

ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
Wessex Solar Energy

Garley's Wood
Backwell
North Somerset

geophysical survey

report 2980
September 2012

Contents

1.	Summary	1
2.	Project background	2
3.	Historical and archaeological background	2
4.	Landuse, topography and geology	3
5.	Geophysical survey	3
6.	Conclusions	7
7.	Sources	7

Figures

Figure 1:	Site location
Figure 2:	Survey overview
Figure 3:	Geophysical survey
Figure 4:	Geophysical interpretation
Figure 5:	Archaeological interpretation
Figure 6:	Trace plots of geomagnetic data

1. Summary

The project

- 1.1 This report presents the results of geophysical surveys conducted in advance of proposed development at Garley's Wood, Backwell, North Somerset. The works comprised the geomagnetic survey of 12ha of pasture and arable farmland.
- 1.2 The works were commissioned by Wessex Solar Energy and conducted by Archaeological Services Durham University.

Results

- 1.3 Possible soil-filled ditches, including the remains of a possible oval enclosure, were identified in Area 2.
- 1.4 Traces of former cultivation were identified in Areas 1, 3, 4a and 4b.
- 1.5 Possible evidence of localised quarrying was identified in Area 1.
- 1.6 Former field boundaries were detected in Areas 1 and 3.
- 1.7 Broad and diffuse anomalies in Areas 1 and 2 may reflect geological features such as fissures or other variations in rockhead topography.
- 1.8 Areas of disturbed ground and recent bonfires were detected in Areas 1 and 2.
- 1.9 A probable service pipe was detected crossing the north-east corner of Area 1.

2. Project background

Location (Figure 1)

- 2.1 The study area was located east of Garley's Wood, Backwell, North Somerset (NGR centre: ST 50365 66296). Five surveys totalling 12ha were conducted in five land parcels. To the north was Oatfield Farm and open farmland, to the west was Garley's Wood and to the south was a sewage works. To the east were the remains of Broadfield Down Second World War airfield base. Bristol International Airport lies 1km to the south, beyond the settlement of Downside.

Development proposal

- 2.2 The development proposal is for a solar farm and associated infrastructure.

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 proposed development 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 in line with national standards and guidelines (5.1 below).

Dates

- 2.5 Fieldwork was undertaken between 20th and 24th August 2012. This report was prepared for 7th September 2012.

Personnel

- 2.6 Fieldwork was conducted by Jamie Armstrong and Matt Claydon (Supervisor). The geophysical data were processed by Natalie Swann. This report was prepared by Natalie Swann, with illustrations by Janine Watson, and edited by Duncan Hale, the Project Manager.

Archive/OASIS

- 2.7 The site code is **BGW12**, for **Backwell, Garley's Wood 2012**. 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 **archaeol3-133212**.

3. Historical and archaeological background

Previous archaeological works

- 3.1 Excavations were carried out at Edson's Farm, west of the proposed development area (PDA), which recorded post-medieval settlement remains and remains relating to the 16th-century deserted glebe farmhouse. An archaeological desk-based assessment was conducted for the PDA (Archaeological Services 2011); the results of that assessment are summarised below.

The prehistoric period (up to AD 70)

- 3.2 There is no direct evidence of prehistoric activity in the proposed development area however there is evidence that the surrounding area was exploited in prehistory. Mesolithic, Neolithic and Bronze Age flint artefacts have been found at Freeman's Farm north-east of the PDA and five prehistoric barrows have been recorded to the south and south-west of the PDA.

The Roman period (AD 70 to 5th century)

- 3.3 There is no direct evidence for Roman occupation within the PDA but the A38 road to the east of Downside follows the line of a Roman road.

