



Spalding Solar, Spalding, Lincolnshire

Magnetic Gradiometer Survey Report

Document Ref.: 278522.03
January 2025



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Document Information

Document title Spalding Solar, Spalding, Lincolnshire
Document subtitle Magnetic Gradiometer Survey Report
Document reference 278522.03

Commissioned by Envams Ltd.
Address 54 Hunters Way
 York
 YO24 1JJ

Site location Land off A16, Spalding, PE12 6FA
County Lincolnshire
National grid reference 526267 323155 (TF 26267 23155)
Statutory designations N/A
Planning authority South Holland District Council

WA project name Spalding Solar - TGS
WA project code 278522
Date of fieldwork 09 January 2025
Fieldwork directed by Jack Trueman
Project management by Tom Richardson
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Graphics by Lydia Jones

Quality Assurance

Issue	Date	Author	Approved by
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Summary

A magnetic gradiometer survey was conducted over land at Spalding, Lincolnshire (centred on NGR 526267 323155). The project was commissioned by Envams Ltd. 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 with a photovoltaic (PV) solar array.

The site comprises arable fields located immediately east of the town of Spalding, 20 km north-east of the city of Peterborough in the county of Lincolnshire, covering an area of 4 ha. The geophysical survey was undertaken on 09 January 2025.

The survey has identified several previously mapped and unmapped agricultural features in the form of field boundaries, drainage and an area of former coppice and marshland. This is consistent with the known agricultural nature of the area from the early-medieval period onwards. Two ditches have been detected in the centre of the site which are possibly the remains of an unmapped former field boundary predating the available OS mapping, or a former drain. A much larger feature has been detected crossing the site north-west to south-east which is potentially a large man-made former drain or a natural channel which has likely been altered and straightened to better drain away excess water. There is however, the possibility that this is a natural feature.

In the south of the site the remains of a marshland and two ditches within an area of coppice have been detected, with a former field boundary bordering them to the north. They were recorded on the historical OS mapping, and look to have since been infilled with strongly magnetic rubble or waste. A further previously mapped field boundary to the north has also been identified.

Strong variations in the underlying Tidal Flat deposits have been detected across the site. As former field boundaries and ditches have been detected within the area of Tidal Flat deposits the survey has been effective at this site. However, due to the strength of these natural deposits there is the possibility they may be masking or reducing the detectability of weaker anomalies if present.

The remainder of the anomalies pertain to likely modern agricultural features such as informal routeways and drainage.

Acknowledgements

Wessex Archaeology would like to thank Envams Ltd. for commissioning the geophysical survey. The assistance of Bryony Clement is gratefully acknowledged in this regard.

The fieldwork was undertaken by Jack Trueman and Cameron Lane. Lydia Jones processed and interpreted the geophysical data and wrote the report. This report was quality controlled by Brett Howard and project managed on behalf of Wessex Archaeology by Tom Richardson.



Spalding Solar, Spalding, Lincolnshire

Magnetic Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by Envams Ltd. to carry out a geophysical survey at Spalding Solar, Spalding, Lincolnshire (centred on NGR 526267 323155) (**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 the site with a photovoltaic (PV) solar array.

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 site is located immediately east of the town of Spalding, 20 km north-east of the city of Peterborough in the county of Lincolnshire.
- 1.3.2 The survey comprises 4 ha of agricultural land, currently utilised for pasture. The site is bounded to the north by Pilgrim's UK and industrial developments, to the east by the A16, to the south by the junction between Low Road and the A16, and to the west by the Coronation Channel. The site tapers to the south, bound by a roundabout where Low road and the A16 meet. It is currently split into three separate fields, with the hardstanding from the industrial site to the north.
- 1.3.3 The site is mainly flat varying between 2 m above Ordnance Datum (aOD) to 4 m aOD.
- 1.3.4 The solid geology comprises mudstone of Oxford Clay Formation, with overlying superficial geological deposits of clay and silt tidal flat deposits (BGS 2024).
- 1.3.5 The soils underlying the northern site are likely to consist of loamy and clayey soils of coastal flats with naturally high groundwater (Cranfield University 2024). 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 BACKGROUND

2.1 Introduction

- 2.1.1 The archaeological and historical background was assessed in a prior desk-based assessment (DBA) (Wessex Archaeology 2024a), which considered the recorded historic environment resource within a 1 km study area of the proposed development. The following archaeological background is not exhaustive but is summarised from aspects of the DBA that are considered relevant to the interpretation of the geophysical survey data. The DBA used sources such as the National Heritage List for England (NHLE), the Lincolnshire Historic Environment Record (LHER) and other relevant sources.

