



# Longfield Solar Farm

Environmental Statement PINS Ref: EN010118

Volume 2

Appendix 7C: Geophysical Survey

PART 1 OF 5

Document Reference EN010118/APP/6.2

Revision Number: 1.0

February 2022

Longfield Solar Farm Ltd

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure)  
Regulations 2009

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CFSF20



# Longfield Solar Farm, Chelmsford, Essex

## GEOPHYSICAL SURVEY REPORT PLANNING REF. pre-application

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for AECOM Limited

Draft v.1.0  
15/07/2020

## PROJECT INFORMATION:

PROJECT NAME	Longfield Solar Farm, Chelmsford
TYPE OF WORK	Geophysical Survey
PLANNING REF.	Pre-application
EHE NO. (OPTIONAL)	n/a
CONSULTANT/AGENT	AECOM Ltd
CLIENT	Longfield Solar Farm Ltd
PROJECT CODE	CFSF20
HAS. NO (HEREFORD ONLY)	n/a
NGR	TL 74179 14620
PARISH	Terling
COUNCIL AREA	Essex County Council
FIELDWORK DATES	21/09/2020 – 06/11/2020
OASIS REF.	Headland5-409718
ARCHIVE REPOSITORY	Headland Archaeology

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## PROJECT SUMMARY

Headland Archaeology (UK) Ltd was commissioned by AECOM Ltd (the Consultant) on behalf of Longfield Solar Farm Ltd (the Client) to undertake a geophysical (magnetometer) survey at the proposed site of a large solar farm (Longfield Solar Farm) north-east of Chelmsford, near Terling, Essex. The survey covered approximately 470 hectares of arable land and was undertaken to assess the impact of any possible future development on the historic environment. The results will both support any future planning application and inform future archaeological strategy at the site, if required.

The survey has identified few anomalies which cannot be confidently interpreted as of agricultural or geological origin. Exceptions include several isolated or small groupings of faint trend and magnetically enhanced discrete anomalies which have been interpreted as uncertain, where an anthropogenic cause is considered to be tentative given the absence of any supporting evidence. Anomalies of possible archaeological origin have been identified at four locations at or close to the position of recorded heritage assets relating to cropmarks though any direct association with these cropmarks or their archaeological potential remains uncertain. A clearly defined cropmark ring ditch in the south of the site has not been identified by the survey. No anomalies of probable archaeological origin have been identified by the survey.

Ubiquitous in the data set are linear and curvilinear anomalies caused by land drains which indicate the poorly draining nature of the site. Other linear anomalies locate former field boundaries, sub-surface pipes or are due to recent agricultural activity.

It is not certain whether the apparent lack of archaeological activity across this extensive site is truly reflective of an absence of such activity given the unresponsive nature of the underlying clay geology. Until demonstrated otherwise it is concluded that the apparent lack of probable archaeological anomalies on this site is more likely reflective of a lack of archaeological activity on marginal agricultural land than an inability of the methodology to identify any archaeological activity. Currently, on the basis solely of the geophysical survey, the site is assessed as being of very low archaeological potential.

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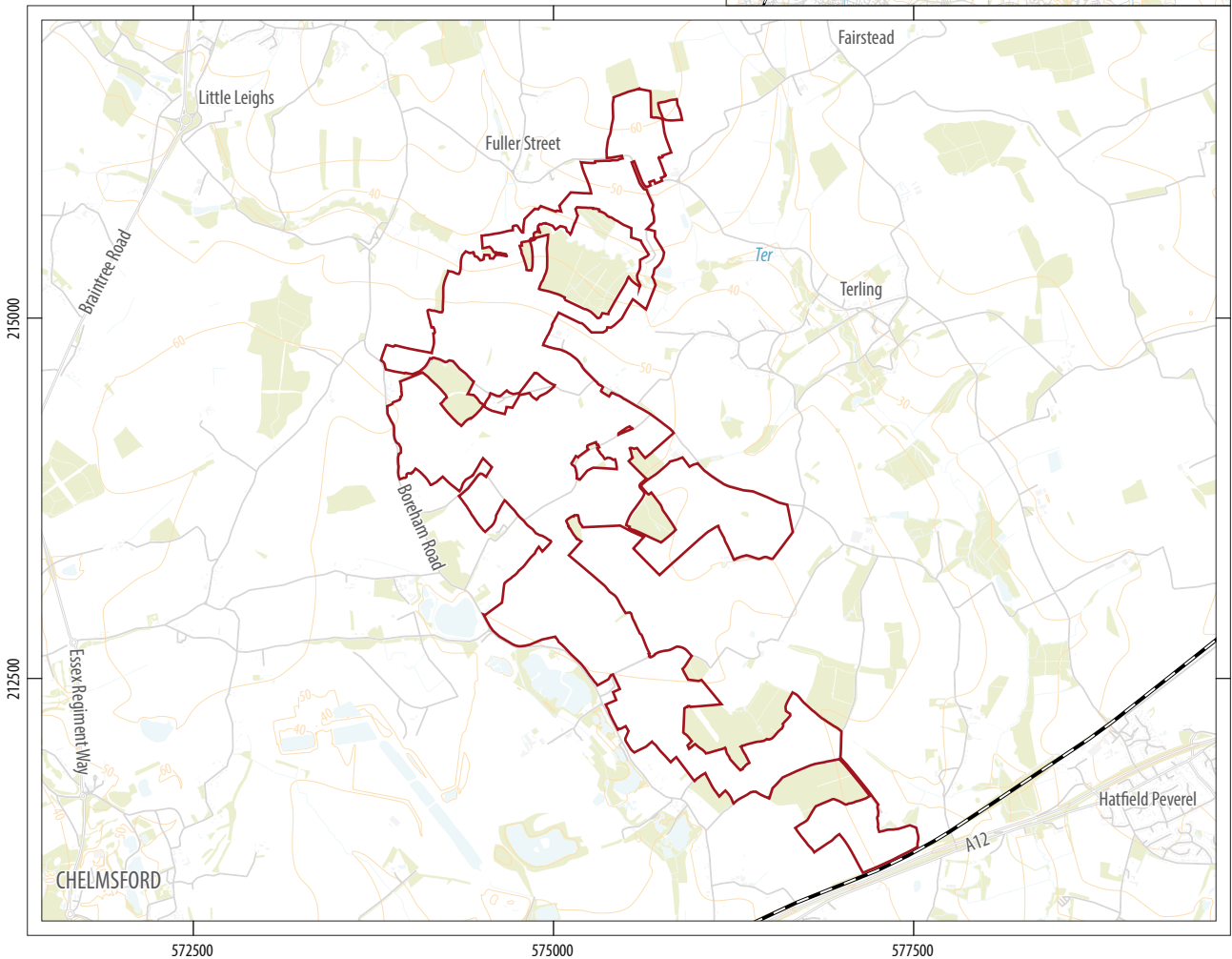
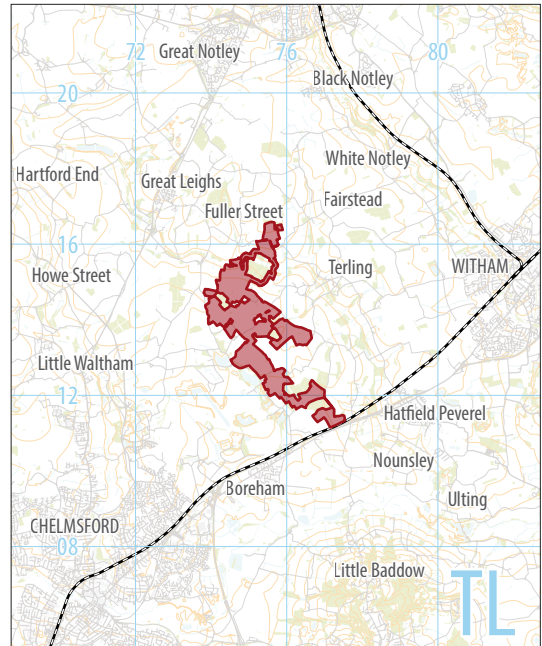
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Longfield Solar Farm  
Chelmsford  
Essex



0 200km  
1:12,500,000 @ A4



0 1km  
1:50,000 @ A4

geophysical survey area



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# Longfield Solar Farm, Chelmsford

## GEOPHYSICAL SURVEY REPORT

### 1. INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by AECOM Ltd (the Consultant) on behalf of Longfield Solar Farm Ltd to undertake a geophysical (magnetometer) survey at the proposed site of a large solar farm (Longfield Solar Farm) north-east of Chelmsford, near Terling, Essex (Illus 1). The red line boundary for the proposed application encloses an area of approximately 470 hectares of agricultural land under single ownership comprising 48 fields.

The results of the survey will be used to provide information in support of a future planning application and will also inform future archaeological strategy at the site, if required. The survey was undertaken to assess the impact of the proposed development on the historic environment. It was undertaken in accordance with an Archaeological Written Scheme of Investigation for Geophysical Survey (WSI) (AECOM 2020a) and in line with current best practice (Chartered Institute for Archaeologists 2014, Europae Archaeologia Consilium 2016).

The surveys were carried out between September 21st 2020 and November 6th 2020.

#### 1.1. SITE LOCATION, TOPOGRAPHY AND LAND-USE

The proposed development area (PDA) is located between several small villages, including Fuller Street to the north, Gamble's Green and Terling to the east, Boreham and Little Waltham to the south-west and Hatfield Peverel to the south-east. Chelmsford is located 4km to the south-west. Boreham Road runs north/south along the western edge of the PDA, with the A12 abutting and bounding the southern edge of the PDA (Illus 1).

The PDA is centred on National Grid Reference (NGR) TL 74179 14620 and comprises of one contiguous parcel of land separated by areas of woodland approximately 470ha in extent. All the fields are connected by a network of concrete or permanent hardcore tracks. At the time of the survey all the fields were under arable production and were mostly still under stubble following recent harvest or had just been ploughed, drilled and re-seeded. A handful of fields were deep ploughed and were too wet to cultivate (and hence survey) within the survey window.

The topography of the PDA is relatively flat, although there is some variation sloping down from approximately 64m Above Ordnance Datum (AOD) at the northern end of the PDA to approximately 40m (AOD) towards the south of the PDA.

#### 1.2. GEOLOGY AND SOILS

The bedrock geology across the whole of the PDA comprises London Clay Formation - Clay, Silt and Sand, sedimentary bedrock formed approximately 48 to 56 million years ago, which is overlain throughout by superficial deposits comprising variously Glaciofluvial deposits (sand and gravel), Brick Earth (clay, silt and sand) and Lowestoft Formation Diamicton (UKRI 2021). Average magnetic responses of London Clay to magnetometer survey are generally poor though results can be variable (English Heritage 2008; Table 4).

The soils across most of the PDA comprise slightly acid loamy and clayey soils with impeded drainage (Soilscape 8) with a pocket of freely draining slightly acid loamy soils (Soilscape 6) to the centre of the PDA (Cranfield 2021).

A previous survey (Headland Archaeology 2019) on a site bordering the current PDA to the west at Bulls Lodge Quarry, also on London Clay overlain by Diamicton, identified weak but unmistakable archaeological anomalies corroborating previous cropmark data. This demonstrates that it is possible to identify archaeological features on the prevailing soils and geology.

## 2. ARCHAEOLOGICAL BACKGROUND

The following archaeological and historical background summary is taken from the Scoping Report produced by AECOM as part of the project baseline works (AECOMb 2020).