The medieval and post-medieval periods (5th century to 1899)

- 3.4 The PDA lies near two medieval or early post-medieval settlements at Edson's Farm and Oatfield Farm. The remains of a 16th-century glebe farmhouse have been recorded at Edson; this site is considered to be of more than local importance. An outbuilding at Edson's Farm has a medieval chapel incorporated into its structure.
- 3.5 There is a considerable history of quarrying, lime production and lead-mining in the area. Lead was mined at Oatfield Farm and Oatfield Wood and quarrying of the local limestone is recorded from the post-medieval period and continues into the present day at a quarry north of the PDA.

The modern period (1900 to present)

- 3.6 During the Second World War an airfield was built on Broadfield Down and many sites recorded in the Somerset HER relate to this activity, including sites immediately east of the PDA which include an access road, accommodation block and ancillary services.

4. Landuse, topography and geology

- 4.1 At the time of survey the proposed development area comprised two arable fields, one field of pasture and two small fields in meadow.
- 4.2 The survey areas sloped gently from approximately 186m OD in the north-east to 170m in the south-west.
- 4.3 The underlying solid geology of the area comprises Brockley Down Limestone. The soil is relatively free draining and up to 0.4m thick.

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 evidence from the desk-based assessment, 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.
- 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 30m grid was established across each survey area and related to Ordnance Survey (OS) 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 both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and interpretations are presented in Figures 1-5; 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. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.
- 5.9 The following basic processing functions have been applied to each dataset:

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

<i>zero mean traverse</i>	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
<i>destagger</i>	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
<i>interpolate</i>	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 Colour-coded geophysical interpretations are provided. Three types of geomagnetic anomaly have been distinguished in the data:

<i>positive magnetic</i>	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
<i>negative magnetic</i>	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
<i>dipolar magnetic</i>	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

- 5.11 Colour-coded archaeological interpretations are 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 1

- 5.13 A series of slightly arcuate, parallel, positive magnetic anomalies has been detected across the northern part of this survey area, which is likely to reflect former ridge and furrow cultivation.
- 5.14 Two linear positive magnetic anomalies were detected, one aligned approximately north/south and the other broadly west/east. These anomalies are likely to reflect soil-filled features and correspond to former field boundaries shown on historic Ordnance Survey maps.
- 5.15 A number of broad and diffuse positive magnetic anomalies were detected across this survey area, which may reflect soil-filled features such as ditches, though the

diffuse nature of the anomalies suggests they are more likely to be geological, perhaps the result of fissures or changes in rockhead topography. The intense positive magnetic anomaly in the north-west part of the survey area may reflect quarrying of the limestone.

- 5.16 A chain of dipolar magnetic anomalies detected in the north-east corner of this area is likely to reflect a modern service pipe.
- 5.17 The intense magnetic anomaly on the south-east edge of the survey area may reflect the remains of adjacent structures relating to the WWII airfield, which was situated immediately east of this survey area. A high concentration of ferrous/fired debris in the southern part of this field may indicate disturbed ground.

Area 2

- 5.18 A linear positive magnetic anomaly was detected aligned approximately north-east/south-west at the west end of this area which may reflect a soil-filled ditch. A second linear magnetic anomaly was detected in the south-east corner of the area aligned approximately north-west/south-east which may also reflect a soil-filled ditch.
- 5.19 Two curvilinear positive magnetic anomalies were detected on the southern edge of the survey area, which probably reflect soil-filled ditches; these appear to form part of a sub-circular or oval enclosure.
- 5.20 A number of broad, diffuse positive magnetic anomalies were detected in this area similar to those seen in Area 1, which could again reflect soil-filled features but are likely to be geological in origin.
- 5.21 A series of concentrations of intense dipolar magnetic anomalies were detected across this area. These clusters correspond to areas of burning visible on the ground.

Area 3

- 5.22 Two linear positive magnetic anomalies were detected aligned north/south in the northern part of this survey area. Further chains of positive and dipolar magnetic anomalies were detected in the south-east corner of the survey area aligned north/south and east/west. These anomalies together correspond to former field boundaries shown on historic OS maps.
- 5.23 A series of parallel positive and negative magnetic anomalies was detected aligned north/south across the survey area; these anomalies are likely to reflect former cultivation.

