

**SHAWELL QUARRY,
LEICESTERSHIRE**

**Report on Archaeological Geophysical Surveys
2012-2013**

Surveyed by:

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Shawell Quarry, Leicestershire

Report on Archaeological Geophysical Surveys 2012-2013

Introduction

This report describes geophysical surveys carried out in 2012 and 2013 as part of a programme of archaeological investigations in advance of quarrying at Shawell, Leicestershire. The recent surveys cover areas adjacent to a previous more extensive survey completed and reported on in 2007.

The surveys were commissioned from Bartlett-Clark Consultancy, Specialists in Archaeogeophysics of Oxford, by Archaeologica Ltd on behalf of Lafarge Tarmac Ltd. Fieldwork for the 2012 survey was done on 2-3 May 2012. This was not reported on at the time because one of the fields requiring investigation was under a crop and could not be surveyed. The remaining field was surveyed on 7-8 March 2013. Plots showing findings from both surveys have previously been supplied to Archaeologica Ltd, and are now included in this report.

The Site

Location and topography

The fields surveyed in 2012 and 2013 (as indicated in red and green on the location plan, figure 1, and labelled 1-3) are located to the east of the A426 near Cotesbach village, and are immediately to the north of the existing quarry workings. They are centred approximately at NGR 453700 281800, and are adjacent to the 2007 survey (blue in figure 1). The fields are level arable farmland, and the 2012-13 coverage amounts in total to 10.25ha.

The site is on a geology of River Terrace Gravels above an Early Jurassic Lias bedrock. Boulder Clay drift deposits may also be present, and the variable magnetic response from the fields previously investigated suggests there could be a clay (rather than gravel) topsoil in the present survey area. Areas of strong background magnetic activity were seen in some of the fields surveyed in 2007 (as can be seen in grey scale plots from the 2007 survey, which are reproduced in part for comparison alongside the recent surveys in figure 2). Concentrations of small magnetic anomalies are often seen at sites with near-surface outcrops of glacial gravel, and the effect here was unusually strong. The activity diminished at the northern end of the 2007 survey area, and only a few minor background magnetic anomalies (as outlined in light brown in the interpretation) are visible in the present survey.

Archaeological background

It was noted in the 2007 report [1] that the site is close to the Roman Watling Street, which forms the modern A5 (immediately to the south of the 2007 survey area), but that the archaeological potential of the site is otherwise largely unknown. The 2007 survey detected

cultivation effects and various disturbances, but produced no conclusive archaeological findings other than a number of pit-like features of uncertain significance. These were located mainly to the SW of the 2007 survey area, and so were about 1km from the present survey.

Survey Procedure

The method used for this geophysical investigation was a recorded magnetometer survey, with readings collected along transects 1m apart using Bartington 1m fluxgate gradiometers, and plotted at 25cm intervals along each transect. The results of the survey are presented as a grey scale plot in figure 2 and as a graphical (x-y trace) plot at 1:1250 in figures 3-5. Comparison of these alternative presentations allows the detected magnetic anomalies to be examined in plan and profile respectively. An interpretation of the findings is shown superimposed on figures 3-5 (which permits the interpreted magnetic anomalies to be compared with the underlying data), and is reproduced separately to provide a summary of the findings (figure 6).

The graphical plot shows the magnetometer readings after minimal processing to adjust for irregularities in line spacing caused by variations in the instrument zero setting. Additional 2D low pass filtering has been applied to the grey scale plot to adjust background noise levels.

Colour coding has been used in the interpretation to distinguish different effects. Magnetic anomalies of possibly archaeological origin are outlined in red. Strong magnetic disturbances which are likely to be of recent origin are shown in dark brown. Some other individual strong magnetic anomalies which appear to represent iron objects are in blue, and possible cultivation effects in green. Pipes and drains are also indicated. Small background magnetic anomalies are in light brown.

The magnetometer survey was supplemented by a background magnetic susceptibility survey with readings taken using a Bartington MS2 meter and field sensor loop. The results are presented as a plot of shaded squares at 30m intervals inset in figure 6.

Susceptibility surveying can be used to provide a broad indication of previously occupied or disturbed areas in which burning associated with past human occupation has enhanced the magnetic susceptibility of the topsoil, although the readings may be affected by a number of non-archaeological factors, including geology and land use.