2.2 Archaeological and historical context

Designated heritage assets

- 2.2.1 Within the study area are various listed buildings including a Grade I church (NHLE 1306702) 390 m north of the site, with the Grade II* buildings of East Elloe (NHLE 1359525), Vicarage (NHLE 1392209), and Willesby (NHLE 1063991) 975 m west, 430 m north, and 980 m west respectively. Two Grade II listed dwellings, Fulney Hall (NHLE 1063984) and 69 and 71 Albion Street (NHLE 1063990) are located 410 m north and 980 m west of the site.

Non-designated heritage assets

Romano-British

- 2.2.2 Typically, the Roman road systems avoided the Fen region, except for minor roads designed for exporting the products of the region, especially salt, beef, and leather. There has been a variety of Romano-British features uncovered, primarily in the northern half of the study area, indicating at least a low-level of activity within the area.
- 2.2.3 As salt was one of the region's largest exports during the period, evidence that salt making possibly occurred nearby was identified 450 m north-east of the site. A north-east to south-west ditch was uncovered, where the fill contained sherds of 3rd to 4th-century Roman pottery and fragments of burnt clay, thought to be briquetage (a very coarse pottery) typically associated with the process of salt making. Only 225 m north of this site, further Romano-British features were identified below post Roman silts. Consisting of cut features, a possible ditch or creek was recorded which contained one early 2nd-century shelly ware sherd, another cut feature also held pottery of the 1st to 2nd century.
- 2.2.4 To the north-east of the site (790 m) a single grave aligned north – south was identified from the presence of coffin nails and the alignment of the grave. It has been suggested that the burial was Romano-British in date.
- 2.2.5 As well as the above features there have been six further instances of Roman pottery identified throughout the study area.

Saxon – medieval

- 2.2.6 During the Saxon period Lincolnshire likely comprised a number of small tribal units, with documentary evidence from the period, the Tribal Hidage, suggesting the presence of the Spalda peoples in Spalding in the early Saxon period. These tribes were later amalgamized to create the region of Middle Anglia, before coming under Mercian control in the 7th century (Albone 2006).
- 2.2.7 The name Spalding derives from Old English and means a narrow opening or slit, in reference to a topographical feature. The settlement is recorded in the Domesday records as a large prosperous settlement; in 1089 approximately 116 families lived there. Domesday also records a market, saltpans, a wood of alders and 10 fisheries, one of which yielded 1500 eels (Cameron 1998). The historic Anglo-Saxon settlement can be seen within the west of the study area, 960 m from the site.
- 2.2.8 By the early 14th century, Spalding had grown to become one of the wealthiest towns in the Lincolnshire Fens, serving as a port and commercial centre for such inland towns such as Stamford, Peterborough, and Bourne (Symonds 1988).
- 2.2.9 The LHER data indicates that the majority of assets identified from the medieval period within the study area appear to be concentrated within the north-eastern and eastern

bounds of Spalding, with further sparse levels of other known medieval activity outside of this.

- 2.2.10 The medieval activity that has been identified within the study area is broadly comprised of medieval pottery fragments and several medieval field boundaries. Several instances of local industry have been uncovered during at Holbeach Road 550 m north of the site, revealing large-scale crop processing from the 12th century and ironworking from the 13th century to the early post-medieval period. Both of these would have played an important part in the local economy.
- 2.2.11 During excavations 490 m north of the site, evidence was uncovered of a small medieval settlement, thought to be in use from the 11th – 14th century. Evidence for this settlement included ditches flanking a trackway and rubbish pits containing a number of finds.
- 2.2.12 It is likely that during the early medieval to medieval periods the site sat within the agricultural hinterland of Spalding and its associated smaller settlements.