Area 4a

- 5.24 A series of parallel positive and negative magnetic anomalies was detected aligned north-east/south-west across this area; this is likely to reflect traces of former cultivation.

Area 4b

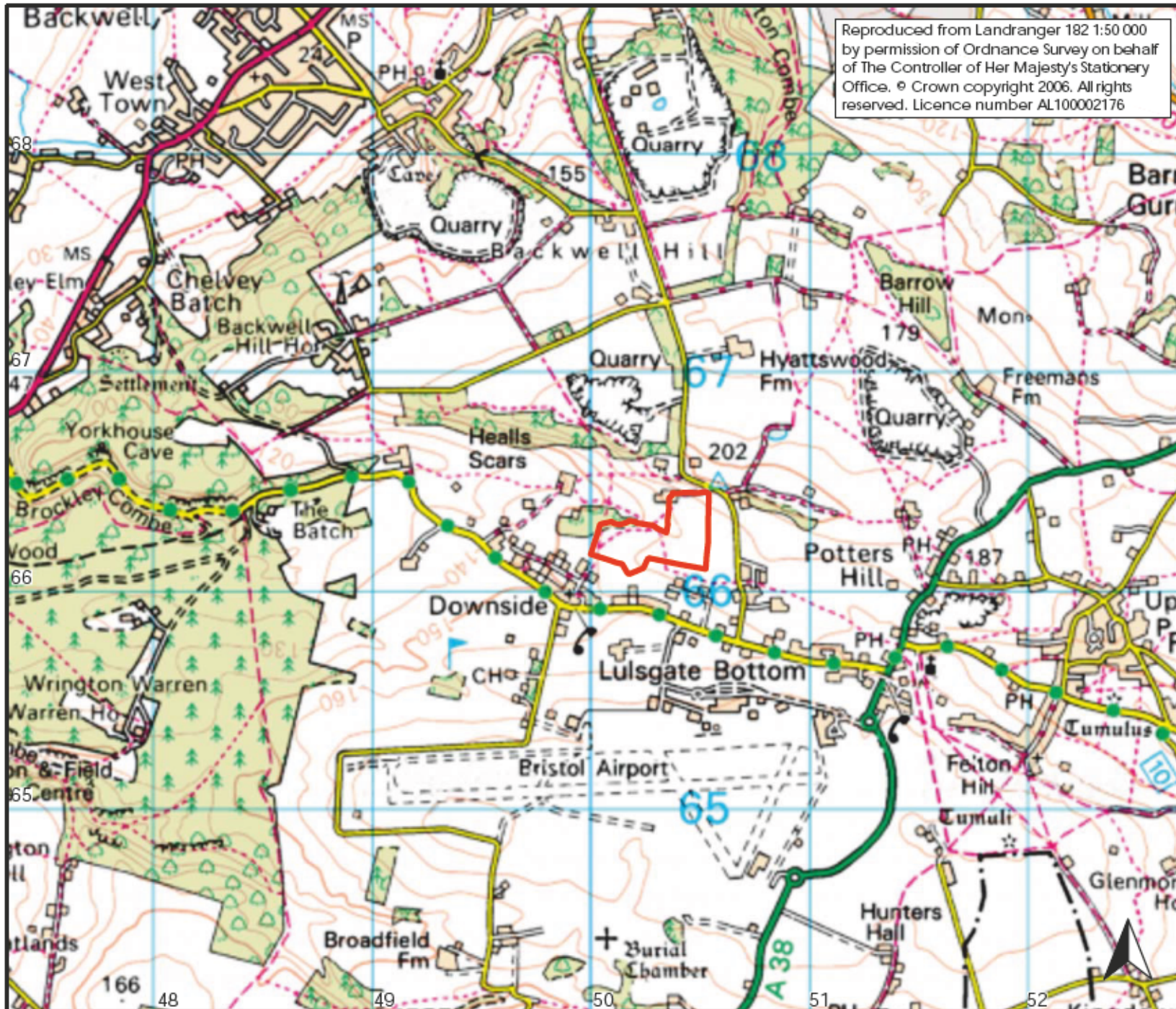
- 5.25 The north-east/south-west aligned anomalies reflecting former cultivation in Area 4a continue into this area. In the eastern part of the field the anomalies change direction, becoming aligned north-west/south-east.