The magnetometer responds to cut features such as ditches and pits when they are silted with topsoil, which usually has a higher magnetic susceptibility than the underlying natural subsoil. It also detects the thermoremanent magnetism of fired materials, notably baked clay structures such as kilns or hearths, and so responds to the presence of ancient settlement or industrial remains, as well as to modern debris.

Survey location

The survey grid was set out and tied to the OS grid using a Trimble differential GPS system (with Omnistar correction to give c. 10cm accuracy). The plans are therefore geo-referenced,

and OS co-ordinates of map locations can be read from the AutoCAD version of the plans which can be supplied with this report.

Results

The surveys have (as in 2007) produced only limited findings, although conditions at the site appear to be reasonably favourable for magnetic investigation. This is indicated both by the clear response to cultivation effects (as seen particularly in field 3), and by the magnetic susceptibility readings taken during the survey. The susceptibility readings (as displayed on the plot inset in figure 6) have a mean value of 20×10^{-5} SI, which is comparable with values obtained at numerous sites where archaeologically productive surveys have been undertaken.

Field 1

Findings in field 1 are limited to minor (and probably recent) disturbances near boundaries, and some weak linear markings which may be cultivation effects (as indicated by broken green lines and labelled A in figure 6). An isolated strong magnetic anomaly (B) to the north of the field is indicated in red because it could represent a silted pit containing magnetically enhanced (e.g. burnt) debris in the fill. A feature of this kind could be of archaeological interest in a relevant context, but its isolation here suggests it is perhaps more likely to be of recent or non-archaeological origin.

Field 2

The linear cultivation markings (C) in the northern half of the field are slightly stronger than in field 1, but fade towards the south. An area of strong disturbances (D) in the NW corner could typically indicate an infilled pit or pond, or alternatively it could be the site of a building or a spread of hardcore near a field entrance.

The magnetic anomalies at E, F are similar to B in field 1. They could again be pits containing strongly magnetic fill, or alternatively they could be metal objects which are larger or more deeply buried than the near-surface iron objects which give rise to narrow spikes in the graphical plots (and which are outlined in blue). A pipe follows the western field boundary.

Field 3

The 2013 survey has detected a distinct overall linear cultivation pattern. This is visible throughout the field, but particularly in the northern half (as around G). It is unclear whether this pattern results from modern ploughing, or indicates surviving traces of earlier ridge and furrow. The linear markings, as in the other fields, align with the modern field boundaries, and so do not necessarily relate to a pre-enclosure field system. The only other identifiable findings in field 3 are fragmentary linear anomalies of a kind which usually represent land drains (as at H).

Conclusions

Ground conditions at the site appear to be favourable for a magnetometer survey, but findings are minimal. Linear cultivation markings were seen in each of the three fields investigated, but most clearly in field 3. The cultivation pattern in each case aligns with present boundaries, and so is not necessarily ancient. Other findings include three strongly responsive possible pit-like features. These are not associated with any other findings to suggest the presence of an archaeological site, and so could perhaps be of recent or non-archaeological origin.

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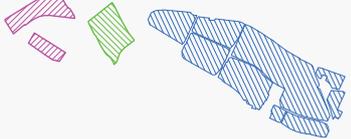
10 October 2013

The fieldwork for this project was done P. Cottrell and C. Oatley.

Reference

- [1] *Shawell Quarry, Leicestershire; Report on Archaeological Geophysical Survey 2007.*
Report by Bartlett Clark Consultancy for Archaeologica Ltd and Lafarge Aggregates.
23 March 2007.

