

ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
CgMs Consulting

Spaldington Airfield
Spaldington
Goole
East Riding of Yorkshire

geophysical surveys

report 2603
February 2011

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1. Summary

The project

- 1.1 This report presents the results of geophysical surveys conducted in advance of proposed development at Spaldington Airfield, Spaldington, Goole, East Riding of Yorkshire. The works comprised five areas of geomagnetic survey totalling 5ha.
- 1.2 The works were commissioned by CgMs Consulting and conducted by Archaeological Services Durham University.

Results

- 1.3 Features associated with the former Howden Airbase have been detected in area T2 and T5.
- 1.4 Field drains have been detected in areas T1, T3 and T4.

2. Project background

Location (Figure 1)

- 2.1 The survey area was located at Spaldington Airfield, Spaldington, Goole, East Riding of Yorkshire (NGR centre: SE 7498 3314). Five surveys totalling 5ha were conducted in four land parcels. Open farm land and plantations lay to the north, east and west with a golf course to the south. A farm and depot lay to the south-west, with the village of Spaldington c. 500m to the north-east.

Development proposal

- 2.2 The proposed development is for the construction of a wind farm (planning application number DC/09/04550).

Objective

- 2.3 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the development.

Methods statement

- 2.4 The surveys have been undertaken in accordance with instructions from the client and to current national standards and guidance (see para. 5.1 below).

Dates

- 2.5 Fieldwork was undertaken between 10th and 11th February 2011. This report was prepared for 25th February 2011.

Personnel

- 2.6 Fieldwork was conducted by Edward Davies and Richie Villis (Supervisor). The geophysical data were processed by Richie Villis. This report was prepared by Richie Villis with illustrations by Edward Davies and edited by Peter Carne. The Project Manager was Duncan Hale.

Archive/OASIS

- 2.7 The site code is **HSA11**, for **Humberside Spaldington Airfield 2011**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **Online AccesS to the Index of archaeological investigationS project (OASIS)**. The OASIS ID number for this project is **archaeol3-93797**.

3. Historical and archaeological background

- 3.1 A detailed archaeological desk-based assessment has been conducted (RSK Environment Ltd). The following is a summary of its results.
- 3.2 There are 16 sites dating from the prehistoric period within Study Area A. These represent the Bronze Age and Romano-British periods most predominantly, and suggest that such features may be more widely spread through the area of the proposed wind farm. RSK Site 65 lies within the wind farm site and relates to the cropmark of a linear ditch interpreted from aerial photographs as being prehistoric.

The proposed wind farm site is therefore considered to have a low to moderate potential for the survival of prehistoric archaeological features and deposits.

- 3.3 Local place-name evidence suggests that the settlement of Spaldington originated in the Anglo-Saxon period and that it was initially a single farmstead. It is likely that the expansion during the medieval period has removed traces of this early farmstead. Also, there are no recorded sites from this period with Study Area A. The proposed wind farm site is therefore considered to have a low potential for archaeological features and deposits of an Anglo-Saxon date.
- 3.4 Map regression, and in particular the Tithe mapping, indicate that the western limit of the settlement of Spaldington once extended towards the boundary of the proposed wind farm site (RSK Site 35). However, the application area appears to lie outside of any area of medieval settlement, and is more likely to have been used as horticultural or agricultural land at this time. Consequently, the proposed wind farm site is considered to have a low potential for the survival of medieval archaeological features of anything greater than a low archaeological importance.
- 3.5 Spaldington mill (RSK site 24) is located a little to the east of the eastern site boundary. Associated features such as trackways and field boundaries could have continued within the site boundary. Consequently, the proposed wind farm site is considered to have a moderate potential for post-medieval archaeological features and deposits. It is, however, noted that these sites are likely to be of low archaeological importance.
- 3.6 Howden Airbase (RSK site 77) is located within the western site boundary. Above ground-level, remains of the Airbase consists of base blocks, anchor links, the airfield road, earthworks possibly relating to an on-site railway branch, and two outlying buildings. The steam ploughing noted during the walkover survey could relate to cultivation efforts serving the military personnel. The extent of subsurface survival is unknown, but the site is known from aerial photographs to have covered an area of approximately one acre. Documented positions of anti-aircraft batteries within the Study Area are included in the gazetteer (RSK sites 64 & 68), which are contemporaneous with Howden Airship base. Consequently, the proposed wind farm site is considered to have a high potential for modern archaeological features and deposits.

