

**LAND AT GOOSEHALL FARM, BURWELL,  
CAMBRIDGESHIRE**

**Archaeological Geophysical Survey  
2014**

**Report by:**

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**on behalf of:**

**Lightsource Renewable Energy Ltd**

**15 December 2014**

# Land at Goosehall Farm, Burwell, Cambridgeshire

## Geophysical Survey 2014

### 1. Introduction

This report describes a geophysical survey which has been undertaken as part of an archaeological field evaluation of an area of land which is under consideration for development as a solar power site. The survey was commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford, by CgMs Consulting Ltd of Cheltenham. The site is located at Goosehall Farm (at NGR 558300, 268900) about 1km NW from Birchall village, Cambridgeshire.

The fieldwork for the survey was done in two stages during 2014. Some initial areas (amounting to 6.7ha) were surveyed on 30 June - 1 July, and the remainder (78.9ha) between 3-19 November. The proposed development area (as indicated by a red outline on the location plan inset in figure 1) amounted initially to 105ha, but this could not be surveyed in the summer because of standing crops (wheat and beet) in the fields. Small areas (as indicated in green in figure 1) were surveyed, but the crops elsewhere were too dense to be walked through. The survey was therefore completed following the removal of the beet in November. The survey now covered a modified development area (as indicated by a yellow outline in figure 1, and amounting to c. 88ha). This was surveyed in full with the exception of the farm buildings in the centre of the site, and overgrown areas along the eastern boundary. Two small areas surveyed in June (in fields 8 and 10 as numbered in figure 1) are included in the report for the record, but lie outside the modified development area. The total area covered by both phases of the survey amounts to 85.6ha.

Background information on site conditions and the archaeological potential of the surrounding area is presented in a Desk Based Assessment (DBA) of the site, which has previously been prepared by CgMs [1]. The following notes are reproduced or summarised in part from this document.

Fields within the study area have been numbered in an arbitrary sequence (1-11, as indicated on the survey plans) for reference in this report.

### 2. Topography and Geology

The fields within the development area are centred around the farm buildings at Goosehall Farm. The land is flat and low lying at an elevation between 1m AOD at the eastern boundary, and 2m AOD in the west.

The underlying geology of the site is described in the DBA as Mudstone of the Gault Chalk Formation in the western half of the site, with Chalk of the Totternhoe Stone Member to the east. Isolated superficial sand and gravel deposits are also recorded within the study site. Geophysical surveys on both chalk and gravel soils (including surveys done at other locations in Cambridgeshire) have often provided clear evidence for the presence of archaeological features, and ground conditions here should therefore

be reasonably satisfactory for a magnetometer survey.

### **3. Archaeological Background**

Summary plans from the Desk Based Assessment are reproduced (inset) in figure 3. These show the locations of nearby archaeological findings as listed in the County Historic Environment Record (HER) and National Monuments Record (NMR).

Findings shown on the plans include a possible D shaped enclosure to the north of Goosehall Farm (NMR 1582770). This may be of late prehistoric or Roman date. A further Roman artefact scatter (HER 06498) is indicated c. 150m east of the study site, and Roman pottery and ditches have been identified during excavations in Burwell. No Saxon or early medieval activity is recorded within or near the study site, although the route of the Black Lake watercourse (NMR 374754) runs through the site (along field boundaries). This is of possibly Medieval origin. Quarries immediately west of the site (HER 374754) may also have Medieval origins. An area of Medieval ridge and furrow is recorded c. 800m east of the study area, and a moated site c. 640m to the north.

Historic maps show various former field boundaries, including narrow strip fields in the southern part of the site. A quarry or clay pit and brickworks is shown in the western part of the site (field 1) on the 1886 OS map (inset in figure 4), although the brickworks appears to have been disused by 1903. A mineral railway (NMR 1367209), which was in use from before 1926 to c. 1973, is shown crossing the site on the 1958 OS map. The former quarry is marked on the 1980 OS map (figure 8 in DBA: not reproduced here), but is no longer visible by 2006 (figure 9 in DBA). A further post-medieval brick works (HER MCB16568) is recorded close to Goosehall Farm on the HER plan. A building and orchard are indicated to the north of the farm on the 1958 map (inset in figure 4).

The DBA concludes there is a high potential for medieval drainage ditches within the site, and moderate potential for prehistoric or Roman and Medieval or modern activity within the site.

### **4. Objectives of the Survey**

The aim of the geophysical survey was to identify where possible the extent and character of any archaeological remains capable of producing a magnetic response, and to test for evidence of any previously unrecorded archaeological sites or features. This information may then inform any further archaeological fieldwork which may be required during later stages of the evaluation. 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. The survey is also strongly affected by ferrous and other debris of recent origin.

Magnetic anomalies may be weakened if there is a lack of magnetic contrast between the contents of earth-filled features and the surrounding natural soil, as is sometimes the case on clay soils, or if features are buried at depth beneath subsequent deposits.

## 5. Survey Procedure

### *Fluxgate magnetometer survey*

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 in figures 5-8, and as a graphical (x-y trace) plot at 1:1500 scale in figures 9-14. Comparison of these alternative presentations allows the detected magnetic anomalies to be examined in plan and profile respectively. [Inclusion of the xy plots in the report also permits further re-interpretation of the data if required.] An interpretation of the findings is also shown superimposed on figures 9-14 (which permits the interpreted outlines to be compared with the underlying data). A further summary of findings is presented in figures 2-4.

The graphical plots in figures 9-14 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.

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 in red. Background magnetic anomalies which may be of natural or non-archaeological origin are indicated in light brown, and some larger natural disturbances (which may indicate natural silted hollows in the subsoil) are in a light green. Probable recent disturbances are in grey. Possible cultivation effects are indicated by green lines, and some of the more conspicuous ferrous objects (identifiable as narrow spikes in the graphical plots) are marked in light blue. Probable land drains are also marked. Disturbances corresponding to former field boundaries are shown in brown.

### *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

We comment on the survey findings by fields from NW to SE in the sequence as numbered, starting at the north east.

### *Fields 1-2*

There are extensive magnetic disturbances centred on an area of extreme out-of-range

values labelled A at the south end of field 1 (figure 3). The disturbances at A must represent magnetic debris in the fill of the former quarry with a less concentrated scatter of material across the surrounding area. A further strip of disturbed readings is labelled B in field 1a (figure 3: this was surveyed in June on a slightly different alignment to the remainder of the field). This strip can be seen in the 1958 map to represent part of the route of the mineral railway, which continues to the works shown on the same map to the south. Further disturbances along the western boundary of field 1 (figure 2) correspond to a track on the 1958 map, and the railway (labelled C in field 2) continues across the survey to the NE.

Other findings in fields 1-2 consist mainly of linear markings which can be variously interpreted as former field boundaries, drains, and cultivation effects. Linear features D, E, F, G, H (figure 2) can be identified as boundaries on either or both of the 1886 and 1903 OS maps (1903 not reproduced). A similar feature (I) does not appear to be marked on the maps.

The linear features marked as drains in the interpretation are represented in the data plots by sequences of small magnetic anomalies of a kind which typically represent sections of clay land drain. The distinction between the categories of findings is not in all cases entirely clear, but other linear features which are indicted (in green) as possible cultivation effects are usually defined by more uniform linear effects, and not by an alternation of small positive and negative magnetic anomalies. They could therefore represent silted furrows resulting from recent or earlier ploughing. Sequences of linear anomalies following slightly varying alignments were detected in both fields 1 and 2 (figure 2). These suggest variations in the direction of ploughing at different times.

### *Field 3*

Disturbances on the line of the former railway continue across the field, as does the field boundary H (visible on the 1886 and 1903 maps). A disturbed area at J corresponds to an enclosure containing a building shown on the 1903 and 1958 maps, although there does not seem to be any specific response to the orchard shown on these maps. [Various individual magnetic anomalies in this part of the site are shown either as ferrous objects (blue – if strong), or as possible natural silted hollows (light green). It is possible some could represent tree holes or other disturbances associated with the orchard.]

A N-S linear feature (K) at the east of field 3 corresponds to a line on a map of 1839 (figure 4 in DBA: not reproduced). This forms a western boundary to a distinct cultivation pattern visible to the east.

One remaining finding is a distinct curving linear feature towards the west of field 3 at L. It appears to continue a cultivation marking seen in field 2, but cultivation effects are usually straight. It is close to the location of the possible D shaped Roman enclosure listed by the NMR, and is therefore marked in red as a potential archaeological feature.

### *Fields 4-7*

There are strong disturbances near to the farm at the west of field 4, together with possible cultivation effects. These are intersected by a possible curving feature M. This is rather ill-defined against a disturbed background in the grey scale plot, and is much less distinct than L in field 3. It cannot therefore be interpreted with any confidence, but is marked in red in case it represents an eroded trace of an enclosure-like feature.

Boundaries shown on the 1903 map (and in part on the 1958 map) are visible at N in

fields 5-6 and 7. Other linear markings in field 7 are defined by fragmented linear disturbances (as seen in the grey scale plot), and so are probably drains.

### *Fields 8-10*

There is a high background noise level in field 8 (perhaps indicating a scatter of brick-making debris). Linear features (as at P, Q) in field 8 correspond to strip fields shown on the 1839 and later maps. The strong disturbances at Q suggest a ditch filled with modern debris. Various drains have also been detected in fields 9 – 10. A narrow cultivation pattern in the north of field 9 is likely to relate to recent ploughing.

## **7. Conclusions**

The survey has provided a comprehensive representation of subsurface features and disturbances relating to past and present land use, and to industrial activities at the site, but there is only minimal evidence for the possible presence of any archaeological features.

Findings include disturbances corresponding to the quarry and brick works, the mineral railway, and former buildings north of the farm. Various field boundaries which are identifiable on historic maps have been located, together with related cultivation patterns and land drains. One feature which could cautiously be suggested as of potential archaeological origin is a curving ditch-like feature (at L in field 3). This is at a location corresponding to the possible Roman enclosure listed by the NMR, but it does not appear to be associated with any other identifiable archaeological features. A further possible curving ditch-like feature at M in field 4 is much less distinct, and cannot be interpreted with any confidence.