magnetometer survey 2012
magnetometer survey 2012
magnetometer survey 2007



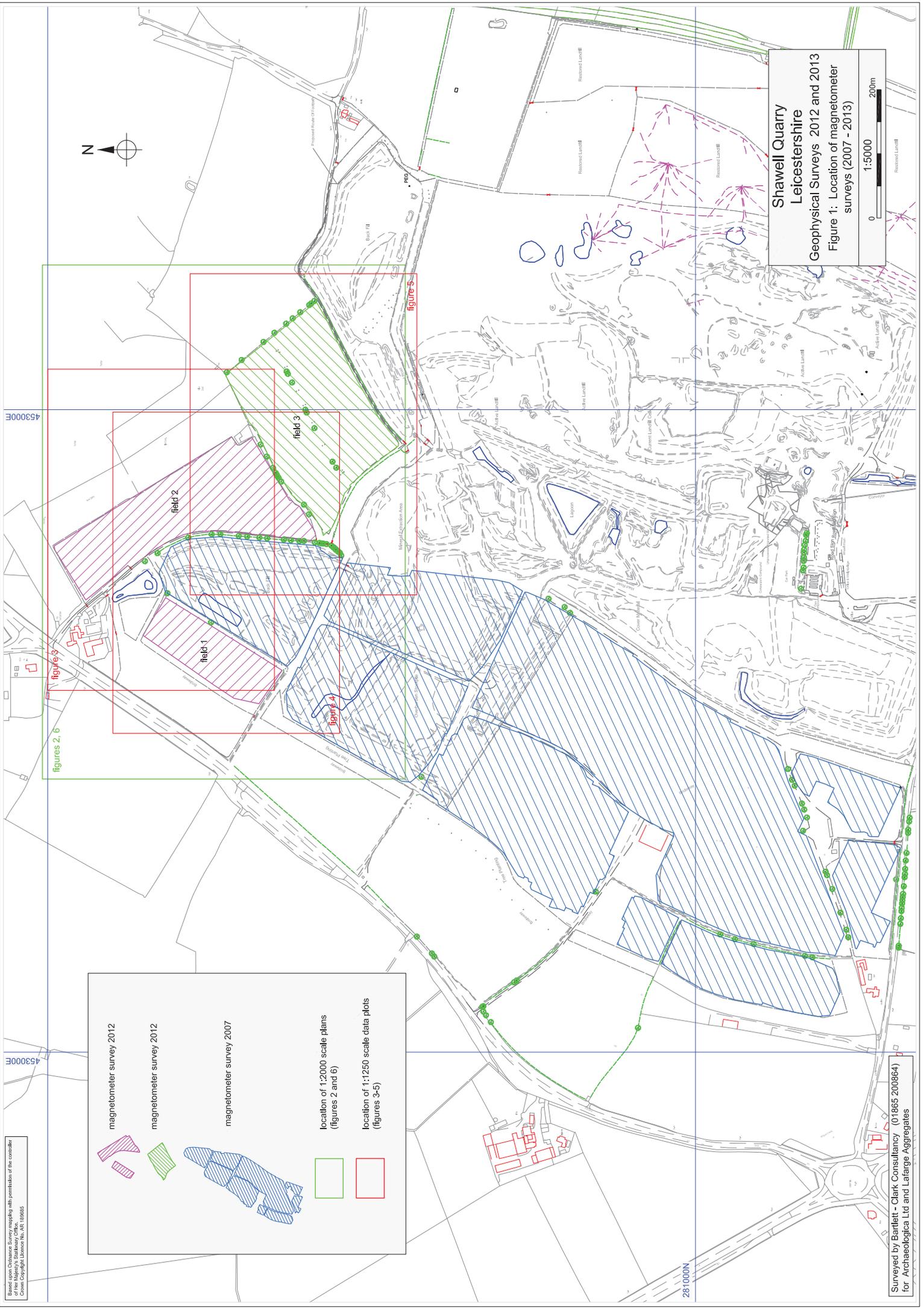
location of 1:2000 scale plans
(figures 2 and 6)



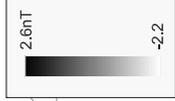
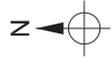
location of 1:1250 scale data plots
(figures 3-5)



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Geophysical Surveys 2012 and 2013
Figure 1: Location of magnetometer surveys (2007 - 2013)

