
**LAND OFF
WHATTON ROAD,
KEGWORTH,
LEICESTERSHIRE**

**GEOPHYSICAL SURVEY
(KEWR15)**

**Work undertaken for
SLR Consulting**

July 2015

**Report produced by
Jonathon Smith BA (Hons), MA**

**OASIS Ref: archaeol1-216300
National Grid Reference: SK 48206 25857**

APS Report No: **63/15**


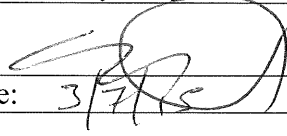
**ARCHAEOLOGICAL
PROJECT
SERVICES**



Quality Control
Whatton Road,
Kegworth,
Leicestershire,

KEWR15

Project Coordinator	Gary Taylor
Site Staff	Jonathon Smith, Neil Jefferson
Survey processing and report	Jonathon Smith

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CONTENTS

1.	SUMMARY	1
2.	INTRODUCTION	1
2.1	DEFINITION OF AN EVALUATION	1
2.2	BACKGROUND	1
2.3	TOPOGRAPHY AND GEOLOGY	1
3.	GEOPHYSICAL SURVEY	1
3.1	METHODS	1
3.2	RESULTS	3
4.	DISCUSSION	3
5.	ACKNOWLEDGEMENTS	4
6.	PERSONNEL	4
7.	BIBLIOGRAPHY	4
8.	ABBREVIATIONS	4

Appendix 1 The Archive

Appendix 2 OASIS Form

List of Figures

Figure 1 General location plan

Figure 2 Site location map

Figure 3 Layout of survey area

Figure 4 Minimally processed data greyscale plot

Figure 5 Processed data greyscale plot

Figure 6 Interpretive plot

Figure 7 Geophysical survey greyscale and interpretive plot, overlain on 1883 map

1. SUMMARY

A detailed magnetic gradiometer survey was undertaken for SLR Consulting in connection with proposed development on land off Whatton Road, Kegworth, Leicestershire. The survey totalled c.3.4ha. Roman remains, including a possible road and a pottery scatter, has been identified nearby previously.

The survey revealed two possible enclosures. These are small but could be rural stock compounds. One of a pair of parallel ditches represents a former field boundary that was recorded on maps from 1883 until 1955, but which was removed by the 1960s. These ditches are 7m apart and it is possible that together they represent a trackway.

The remaining features identified include two positive linears and two negative linears. These probably represent modern agricultural features and the underlying geology.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation. Evaluation is defined as ‘*a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate*’ (CIfA 2014a).

2.2 Background

Archaeological Project Services was

commissioned by SLR Consulting to undertake a detailed magnetometer survey totalling some 3.4ha on land at Whatton Road, Kegworth, Leicestershire. This was in advance of proposed development of the area. The survey was carried out over two days on 26th June and 29th June 2015 in accordance with a Written Scheme of Investigation prepared by SLR Consulting (2015).

Archaeological finds and remains of various dates have been identified in the general area previously. A medieval seal was found about 150m north of the site. Approximately 280m east of the site is a possible Roman road, Long Lane II. A little further east of this route a scatter of Roman pottery has been recorded (SLR Consulting 2014). The site is 700m south of the historic core of medieval Kegworth.

2.3 Topography and Geology

The site (centred approximately on NGR SK 48206 25857) is located off Whatton Road, to the south of Kegworth in the North West District of Leicestershire (Figs 1 and 2). It sits at 70m-65m O.D., gently sloping to the south. Beyond the southern edge of the site the ground slopes sharply down to a stream.

The site sits on a mixture of Gunthorpe Member Mudstone and Diseworth Sandstone bedrock (BGS 2015). Local soils are from the Bardsey association, consisting of loam over clay and fine silt (Hodge *et al.* 1984).

3. GEOPHYSICAL SURVEY

3.1 Methods

The layout of the survey area is shown in Figure 3. The site was level, gently sloping to the south and mostly covered in ankle high grass, which made good surveying conditions. A small area at the northern

edge of the site was under crop and was excluded from the survey. The weather was generally warm and bright.

Survey was undertaken in accordance with English Heritage (2008) and CIfA (2014b) guidelines and codes of conduct.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. This records subtle changes in the magnetic field resulting from differing features in the soil. Changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity.

The mapping of anomalies in a systematic manner allows interpretation of the type of material present beneath the surface. Strong magnetic anomalies are generated by buried iron-based objects or by kilns or hearths, usually resulting in a bipolar (positive/negative) response. More subtle positive anomalies representing pits and ditches can be seen where these contain more topsoil which is normally richer in magnetic iron oxides and provides a contrast with the natural subsoil (but this can vary depending on the nature of the underlying deposits). A negative anomaly may result from upcast bank material. Wall foundations can also show as negative anomalies where the stone is less magnetic than the surrounding soil, or as stronger positive and negative anomalies if of brick, but are not always responsive to the technique. It should be noted that not all features will be responsive and absence of anomalies does not necessarily indicate absence of archaeological features (Clark 1996).

Magnetometers measure changes in the Earth's magnetic field. With two sensors configured as a gradiometer the recorded

values indicate the difference between two magnetic measurements separated by a fixed distance. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame with a 1m separation between the sensing elements giving a strong response to deep anomalies.

