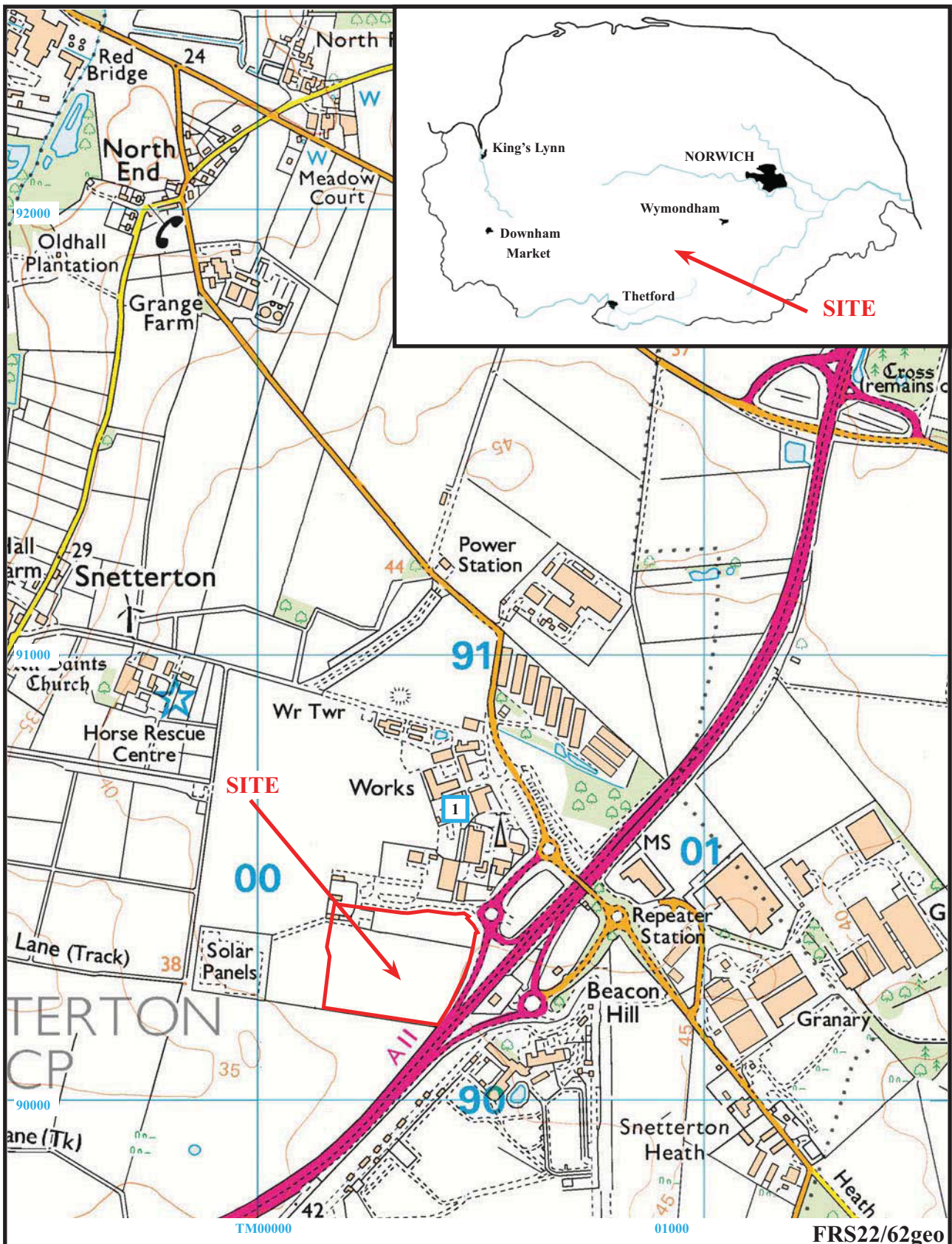
- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to UTM).
- 3 DeStripe Median Traverse:
- 4 Clip from -5.00 to 5.00
- 5 DeStagger by: 50.00cm, Shift Positions
- 7 DeStagger by: 50.00cm, Shift Positions
- 8 DeStagger by: 50.00cm, Shift Positions

Filename: Snetterton B.xcp

Stats
Max: 5.53
Min: -5.50
Std Dev: 3.13
Mean: -0.11
Median: 0.05
Composite Area: 4.2902 ha
Surveyed Area: 2.3801 ha

