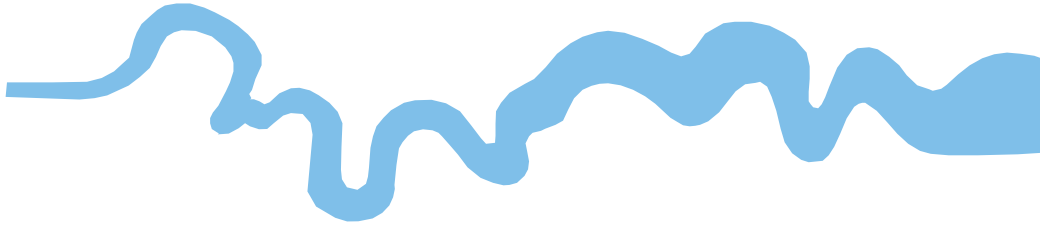


**T V A S**



**EAST MIDLANDS**

**Land west of Station Road,  
Kimbolton, Cambridgeshire**

**Geophysical Survey (Magnetic)**

**by Kyle Beaverstock**

**Planning ref: 18/01411/FUL  
CHER Event: ECB6225**

**Site Code: SRK20/52**

**(TL 0953 6829)**

# **Land west of Station Road, Kimbolton, Cambridgeshire**

**Geophysical Survey (Magnetic) Report**

**For Bewick Homes Limited**

**Planning ref: 18/01411/FUL**

**CHER Event: ECB6225**

By Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code SRK 20/52

**May 2020**

## Summary

**Site name:** Land west of Station Road, Kimbolton, Cambridgeshire

**Grid reference:** TL 0953 6829

**Site activity:** Magnetometer survey

**Date and duration of project:** 18<sup>th</sup> May 2020

**Project coordinator:** Tim Dawson

**Site supervisor:** Kyle Beaverstock

**Site code:** SRK20/52

**CHER event number:** ECB6225

**Area of site:** c.1.5ha

**Summary of results:** A number of magnetic disturbances were encountered by the geophysical survey; however, these were most likely caused modern disturbances such as buried services.

**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](http://www.tvas.co.uk/reports/reports.asp).*

Report edited/checked by: Steve Ford✓ 19.05.20 Tim Dawson✓ 19.05.20
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# Land west of Station Road, Kimbolton, Cambridgeshire A Geophysical Survey (Magnetic)

by Kyle Beaverstock

**Report 20/52**

## **Introduction**

This report documents the results of a geophysical survey (magnetic) carried out at Station Road, Kimbolton, Cambridgeshire (TL 0955 6831) (Fig. 1). The work was commissioned by Mr Josh Twigden on behalf of Bewick Homes Ltd, 40 Mill Street, Bedford, MK40 3HD.

Planning permission (18/01411/FUL) has been gained from Huntingdonshire District Council to develop the site for housing. The consent is subject to a condition (8) relating to archaeology. This is in accordance with the *National Planning Policy Framework* (NPPF 2019) and the District's policies on archaeology. The field investigation was carried out to a specification approved by Mr Andy Thomas, Senior Archaeologist for Cambridgeshire County Council. The fieldwork was undertaken by Kyle Beaverstock on the 18<sup>th</sup> May 2020 and the site code is SRK 20/52.

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 on the northwest fringes of Kimbolton. The site is bounded by the Kym River in the west and south, residential property to the north and Station Road to the east. The site has a gentle slope from 36m in the north to 35m above Ordnance Datum in the south. The underlying geology is stated as Oxford Clay Formation (BGS 2007).

## **Site history and archaeological background**

The archaeological potential of the site has been highlighted in a brief for the project prepared by Mr Andy Thomas of Cambridgeshire County Council Historic Environment Team drawing on records from the Cambridgeshire HER. In summary, the site lies to the north-west of the historic village of Kimbolton. A series of earthworks suggesting rectilinear ditched enclosures and platforms, pits and linear banks are spread along both sides of the River Kym to the north-west of the site (HER MCB26598). These are likely to be the remains of a

deserted medieval village, possibly the 14<sup>th</sup> century settlement of Werkwell. Kimbolton appears in Domesday Book of 1086 as a large settlement with a mill and church and a population of 121 households (Williams and Martin 2002). The settlement includes a castle which is located to the south east of the village.