Post-medieval – 20th century

- 2.2.13 The importance of Spalding as a port declined as the nearby port of Bicker Haven gradually silted up during the 15th and 16th centuries. However, Spalding was still an important commerce centre during the 17th and 18th centuries, due to its location at the lowest bridging point of the Welland. The river was still navigable to Stamford, and Spalding became a centre for river traffic between the fens of south Lincolnshire, and the uplands in the west.
- 2.2.14 The river Westlode was also an important feature used to import corn from surrounding villages. The importance of the river systems at Spalding meant that its main rivers, such as the Welland had to be maintained, and in 1743 the River Welland was canalised and deepened. The use of the rivers allowed the town to grow, and this growth in prosperity is apparent in some of the residential properties built during this period, especially between 1750 and 1850. The Grade II listed East Etloe and 69 - 71 Albion Street (NHLE 1359525 & NHLE 1063990) date from this period which saw more and more properties being constructed on the banks of the rivers.
- 2.2.15 As the settlement continued to thrive, a large number of archaeological features relating to the post-medieval phase of settlement in Spalding have been identified including ditches, drains, cellars, cess pits, walls, and flooring. The historic core of the settlement lies just west of the study area and is broadly represented by the bounds of a Conservation Area.
- 2.2.16 Evidence of a brick making site as well as general settlement and agricultural activity have also been identified 100 m west of the site off Low Road indicating that the settlement had started expanding towards the site during this period.
- 2.2.17 The post-medieval period saw nationwide enclosure of the medieval open field system through parliamentary act or private agreement; however, archival evidence suggests that within the parish of Spalding, the act of enclosure was post-production of the tithe map and awards. As such, the tithe records could not be located for reference and the earliest available mapping of the site is the First Edition 1888 Ordnance Survey (OS) Map.
- 2.2.18 The First Edition mapping indicates that at least at the time of the later 19th century, the site was situated within the wider agricultural landscape to the east of the town. The site itself was largely part of one parcel of land despite several roads crossing throughout, separating

it into five sections. Within the south of the site a small parcel of land can be seen as a mix of coppice and marshland.

- 2.2.19 By the 1930's the northern section of the site has been amalgamated into one larger field with the road traversing the site from north-west to south-east following the same route as the present-day field boundary. In the south, the area of marshland is still present separated by a road crossing east to west. By the 1960s the only change within the site is the removal of the marshland and a further smaller subdivision of field within the most northern extent of the site. The map also shows that the Coronation Channel to the west had been built by then.

Undated

- 2.2.20 LiDAR imagery was consulted during the preparation of the DBA (Wessex Archaeology 2024). The LiDAR confirmed the features indicated could be identified on historical mapping, for example, the former lands/roads and field divisions crossing the site and the area of marshland in the south.

3 METHODOLOGY

3.1 Introduction

- 3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 09 January 2025. Field conditions were wet throughout the period of survey. An overall coverage of 3.52 ha was achieved, with reductions due to vegetation at the edges of fields and the existing industrial estate in the north.
- 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 2024b) and Lincolnshire County Councils Archaeology Handbook (2024), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014; revised 2020) and Europae 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; and
 - Where possible, to determine the general nature of any anomalies of archaeological potential.

3.3 Fieldwork methodology

- 3.3.1 The cart-based gradiometer system used a Carlson BRX-7 RTK GNSS instrument, which receives corrections from a network of reference stations operated by the OS. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds Europae Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).
- 3.3.2 The survey was conducted using four Sensys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of $\pm 8 \mu\text{T}$ over $\pm 1000 \text{ nT}$ range at a rate of 100 Hz, producing intervals of 0.02 m along transects spaced 4 m apart.

3.4 Data processing

- 3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'Destripe' function ($\pm 5 \text{ nT}$ 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 magnetic gradiometer survey has identified magnetic anomalies across the site. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:2000 (**Figures 2 and 3**). Due to technical difficulties at the time of reporting, XY trace plots could not be published. They will be generated at a later date and provided as a supplementary appendix. The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image.
- 4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, 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 Two weak positive linear anomalies have been detected in LP_001 and 002 at **4000** and **4001** respectively. They are 42 m and 48 m long and up to 1.5 m wide, and both cross the fields east – west. Their magnetic properties and morphology are typical of infilled ditched features. Historical mapping shows that the immediate and wider area was previously split into fields formed by ditched boundaries. The anomalies are similar in orientation to these

previously mapped field boundaries. It is considered likely that these anomalies are the remains of a former unmapped field boundary predating the available mapping. The former mapped field boundaries are likely post-medieval in date, and given the agricultural activity from this period already recorded in the surrounding area, it is likely they are of a similar date. However, given the site also sits within the agricultural hinterland of medieval Spalding, an earlier medieval origin cannot be discounted. It is also possible that given the wetland nature of the site and proximity to the Coronation Channel, that they may be drains.

