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SERVICES
DURHAM UNIVERSITY

on behalf of
J R Power Ltd

Land at Whitnell Farm
Fiddington, Bridgwater
Somerset

geophysical survey

report 2572
January 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 Whitnell Farm, Fiddington, near Bridgwater in Somerset. The works comprised detailed geomagnetic surveys of two areas totalling 16ha.
- 1.2 The works were commissioned by J R Power Ltd and conducted by Archaeological Services Durham University.

Results

- 1.3 No anomalies of likely archaeological significance have been identified in Area 1. Probable building rubble associated with the former Mead's Farm was identified in Area 1, as well as a former post-medieval water channel. Several former field boundaries are shown on early Ordnance Survey maps, however, they have not been detected in the survey. It is likely that this field has been heavily ploughed, to the extent that no traces of the former boundaries, or other possibly earlier features, survive.
- 1.4 Potentially significant archaeological features have been identified in Area 2, comprising a probable banjo enclosure with associated antennae ditches and smaller supplementary enclosures; such complexes typically date from the Iron Age. It is likely that the planning authority will require further investigation of these features if they remain within the proposed development area.
- 1.5 A post-medieval field boundary has also been identified in Area 2.

2. Project background

Location (Figures 1 & 2)

- 2.1 The proposed development area was located on land at Whitnell Farm, Fiddington, near Bridgwater in Somerset. It comprised two fields (Areas 1 and 2) approximately centred on NGR: ST 20877 40155 and NGR: ST 21285 39502. Area 1, in the north, measured 8.9ha; Area 2, in the south, measured 7.1ha. Both fields, totaling 16ha, have been surveyed.
- 2.2 To the east of Area 1 is a sewage works and Whitnell Lane beyond. Whitnell Lane also borders the east side of Area 2. On all other sides the fields are surrounded by agricultural land.

Development proposal

- 2.3 The development proposal is for a solar farm. The details of the proposed construction techniques, including any associated works that will have a below-ground impact, are detailed in an environmental statement.

Objective

- 2.4 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

- 2.5 The surveys were undertaken in accordance with instructions from the client and in accordance with current national standards and guidance (see para. 5.1 below).

Dates

- 2.6 Fieldwork was undertaken in two visits: survey of Area 1 was undertaken between 6th and 10th December 2010; survey of Area 2 was undertaken between 17th and 20th January 2011. This report was prepared for 28th January 2011.

Personnel

- 2.7 Fieldwork was conducted by Jamie Armstrong, Edward Davies (Supervisor), David Graham and Natalie Swann (Supervisor). Data processing and report preparation was by Duncan Hale, the Project Manager, with illustrations by Edward Davies.

Archive/OASIS

- 2.8 The site codes are **FWF10** and **FWF11**, for **Fiddington Whitnell Farm 2010** and **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 **archaeol3-92225**.

3. Historical and archaeological background

- 3.1 An archaeological desk-based assessment of the proposed development area was conducted by Archaeological Services in 2010 and updated in 2011 (Archaeological Services 2011). The results of the assessment are summarised below.

- 3.2 No archaeological resource has been identified which requires preservation *in situ*. There are no historic or statutorily protected buildings in the vicinity of the site. There are no Scheduled Ancient Monuments on or in the near vicinity of the site.
- 3.3 There is evidence of prehistoric activity in the surrounding area. In addition, a cropmark thought to be caused by a prehistoric enclosure is present in the southern half of the proposed development area. Therefore there is the potential for remains of this period to survive within the proposed development area.
- 3.4 The area lies beyond the edge of the hamlet of Whitnell, to the south-west of Fiddington, and it is probable that the area was used in the medieval and post-medieval periods as agricultural land. Evidence relating to this, in the form of ridge and furrow cultivation and field boundaries, may survive. Evidence for buildings from these periods may survive at the location of Mead's Farm and towards the north-eastern corner of the site.

4. Landuse, topography and geology

- 4.1 At the time of fieldwork both fields were arable land.
- 4.2 Area 1 occupied very gently sloping land, at approximately 55m OD in the north and 40m OD in the south. Area 2 spanned the crest of a low ridge at elevations between approximately 60-70m OD.
- 4.3 The underlying solid geology of the area comprises Triassic strata of the Mercian Mudstone Group, with river terrace deposits over the southern part of the site and alluvium along the southern boundary of Area 1.

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 the desk-based assessment, it was considered likely that cut features such as ditches and pits might survive on the site, and that other types

of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) could also be present.