6. Conclusions

- 6.1 Twelve hectares of geomagnetic survey was undertaken at Garley's Wood, Backwell, North Somerset, prior to proposed development.
- 6.2 Possible soil-filled ditches, including the remains of a possible oval enclosure, were identified in Area 2.
- 6.3 Traces of former cultivation were identified in Areas 1, 3, 4a and 4b.
- 6.4 Possible evidence of localised quarrying was identified in Area 1.
- 6.5 Former field boundaries were detected in Areas 1 and 3.
- 6.6 Broad and diffuse anomalies in Areas 1 and 2 may reflect geological features such as fissures or other variations in rockhead topography.
- 6.7 Areas of disturbed ground and recent bonfires were detected in Areas 1 and 2.
- 6.8 A probable service pipe was detected crossing the north-east corner of Area 1.

7. Sources

- Archaeological Services 2011 *Land near Downside, North Somerset: archaeological desk-based assessment*. Unpublished report 2527, Archaeological Services Durham University
- 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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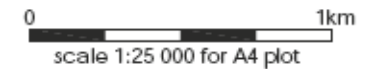
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Figure 1: Site location



 site location

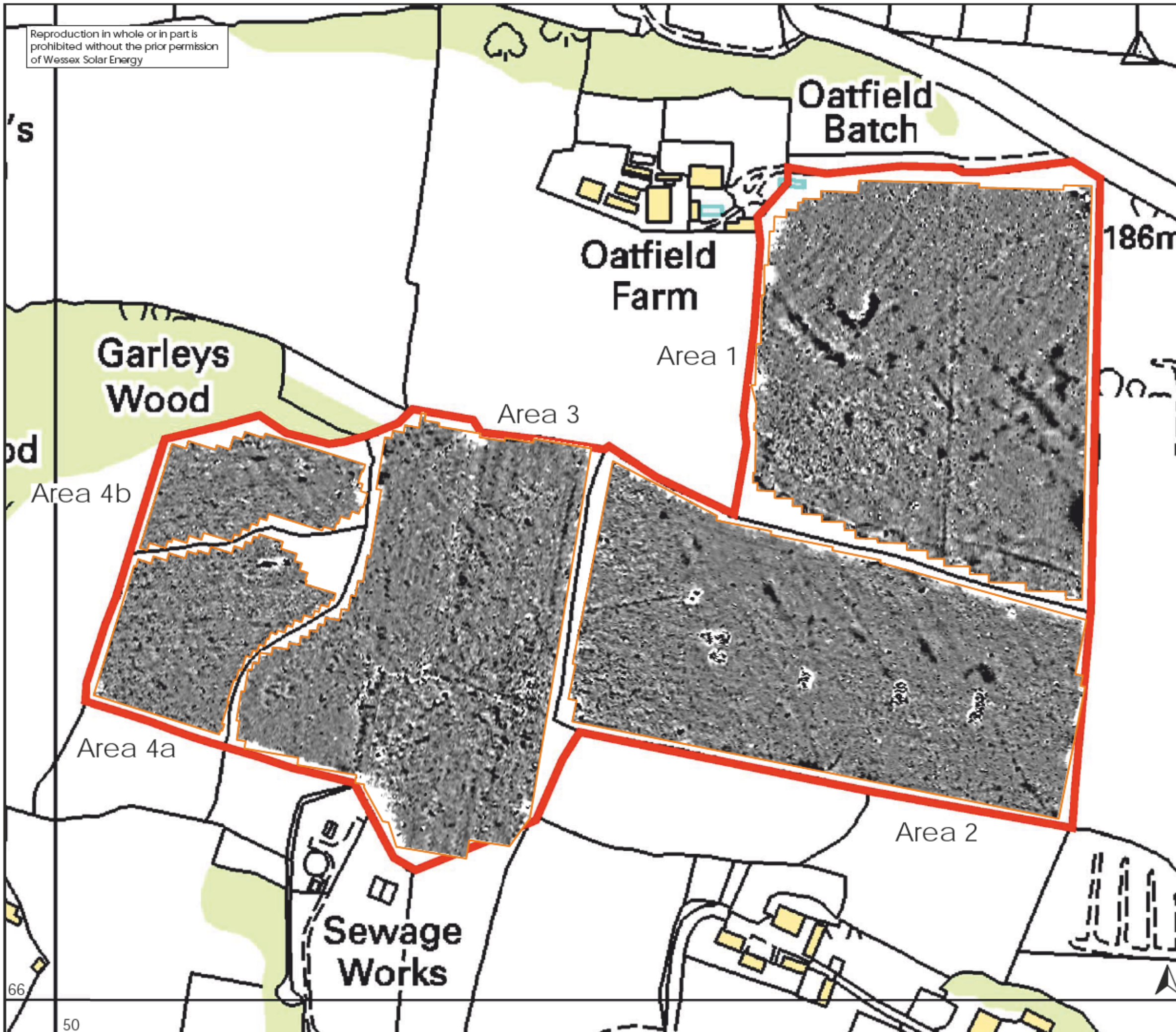
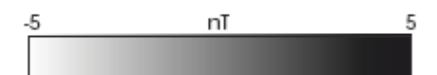
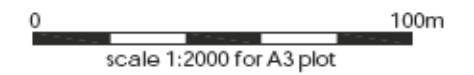
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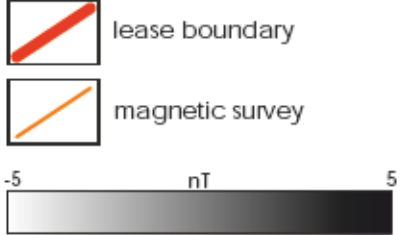
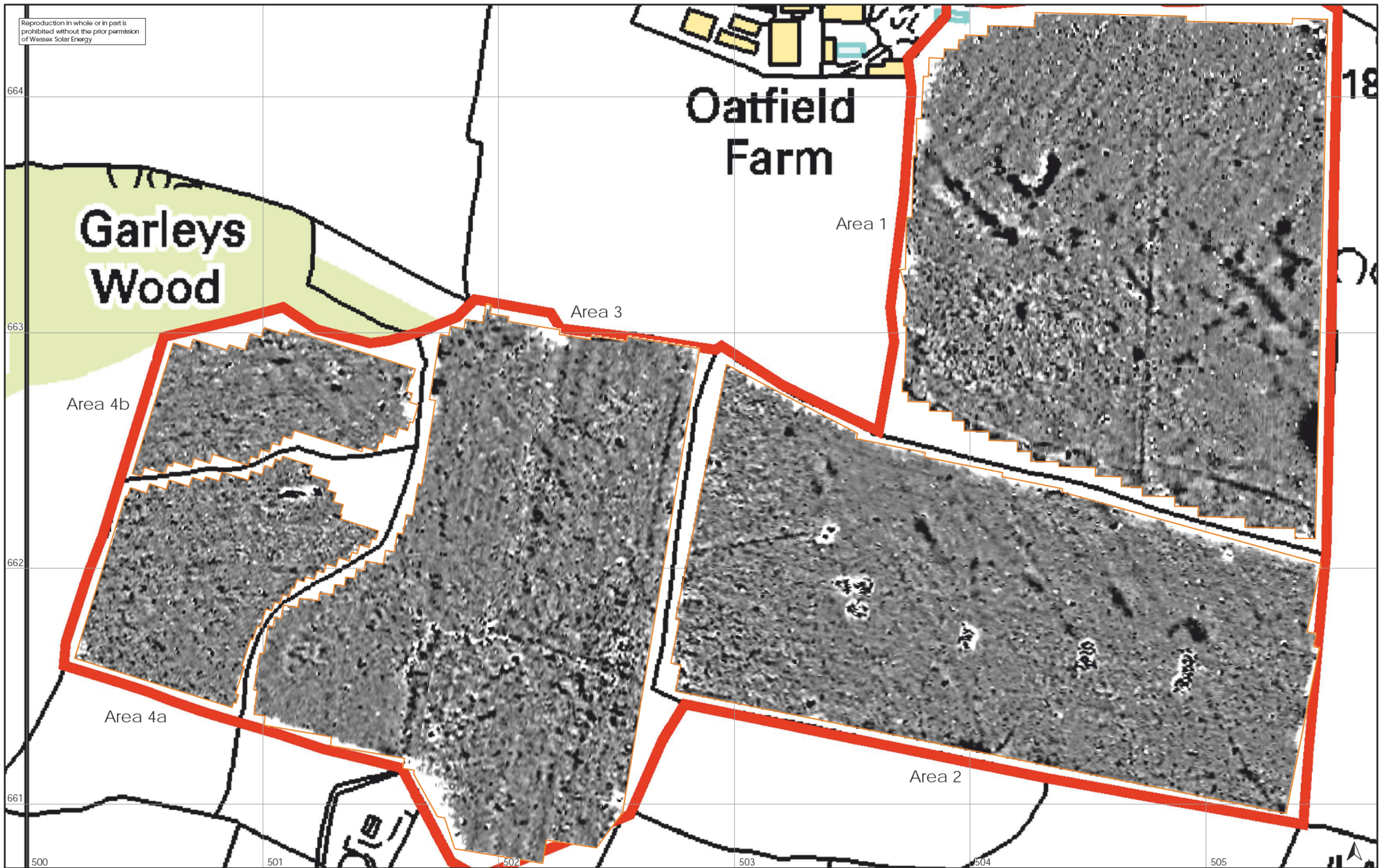
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Figure 2: Survey overview



