BEACON FEN ENERGY PARK

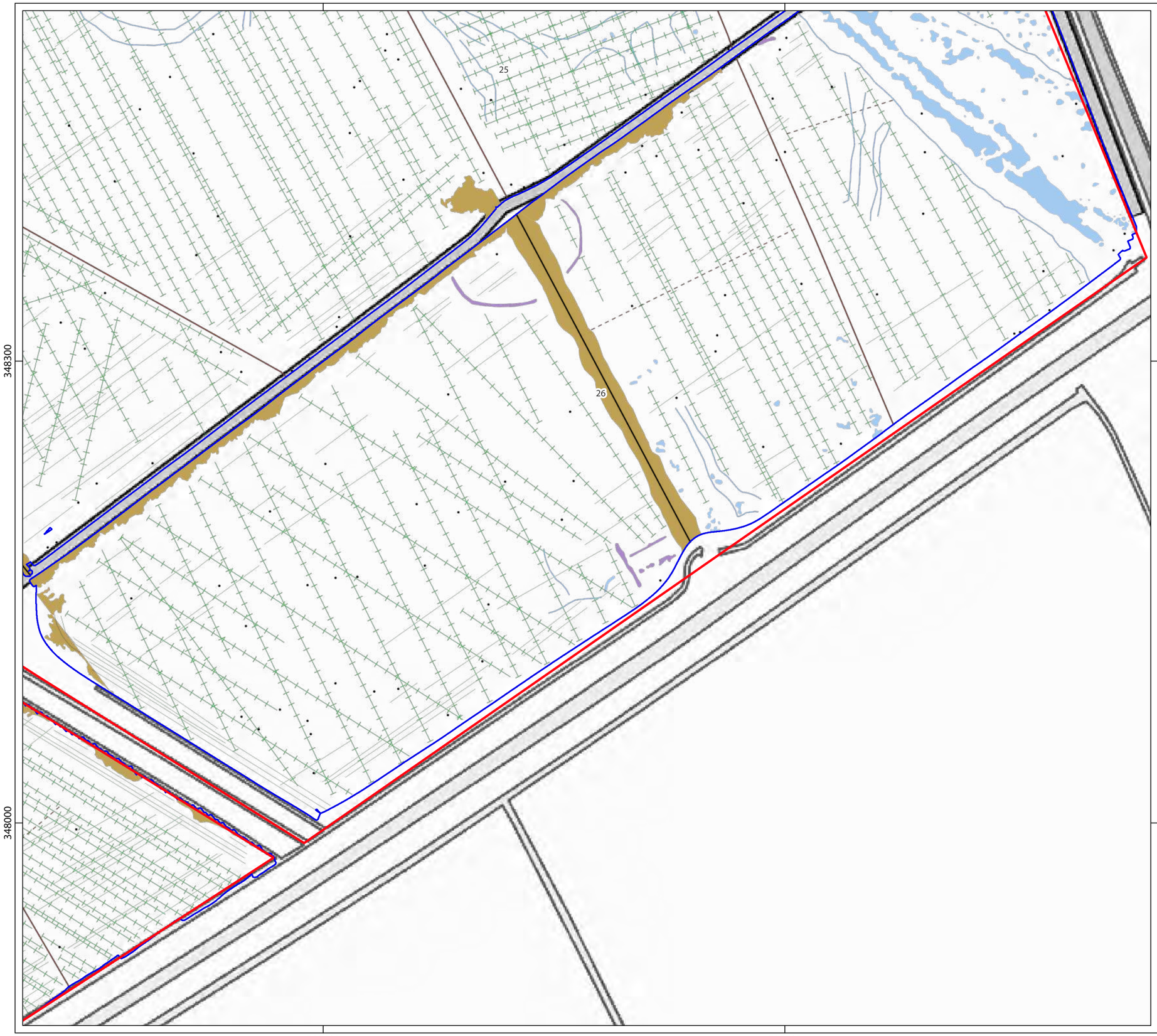
Planning Inspectorate Reference: EN010151

Appendix 8.6 Geophysical Survey Summary Report - Solar Array Part 5

Document Reference: 6.3 ES Volume 2, 6.3.54

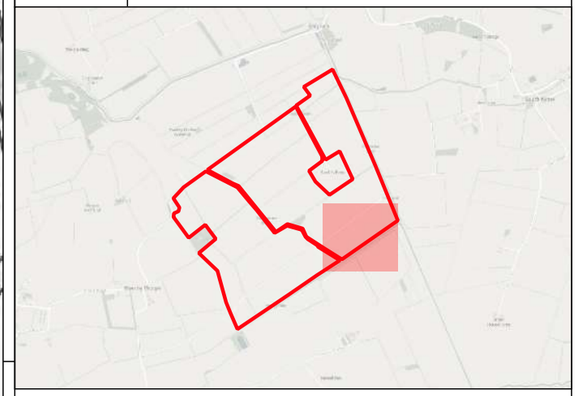
April 2025

The Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572) – Regulation 14



N

HEADLAND ARCHAEOLOGY
part of the RSK Group



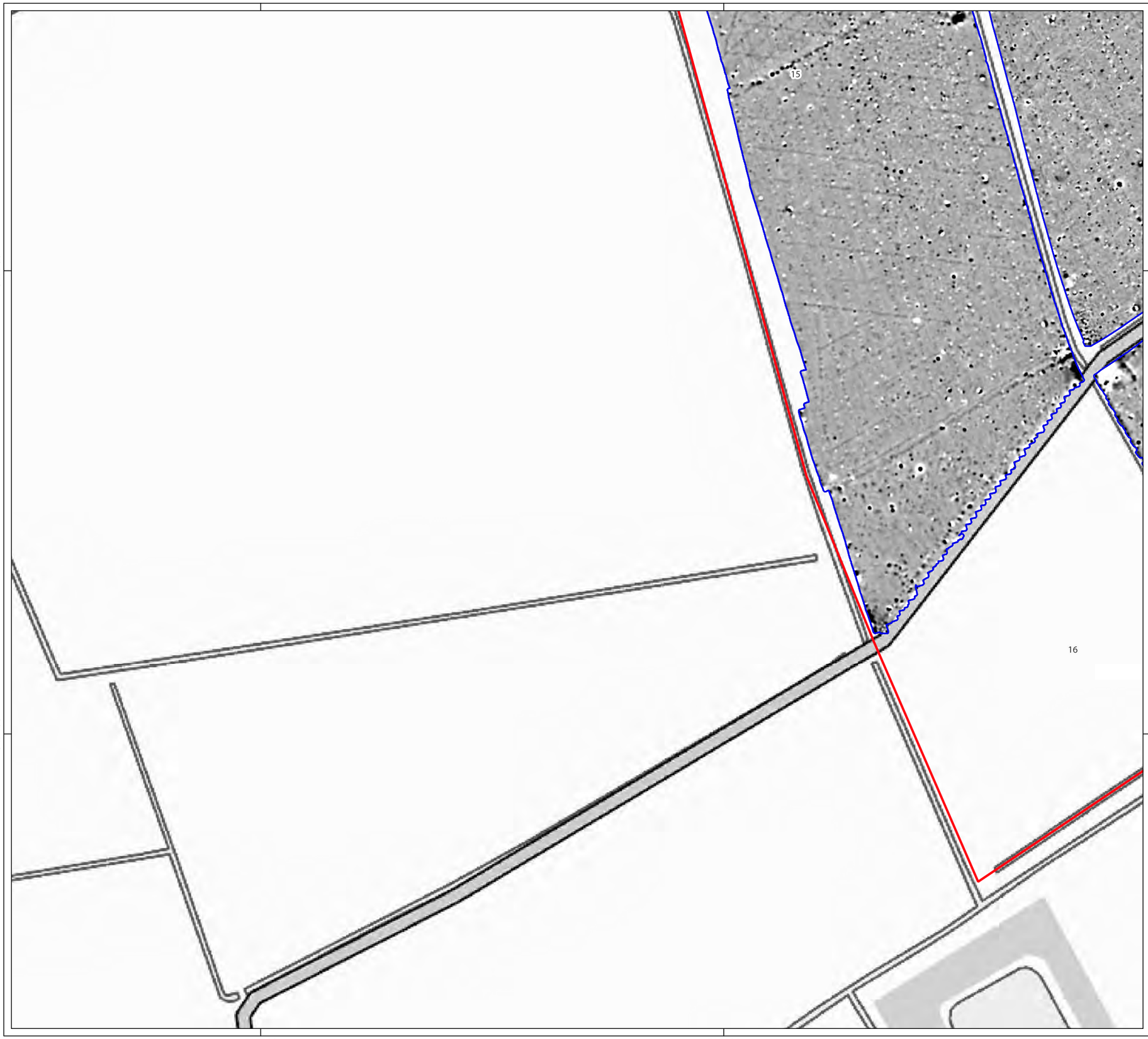
Key

- Site Boundary
- Survey Extent
- Ferrous Objects
- Agriculture
- Field Boundary
- Possible Field Boundary
- Field Drain
- Natural
- Pipe
- Ferrous Disturbance
- Natural
- Uncertain

0 50 100 m

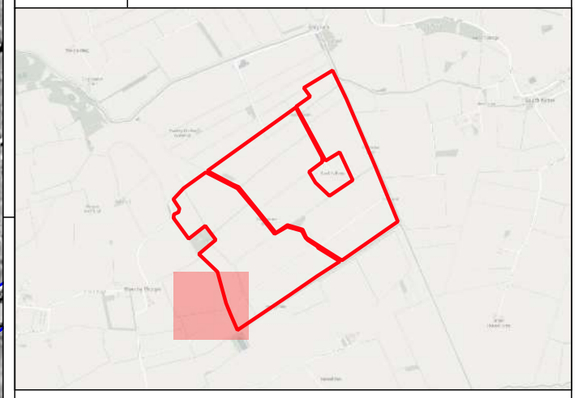
Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 32 - Interpretation of magnetometer data; Sector 8