- 5.4 Given the anticipated depth of likely 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 area and tied-in to known, mapped Ordnance Survey points using a Leica GS50 global positioning system with post-processing.
- 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 2-8; the trace plots are provided in Figure 9. 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 the data:

<i>clip</i>	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 Except where stated otherwise in the text below, 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.
- 5.13 A scatter of small, discrete dipolar magnetic anomalies has been detected in each survey area. These anomalies 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 plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

Area 1

- 5.14 A high concentration of dipolar magnetic anomalies has been detected in the central part of the survey. The anomalies almost certainly reflect building rubble associated with the former buildings of Mead's Farm in this area.
- 5.15 Several other dipolar magnetic anomalies correspond to existing inspection covers and pylons.
- 5.16 An anomaly aligned north-south on the south side of Mead's Farm corresponds to a water channel shown on early Ordnance Survey maps, linking with the stream to the south.
- 5.17 Several weak parallel anomalies in the eastern part of the survey almost certainly reflect land drains.
- 5.18 The only other anomalies detected across this area almost certainly reflect current and former plough regimes and geomorphological features.

Area 2

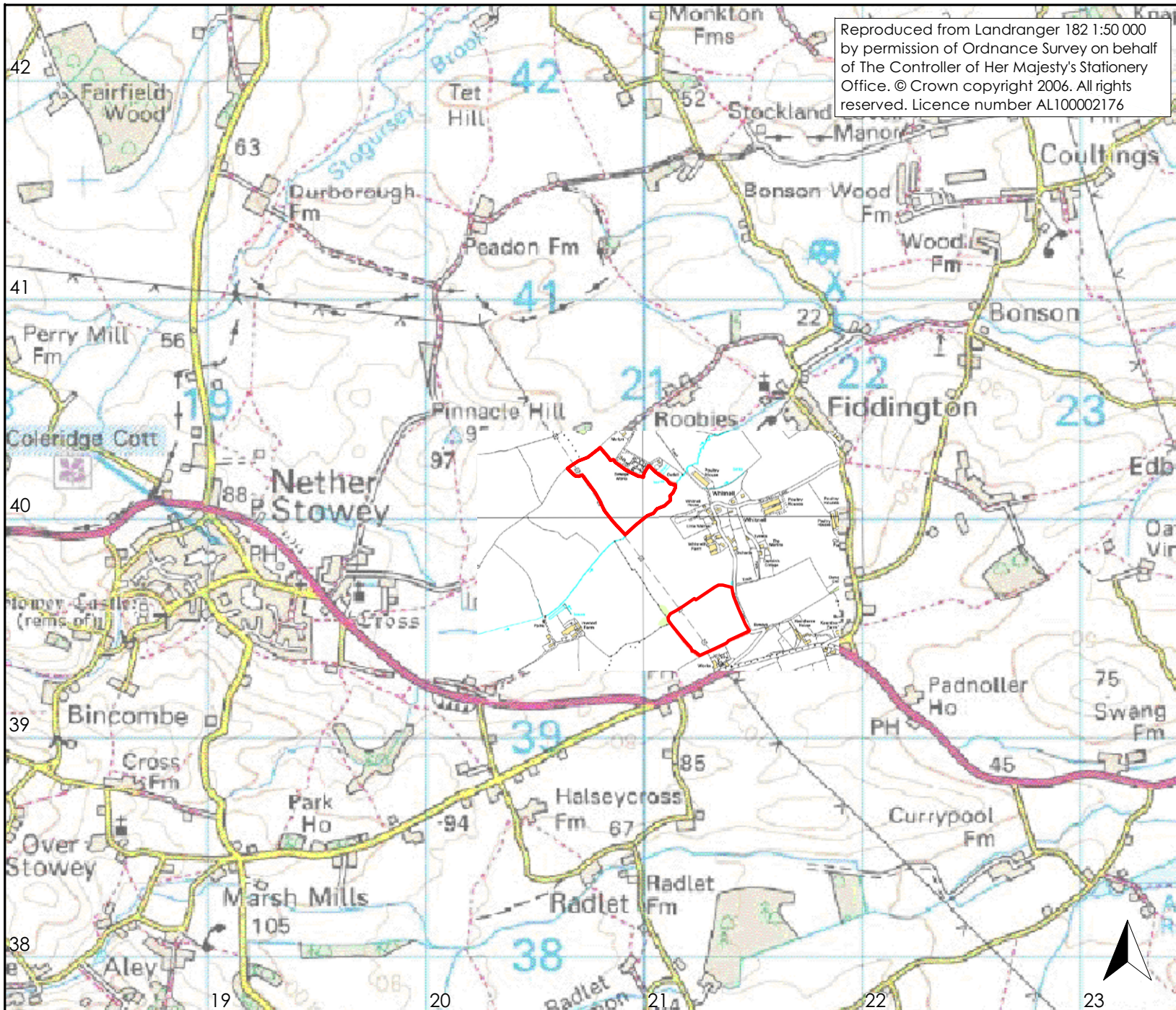
- 5.19 A curvilinear positive magnetic anomaly in the north-eastern quarter of this area corresponds to the location of a cropmarked enclosure recorded on aerial photographs. The anomaly almost certainly reflects a soil-filled ditch, with enlarged terminals on its eastern side, either side of a causewayed entrance. The enclosure measures approximately 50m in diameter and covers approximately 0.2ha. Some small, weak anomalies inside the enclosure will almost certainly reflect internal features, possibly relating to occupation.
- 5.20 Several other, weaker, positive magnetic anomalies have also been detected in the eastern half of the survey; some of these are probably contemporary with the enclosure. To the immediate east of the enclosure's entrance are the remains of two 'antennae' ditches, creating a funnel-like approach. Two further antennae ditches have been detected to the north. Further ditch remains are present to the south and east of the enclosure, some of which almost certainly define further smaller enclosures.
- 5.21 This complex of features is often referred to as a banjo enclosure with antennae and supplementary enclosures, and is typically of Iron Age date. Such sites are generally found to be occupation sites, rather than for stock control or ritual purposes.
- 5.22 Elsewhere in this survey, a weak linear positive magnetic anomaly corresponds to a former field boundary.
- 5.23 Large, intense dipolar magnetic anomalies reflect existing pylons and a large buried ferrous item or structure, presumed recent.

