

**HARDINGHAM 3 SOLAR PARK, NORFOLK**  
**Archaeological Geophysical Survey**  
**2014**

**Report by:**

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**on behalf of:**

**Savills and Solar Century**

**18 September 2014**

**Norfolk CC Event Number: ENF 138812**  
**Application Reference: 3PL/2014/0545/F**

# HARDINGHAM 3 SOLAR PARK, NORFOLK

## Geophysical Survey 2014

### Abstract

*This geophysical survey was undertaken as part of an archaeological field evaluation in advance of a planning application for a proposed solar power development at Hardingham, Norfolk.*

*Conditions at the site appear to be reasonably favourable for the magnetic detection of archaeological features, but the survey has produced only minimal findings, and has not provided any evidence for the presence of an identifiable archaeological site.*

### 1. Introduction

The survey was commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford, by Archaeologica Ltd on behalf of Solar Century. Fieldwork for the survey was done on 8-10 September 2014. A plan showing the survey findings has previously been supplied to the clients and curator, and is now included in this report.

The location and condition of the site are described in the Planning and Environmental Report issued by Solar Century [May 2014]. This information was summarised also in the Method Statement prepared in advance of the project [1]. The following notes are reproduced in part from these documents.

The survey investigated an area of arable land located (at TG 053049) about 1.3km NE of Hardingham, and 8km south of Dereham. The extent of the application area is outlined in red on the location plan inset in figure 1, and the survey coverage is indicated in blue. The site is adjacent to the existing Hardingham 2 Solar Park to the south. It amounts to c. 11.7ha.

### 2. Objectives of the Survey

The aim of the geophysical survey was to identify the extent and character of any archaeological remains capable of producing a magnetic response. 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 preferentially to the presence of ancient settlement or industrial remains. It is also strongly affected by ferrous and other debris of recent origin.

### **3. Topography and Geology**

The site is relatively flat, with a block of woodland at the centre of the application site. It is on a bedrock of Grey Chalk, with a glacial drift cover of Diamicton Till. The drift material is variable in composition, but may comprise sandy or silty clay, sometimes with gravel-rich layers. Gravel sites in Norfolk and elsewhere have produced positive archaeological findings in previous surveys, but the response on clay may be weaker. It is possible therefore (particularly on clay) that isolated ditches or other features which are remote from ancient settlement or industrial sites (and so lack magnetically enhanced fill of the kind usually found at such locations) might not respond reliably to the survey. There should, however, usually be at least some magnetic response from dense concentrations of archaeological features of the kind which might be found at a former settlement site.

### **4. Archaeological Background**

It has been mentioned in comments on the proposal from Norfolk County Council Heritage Environment Service that 'the proposed development is located in an area with potential to contain previously unidentified heritage assets with archaeological interest. Although only an isolated find of a prehistoric axe is recorded in the vicinity of the site, such a large area with no recorded heritage assets is exceptional in the mid-Norfolk landscape. It is very likely that this is due to a lack of previous archaeological investigations rather than a genuine absence of any archaeological remains in this area. Consequently there is potential for previously unrecorded heritage assets with archaeological interest to be present within the proposed development site and for the significance of these to be affected by the groundworks for the infrastructure of the solar farm.'

It was therefore requested by NCC that the results of an archaeological evaluation (magnetometer survey) should be submitted prior to the determination of the application.

### **5. Survey Procedure**

The survey followed procedures as described in the standard brief for magnetometer surveys issued by Norfolk County Council [2]. [It was not practical in this case to use a cart-mounted magnetometer system as proposed in the revised version of the brief dated 13 June 2014.]

The site was investigated by means of a recorded magnetometer survey. Readings were collected along transects 1m apart using Bartington 1m fluxgate gradiometers, and are plotted at 25cm intervals along each transect. The survey data is shown at 1:2000 scale as a grey scale plot (figure 1), and as graphical (x-y trace) plots at 1:1250 (figures 2-3). Comparison of these alternative presentations allows the detected magnetic anomalies to be examined in plan and profile respectively. An interpretation of the findings is also shown superimposed on figures 2-3 (which permits the interpreted outlines to be compared with the underlying data). A further interpreted summary of findings is presented in figure 4.