N

HEADLAND ARCHAEOLOGY
part of the RSK Group



Key

Site Boundary

Survey Extent

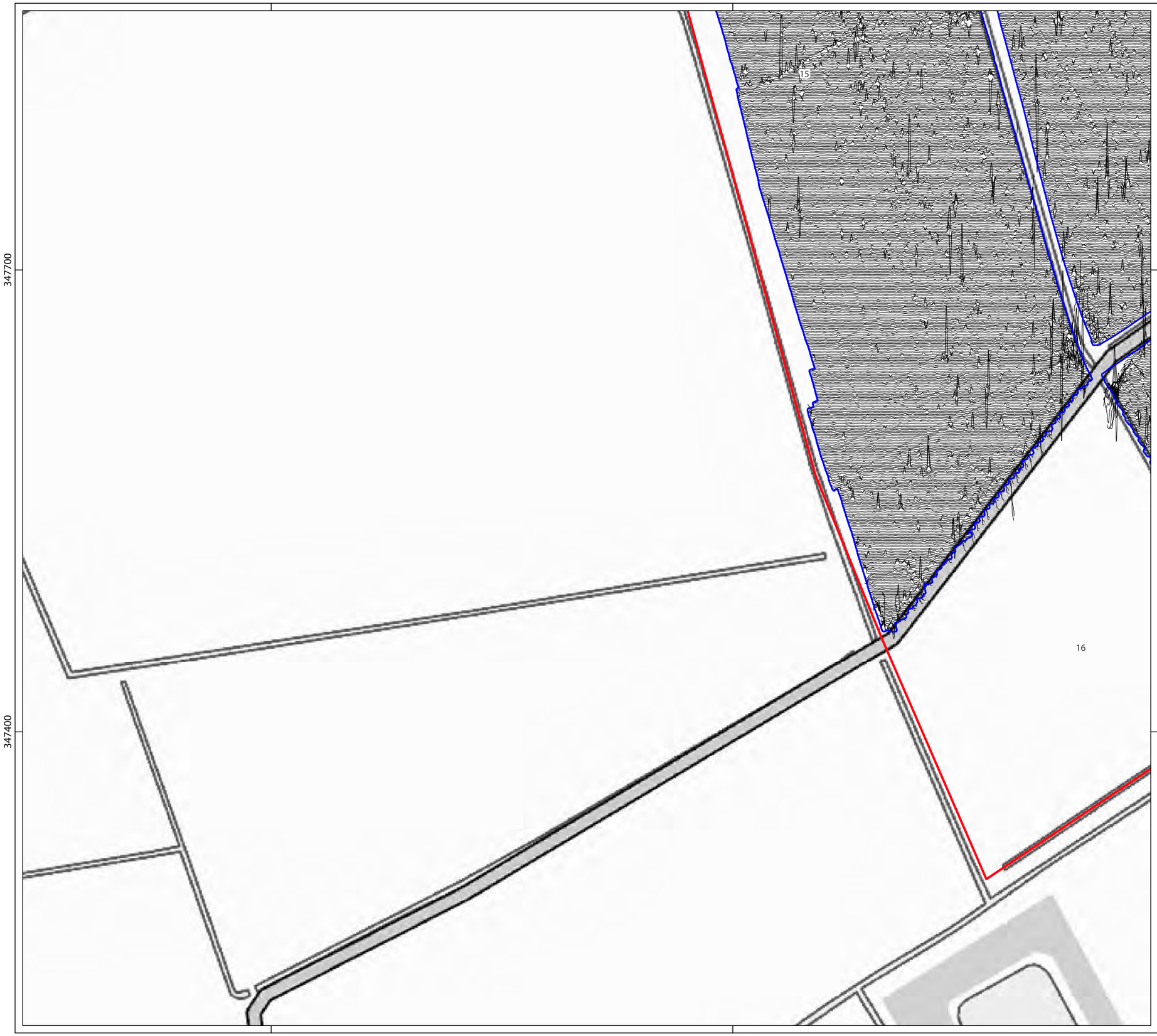
+2nT

-1nT

0 50 100 m

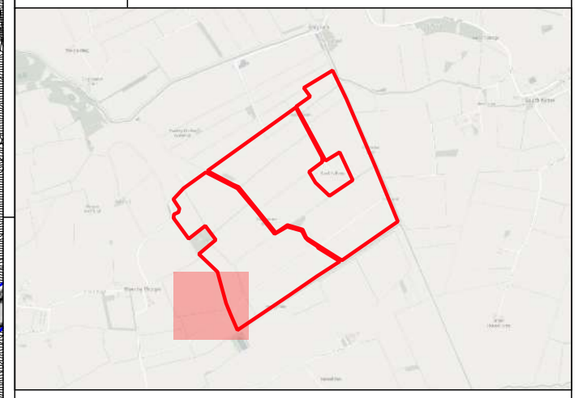
Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 33 - Processed greyscale magnetometer data; Sector 9



N

HEADLAND ARCHAEOLOGY
part of the RSK Group



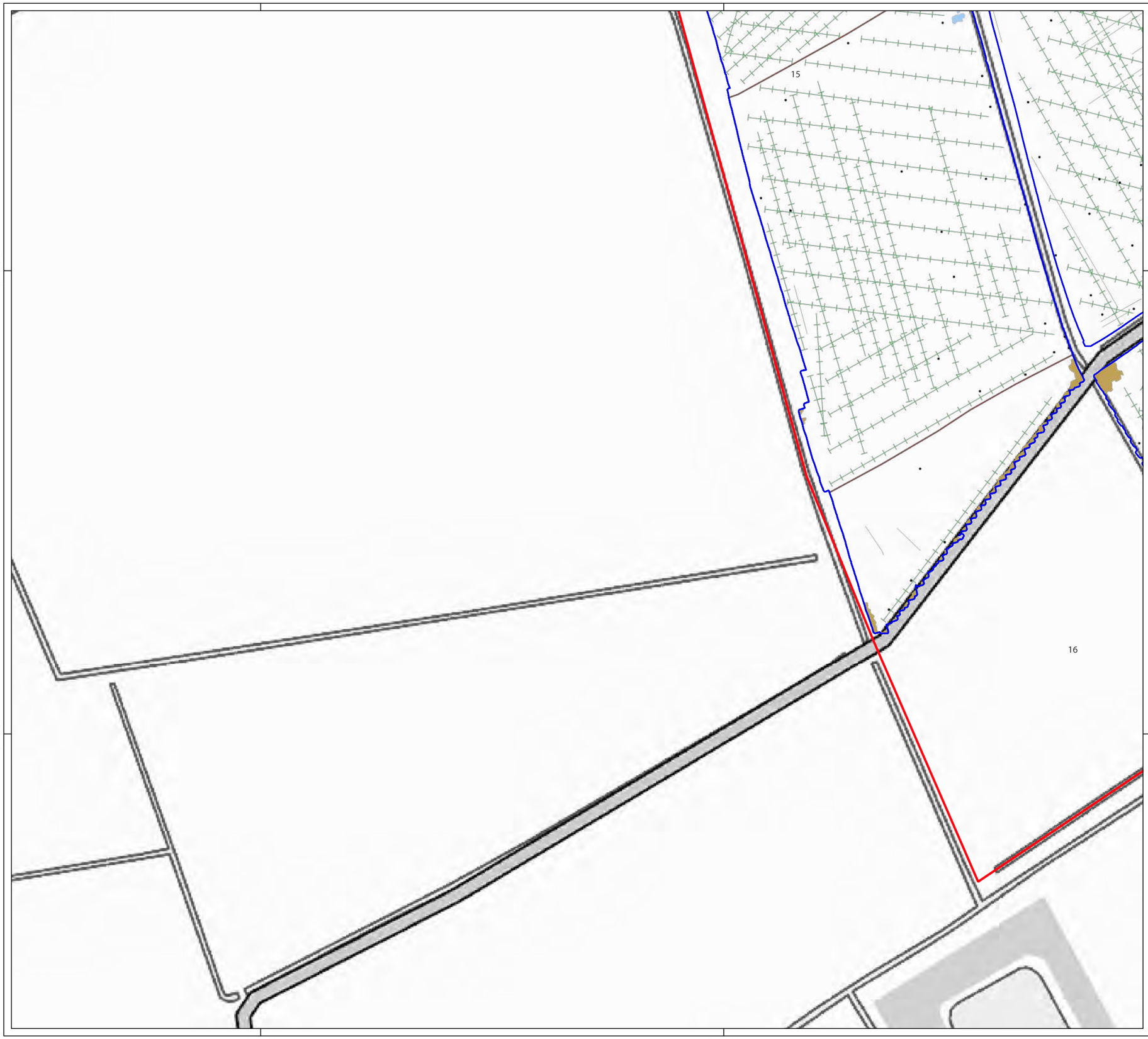
Key

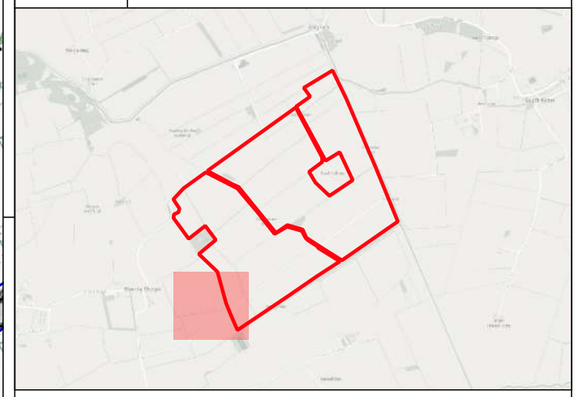
- Site Boundary
- Survey Extent
- XY Trace (25nT/cm)

0 50 100 m

Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 34 - XY trace plot of minimally processed magnetometer data; Sector 9





Key

- Site Boundary
- Survey Extent
- Ferrous Objects
- Agriculture
- Field Boundary
- Field Drain
- Ferrous Disturbance
- Natural

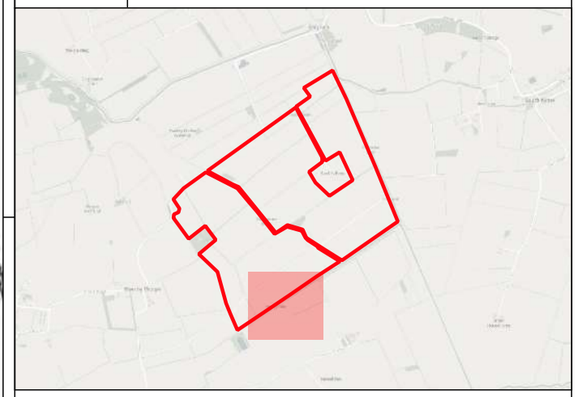
0 50 100 m

Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 35 - Interpretation of magnetometer data; Sector 9

