ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
Solar Planning Limited

Land south of Kingsclere Road Monk Sherborne Hampshire

geophysical survey

report 3241
September 2013

Durham University

Contents

Figures

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1. Summary

The project

1.1 This report presents the results of a geophysical survey conducted in advance of a proposed development on land south of Kingsclere Road, Monk Sherborne, Basingstoke, Hampshire. The works comprised the detailed magnetic survey of 40 hectares of arable land.

1.2 The works were commissioned by Solar Planning Limited and conducted by Archaeological Services Durham University.

Results

1.3 The survey identified a number of linear, curvilinear and discrete anomalies, which form a series of enclosures with internal features and trackways in Area 1. This includes two 'banjo' type enclosures typical of the middle Iron Age. It is likely that all the enclosures date to the late prehistoric period.

1.4 The anomalies correlate with the cropmarks previously identified in satellite and aerial imagery. The survey has provided additional information on the morphology and extent of previously identified enclosure systems. In addition, previously unrecorded enclosures were also identified (anomaly groups **A** and **B**).

1.5 Three services pipes were also detected in Area 1

1.6 The satellite and aerial imagery indicates that the identified enclosure systems extend beyond the western and southern boundaries of the survey area.

2. Project background

Location (Figure 1)

2.1 The survey area was located south of Kingsclere Road, Monk Sherborne, Basingstoke, Hampshire (NGR centre: SU 60309 54112). A total of 40 hectares of land was surveyed covering two separate areas (1 and 2).

Development proposal

2.2 The development proposal is for a solar park.

Objective

2.3 The principal aim of the survey 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 survey has been undertaken in accordance with instructions from the client and national standards and guidance.

Dates

2.5 Fieldwork was undertaken between 27th August and 5th September 2013. This report was prepared for September 2013.

Personnel

2.6 Fieldwork was conducted by Jonathan Dye, Ashley Hayes, Natalie Swann (supervisor), Nathan Thomas (supervisor) and Rebekah Watson. The geophysical data were processed by Nathan Thomas. This report was prepared by Nathan Thomas with illustrations by Janine Watson and edited by Duncan Hale, the Project Manager.

Archive/OASIS

2.7 The site code is **BMS13**, for **B**asingstoke**, M**onk **S**herborne 20**13**. 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 **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (**OASIS**). The OASIS ID number for this project is **archaeol3-159096**.

3. Archaeological background

3.1 The Hampshire Archaeology and Historic Buildings Register (AHBR 2013) contains two entries for the survey area. A small 'banjo' enclosure with a well-defined tunnel was noted south of Shothanger Farm in aerial photographs (36295); this lies within Area 1 of the survey. In addition, a complex of enclosures formed by linear and curvilinear features was also noted from aerial photographs west of the banjo enclosure (36296), again within Area 1.

4. Landuse, topography and geology

4.1 At the time of survey the proposed development area comprised two fields both under arable cultivation. The northern field (Area 1) was the larger of the two surveyed areas, covering 32.2ha. Area 1 bordered Kingsclere Road to the north, the Wootton St Lawrence road to the west, further arable fields to the east and was separated from Area 2 to the south by a bridle path. Area 2 covered 7.6 ha. Both fields had been recently harvested and ground conditions were generally good for the survey work.

4.2 The survey areas were predominantly level with a maximum elevation of 139m OD in the north-west, falling to 135m OD in the south-east.

4.3 The underlying solid geology of the area is chalk (BGS 2013).

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) *Standard and Guidance for archaeological geophysical survey* (2011); 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* (Schmidt & Ernenwein 2011).

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 satellite and aerial photographic cropmark evidence it was considered likely that cut features such as ditches and pits would be present on the site, and that other types of feature such as trackways and fired structures (for example kilns and hearths) might also be present.

5.4 Given the anticipated shallowness of targets and the underlying chalk geology, 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 30m grid was established across each survey area and related to the Ordnance Survey National Grid using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic (RTK) corrections typically providing 10mm accuracy.