4. Landuse, topography and geology

- 4.1 At the time of survey the proposed development area comprised 2 fields of arable land and 2 fields of pasture. In the two pasture fields (areas T2 and T5) reinforced concrete features relating to the former Spaldington Airship base were noted on the ground.
- 4.2 The area was predominantly level with a mean elevation of approximately 6m OD.
- 4.3 The underlying solid geology of the area comprises Triassic strata of the Mercia Mudstone Group, which are overlain by Devensian glaciolacustrine deposits of clay and silt.

5. Geophysical survey Standards

- 5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists (IfA) *Draft Standard and Guidance for archaeological geophysical survey* (2010); the IfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Guide to Good Practice: Geophysical Data in Archaeology* (draft 2nd edition, Schmidt & Ernenwein 2010).

Technique selection

- 5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.
- 5.3 In this instance, based on desktop evidence, it was considered likely that cut features such as ditches and pits might be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present, especially structures related to the former airship base.
- 5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

- 5.5 A 20m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system with real-time correction.
- 5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval was 0.25m and the traverse interval was 1.0m, thus providing 1,600 sample measurements per 20m grid unit.
- 5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and interpretations are presented in Figures 2-5; the trace plots are provided in Figure 6. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to the geomagnetic data:

clip clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic

zero mean traverse sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities

destagger corrects for displacement of anomalies caused by alternate zig-zag traverses

despike locates and suppresses iron spikes in gradiometer data

interpolate increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

Interpretation: anomaly types

5.10 A colour-coded geophysical interpretation plan is provided. Two types of geomagnetic anomaly have been distinguished in the data:

positive magnetic regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches

dipolar magnetic paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

Interpretation: features

5.11 A colour-coded archaeological interpretation plan is provided.

5.12 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plan, however, they have been omitted from the archaeological interpretation plan and the following discussion.

Area T1

- 5.13 A series of parallel positive magnetic and dipolar magnetic anomalies have been detected in this area. The “herring-bone” pattern formed by these anomalies is typical of a system of land drainage.
- 5.14 Two weaker positive magnetic anomalies, aligned broadly north-west/south-east and north-east/south-west, have also been detected. These could reflect soil-filled ditch features but are more likely to reflect an earlier phase of land drainage.

Area T2

- 5.15 A high concentration of very strong dipolar magnetic anomalies has been detected in this area. These anomalies almost certainly reflect features related to the former Howden airship base.
- 5.16 The two circular, very strong dipolar magnetic anomalies detected in the centre of the area reflect the position of two large circles of concrete on the ground, which have been identified as airship mooring points.
- 5.17 A third circular, weaker, dipolar anomaly has been detected to the north of one of these concrete areas. This may reflect the position of an earlier mooring point.
- 5.18 The concentration of dipolar magnetic anomalies detected to the south of these circular anomalies is likely to reflect the location of structures and demolition rubble associated with the former airship base. A number of wall footings were noted on the ground in this area.
- 5.19 A north/south aligned linear chain of dipolar magnetic anomalies has been detected in the north corner of this area. This may reflect a service pipe.

Area T3

- 5.20 A parallel series of regularly spaced positive and dipolar magnetic linear anomalies has been detected in this area, aligned broadly north-east/south-west. These almost certainly reflect a system of land drainage.

Area T4

- 5.21 Similar anomalies to those detected in area T3 to the north-west have been detected in this area. These almost certainly reflect the same system of land drainage.

Area T5

- 5.22 The “L” shaped dipolar magnetic anomalies detected in this area reflect the position of a number of pieces of reinforced concrete noted on the ground, other features, such as concrete drains and walls were also noted. These are likely to relate to structures associated with the former airship base.
- 5.23 The two linear chains of dipolar magnetic anomalies along the north-west edge of the survey area are also likely to reflect the location of features related to the former airship base, such as tracks and other structures.