N

HEADLAND ARCHAEOLOGY
part of the RSK Group



Key

Site Boundary

Survey Extent

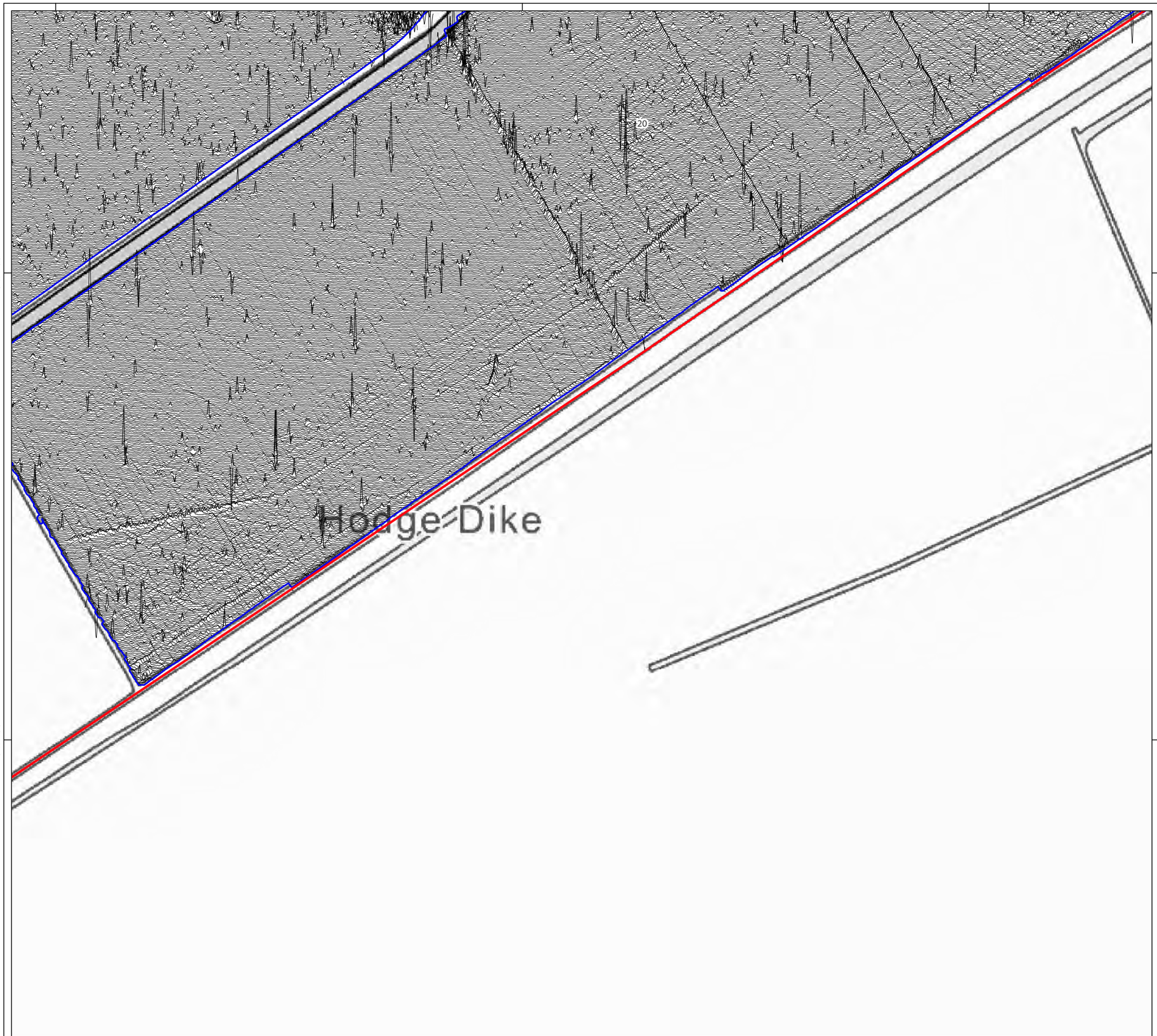
+2nT

-1nT

0 50 100 m

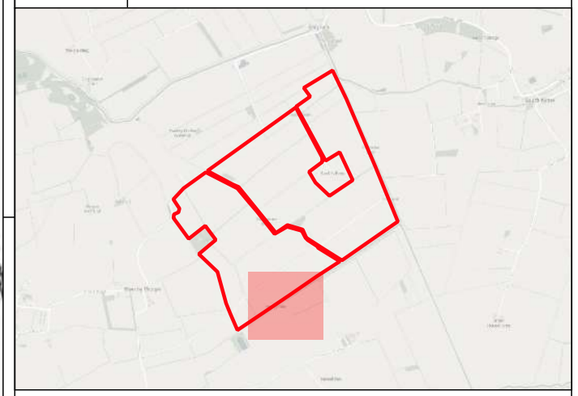
Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 36 - Processed greyscale magnetometer data; Sector 10



N

HEADLAND ARCHAEOLOGY
part of the RSK Group



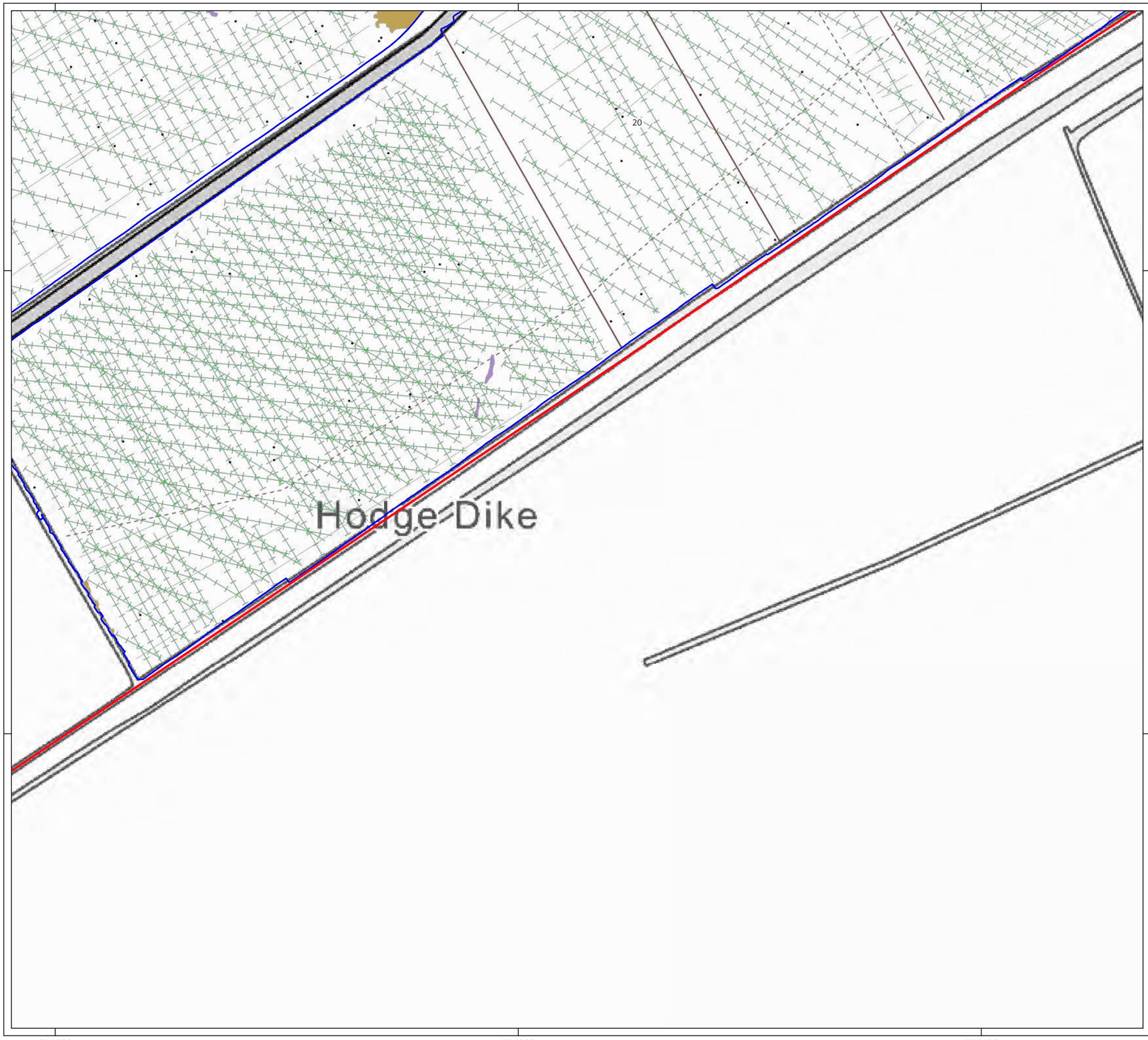
Key

- Site Boundary
- Survey Extent
- XY Trace (25nT/cm)

0 50 100 m

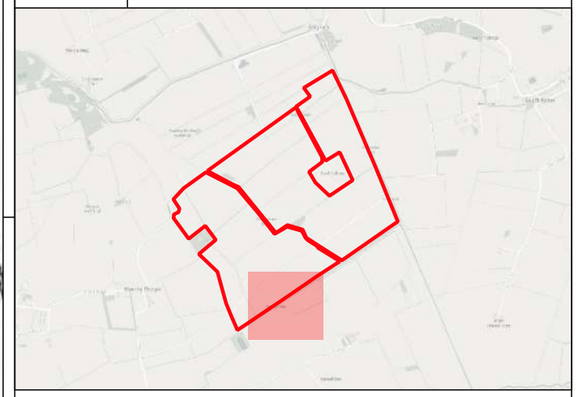
Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 37 - XY trace plot of minimally processed magnetometer data; Sector 10



N

HEADLAND ARCHAEOLOGY
part of the RSK Group



Key

- Site Boundary
- Survey Extent
- Ferrous Objects
- Agriculture
- Field Boundary
- Possible Field Boundary
- Field Drain
- Ferrous Disturbance
- Uncertain

0 50 100 m

Site:	BFEP23
Created by:	LD
Checked by:	JM
Version:	v1.0
Date:	11/05/2023
Scale:	1:2,500 @ A3

BFEP23: Illus 38 - Interpretation of magnetometer data; Sector 10

Illus 2 F7, looking north-east

Illus 3 F23, looking south-west

Illus 4 F25, looking north-west

Illus 5 F27, looking north-east

7. 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 the topsoil, subsoil and rock, 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 most 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 introduced into the topsoil during 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 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). 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 [redacted] The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 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) 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 ARCHIVE

Annex 2 – Detailed Gradiometer Survey Report

Beacon Fen Energy Park, Sleaford, Lincolnshire

Detailed Gradiometer Survey Report

Document Ref.: 278050.03
May 2023

wessexarchaeology

Portway House
Old Sarum Park
Salisbury
SP4 6EB

Wessex Archaeology Ltd is a company limited by guarantee registered in England, company number 1712772. It is also a Charity registered in England and Wales number 287786, and in Scotland, Scottish Charity number SC042630. Our registered office is at Portway House, Old Sarum Park, Salisbury, Wiltshire, SP4 6EB

Document Information

Document title	Beacon Fen Energy Park, Sleaford, Lincolnshire
Document subtitle	Detailed Gradiometer Survey Report
Document reference	278050.03
Client name:	Wardell Armstrong
Address:	36 Park Row Leeds LS1 5JL
On behalf of:	Low Carbon
Site location:	Ewerby Lane Howell
County:	Lincolnshire
National grid reference	514173 347055 (TF 14173 47055)
Statutory designations	None
Planning authority	Lincolnshire County Council
WA project name	Beacon Fen Energy Park, Beacon Fen, Lincolnshire
WA project code(s)	278050
Date of fieldwork	03 – 18 April 2023
Project management by	Tom Richardson
Document compiled by	Lydia Jones
Contributions from	Ffion Lister, Manasi Patil & Filippo Carrozzo
Graphics by	Lydia Jones

Quality Assurance

Issue	Date	Author	Approved by
1	31/05/2023	[redacted]	R

Contents

List of Figures

Summary

A gradiometer survey was conducted over land at Beacon Fen Energy Park, Sleaford, Lincolnshire (centred on NGR 514173 347055). The project was commissioned by Wardell Armstrong, on behalf of Low Carbon, with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as a solar farm.

The site comprises arable fields located immediately to the north of the village of Howell and to the east of the village of Ewerby Thorpe, 2.3 km north of the town of Heckington and 24.8 km to the north-east of Grantham, in the county of Lincolnshire. It covers an area of 184 ha. The geophysical survey was undertaken between 3 – 18 April 2023.

The survey has identified archaeological activity in the north-western portion of the survey area which pertains to a possible ladder settlement, a grouping of enclosures and further agricultural processes associated with the medieval landscape. The grouping of enclosures includes pit-like and possible burning anomalies. It is likely to either be settlement or agricultural enclosures from the early medieval or medieval period, and contemporary with the surrounding field boundaries and ridge and furrow. To the south-east of the aforementioned enclosures is another concentration of at least five conjoined ditched enclosures. These enclosures likely represent agricultural enclosures associated with the nearby medieval settlements of Ewerby Thorpe and Howell, however an earlier prehistoric date cannot be ruled out.

The area's agricultural past is evident with medieval ridge and furrow thought to be associated with the villages of Ewerby Thorpe and Howell. There is also evidence of post-medieval field boundaries, the majority of which are visible from the 1888 six inch OS mapping and are still present by the OS 1:25,000 1955 mapping. Several of these anomalies are not visible on the OS mapping but, due to their similar signal and orientation, are considered to be field boundaries already removed by 1888.