6. Conclusions

- 6.1 Geomagnetic surveys have been undertaken over three fields at Whitnell Farm, near Bridgwater in Somerset, prior to a proposed solar farm development.
- 6.2 No anomalies of likely archaeological significance have been identified in Area 1. Probable building rubble associated with the former Mead's Farm was identified in Area 1, as well as a former post-medieval water channel. Several former field boundaries are shown on early Ordnance Survey maps, however, they have not been detected in the survey. It is likely that this field has been heavily ploughed, to the extent that no traces of the former boundaries, or other possibly earlier features, survive.
- 6.3 Potentially significant archaeological features have been identified in Area 2, comprising a probable banjo enclosure with associated antennae ditches and smaller supplementary enclosures; such complexes typically date from the Iron Age. It is likely that the planning authority will require further investigation of these features if they remain within the proposed development area.
- 6.4 A post-medieval field boundary has also been identified in Area 2.

7. Sources

- Archaeological Services 2011 *Land at Whitnell Farm, Fiddington, Bridgwater, Somerset: archaeological desk-based assessment*. Unpublished report **2526rev**, 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 2010 *Draft Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists
- Schmidt, A, & Ernenwein, E, 2010 (draft) *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service



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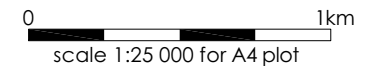
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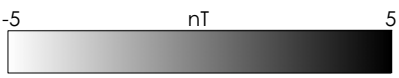
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Figure 1: Site location