Sampling interval and data capture

Readings were taken at 0.25m intervals along traverses 1m apart. This equates to 6400 sampling points in a full 40m x 40m grid. The Grad 601 has a typical depth of penetration of 0.5m to 1.0m although a greater range is possible where strongly magnetic objects have been buried in the site.

Readings are logged consecutively into the data logger which is downloaded daily either into a portable computer whilst on site or directly to the office computer. At the end of each job, data is transferred to the office for processing and presentation.

Processing and presentation of results

Processing is performed using specialist TerraSurveyor software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves flattening the background levels with respect to adjacent traverses and adjacent grids (Destripe or zero median traverse). Despiking is also performed to reduce the effect of the anomalies resulting from small iron objects often found on agricultural land. Further processing can then be carried out which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following are the processing techniques carried out on the processed gradiometer data used in this report:

1. DeStripe (sets the background median

of each traverse within a grid to zero and is useful for removing striping effects)

2. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

Parameters: X radius = 2; Y radius = 2; Threshold = 3SD; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -3 to 3nT.

3.2 Results

The presentation of the data for the site involves a print-out of minimally processed data as greyscale plots (Fig 4; clipped for display but otherwise unprocessed), together with a greyscale plot of the processed data (Fig 5). Magnetic anomalies have been identified and plotted onto an interpretative drawing (Fig 6).

Positive linear anomalies (red lines)

At the far west of the site there are two slightly diffuse positive linears which may link up just beyond the limit of the survey. To the east of these linears the background results reflect faint parallel plough marks, whereas to the west of this line the background results are more speckled. Therefore it seems likely these linears are an artefact of modern agricultural practice, or possibly a fault line in the bedrock between the underlying mudstone and sandstone.

Slightly further east there are two sub-rectangular enclosures. The smaller of the two, to the north, is 7m x 7m and the larger 14m x 24m. In the middle of the site are two parallel north-south linears, 7m apart.

Negative linear anomalies (green lines)

Along the southern edge of the site are two parallel, broad, pale linears. These are

likely to be ridges in the natural or subsoil. Although there is the possibility that these are the result of river terracing where the site slopes down to the stream valley, the ridges coincide with a change in the crops shown on aerial photographs, so the ridges may result from differing modern agricultural practice.

Modern magnetic disturbances (blue cross hatching)

In the south west corner of the site is a broad area of magnetic disturbance caused by agricultural machinery stored around the barn.

Discrete bipolar anomalies (blue circles)

Iron items within the topsoil give a distinctive localised bipolar (strong positive with associated strong negative) response. Such items usually derive from relatively recent management or agricultural use of the land – broken or discarded pieces of agricultural machinery or other modern debris. Examples of these have been circled.

4. DISCUSSION

The survey revealed two possible enclosures of indeterminate date. It is possible that, if correctly interpreted, the enclosures are rural stock compounds, though they are small, particularly that to the north.

In the centre of the site is a pair of parallel linear features. These coincide with the location of a field boundary shown on maps from at least 1883 to 1955, but removed by the 1960s (OS 1883; 1955; 1962). It is probable that the two linear anomalies represent ditches adjacent to the now-removed field boundary. They are 7m apart, which may suggest they perhaps defined a trackway alongside the boundary (Fig 7).

The remaining features identified – two

positive linears to the west and two negative linears to the south – could either be a result of the modern agricultural use of the site or the underlying geology, but are unlikely to be of archaeological significance.

5. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge SLR Consulting who commissioned the project. Thanks are also due to the landowner, Richard Crane, for permitting access. Neil Jefferson and Gary Taylor edited the report.

6. PERSONNEL

Project coordinator: Gary Taylor.
 Geophysical Survey: Jonathon Smith, and Neil Jefferson.
 Survey processing and reporting: Jonathon Smith.

7. BIBLIOGRAPHY

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<http://mapapps.bgs.ac.uk/geologyofbritain/home.html> accessed 01.07.2015

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OS, 1883 *Leicestershire Sheet X.N.W.*, 6 inches to 1 mile map

OS, 1955 *Sheet SK 42 NE*, 6 inches to 1 mile map (provisional edition)

OS, 1962 *Sheet SK 42 NE*, 6 inches to 1 mile map

SLR Consulting, 2014 *Push Energy Ltd. Land off Whatton Road, Kegworth, Leicestershire Proposed Solar Farm Heritage Statement*

SLR Consulting, 2015 *Land off Whatton Road, Kegworth, Leicestershire Solar Farm, Written Scheme of Investigation for Archaeological Geophysical Survey (version 2)*