The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to drainage, ploughing, and services.

Acknowledgements

Wessex Archaeology would like to thank Wardell Armstrong for commissioning the geophysical survey. The assistance of Victoria Anderton-Johnson is gratefully acknowledged in this regard.

The fieldwork was undertaken by Jo Instone-Brewer, Jack Trueman, Amy Dunn, Manasi Patil and Phoebe Baker. Lydia Jones processed the geophysical data, wrote the report, and prepared the illustrations. Lydia Jones, Ffion Lister, Filippo Carrozzo and Manasi Patil interpreted the geophysical data. The geophysical work was quality controlled by Brett Howard. The project was managed on behalf of Wessex Archaeology by Tom Richardson.

Beacon Fen Energy Park, Sleaford, Lincolnshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Wardell Armstrong to carry out a geophysical survey at Beacon Fen Energy Park (centred on NGR 514173 347055) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of a solar farm.

1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

1.3 The site

1.3.1 The proposed site is located immediately to the north of the village of Howell and to the east of the village of Ewerby Thorpe. It is located 2.3 km north of the town of Heckington and 24.8 km to the north-east of Grantham, in the county of Lincolnshire.

1.3.2 The site comprises 184 ha of agricultural land, currently utilised for arable crop. The site is bound by Thorpe Road and agricultural land to the north; Ewerby Thorpe, Heckington Road, and further agricultural land to the west; agricultural land and Carr Dyke to the east; with Howell Fen Drive and the village of Howell to the south. A drove way and Hodge Dyke bisect the site east – west.

1.3.3 The site is on an incline sloping from 1 m above Ordnance Datum (aOD) in the east to 10 m aOD in the south-west, and 6 m aOD in the north.

1.3.4 The solid geology for most of the site comprises Mudstone of the Oxford Clay Formation, with an area of Mudstone and Siltstone of the West Walton Formation in the far eastern extent. Overlying superficial geological deposits of diamicton till cover much of the site. Areas of clay and silt tidal flat deposits have been recorded in the north-east and east with a narrow band stretching into the centre of the site. A narrow area of sand and gravel has been recorded in the south-western corner of Area D (BGS 2023).

1.3.5 The soils underlying the site are likely to consist of typical stagnogley soils of the 711t (Beccles 3), except for a thin band of gleyic brown calcareous earths of the 512c (Ruskington) association in the east, and pelo-alluvial gley soils of the 813g (Wallasea 2) association (SSEW SE Sheet 4 1983) at the eastern extent. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a historical and archaeological background within the overarching WSI (Wardell Armstrong 2023), which considered the relevant recorded historic environment resource within, and up to 1 km from, the site boundaries of the whole proposed development site. The overarching WSI used information from the Lincolnshire Historic Environment Record (HER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The findings of the overarching WSI are summarised below. Designated heritage assets in the immediate vicinity, undesignated heritage assets located within the site, and a 1 km search area around the site are discussed.

2.2 Archaeological and historical context

2.2.1 Within 500 m of the site are six designated heritage assets including one scheduled monument which is also a Grade II* listed building, four Grade II listed buildings, and one Grade II* listed buildings. They are all located within the villages of Howell and Ewerby Thorpe just outside the boundaries of the site.

2.2.2 The scheduled monument of St Oswald's Churchyard Cross (NHLE 1009228) dates from the medieval period and is located within Howell 175 m south-west of the south-western corner of the site. It is also listed as a Grade II* listed building (NHLE 1168431).

2.2.3 The listed buildings within the village of Howell comprise the medieval Grade II* Church of St Oswald, the post-medieval Grade II listed Old Rectory (NHLE 1061834), and Howell Hall (NHLE 1168460).

2.2.4 The listed buildings within the village of Ewerby Thorpe comprise Grade II listed Austhorpe Farm (NHLE 1306847) and Thorpe House (NHLE 1360566), both post-medieval in origin.

Prehistoric

2.2.5 Within the 1 km study area the prehistoric period is represented by find spots and cropmarks including stone axes, bronze axes, flint scatters, and prehistoric pottery. The earliest in date is the Neolithic period. Worked flints (HER MLI60542) were found next to Hodge Dyke within the north-east of the site, and a Neolithic stone axe was found close to Hodge Dyke, just outside the north-eastern boundary.

2.2.6 Aerial photography has identified a possible Bronze Age barrow next to an enclosure and ring ditch of unknown origins (HER NLI86039) 905 m north of the site.

Iron Age - Romano-British

2.2.7 The Iron Age is evidenced by a ditch (HER MLI82553) discovered during a watching brief and located 885 m north-west of the site.

2.2.8 Roman activity in the surrounding area is evidenced by Carr Dyke located 130 m to the north-east of the north-eastern extent of the site. It is thought to have been constructed in 125 AD.

Early medieval

2.2.9 The early medieval period in the surrounding area is represented by the villages of Howell and Ewerby Thorpe, both of which have origins in this period. Howell is 170 m to the south of the south-western edge of the site, and Ewerby Thorpe 200 m to the west. Both are

recorded as shrunken medieval settlements. It is likely the site was land used by these settlements for agriculture.

2.2.10 In the wider area Saxon finds including pottery and an unidentified bronze object (HER MLI89848) found 735 m south-west of the site.

Medieval

2.2.11 The settlements of Howell and Ewerby Thorpe continued to be inhabited through the medieval period, and Howell's St Oswald's Church and churchyard cross were constructed. Medieval pottery (HER MLI60543) was discovered next to Hodge Dyke within the north of the site.

2.2.12 Other evidence of this period in the wider area surrounding the whole development consists of earthworks, ridge and furrow, field systems, pottery scatters, and findspots.

Post-medieval

2.2.13 The settlements of Howell and Ewerby Thorpe continued to be used in the post-medieval period and various farmsteads and agricultural buildings, many still in use currently, were constructed in this period. Westmorelands (Asgarby Fen Farm) (MLI121926), a partially extant 19th century farmhouse, is located immediately to the south of the site.

2.2.14 In the wider area the period is evidenced by various buildings, the Sleaford Navigation canal, ridge and furrow, enclosures, and parkland association with Howell Hall (immediately to the south of the site).

Undated

2.2.15 Cropmarks of an undated boundary ditch (HER MLI90710) have been detected via aerial photography in the south of the site.

2.2.16 Cropmarks of a series of enclosures within LP_002 have been identified from consulting aerial photography from 2011 (Historic England, 2023).

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 3 – 18 April 2023. Field conditions were mixed throughout the survey period. An overall coverage of 178.8 ha was achieved.

3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex Archaeology 2023), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and

- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential;
- Where possible, to determine the general nature of any anomalies of archaeological potential;
- Inform the layout of the proposed development;
- Determine the requirement for and location of intrusive archaeological works (archaeological trial trenching); and
- Disseminate the results of the fieldwork through an appropriate level of recording and reporting.

3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Carlson RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS). Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four SenSys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart towed by an All-Terrain Vehicle (ATV). Data were collected at a rate of 100 Hz and interpolated to 0.1 m intervals along transects spaced 1 m apart, in accordance with European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.4 Data processing

3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'Destripe' function (±5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

4.1.1 The detailed gradiometer survey has identified magnetic anomalies of archaeological and potential archaeological origin across the site, along with ridge and furrow cultivation, old field boundaries, former ponds, variations in the underlying deposits and large amounts of ploughing and drainage. Results are presented as a series of greyscale plots, and archaeological interpretations at a scale of 1:2000 (**Figures 2** to **27**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image.

4.1.2 The interpretation of the dataset highlights the presence of potential archaeological activity, ferrous responses, burnt or fired objects, and magnetic trends (**Figure 3**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

4.1.5 Gradiometer survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g., CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

4.2 Gradiometer survey results and interpretation

4.2.1 The geophysical survey has identified features that are considered to be archaeological in origin. These are primarily associated with two areas containing ditch-like linear features in the north-west of the site pertaining to series of enclosures containing various subdivisions, together with pit-like anomalies relating to probable agricultural and possible settlement activity. Dense concentrations of linear and curvilinear anomalies on various orientation have been identified across the west of the site representing medieval ploughing, along with anomalies relating to unmapped and mapped previous field boundaries.

4.2.2 A series of weak and strong positive linear anomalies are located in the north-western portion of the survey area, at **4000** (**Fig. 5** and **7**). The collection of anomalies covers an area of 70 m by 273 m and is oriented north-north-west to south-south-east forming a rectangular shape. This is sub-divided into smaller rectilinear areas (**4001** – **4006**) by positive linear anomalies between 35 m – 60 m long and 1 – 5 m wide oriented west-south-west to east-north-east.

4.2.3 The area at **4001** is 46 m x 70 m. Positive linear anomalies forming further sub-divisions within **4001** are visible at **a** and **b**. The anomaly at **a** is 33 m long and between 1.1 m – 2.5 m wide on a north-east to south-west orientation. The anomaly at **b** branches off from a larger anomaly to the south and is 13 m long by 1.1 m – 1.5 m wide.

4.2.4 **4002** forms an area of 52 m x 65 m. Positive linear anomalies forming further sub-divisions are evident within this at **c** – **e**. The anomalies at **c** and **d** are L-shaped anomalies and are 62 m long by 1 – 1.9 m wide, and 22 m long by 0.7 m – 3.8 m wide respectively. At **e** there are a collection of amorphous anomalies of various sizes arranged in a roughly linear north – south alignment which may represent a now broken-up linear anomaly.

4.2.5 The area at **4003** is 64 m x 37.2 m. Further sub-divisions are visible at **f** – **h**. The L-shaped anomaly at **f** is 18.6 m long and 0.7 m – 1.7 m wide. The linear anomalies at **g** and **h** are 19.4 m long by 1.6 m wide and 10 m long by 1.5 m wide respectively. The anomaly at **i** branches off from a larger linear anomaly to its south and is 7 m long by 0.9 m wide.

4.2.6 The area at **4004** is 54 m x 43 m and is further subdivided by anomalies at **j** and **k**. The north – south orientated anomaly at **j** branches off from a larger anomaly to its north and is 12.7 m long by 0.9 m wide. At **k** the anomaly is L-shaped and is 13 m long by 1.4 m wide. It meets the outer anomalies of **4004** at both its eastern and southern ends forming a completely enclosed area.

4.2.7 The areas at **4005** and **4006** are more difficult to define due to a more complex and densely spaced series of linear anomalies. This obscures whether **4005** and **4006** are one, or two separate areas. These anomalies are oriented west-south-west to east-north-east, which is

both the same orientation as the inner dividing anomalies of **4000** and as the ridge and furrow to the east. This is clearest at **n** where four linear anomalies, between 0.9 m – 1.4 m wide and spaced between 3 m – 5 m apart run parallel to each other. Together **4005** and **4006** are 80 m x 46 m. The clearest subdivisions are at **l** which is 15.4 m long by 1 m wide, and **m** which is 12 m long by 1 m – 2 m wide.

4.2.8 Various discrete positive and dipolar anomalies have been detected throughout the enclosures. They are between 0.8 m – 3 m in diameter. Those with a positive signal may be pit-features, and those with a strong positive and negative may be evidence of burning for example from hearths. The clearest examples of these are seen at **o** – **q**.