magnetic survey



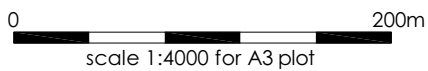
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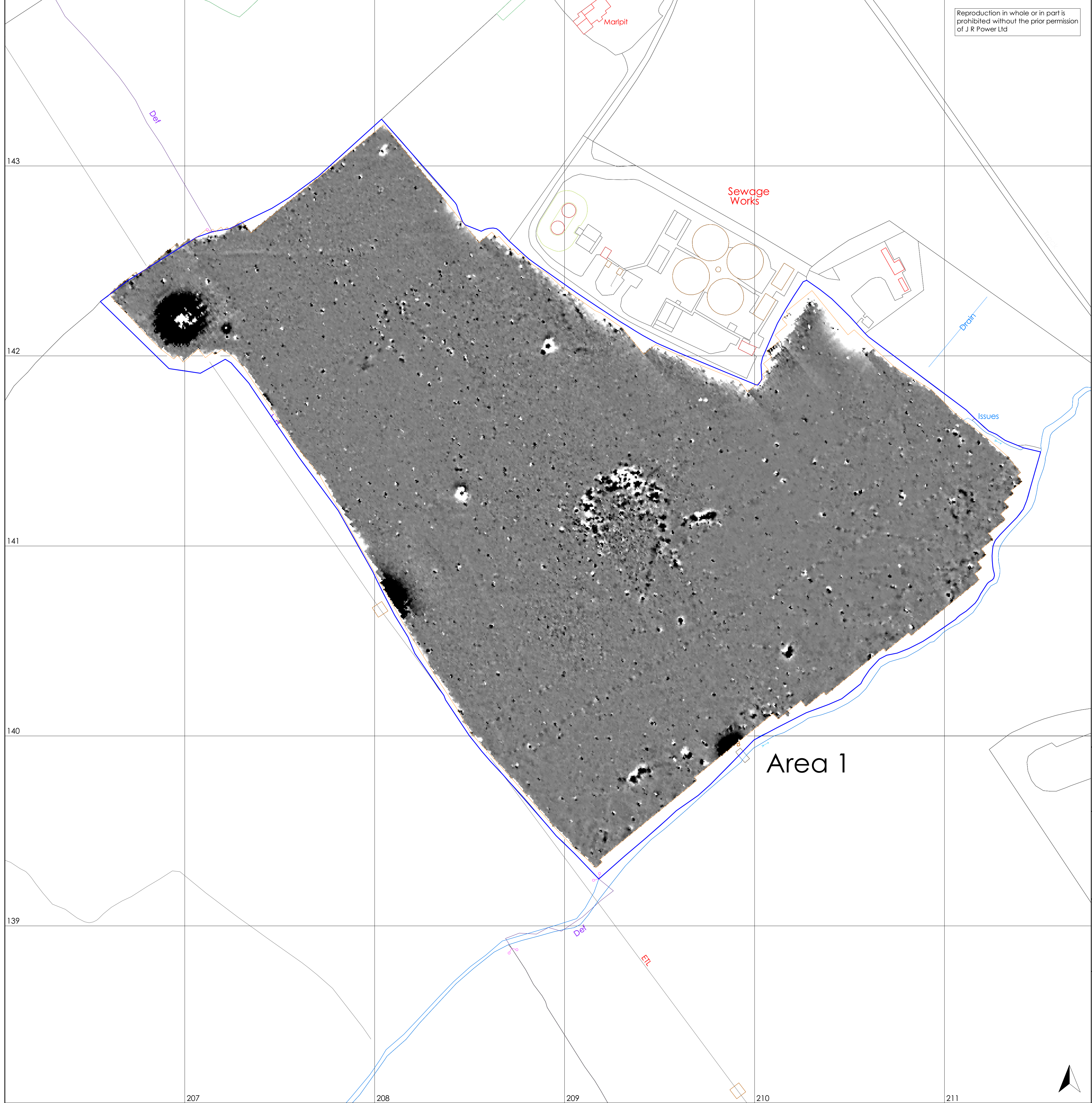
site boundary magnetic survey



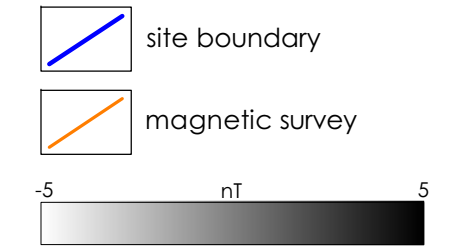
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Figure 2: Geophysical survey overview



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Area 1



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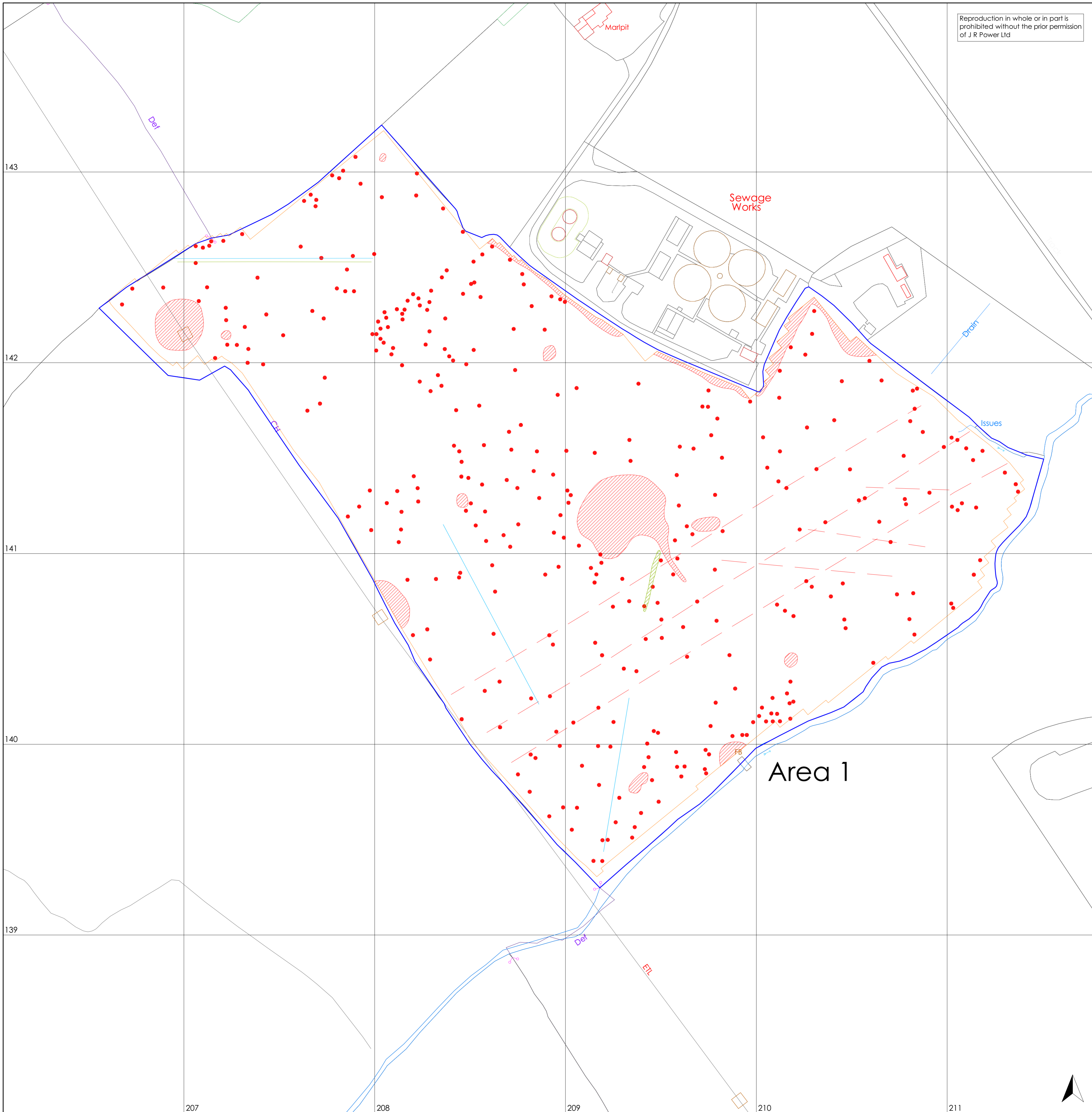
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Figure 3: Area 1 geophysical survey



