

**ARCHAEOLOGICAL EVALUATION REPORT:  
GEOPHYSICAL SURVEY BY MAGNETOMETRY: LAND OFF ROOKERY LANE, LINCOLN,  
LINCOLNSHIRE**

Planning Reference: Pre-application  
NGR: SK 9613 6845  
AAL Site Code: LIRL 20  
OASIS Reference Number: allenarc1-407405



Report prepared for Wilmott Dixon

By  
Allen Archaeology Limited  
Report Number AAL 2020120

November 2020



Allenarchaeology



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*Cover image: View across the survey area, looking south-southwest*

## Executive Summary

- Wilmott Dixon commissioned Allen Archaeology Limited to undertake a geophysical survey using magnetometry on land off Rookery Lane, Lincoln, Lincolnshire, prior to submission of a planning application for a residential development.
- The site lies within an area of limited archaeological activity, with Roman pottery kilns located approximately 90m northwest of the site, and 680m southeast of the site. The site appears to have been largely undeveloped during the medieval and post-medieval period, with terraced housing and allotments developed nearby in the 19<sup>th</sup> and 20<sup>th</sup> centuries.
- The survey has identified limited evidence for archaeological activity. This was in part due to the large amount of magnetic noise across the majority of the site, likely the result of buried modern waste within this site. Part of the site was not suitable for survey due to overgrown vegetation.
- A large dipolar area could represent buried modern material, but could instead represent former industrial activity such as a kiln.

## 1.0 Introduction

- 1.1 Wilmott Dixon commissioned Allen Archaeology Limited to undertake a geophysical survey using magnetometry on land off Rookery Lane, Lincoln, Lincolnshire, prior to submission of a planning application for a residential development.
- 1.2 The site works and reporting conform to current national guidelines, as set out in 'EAC Guidelines for the Use of Geophysics in Archaeology' (EAC 2016), 'The Use of Geophysical Techniques in Archaeological Evaluations' (Gaffney *et al.* 2002), the Chartered Institute for Archaeologists 'Standard and guidance for archaeological geophysical survey' (CIfA 2014) and local guidelines set out in the Lincolnshire Archaeological Handbook (LCC 2019).

## 2.0 Site Location and Description

- 2.1 The proposed development site is located off Rookery Lane, Lincoln, in the administrative district of the City of Lincoln Council. It is situated 4km southwest of Lincoln centre and 2km northeast of North Hykeham. The site is approximately 1.2 hectares and is presently occupied by a residential property with a garden and outbuilding, and a plot of disused partially overgrown land. The site is centred at National Grid Reference (NGR) SK 9613 6845 and is c.12m above Ordnance Datum.
- 2.2 The bedrock geology comprises Charmouth Mudstone, overlain by superficial deposits of Balderton Sand and Gravel (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). Responses of magnetometry to the bedrock of mudstone is generally considered average and can provide variable responses (English Heritage 2008).

## 3.0 Planning Background

- 3.1 The geophysical survey follows on from a desk-based assessment, both helping to inform a planning application which will be submitted in due course for a proposed residential development of up to 45 dwellings including associated works, open space, amenity space and infrastructure.
- 3.2 The approach adopted is consistent with the recommendations of the National Planning Policy Framework (NPPF), with the particular chapter of relevance being 'Section 16. Conserving and enhancing the historic environment' (Ministry of Housing, Communities and Local Government 2019).

## 4.0 Archaeological and Historical Background

- 4.1 An archaeological desk-based assessment has previously been prepared for this site, so is only summarised here (AAL 2018).
- 4.2 There is no physical evidence of prehistoric activity recorded close to the site. Activity of prehistoric date in Lincoln has been recorded extensively further to the north, particularly around the Brayford Pool area c.2.7km northeast of the site.
- 4.3 The only instance of Roman activity recorded within the search area is a pottery kiln excavated in the 1940s c.90m northwest of the site boundary. While limited information on this specific

kiln is available, it is likely given the location that it is the 'Swanpool' type noted on Rookery Lane dating to the mid-4<sup>th</sup> century AD in Swan's *The Pottery Kilns of Roman Britain* (<https://romankilns.net/>). Similarly dated examples have been found c.680m southeast of the site to the west of the River Witham (AAL 2017).