4.2.9 These anomalies have been interpreted as ditched enclosures, pertaining to settlement or agricultural activity. This arrangement of small, connected ditched enclosures may infer 'Ladder' or 'Ribbon' settlement. These are commonly dated to the Late Iron Age to medieval period and are normally oriented around a trackway. Notably a road runs on the same orientation as these anomalies immediately to the west. However, whilst there are sub-divisions and pits, there is no definitive evidence of structural and / or settlement remains. The ridge and furrow to the east of the northern portion of the enclosures respects their boundaries. This may indicate that the ridge and furrow is contemporary. However, there is evidence to suggest that the ridge and furrow may continue over the southern portion of the settlement (**4005**), suggestive of a different phase of activity. The ridge and furrow, based on spacing and morphology, is considered most likely to be medieval in date, so a similar or earlier date is proposed for the enclosures.

4.2.10 In LP_002 a series of conjoining linear weak and strong positive anomalies typical of ditched features have been detected at **4007** – **4011** (**Figs. 5** – **7**). The collection of anomalies covers an area of 160 m x 87 m and is oriented south-south-east to north-north-west along a former field boundary. The anomaly at **4007** is a sub-rectilinear shape joining the old field boundary at its eastern ends, and potentially crossing it at its north-eastern end to join with **4008**. It is 39 m in length and 1.5 m wide, enclosing an area of 37 m x 57 m. The anomaly at **4008** is an L-shaped anomaly. It is 108 m long and between 1.7 m – 2.5 m wide. The anomalies at **4009** and **4011** are both L-shaped anomalies and measure 78 m long by 1.6 m wide, and 126 m long by 1.8 m – 2.8 m wide respectively. These anomalies join at the southern end of **4009** and northern edge of **4011**. The anomaly at **4010** is a linear anomaly. It is 89 m long by 1.4 m wide and oriented north – south. It crosses **4011**, and together with **4009** and **4010** forms a series of four enclosed areas, with the old field boundary forming the eastern extent. These anomalies have been interpreted as ditched enclosures. They are visible in aerial photographs from 2011 (Historic England, 2023). Given the surrounding early medieval – medieval settlements, it is likely these date from then and may be related to **4000** 375 m to the north-west, however an earlier prehistoric date cannot be ruled out.

4.2.11 Within the enclosure formed by **4007** a strong positive amorphous anomaly (**4012**) measuring 8.7 m x 4.1 m has been detected (**Figure 5**). This may be activity related to the enclosure such as small scale quarrying or could be the result of more modern agricultural ground disturbance.

4.2.12 In the north of LP_001 is a T-shaped weak positive anomaly (**4013**) (**Figure 5**). It measures 60m east – west and extends 21 m north – south. It is between 0.6 – 1.2 m wide. Given its position on the edge of the field it may have been caused by modern agricultural machine movement or drainage, however there is the possibility of it being the result of earlier archaeological activity associated with ditched boundary features of unknown date.

4.2.13 In the north of LP_009 a linear weak positive anomaly has been detected at **4014** (**Figure 13**). It is 98 m long by 1.3 m wide and oriented north-north-west to south-south-east. It is on a roughly similar orientation to mapped former field boundaries but does not continue from any. The anomaly may be a former unmapped field boundary or part of other ditched features, such as an enclosure boundary. At its northern end is a discrete strong positive anomaly measuring 3.8 m in diameter, this is typical of a pit feature. However, it is not possible to say if this is a natural pit feature or manmade.

4.2.14 Two weak positive curvilinear anomalies have been detected in LP_014 (**4015** – **4016**) (**Fig. 17** and **21**). The northern-most anomaly is 200 m long by 1.4 m wide, and the southern is 25 m long by 0.5 m – 1 m wide. They are spaced 6 m apart and are oriented east – west leading from an extant ditched field boundary in the east. In the west, the northern-most anomaly terminates at a historical field boundary. Given their position and signal it is likely that they relate to the mapped post-medieval field system, however a definite origin cannot be provided from the geophysical data alone.

4.2.15 A curvilinear weak positive anomaly has been detected 175 m to the east of **4015** in LP_014 at **4017** (**Figure 19**). It is 76 m long and 0.8 m wide. The relative isolation of the anomaly makes confident interpretation difficult. While it is indicative of a ditch feature, it may relate to an archaeological boundary, modern agricultural activity, or natural variation.

4.2.16 In the west of the site, close to the shrunken medieval villages of Howell and Ewerby Thorpe, across LP_001, 002, 003, 005, 006, 008 & 009 areas of linear weak and strong anomalies have been detected (**4018** – **4024**) (**Fig. 5, 7, 9, 11, 13 & 15**). They are oriented on a broadly east – west and north – south coaxial system. The anomalies are spaced 4 m – 10 m apart. These anomalies represent the remnants of early-medieval to post-medieval ridge and furrow cultivation. The anomalies at **4018** and **4024** (**Fig. 5 & 13**) are noticeably more curved, with those in **4024** exhibiting some of the widest spacings of 10 m, potentially indicating an earlier date. At **4024** there are smaller areas of these differing orientations, with those on the edges of these sections being stronger in signal, likely being deeper and forming delimiting field boundaries (**Figure 13**). In the east of LP_003 (**4021**) linear dipolar anomalies within the ridge and furrow indicate the later reuse of the furrows to lay a clay drainage system (**Figure 11**).

4.2.17 In LP_001 – 003 (**Fig. 5**, **7**, **9**, **& 11**) and LP_012 – 16 (**Fig. 17**, **19**, **21**, **23**, **25**, **& 27**) weak and strong positive linear anomalies have been detected. They are oriented south-south-east to north-north-west by west-south-west to east-north-east and are visible from the 1888 six inch OS mapping onwards as previous ditched field boundaries. The majority are still present on the OS 1:25,000 published in 1955 (Lincolnshire, TF14) and so were removed at some point after this. Positive linear anomalies have been detected in LP_014 (**4025** – **4027**) and LP_016 (**4028**) which are not present on historical OS mapping. They are similar in signal and orientation and extend from the previously mapped field boundaries. They are considered to be field boundaries already removed by the time of the first OS map in 1888.

4.2.18 In LP_001 (**4029** – **4031**) (**Figure 5**), LP_002 (**4032**) (**Figure 7**), LP_003 (**4033**) (**Figure 11**), and LP_008 (**4034**) (**Figure 13**) amorphous positive and strong positive and negative anomalies have been detected. The smallest covers an area of 6 m x 11 m (**4031**) and the largest an area of 30 m x 26m (**4030**). **4029** – **4034** are visible on historical OS mapping from 1888 (six inch) as ponds. **4035** is not recorded on historical mapping however given its similar signal and size has also been interpreted as a pond.

4.2.19 In LP_0015 a strong negative amorphous anomaly at **4036** has been detected covering an area of 16 m x 17m (**Figure 21**). On OS mapping from 1888 (Six inch) a small building or pond is recorded in this location.

4.2.20 In the east of LP_ 015 an area of magnetic disturbance at **4037** has been detected. It is located at the junction of two former field boundaries and covers an area of 17 m x 21 m (**Figure 27**). On OS mapping from 1888 (six inch) a small building is recorded in this location.

4.2.21 Weak positive narrowly spaced linear anomalies have been detected across the site. These are considered to represent post-medieval to modern cultivation. At **4038** in LP_015 these are contained within two historical field boundaries (**Figure 23**). The narrow spacing, and orientation along the shortest axis of the field, indicates it is the remnants of post-medieval steam-ploughing.

4.2.22 Three bands of weak positive sinuous magnetic enhancement have been detected in LP_004 at **4039** – **4041** (**Fig. 17**, **19**, **& 21**). They are oriented west-north-west to east-south-east and are 654 m, 311 m, and 129 m long respectively by 7m – 18 m wide. Based on their morphology they are considered likely to be variations in the underlying clay, sand, and gravel deposits.

4.2.23 In the north-east of LP_016 at **4042** there is an area containing strong positive and negative sinuous responses and strong positive discrete anomalies (**Figure 25**). These are considered likely to represent an old estuarine environment with a former channel and associated deposits. Running along the north-western borders of LP_015-016 from **4042** is an enhanced mottled response (**4043**) also considered to represent variation in the underlying superficial deposits (**Fig. 23** and **25**).

4.2.24 An amorphous band of enhanced signal in LP_004 at **4044** is also considered to be the result of variation in the underlying superficial deposits (**Fig 9, 11**, and **15**).

4.2.25 Dipolar, positive and negative narrow linear trends on various orientations have been detected across the site, in most cases leading to the larger extant and non-extant ditch drains on the edges of the fields. These represent drainage regimes necessary to manage the flat fen landscape. These drains likely date from the post-medieval to modern period.

4.2.26 Strong magnetic linear anomalies on a south-south-west to north-north-east and north-north-west to south-south-east alignment have been detected in the north of LP_002 at **4045** – **4047** (**Figure 7**). These are interpreted as modern services.

4.2.27 Two series of strong discrete magnetic anomalies measuring between 5 m – 13 m in diameter have been detected along two old field boundaries at **4048** and **4049**. They are considered likely to be the remnants of old fence posts.

5 DISCUSSION

5.1.1 The gradiometer survey has identified archaeological activity in the north-western portion of the survey area which pertains to a possible ladder settlement, a grouping of enclosures and further agricultural processes associated with the medieval landscape. Further agricultural features such as former field boundaries, a building, various ponds, and cultivation are evident across the site.

5.1.2 In the north-west of the site along the area's boundary is a series of sub-divided enclosures, with some pit-like and possible burning anomalies, likely associated with the medieval settlement of Ewerby Thorpe. It is similar in morphology to 'Ladder' or 'Ribbon' type settlements. It is likely to either be settlement or agricultural enclosures from the early medieval period, and contemporary with the surrounding field boundaries and ridge and furrow. To the south-east of the aforementioned enclosures is another concentration of at least five conjoined ditched enclosures. These enclosures are larger than those to the north-west and are likely to represent agricultural enclosures associated with the nearby medieval settlements of Ewerby Thorpe and Howell, however a prehistoric date cannot be ruled out.

5.1.3 Surrounding the enclosures, and across much of the west of the site, are various regimes of ridge and furrow oriented on a broadly east – west and north – south coaxial system. These anomalies are situated between the villages of Ewerby Thorpe and Howell and represent the remnants of early-medieval to post-medieval ridge and furrow cultivation associated with these villages.

5.1.4 There is evidence of the land's agricultural use continuing into the post-medieval period with several mapped and unmapped field boundaries detected across the site. The majority are visible from the 1888 six inch OS mapping and are still present by the OS 1:25,000 1955 mapping. Several of these anomalies are not visible on the OS mapping but, due to their similar signal and orientation, are considered to be field boundaries already removed by 1888.

5.1.5 Various anomalies associated with ponds, and one building, recorded on the 1888 OS mapping have been detected across the site.

5.1.6 The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to drainage, ploughing, and services.

REFERENCES

Bibliography

ADS 2013. *Caring for Digital Data in Archaeology: a guide to good practice*. Archaeology Data Service & Digital Antiquity Guides to Good Practice.

Chartered Institute for Archaeologists [CIfA] 2014 *Standards and guidance for archaeological geophysical survey*. Reading, CIfA.

Jones, L. 2023. *Beacon Fen Energy Park, Beacon Fen, Lincolnshire: Site Specific Written Scheme of Investigation for an Archaeological Geophysical Survey.* Wessex Archaeology

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J. 2015. *Guidelines for the use of geophysics in archaeology: questions to ask and points to consider.* EAC Guidelines 2, Belgium: European Archaeological Council.