The baseline, as derived from the Essex Historic Environment Record database, comprises assets (both features and stray artefacts/material culture scatters) dating from the Palaeolithic to the modern periods. A 1km study area surrounding the Longfield Solar Farm boundary was used in the HER search.

Most of the recorded assets are located in the northern, eastern and southernmost parts of the PDA with the remainder of the PDA currently devoid of any known assets.

In outline, the known archaeological baseline for the Longfield Solar Farm PDA and its immediate environs is as follows:

- Palaeolithic: No Palaeolithic sites, finds or assets have been recorded within 1km of the PDA.
- Mesolithic: No Mesolithic sites, finds or assets have been recorded within 1km of the Site.
- Neolithic: Only one Neolithic asset has been recorded within the 1km study area; Neolithic artefacts were recovered within a Prehistoric ring ditch (HER 18646).
- Bronze Age: Evidence of Bronze Age settlement and funerary monuments are recorded within the 1km study area, including evidence of ploughed-out barrows (HER 6139) and associated ring ditches (HER 18646), pits (HER 18646) and gullies containing Bronze Age pottery (HER 46212).
- Iron Age: Several Iron Age features are within the vicinity of the PDA, including pits and ditches (HER 8956 and HER 47948), postholes (HER18646) and residual Iron Age finds within a medieval settlement, close to Boreham (HER 17912).

- Roman: Roman activity has been established within the vicinity of the Site. A rural settlement was established at Holt's Far, (HER 14127), with the London to Colchester Road established in this period (HER 6059). Roman finds have been recorded across the 1km study area, (HER 14633; HER 1792; HER 5950).
- Medieval: A 12th-13th-century settlement consisting of field systems, pits and a moated site is located close to Boreham Field (HER 18116). Two moated sites are recorded close to the PDA boundary (HER6031; HER 6118).
- Post-Medieval: Several linear cropmarks have been identified and interpreted as potential post-medieval field boundaries within the 1km study area (HER 8957; HER 8971; HER 13968; HER 6174; Her 8964), and cropmarks identified as potential enclosures (HER 8972). Several post-medieval finds have been identified through fieldwalking (HER 14128; HER 14634; HER 14128). Several features relating to the Manor Houses in the area include in-filled fishponds and moated sites (HER 6082). The 17th-century Dukes Park is located at New Hall, Boreham.
- Undated: Undated cropmarks and field boundaries have been recorded within or adjacent to the PDA boundary (HER 14006; HER 14007; HER 13971; HER 8970; HER 8960; HER 47732).

What is unclear is whether this relative paucity of archaeological activity reflects a very low level of activity in this area, possibly due to the poor quality of the land, or whether it is due to the previous lack of archaeological work within this area. The poor quality of the land is in part demonstrated by detailed drainage plans which show that many of the fields within the PDA have systematic arrangements of drains and that multiple attempts had been made in most fields to drain them in the second half of the 20th century. These plans were consulted to aid interpretation of the data.

Recent geophysical survey of an adjoining site at Bulls Lodge Quarry (Headland Archaeology 2019), where the geology and soils are identical, did identify archaeological anomalies (numerous linear ditch type features and two probable ring ditches) although the anomalies were weak and discontinuous.

### 3. THE SURVEY

#### 3.1. AIMS & OBJECTIVES

The aim of the geophysical survey was to provide information on the extent, condition, character and date (as far as circumstances permit) of any archaeological features and deposits within the PDA and therefore to provide information to support the outline planning application and help determine the need any further archaeological works, if required.

The objectives were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the likely presence/absence and extent of any buried archaeological features; and
- to produce a comprehensive site archive and report.

#### 3.2. MAGNETOMETER SURVEY

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. A feature such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

Magnetometry is the most widely used geophysical survey technique in archaeology as it can quickly evaluate large areas and, under favourable conditions, identify a wide range of archaeological features including infilled cut features such as large pits, gullies and ditches, hearths and areas of burning and kilns and brick structures. It is therefore good at locating settlements of all periods, prehistoric field systems and enclosures and areas of industrial or modern activity, amongst others. It is less successful in identifying smaller features such as post-holes and small pits (except when using a non-standard sampling interval), unenclosed (prehistoric) settlement sites and graves/burial grounds. However, magnetometry is by far the single most useful technique and was assessed as the best non-intrusive evaluation tool for the size of this site, albeit

recognising that previous surveys on similar geology had not recorded the full extent of sub-surface archaeological remains.

#### 3.3. METHODOLOGY

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10-15cm sample interval) on roaming traverses (swaths) 4m apart. These readings were stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system was linked to a Trimble R8s Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy for each data point.

MLGrad601 and MultiGrad601 (Geomar Software Inc.) software was used to collect and export the data. Terrasurveyor V3.0.35.1 (DWConsulting) software was used to process and present the data.

### 4. RESULTS

#### 4.1. DATA PRESENTATION & TECHNICAL DETAIL

A site location plan is presented at a scale of 1:50,000 in Illus 1. Greyscale magnetometer data and interpretation for the whole PDA is shown in Illus 2 and Illus 3 at 1:17,500. Illus 4 shows the GPS swaths also at 1:17,500. Fully processed (greyscale) data and an interpretative plot are presented at a scale of 1:7,500 for each of the four sectors into which the site has been split in Illus 5 to Illus 12 inclusive. Fully processed data (greyscale), minimally processed data in XY trace plot format and interpretation plots are presented by Area (1-22 from north to south) at a scale of 1:2,500 in Illus 13 to Illus 78 inclusive.

The findings from the geophysical survey are presented in numerical field order in Table 1 below and discussed fully in Section 5.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. Data processing details are presented in Appendix 4. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 5.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (AECOM 2020a), guidelines outlined by Europae Archaeologia Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2014).

All illustrations from Ordnance Survey (OS) mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations in this report have been produced following analysis of the data in 'raw' (minimally processed) and processed formats and over a range of different display levels. All illustrations are presented to display and interpret the data to best effect. The interpretations are based on the experience and knowledge of management and reporting staff.

#### 4.2. SITE CONDITIONS

Ground conditions were generally good to moderate across the PDA with most of the fields either still under stubble following the recent harvest

or having been ploughed and re-sown. The soils were clay rich and heavy underfoot when wet. Nevertheless, the data quality was very good requiring little post-processing. A small number of fields were not surveyed as they were deep ploughed and therefore unsuitable for survey.

Overall, the magnetic background is extremely homogenous providing little contrast to the data and generally giving the data a uniform grey tone. This is typical of soils on London Clay bedrock and can indicate that there may be little magnetic contrast between the fill of an archaeological feature, such as a pit or ditch, and the surrounding soils. If there is little or no magnetic contrast it can be difficult or impossible to identify sub-surface archaeological features. This was the case on the adjoining site with the same geological conditions at Bulls Lodge Quarry (Headland Archaeology 2019) where anomalies of definite archaeological origin appeared fragmentary and weak in the data. Evidence from an excavation bordering the Bulls Lodge Quarry site strongly suggested that this previous survey was not identifying all the surviving sub-surface features.

Field Number	Summary of findings
F1 Illus 13-15	This field was only partly surveyed due to deep ploughing. No anomalies of archaeological interest have been identified.
F2 Illus 13-15	A low magnitude linear anomaly at the southern end of the field, aligned broadly west/east, is probably a drain marking the continuation of the drain recorded in F3. A much fainter anomaly sharing the same alignment towards the centre of the field is a probable former boundary likely connected to a further former boundary in the adjacent field outside the PDA to the east. The high magnitude responses recorded along the eastern boundary of the field indicate the presence of a service pipe (SP1).
F3 Illus 13-15	A cluster of discrete high magnitude anomalies (FB1) mark the location of structures located off Braintree Road which are recorded on historic OS maps and which were demolished during the early 20th century. Multiple field drains and former boundaries cross the field visible as clear low magnitude linear and curvilinear anomalies corresponding well to detailed estate drainage plans and historic OS mapping respectively. It is evident from historic mapping that some drains have been laid along former field boundaries. Two areas of ferrous disturbance at the boundary with F4 and at the junction of three former boundaries locate infilled ponds. A broad area of interference from low hanging overhead power cables between pylon bases located in the field obscures any meaningful data along the line of the overheads.
F4 Illus 13-15, 19-21	Findings in this field are limited to two sub-surface pipes (SP2 and SP3) aligned parallel with the eastern field boundary and along southern boundary and field drains which match estate drainage plans.
F5 Illus 13-15, 19-21	<p>Two vaguely parallel linear trend anomalies (L1) of uncertain origin are tentatively identified towards the south of the field. These may be further examples, if not slightly more regular, of sinuous anomalies geological in origin seen across the field. No anomalies were identified in the vicinity of the cropmarks (linear ditches or earthworks - HER 6007) recorded immediately outwith the PDA to the south-west of The Moors.</p> <p>Two high magnitude linear anomalies along the southern field edge, and at right angles to it, identify sub-surface pipes (SP4 and SP5). A former field boundary aligned south-west/north-east is recorded as a fragmented linear anomaly north of centre of the field. Irregular broad anomalies aligned roughly north-west/south-east are likely geological in origin. Patches of ferrous disturbance at the eastern boundary mark the location of a former pond. The survey has not detected the systematic drainage scheme recorded on estate drainage plans in this field.</p>
F6 Illus 13-15, 19-21	<p>A former boundary and field drain aligned east/west appear as low magnitude linear anomalies across the centre of the field. Discrete enhanced anomalies at the break between the linear anomalies marking the former boundary locate an infilled pond. Two drains aligned north-east/south-west are identified in the north-west corner of the field. As in F5 the survey has not detected evidence of the systematic drainage system shown on estate plans.</p> <p>Elsewhere a broad area of magnetic interference from low slung overhead cables and a large area of ferrous disturbance marking an infilled pond are recorded in the northern part of the field. Broad and sinuous anomalies mark a continuation of geological anomalies recorded in F5 to the east.</p>
F7 Illus 19-21	Deep ploughed – not surveyed.
F8 Illus 16-21	Deep ploughed – not surveyed.
F9 Illus 16-18	Deep ploughed – not surveyed.
F10 Illus 16-18	Deep ploughed – not surveyed.
F11 Illus 16-18	The only findings in this field are broad east/west linear anomalies arising from alluvial deposition adjacent to the River Ter and areas of ferrous disturbance at the field boundary.