### **Report by:**

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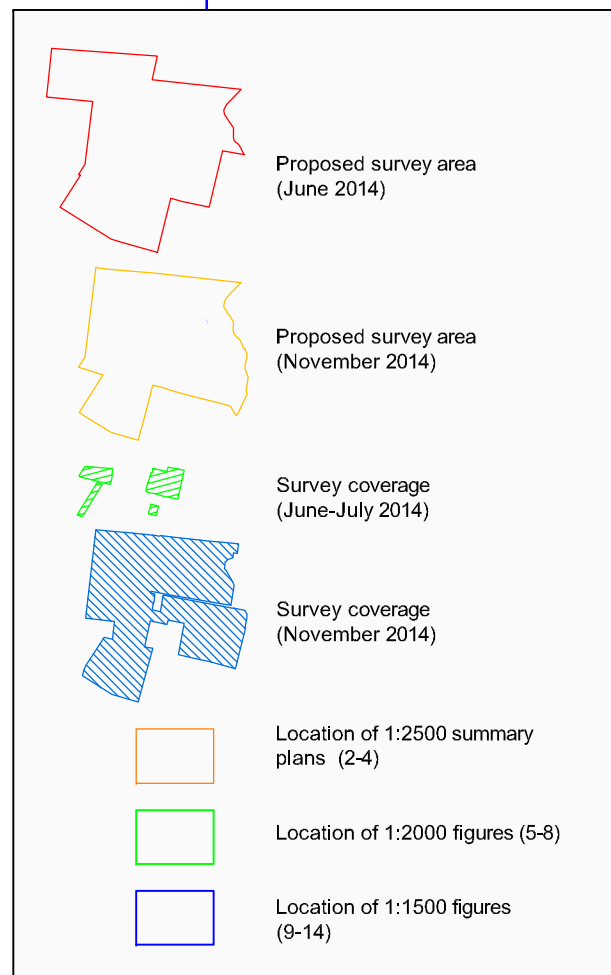
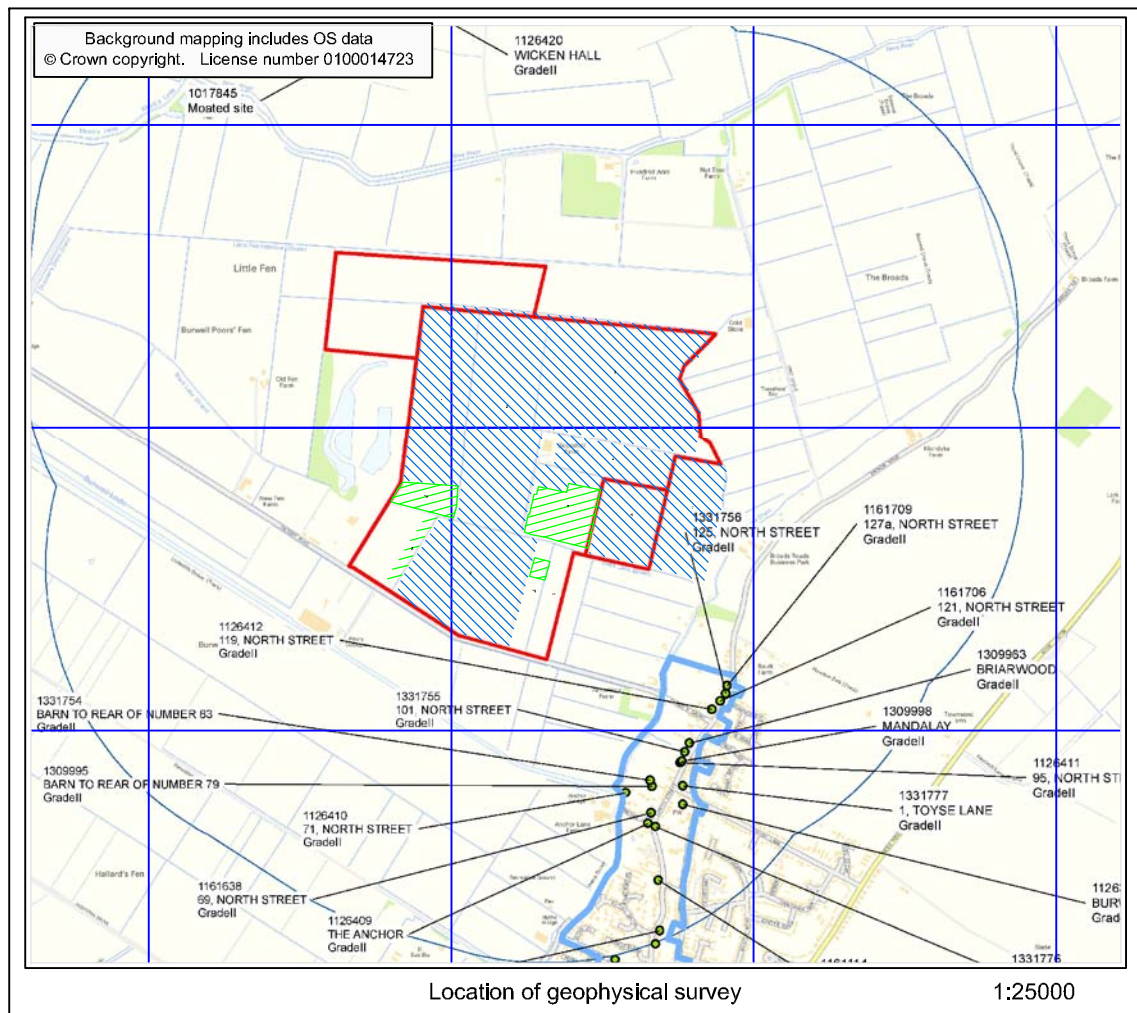
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15 December 2014

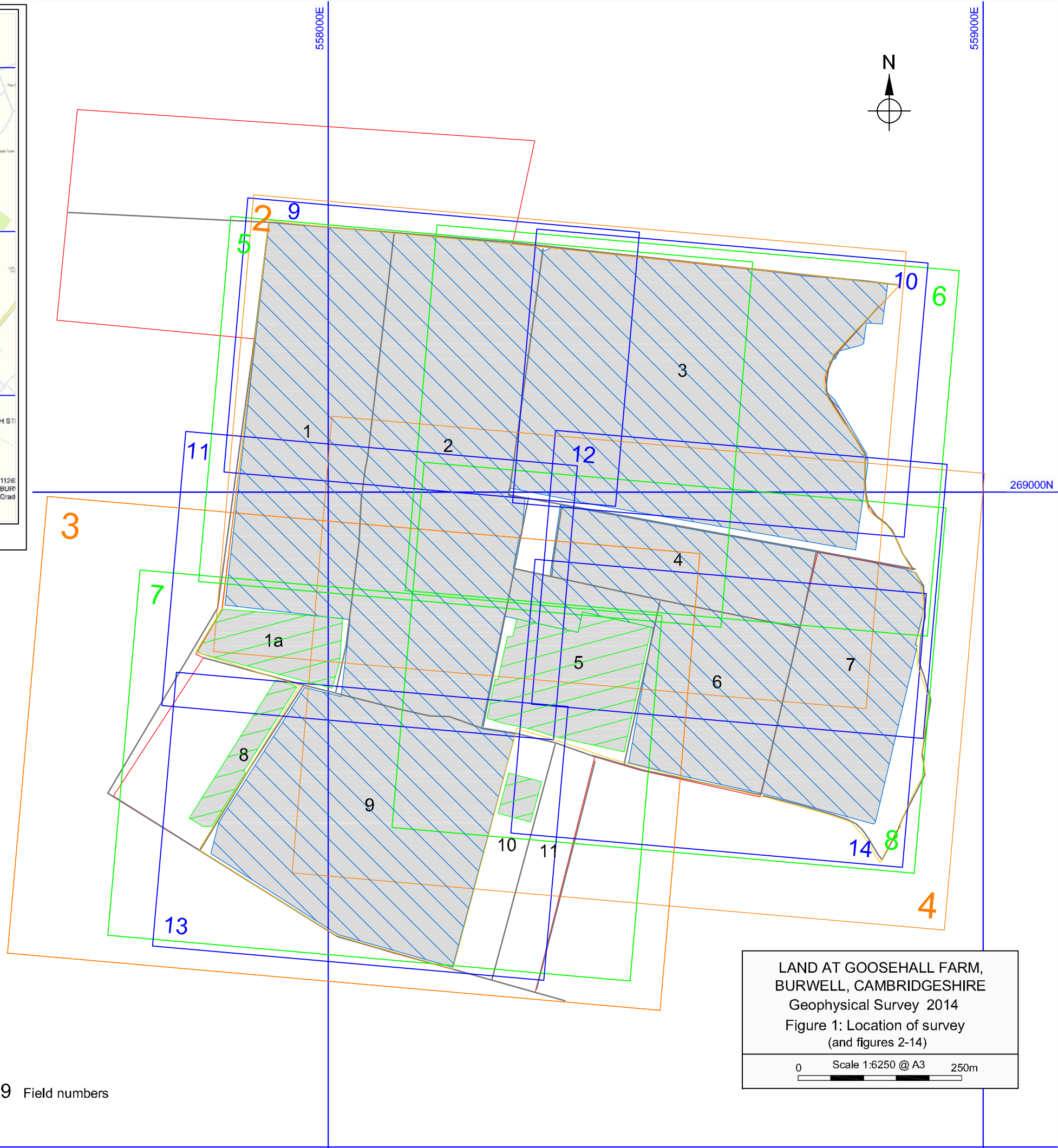
The fieldwork for this project was done by N. Paveley, R. Organ and P. Heykoop.