8. ABBREVIATIONS

BGS British Geological Survey

CifA Chartered Institute for Archaeologists

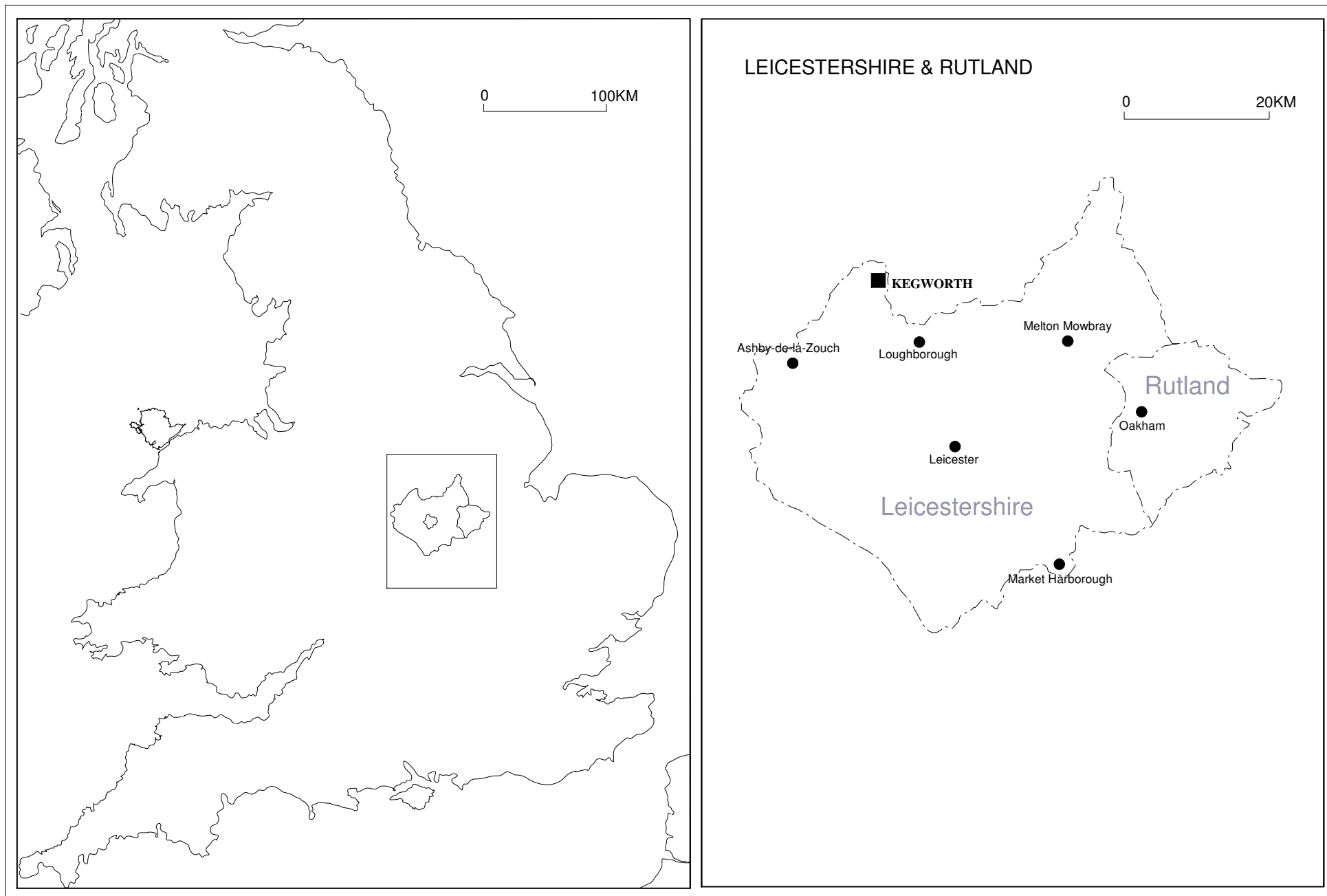