## **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 on a northwest to southeast orientation across the survey area. A number of obstructions were encountered including temporary cabins, fencing and heavily disturbed ground which prevented these areas from being surveyed. The conditions on site 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.

<b>Process</b>	<b>Effect</b>
Clip from -7.56 to 7.39 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

The results of the geophysical survey showed a significant amount of magnetic disturbance (Fig. 2). These include a number of dipolar and bipolar linear anomalies (Fig. 3) such as two parallel features orientated northwest to southeast which were caused by fencing (Fig. 4). To the east of these are several other linear anomalies, which appear to match service plots for foul water drainage. In the northeast and southeast are several sub-circular areas of disturbance which correspond to manholes seen on site and in the southeast, to the south of the cabin area, is an area of magnetic debris. This is an area of disturbed ground which may account for the mixed strong positive and negative responses.

## Conclusion

A number of magnetic disturbances were encountered by the geophysical survey; however, these were most likely caused modern disturbances such as services, fencing and temporary structures. There is the possibility that these stronger magnetic anomalies mask weaker ones caused by buried features of archaeological interest.

## References

- BGS, 2007, *British Geological Survey*, 1:50,000, Sheet 186, Bedrock and Superficial 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, 2019, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London
- Williams, A and Martin, G H, 2002, *Domesday Book: A Complete Translation*, London

## Appendix 1. Survey and data information

### Programme:

Name: TerraSurveyor  
Version: 3.0.25.0

### Raw data

Filename: Kimbolton RAW.xcp  
Instrument Type: MLgrad Import  
Units:  
UTM Zone: 30U  
Survey corner coordinates (X/Y):  
Northwest corner: 677577.699314299, 5797933.28782252 m  
Southeast corner: 677677.409314299, 5797753.23782252 m  
Direction of 1st Traverse: 90 deg  
Collection Method: Parallel  
Sensors: 2 @ 1 m spacing.  
Dummy Value: 32702

### Dimensions

Survey Size (meters): 99.7 m x 180 m  
X&Y Interval: 0.13 m  
Source GPS Points: Active: 27267, Recorded: 27267

### Stats

Max: 107.65  
Min: -109.76  
Std Dev: 18.08  
Mean: -4.27  
Median: -3.88  
Composite Area: 1.7953 ha  
Surveyed Area: 0.76035 ha

