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Land at Kennylands Road, Sonning Common, Oxfordshire

Geophysical Survey

by Kyle Beaverstock and Ashley Kruger

Site Code: KRSC10/135

(SU 7069 7963)

Land at Kennylands Road, Sonning Common, Oxfordshire

Geophysical Survey (Magnetic) Report

For TA Fisher

by Kyle Beaverstock and Ashley Kruger

Thames Valley Archaeological Services Ltd

Site Code KRSC 10/135

February 2019

Summary

Site name: Land at Kennylands Road, Sonning Common, Oxfordshire

Grid reference: SU 7069 7963

Site activity: Magnetometer survey

Date and duration of project: 20th February 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: KRSC 10/135

Area of site: 1.6ha

Summary of results: A small number of magnetic anomalies indicating the presence of possible features of archaeological interest were detected in the course of the survey.

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

Report edited/checked by:	Steve Ford✓ 12.03.19
	Tim Dawson✓ 12.03.19

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Land at Kennylands Road, Sonning Common, Oxfordshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock and Ashley Kruger

Report 10/135

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Kennylands Road, Sonning Common, Oxfordshire SU 7069 7963 (Fig. 1). The work was commissioned by Ms Katherine Miles, Grosvenor Court, Ampfield Hill, Ampfield, Romsey, Hampshire SO51 9BD, on Behalf of TA Fisher.

An application has been submitted to the South Oxford District Council Seeking permissions for a 25 residential unit development on an irregular parcel of land at Kennylands Road, Sonning Common, Oxfordshire. The proposed plan presents the prospect of existing archaeological deposits to be either damaged or destroyed by the subsequent development. As a result of potential damaged to the underlying archaeology a geophysical survey has been requested in order to inform any future work carried out within the area of investigation. The fieldwork was undertaken by Kyle Beaverstock and Maisie Foster on the 20th of February 2019 and the site code is KRSC 10/135.

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

Location, topography and geology

The survey area is situated at the south eastern edge of the village of Sonning Common, approximately 6.5km north of Reading. Kennylands Road and a number of residential properties form the north-eastern edge of the site, while hedging and fencing represent the remaining boundaries. The topography of the area is relatively flat and is situated at a height of 91m above Ordinance Datum (OD); the grounds are well manicured and used as pasture with mature tree species established only on the peripheries of the proposal area. The geological profile is typical of the area; the bedrock deposits area recorded as Seaford Chalk Formation and Newhaven Chalk Formation (SNCK) with a superficial deposit of Anglian stage Winter Hill Gravels (WIHG) (BGS 2000).

Site history and archaeological background

The archaeological potential of the site was outlined within a desk-based assessment conducted in 2014, in which it was concluded that the archaeology of the Chiltern Hills of South Oxfordshire is poorly understood

(Ford 2014). While there are no HER results recorded directly within the proposed area, a modest number of sites and findspots have been catalogued in and around the local area (Ford 2014); most notably are a number of findspots of Palaeolithic provenance.

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 north-west to south-east zig-zag orientation across the entirety of the site. A line of wooden posts, most likely a former fence line partitioned off a small portion of land in the south-eastern most quadrant of the site resulting in this area being recorded separately from the main bulk of data; otherwise there were no further obstructions affecting the methodological process of survey.

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 a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. 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.

A Trimble Geo7x handheld GPS system with sub-decimetre real-time accuracy was used to tie the site grid 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 -16.50 to 16.58 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	Cancels 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. 3) with the processed data then presented as a second figure (Fig. 4), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 5). 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 3.4.4 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

In terms of archaeology there are no significant anomalies that would indicate extensive groundworking or activities of archaeological interest that are detectable by a magnetometer (Fig. 3). However, there are a number of smaller positive anomalies which may be indicative of pit-digging; they are defined by both rounded and irregular morphologies, varying between 1-3m in diameter. The possible pits are primarily clustered within the north-western half of the site, with three smaller isolated instances in the southern section (Fig. 4).