Figure 1 - General location map

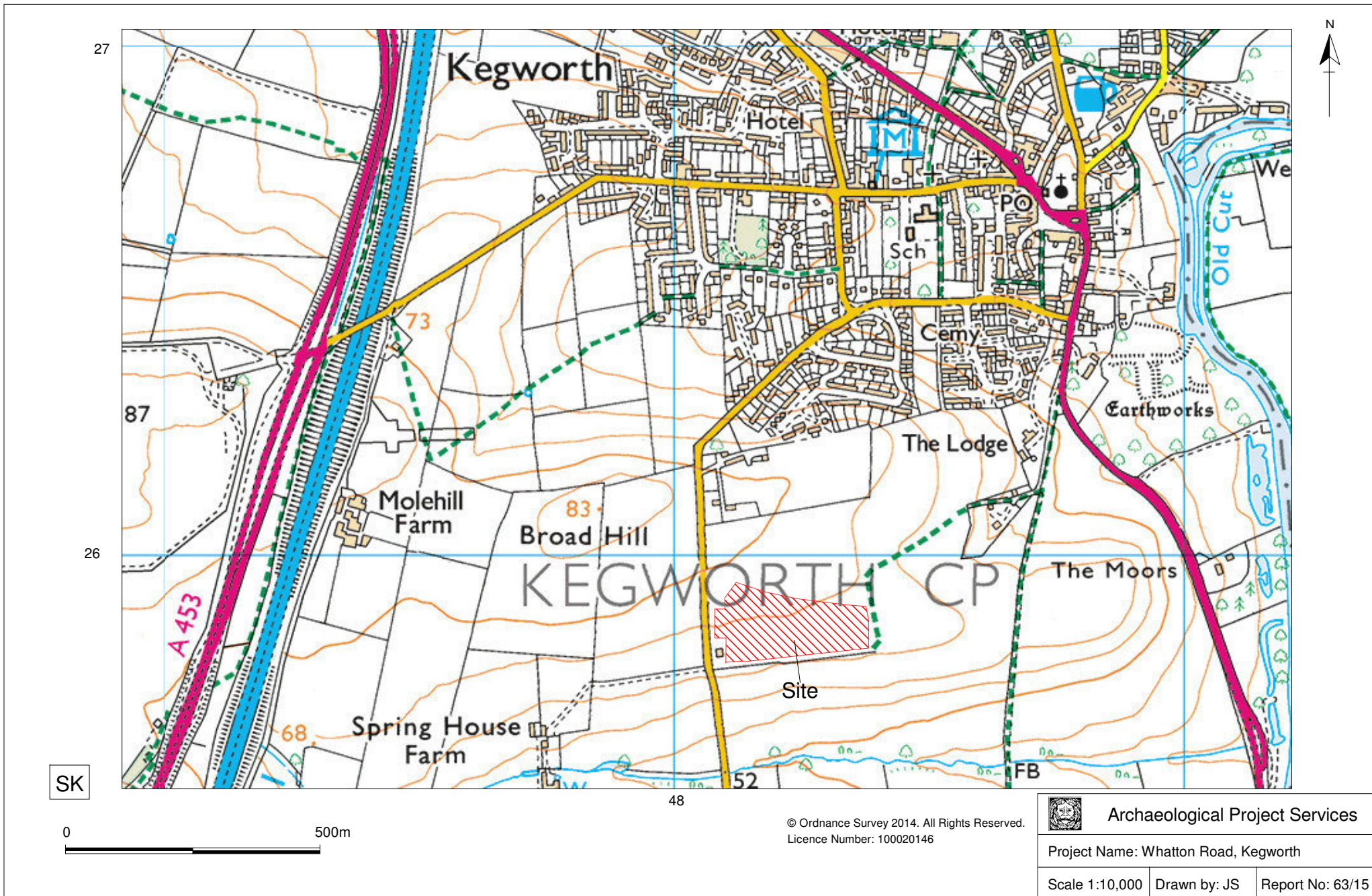


Figure 2 - Site Location