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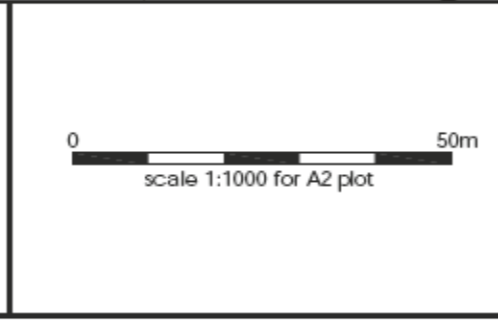
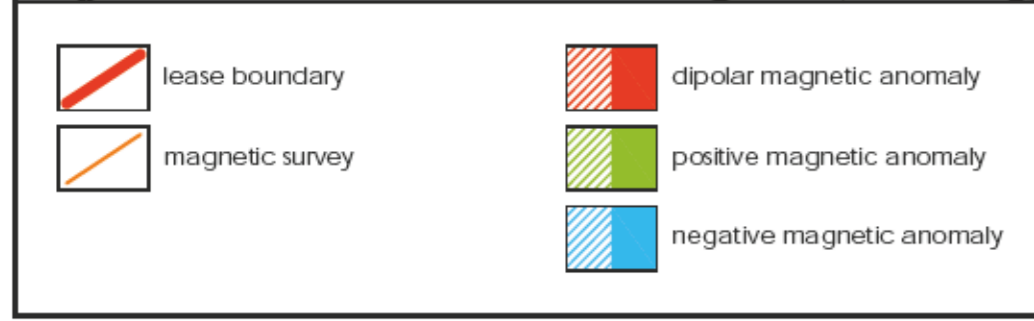
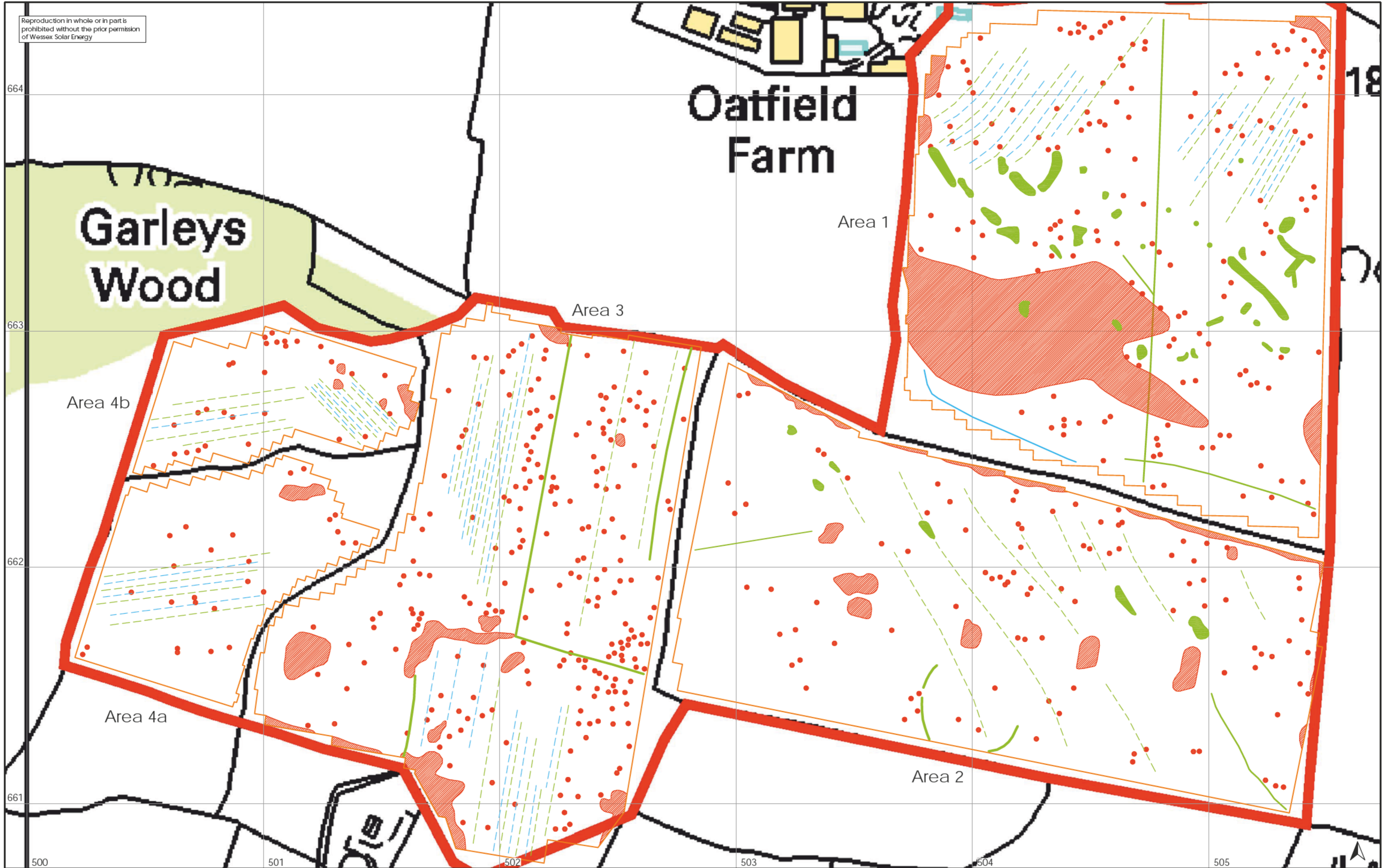