In total 11% of the survey area is defined by signals indicating the presence of magnetic debris or disturbance of some nature. A large elongated portion of the magnetic disturbance corresponds to an extended surface level depression which truncates the area on a north-east/south-west trajectory. This particular disturbance, and associated surface depression, is indicative of a removed service pipeline. All the remaining instances of magnetic disturbance are situated along the boundaries of the survey area, and can be attributed to the existing fencing assembled with ferrous elements.

Several dipolar magnetic spikes were also detected across the site that was most likely the result of buried ferrous objects or magnetic debris.

Conclusion

While the survey did pick up on a number of anomalies that may indicate the presence of buried pits, the nature and provenance of the features cannot be decisively determined through the interpretation of magnetic data. In addition, a relatively sizeable portion of the site is defined by signals of magnetic disturbance and/or magnetic debris. While these data points are generally constrained to the edges of the property, they may work to mask weaker signals that are archaeological in nature.

References

BGS, 2000, *British Geological Survey*, 1:50,000, Sheet 268, Solid and Drift Edition, Keyworth

CI*f*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

Ford, S, 2014, 'Land at Kennylands Road, Sonning Common, Oxfordshire: An Archaeological desk-based assessment', Thames Valley Archaeological Services unpublished report 10/135

IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading

NPPF, 2018, *National Planning Policy Framework*, Dept Communities and Local Government, London

Appendix 1. **Survey and data information**

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data
Filename: kennylands RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 639942.555434856, 5708654.21072311 m
Southeast corner: 640091.795434856, 5708465.97072311 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 149 m x 188 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 30247, Recorded: 30247

Stats
Max: 107.23
Min: -109.74
Std Dev: 17.12
Mean: -2.76
Median: -0.51
Composite Area: 2.8093 ha
Surveyed Area: 1.078 ha

Processed data
Filename: kennylands.xcp
GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip from -15.00 to 15.00
6 DeStagger by: 100.00cm, Shift Positions

Stats
Max: 16.58
Min: -16.50
Std Dev: 4.44
Mean: -0.81
Median: 0.02
Composite Area: 2.8093 ha
Surveyed Area: 1.0744 ha

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Figure 1. Location of site within Sonning Common and Oxfordshire.