GPS based Proce7

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to UTM).
- 3 DeStripe Median Traverse:
- 4 Clip from -5.00 to 5.00
- 5 DeStagger by: 50.00cm, Shift Positions
- 6 DeStagger by: 50.00cm, Shift Positions
- 7 DeStagger by: 50.00cm, Shift Positions



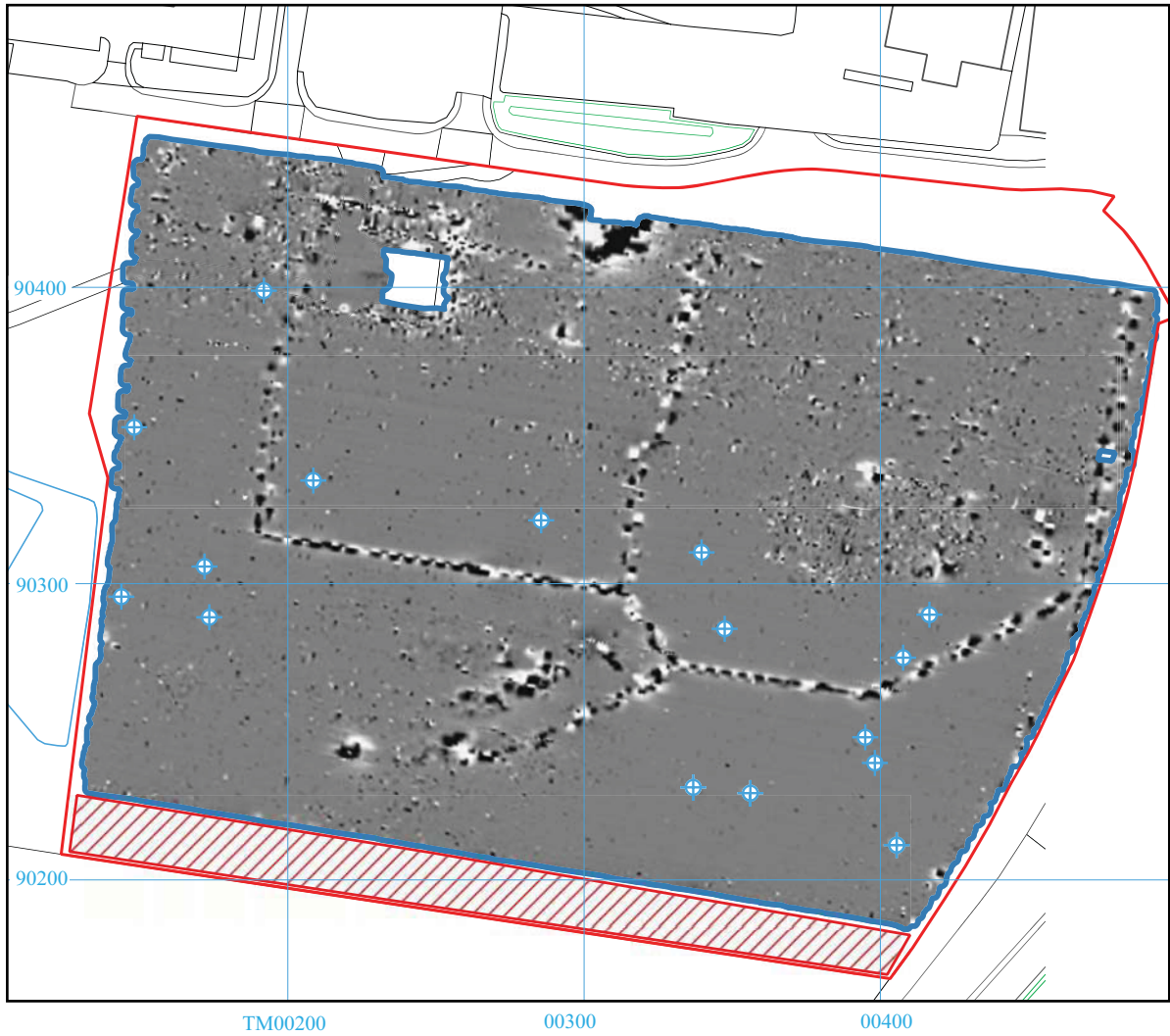
**Land off Falcon Road, Snetterton,
Norfolk, 2022**

Geophysical Survey (Magnetic)

Figure 1. Location of site within Snetterton and Norfolk.