- 4.4 It is likely that the areas around Boultham Moor, immediately to the west of the site, would have been woodland. It is possible the gravel terraces of the Witham Valley, to the north of Bracebridge, along with access to the woodland resource, would have provided an attractive area for settlement during the early medieval period (Heritage Connect Lincoln, 2015). Despite this, no evidence of early medieval activity has been recorded within the search area.
- 4.5 Evidence from the Domesday Book suggests some form of settlement here prior to the Norman Conquest. It records the lords of the manor in 1066, who are Ulf the Fenman and Strui. Bracebridge is included in the Domesday Book of 1086 under the names '*Brachebrige*' and '*Bragebruge*' in conjunction with Canwick, a neighbouring settlement approximately 2km northeast.
- 4.6 During the High Medieval Era both Canwick and Bracebridge appear to have been predominantly agricultural areas supplemented by fishing, although production of a surplus of flour by Bracebridge implies some level of organisation and cooperation here beyond normal subsistence levels of agricultural production (Heritage Connect Lincoln 2015).
- 4.7 The Ordnance Survey Drawing dating to 1819 shows the site as undeveloped land, although two watercourses are shown running close to the site and correlate to a watercourse and the Pike Drain, both of which are still extant today. The 1819 map shows the site situated c.1.5km southwest of the furthest extent of Lincoln at that time, being closer to Boultham (c.600m away), and Bracebridge (c.250m).
- 4.8 Later historic mapping dated to 1887 shows a trackway or road running along the southern flank of the site, leading to a gravel pit c.180m to the west.
- 4.9 Modern activity within the search area primarily relates to house building in the 1920s–1950s on Hainton Road and Rookery Lane. Rookery Lane also contains allotment plots, a sewage pumping station to the north of the proposed development site and a water pump. The Ordnance Survey map of 1933 shows two structures within the site but not the nature of these buildings, but the lack of connecting roads may indicate that they are not residential. The map also suggests several areas around the site were hallmarked as allotments. Additionally, the Westwick Gardens estate was established in the early part of the 20<sup>th</sup> century, and the HER records an incident in May 1941 when high explosive bombs were dropped on the estate, destroying two houses and killing 3 people.

## 5.0 Methodology

- 5.1 The geophysical survey consisted of a detailed gradiometer survey of as much of the site as was possible. The survey was undertaken in a series of 20m grids across the site. It was not possible to survey a number of areas within the site due to vegetation.

## **Summary of Survey Parameters**

### 5.2 Fluxgate Magnetometer

Instrument:	Bartington Grad601-2 Dual Fluxgate Gradiometer
Sample Interval:	0.25m
Traverse Interval:	1.00m
Traverse Separation:	1.00m
Traverse Method:	Zigzag
Resolution:	0.01nT
Processing Software:	3.0.36.0
Surface Conditions:	Partially cleared pasture
Area Surveyed:	0.43 hectares
Date Surveyed:	Friday 30 <sup>th</sup> October 2020
Surveyor:	Robert Evershed BSc (Hons)
Data Interpretation:	Robert Evershed BSc (Hons)

## **Data Collection and Processing**

5.3 The grids were marked using pre-programmed grids on the Leica GS08 Net rover. Magnetic data was collected close to a north to south alignment. A traverse pattern close to north-south is preferable as the fluxgate gradiometer is set up and balanced with respect to the cardinal points. Since the data is plotted as north-south traverses there is considerable merit sampling the north-south response of a magnetic anomaly with as many data points as is possible, this is accomplished as the density collected along the traverse line is greater than that between traverses (Aspinall *et al.* 2008). On this occasion the grids were aligned north to south.

5.4 The data collected from the survey has been analysed using Terrasurveyor 3.0.36.0. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripping
- Clipping
- De-staggering

5.5 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.

5.6 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.

5.7 The de-staggering process compensates for data correction errors caused by the operator commencing the recording of each traverse too soon or too late. It shifts each traverse either forward or backwards by a specified number of intervals.

- 5.8 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

## 6.0 Results

- 6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -3 to 3 nT/m (Figure 3). This enhances faint anomalies that may otherwise not be noted in the data, with a number of anomalies identified across the data set. These are discussed in turn and noted as single digit numbers in square brackets.
- 6.2 There were several areas within the site which were not suitable for surveying. This was due to the overgrown vegetation and trees.