F12 Illus 16-18, 22-24	Broad geological responses arising from alluvial deposition adjacent to the river are recorded matching similar responses in neighbouring fields F11 and F13. A former boundary and field drain lie parallel spanning the field east/west in addition to areas of ferrous disturbance recorded at the field boundaries and in the location of a pylon at the northern edge of the field.
F13 Illus 16-18, 22-24	Findings are limited here to a likely service pipe (SP6) indicated by a high magnitude linear anomaly along the eastern field boundary, interference from low slung overhead cables on a south-west/north-east alignment and broad, sinuous, magnetically enhanced anomalies, geological in nature, arising due to variations in the glaciofluvial and alluvial superficial deposits.
F14 Illus 22-24	A linear trend anomaly of uncertain origin (L2) is identified towards the centre of the field and is most likely either natural in origin, related to the nearby River Ter, or associated with the neighbouring former boundary to the west. Low magnitude linear anomalies, predominantly in the eastern half of the field, are drains. A large area of interference and magnetic disturbance is recorded in the southern and eastern parts of the field due to overhead powerlines.
F15 Illus 22-24	The anomaly response suggests service pipes (SP7 and SP8) are present along the eastern and northern boundaries of this irregularly shaped field. Discrete magnetically enhanced anomalies are consistent with naturally silted hollows close to the River Ter and nearby pond.
F16 Illus 19-21, 25-27	Deep ploughed – not surveyed.
F17 Illus 19-21, 25-27	Deep ploughed – not surveyed.
F18 Illus 25-27	Deep ploughed – not surveyed.
F19 Illus 25-27	Deep ploughed – not surveyed.
F20 Illus 25-27	Deep ploughed – not surveyed.
F21 Illus 25-27	Findings in this area, immediately to the east of Sandy Wood, are limited to a possible short section of service pipe (SP9) at the boundary with the wood, field drains at the boundary with F22 and a range of broad sinuous anomalies likely natural in origin.
F22 Illus 25-27	<p>A small cluster of magnetically enhanced discrete pit-like anomalies (P?1) of uncertain origin are identified south of Sandy Wood. The pit-like responses are similar in magnitude to the variation in the magnetic background and a natural origin for these anomalies remains the most likely interpretation.</p> <p>Elsewhere a service pipe (SP10) leading south-west to Leylands Farm, field drains and a former boundary are recorded. Random arrangements of interconnected sinuous low magnitude anomalies towards the east of the field are typical patterns resulting from periglacial processes.</p>
F23 Illus 22-27	<p>At the eastern edge of the field vague low magnitude linear anomalies may form part of an enclosure (E?1) measuring approximately 65m x 40m. Low magnitude pit-like anomalies are identified within the possible enclosure. However, their form is similar to the more variable magnetic background in this area and may be natural in origin. This also applies to linear trend anomalies (L3) just to the north and collectively these anomalies are tentatively interpreted as possibly archaeological.</p> <p>A broad area of geological variation in the western half of the field, identified by a spread of enhanced sinuous and discrete anomalies south-west of Sandy Wood, corresponds to cropmarks of linear and amorphous features resulting from small scale extraction pits (HER 13971) recorded in the HER.</p> <p>Drains aligned north/south and north-west/south-east are identified in the western half of the field, whilst interference from overhanging powerline cables is visible east of centre.</p>
F24 Illus 28-30	Findings are limited to field drains which match estate drainage plans, a former boundary in the western half of the field and a former right angle shaped pond and boundary in the south-eastern corner of the field recorded on 1st edition OS mapping.

F25 Illus 22-33	Deep ploughed – not surveyed.
F26 Illus 22-33	Deep ploughed – not surveyed.
F27 Illus 28-33	Deep ploughed – not surveyed.
F28 Illus 31-33	Findings here are limited to a sub-surface pipe (SP11), aligned north-east/south-west heading towards Leylands Farm, near the northern edge of field, a linear/curvilinear anomaly that locates a former boundary and field drains recorded on historic mapping and estate drainage plans respectively.
F29 Illus 31-36, 40-45	<p>Discrete isolated magnetically enhanced anomalies of uncertain origin are recorded towards Sparrow's Farm and the eastern corner of the field (ME1 and ME2). These anomalies have an elevated magnetic response above that of other discrete anomalies constituting the general magnetic background in this field though a natural cause remains most likely. Anomalies ME2 are similar in character to anomaly ME4 65m to the south-east in F35. A negative sinuous curvilinear anomaly towards the south of the field is not recorded on drainage plans and is likely natural in origin.</p> <p>Elsewhere field drains and former boundaries present as irregular low magnitude linear and curvilinear anomalies corresponding well to estate drainage plans and the 1st edition OS map. Two sub-surface service pipes (SP12 and SP13) are present parallel and adjacent to the eastern and southern field boundaries respectively.</p>
F30 Illus 31-33, 40-42	<p>A faint low magnitude right angle linear anomaly (L4) located immediately adjacent to a copse on the eastern boundary of the field may relate to drainage of a former pond at this location identified on historic mapping though an archaeological origin cannot be discounted although considered tentative.</p> <p>Elsewhere field drains and former boundaries present as clear low magnitude linear and curvilinear anomalies generally corresponding well to estate drainage plans and historic mapping. Drainage location plans suggest further field drains are present in the eastern half of the field although these have not been detected. Small areas of magnetic disturbance are caused by two large pylons and overhead cables in the eastern half of the field. No anomalies of likely archaeological potential are recorded near Scarletts Farm and the location of a medieval moat (HER 6031).</p>
F31 Illus 37-42, 49-51	Field drains and former boundaries across the field are visible as clear low magnitude linear and curvilinear anomalies corresponding well to recorded drains on detailed estate drainage plans and historic OS mapping respectively. A small area of ferrous disturbance adjacent to Noakes Lane identifies an infilled pond recorded on historic mapping. A sub-surface pipe (SP14) running from Noakes House turning ninety degrees to the boundary between F32 and F33 follows the line of a former boundary.
F32 Illus 28-33, 37-42	Findings from this field, immediately south of Scarletts Farm, are limited to a former boundary marking an extension to the existing boundary extending north-west towards Scarletts Wood in the southern part of the field and a regular pattern of field drains visible as clear low magnitude linear anomalies aligned south-west/north-east parallel with current field boundary which match estate drainage plans. No anomalies were identified that may relate to the adjacent heritage asset of a medieval moat at Scarletts Farm (HER 6031).

<p>F33 Illus 28-30, 37-39</p>	<p>An isolated magnetically enhanced anomaly (ME3) of uncertain origin is recorded towards the southern boundary of the field. The anomaly is likely natural/geological though an archaeological interpretation, such as a large pit or area of burning, cannot be discounted. No anomalies were identified that might be associated with the nearby recorded assets outside the PDA of the two moated sites at Scarletts Farm (HER 6031) and Whitehouse Farm (HER 6118).</p> <p>Field drains and former boundaries in the southern half of the field, visible as regular high magnitude linear and curvilinear anomalies, correspond well to recorded drains on detailed estate drainage plans and 1st edition OS mapping respectively. Predominantly negative linear and curvilinear anomalies in the northern half of the field, which are likely further field drains, do not correspond to estate drainage plans which show a different pattern of drains in this part of the field. The difference in response perhaps suggests a different material used for the drains with the enhanced positive response resulting from clay drains known from the estate plans and the negative response possibly indicating the ditch cuts or less magnetically enhanced trench fill where plastic drains may have been laid.</p> <p>A service pipe (SP15) runs south from Whitehouse Farm towards Boreham Road.</p>
<p>F34 Illus 37-42, 49-51</p>	<p>A very faint low magnitude circular anomaly (C?1) approximately 17.5m in diameter is tentatively interpreted south of centre of the field. In isolation and with no known heritage assets recorded nearby the anomaly is most likely natural in origin though an archaeological cause cannot be completely discounted. A regular pattern of drains matching estate drainage plans are the only other findings in this field.</p>
<p>F35 Illus 34-36, 40-45</p>	<p>Three isolated discrete high magnitude anomalies of uncertain origin (ME4 and ME5) are found in the southern part of the field south of Roll's Spring with two also recorded towards the north corner of the field. These anomalies possibly represent natural accumulations of enhanced material associated with springs recorded in this area. However, the response is similar to that of a pit-like anomaly and therefore an archaeological interpretation cannot be completely ruled out. Anomaly ME4 is similar in character to three similar anomalies 65m to the north-west in F29.</p> <p>Elsewhere anomalies locating a regular pattern of drains and former boundaries that match estate drainage plans and the 1st edition OS map respectively are recorded. A sub-surface pipe (SP16) is recorded running along the north-eastern edge of the field.</p>
<p>F36 Illus 40-45, 52-54</p>	<p>Findings are limited to a regular pattern of drains matching estate drainage plans and a possible service pipe (SP17) along the northern boundary of the field.</p>
<p>F37 Illus 40-45, 49-54</p>	<p>Immediately east of the copse at the centre of F37 is a low magnitude right angle linear anomaly (L5), faint discrete pit-like anomalies and an amorphous spread of enhanced magnetic response (Q?1) possibly identifying a small area of localised extraction. These anomalies are located immediately south of a curving former boundary extending from the copse north-east towards F36. The shape and form of the anomalies are unlikely to result from drains or simple agricultural effects though there is no additional contextual information to interpret these anomalies beyond possible archaeology.</p> <p>Other findings are limited to former field boundaries and drains which match the 1st edition OS map and estate drainage plans respectively. It is unclear whether the strongly magnetic readings along the south-western boundary are due to a concrete track at the edge of the survey area or an underground service (SP18) not recorded on estate plans of services locations. Negative linear trend anomalies in the north-west of the field are agricultural in origin.</p>



<p>F38 Illus 43-45</p>	<p>The origin of a circular arrangement of magnetically enhanced discrete pit-like anomalies (P?2) close to an area of possible extraction (Q?2) in F39 is uncertain. It is noted that the magnetic background of this field contains a greater number of discrete anomalies than in most other surrounding fields so those at P?2 are considered likely to be natural in origin. Three further isolated discrete high magnitude anomalies (ME6) of uncertain origin are present in the western half of the field. The isolated nature of these anomalies again strongly suggests that a natural origin is more likely.</p> <p>Elsewhere findings are limited to vague linear trend anomalies in the south-west of the field parallel to the boundary that are likely of modern/agricultural or natural origin and a field drain and modern ferrous disturbance near to Roll's Farm.</p>
<p>F39 Illus 43-45</p>	<p>A group of anomalies with different magnetic signatures are recorded towards the centre of the field. No direct connection between the anomalies can be established and any association is only inferred by their proximity. Firstly, an amorphous spread of enhanced magnetic readings (Q?2) may identify a possible area of extraction. Localised extraction is known in the area; a gravel pit approximately 140m to the east is recorded on the 1st edition OS map immediately adjacent the field, outside the PDA on the opposite side of Terling Hall Road. Secondly, immediately south of Q?2 is a short section of field drain and a cluster of discrete enhanced anomalies of uncertain origin (ME7), but which may represent the natural accumulation of enhanced material adjacent to the drain. Thirdly, south-east of this is a large high magnitude anomaly (ME8) also of uncertain origin. The anomaly response of ME8 suggests a singular feature rather than an accumulation of ferrous or magnetically enhanced material typical of an infilled pond.</p> <p>Low magnitude linear and discrete pit-like anomalies (L6) at the northern corner of the field are located adjacent to a former gravel pit positioned outside of the PDA on the opposite side of Terling Hall Road. Linear anomalies lay parallel to the eastern boundary of the field and may reflect agricultural effects, such as ploughing, although an archaeological or historical cause associated with the gravel pit cannot be discounted.</p> <p>A short section of pipe (SP19) spanning F39 and F40 is indicated by very high magnitude responses in the western corner of the field where a field drain running the length of the northern boundary terminates.</p>
<p>F40 Illus 43-48, 52-57</p>	<p>Towards the south-west boundary of the field, south of Ringer's Wood are a cluster of magnetically enhanced linear and discrete pit-like anomalies (L7 and P?3) of unclear origin. Topographically this section of the field is slightly raised and was noticeably better draining than the remainder of the field at the time of survey. It remains possible the linear anomalies represent a former boundary pre-dating the 1st edition OS map lying almost parallel to the modern boundary to the south.</p> <p>Elsewhere several former field boundaries and an extensive system of field drains matching drainage plans are recorded as a series of high magnitude linear and curvilinear anomalies. Immediately north of Ringer's Wood a series of interconnected sinuous low magnitude anomalies represents typical patterning from periglacial processes.</p>
<p>F41 Illus 46-48, 55-57</p>	<p>South of centre in F41 are a series of vague, low magnitude linear/curvilinear and discrete anomalies (L8 and L9) of uncertain origin. These anomalies occur in the location of a cropmark of an undated oval enclosure (HER 49051). On the basis of the correlation with the cropmark these anomalies are interpreted as of possible archaeological origin although the weak magnitude of the anomalies combined with the likely arrangement of closely spaced drains here precludes a more confident interpretation.</p> <p>Elsewhere a former boundary to the east of the pond is identified as two very faint low magnitude linear trend anomalies. Field drains linked to the pond around the western extent of the field are clearly visible as high magnitude linear/curvilinear anomalies. No anomalies indicative of the systematic drainage scheme parallel to the boundary adjacent to Ringer's Farm, as recorded in the drainage plans, are present.</p>