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 30m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval was 0.25m and the traverse interval was 1m, thus providing 3,600 sample measurements per 30m 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 continuous tone greyscale images of the raw (minimally processed) data. Images of filtered data are also presented. The greyscale images and interpretations are presented in Figures 2-6. Trace plots of selected areas are presented in Figure 7. 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. Palette bars with the filtered images relate the greyscale intensities to standard deviations rather than absolute values.

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

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 geomagnetic anomalies caused by alternate zig-zag traverses

5.10 The following filter has been applied to the data:

low pass filter	applied with Gaussian weighting to remove high frequency, small-scale spatial detail

Interpretation: anomaly types

5.11 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

General comments

5.12 A colour-coded archaeological interpretation plan is provided. A number of anomaly groups of archaeological interest have been labelled (**A-F**) and are discussed below.

5.13 Except where stated otherwise, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning.

5.14 Small, discrete positive magnetic anomalies have been detected across both survey areas. Although these responses could be interpreted as pits, it is unlikely that all the responses are of an archaeological origin. It is more probable that the majority of these responses represent variations in the underlying chalk geology, such as solution hollows in the rockhead. However, where these responses have been identified within or adjacent to other anomalies of a probable archaeological origin, they have been interpreted as pits by association.

5.15 A number of additional, linear and irregular anomalies have been identified, which are also likely to reflect underlying geological variation, including fissures in the rockhead.

5.16 Small, discrete dipolar magnetic anomalies have been detected in both 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.

5.17 Parallel, weak magnetic anomalies (positive and negative) have been detected across both survey areas. These anomalies reflect the modern ploughing regimes.

Area 1

5.18 Located in the north-east of the survey area is anomaly **A**. This consists of a sub-rectangular positive magnetic anomaly (approximately 84m x 51m) oriented north-west to south-east. The anomaly almost certainly reflects a ditched enclosure. Internally, further anomalies of a probable archaeological origin are present. This includes a positive ring anomaly (15m in diameter) at the north-west and also a series of discrete positive magnetic anomalies towards the south-east. A further weak curvilinear anomaly has been identified to the east, which may also be associated with a pair of linear magnetic anomalies that cross the survey area on a north-east to south-west alignment (see anomaly **E**, below).

5.19 Located in the north-west of the survey area is anomaly **B**. This consists of a positive linear anomaly (69m in length) on a north-west to south-east alignment. The anomaly appears to turn at 90 degrees at its south-east end forming part of a rectilinear ditched enclosure. Internally a large discrete positive anomaly has been identified which may indicate the presence of internal features. It is likely that

anomaly **B** is associated with the prehistoric enclosure systems detected to the south (anomaly group **C**).

5.20 In the south-west of the survey area, a complex of intercutting linear and rectilinear anomalies has been recorded (anomaly **C**). These anomalies are interpreted as reflecting at least three separate phases of enclosure systems in this area. The complex includes a rectilinear enclosure (120m x90m) in the south-west corner of the survey area. Possibly cutting this is a second enclosure (marked **C1**) with a clear entrance to the south-west, (100m x 60m). A 'banjo' type enclosure (30m x 60m) is bisected by a modern service pipe, and labelled anomaly **D**. This anomaly has an entrance oriented to the south-east and is connected to a pair of curvilinear anomalies that snake out to the north-east and north-west respectively. All the above mentioned enclosures contain possible internal features represented by discrete positive and more ephemeral linear anomalies. These anomalies correlate closely to the available satellite imagery and aerial photographs (AHBR 36296) of the area, which indicate the continuation of the enclosure systems to the west of the Wootton St Lawrence Road and to the south of Area 2.

5.21 East of anomaly **D**, a second banjo enclosure (50m x 20m) has also been identified, labelled anomaly **E**. This anomaly has a well-defined entrance tunnel to the south-west and is associated with a pair of parallel anomalies on a north-east to south-west alignment across the survey area, continuing into Area 2. Further discrete positive anomalies within the enclosure itself may indicate internal features such as pits. The two parallel anomalies could rereflect the remains of a former track associated with the use of the enclosure. This enclosure is likely to be the one noted by the AHBR (36295).