The graphical plots in figures 2-3 show the magnetometer readings after minimal pre-processing [of the kind permitted by English Heritage (2008) *Geophysical Survey in Archaeological Field Evaluation* Section 4.8]. This includes adjustment for irregularities in line spacing caused by variations in the instrument zero setting, and truncation of extreme values. Additional weak 2D low pass filtering has been applied to the grey scale plot to adjust background noise levels.

Figure 5 is included in the report to meet additional specific requirements stated in the generic brief for magnetometer surveys, as issued by Norfolk Historic Environment Service [2]. These figures show the magnetometer data without the conventional correction to the zero level in each transect, which is the usual initial step in data processing. The brief also requires a data block to be re-surveyed at the end of each day of fieldwork. The re-surveyed sample blocks are shown alongside the main survey in figure 5.

Colour coding has been used in the interpretation to distinguish different effects. The interpretation is intended to categorize most of the identifiable magnetic anomalies, but cannot reproduce the detail of the grey scale plots.

Magnetic anomalies which may show characteristics to be expected from features of potential archaeological interest are outlined (or indicated more schematically by broken lines) in red. Background magnetic anomalies which may be of natural or non-archaeological origin are indicated in light brown. Stronger (and perhaps recent) disturbances are in grey. Possible cultivation effects are indicated by green lines, and probable land drains in blue/purple. Some of the more conspicuous ferrous objects (identifiable as narrow spikes in the graphical plots) are marked in light blue.

### *Survey location*

The survey grid was set out and tied to the OS grid using a Trimble ProXRT GPS system (with VRS correction to give accuracy of c. 0.1m). 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.

## **6. Results**

The most clearly identifiable findings are two probable land drains at the southern end of the site (labelled A and B on figure 4). There are also small patches of disturbed readings indicated by clusters of magnetic anomalies at C and D. These could be recent disturbances, or shallow infilled hollows. The disturbances are less concentrated than would usually be the case if they represented deliberately filled former ponds. There are other scattered recent disturbances along the NE and E field boundaries.

Other findings include various linear cultivation markings, the strongest of which is marked in green (at F) along the NE boundary. This is probably a modern ploughing headland. Other weaker cultivation effects are aligned with the present field boundaries, and so are likely to result from current cultivation.

A possible weak linear feature in the NW of the field is marked in red and labelled E. It is slightly stronger than some of the cultivation effects, but remains only marginally distinguishable from the general level of background magnetic activity (as represented in

the interpretation by small magnetic anomalies outlined lightly in brown). The feature at E could be an eroded or insubstantial former ditch, or alternatively a further cultivation effect, or an apparent alignment of background disturbances.

It is usually possible in a magnetometer survey to identify magnetic anomalies which could represent silted pits. Such features are characterised by rounded profiles in the graphical data plots (figures 2 and 3 in this report), and are often seen in large numbers at ancient settlement sites. A few such features are outlined in red in figure 4, but are scattered and isolated. The largest of them (at G) is not associated with any other nearby features which would suggest the presence of an archaeological site.

## 7. Conclusions

The detection of minor ploughing disturbances (as are visible particularly to the N and NE of the survey) suggests that soil conditions here should be reasonably responsive to a magnetometer survey, but no findings of clear archaeological significance were obtained.

Features visible in the survey plots include probable clay land drains (at A and B), and disturbances which appear to represent localised scatters of recent debris at C and D. The possible weak ditch-like feature at E and pit-like magnetic anomaly at G are isolated and of uncertain origin. They are not associated with any groups or concentrations of findings to indicate the presence of an archaeological site.