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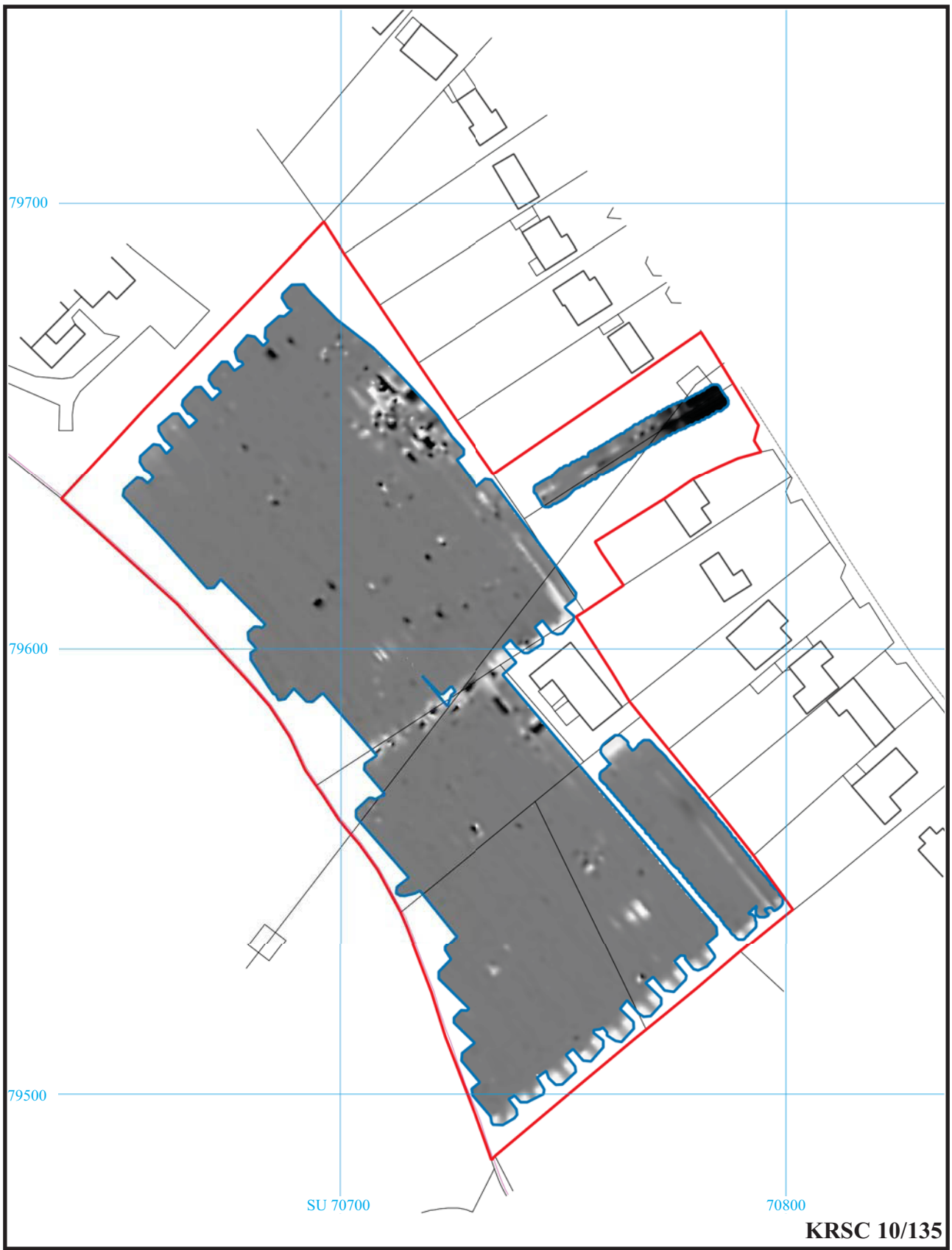
79700
79600
79500
SU 70700
70800
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Figure 2. Plot of raw gradiometer data.
0m
100m
+100
nT
-100
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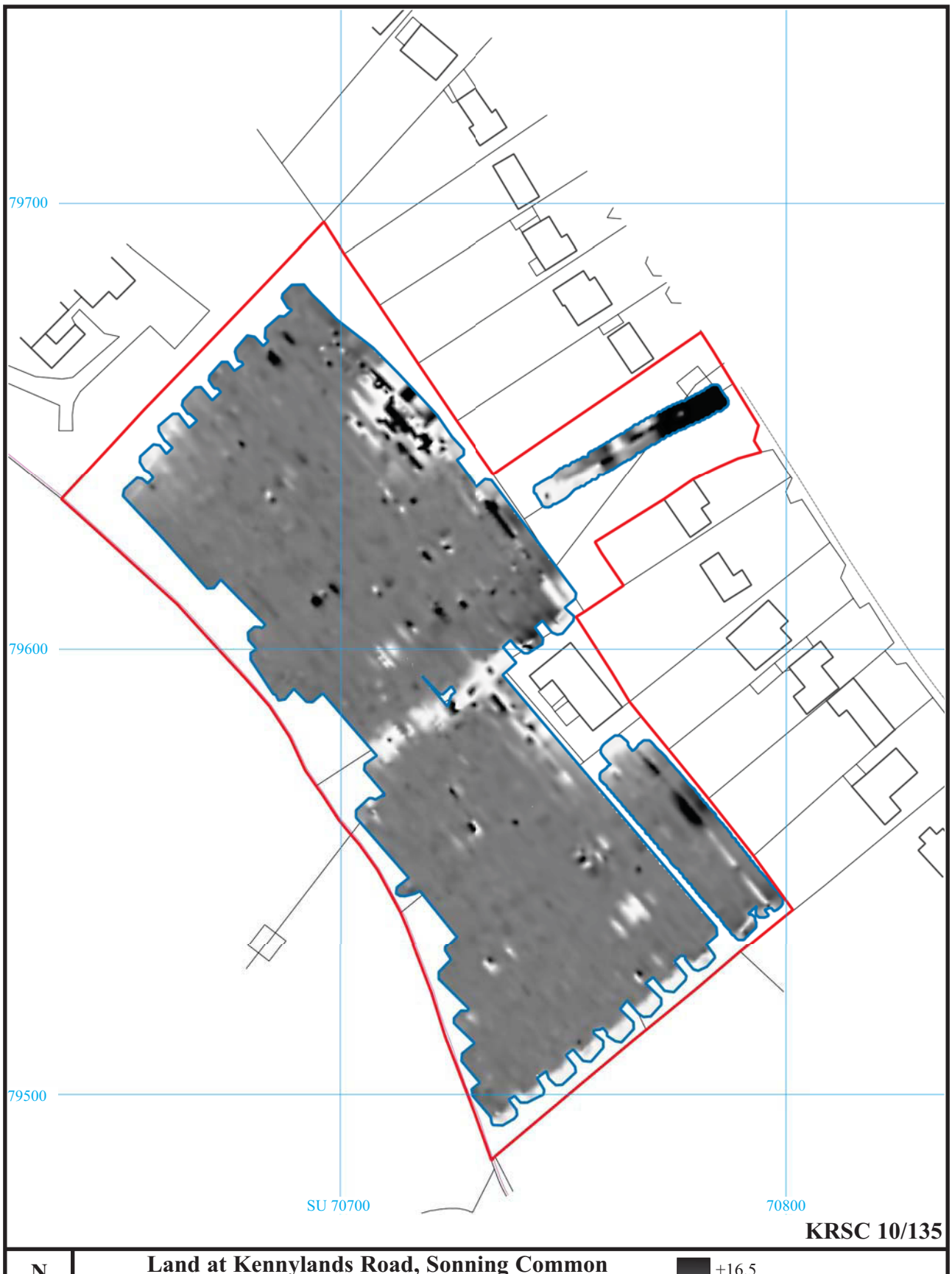
79700
79600
79500
SU 70700
70800
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N