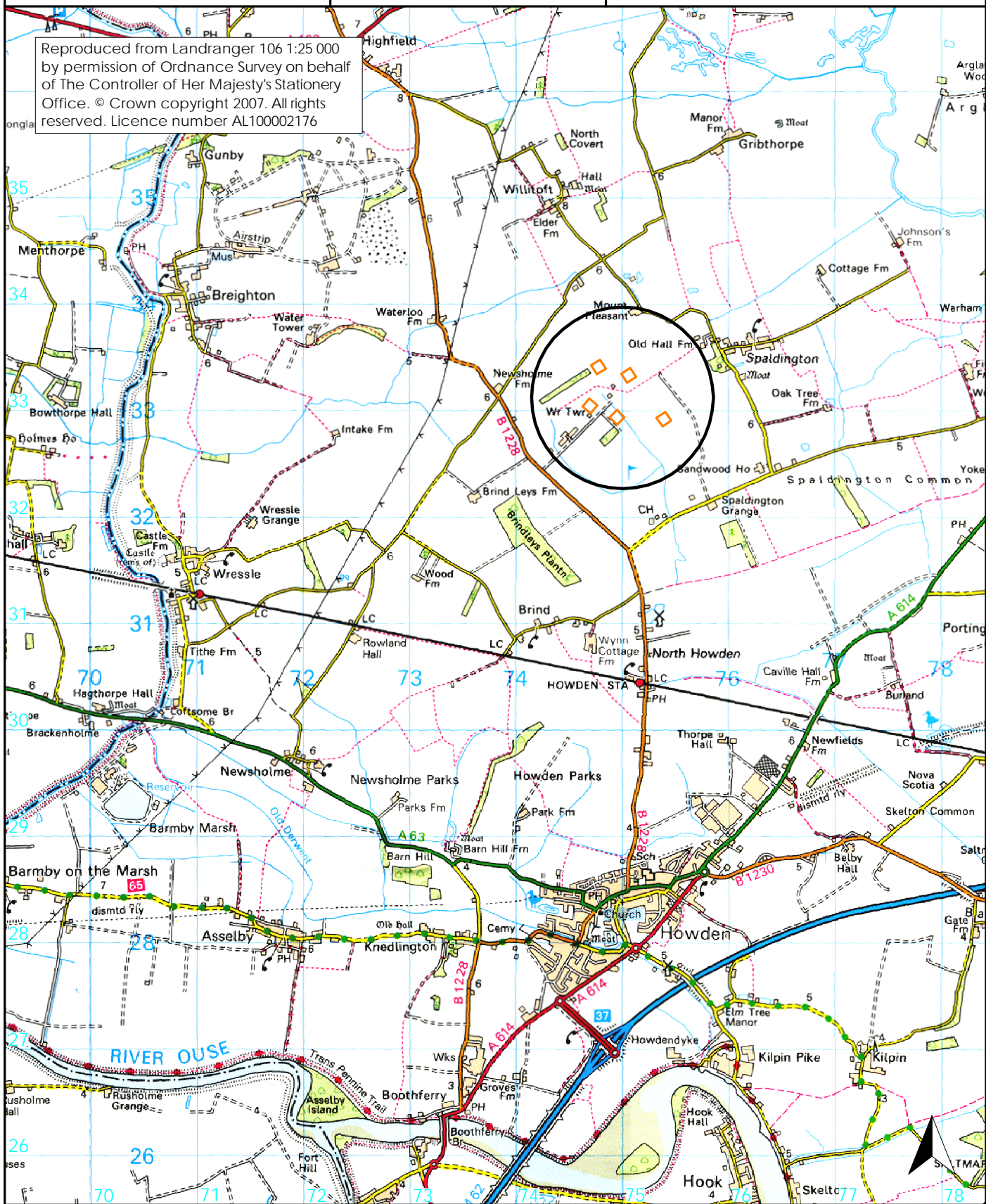
6. Conclusions

- 6.1 Five hectares of geomagnetic survey was undertaken at Spaldington, Goole, East Riding of Yorkshire prior to the development of a wind farm.
- 6.2 Features associated with the former Howden Airbase have been detected in area T2 and T5.
- 6.3 Field drains have been detected in areas T1, T3 and T4.

7. Sources

- David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage
- Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper 6, Institute of Field Archaeologists
- IfA 2010 *Draft Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists
- RSK Environment Ltd *Spaldington Airfield Wind Farm Environmental Statement*
- Schmidt, A, & Ernenwein, E, 2010 (draft) *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service