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Figure 3: Geophysical survey

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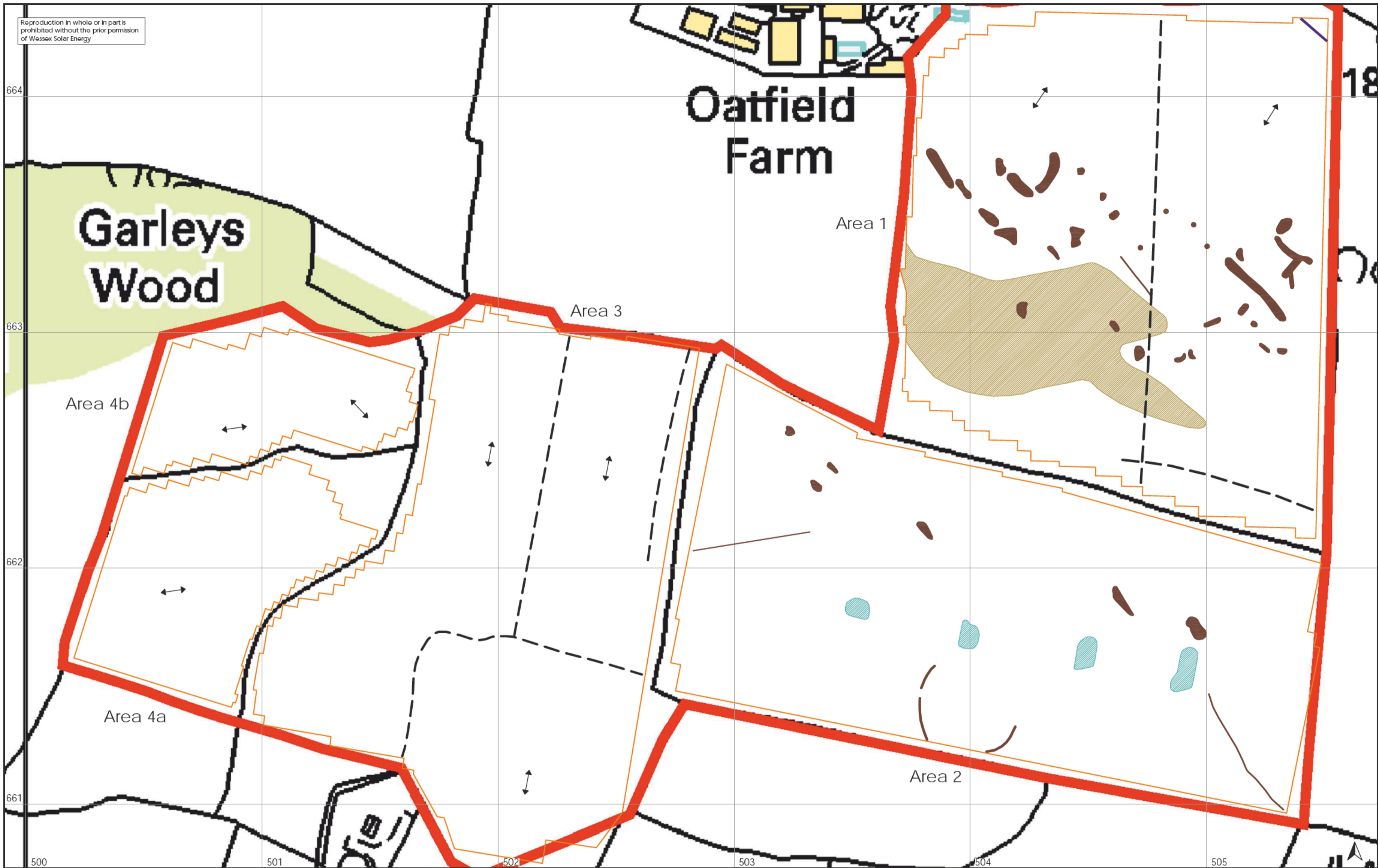


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Figure 4: Geophysical interpretation

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Figure 5: Archaeological interpretation