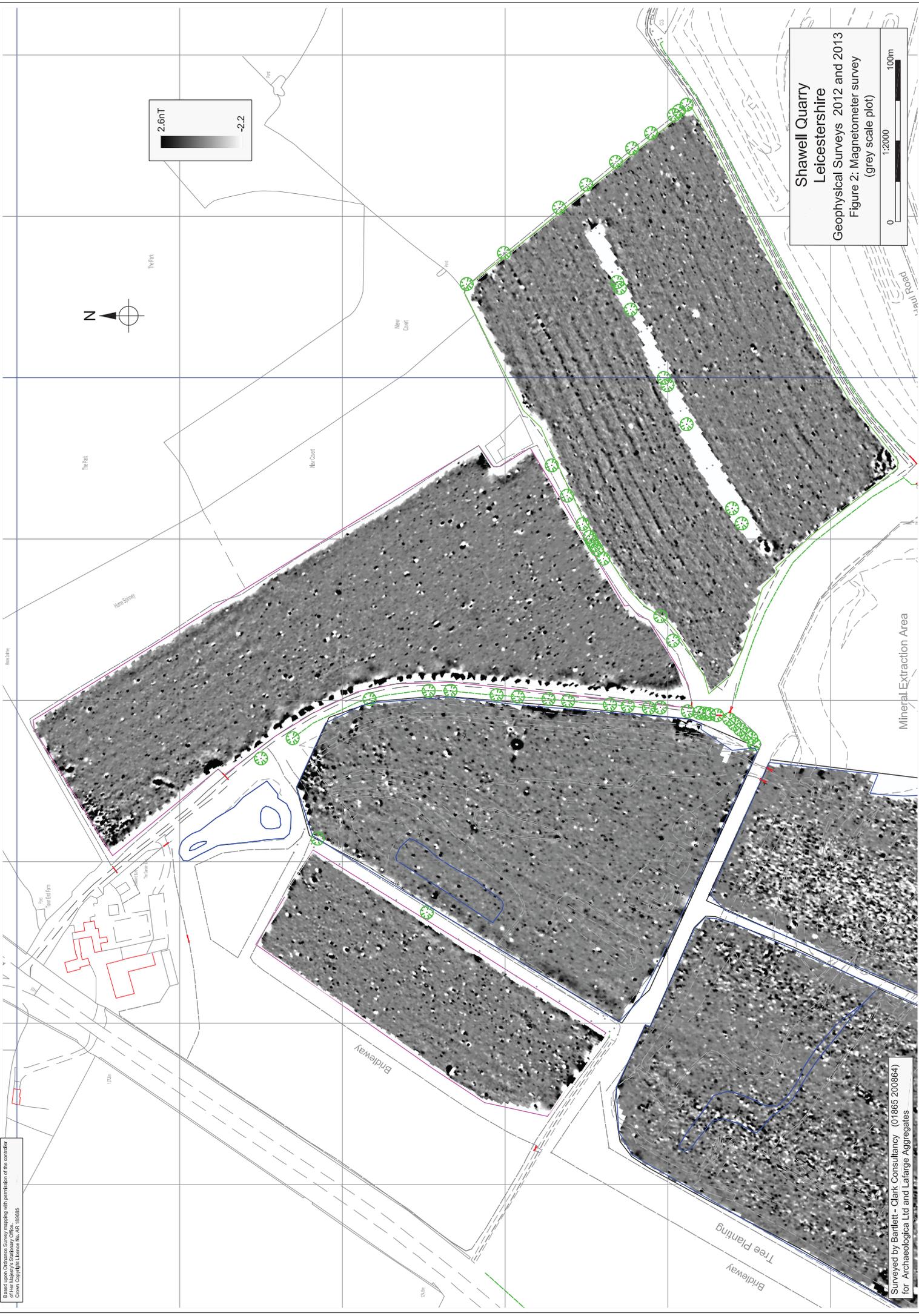


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Figure 2. Magnetometer survey
(grey scale plot)