### **Reference**

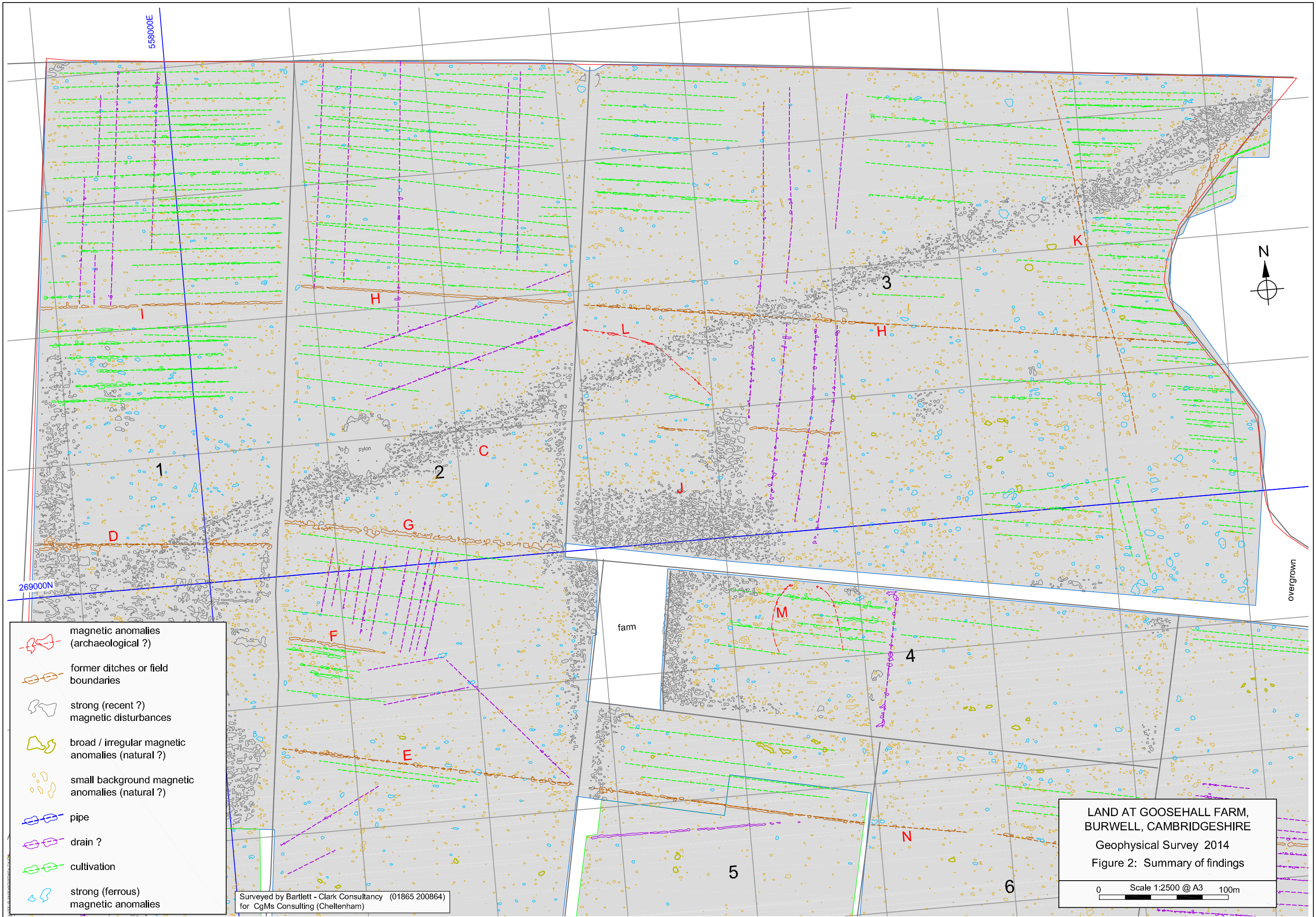
[1] *Land at Goosehall Farm, Burwell, Cambridgeshire. Archaeological Desk-Based Assessment.* Report prepared by CgMs Consulting Ltd for Lightsource Renewable Energy Ltd. CgMs reference WB/RAJS/17201; September 2014 2014.












1 - 9 Field numbers



LAND AT GOOSEHALL FARM,  
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Geophysical Survey 2014  
Figure 1: Location of survey  
(and figures 2-14)












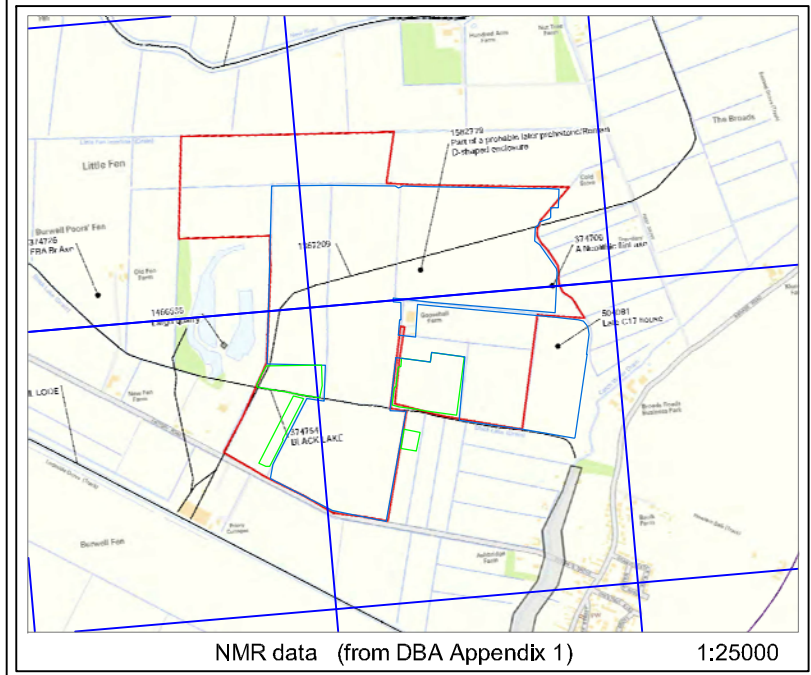
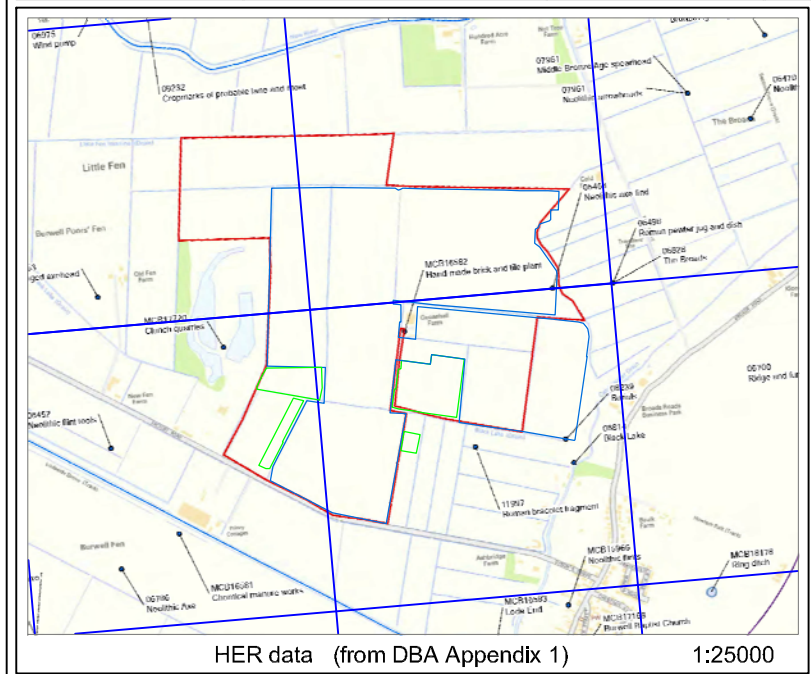
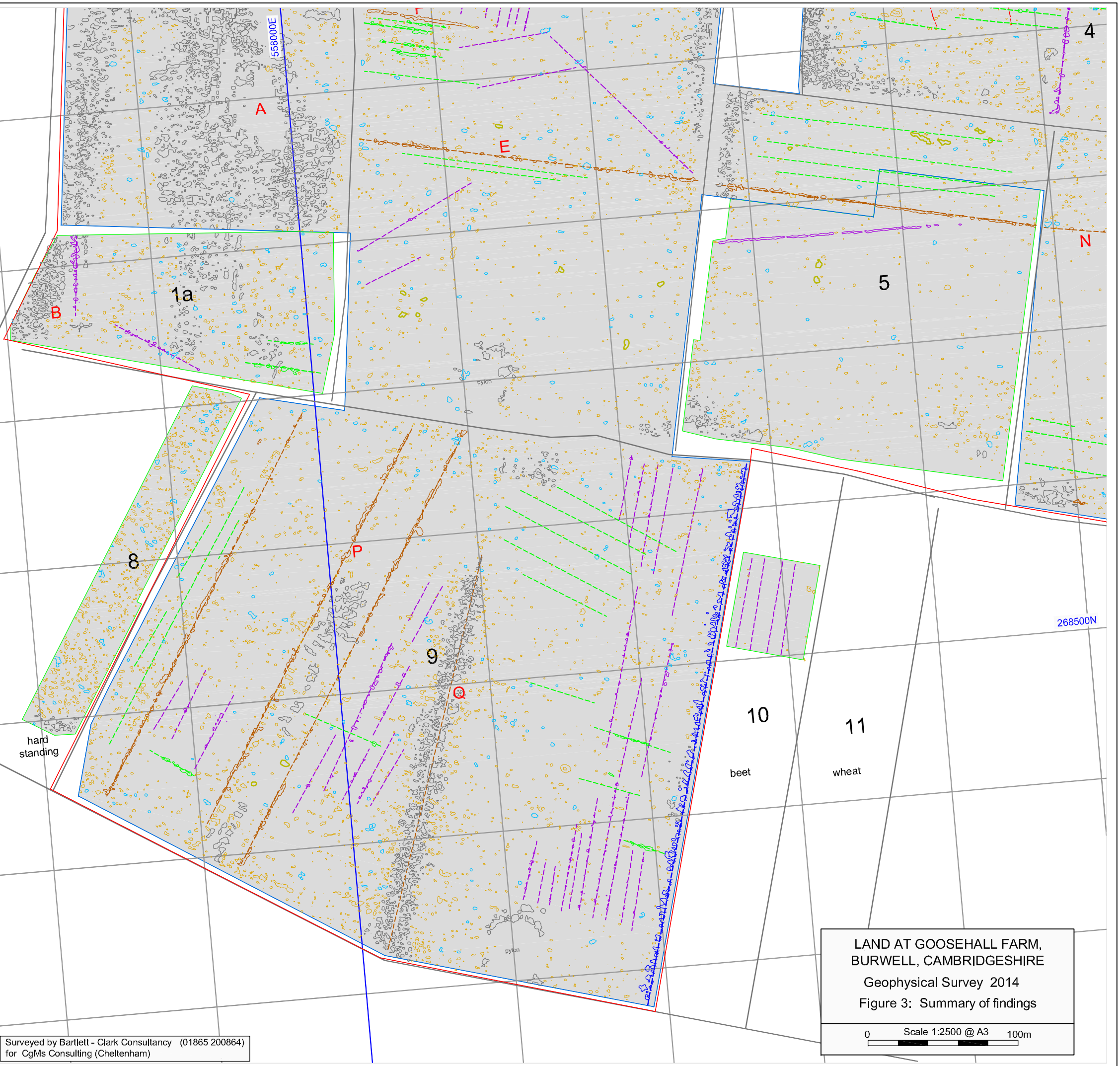
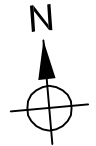
-  magnetic anomalies (archaeological ?)
-  former ditches or field boundaries
-  strong (recent ?) magnetic disturbances
-  broad / irregular magnetic anomalies (natural ?)
-  small background magnetic anomalies (natural ?)
-  pipe
-  drain ?
-  cultivation
-  strong (ferrous) magnetic anomalies