*Plate 1: View of trees and vegetation in area [1], looking west*



*Plate 2: Overgrown vegetation at the southeast end of the site*



*Plate 3: View across the overgrown vegetation at the western edge of the site*

- 6.3 There was a large amount of magnetic noise [2] across much of the site, this is likely the result of a large amount of modern waste on and within the topsoil. This has produced readings of between -100 and 100 nT/m.



*Plate 4: An example of the modern waste within the site*

- 6.4 There were a couple of larger dipolar features within the site, and example of which is [3]. This has produced readings of -100 to 100 nT/m, and most likely relates to a large piece of buried modern waste, however it could relate to former industrial activity within the site, such as a former kiln.
- 6.5 Scattered randomly throughout the site are several weak and strong dipolar responses, examples of which are highlighted as [4]. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near-surface ferrous metal or other highly fired material in the



topsoil, which could represent small pieces of metal such as nails, horseshoes or parts of agricultural machinery.

## **7.0 Discussion and Conclusions**

7.1 The geophysical survey has identified little of archaeological interest due in part to the large amount of magnetic noise across the majority of the site and the large areas which were unsuitable for survey. Whilst surveying it was possible to see a large amount of modern waste within the site, and this likely accounts for some of the magnetic noise. The magnetic noise has the potential to mask some more subtle archaeological features, but it is unlikely to mask the type of very strong response expected of a kiln for example. The large dipolar area identified by the survey is probably too big to be a kiln, measuring approximately 7.5m x 3m, and likely represents a large dump of buried modern waste, but could potentially represent former industrial activity such as a kiln.

## **8.0 Effectiveness of Methodology**

8.1 The non-intrusive evaluation methodology employed was appropriate to the scale and nature of the site to be surveyed. However due to the overgrown nature of parts of the site it was not possible to survey it in its entirety. Magnetometry was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required further justification and may have proved too time consuming or cost-prohibitive.