5.22 Three service pipes have been identified across the area. Two are parallel to the western and southern boundaries respectively. The third is aligned north-west to south-east across the survey area, bisecting anomaly **D**.

5.23 A number of large, irregular anomalies and a series of north-west to south-east oriented linear and curvilinear anomalies have been identified in the south-east of Area 1. These anomalies do not appear to form any coherent pattern and lack the defined morphology of the above mentioned archaeological anomalies. Therefore these anomalies have been interpreted as relating to underlying geological variations, possibly solution hollows and fissures in the chalk rockhead.

Area 2

5.24 Anomaly **F** is a broad area of magnetic disturbance in the north-east of Area 2 (100m x 60m). The concentration of small, intense dipolar magnetic anomalies is likely to reflect brick and rubble debris (noted on the ground during the survey), probably dumped within a hollow or spread across the surface of the field.

5.25 The north-east to south-west aligned anomaly noted in Area 1 (anomaly **E**) continues across Area 2. Outside of the survey area and visible on the satellite imagery is a small square enclosure immediately to the south of this anomaly.

6. Conclusions

6.1 A detailed geomagnetic survey was undertaken on land to the south of Kingsclere Road, Basingstoke, in advance of a planning proposal to develop a solar park. The survey covered 40 hectares across two arable fields.

6.2 The survey identified a number of linear, curvilinear and discrete anomalies, which form a series of enclosures with internal features and trackways in Area 1. This includes two 'banjo' type enclosures typical of the middle Iron Age. It is likely that all the enclosures date to the late prehistoric period.

6.3 The anomalies correlate with the cropmarks previously identified in satellite and aerial imagery. The survey has provided additional information on the morphology and extent of previously identified enclosure systems. In addition, previously unrecorded enclosures were also identified (anomaly groups **A** and **B**).

6.4 Three services pipes were also detected in Area 1

6.5 The satellite and aerial imagery indicates that the identified enclosure systems extend beyond the western and southern boundaries of the survey area.

7. Sources

AHBR 2013 *Hampshire Archaeology and Historic Buildings Register* online; available from http://historicenvironment.hants.gov.uk/ahbresults.aspx

BGS 2013 *British Geological Survey geology of Britain viewer* online; available from http://mapapps.bgs.ac.uk/geologyofbritain/home.html

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 2011 *Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists

Schmidt, A, & Ernenwein, E, 2011 *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service