0 1:2000 100m



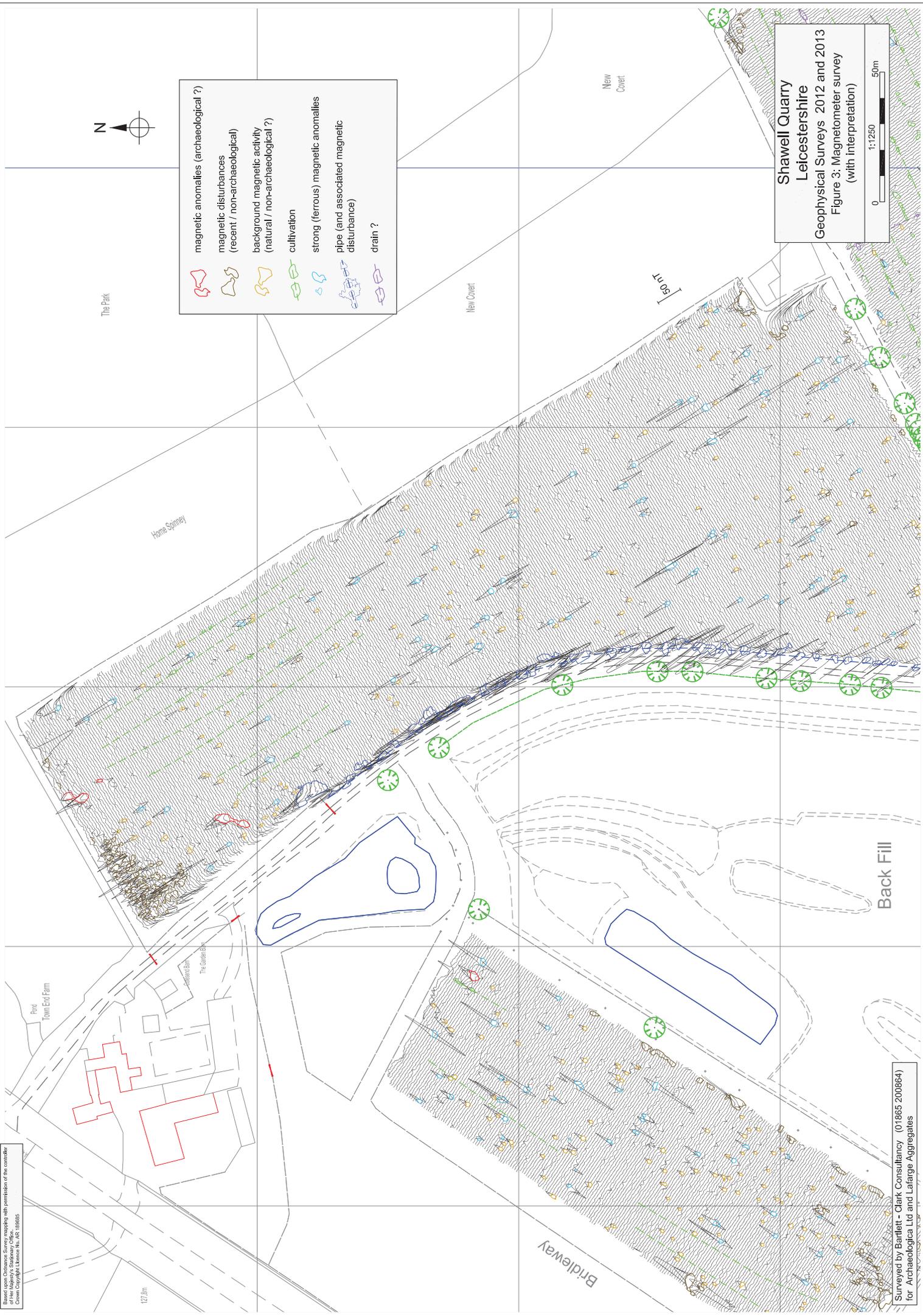
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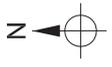


	magnetic anomalies (archaeological ?)
	magnetic disturbances (recent / non-archaeological)
	background magnetic activity (natural / non-archaeological ?)
	cultivation
	strong (ferrous) magnetic anomalies
	pipe (and associated magnetic disturbance)
	drain ?

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Leicestershire

Geophysical Surveys 2012 and 2013
Figure 3: Magnetometer survey
(with interpretation)