## **9.0 Acknowledgements**

9.1 Allen Archaeology Limited would like to thank Wilmot Dixon for this commission.

## 10.0 References

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<https://romankilns.net/>

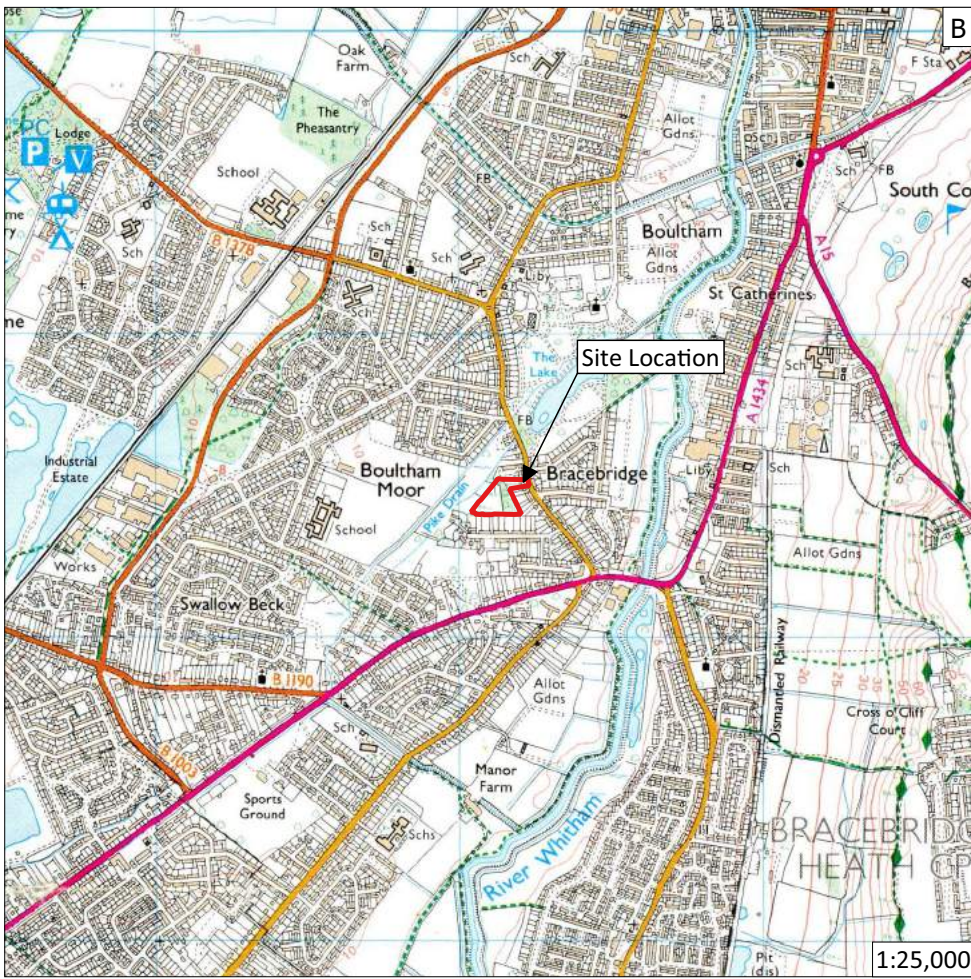
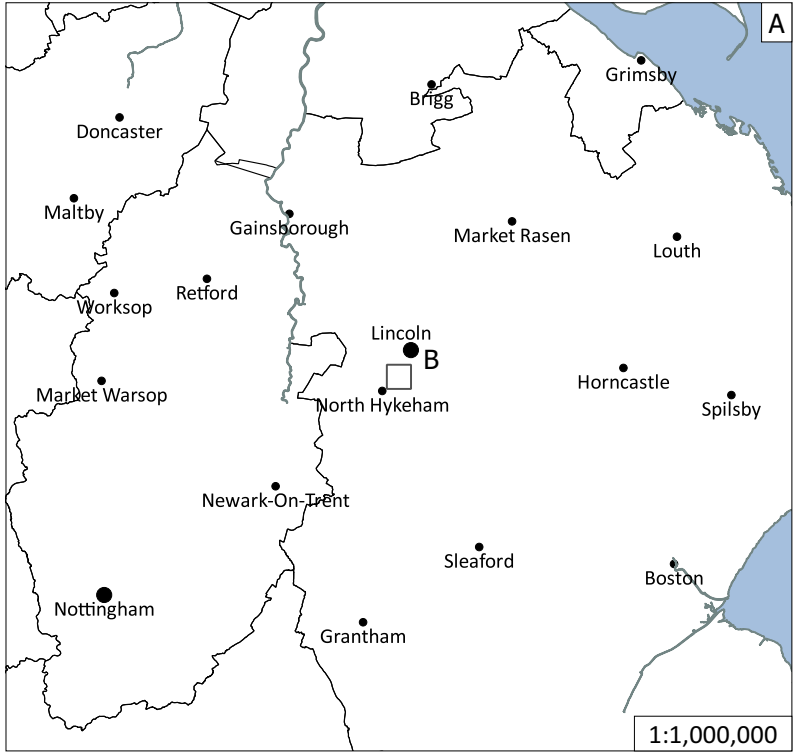
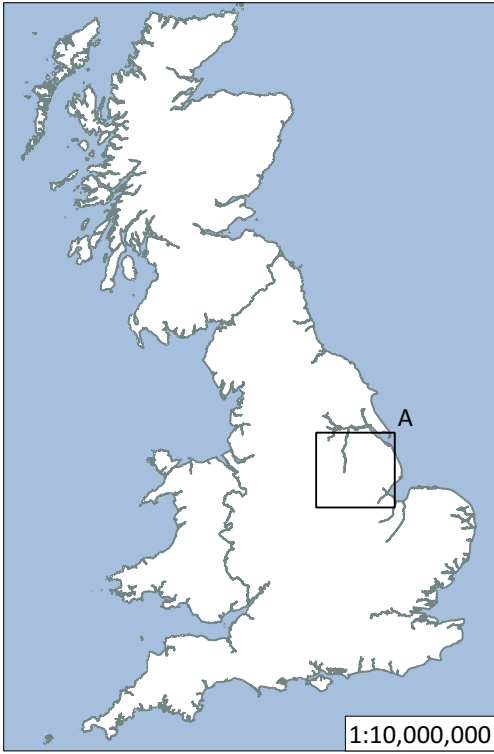