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



0 50m
scale 1:1000 for A1 plot

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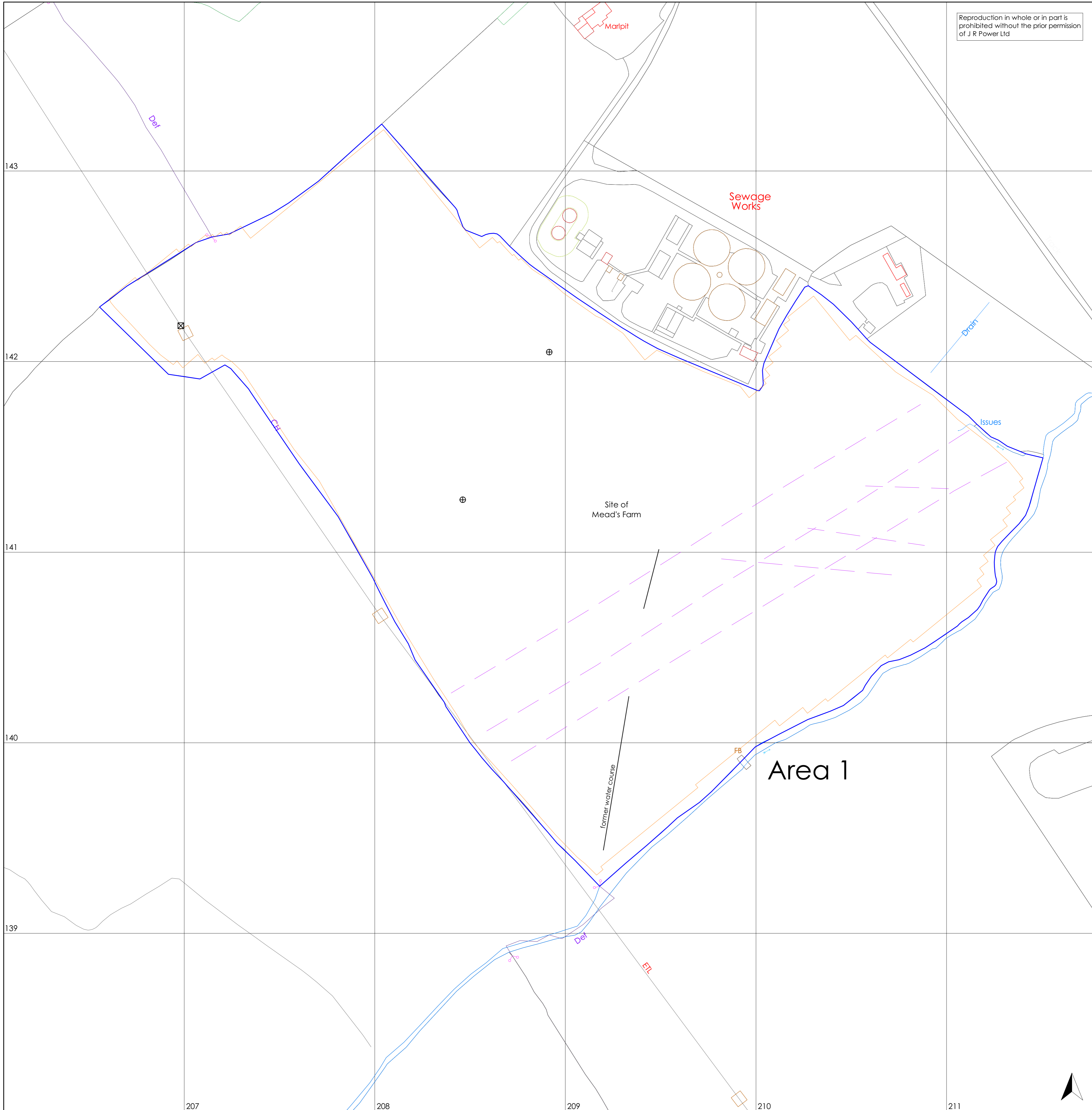
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Figure 4: Area 1 geophysical interpretation