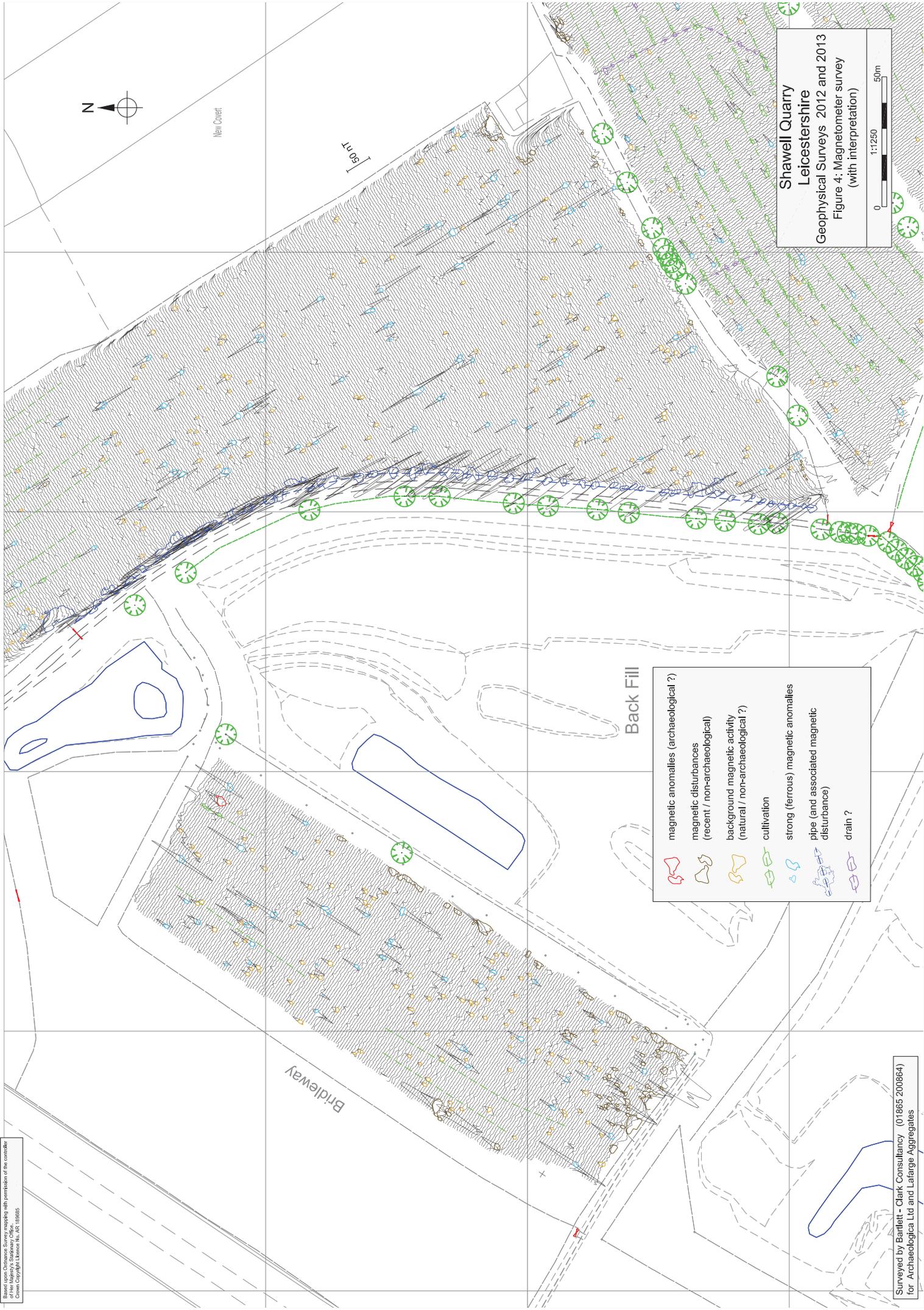




High Coast

50m

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Figure 4: Magnetometer survey
(with interpretation)

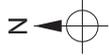


Back Fill

	magnetic anomalies (archaeological ?)
	magnetic disturbances (recent / non-archaeological)
	background magnetic activity (natural / non-archaeological ?)
	cultivation
	strong (ferrous) magnetic anomalies
	pipe (and associated magnetic disturbance)
	drain ?

Bridleway

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Leicestershire
 Geophysical Surveys 2012 and 2013
 Figure 5: Magnetometer survey
 (with interpretation)



