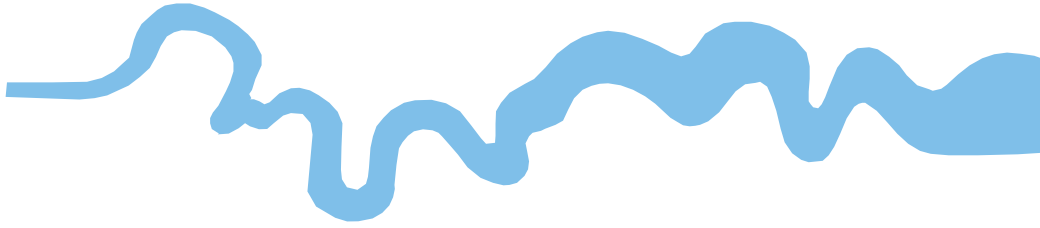


T V A S



EAST MIDLANDS

**Rolleston Folly, Rolleston,
Leicestershire**

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: RFR21/04

(SP 7358 9991)

Rolleston Folly, Rolleston, Leicestershire

Geophysical Survey (Magnetic) Report

For Gluckmansmith

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code RFR 21/04

January 2021

Summary

Site name: Rolleston Folly, Rolleston, Leicestershire

Grid reference: SP 7358 9991

Site activity: Magnetometer survey

Date and duration of project: 18th January 2021

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: RFR21/04

Area of site: c.0.4ha

Summary of results: The results of the geophysical survey show the potential for the presence of ridge and furrow in the northern area of the site and a circular positive anomaly in the central area of the site. The latter circular feature could be a ditch surrounding a clump of woodland, a feature often encountered in post-medieval parkland settings. However, the anomaly corresponds with a circular mound and a more plausible interpretation is that this feature is a round barrow with surrounding ditch of Bronze Age date.

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

*This report may be copied for bona fide research or planning purposes without the explicit permission of the copyright holder. All TVAS unpublished fieldwork reports are available on our website:
www.tvas.co.uk/reports/reports.asp.*

Report edited/checked by: Steve Ford✓ 22.01.21 Tim Dawson✓ 22.01.21
--

Rolleston Folly, Rolleston, Leicestershire A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 21/04

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Rolleston Hall, Rolleston, Leicestershire (SP 7358 9991) (Fig. 1). The work was commissioned by Tom Hough of Brindle and Green, Unit 3, Silverhill Court, Radbourne, Derby, DE6 4LY on behalf of Gluckmansmith, 112 Great Western Studios, Alfred Road, London, W2 5EU.

An application is to be made for planning permission to construct a stone folly on land within the wider Rolleston Estate. A geophysical survey has been requested in order to inform the application. This is in accordance with the *National Planning Policy Framework* (NPPF 2019), and the council's policies on archaeology. The fieldwork was undertaken by Kyle Beaverstock on the 18th of January 2021 and the site code is RFR21/04.

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 within the Rolleston Estate to the south-east of Rolleston Hall which is 15km south-east of Leicester (Fig. 1) and 19km north-west of Corby. The site sits at the crest of a small hill at an elevation of 171m above Ordinance Datum (aOD) in the centre and sloping down to 169m aOD in the north and 167m aOD in the south. It is bounded by woodland to the east and west and the continuation of the open parkland to the north and south. The underlying geology is recorded as Whitby Mudstone Formation, overlain by Oadby Member diamicton in the central area of the site and glaciofluvial deposits to the west (BGS 2021).

Site history and archaeological background

The archaeological potential for the site has been highlighted in a desk-based assessment (Hough 2020) which shows that the wider Leicestershire area in which the site lies is known to have a rich historic background with prehistoric, Roman and medieval activity occurring in the area. The site is located close to the Fosse Way, the

Roman road that linked Exeter to Lincoln, and a manor house has been present on the estate since the medieval period, with an older hall demolished in the 1950s to make way for the current structure.