- 4.2.2 A diffuse linear anomaly has been detected crossing LP_002 at **4002**. Its magnetic properties change along its length; it exhibits a negative properties in the north, positive in the south, and is very weak centrally. In the centre and north the anomaly appears to cut into the background natural responses caused by the superficial Tidal Flat deposits, possibly indicating a more modern origin. It is 165 m long and up to 2 - 6 m wide, however given its diffuse nature it is difficult to confidently measure its width. Its diffuse and variable magnetic properties are more reminiscent of a natural feature, possibly associated with a drainage channel. However, given its more linear morphology at its northern end there is the possibility it is a man-made channel, or natural channel which has since been altered and straightened to better drain away excess water.
- 4.2.3 In the south of LP_001 are several areas of strong magnetic disturbance at **4003** and **4004**. This disturbance covers a roughly rectangular area of 97 m by 46 m. The two anomalies at **4004**, immediately west of **4003**, exhibit similar magnetic properties, however, both are linear in morphology, are between 114 m and 86 m long, up to 17 m wide, and are oriented north – south. These anomalies correspond with an area of marshland (**4003**) and two ditches (**4004**) for water management that ran between an area of coppice that are recorded on the OS mapping from 1887 (Lincolnshire CXXXIV.SW) to 1955 (TF22). It is likely that the strong magnetic field of these anomalies is caused by the infilling of the marshland and ditches with magnetically enhanced rubble and waste.
- 4.2.4 To the north of **4004**, in LP_001, is a strong linear L-shaped anomaly at **4005**. It broadly crosses the field west to east and then continues south. It is 111 m long and up to 3 m wide. This anomaly corresponds with a former ditched field boundary recorded on the OS mapping from 1887 (Lincolnshire CXXXIV.SW) to 1955 (TF22). A very weak narrow positive anomaly looks to run parallel to **4005** 20 m to the north. This appears to branch off the north-west. Given the orientation it may be another former field boundary however its weak and narrow nature is more reminiscent of a drain or cultivation trend.
- 4.2.5 A further mapped former field boundary has been detected at **4006**. It is a weak positive L-shaped linear anomaly in LP_002. Its southern element is oriented west-south-west to north-east-north before being diverted north. It is 75 m long and up to 1 m wide. It is in the same position as a former field boundary recorded on the OS mapping from 1887 (Lincolnshire CXXXIV.SW) and is no longer recorded on the 1931 OS map (25-inch map, Wessex 2024a).
- 4.2.6 The anomalies at **4003** – **4006** are likely post-medieval in date, however given their position within the agricultural hinterland of medieval Spalding and its surrounding smaller settlements, an earlier medieval origin cannot be entirely discounted.
- 4.2.7 Both strong negative and positive amorphous and diffuse anomalies have been detected across the majority of the site. They are typical of variations in the underlying superficial Tidal Flat deposits. Given the strength of these anomalies it should be noted that they have the potential to mask or reduce the detectability of weaker archaeological anomalies if present.



- 4.2.8 Several weak linear anomalies have been detected across the site, these are considered likely to be the remains of agricultural features such as informal routes used by animals and vehicles, or possibly related to modern drainage.

5 DISCUSSION

- 5.1.1 The survey has identified several previously mapped and unmapped agricultural features in the form of field boundaries, drainage and an area of former coppice and marshland. This is consistent with the known agricultural nature of the area from the early-medieval period onwards. Two ditches have been detected in the centre of the site which are possibly the remains of an unmapped former field boundary predating the available OS mapping, or a former drain. A much larger feature has been detected crossing the site north-west to south-east which is potentially a large man-made former drain or a natural channel which has likely been altered and straightened to better drain away excess water. There is however, the possibility that this is a natural feature.
- 5.1.2 In the south of the site the remains of a marshland and two ditches within an area of coppice have been detected, with a former field boundary bordering them to the north. They were recorded on the historical OS mapping, and look to have since been infilled with strongly magnetic rubble or waste. A further previously mapped field boundary to the north has also been identified.
- 5.1.3 Strong variations in the underlying Tidal Flat deposits have been detected across the site. As former field boundaries and ditches have been detected within the area of Tidal Flat deposits the survey has been effective at this site. However, due to the strength of these natural deposits there is the possibility they may be masking or reducing the detectability of weaker anomalies if present.
- 5.1.4 The remainder of the anomalies pertain to likely modern agricultural features such as informal routeways and drainage.