Wardell Armstrong 2023 *Low Carbon, Beacon Fen Energy Park, Overarching Written Scheme of Investigation for Geophysical Survey,* Version 1.0

Cartographic

Soil Survey of England and Wales 1983 *Sheet 4, Soils of Eastern England*. Ordnance Survey, Southampton

Online Resources

British Geological Survey 2023. *Geology of Britain Viewer* http://mapapps.bgs.ac.uk/geologyofbritain/home.html (accessed April 2023)

Google Earth website http://earth.google.com (accessed April 2023)

Historic England (HE) https://historicengland.org.uk (accessed April 2023)

Old Maps Online http://oldmapsonline.org (accessed April 2023)

National Library of Scotland (NLS) https://maps.nls.uk/geo/explore/ (accessed April 2023)

APPENDICES

Appendix 1 Survey equipment and data processing

Survey methods and equipment

The magnetic data for this project were acquired using a non-magnetic cart fitted with four SenSys FGM650/3 magnetic gradiometers and pulled by an ATV. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 0.6 m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of ±8 µT over ±1000 nT range. All of the data will be then relayed to a CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 probes at a rate of 100 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Captivate system with rover and base station (or equivalent). This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02 m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium (Schmidt *et al.* 2015).

Post-processing

The magnetic data collected during the detail survey are downloaded from the cart system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

The cart-based system generally requires a lesser amount of post-processing than the handheld instrument. This is largely because mounting the gradiometers on the cart reduces the occurrence of operator error, caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

Typical data and image processing steps may include:

- Destripe – Applying a smooth function to remove differences caused by directional effects inherent in the magnetometer;
- Despike – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data).

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

Appendix 2 Geophysical interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural, and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.

Appendix 3 OASIS form

Project Details:

Project name		Beacon Fen Energy Park, Sleaford Lincolnshire			
Type of project		Gradiometer survey			
Project description		The detailed gradiometer survey has identified archaeological activity in the north-western portion of the site which pertains to a possible ladder settlement, a grouping of enclosures and further agricultural processes associated with the medieval landscape. Further agricultural features such as former field boundaries, a building, various ponds, and cultivation are evident across the site. Sub-divided enclosures, with some pit-like and possible burning anomalies, likely associated with the medieval settlement of Ewerby Thorpe. It is similar in morphology to 'Ladder' or 'Ribbon' type settlements. It is likely to either be settlement or agricultural enclosures from the early medieval or medieval period, and contemporary with the surrounding field boundaries and ridge and furrow. To the south-west is another concentration of at least five conjoined ditched enclosures. These enclosures are larger than those to the north-west and are likely to represent agricultural enclosures associated with the nearby medieval settlements, however an earlier prehistoric date cannot be ruled out. Surrounding the enclosures, and across much of the west of the site, are various regimes of ridge and furrow oriented on a broadly east-west and north-south coaxial system. These anomalies are situated between the villages of Ewerby Thorpe and Howell and represent the remnants of early-medieval to post-medieval ridge and furrow cultivation. Anomalies have been detected across the site that are potentially archaeological in origin. Likely to be the remnants of medieval land management such as previous ditched field boundaries and ridge and furrow cultivation. Linear ditch anomalies representative of old mapped and unmapped field boundaries have been detected across the site. Various anomalies associated with ponds, and one building, recorded on the 1888 OS mapping have been detected across the site. Narrowly spaced linear anomalies representative of post-medieval to modern cultivation practices, including one area of probable steam ploughing, and various drainage schemes have been detected across the site. Variations in the underlying superficial deposits have been detected across the site. Modern services have been detected in one field in the west of the site.			
Project dates		**Start:** 03-04-2023		**End:** 18-04-2023	
Previous work		DBA			
Future work		N/A			
Project Code:	PN278050	**HER event no.**	If relevant	**OASIS form ID:**	e.g., wessexar1-515584
		NMR no.	N/A		
		SM no.	N/A		
Planning Application Ref.		N/A			
Site Status		None			
Land use		Agricultural			
Monument type			**Period**		

Project Location:

Site Address	Ewerby Lane, Howell			**Postcode**	
County	Lincolnshire	**District**	North Kesteven	**Parish**	Asgarby and Howell; Ewerby and Evedon
Study Area	178.8 ha	**Height OD**	1 – 10 m aOD	**NGR**	514173 347055

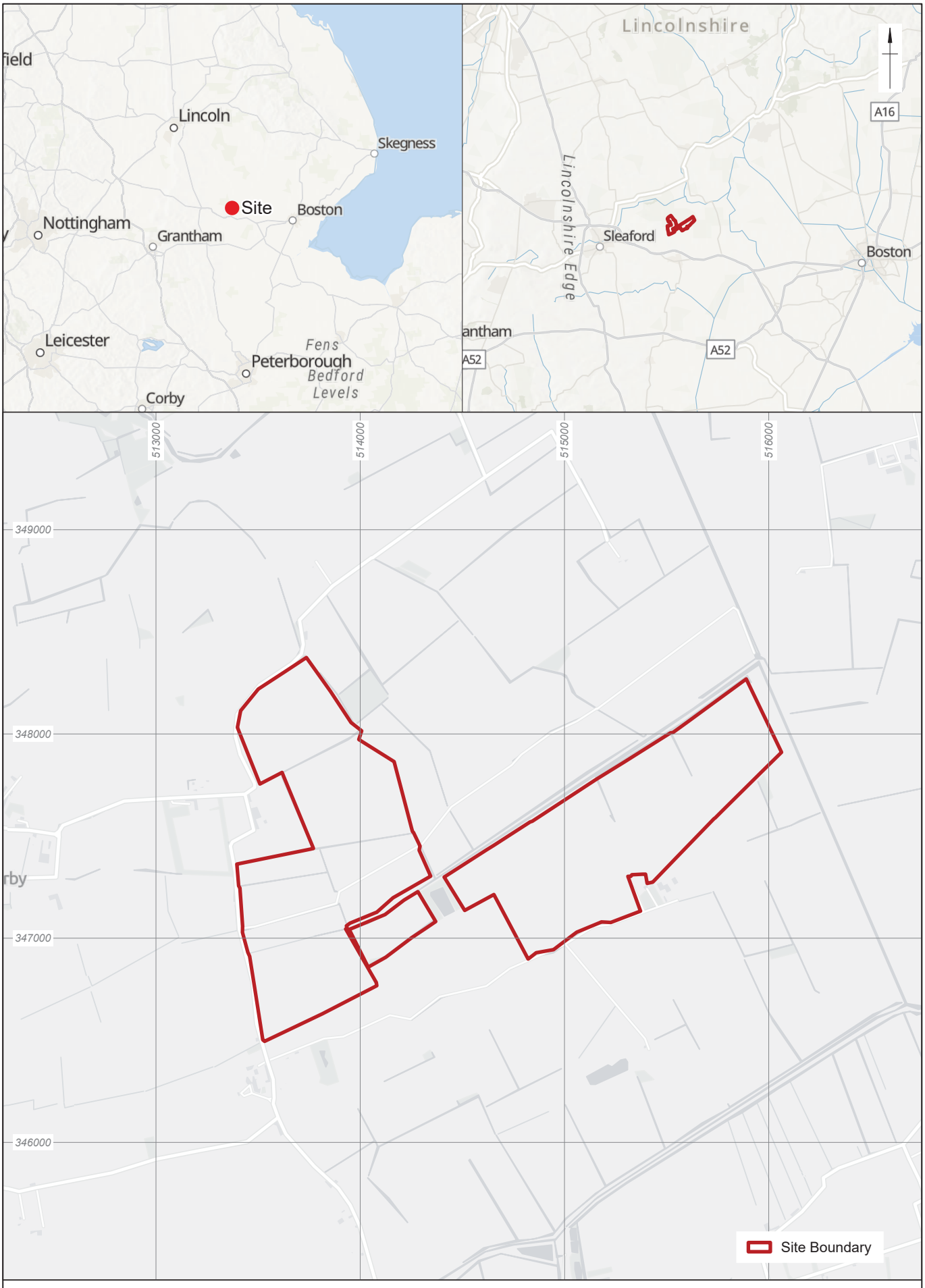
Project Creators:

Name of Organisation	Wessex Archaeology		
Project brief originator	Wardell Armstrong	**Project brief originator**	Wardell Armstrong
Project Manager	Tom Richardson	**Project Manager**	Tom Richardson
Sponsor or funding body	Wardell Armstrong	**Type of Sponsor**	Private

Project Archive and Bibliography:

Physical archive	N/A	**Digital Archive**	Geophysical survey and report	**Paper Archive**	N/A
Report title				**Date**	2018
Author	Wessex Archaeology	**Description**	Unpublished report	**Report ref.**	PN278050.03

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx



0 1,000 m

Date: 28/04/2023	Created by: LJ	Revision: 1	Scale: 1:25,000 at A4

Figure 1: Site location and site boundaries

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514000

515000

516000

348000

347000

Figure 4

LP_001

Figure 8

LP_002

Figure 6

Figure 10

LP_004

LP_003

LP_007

LP_005

LP_006

LP_010

Figure 12

Figure 14

LP_009

LP_008

Figure 16

LP_011

LP_012 & 13

Figure 22

Figure 24

LP_015

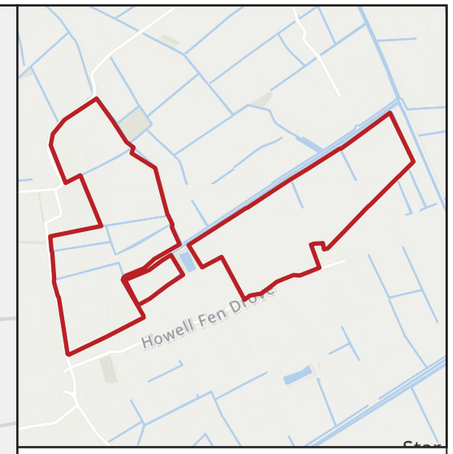
LP_016

Figure 26

Figure 20

LP_014

Figure 18



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

500 m

Date: 09/05/2023 | Created by: LJ

Scale: 1:10,000 @ A3 | Revision: 1

Figure 2: Detailed gradiometer survey results: overall greyscale data

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514000

515000

516000

348000

347000

Figure 5

Figure 7

Figure 9

Figure 11

Figure 13

Figure 15

Figure 17

Figure 19

Figure 21

Figure 23

Figure 25

Figure 27

LP_001

LP_002

LP_003

LP_004

LP_005

LP_006

LP_007

LP_008

LP_009

LP_010

LP_011

LP_012 & 13

LP_014

LP_015

LP_016

- Detailed survey extent
- Site Boundary
- Archaeology
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Agricultural feature
- Drain
- Trend
- Increased response
- Ferrous
- Geology
- Modern service

0 500 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:10,000 @ A3 | Revision: 1

Figure 3: Detailed gradiometer survey results: overall interpretation

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513500

513750

348250

348000

LP_001

Howell Fen Drive

Fox Co

Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 4: Detailed gradiometer survey results: greyscale LP_001-002