<p>F42 Illus 46-48, 55-57</p>	<p>Two linear trend anomalies sharing an approximate north-east/south-west alignment (L10 and L11), located in the southern half of the field, are not recorded on historic mapping or align with current field boundaries and are not recorded on detailed drainage plans of the field. The anomalies have different magnetic properties perhaps indicating a different origin. L10 has a predominantly positive polarity possibly representing a ditch like feature with magnetically enhanced fill and L11 negative polarity possibly indicating the presence of a drain (plastic?) as seen elsewhere on site e.g., F47. The isolated nature and overall weak magnetic response of both anomalies limits interpretation and are both characterised as of uncertain origin. They are located approximately 150m east of a cropmark of an undated oval enclosure (HER 49051) and a series of vague, low magnitude linear/curvilinear and discrete anomalies (L10 and L11) of uncertain origin in F41.</p>
<p>F43 Illus 49-54, 58-60</p>	<p>The survey has identified a regular system of field drains respecting former boundaries and matching detailed drainage plans of the field. A service pipe (SP20) is recorded at the eastern edge of the field and three discontinuous sections of service pipe are recorded as SP21.</p>
<p>F44 Illus 49-51, 58-60</p>	<p>A grouping of faint linear and discrete pit-like anomalies (L12 and P?4) are recorded in the western part of this field at the former boundary of the two southernmost parcels which made up this field. The location and signature of the anomaly responses bear no relation to the pattern of drainage in this part of the field. However, the weak nature of the anomalies and dense pattern of drains limits identifying a cause to uncertain. These anomalies lay approximately 200m east-northeast of a cropmark of a large rectilinear enclosure (HER 6176), west of Boreham Road.</p> <p>The organisation of field drains across this field reflects its former division into three roughly equal parcels. A classic herring-bone pattern of drains is recorded in the northern part and the layout of all the drains matches that recorded on detailed drainage plans. These show the field was drained on at least three occasions between 1954 and 1980 and that the drains are of a clay construction. A large area of magnetic disturbance along the southern boundary identifies the location of a former 20th century building. Very high magnitude responses surrounding the eastern and southern boundaries of the field indicate the presence of a buried service (SP22).</p>
<p>F45 Illus 58-63</p>	<p>Only the western part of the field could be surveyed as the remainder was deep ploughed. A more variable magnetic background was noted in this area alongside linear anomalies resulting from modern agricultural practices.</p>
<p>F46 Illus 61-63</p>	<p>A large area of magnetic disturbance at the south-western edge of field near to Stock's Farm is due to an infilled pond. Patterns of field drains and former boundaries corresponding to detailed drainage plans and historic mapping respectively are evident across the field. Broad sinuous anomalies likely mark former channels or flow of water and largely reflects the topography of the field and large pond east of the centre of the field.</p>

<p style="text-align: center;">F47 Illus 61-75</p>	<p>F47 is the largest single field in the survey and contains several former boundaries, multiple patterns of land drains/pipes and broad low magnitude anomalies likely geological in origin. The effects of overhead cables are again noticeable in the central and northern sections of the field. Several small areas of magnetic disturbance identify the location of ponds marked on historic mapping, now infilled. A rectilinear area of magnetic disturbance on the far south-eastern boundary is likely another example of tipping/infilling or the demolition rubble of a former structure.</p> <p>Very faint curvilinear and linear trend anomalies (L13) tentatively identified towards the centre of the field are recorded in the location of former field boundaries and a rectangular enclosure recorded in the HER (HER 46668) and are therefore assigned a possibly archaeological interpretation. Evidence for a rectangular enclosure is not present in the magnetic data.</p> <p>Two very high magnitude responses, in the north-west corner of the field east of Stock's Farm and the second 250m to the south-east mark the location of buried services (SP23, SP24 and SP25).</p> <p>Several negative linear anomalies are recorded in the southern and eastern parts of the field and are also probably drains despite not matching the detailed drainage plans dating from between the 1960s and 1980s. Though these anomalies are slightly less regular in the southern part of the field they are not believed to relate to cropmarks of extensive practice trenches from either WWI or WWII (HER 48299) recorded within the PDA immediately south of Toppinghoe Hall Wood in the HER. The HER describes these cropmarks as consisting of various patterns, including a square enclosure and trench forms ranging from straight cut crenulations to wavy and straight sections. No evidence of these is recorded in the survey data.</p>
<p style="text-align: center;">F48 Illus 73-78</p>	<p>There is some correlation between linear trend anomalies (L14) and cropmarks of ring ditches, trackways and field boundaries (HER 6117) identified in the HER to the south-west of Toppinghoe Hall. Several discrete magnetically enhanced anomalies are identified adjacent to these linear trends however remain difficult to differentiate from the natural variable magnetic background deriving from glaciofluvial sand and gravel superficial deposits and a spread of enhanced readings and magnetic disturbance from the former road and infilled ponds and may not be archaeological in origin. No cropmarks are recorded in the south-eastern part of the field, linear trend (L15) and discrete anomalies in this location are of uncertain origin but given the proximity and similar nature of the anomalies may relate to those at L14 and cropmarks identified in the HER (HER 6117). Notably a circular cropmark round barrow is not recorded in the data and there is also no trace of neighbouring monument HER 20576, listed as a destroyed(?) former prisoner of war pen.</p> <p>Broad geological anomalies are present across this field and likely mark the course of former channels associated with springs recorded on the 1st edition OS map around Toppinghoe Hall. Areas of magnetic disturbance in the north-east corner and due south of Toppinghoe Hall locate infilled ponds. A broad linear band of magnetic disturbance oriented north/south adjacent to Toppinghoe Hall to the west, marks the line of a former road leading to a railway crossing linking Toppinghoe Hall with the since demolished Ivy Cottage south of the railway adjacent to the B1137. Two former boundaries oriented east-northeast/west-southwest have also been recorded. Very high magnitude responses surrounding the south-eastern boundary of the field indicate the presence of a buried service (SP26).</p>

## 5. DISCUSSION

From the current survey which has covered more than 450 hectares, no anomalies of certain or probable archaeological origin have been identified. Across the PDA very few anomalies are identified which cannot be confidently interpreted as being due to either land drains, former field boundaries or other agricultural or modern activity. In this context uncertain is taken to mean that the anomaly cannot

be confidently interpreted in any non-archaeological category and therefore could be archaeological in origin. However, in these instances an archaeological cause is still considered to be tentative. Faint linear and curvilinear trend anomalies in F5, F14, F23, F34, F42 and F48 and isolated and clusters of magnetically enhanced anomalies in F29, F33, F34, F35, F38, F39, F40 and F44 are included in this category.

Background research had already determined that there are only seven known heritage assets recorded within the PDA, six of which relate to cropmarks in fields F23, F41, F47, and F48. One of the cropmarks in F48 is a probable round barrow which is clearly visible on recent satellite imagery. This cropmark/feature has not been identified by the survey. The remaining cropmarks at this location are less convincing though there is some correlation with faint linear trend anomalies (L14) in the data, leading to an interpretation of possible archaeology. It still remains difficult to differentiate these anomalies from those caused by ploughing or due to land drains ubiquitous across the PDA and whose magnetic responses manifest in different forms.

Cropmarks towards the centre and western parts of F23 (HER 13971) are thought to represent extraction pits heavily masked by geology. The geophysical survey has recorded broad areas of geological variation in this area and a possible rectangular enclosure (E?1) and two short ephemeral linear anomalies at the eastern side of F23. Given the anomaly responses and proximity to recorded cropmarks these are interpreted as possibly archaeological in origin.

A small cluster of anomalies in F41 (L8-L9) have also been interpreted as of possible archaeological origin and, although no clear pattern can be discerned, they occur in the location of a cropmark of an undated oval enclosure (HER 49051) recorded in the HER.

Systematic arrangements of field drains are abundant across the PDA with the survey results generally tying in well with estate plans of drain locations. The survey has identified a number of magnetic anomalies which can be interpreted as field drains likely reflecting different materials used in their construction. In multiple fields the survey has either identified additional field drains perhaps post-dating the drainage plans or failed to detect drains, most likely a result of the combined factors of poor magnetic contrast to the soil and use of a non-magnetic material for the drain such as plastic. In some places the magnetic responses suggest field drains have been laid along the line of former boundaries.

Broad areas of magnetic interference and disturbance from which no meaningful data can be gained have been recorded in areas where low slung overhead electricity cables and service pipes are present.

## 6. CONCLUSION

The geophysical survey has not identified any anomalies of certain or probable archaeological origin. Anomalies of possible archaeological origin have been identified in only six fields though an anthropogenic interpretation is still considered tentative and non-archaeological causes are thought equally likely in most cases.

A probable ring barrow at the southern end of the PDA, identified as a cropmark feature, has not been identified by the survey. It is not clear at this stage whether this is due to unfavourable pedological and geological reasons or other factors, though there is some correlation between linear trends in the data to other cropmarks from the same area which may be archaeological in origin. There are three other areas where anomalies of possible archaeological origin were identified in the data at or close to the location of recorded heritage assets relating to cropmarks. This includes an undated oval cropmark north-east of Ringers Farm (HER 49051), poorly understood amorphous cropmarks thought to represent extraction pits towards the north-west of Leylands Farm (HER 13971) and cropmarks of medieval enclosure and field boundaries immediately west of Porter's Wood (HER 46668). Generally, few cropmarks are recorded across the PDA with some now considered likely caused by non-archaeological features.

There are two examples of small groupings of amorphous, discrete and trend anomalies towards the centre of the PDA which may indicate some form of localised quarrying/extraction though the anomalies remain too faint to interpret confidently. The same applies to a possible circular anomaly south of Noakes House and a small grouping of faint linear and discrete anomalies south of Russell Green House.

Elsewhere land drains are ubiquitous across the PDA and generally tie in well with detailed estate drainage plans. Numerous former field boundaries and ponds have also been recorded as linear/curvilinear anomalies and areas of magnetic disturbance with nearly all depicted on the 1st edition OS map.

It remains difficult to establish whether the apparent lack of archaeological anomalies indicated by the survey is in fact due to an absence of sub-surface features, the prevailing unfavourable geological conditions or a combination of both scenarios. It is concluded that until demonstrated otherwise the

apparent lack of archaeological anomalies on this site is more likely due to a lack of archaeological activity on marginal agricultural land than an inability of the magnetometer survey to identify any archaeological activity. Therefore, on the basis of the geophysical survey, the PDA is assessed as being of very low archaeological potential.