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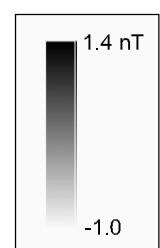
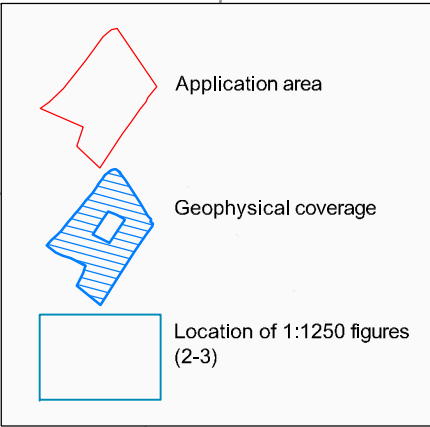
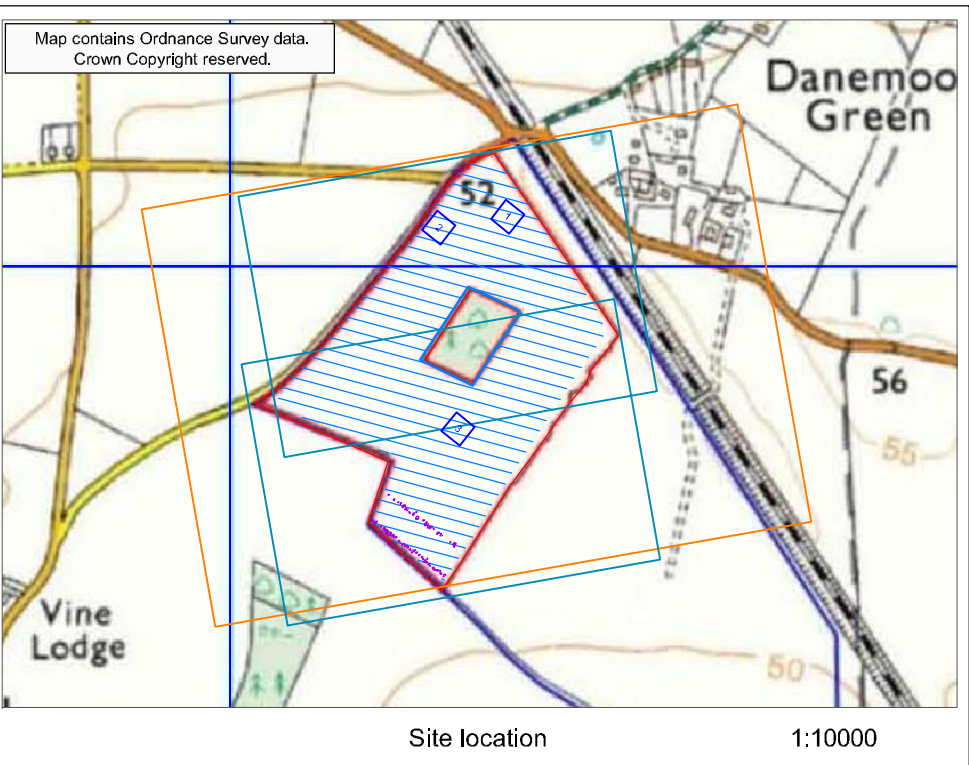
[bcc123@ntlworld.com](mailto:bcc123@ntlworld.com)

18 September 2014

The fieldwork for this project was done by P. Heykoop and R. Organ.