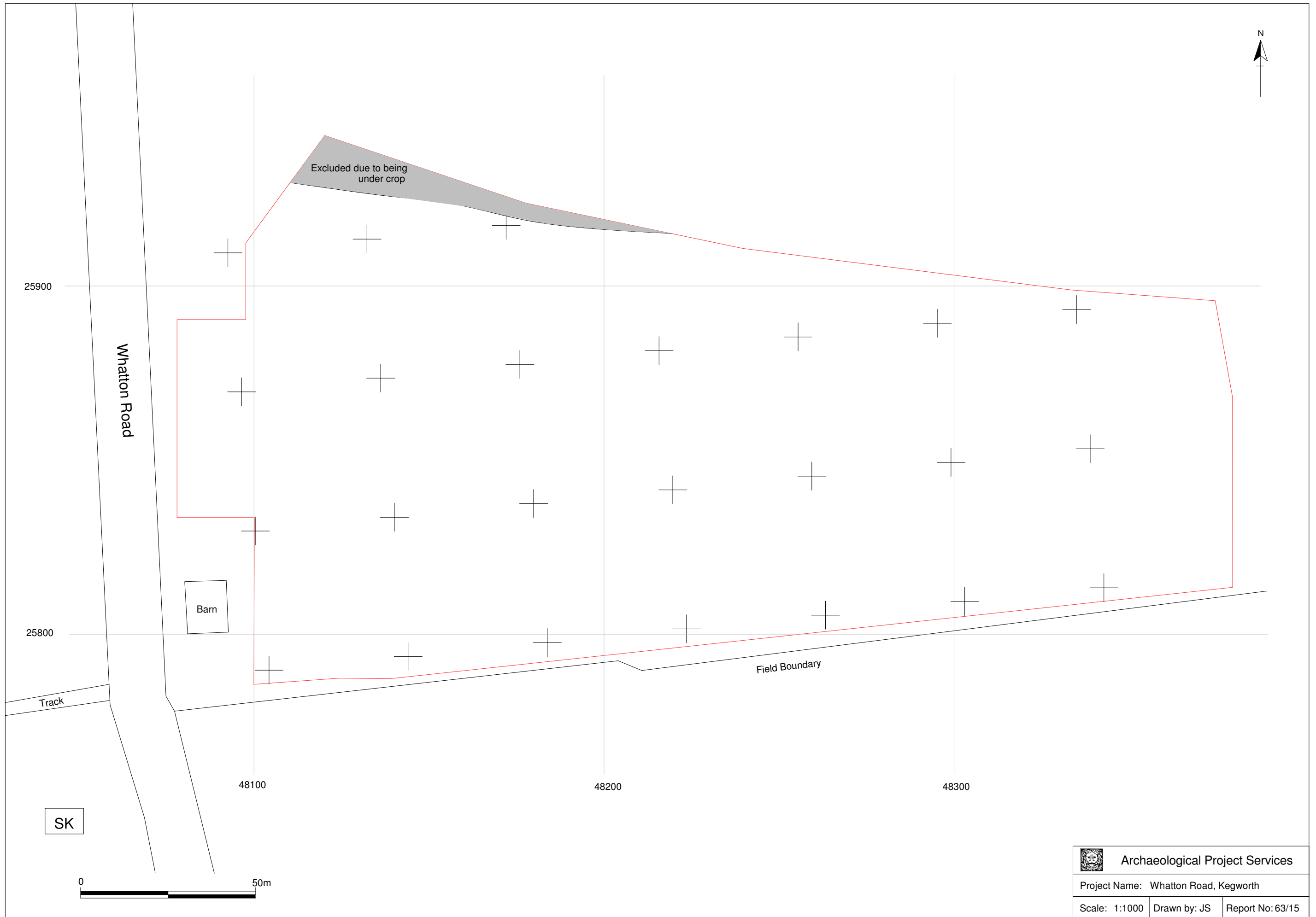


Figure 3 - Site Layout

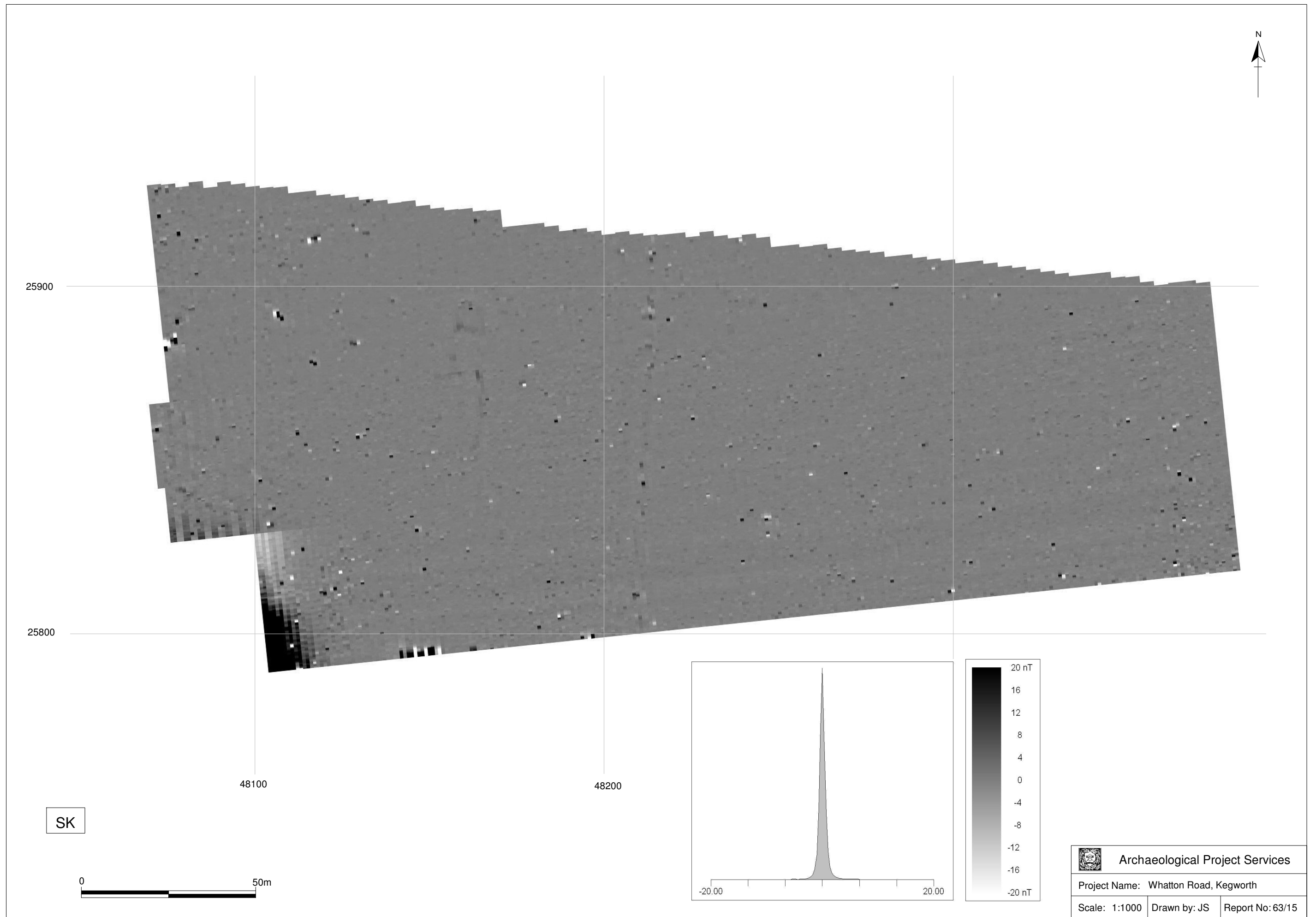