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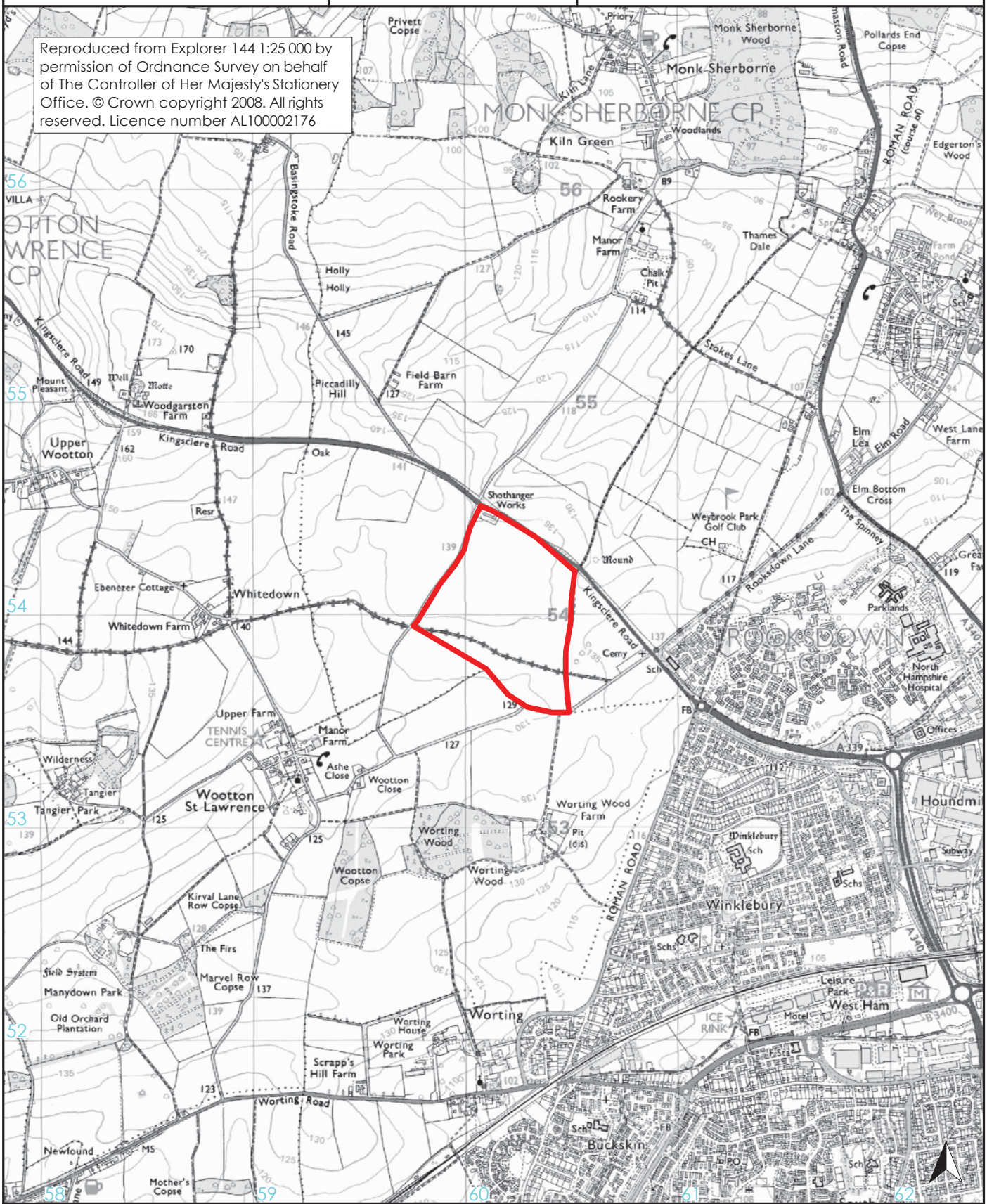
Figure 1: Site location