## References

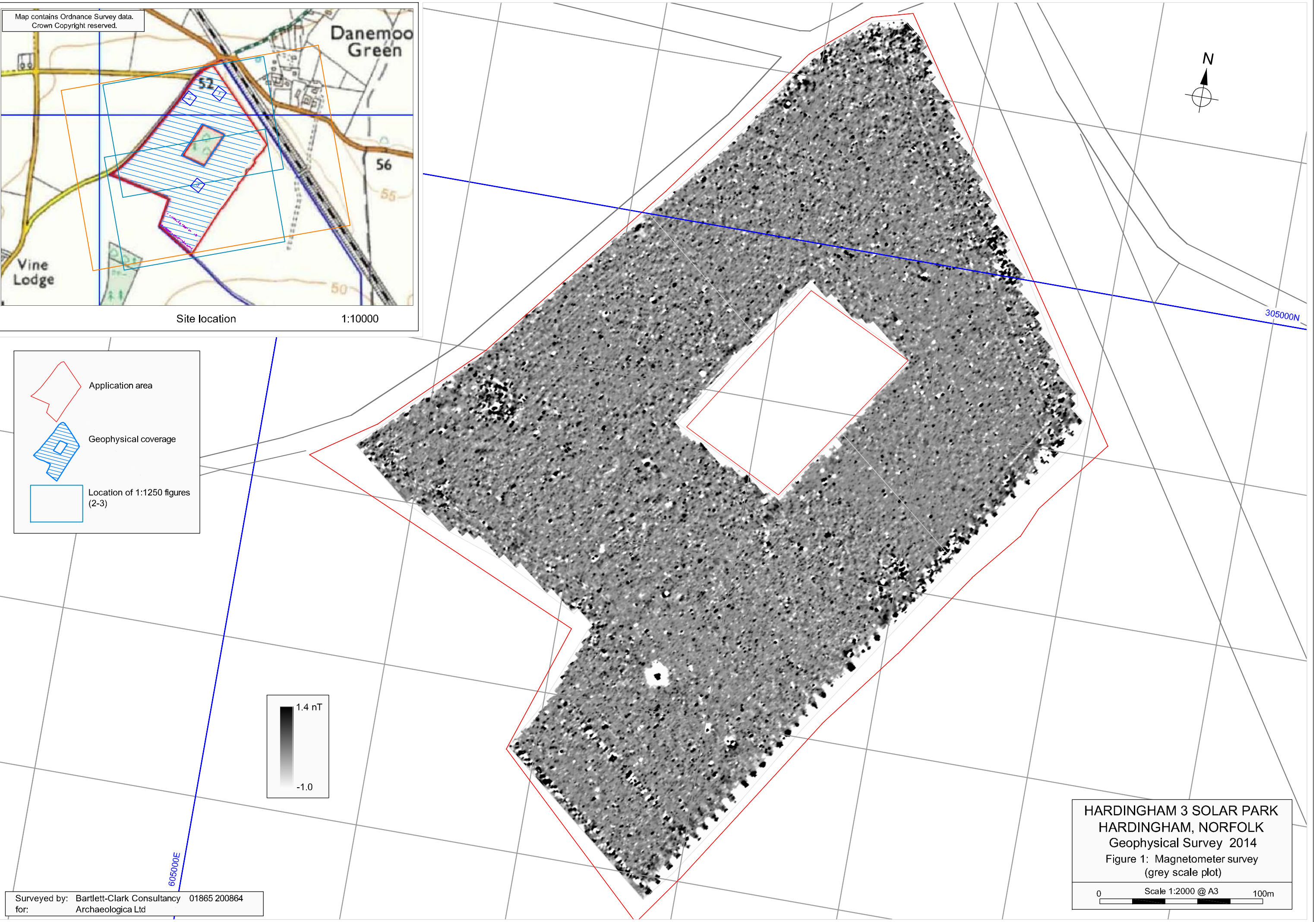
- [1] *Hardingham 3 Solar Park; Method Statement for Archaeological Geophysical Survey.* Document prepared for Archaeologica Ltd by Bartlett Clark Consultancy; 28 August 2014.
- [2] *Generic Brief for Archaeological Evaluation by Magnetometer Survey.* Document issued by Norfolk County Council Historic Environment Service, 7/12/2012.









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 Figure 1: Magnetometer survey  
 (grey scale plot)

0 Scale 1:2000 @ A3 100m



-  magnetic anomalies (archaeological ?)
-  strong magnetic disturbances (recent / non-archaeological)
-  small background magnetic anomalies (mainly natural ?)
-  direction of cultivation
-  drain ?
-  strong (ferrous) magnetic anomalies