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LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 2: Summary of findings  
0 Scale 1:2500 @ A3 100m

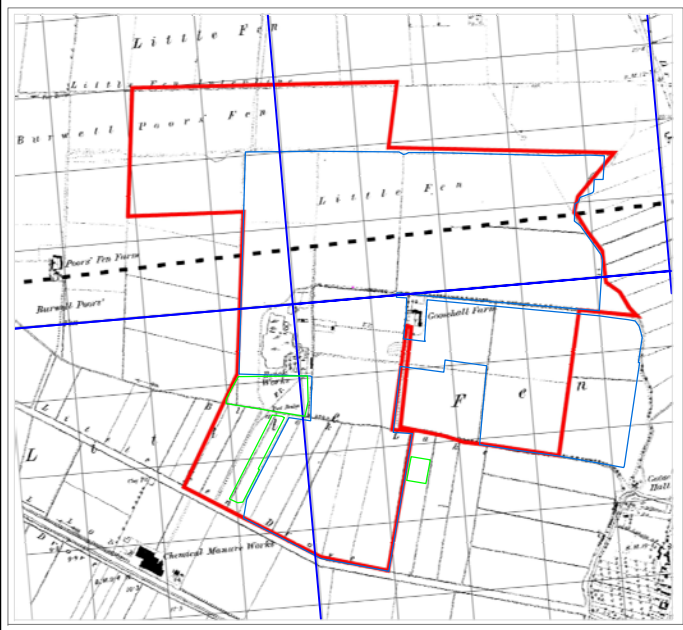
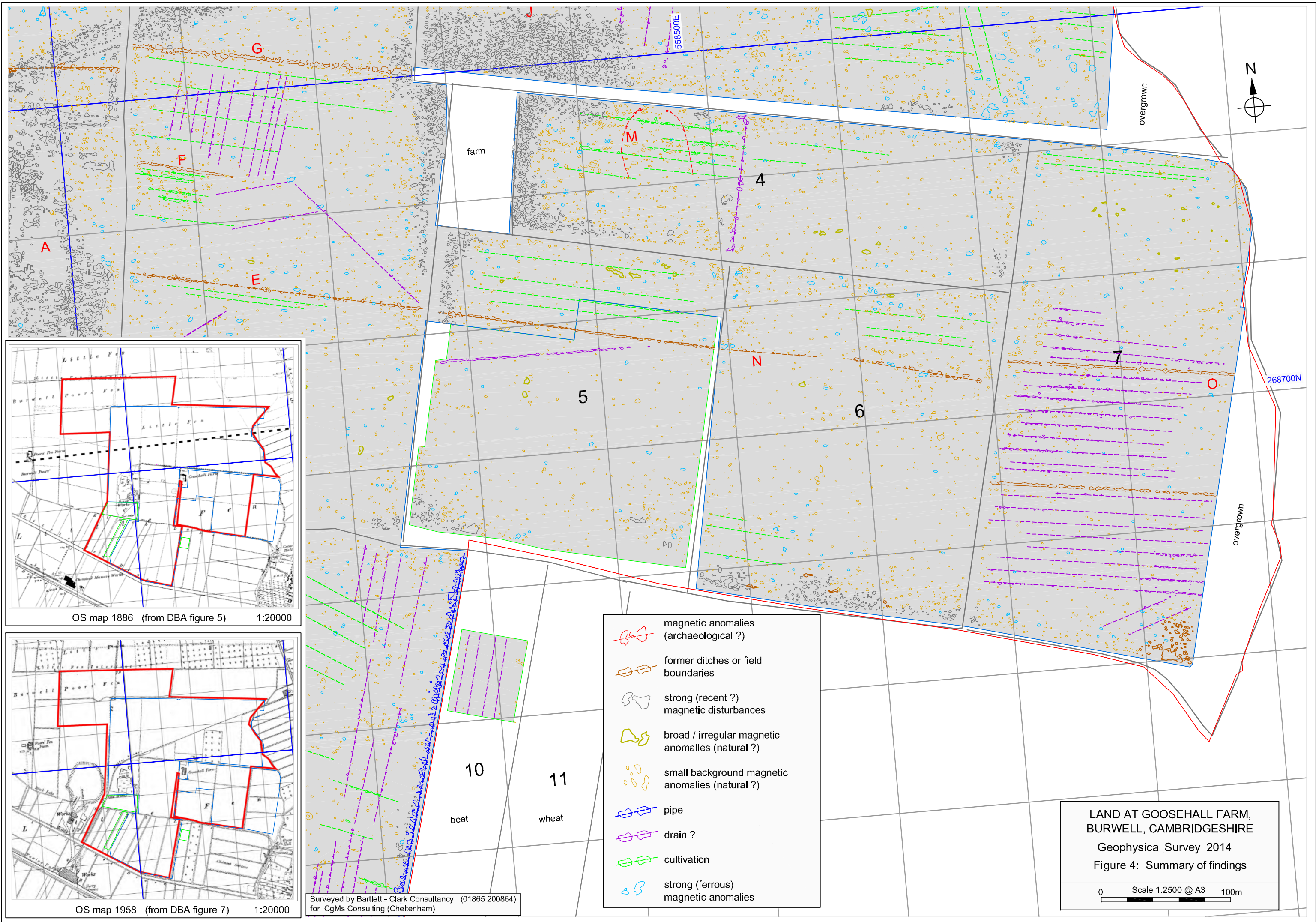


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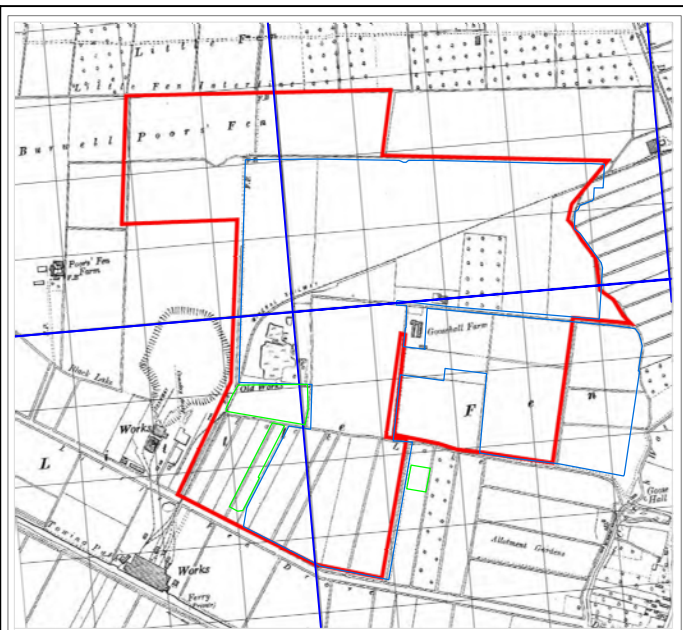


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LAND AT GOOSEHALL FARM, BURWELL, CAMBRIDGESHIRE  
 Geophysical Survey 2014  
 Figure 3: Summary of findings  
 0 Scale 1:2500 @ A3 100m



OS map 1886 (from DBA figure 5) 1:20000



OS map 1958 (from DBA figure 7) 1:20000

-  magnetic anomalies (archaeological ?)
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-  small background magnetic anomalies (natural ?)
-  pipe
-  drain ?
-  cultivation
-  strong (ferrous) magnetic anomalies