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 east to west zig-zag orientation across the northern survey area and north-west to south-east in the eastern field. No obstructions were encountered during the survey, 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	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. 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

There geophysical survey revealed a few anomalies, some of which likely have an archaeological origin (Fig. 3). Around the edge of the site is an area of magnetic disturbance [Fig. 4: 3], this is represented by a bipolar response with a high amplitude and was likely caused by ferrous material in the fencing. In the northern area of the site are a series of parallel positive linear anomalies [2] running north-west to south-east and are likely the result of ridge and furrow as seen on the surface. In the central area of the site is a circular positive curvilinear anomaly [1] approximately 15m in diameter with a branching positive linear anomaly extending from the eastern edge and running for 21m to the east. The circular positive linear corresponds to an earthwork mound (Pl. 1) seen above ground and is possibly a Bronze Age round barrow. The centre of the barrow feature is comprised of both negative and positive responses with some strong positive spikes in the south-east and north-west however it is unclear if these represent central features. It has been considered that this feature represents a circular clump of woodland surrounded by bank and ditch, which are features often encountered in post-medieval parkland settings., but the presence of a central mound suggests that a barrow is the better interpretation. The ditch, running from east to west may be related to the barrow feature however, it may run under or through the barrow and is being masked by built up ground, represented by the negative responses in the centre of the barrow.

Conclusion

The results of the geophysical survey showed the potential for the presence of medieval ridge and furrow in the northern area of the site and of more significance the presence of a round barrow of probable Bronze Age date with surrounding ditch in the central area of the site.

References

- BGS, 2021, *Geology of Britain Viewer*, 1:50,000, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (last checked 22/1/21)
- 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
- Hough, T, 2020, 'Archaeological Desk-based Assessment; Rolleston Folly, Rolleston, Leicestershire' Report BG20.277, Derby
- NPPF, 2019, *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: *Rolleston RAW under.xcp*
Instrument Type: *MLgrad Import*
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 473496.393220817, 299961.896712354 m
Southeast corner: 473721.163220817, 299848.796712354 m
Direction of 1st Traverse: 90 deg
Collection Method: *Parallel*
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions

Survey Size (meters): 225 m x 113 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 23415, Recorded: 23415

Stats

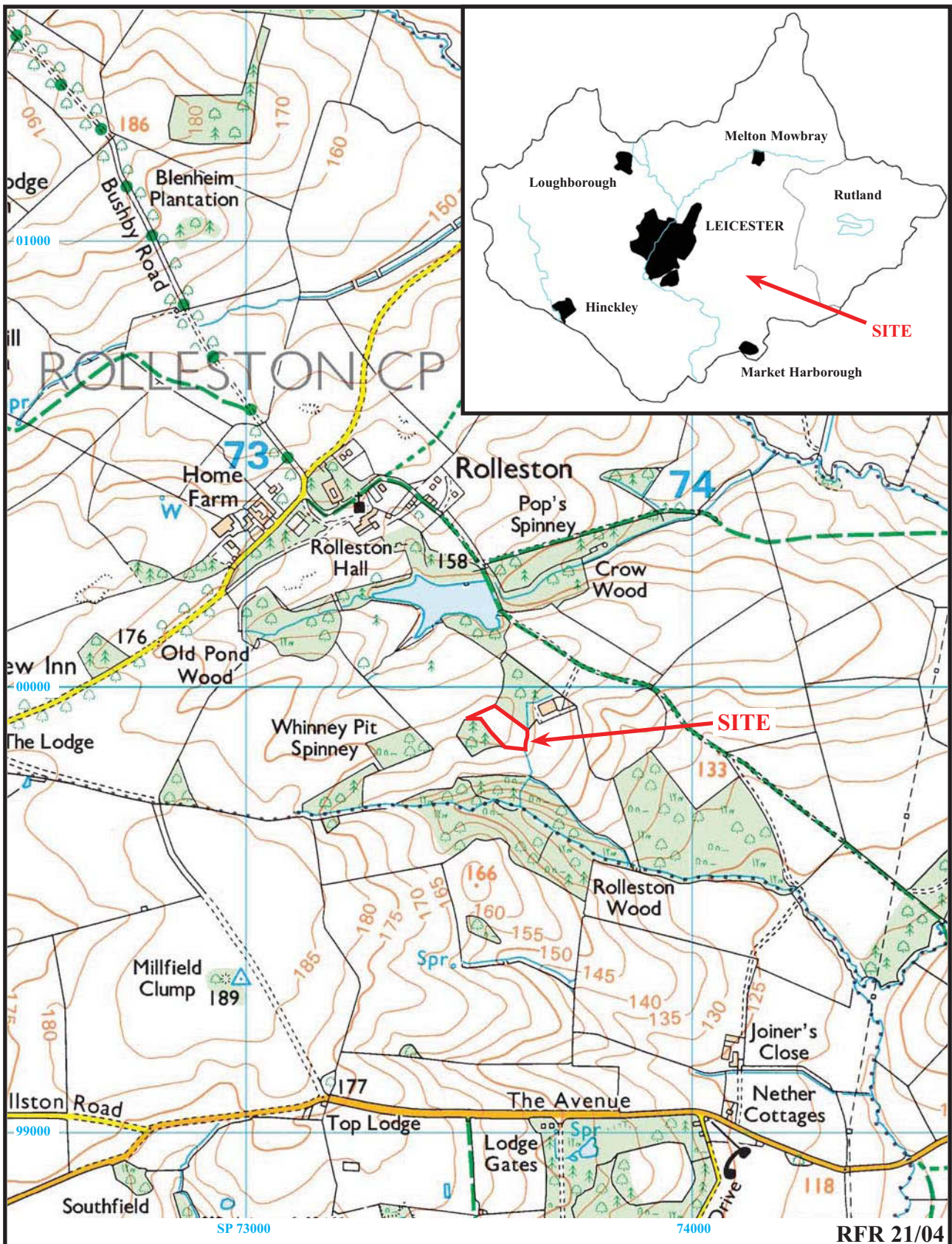
Max: 108.07
Min: -109.78
Std Dev: 23.74
Mean: -7.36
Median: 0.06
Composite Area: 2.5421 ha
Surveyed Area: 0.69818 ha