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site location

0 2.5km

scale 1:50 000 for A4 plot

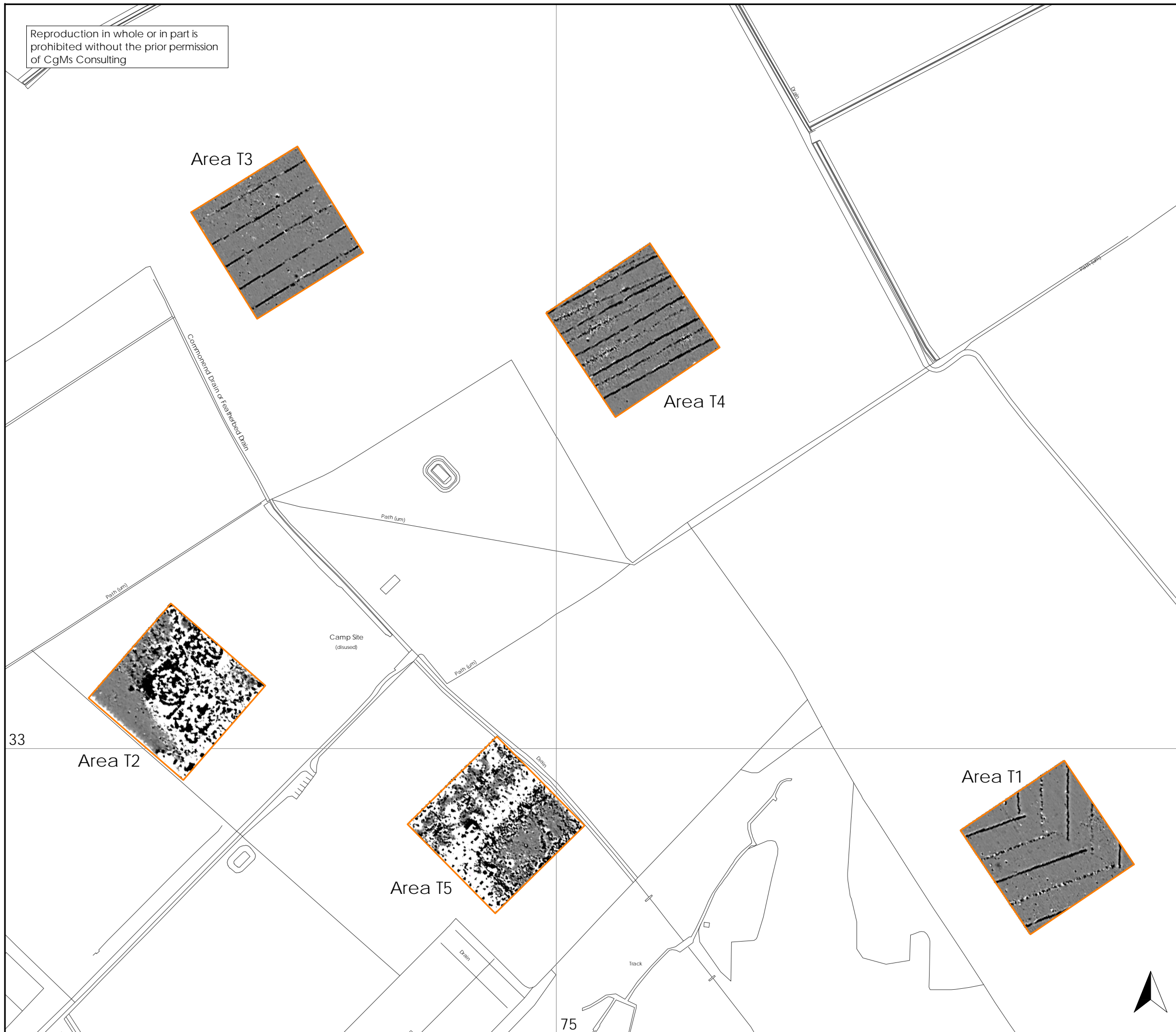
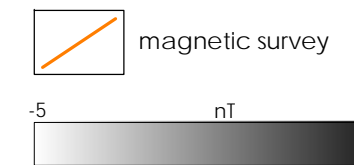