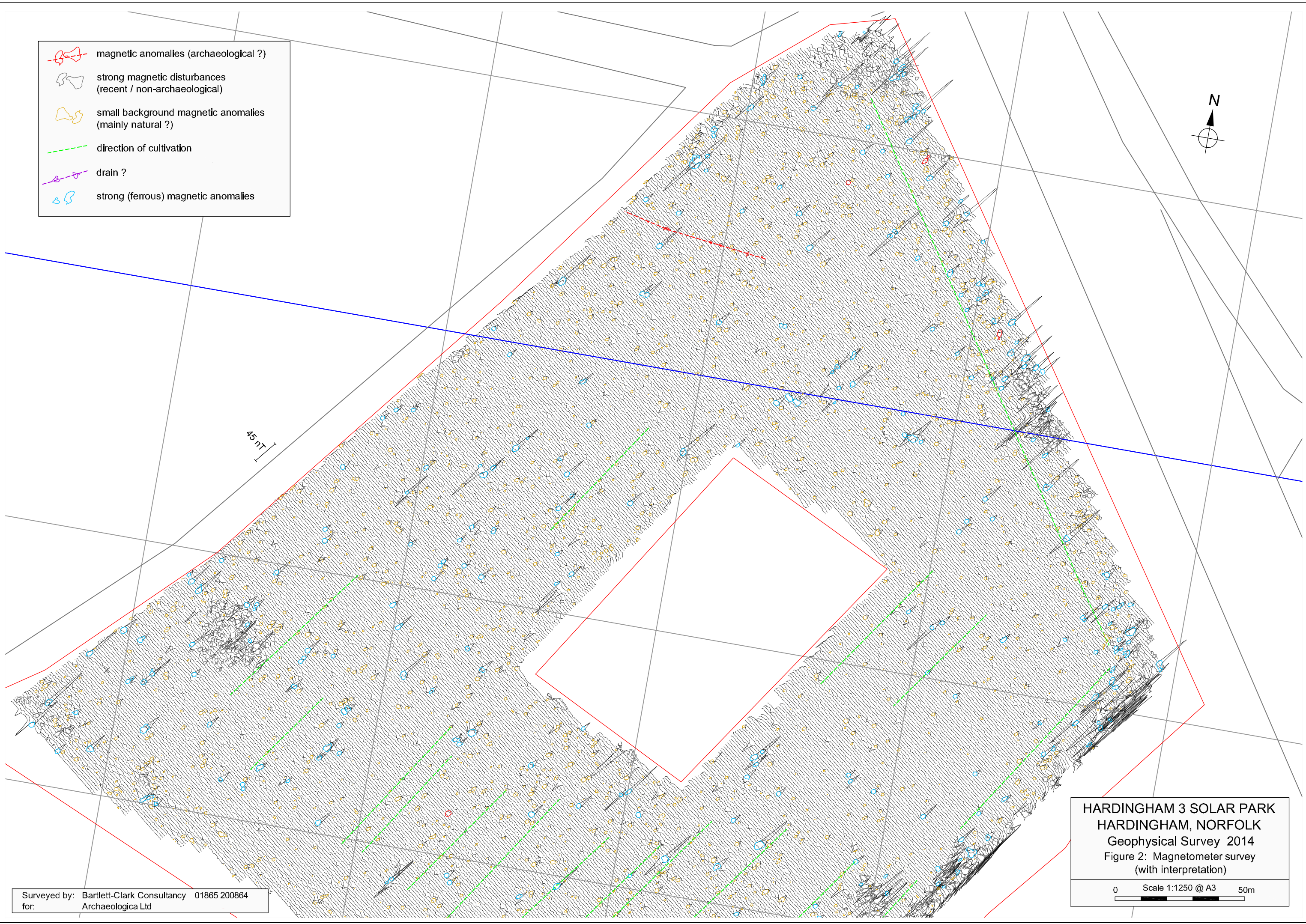


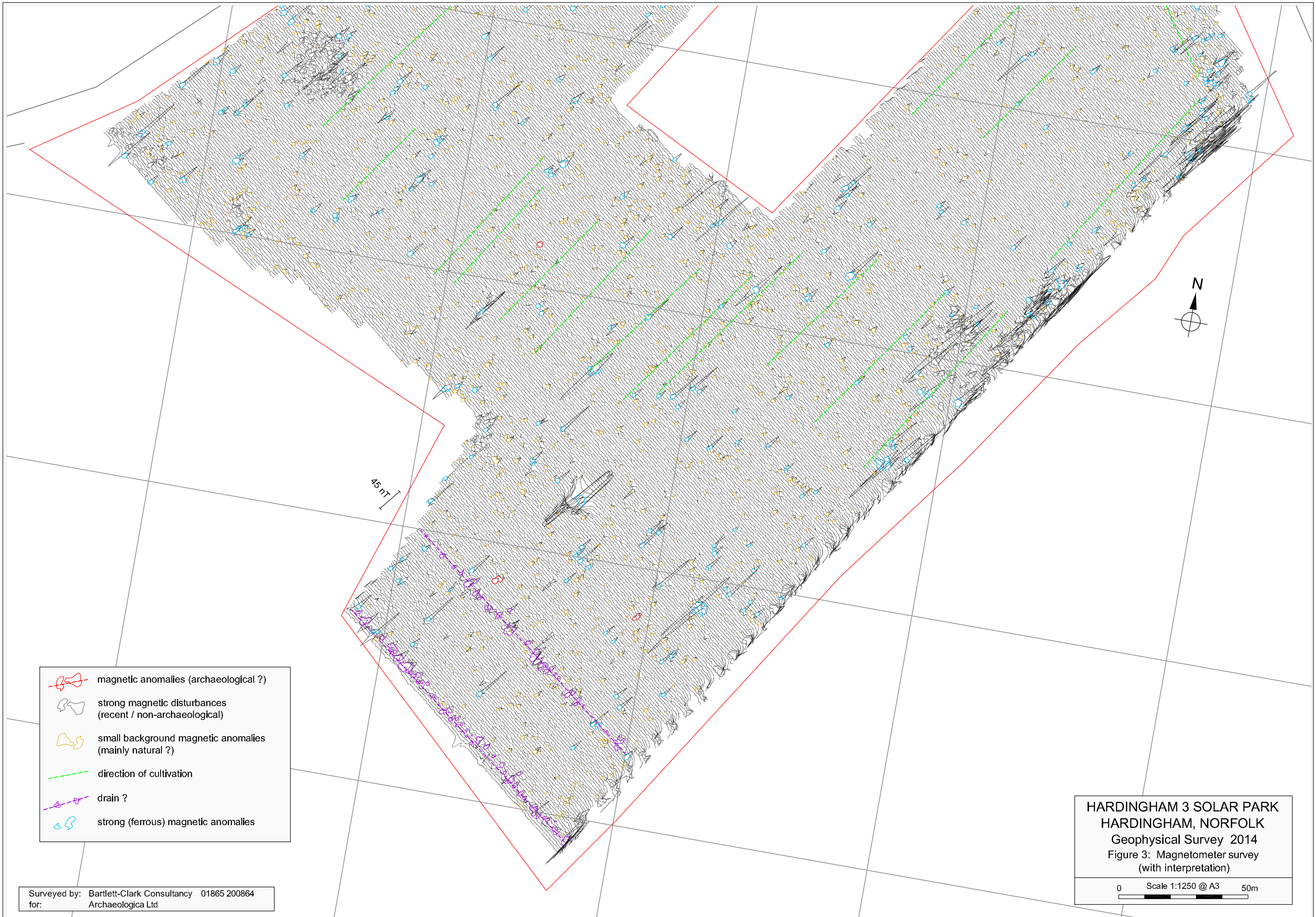
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 Figure 2: Magnetometer survey  
 (with interpretation)

0 Scale 1:1250 @ A3 50m

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-  magnetic anomalies (archaeological ?)
-  strong magnetic disturbances (recent / non-archaeological)
-  small background magnetic anomalies (mainly natural ?)
-  direction of cultivation
-  drain ?
-  strong (ferrous) magnetic anomalies







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 Figure 3: Magnetometer survey  
 (with interpretation)

0    Scale 1:1250 @ A3    50m

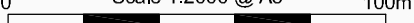
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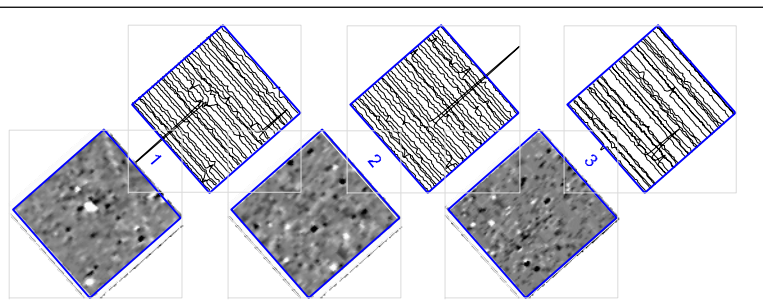


-  magnetic anomalies (archaeological ?)
-  strong magnetic disturbances (recent / non-archaeological)
-  small background magnetic anomalies (mainly natural ?)
-  direction of cultivation
-  drain ?
-  strong (ferrous) magnetic anomalies