Figure 1: Site location outlined in red

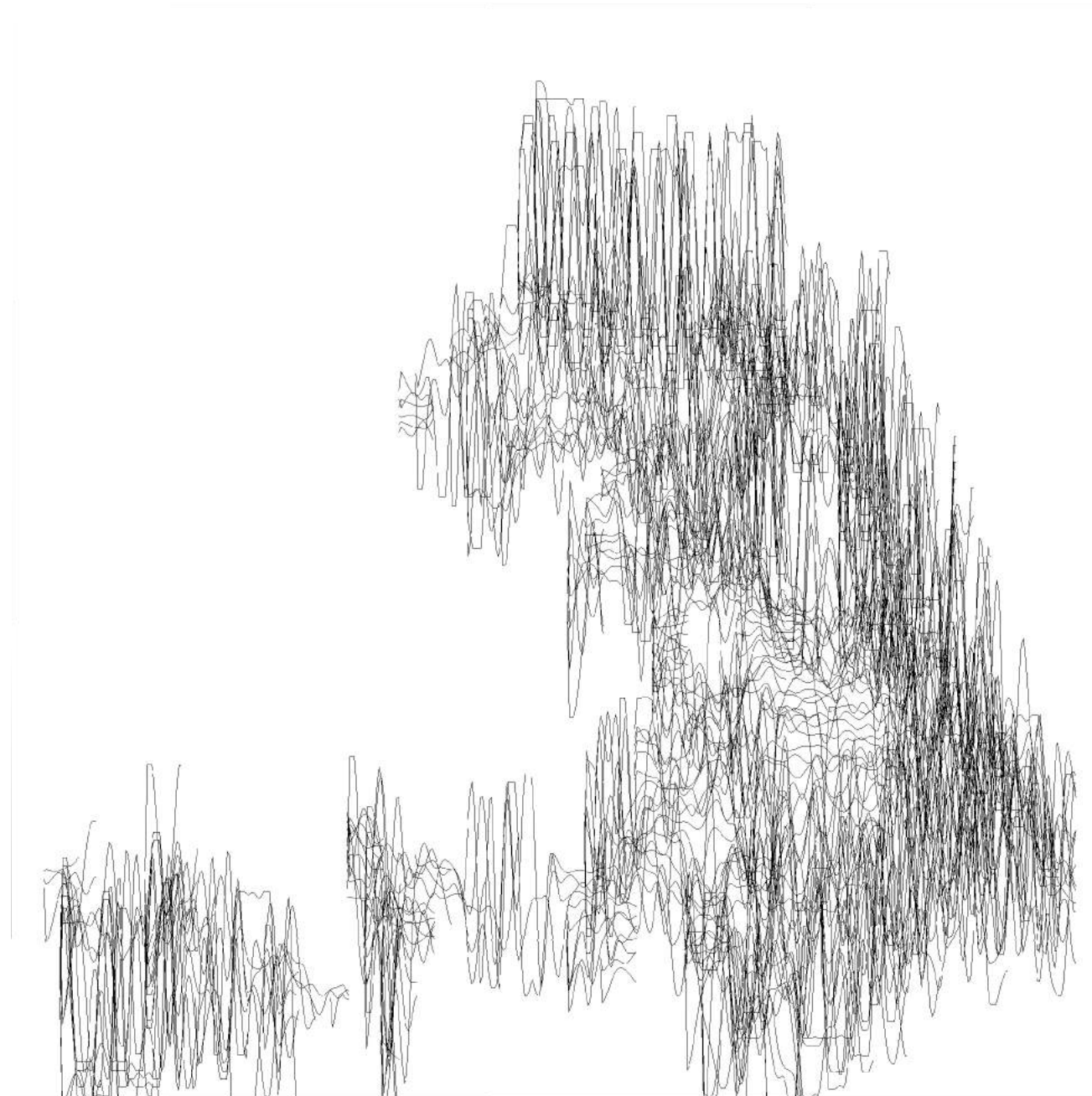
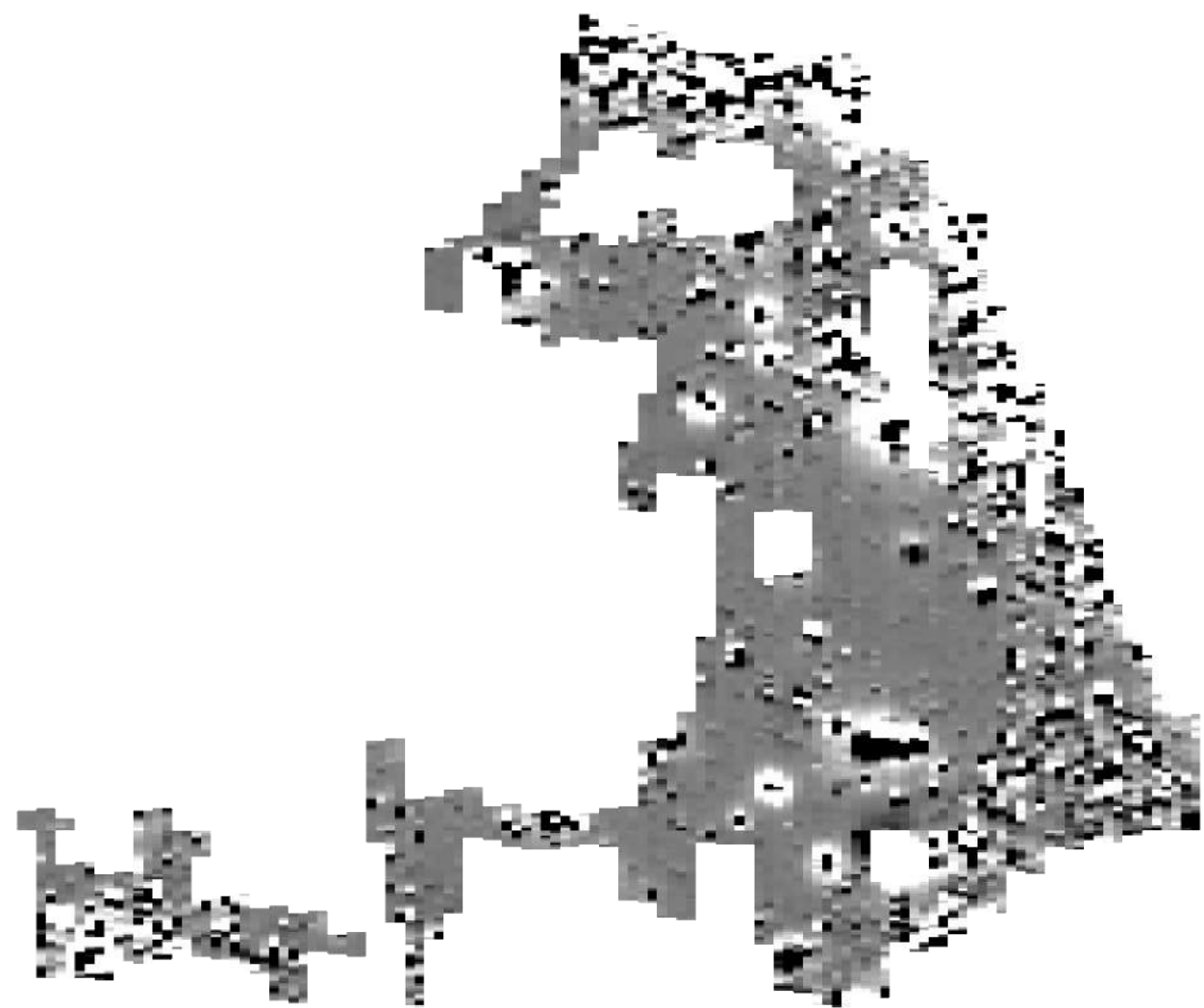
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Drawn by	R Evershed
Date	30/10/2020