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513400 513600 513800

348200 348000

LP_001

4013 4029 4048 4018 4030 4001 4002 4031 4019 4000 4003 4004 4049 4046 4047 4045

a b c d e f g h i j k l p q s

Howell Fen Drive

Fox Co

Detailed survey extent
Site Boundary
Archaeology
Possible archaeology
Former field boundary
Historic landscape feature
Historic cultivation
Drain
Increased response
Ferrous
Geology
Modern service

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 5: Detailed gradiometer survey results: interpretation LP_001-002

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513500

513750

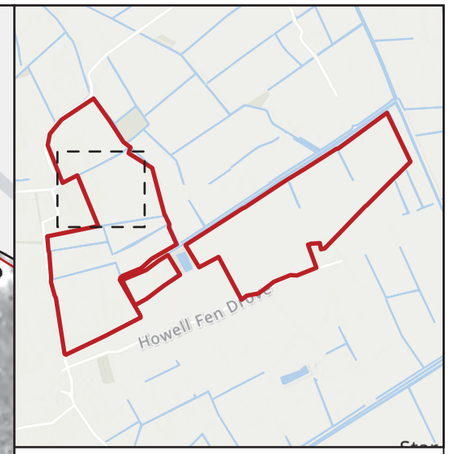
514000

347750

347500

LP_001

LP_002



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 6: Detailed gradiometer survey results: greyscale LP_001-003

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

4002
4019
4000
4003
4004
4005
4006
4045
4020
4046
4047
4032
4012
4008
4007
4009
4010
4011
LP_001
LP_002
513600
513800
514000
347800
347600

Howell Fen Drive

- Detailed survey extent
- Site Boundary
- Archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Drain
- Ferrous
- Geology
- Modern service

0 100 m

Coordinate system: OSGB 1936 British National Grid

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 7: Detailed gradiometer survey results: interpretation LP_001-003

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514000

514250

347750

347500

LP_002

LP_004

LP_007

Howell Fen Drive

Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 8: Detailed gradiometer survey results: greyscale LP_002 & LP_004

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513800

514000

514200

347800

347600

347400

4046

4047

4020

4032

4012

4008

4007

4009

4010

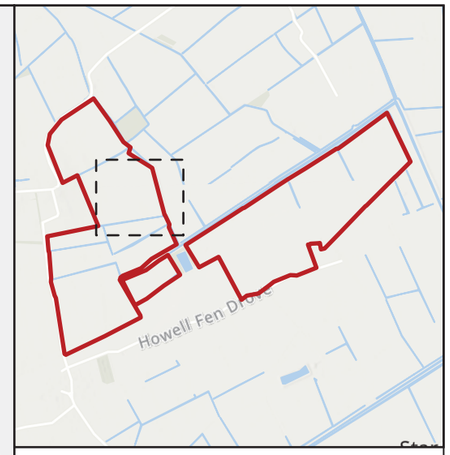
4011

4044

LP_002

LP_004

LP_007



Detailed survey extent
Site Boundary
Archaeology
Former field boundary
Historic landscape feature
Historic cultivation
Agricultural feature
Drain
Ferrous
Geology
Modern service

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 9: Detailed gradiometer survey results: interpretation LP_002 & LP_004

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513500

513750

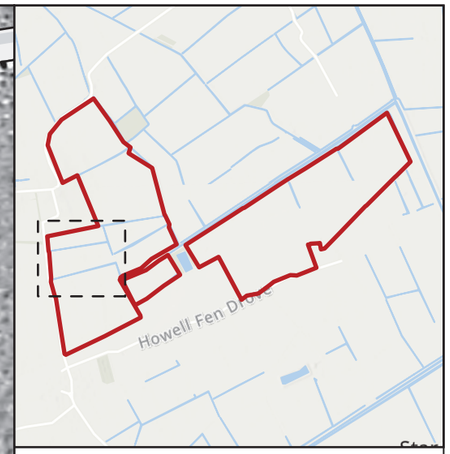
347250

347000

LP_003

LP_005

LP_006



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

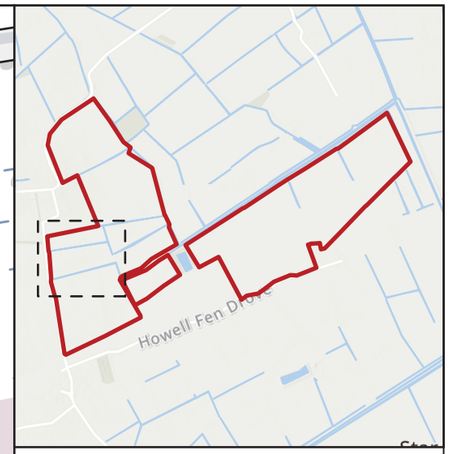
Figure 10: Detailed gradiometer survey results: greyscale LP_003 & LP_005-006

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513400
513600
513800
347400
347200
347000

4021
4033
4044
4022
4023
4035
4014
4034

LP_003
LP_005
LP_006



- Detailed survey extent
- Site Boundary
- Archaeology
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Agricultural feature
- Drain
- Trend
- Increased response
- Ferrous
- Geology

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 11: Detailed gradiometer survey results: interpretation LP_003 & LP_005-006

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513500

513750

514000

347000

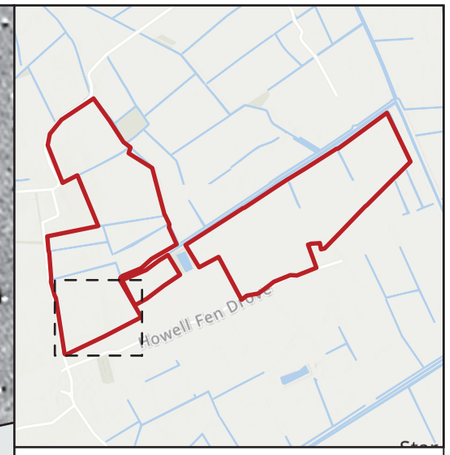
346750

346500

LP_009

LP_008

Howell Fen Drove



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 12: Detailed gradiometer survey results: greyscale LP_006 & LP_008-009

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

513600
513800
514000
347000
346800
346600

4023
4014
4034
4024
LP_009
LP_008
Howell Fen Drove

- Detailed survey extent
- Site Boundary
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Agricultural feature
- Drain
- Increased response
- Ferrous

0 100 m

Date: 11/05/2023 | Created by: LJ
Scale: 1:2,000 @ A3 | Revision: 1

Figure 13: Detailed gradiometer survey results: interpretation LP_006 & LP_008-009

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514000

514250

514500

347250

347000

LP_007

LP_011

LP_010

Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023	Created by: LJ	
Scale: 1:2,000 @ A3	Revision: 1	

Figure 14: Detailed gradiometer survey results: greyscale LP_004, 007 & LP_010-011

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514000

514200

514400

347200

347000

4044

LP_007

LP_011

LP_010

Howell Fen Drive

Detailed survey extent
Site Boundary
Historic cultivation
Drain
Ferrous
Geology

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 15: Detailed gradiometer survey results: interpretation LP_004, 007 & LP_010-011

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514750

515000

347750

347500

LP_012

LP_011

LP_013

LP_014

Hodge Dike

Howell Fen Drive

Detailed survey extent

Site Boundary

-2 nT

3 nT

0

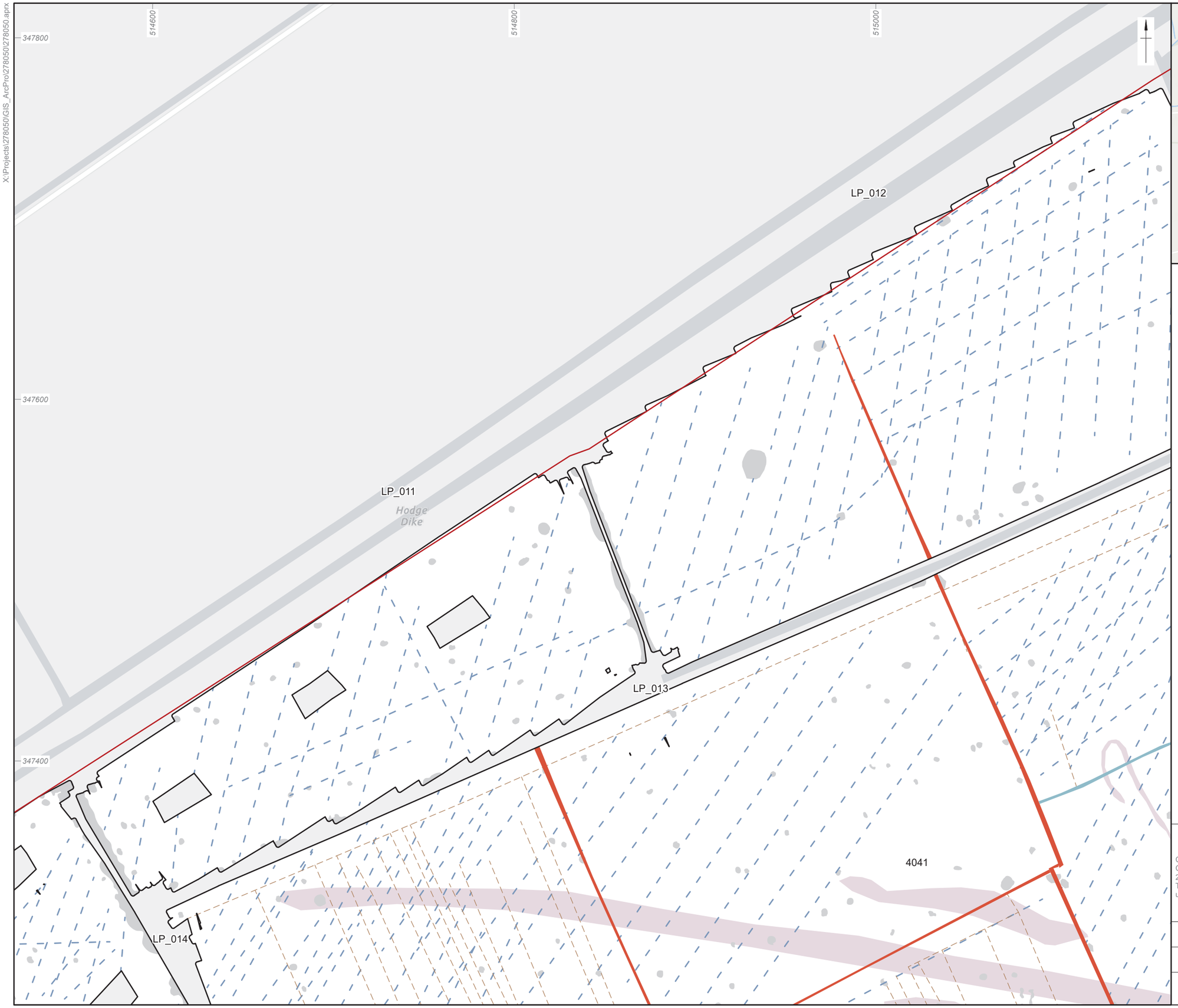
100 m

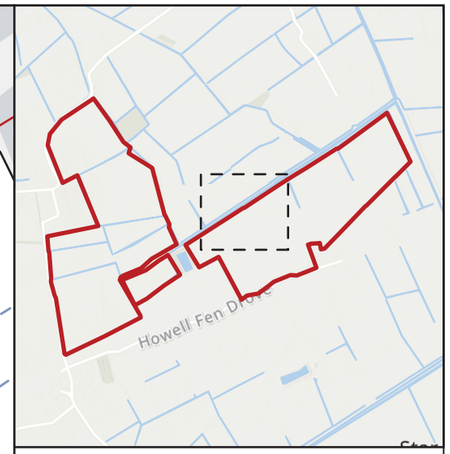
Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 16: Detailed gradiometer survey results: greyscale LP_011-014