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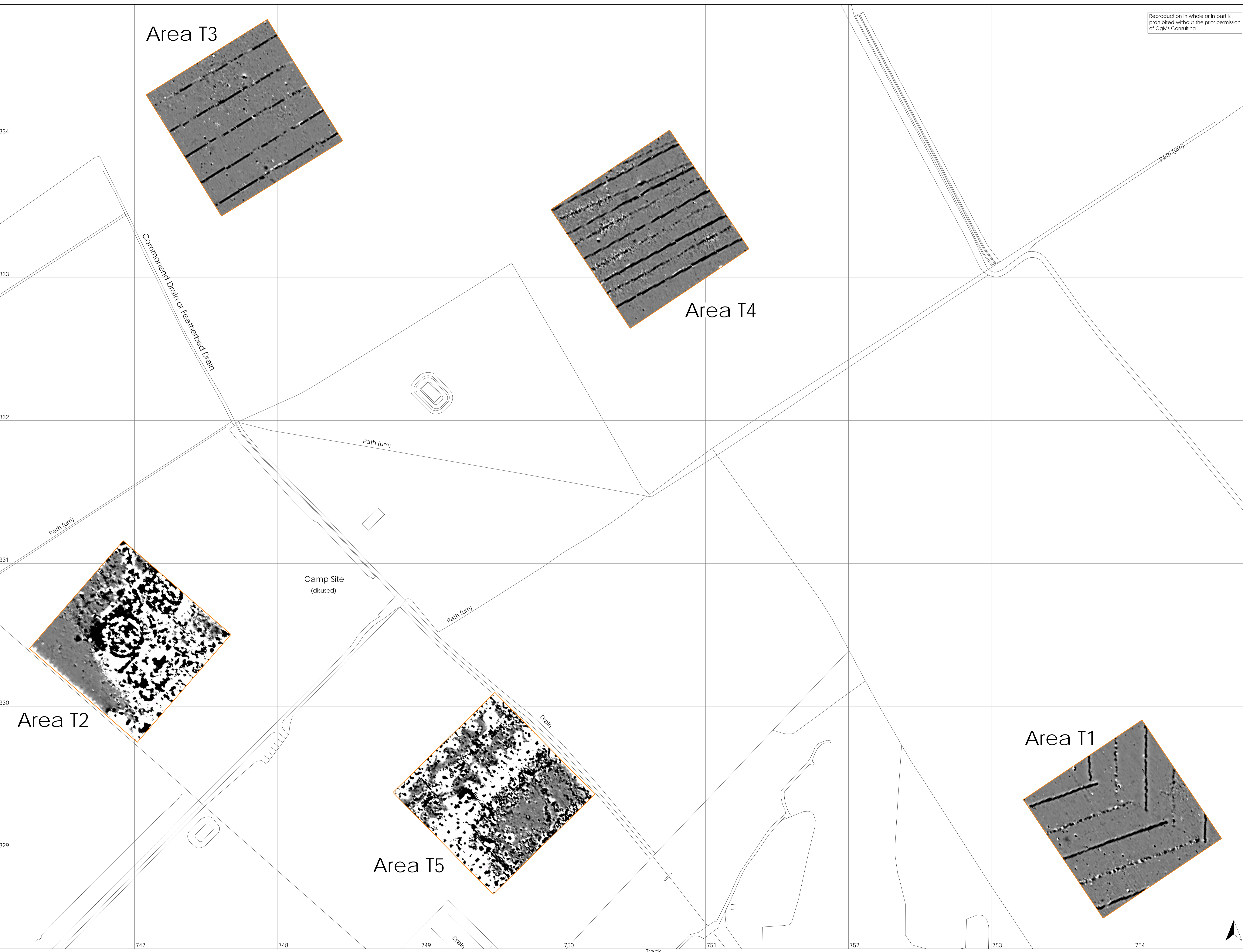
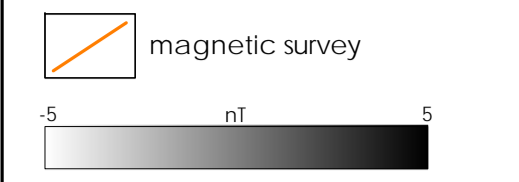
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Figure 2: Geophysical surveys overview