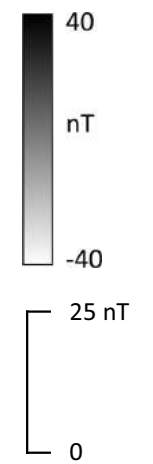
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Key



0

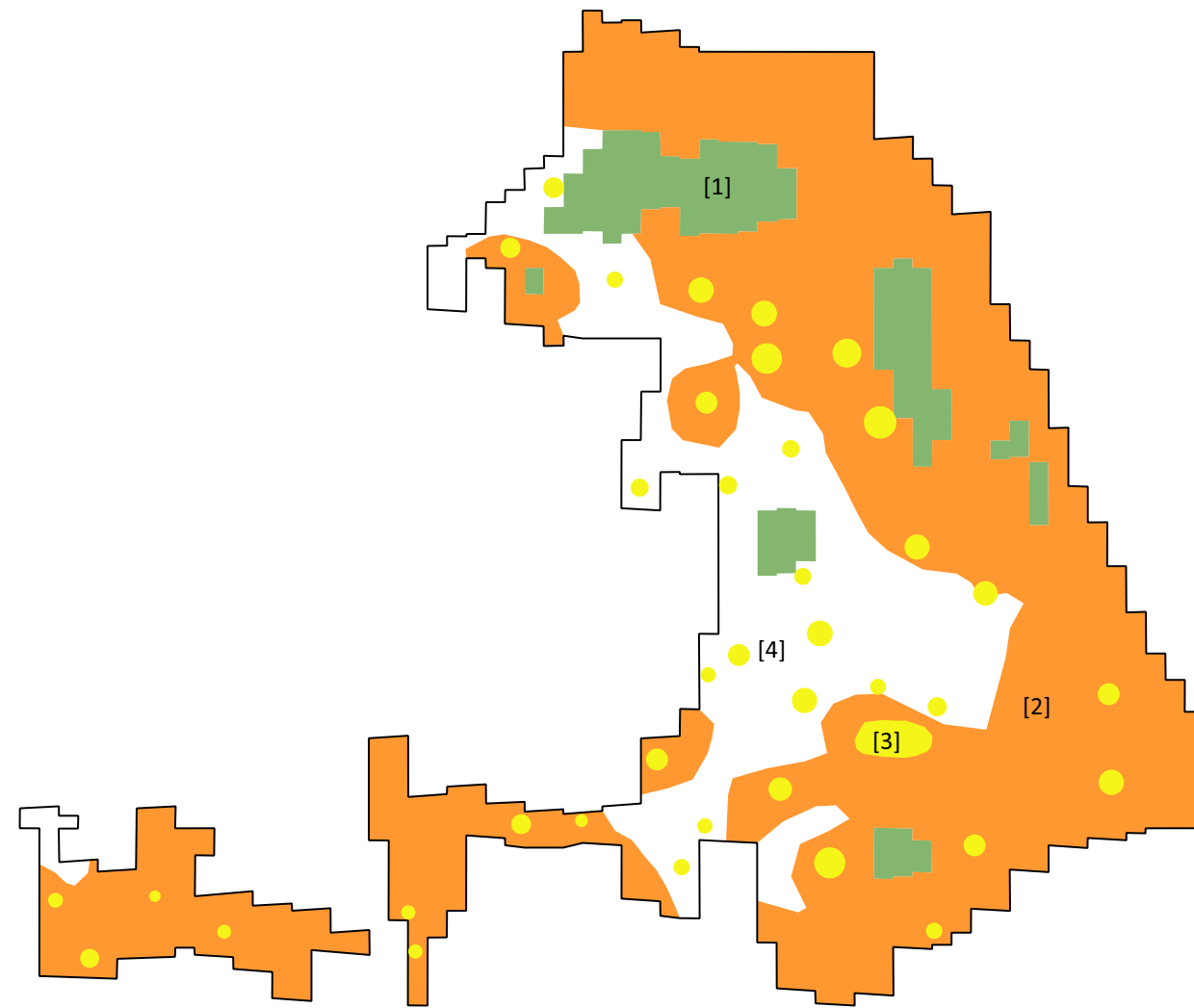
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Site Code	LIRL 20
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Date	30/10/2020

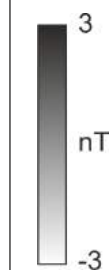
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Figure 2: Greyscale raw data and processed trace plot