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THAMES VALLEY
ARCHAEOLOGICAL
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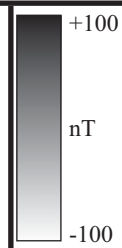


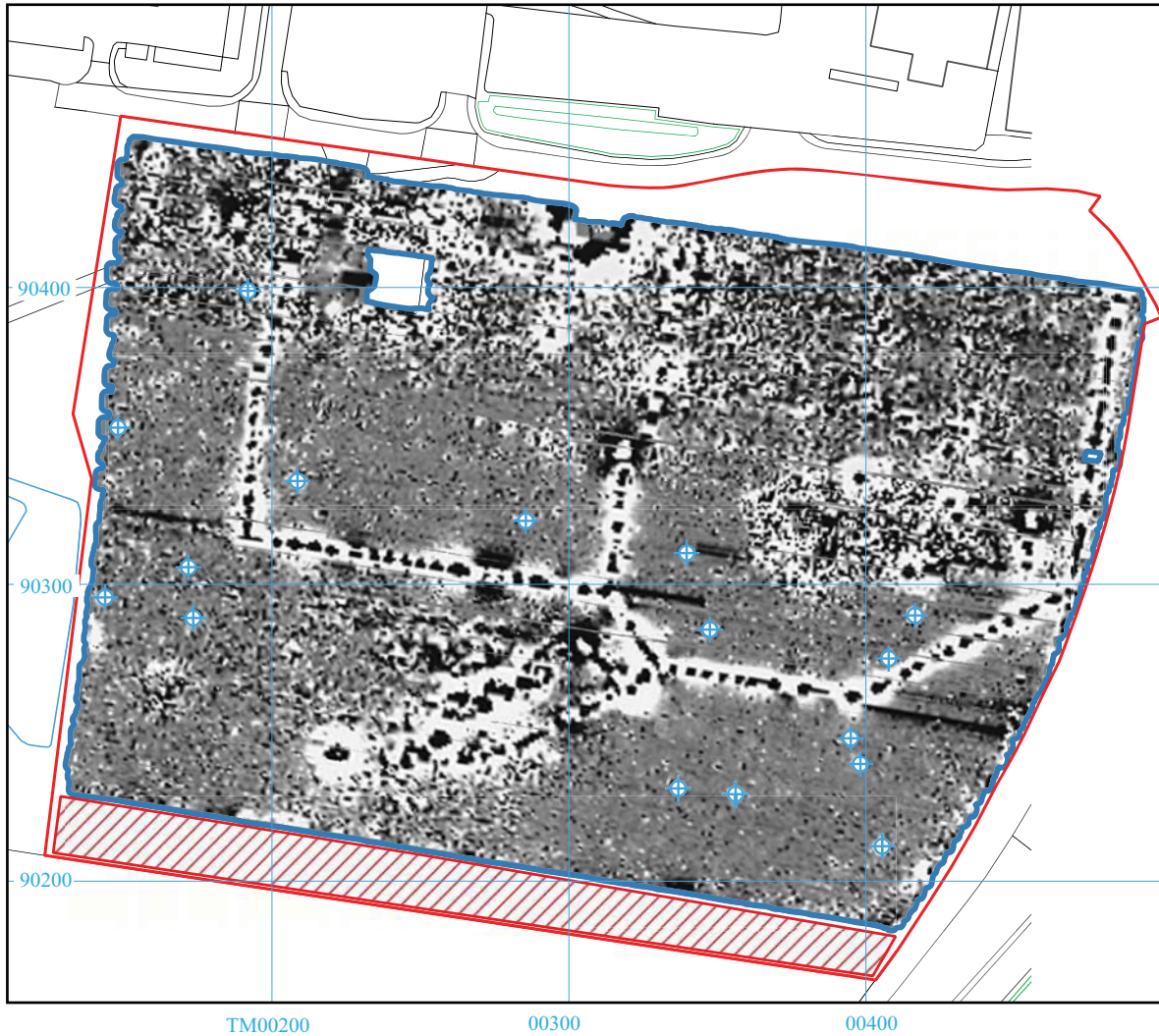
FRS 22/62



**Land off Falcon Road, Snetterton,
Norfolk, 2022**
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.

0m 100m



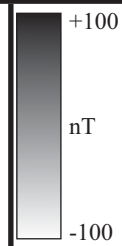


FRS 22/62







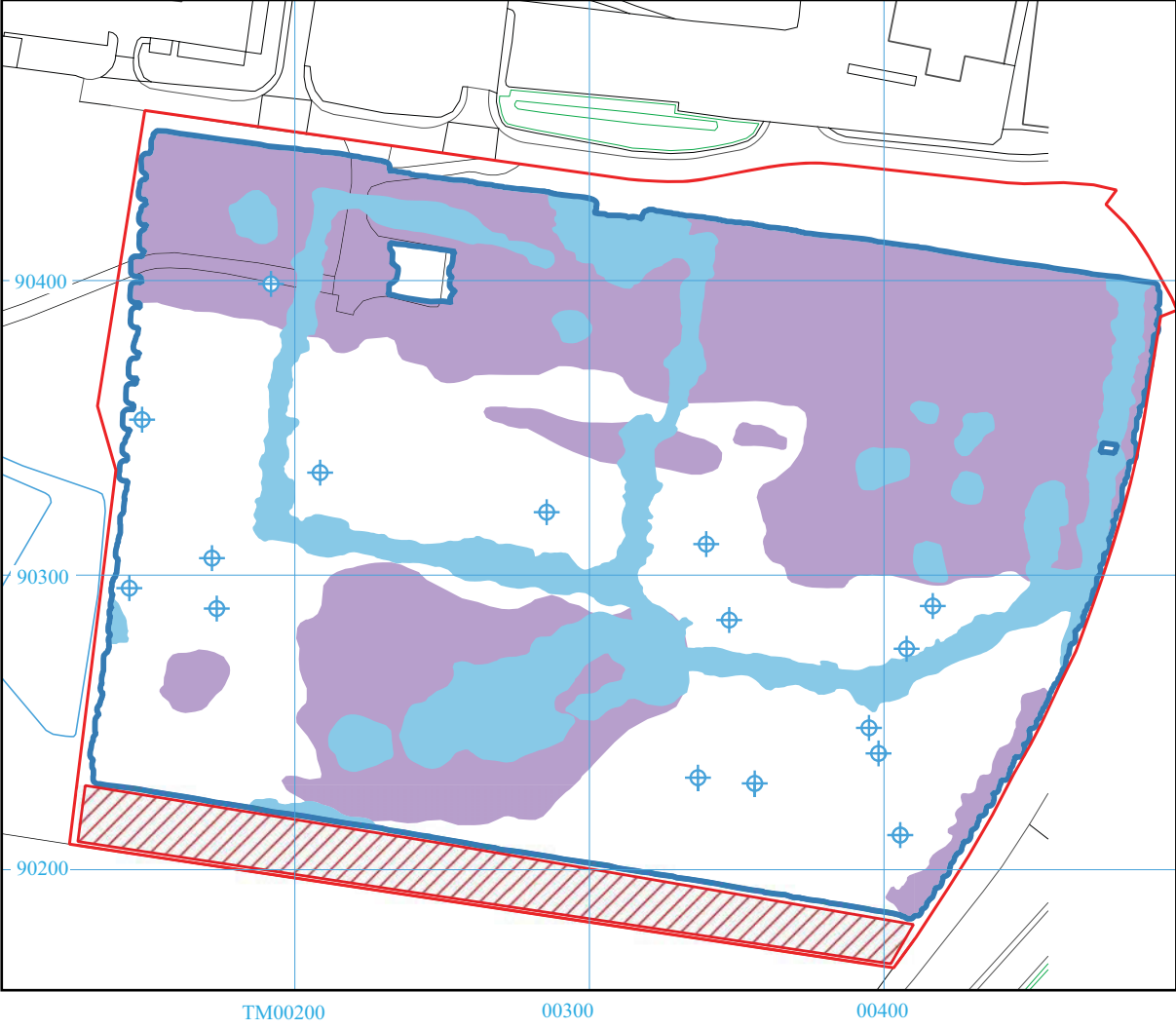
**Land off Falcon Road, Snetterton,
Norfolk, 2022
Geophysical Survey (Magnetic)**

Figure 3. Plot of processed gradiometer data.



Legend

-  Ferrous spike - probable ferrous object
-  Magnetic disturbance caused by nearby metal objects/services
-  Scattered ferromagnetic debris
-  Embankment



FRS 22/62



**Land off Falcon Road, Snetterton,
Norfolk, 2022
Geophysical Survey (Magnetic)**

Figure 4. Interpretation plot.





Plate 1. Concreted area including spoil piles and survey area looking south-east from the north-west corner.