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Figure 3. Plot of processed gradiometer data.
0m
100m
+16.5
nT
-16.6
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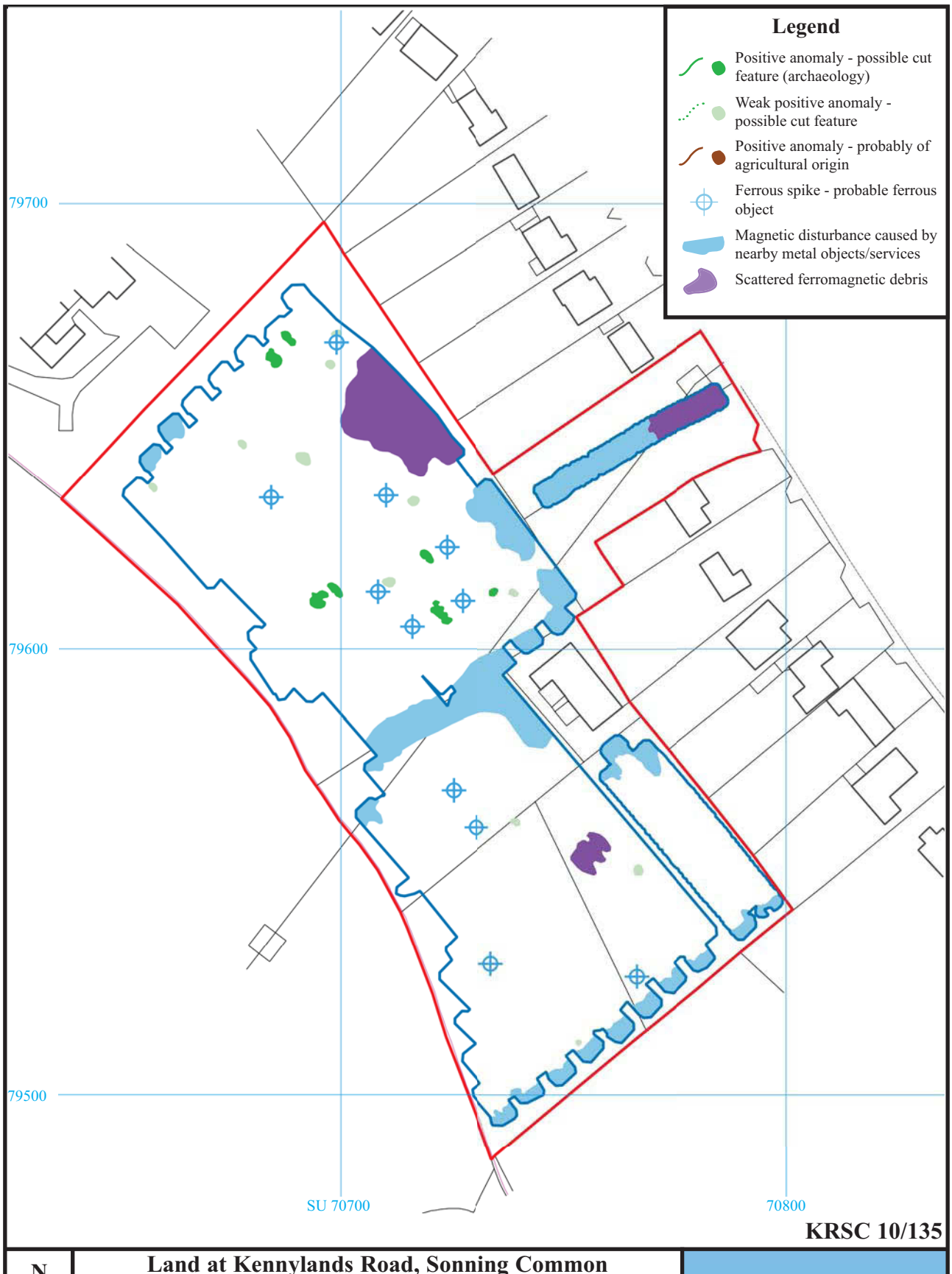

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Figure 4. Interpretation plot.

0m 100m

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Plate 1. Central part of survey area, looking south from site entrance.

Plate 2. Access area looking south-west towards site entrance from Kennylands Road.

Plate 3. South-eastern area of site looking along fenceline towards the south-east

Plate 4. Surface depression in north-west of survey area, looking north-west from site entrance.

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Plates 1 to 4.

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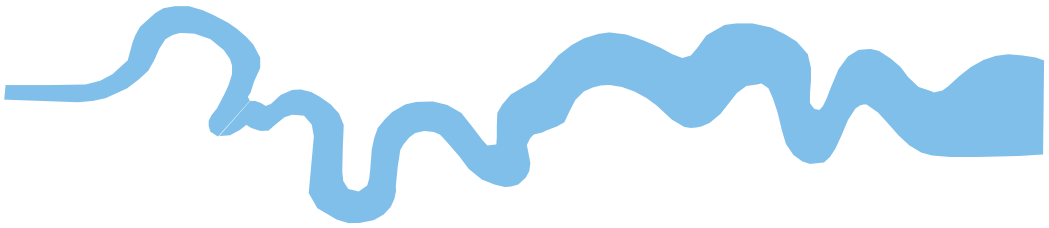
TIME CHART

	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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