## 7. REFERENCES

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## 8. APPENDICES

### APPENDIX 1 MAGNETOMETER SURVEY

#### *Magnetic susceptibility and soil magnetism*

Iron makes up about 6% of the earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

#### *Types of magnetic anomaly*

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However, some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

#### ***Isolated dipolar anomalies (iron spikes)***

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present due to manuring.

#### ***Areas of magnetic disturbance***

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

#### ***Lightning-induced remnant magnetisation (LIRM)***

LIRM anomalies are thought to be caused in the near surface soil horizons by the flow of an electrical current associated with lightning strikes. These observed anomalies have a strong bipolar signal which decreases with distance from the spike point and often appear as linear or radial in shape.

#### ***Linear trend***

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

#### ***Areas of magnetic enhancement/positive isolated anomalies***

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on

an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

#### ***Linear and curvilinear anomalies***

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

## APPENDIX 2 SURVEY LOCATION INFORMATION

An initial survey base station was established using a Trimble VRS differential Global Positioning System (dGPS). The magnetometer data was georeferenced using a Trimble RTK differential Global Positioning System (Trimble R8s model).

Temporary sight markers were laid out using a Trimble VRS differential Global Positioning System (Trimble R8s model) to guide the operator and ensure full coverage. The accuracy of this dGPS equipment is better than 0.01m.

The survey data were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if coordinates are measured off

hard copies of the mapping rather than using the digital coordinates.

*Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.*

## APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report.

The project will be archived in-house in accordance with recent good practice guidelines ([http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics\\_3](http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3)). The data will be stored in an indexed archive and migrated to new formats when necessary.

## APPENDIX 4 MAGNETOMETER DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

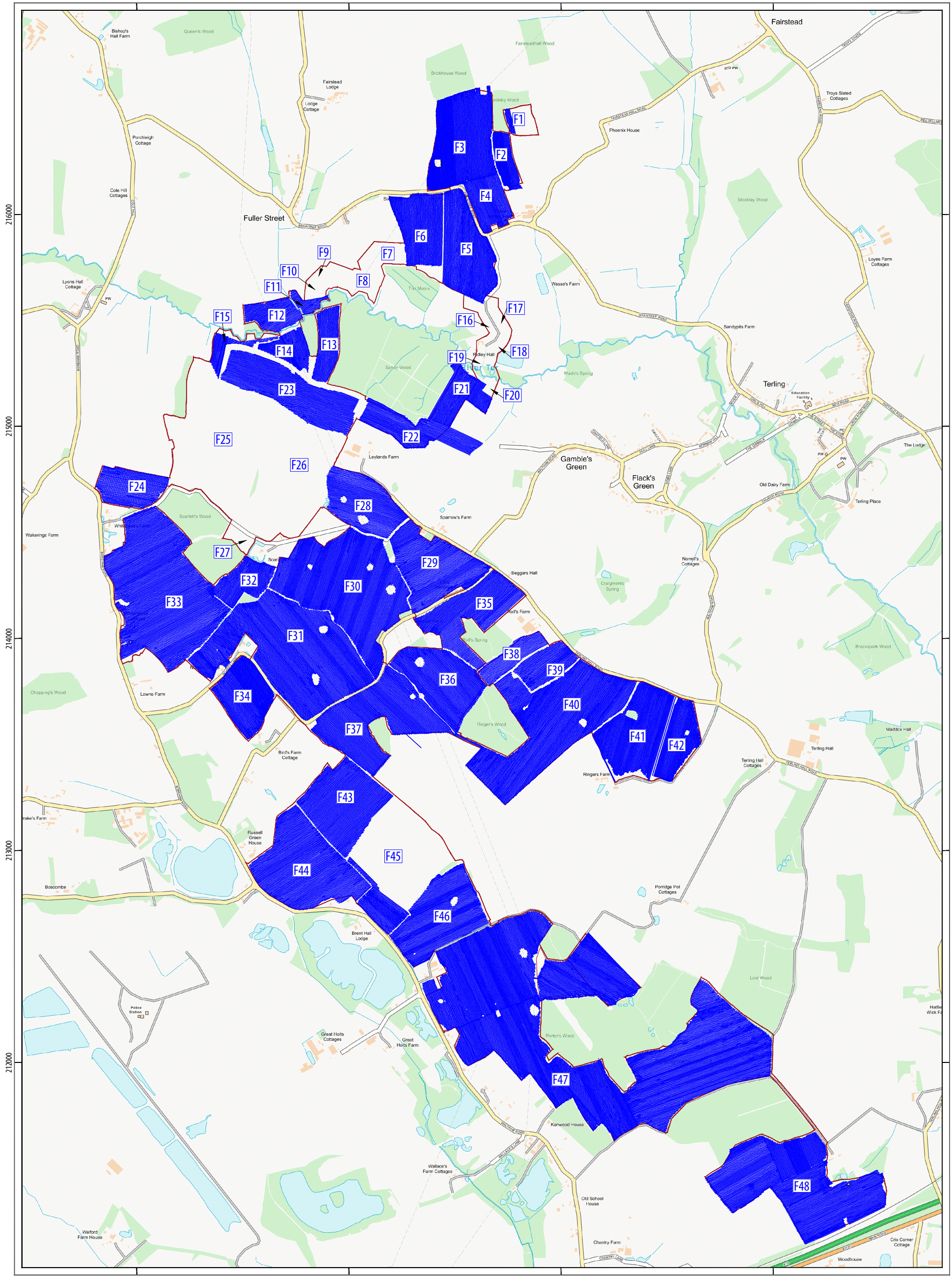
Data collected using RTK GPS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features) in order to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.

## APPENDIX 5 OASIS ENTRY



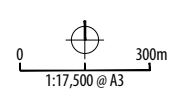


geophysical survey area  
 GPS swaths

PROJECT CF5F20  
 Longfield Solar Farm  
 Chelmsford  
 Essex  
 CLIENT AECOM

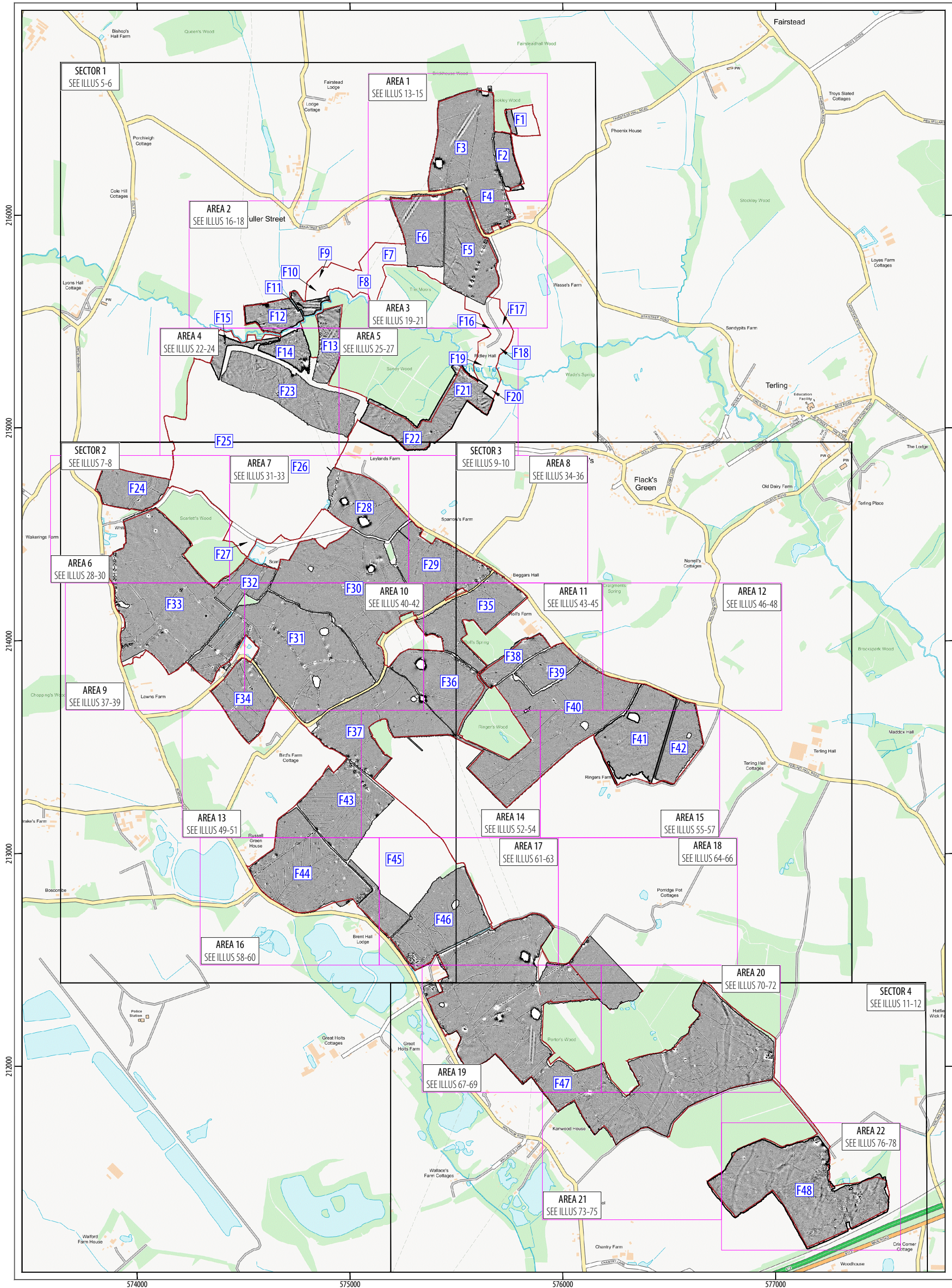


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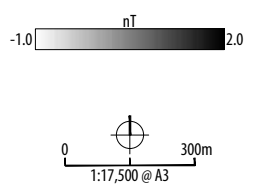