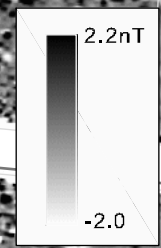
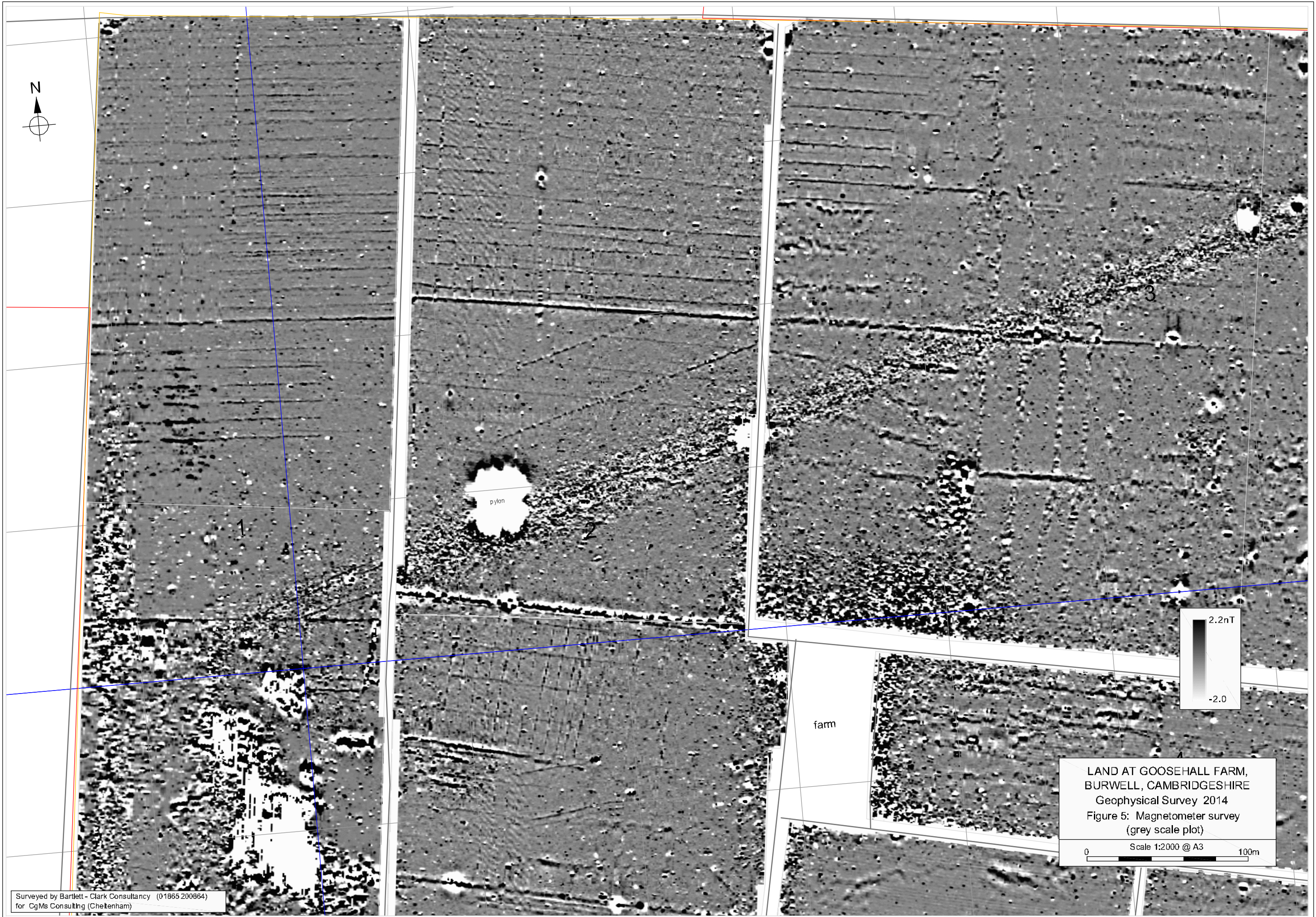
LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE

Geophysical Survey 2014

Figure 4: Summary of findings

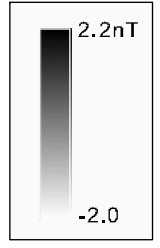
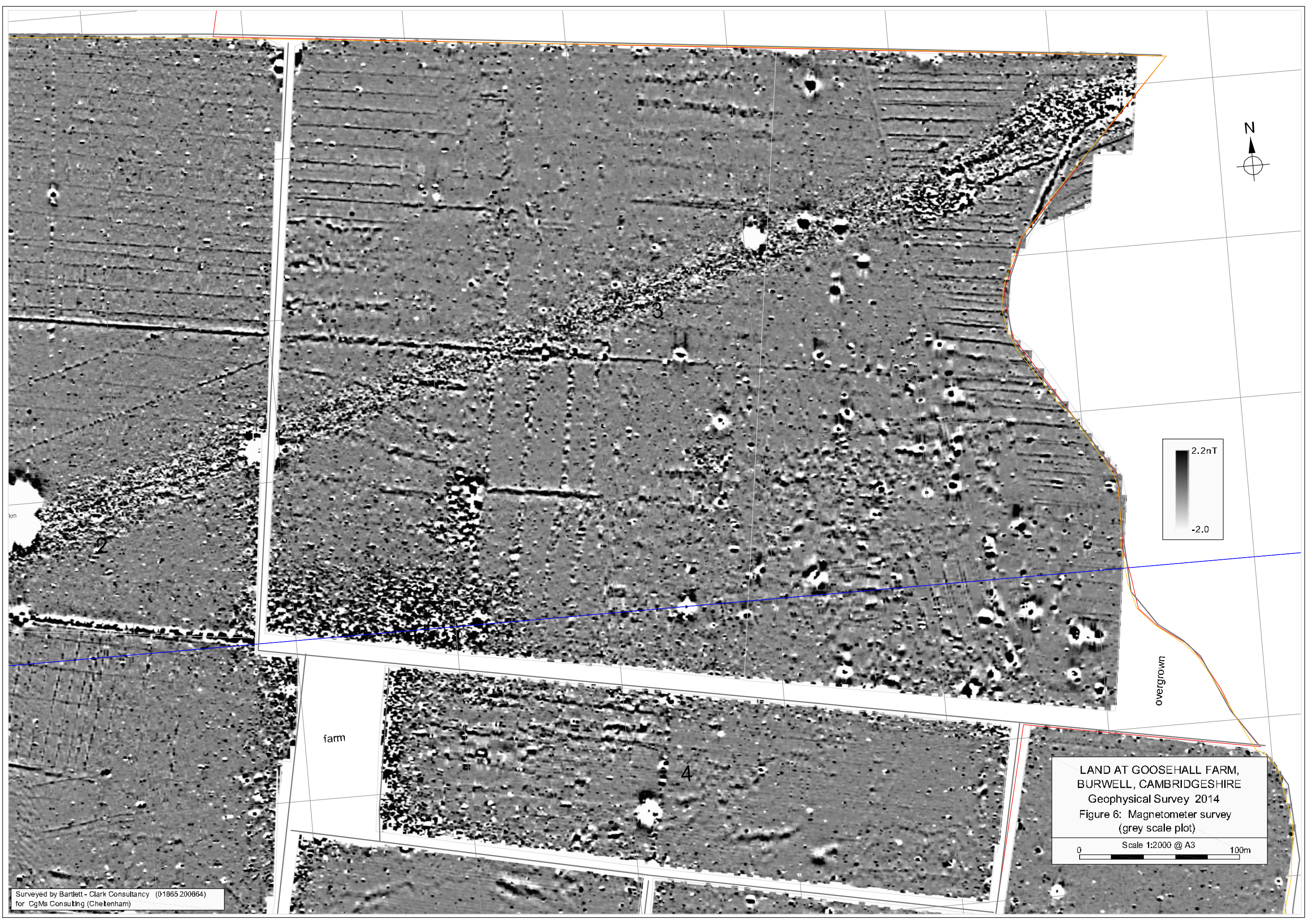
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LAND AT GOOSEHALL FARM,  
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Figure 5: Magnetometer survey  
(grey scale plot)

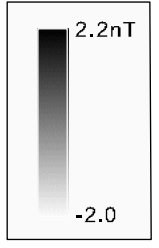
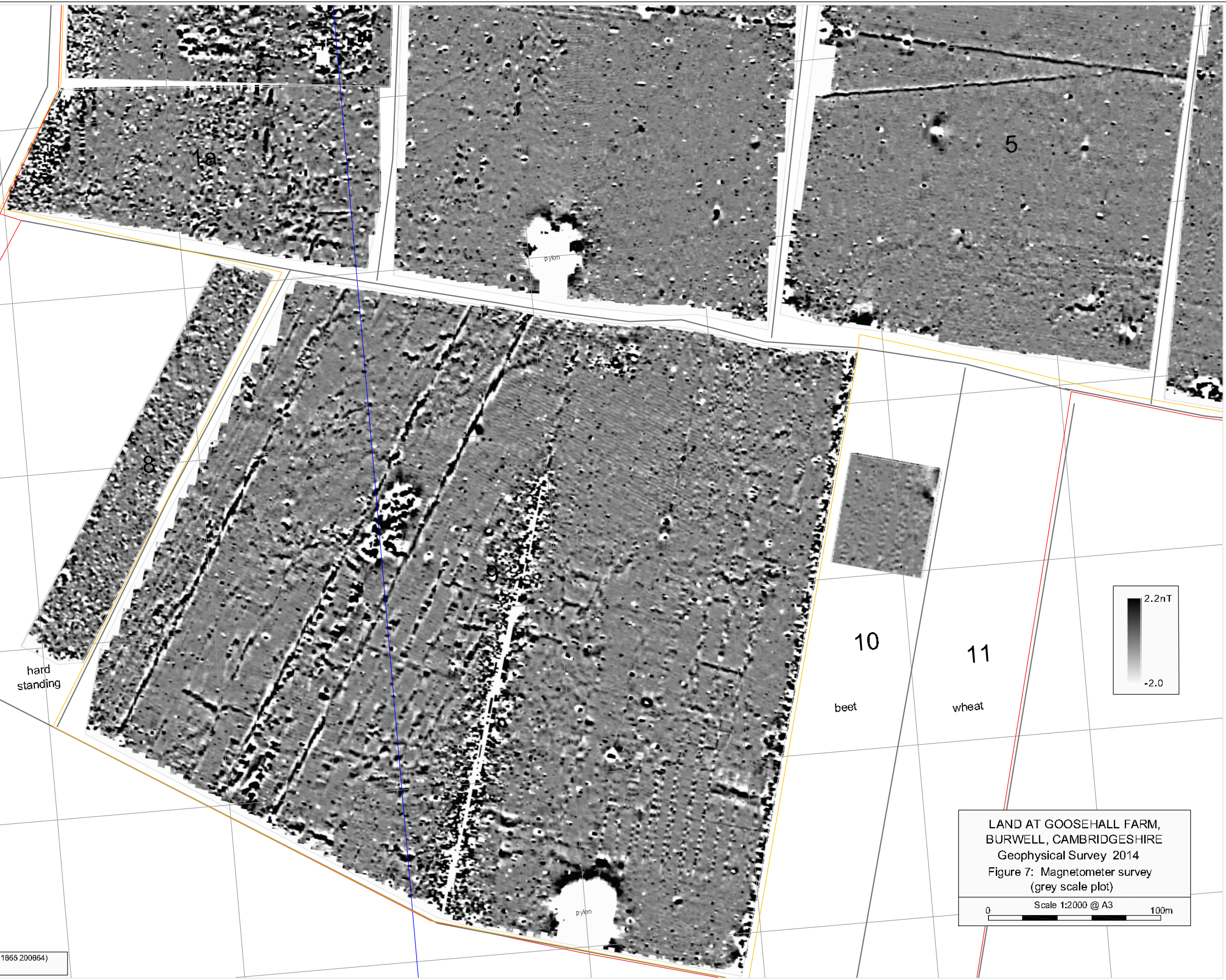
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overgrown