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- land drain
- pylon / telegraph pole
- inspection cover



0 50m
scale 1:1000 for A1 plot

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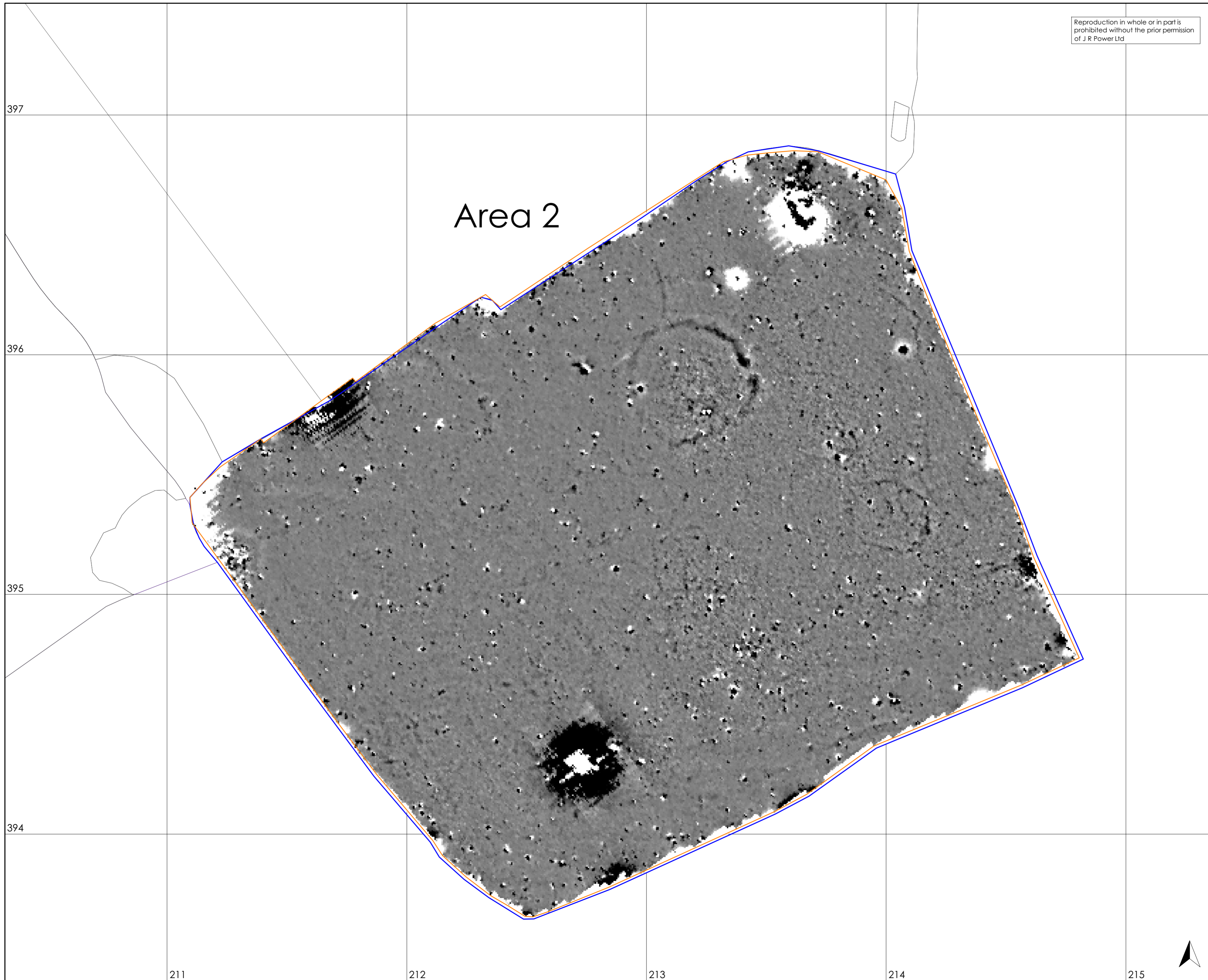
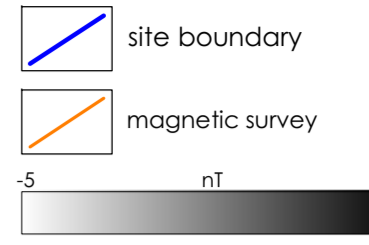
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Figure 5: Area 1 archaeological interpretation