site location

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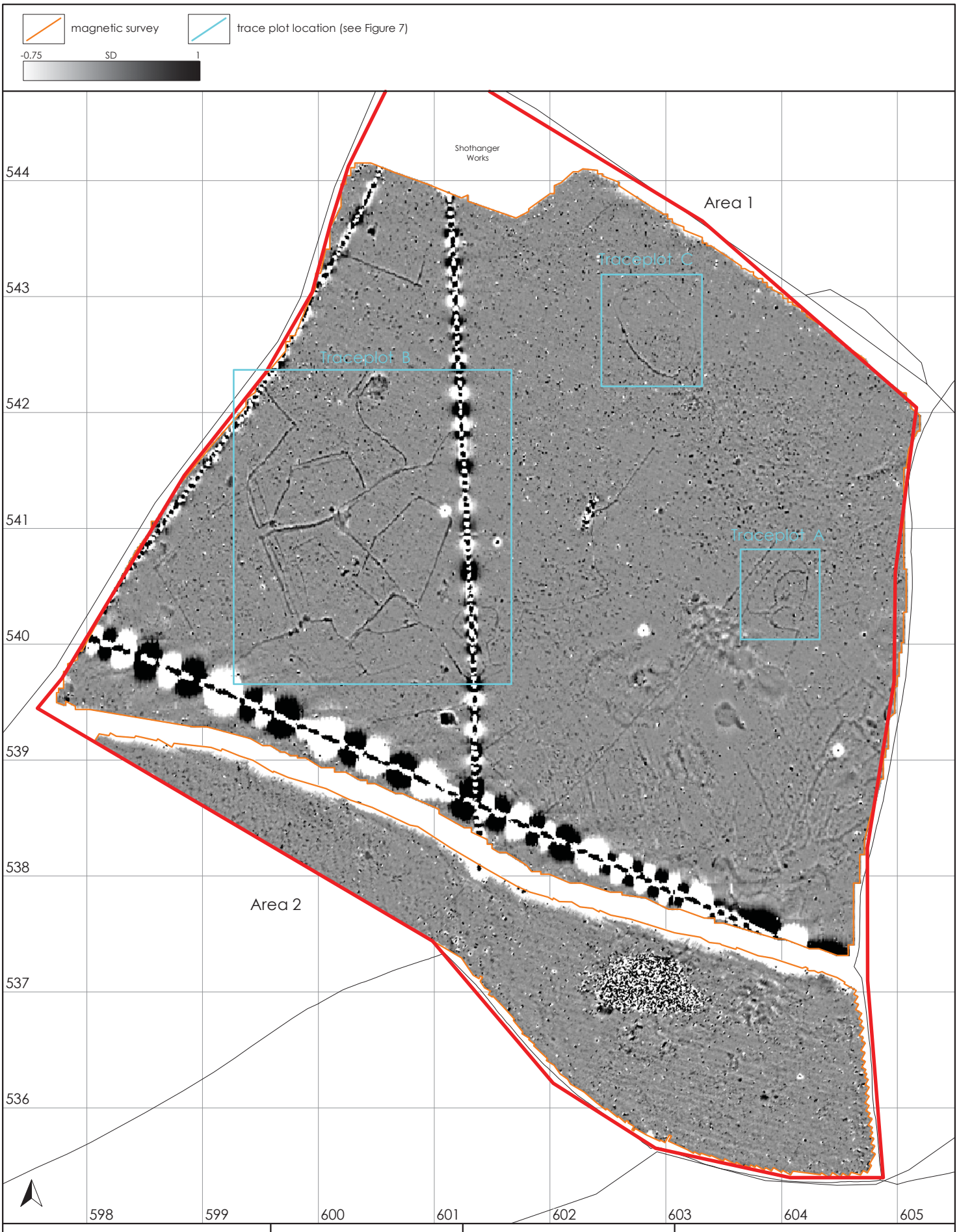
scale 1:25 000 for A4 plot



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0 150m
scale 1:3000 for A3 plot

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Figure 2: Geophysical survey overview