Processed data

Filename: *Rolleston under.xcp*
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.35
Mean: -0.25
Median: 0.01
Composite Area: 2.5421 ha
Surveyed Area: 0.68655 ha

GPS based Proce5

- 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: 120.00cm, Shift Positions

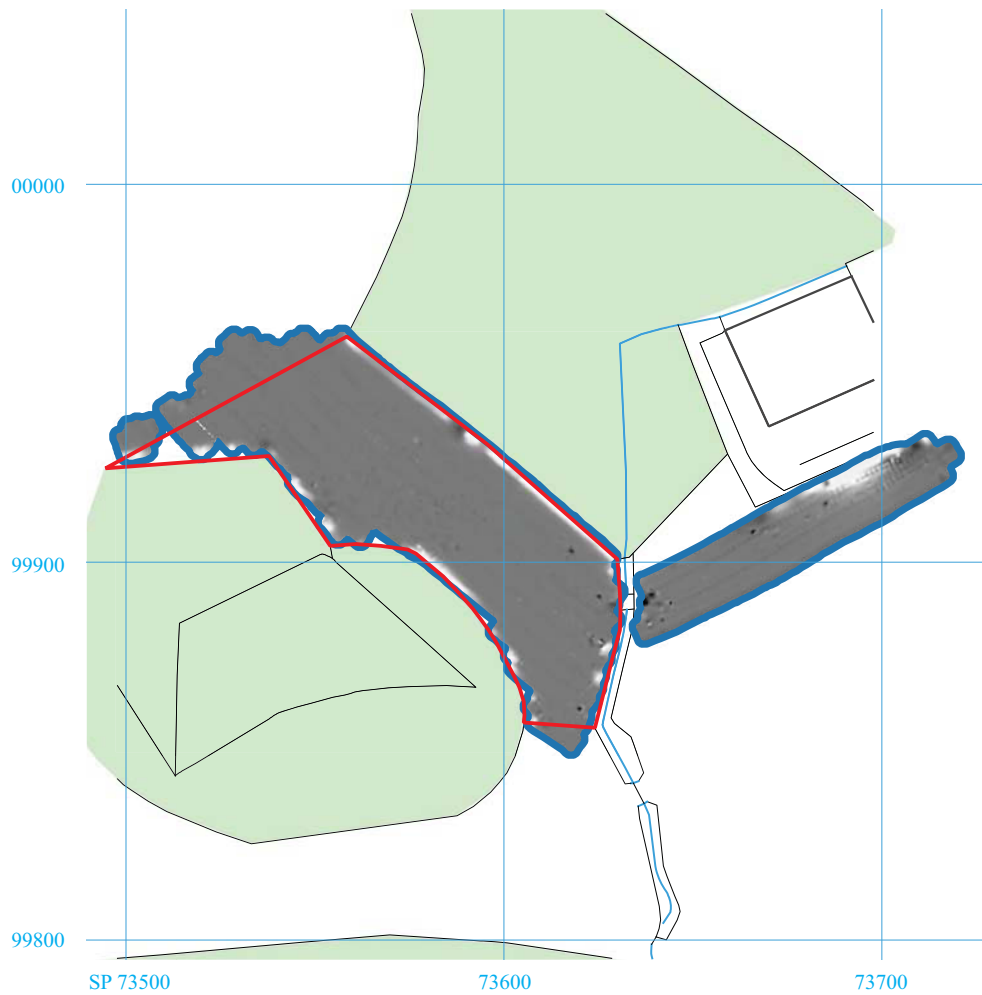


**Rolleston Folly, Rolleston,
Leicestershire, 2021
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Rolleston and Leicestershire.