Plate 2. Survey area including embankment looking east along the southern boundary from the south-west corner.

FRS 22/62

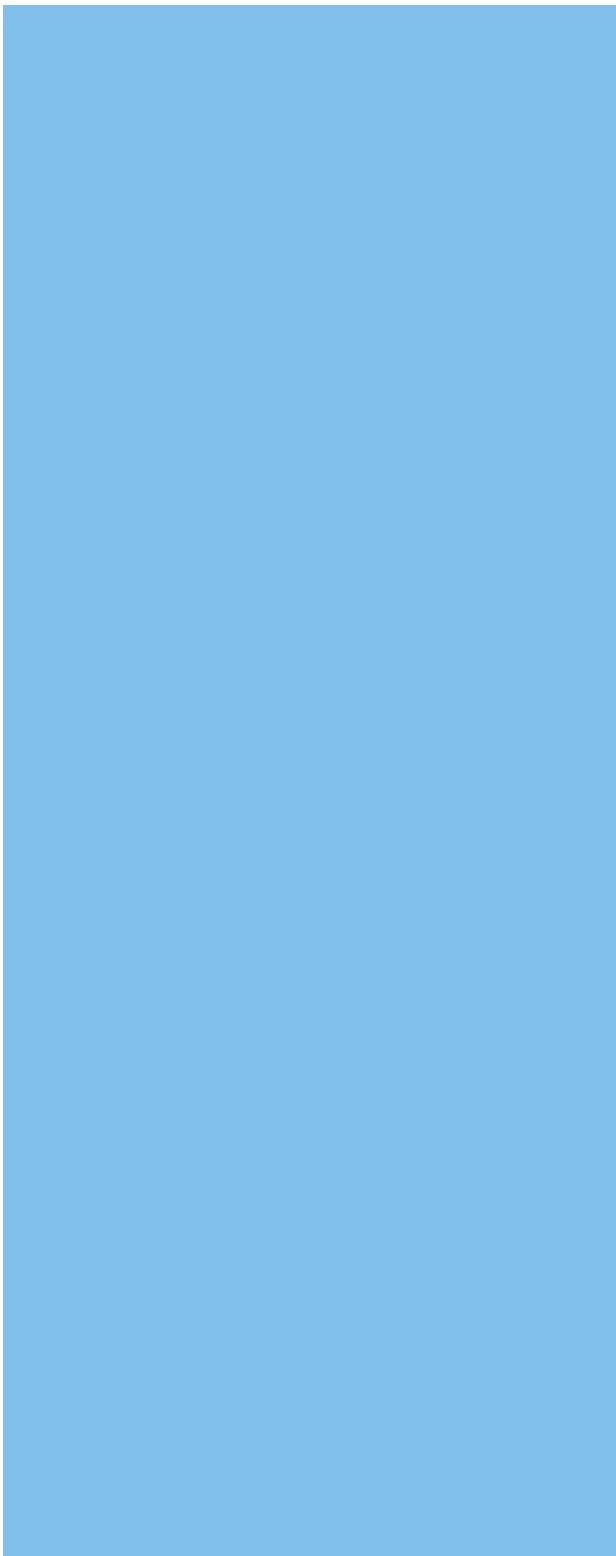
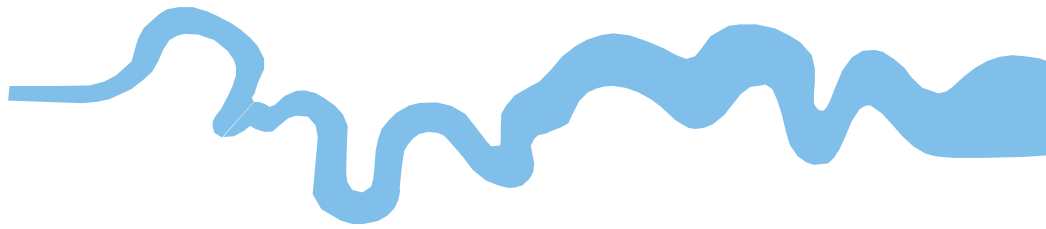
**Land off Falcon Road, Snetterton,
Norfolk, 2022
Geophysical Survey (Magnetic)
Plates 1 and 2.**



TIME CHART

	Calendar Years
Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43 AD 0 BC
Iron Age _____	750 BC
Bronze Age: Late _____	1300 BC
Bronze Age: Middle _____	1700 BC
Bronze Age: Early _____	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC





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