ILLUS 2 Geophysical survey area showing GPS swaths





geophysical survey area



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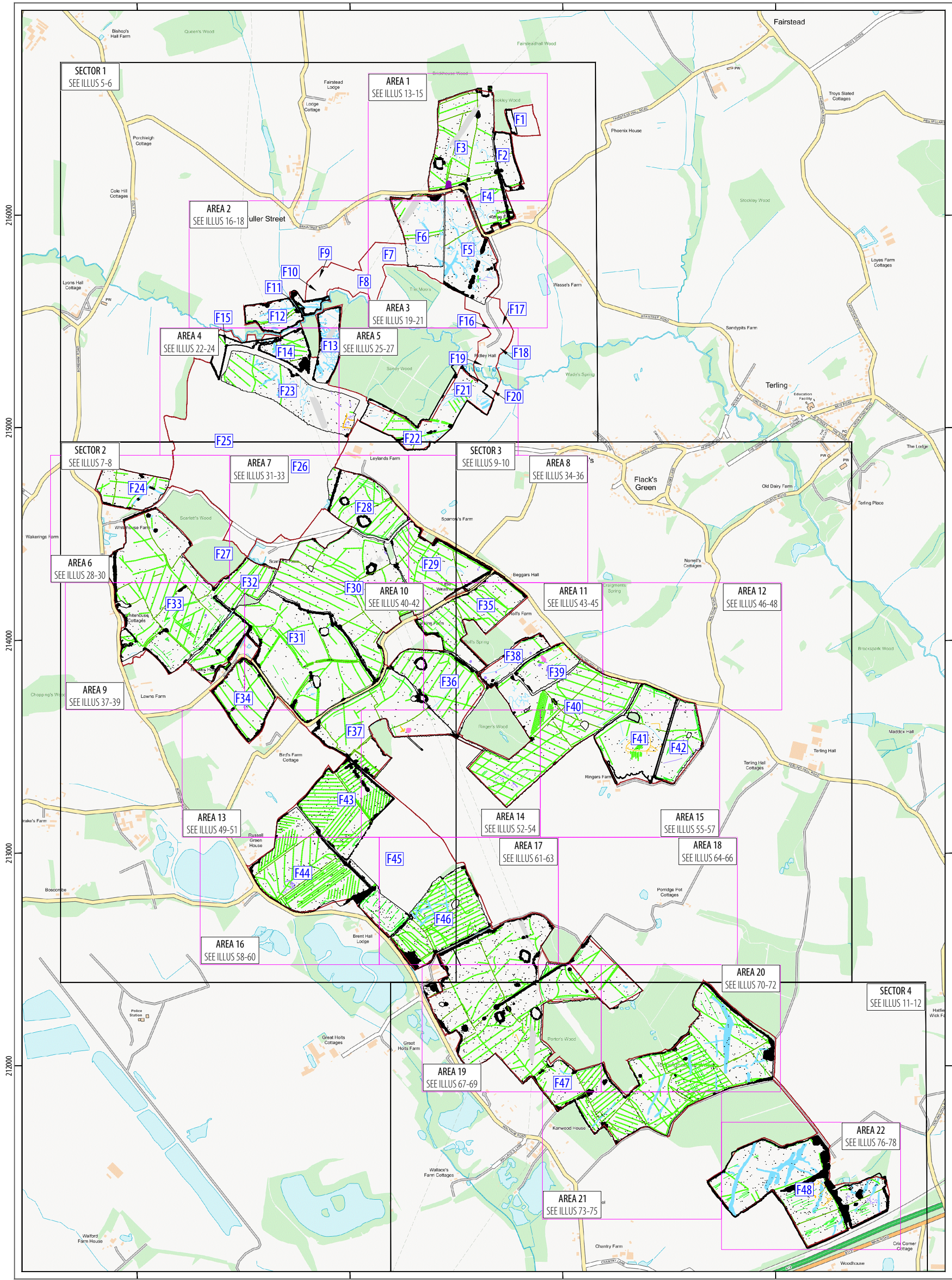
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ILLUS 3 Overall greyscale plot of magnetometer data





TYPE OF ANOMALY	INTERPRETATION	TYPE OF ANOMALY	INTERPRETATION	TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material	— linear trend	agricultural	— linear trend	geological variation
● magnetic disturbance	ferrous material	+++ linear trend	field drain	● magnetic enhancement	geology
— dipolar linear	service pipe	— linear	former field boundary	— linear trend	archaeology?
○ magnetic interference	overhead cables	— linear	former field boundary?	● magnetic enhancement	archaeology?
○ magnetic enhancement	quarrying?	— linear trend	uncertain	○ magnetic enhancement	
○ magnetic disturbance	former building	● magnetic enhancement	uncertain	□ geophysical survey area	

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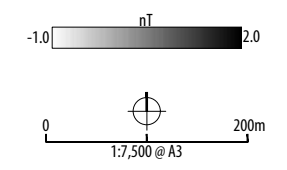
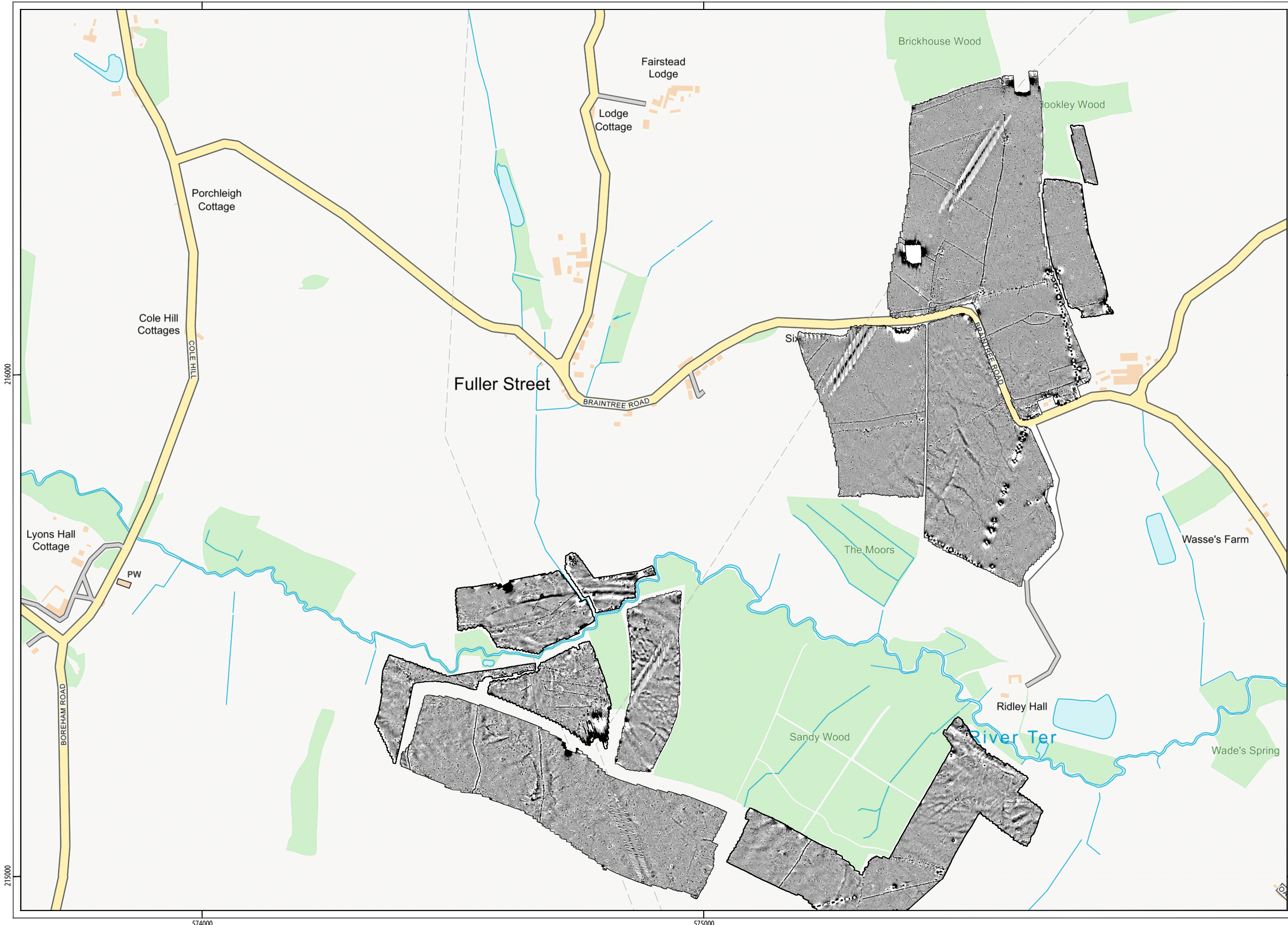
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ILLUS 4 Overall interpretation of magnetometer data





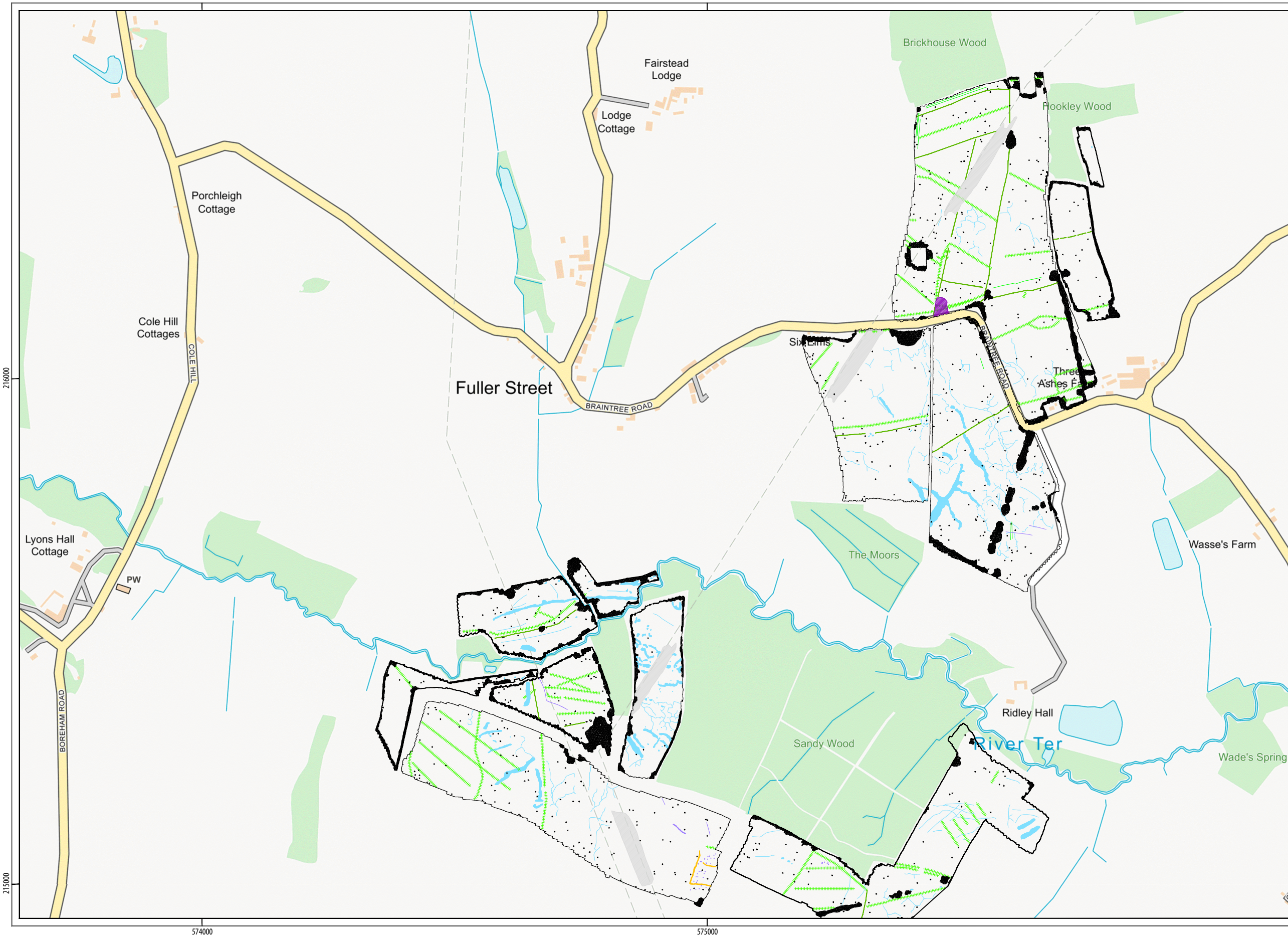
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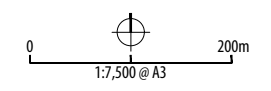
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ILLUS 5 Processed greyscale magnetometer data; Sector 1





TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— dipolar linear	service pipe
— magnetic interference	overhead cables
● magnetic enhancement	quarrying(?)
● magnetic disturbance	former building
— linear trend	agricultural
— linear trend	field drain
— linear	former field boundary
— linear	former field boundary?
— linear trend	uncertain
● magnetic enhancement	uncertain
— linear trend	geological variation
● magnetic enhancement	geology
● magnetic enhancement	archaeology?