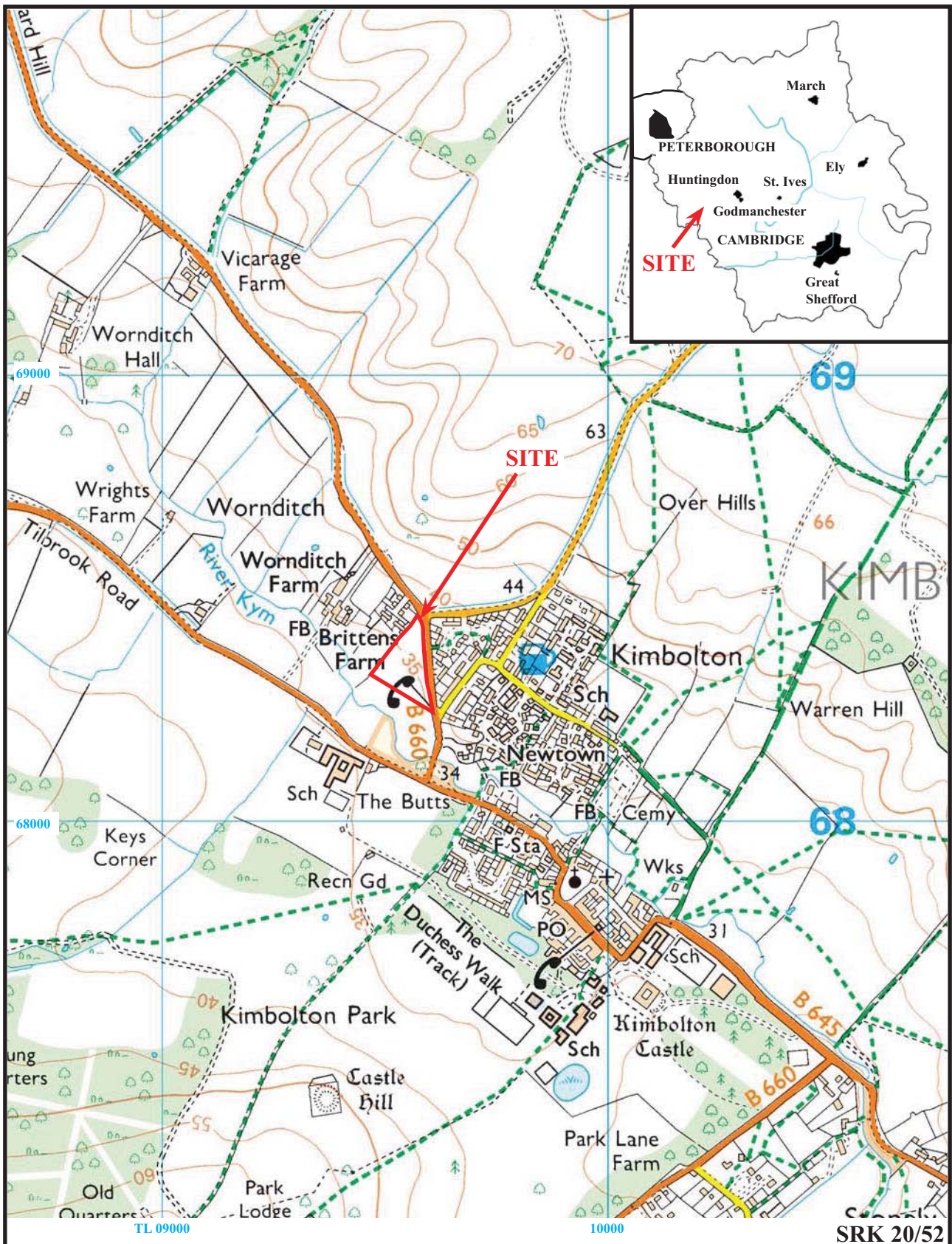
### Processed data

Filename: Kimbolton.xcp  
Stats  
Max: 7.39  
Min: -7.56  
Std Dev: 3.18  
Mean: -0.07  
Median: 0.01  
Composite Area: 1.7953 ha  
Surveyed Area: 0.76035 ha

### GPS based Proce6

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to UTM).
- 3 DeStripe Median Traverse:
- 4 Clip at 1.00 SD
- 5 Clip at 1.00 SD
- 6 DeStagger by: 50.00cm, Shift Positions





**Land west of Station Road, Kimbolton,  
Cambridgeshire, 2020**

**Geophysical Survey (Magnetic)**

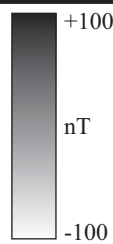
Figure 1. Location of site within Kimbolton and  
Cambridgeshire.