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

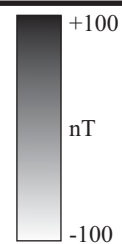


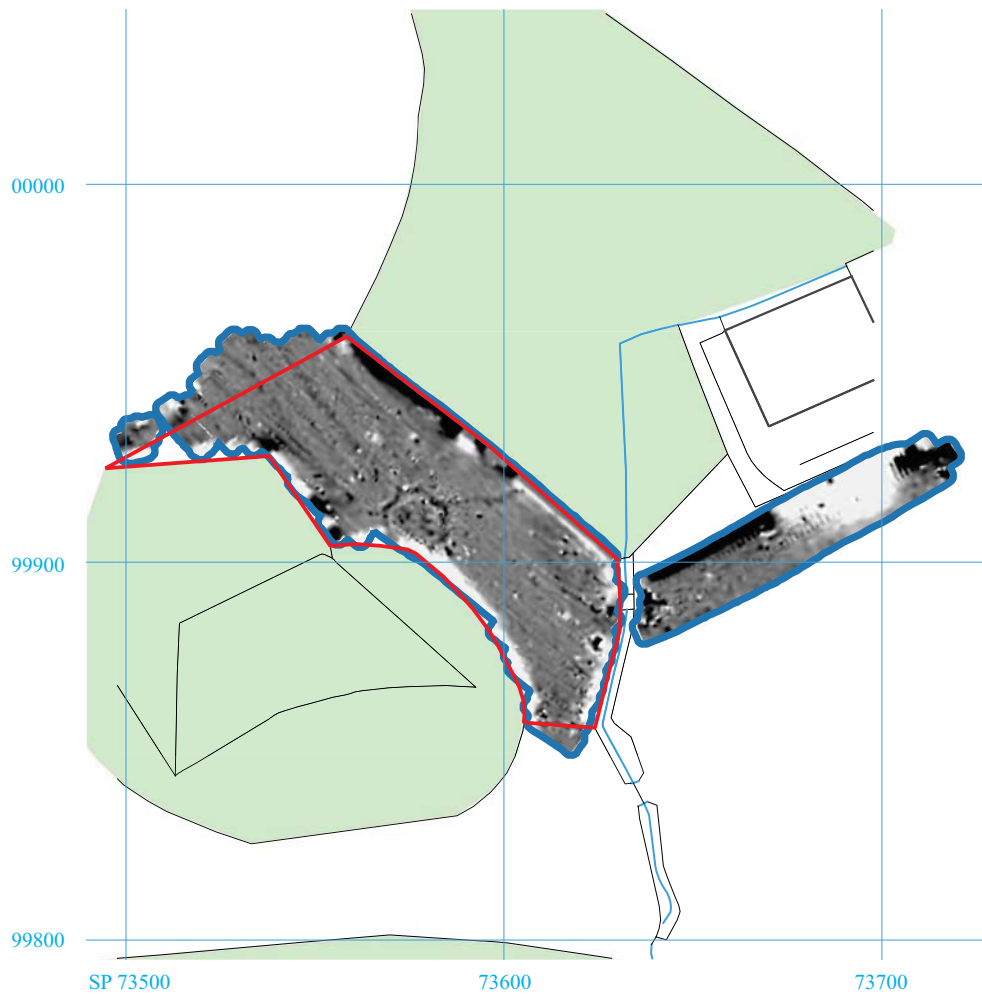


RFR 21/04



**Rolleston Folly, Rolleston
Leicestershire, 2021
Geophysical Survey (Magnetic)**
Figure 2. Plot of raw gradiometer data.