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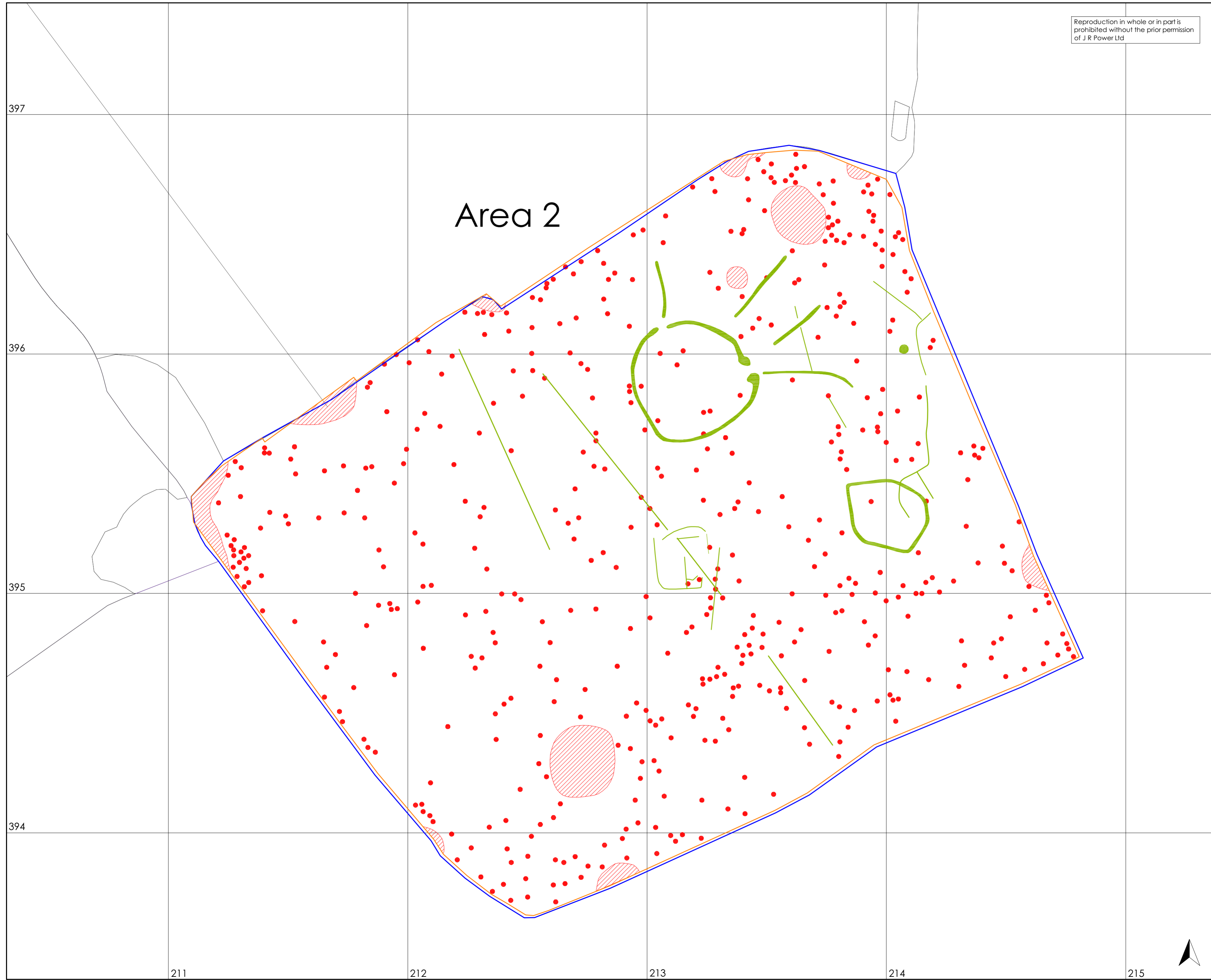
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Figure 6: Area 2 geophysical survey