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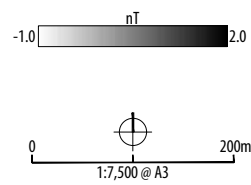
ILLUS 6 Interpretation of magnetometer data; Sector 1





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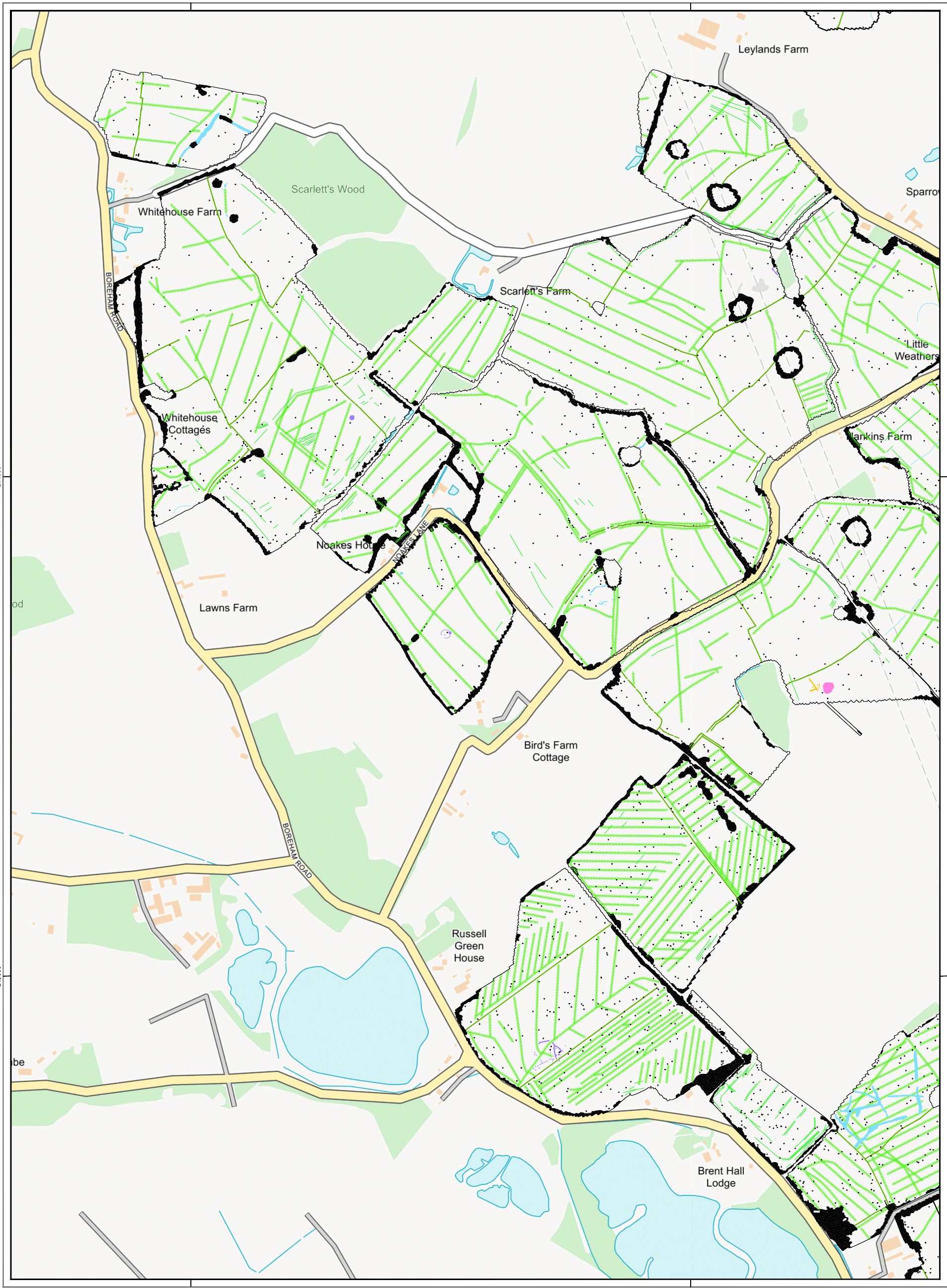


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TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— dipolar linear	service pipe
○ magnetic interference	overhead cables
● magnetic enhancement	quarrying(?)
— linear trend	agricultural

TYPE OF ANOMALY	INTERPRETATION
+++ linear trend	field drain
— linear	former field boundary
— linear trend	uncertain
● magnetic enhancement	uncertain
— linear trend	geological variation
● magnetic enhancement	geology

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

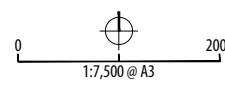
TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

TYPE OF ANOMALY	INTERPRETATION
○ magnetic enhancement	archaeology?

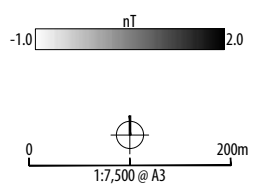
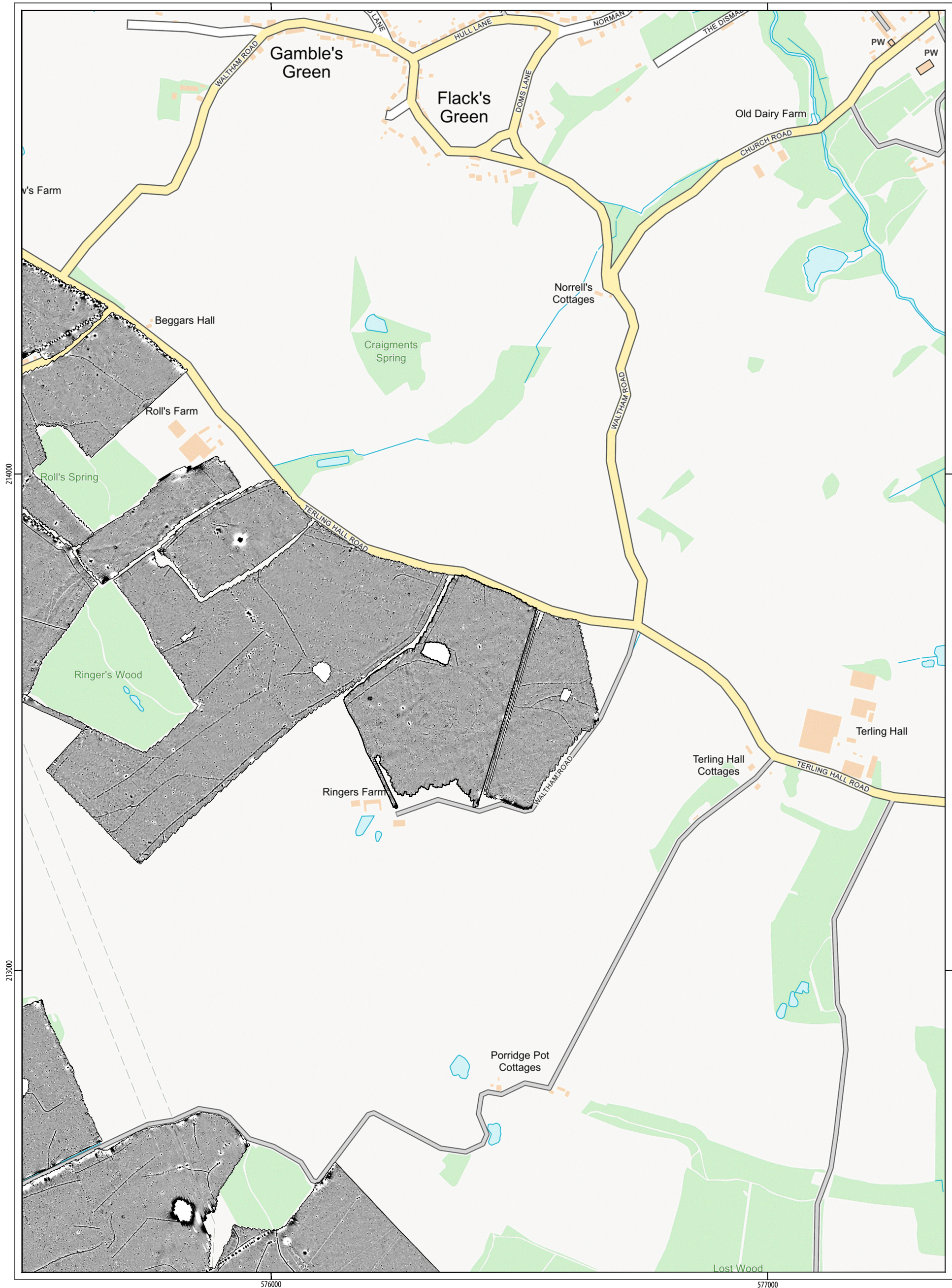
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ILLUS 8 Interpretation of magnetometer data; Sector 2





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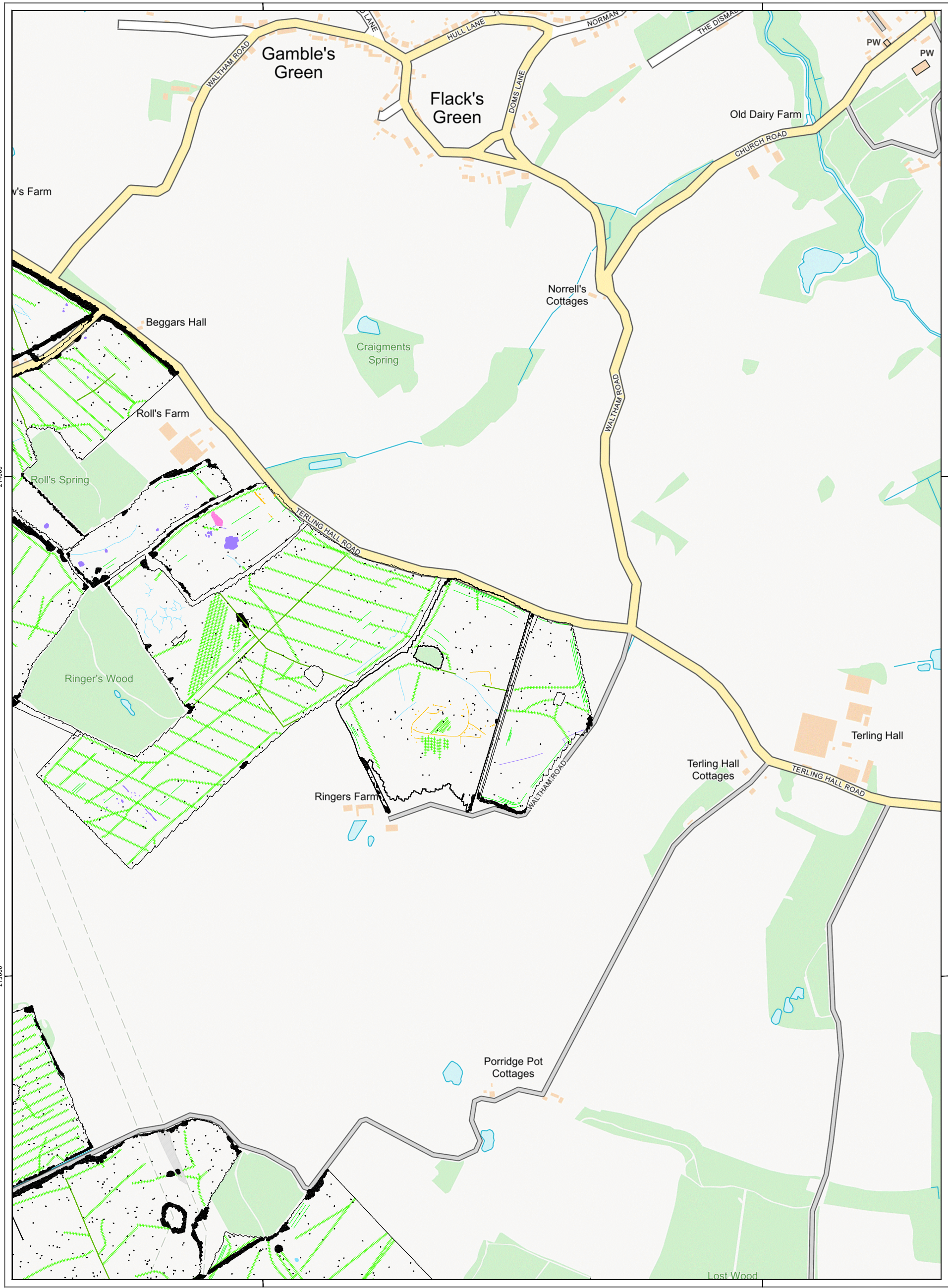