Figure 4 - Minimally processed data greyscale plot

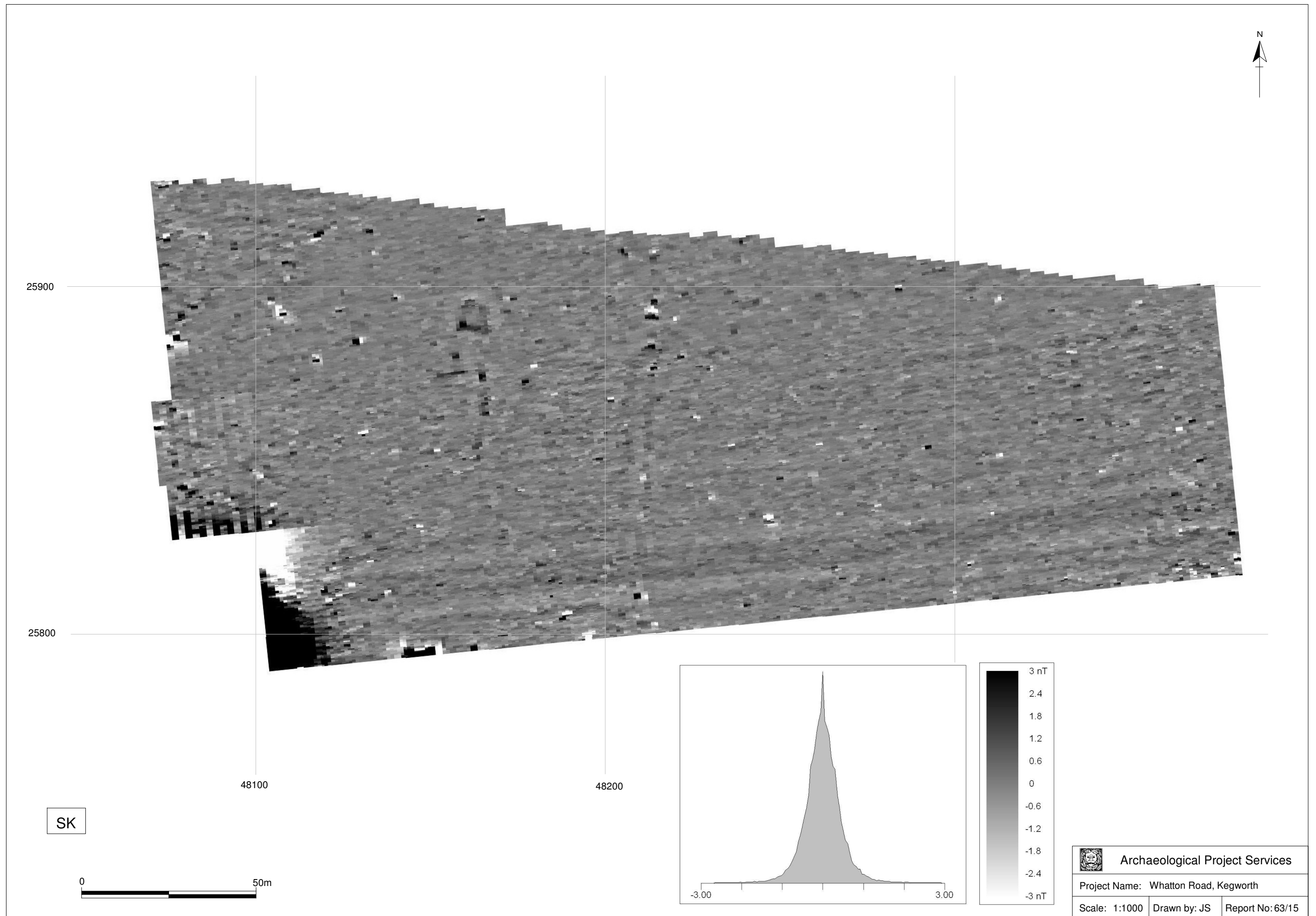


Figure 5 - Processed data greyscale plot