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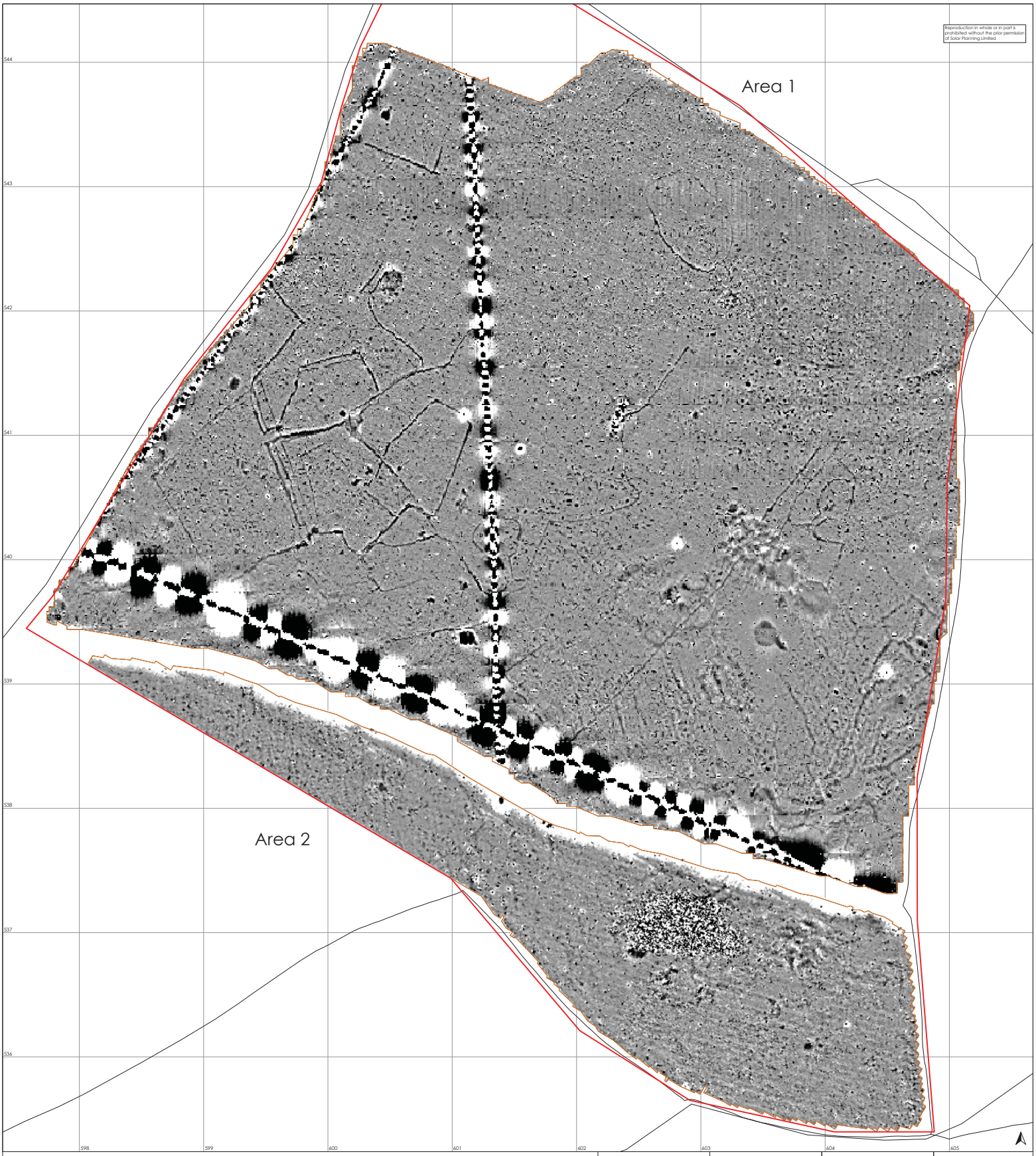

magnetic survey

nT

0 50m

scale 1:1000 for A3 plot

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Figure 3: Geophysical survey