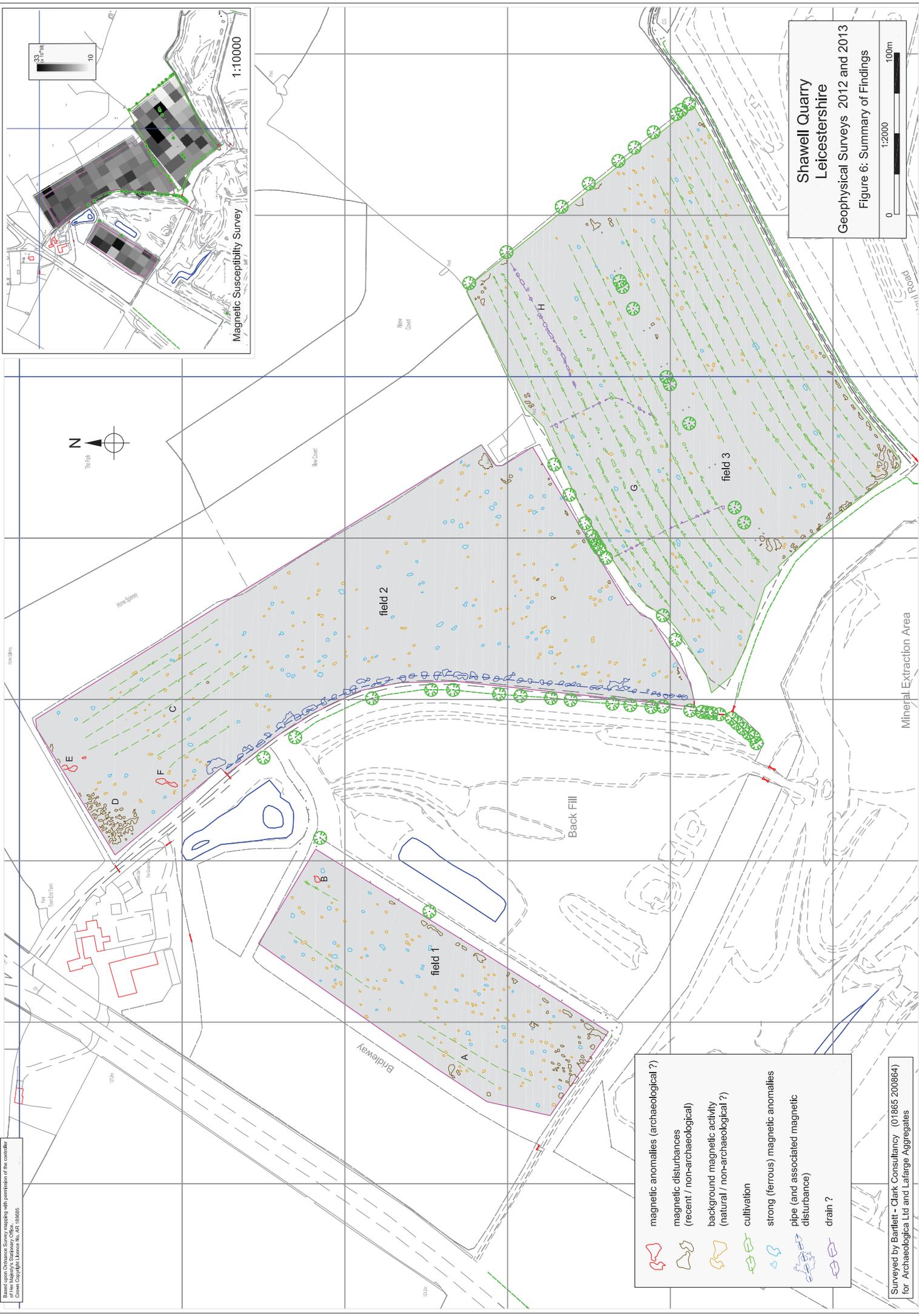
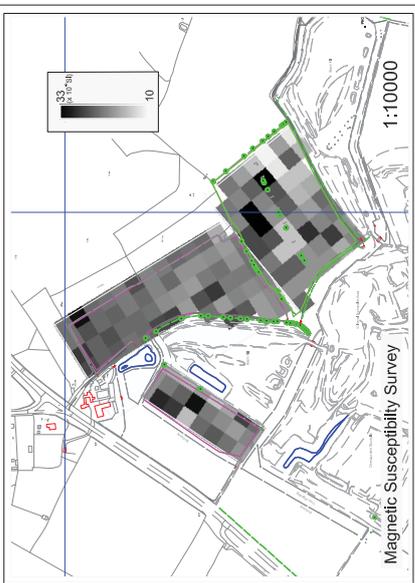
-  magnetic anomalies (archaeological ?)
-  magnetic disturbances (recent / non-archaeological)
-  background magnetic activity (natural / non-archaeological ?)
-  cultivation
-  strong (ferrous) magnetic anomalies
-  pipe (and associated magnetic disturbance)
-  drain ?

Back Fill

MINERAL EXTRACTION AREA

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Geophysical Surveys 2012 and 2013
Figure 6: Summary of Findings

0 1:2000 100m

-  magnetic anomalies (archaeological ?)
-  magnetic disturbances (recent / non-archaeological)
-  background magnetic activity (natural / non-archaeological ?)
-  cultivation
-  strong (ferrous) magnetic anomalies
-  pipe (and associated magnetic disturbance)
-  drain ?

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