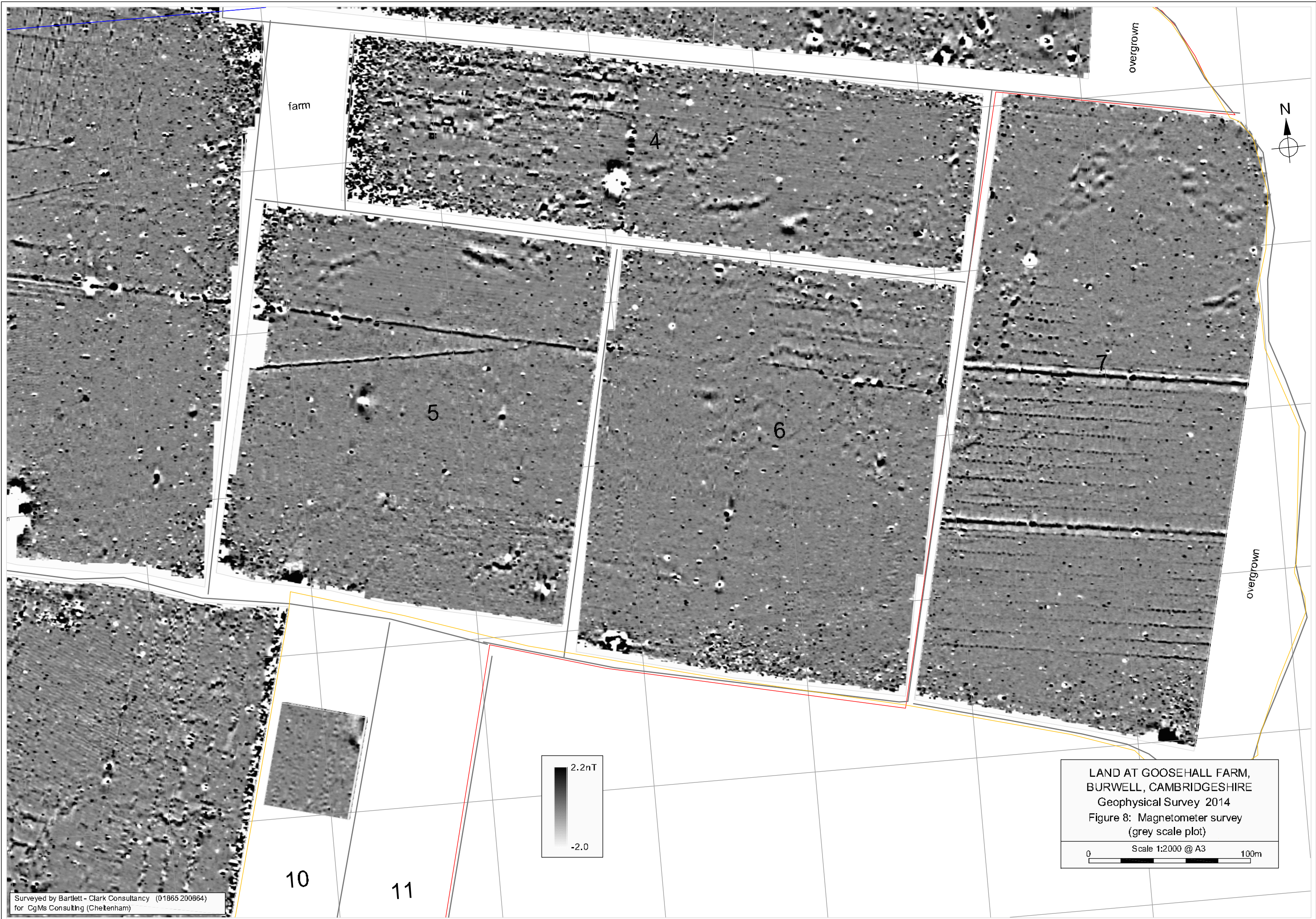
farm

LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 6: Magnetometer survey  
(grey scale plot)  
Scale 1:2000 @ A3  
0 100m



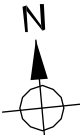
LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 7: Magnetometer survey  
(grey scale plot)

0      Scale 1:2000 @ A3      100m



farm

overgrown



4

7

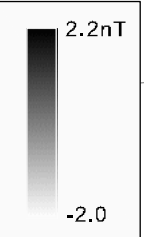
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6

overgrown

10

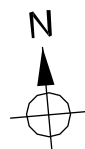
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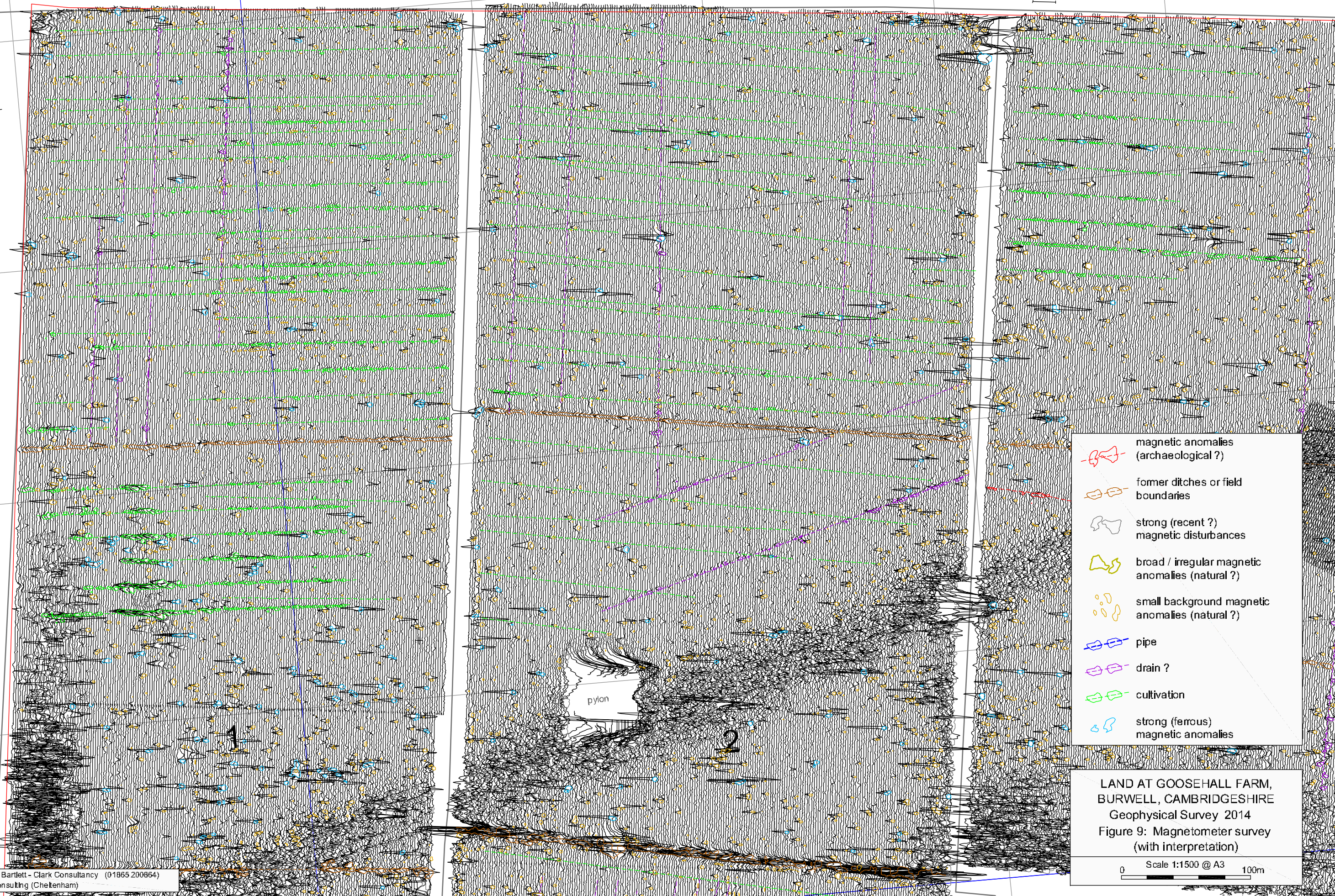
LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 8: Magnetometer survey  
(grey scale plot)