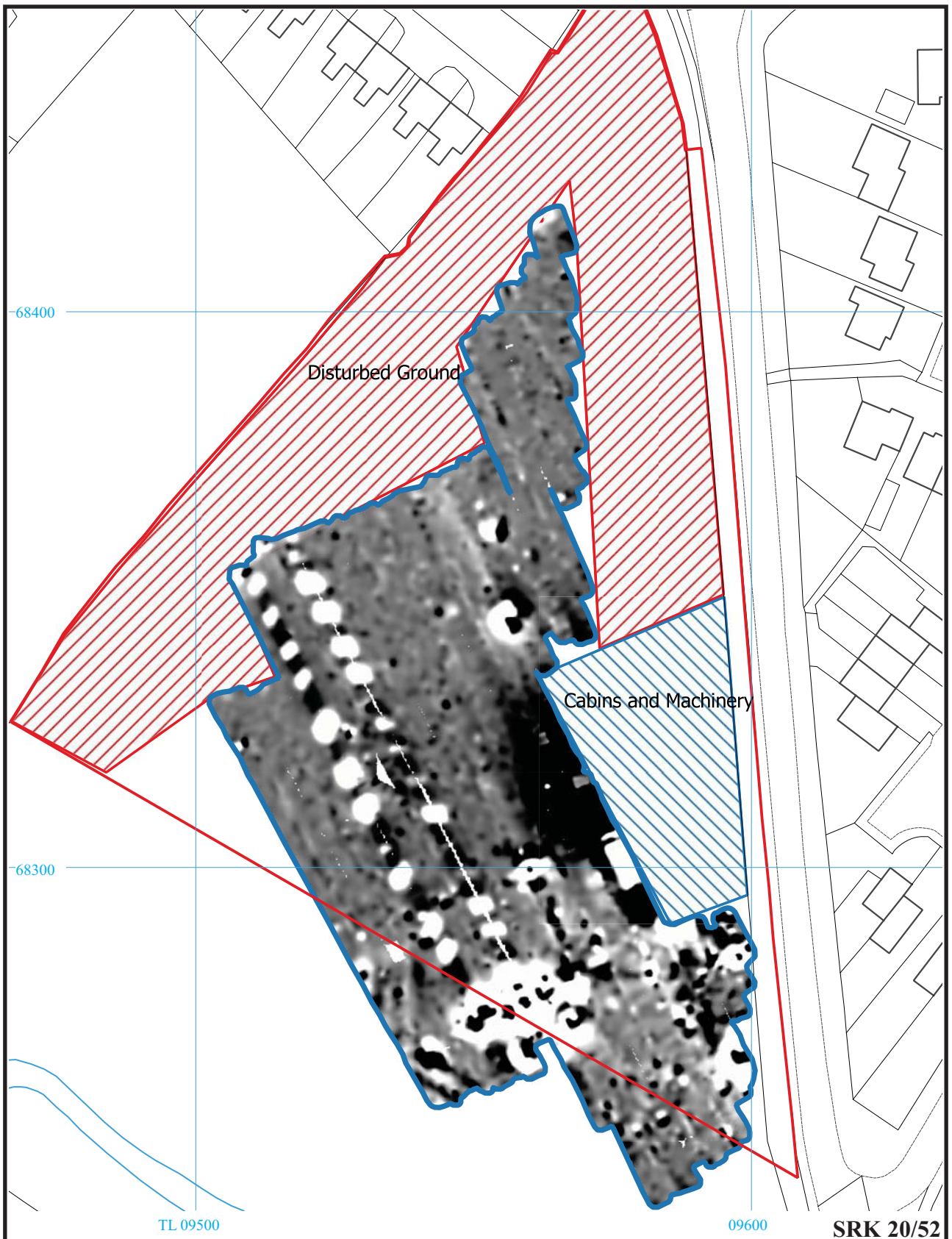
Reproduced under licence from Ordnance Survey Explorer Digital mapping at 1:12500  
Crown Copyright reserved





**Land west of Station Road, Kimbolton,  
Cambridgeshire, 2020**  
**Geophysical Survey (Magnetic)**  
Figure 2. Plot of raw gradiometer data.