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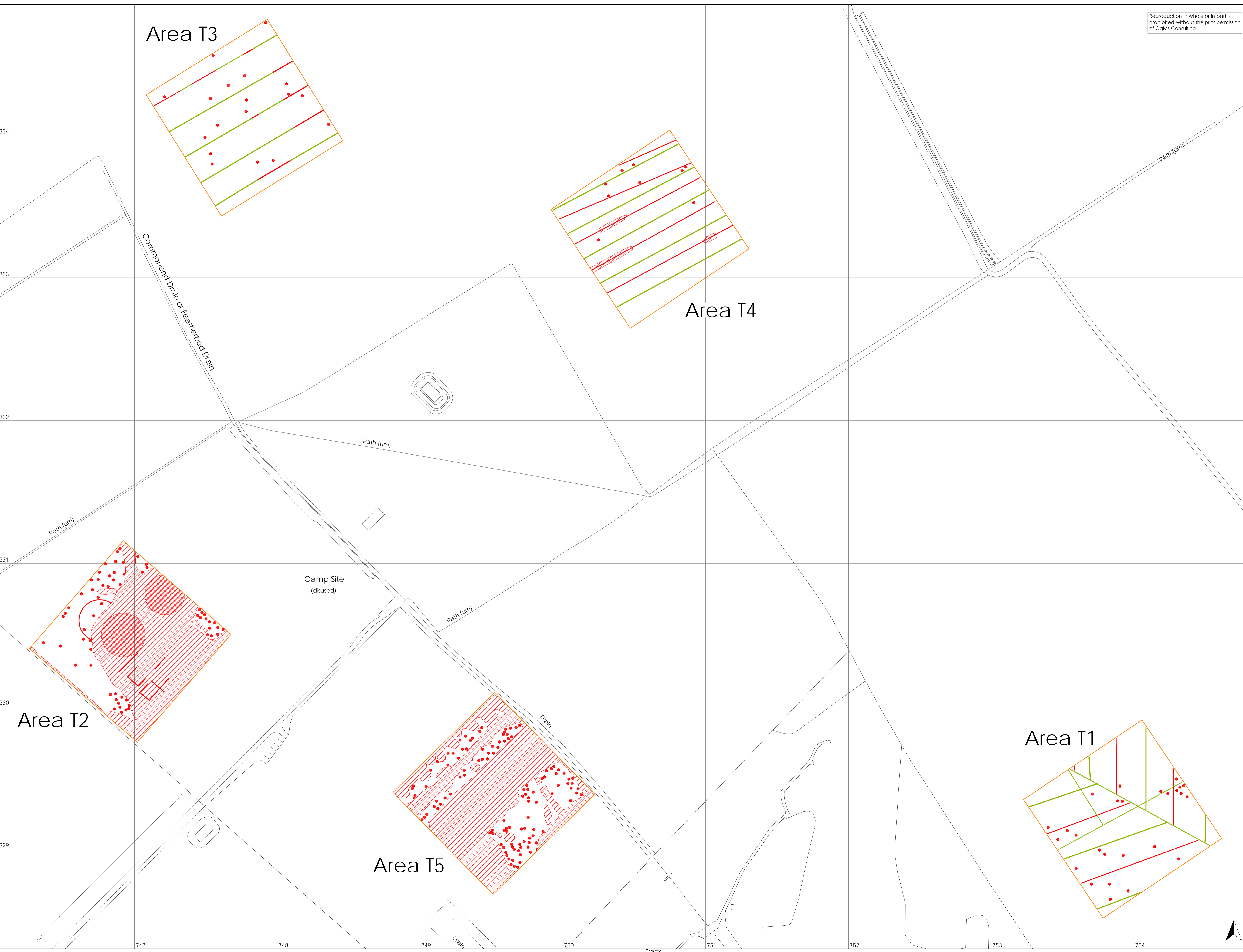
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Figure 3: Geophysical surveys