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 Figure 4: Summary of findings

0  100m  
 Scale 1:2000 @ A3

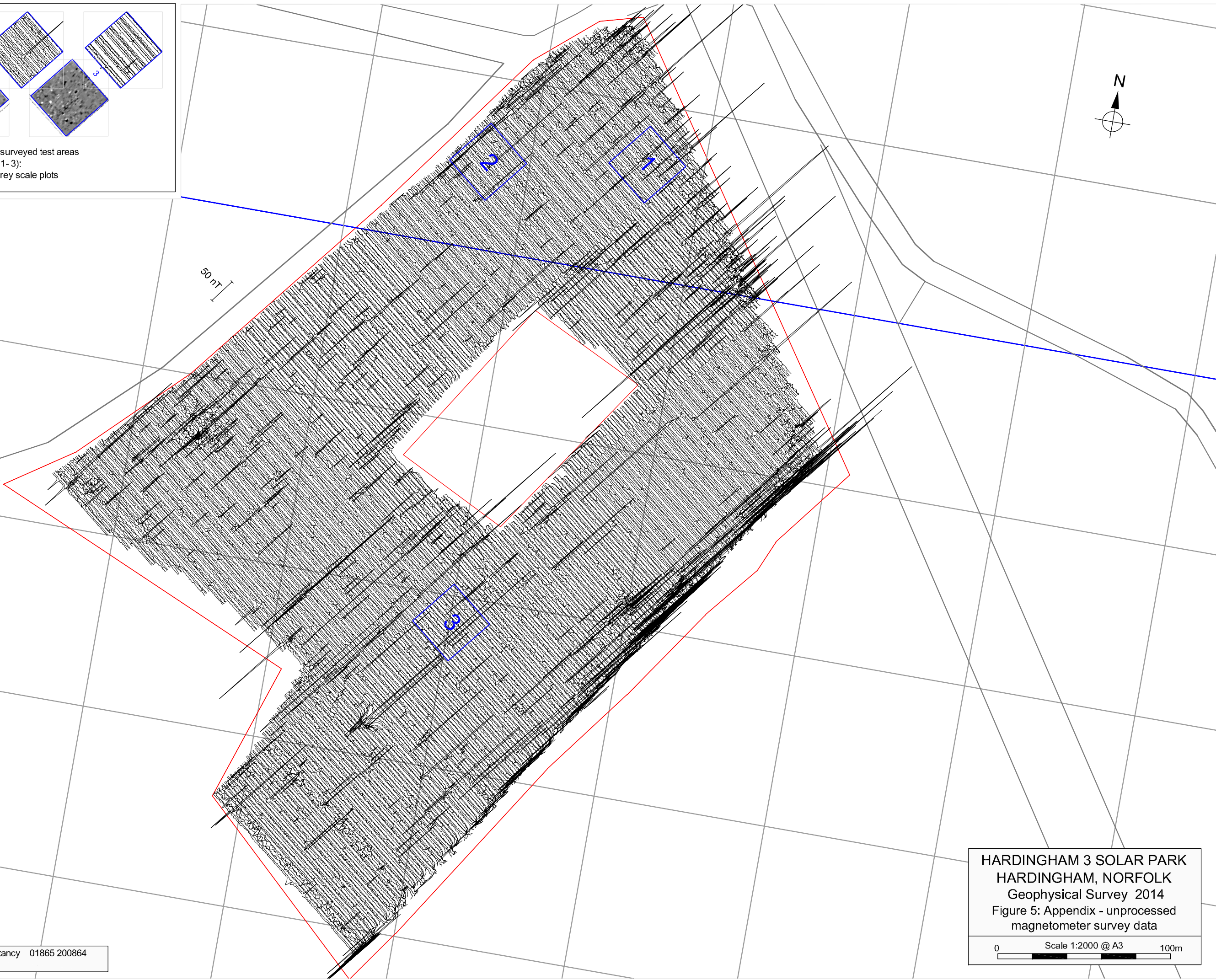
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Duplicate plots of re-surveyed test areas  
(days 1-3):  
graphical and grey scale plots



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Figure 5: Appendix - unprocessed  
magnetometer survey data

0 Scale 1:2000 @ A3 100m