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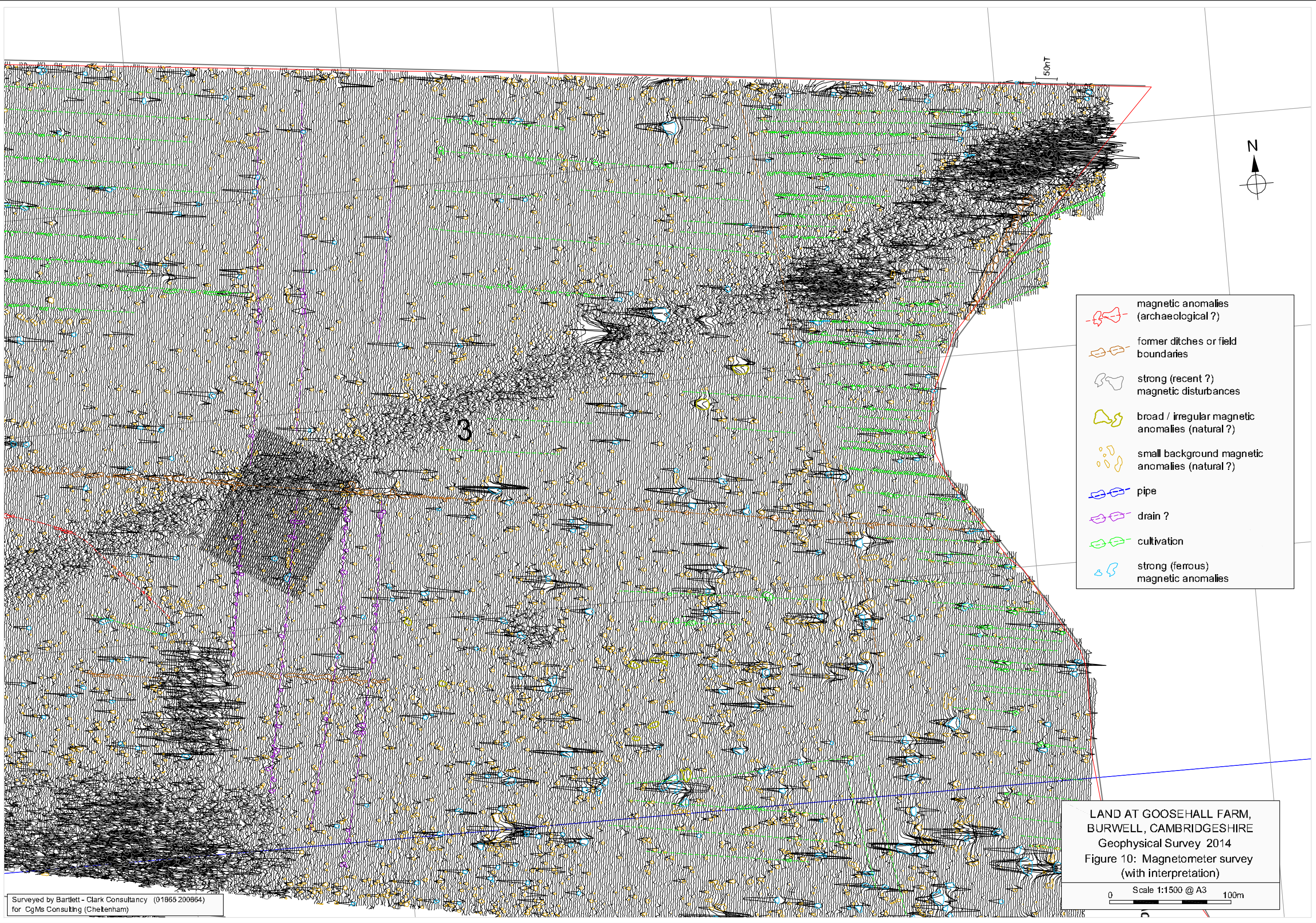
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



-  magnetic anomalies (archaeological ?)
-  former ditches or field boundaries
-  strong (recent ?) magnetic disturbances
-  broad / irregular magnetic anomalies (natural ?)
-  small background magnetic anomalies (natural ?)
-  pipe
-  drain ?
-  cultivation
-  strong (ferrous) magnetic anomalies

LAND AT GOOSEHALL FARM,  
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Geophysical Survey 2014  
Figure 9: Magnetometer survey  
(with interpretation)

Scale 1:1500 @ A3  
0 100m

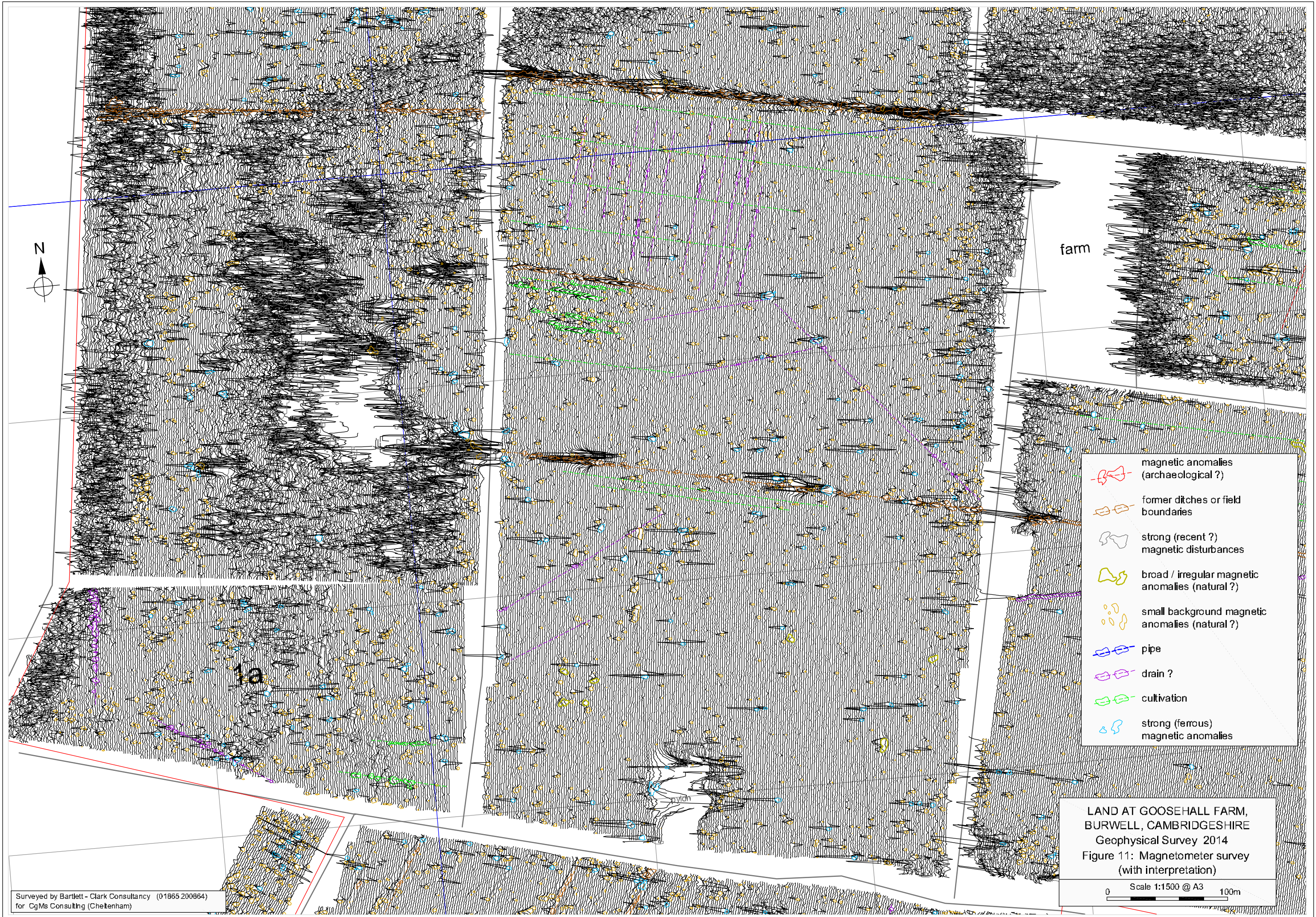


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LAND AT GOOSEHALL FARM,  
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Geophysical Survey 2014  
Figure 10: Magnetometer survey  
(with interpretation)