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- dipolar magnetic anomaly
- positive magnetic anomaly
- negative magnetic anomaly







0 5m
scale 1:1000 for All plot

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Figure 4: Geophysical interpretations

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-  former structures
-  land drain
-  former track
-  service pipe



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Figure 5: Archaeological interpretations

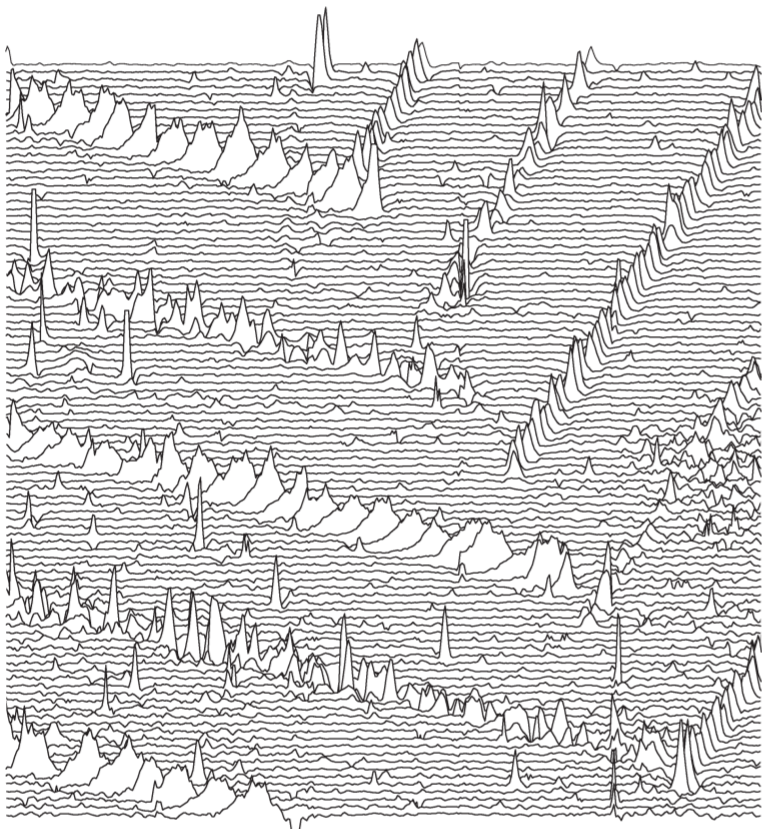
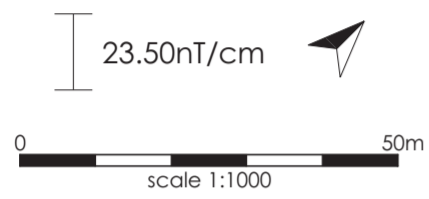


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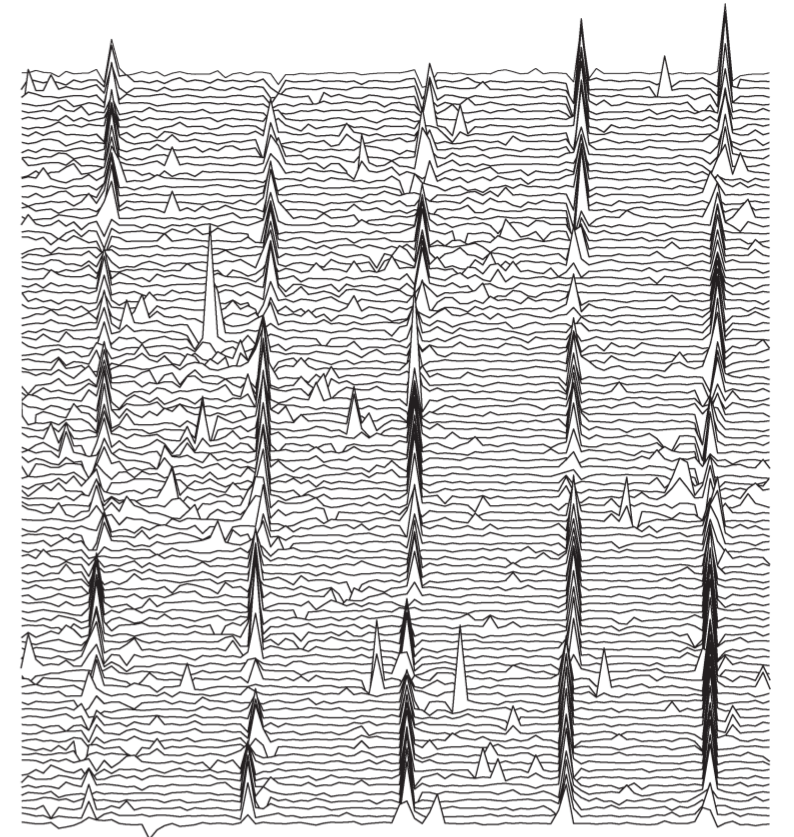
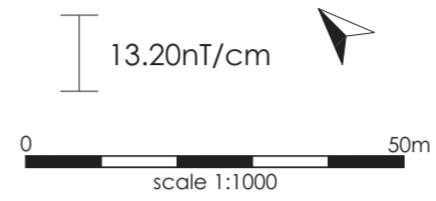
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Figure 6:
Trace plots of geomagnetic data