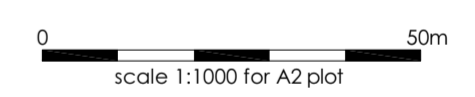


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-  dipolar magnetic anomaly
-  positive magnetic anomaly
-  negative magnetic anomaly



Area 2



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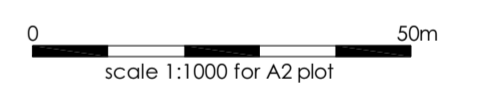
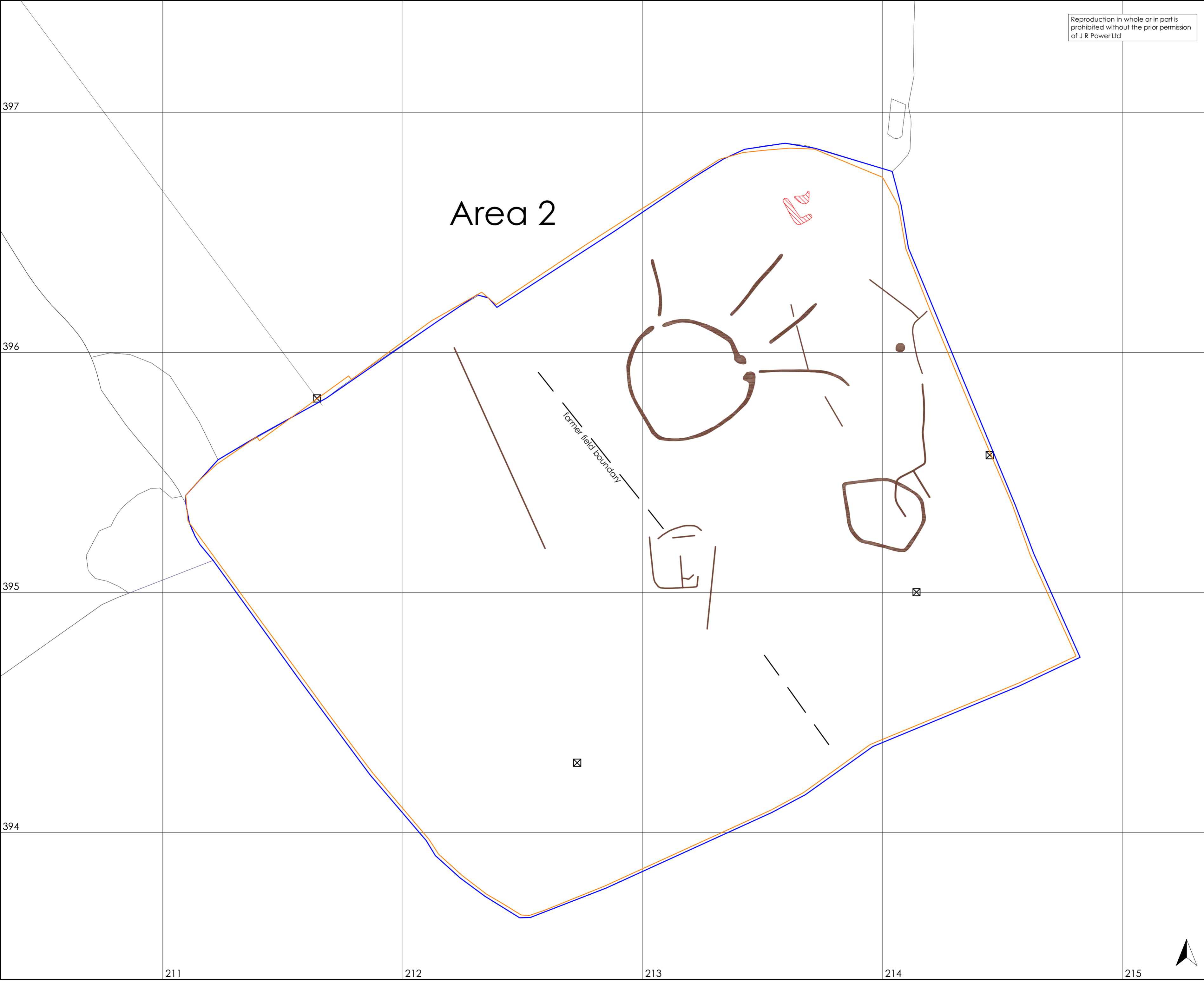
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Figure 7: Area 2 geophysical
interpretation



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-  soil-filled feature
-  recent ferrous / structural debris
-  pylon / telegraph pole



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Figure 8: Area 2 archaeological interpretation

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Figure 9:
Trace plots of geomagnetic data