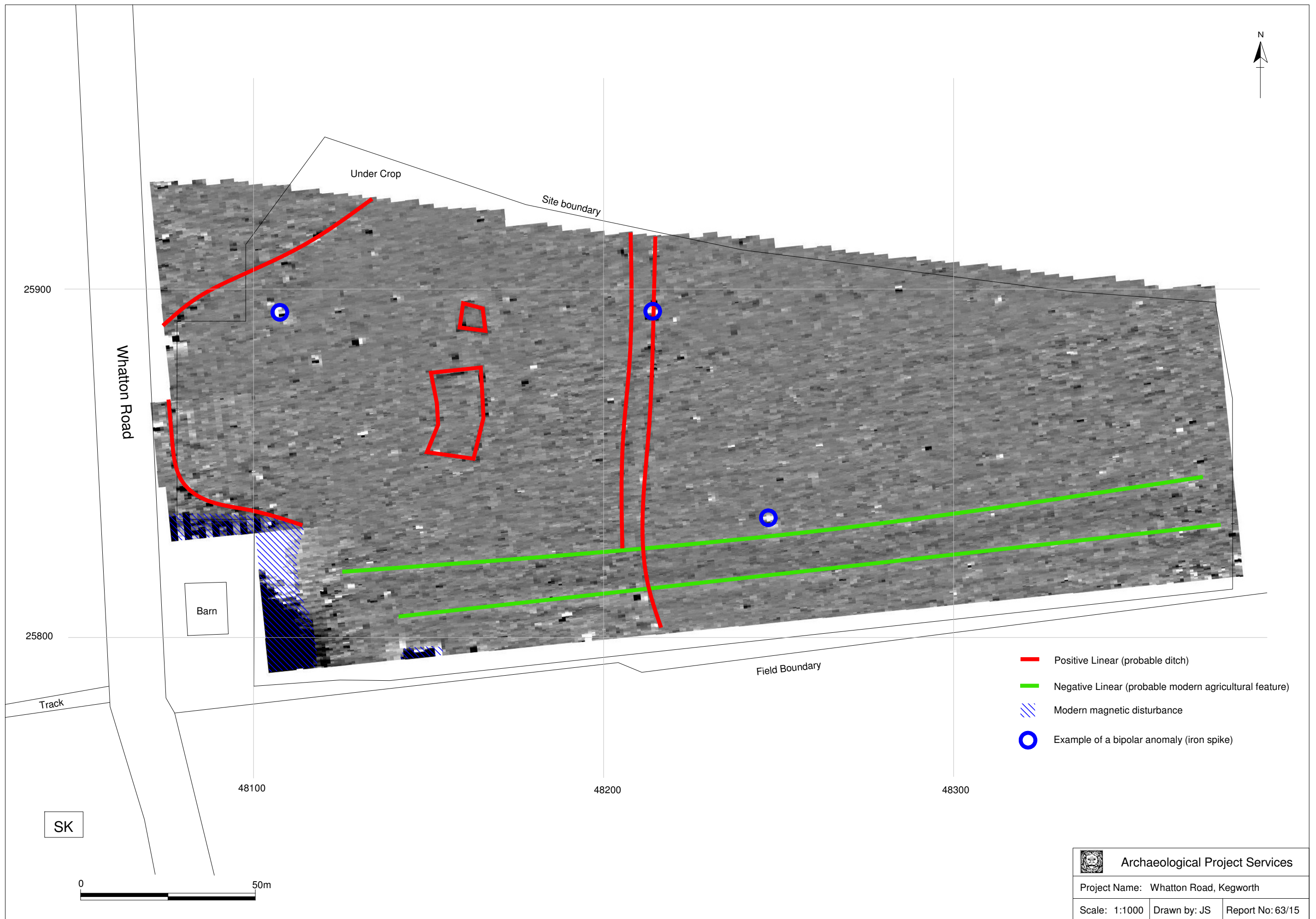
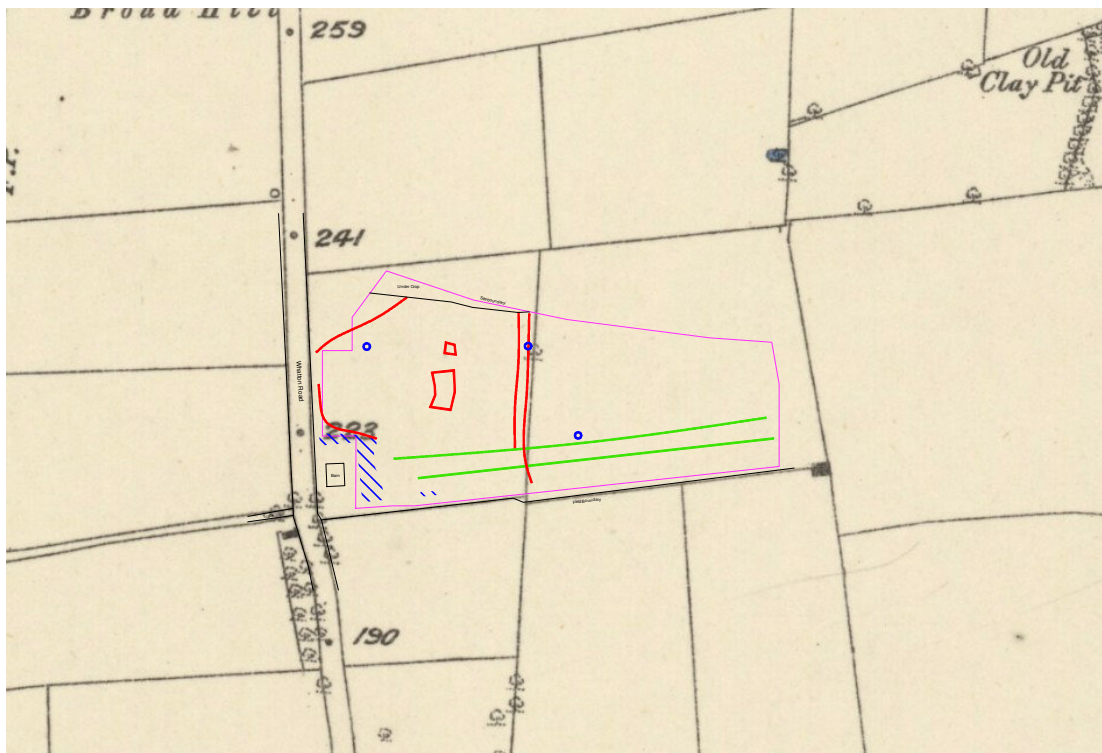
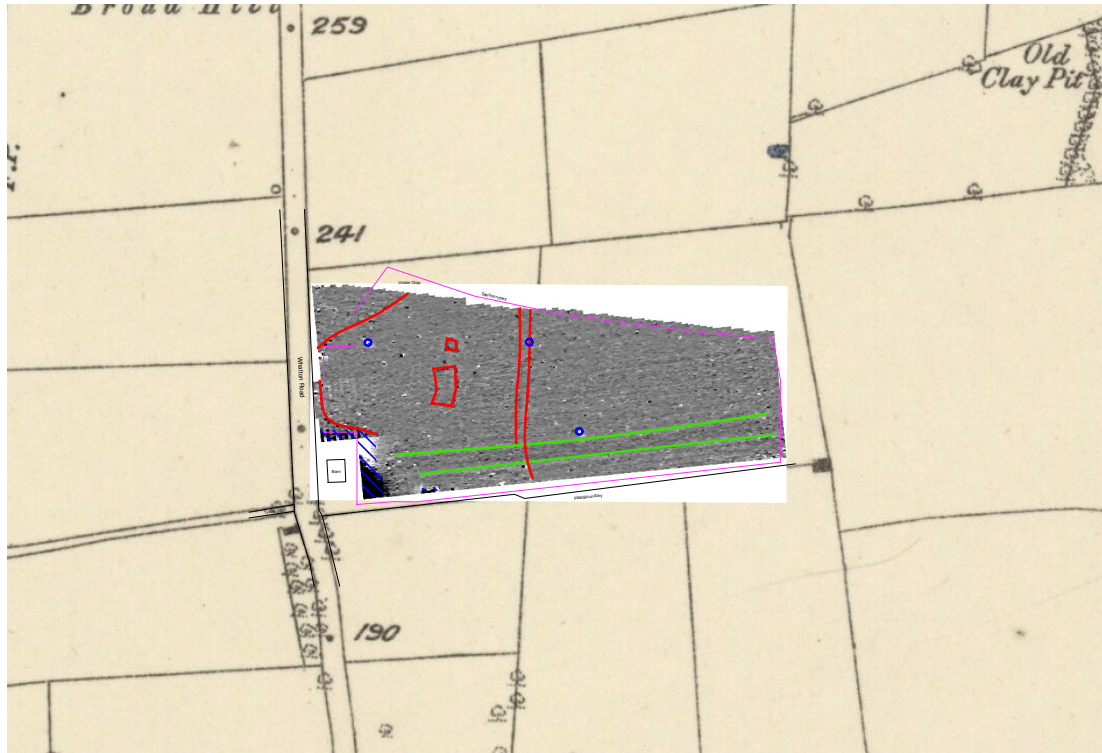