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx





- Detailed survey extent
- Site Boundary
- Possible archaeology
- Former field boundary
- Agricultural feature
- Drain
- Ferrous
- Geology

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 17: Detailed gradiometer survey results: interpretation LP_011-014

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514750

515000

347250

347000

LP_014

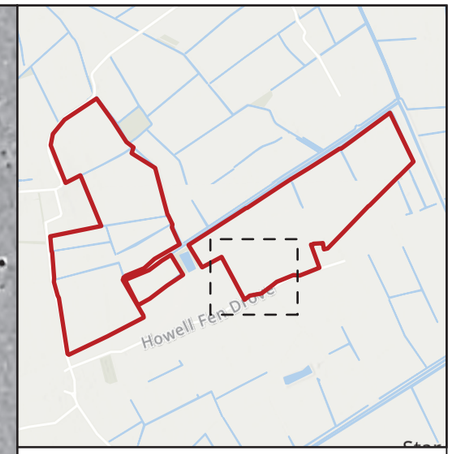
LP_014

Howell Fen Drove

Howell Fen Drove

Howell Fen Drove

Howell Fen Drove



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

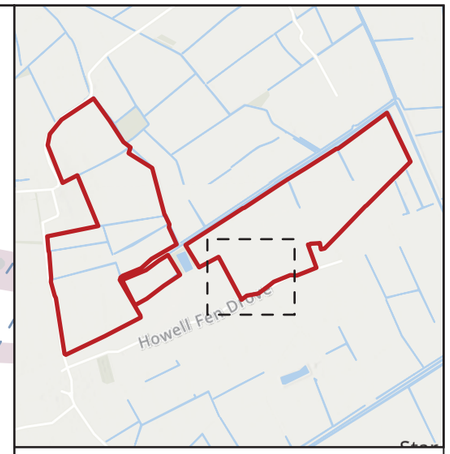
Scale: 1:2,000 @ A3 | Revision: 1

Figure 18: Detailed gradiometer survey results: greyscale LP_011 & LP_013-014

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

514600
514800
515000
347200
347000
346800

LP_014
4041
4039
4027
4040
4026
4017
4025
LP_014
Howell Fen Drove
Howell Fen Drove
Howell Fen Drove



- Detailed survey extent
- Site Boundary
- Possible archaeology
- Former field boundary
- Agricultural feature
- Drain
- Trend
- Increased response
- Ferrous
- Geology

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 19: Detailed gradiometer survey results: interpretation LP_011 & LP_013-014

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515250

515500

347500

347250

LP_015

LP_014

Howell Fen Farmhouse

Howell Fen Drove

Howell Fen Drove

Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 20: Detailed gradiometer survey results: greyscale LP_012-015

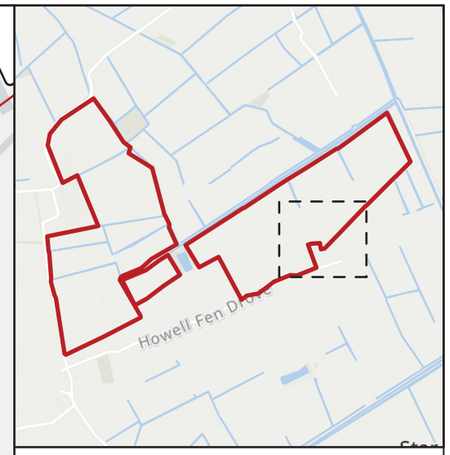
X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

347600
515200
515400
515600
347400
347200

4036
4015
4016
4039
4040

LP_015
LP_014

Howell Fen Farmhouse
Howell Fen Drove



Detailed survey extent
Site Boundary
Possible archaeology
Former field boundary
Historic landscape feature
Agricultural feature
Drain
Trend
Increased response
Ferrous
Geology

0
100 m

Date: 11/05/2023 | Created by: LJ
Scale: 1:2,000 @ A3 | Revision: 1

Figure 21: Detailed gradiometer survey results: interpretation LP_012-015

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515250

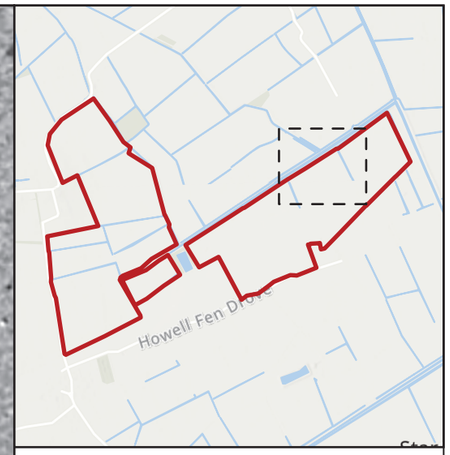
515500

348000

347750

LP_016

LP_015



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

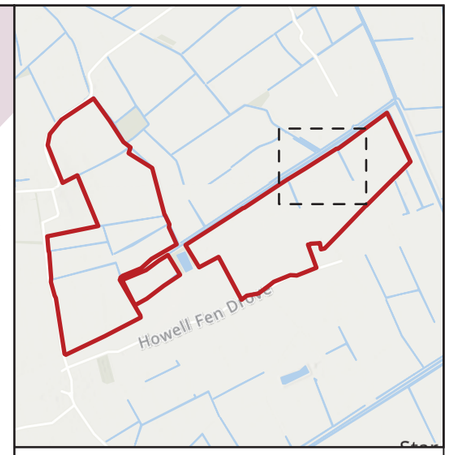
Scale: 1:2,000 @ A3 | Revision: 1

Figure 22: Detailed gradiometer survey results: greyscale LP_012 & LP_015-016

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515200
515400
515600
348000
347800

LP_016
LP_015
4043
4043
4038
4037



Detailed survey extent
Site Boundary
Former field boundary
Historic landscape feature
Agricultural feature
Drain
Increased response
Ferrous
Geology

0
100 m

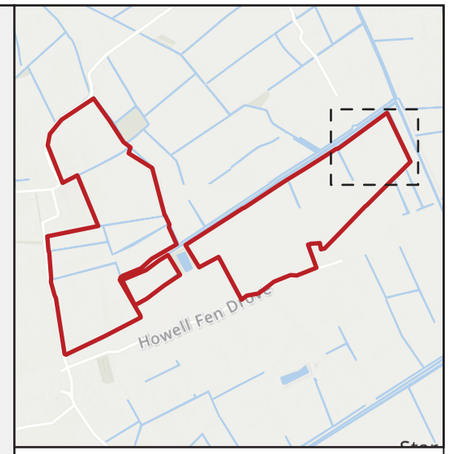
Date: 11/05/2023 | Created by: LJ
Scale: 1:2,000 @ A3 | Revision: 1

Figure 23: Detailed gradiometer survey results: interpretation LP_012 & LP_015-016

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515500
515750
516000
348250
348000
347750

LP_016



Detailed survey extent
Site Boundary

-2 nT
3 nT

0
100 m

Date: 11/05/2023 | Created by: LJ

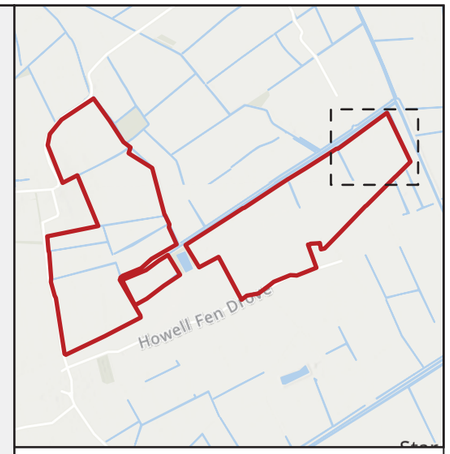
Scale: 1:2,000 @ A3 | Revision: 1

Figure 24: Detailed gradiometer survey results: greyscale LP_015-016

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515600
515800
516000
348200
348000
347800

LP_016
4042
4043
4028



Detailed survey extent
Site Boundary
Former field boundary
Agricultural feature
Drain
Trend
Increased response
Ferrous
Geology

0
100 m

Coordinate system: OSGB 1936 British National Grid

Date: 11/05/2023	Created by: LJ	
Scale: 1:2,000 @ A3	Revision: 1	

Figure 25: Detailed gradiometer survey results: interpretation LP_015-016

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515500

515750

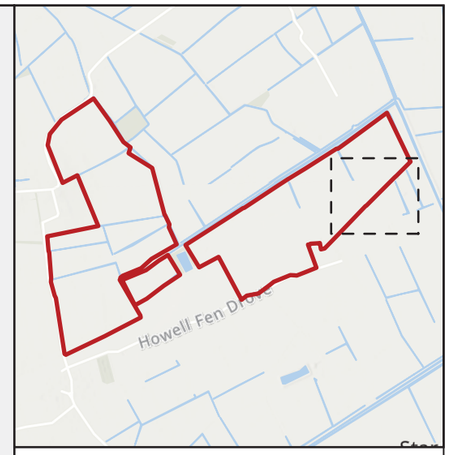
516000

347750

347500

LP_016

LP_015



Detailed survey extent

Site Boundary

-2 nT

3 nT

0

100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

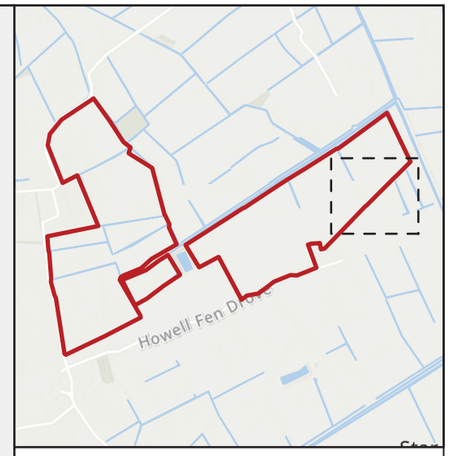
Figure 26: Detailed gradiometer survey results: greyscale LP_015-016

X:\Projects\278050\GIS_ArcPro\278050\278050.aprx

515600
515800
516000
347800
347600
347400

4028
4037

LP_016
LP_015



- Detailed survey extent
- Site Boundary
- Former field boundary
- Historic landscape feature
- Agricultural feature
- Drain
- Trend
- Increased response
- Ferrous
- Geology

0 100 m

Date: 11/05/2023 | Created by: LJ

Scale: 1:2,000 @ A3 | Revision: 1

Figure 27: Detailed gradiometer survey results: interpretation LP_015-016

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk [redacted]

FS 606559

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL
3rd Floor
Brew House
Jacob Street
Tower Hill
Bristol
BS2 0EQ
Tel: +44 (0)117 203 4477

BURY ST EDMUNDS
Armstrong House
Lamdin Road
Bury St Edmunds
Suffolk
IP32 6NU
Tel: +44 (0)1284 765 210

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
The Tun
4 Jackson's Entry
Edinburgh
EH8 8PJ
Tel: +44 (0)131 555 3311

GLASGOW
24 St Vincent Place
Glasgow
G1 2EU
Tel: +44 (0)141 428 4499

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Summit House
12 Red Lion Square
London
WC1R 4QH
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International office:

ALMATY
29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

wardell armstrong

PART OF SLR