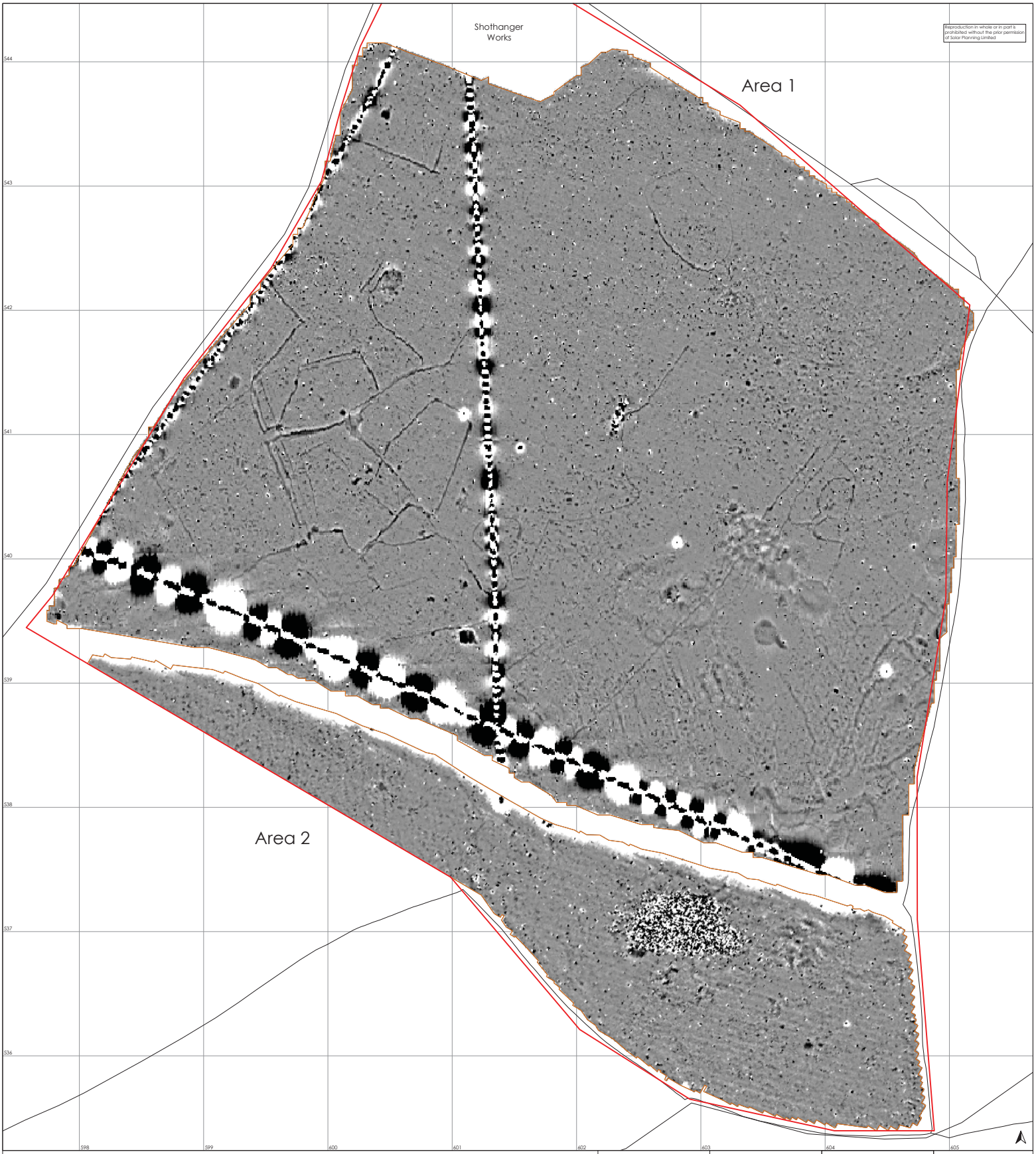

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Figure 4: Geophysical survey (filtered)

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Figure 5: Geophysical interpretation