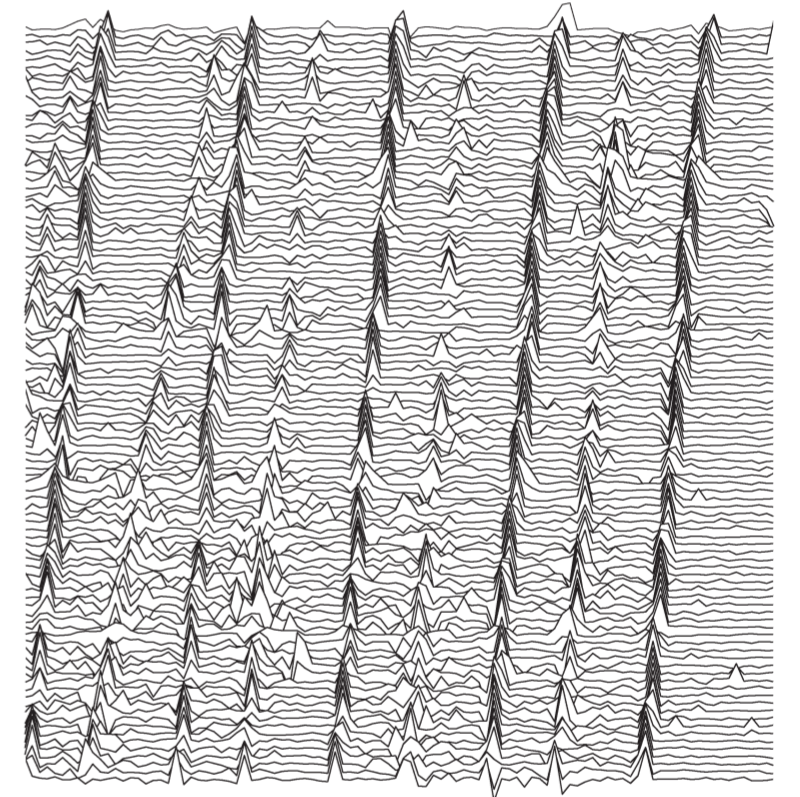
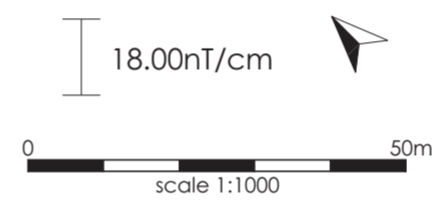
Area T1



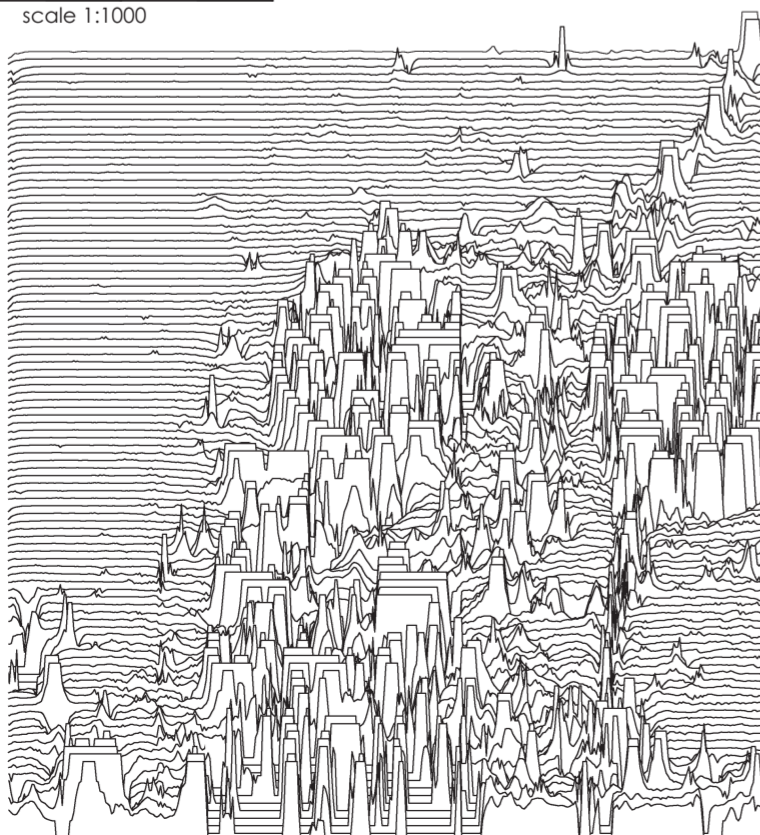
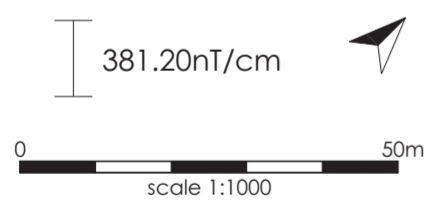
Area T3



Area T4



Area T2



Area T5