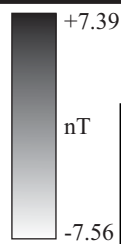


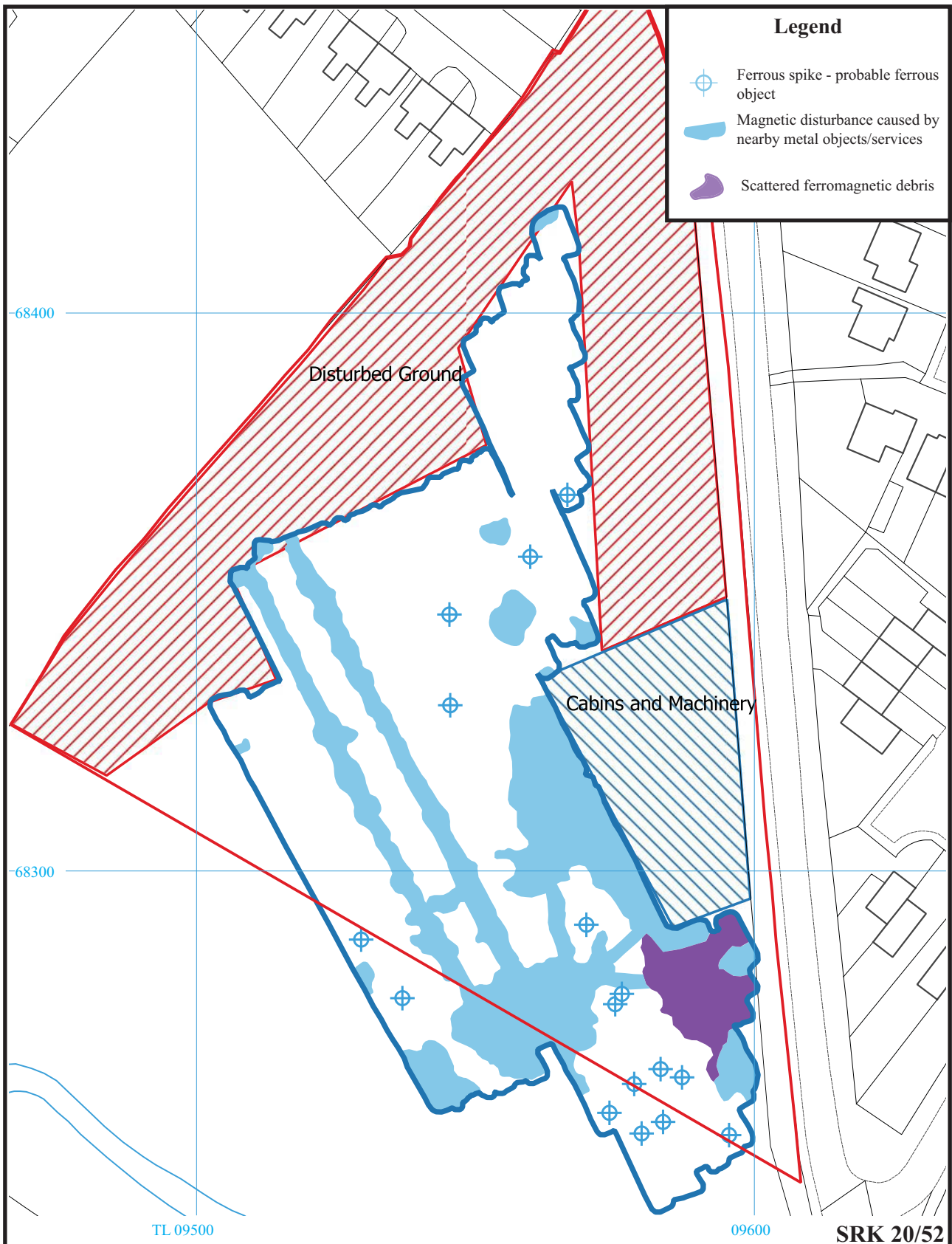


SRK 20/52






**Land west of Station Road, Kimbolton,  
Cambridgeshire, 2020**  
**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

Disturbed Ground

Cabins and Machinery

68400

68300

TL 09500

09600

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**Land west of Station Road, Kimbolton,  
Cambridgeshire, 2020  
Geophysical Survey (Magnetic)  
Figure 4. Interpretation plot.**





Plate 1. Southern part of survey area looking south.



Plate 2. Central area of site including cabins and machinery looking northeast.



Plate 3. Western area of site looking northeast.



Plate 4. Eastern area of site showing disturbed ground looking north.

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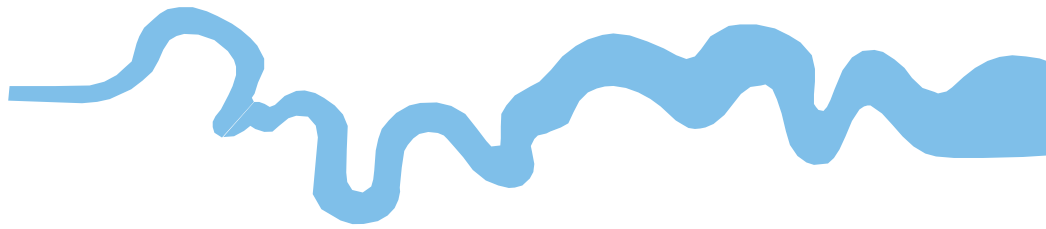
**Land west of Station Road, Kimbolton  
Cambridgeshire, 2020  
Geophysical Survey (magnetic)  
Plates 1 to 4.**



## 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





**TVAS (East Midlands),  
4 Bentley Court, Wellingborough  
Northamptonshire, NN8 4BQ**

**Tel: 01933 277 377  
Email: [eastmidlands@tvas.co.uk](mailto:eastmidlands@tvas.co.uk)  
Web: [www.tvas.co.uk/eastmidlands](http://www.tvas.co.uk/eastmidlands)**

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