0 Scale 1:1500 @ A3 100m





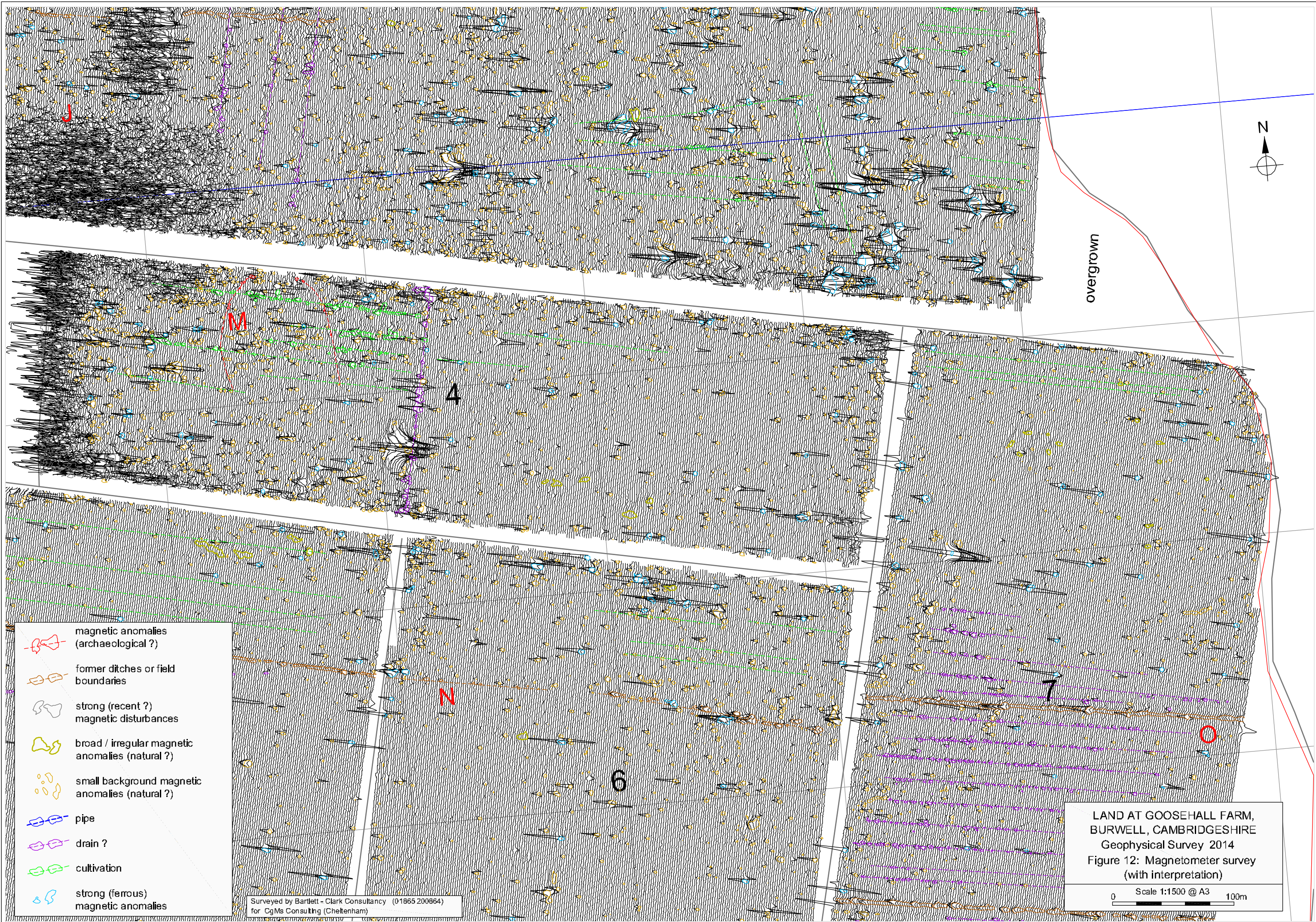
farm










1a

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LAND AT GOOSEHALL FARM,  
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Figure 11: Magnetometer survey  
(with interpretation)

0 Scale 1:1500 @ A3 100m

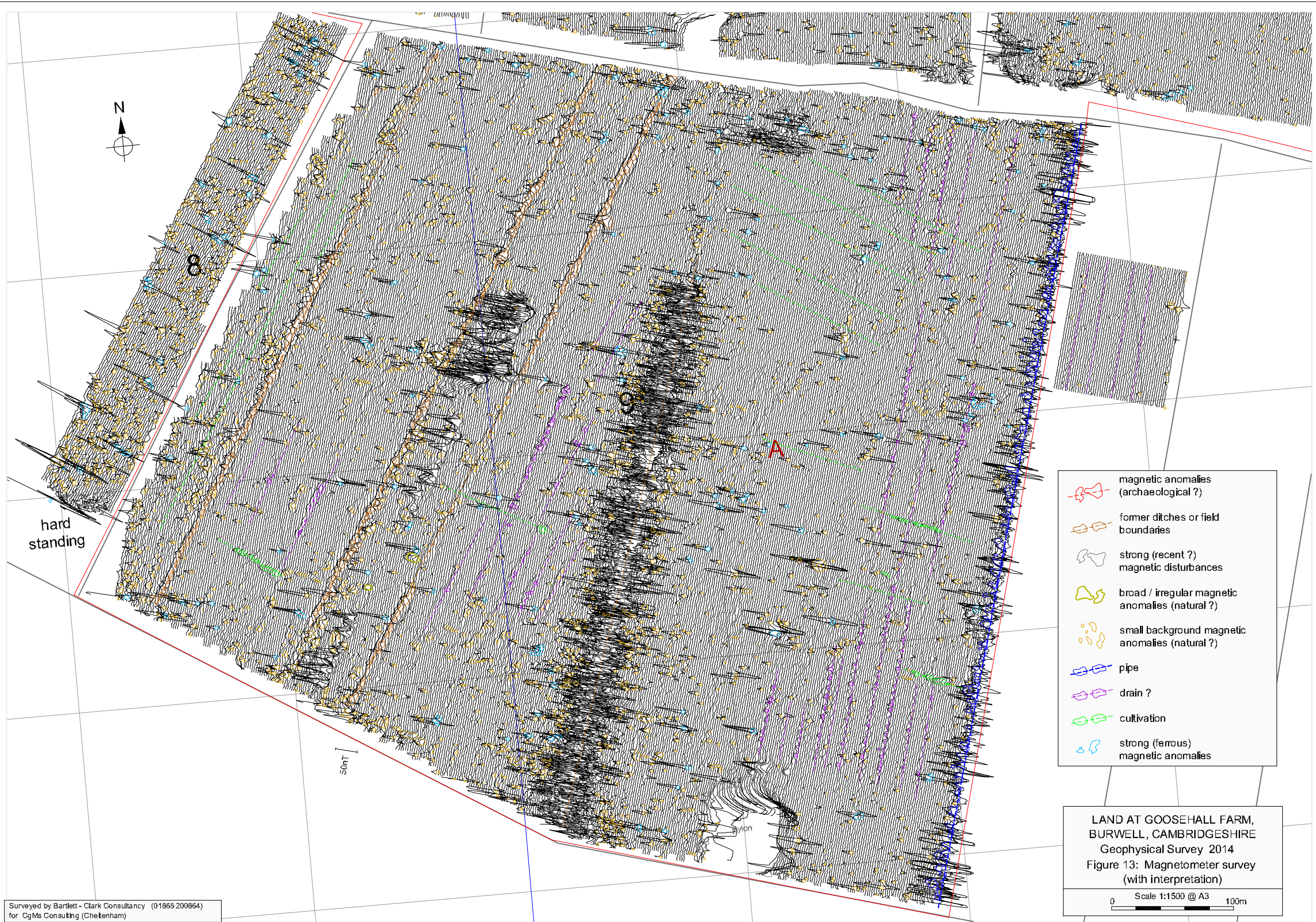











-  magnetic anomalies (archaeological ?)
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LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 12: Magnetometer survey  
(with interpretation)

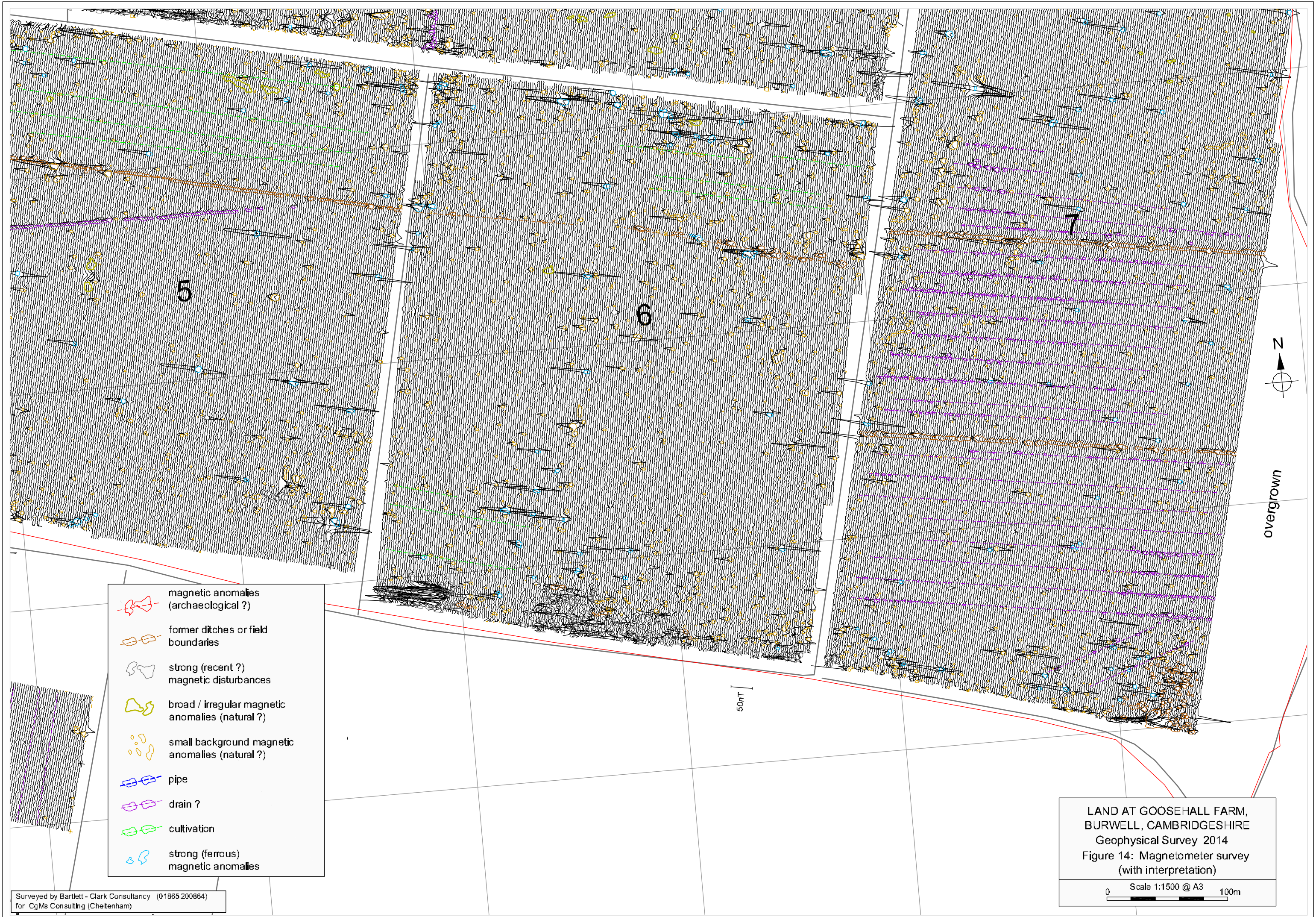
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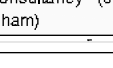


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LAND AT GOOSEHALL FARM,  
BURWELL, CAMBRIDGESHIRE  
Geophysical Survey 2014  
Figure 13: Magnetometer survey  
(with interpretation)

0 Scale 1:1500 @ A3 100m



-  magnetic anomalies (archaeological ?)
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Figure 14: Magnetometer survey  
(with interpretation)

0 Scale 1:1500 @ A3 100m