**Key**

- Magnetic noise
- Dipolar anomaly
- Survey boundary
- Unsurveyed areas



Site Code	LIRL 20
Scale	1:750 @A3
Drawn by	R Evershed
Date	05/11/2020



Figure 3: Processed greyscale plot and interpretation



Figure 4: Processed greyscale location

0 100 m

Site Code	LIRL 20
Scale	1:1,000 @ A4
Drawn By	R Evershed
Date	05/11/2020

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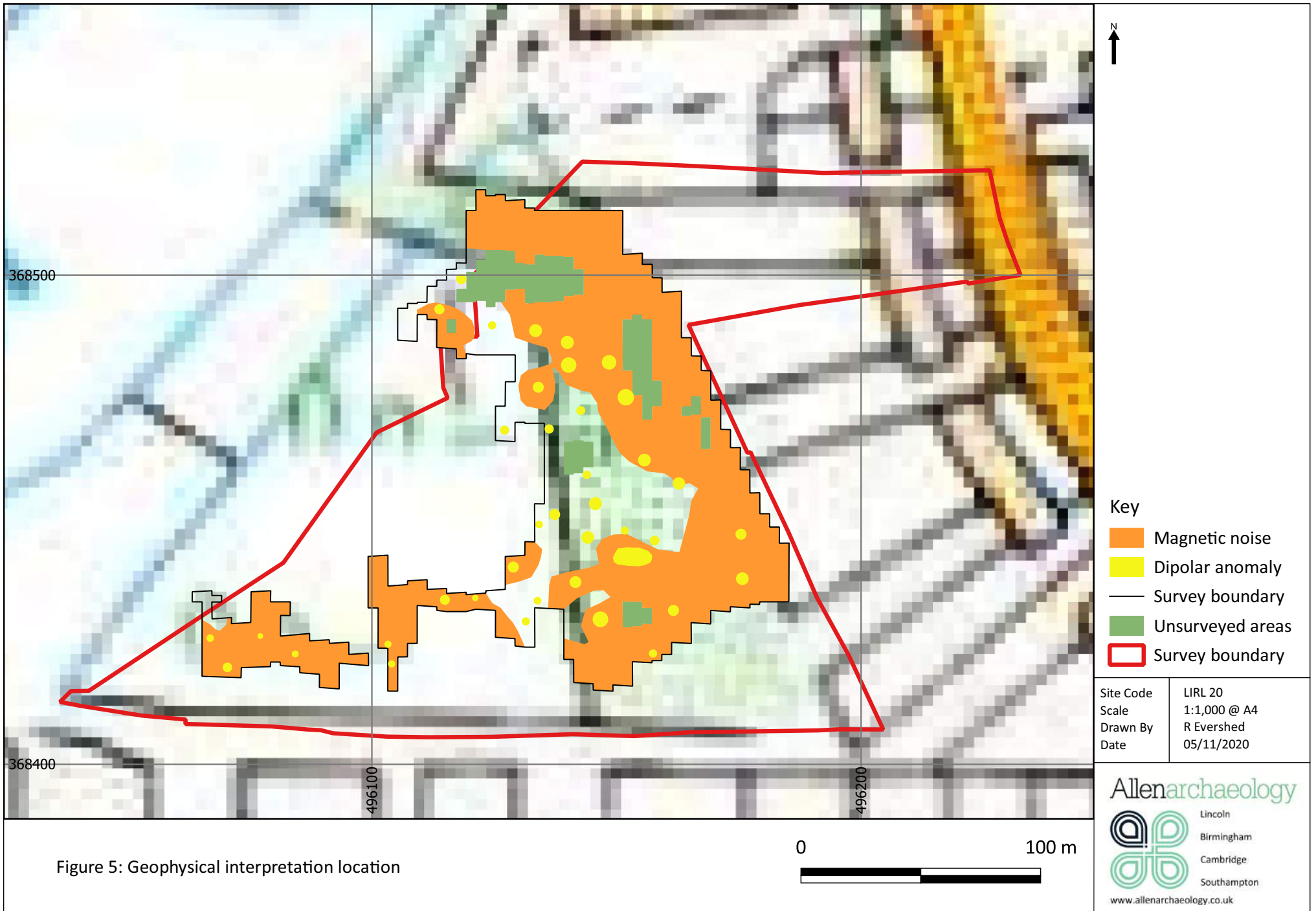


Figure 5: Geophysical interpretation location



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