Figure 6 - Interpretive Plot



KEY

- Positive Linear (probable ditch)
- Negative Linear (probable modern agricultural feature)
- /// Modern magnetic disturbance
- Example of a bipolar anomaly (iron spike)

0 200m




 Archaeological Project Services		
Project Name: Whatton Road, Kegworth		
Scale 1:5000	Drawn by: GT	Report No: 63/15

Figure 7 Geophysical survey greyscale and interpretive plot, overlain on 1883 map

Appendix 1 THE ARCHIVE

The archive consists of:

- 2 Daily record sheets
- 1 Report text and illustrations
- Digital data

File names	KEWR15 1.xgd to KEWR15 7.xgd KEWR15 w1.xgd to KEWR15 w8.xgd KEWR15 y1.xgd to KEWR15 y11.xgd KEWR15 final.xcp
Explanation of codes used in file names	xgd files are magnetometer grids, named with site code and number in the order surveyed. Grids suffixed with '-a' are re-orientated copies. xcp files are composites containing record of all the data and processes used to produce the end product
Description of file formats	All files are in plain text xml format with header data defining survey and processing parameters
List of codes used in files	D indicates a "dummy" value within the composite data
Hardware, software and operating systems	TerraSurveyor 3.0.25.1 running under Windows 7
Date of last modification	01.07.2015
Indications of known areas of weakness in data	

All primary records are currently kept at:

Archaeological Project Services, The Old School, Cameron Street, Heckington, Sleaford, Lincolnshire
NG34 9RW

The ultimate destination of the project archive is:

Leicestershire County Council Heritage Services
Room 500
County Hall
Leicester Road
Glenfield
Leicester
LE3 8TE

OASIS code: archaeo11-216300

Site Code: KEWR15

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OASIS ID: archaeol1-216300

Project details

Project name	LAND AT WHATTON ROAD, KEGWORTH, LEICESTERSHIRE: GEOPHYSICAL SURVEY
Short description of the project	A 3.4ha magnetometry survey of land off Whatton road, Kegworth. The survey revealed two undated rectangular enclosures and a former field boundary or trackway. The field boundary is shown on 19th-mid 20th century maps.
Project dates	Start: 26-06-2015 End: 29-06-2015
Previous/future work	Yes / Yes
Any associated project reference codes	KEWR15 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	ENCLOSURE Uncertain
Monument type	TRACKWAY Uncertain
Monument type	FIELD BOUNDARY Post Medieval
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	Voluntary/self-interest
Position in the planning process	Not known / Not recorded
Solid geology	TRIASSIC MUDSTONES
Drift geology (other)	None
Techniques	Magnetometry

Project location

Country England

Site location	LEICESTERSHIRE NORTH WEST LEICESTERSHIRE KEGWORTH Whatton Road
Postcode	DE74 2DU
Study area	3.40 Hectares
Site coordinates	SK 48206 25857 52.8277518256 -1.28446096714 52 49 39 N 001 17 04 W Point

Project creators

Name of Organisation	Archaeological Project Services
Project brief originator	Consultant
Project design originator	SLR Consulting
Project director/manager	Gary Taylor
Project supervisor	Jonathon Smith, Neil Jefferson
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Leicestershire Museums Service
Digital Contents	"Survey"
Digital Media available	"Geophysics", "Images vector", "Survey"
Paper Archive recipient	Leicestershire Museums Service
Paper Contents	"Survey"
Paper Media available	"Correspondence", "Diary", "Map", "Miscellaneous Material", "Plan", "Report", "Survey "

Project bibliography 1

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