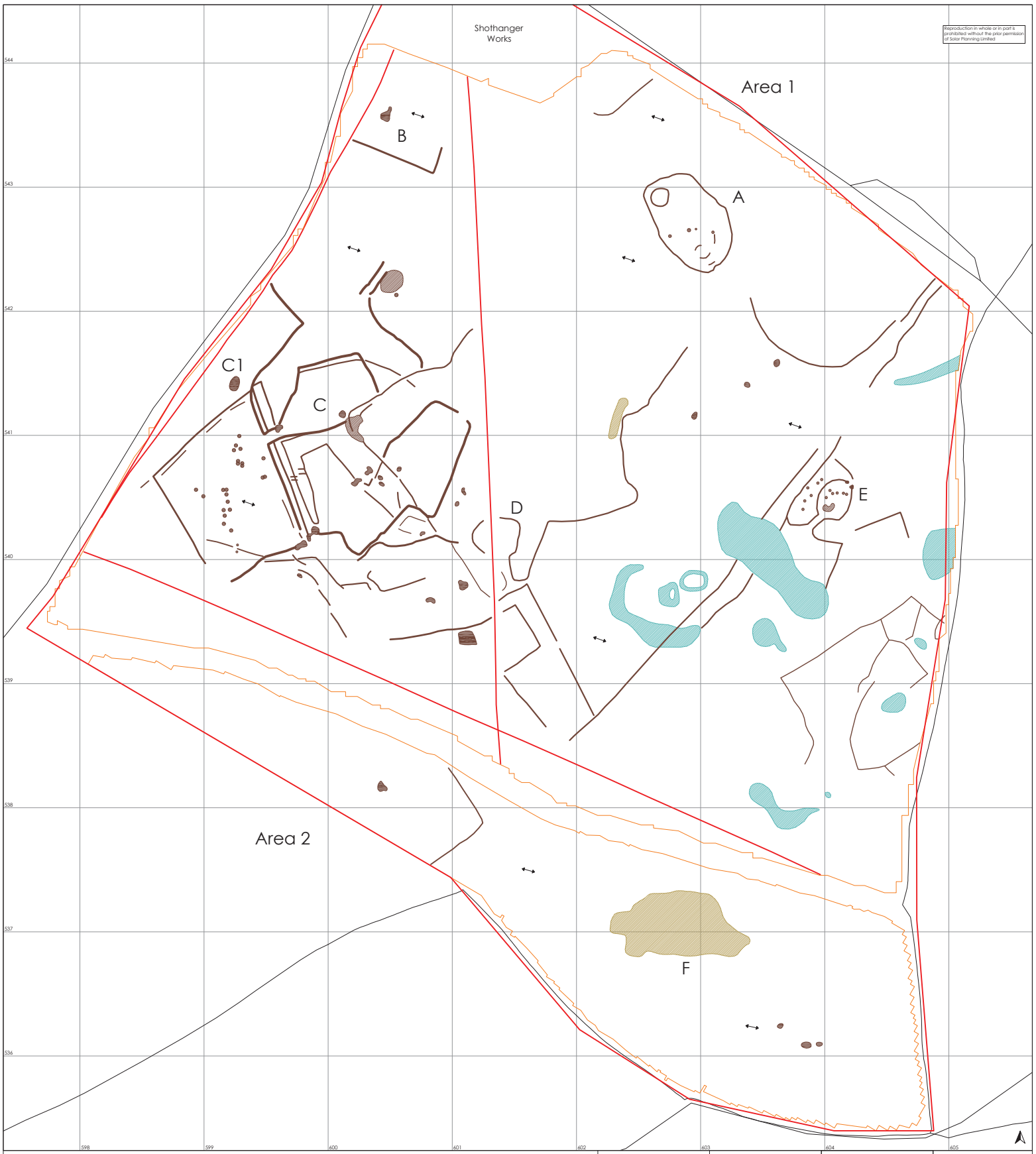

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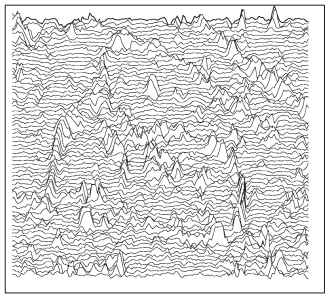
Figure 6: Archaeological interpretation

Traceplot A

8.00nT/cm



Traceplot C

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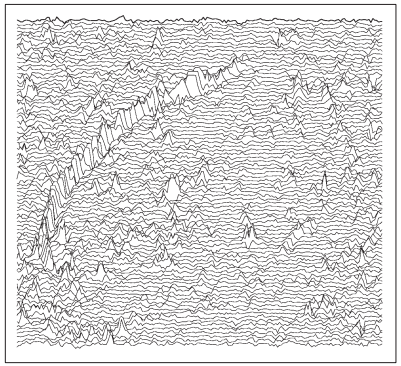

Traceplot B

8.00nT/cm

0 50m

scale 1:1000 for A2 plot

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Figure 7: Trace plots of geomagnetic data