RFR 21/04

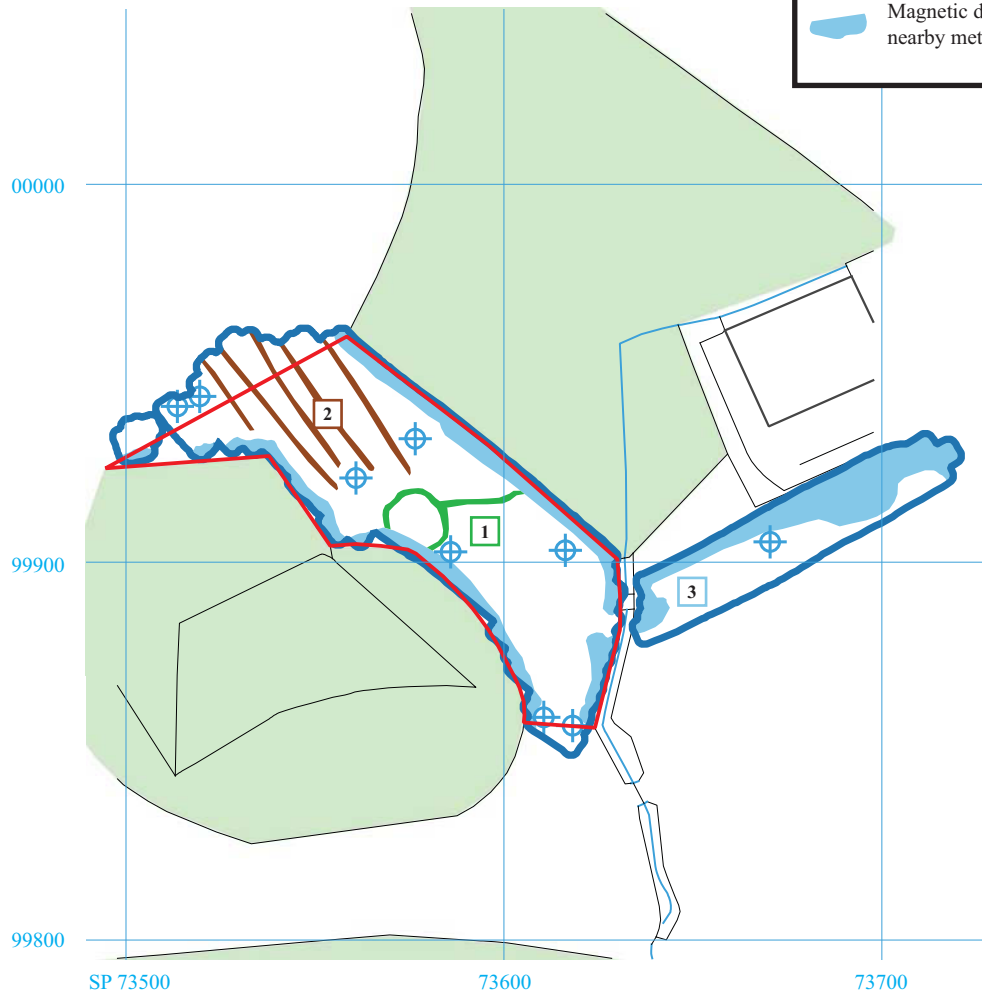


**Rolleston Folly, Rolleston
Leicestershire, 2021
Geophysical Survey (Magnetic)**
Figure 3. Plot of processed gradiometer data.



Legend

-  Positive anomaly - possible cut feature (archaeology)
-  Positive anomaly - probably of agricultural origin
-  Ferrous spike - probable ferrous object
-  Magnetic disturbance caused by nearby metal objects/services



RFR 21/04



**Rolleston Folly, Rolleston,
Leicestershire, 2021
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.**





Plate 1. Potential barrow feature in central area looking northwest.



Plate 2. Southern area of site looking southwest.

RFR 21/04

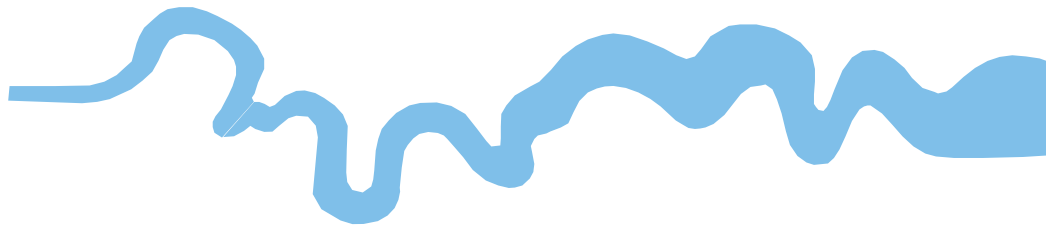
**Rolleston Folly, Rolleston,
Leicestershire, 2021
Geophysical Survey (Magnetic)
Plates 1 and 2.**



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





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

**Tel: 01933 277 377
Email: eastmidlands@tvas.co.uk
Web: www.tvas.co.uk/eastmidlands**

*Offices in:
Reading, Brighton, Taunton and Stoke-on-Trent*