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ILLUS 9 Processed greyscale magnetometer data; Sector 3





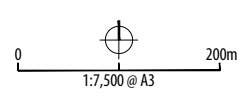
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TYPE OF ANOMALY	INTERPRETATION	TYPE OF ANOMALY	INTERPRETATION	TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material	+++ linear trend	field drain	⊗ magnetic enhancement	archaeology?
● magnetic disturbance	ferrous material	— linear	former field boundary		
— dipolar linear	service pipe	— linear trend	geological variation		
⊗ magnetic interference	overhead cables	— linear trend	uncertain		
⊗ magnetic enhancement	quarrying(?)	⊗ magnetic enhancement	uncertain		
— linear trend	agricultural	— linear trend	archaeology?		



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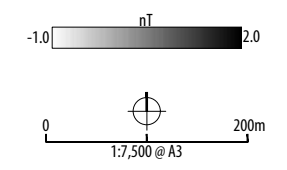
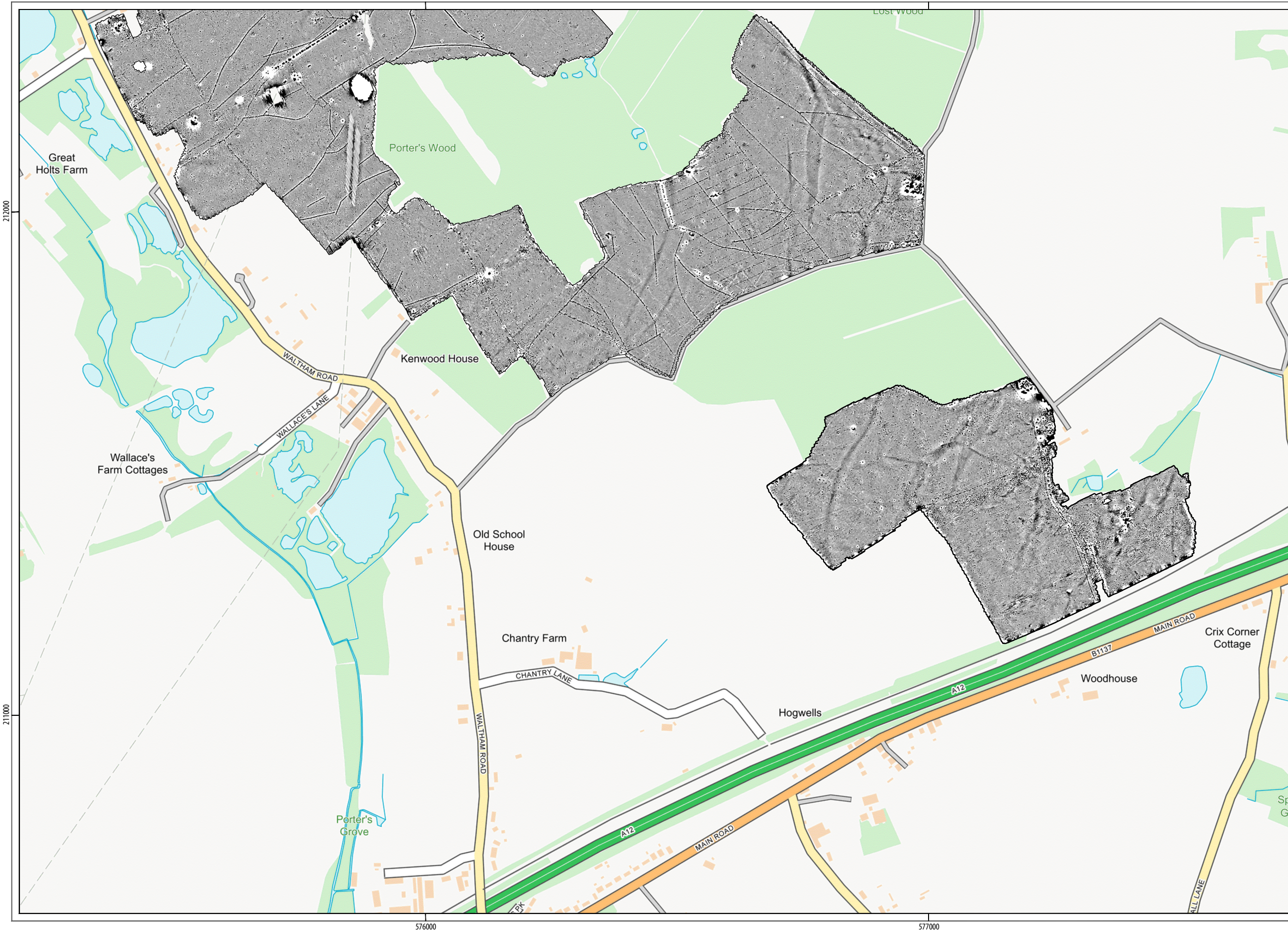
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ILLUS 10 Interpretation of magnetometer data; Sector 3





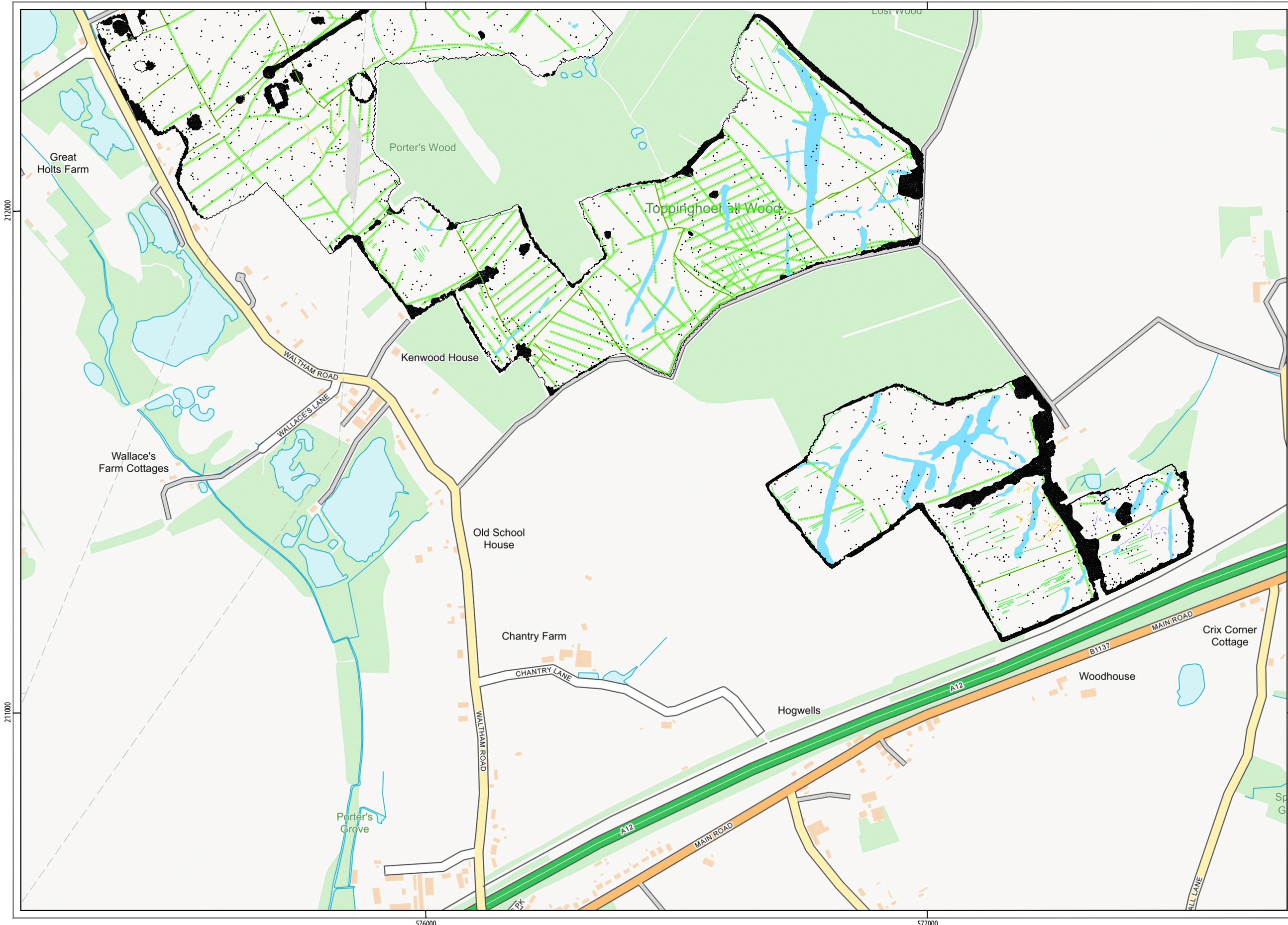
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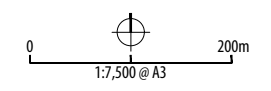
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ILLUS 11 Processed greyscale magnetometer data; Sector 4





TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— dipolar linear	service pipe
▨ magnetic interference	overhead cables
— linear trend	agricultural
▨ linear trend	field drain
— linear	former field boundary
— linear trend	uncertain
▨ magnetic enhancement	uncertain
— linear trend	geological variation
▨ magnetic enhancement	geology
— linear trend	archaeology?
▨ magnetic enhancement	archaeology?



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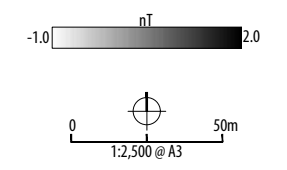
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ILLUS 12 Interpretation of magnetometer data; Sector 4





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ILLUS 13 Processed greyscale magnetometer data; Area 1