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APPENDICES

Appendix 1 Survey equipment and data processing

Survey methods and equipment

The magnetic data for this project were acquired using a non-magnetic hand-pushed cart fitted with four SenSys FGM650/3 magnetic gradiometers. The instrument has four assemblies fixed horizontally at 1 m 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 $\pm 8 \mu\text{T}$ over $\pm 1000 \text{ nT}$ 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 FGM650/3 probes at a rate of 20 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 Carlson BRX-7 RTK system. This receives corrections from a network of reference stations operated by the Ordnance Survey (OS), 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

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 Bartington Grad 601-2 fluxgate gradiometer 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;
- Despiking – 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

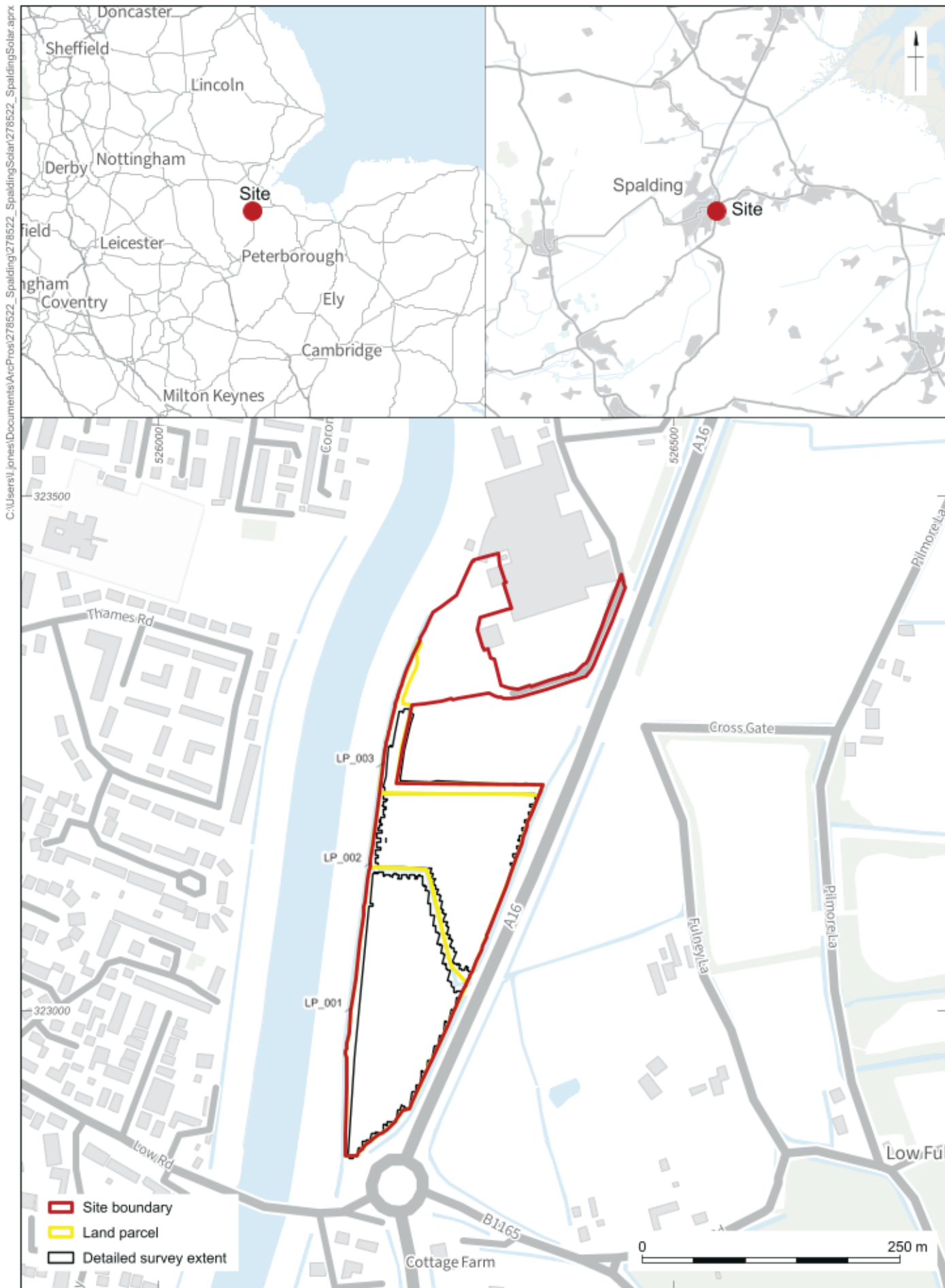
OASIS Summary for wessexar1-530940

OASIS ID (UID)	wessexar1-530940
Project Name	Geophysical Survey at Spalding Solar
Sitename	Spalding Solar
Sitecode	278522
Project Identifier(s)	278522
Activity type	Geophysical Survey, MAGNETOMETRY SURVEY
Planning Id	
Reason For Investigation	Planning requirement
Organisation Responsible for work	Wessex Archaeology
Project Dates	09-Jan-2025 - 09-Jan-2025
Location	Spalding Solar NGR : TF 26267 23155 LL : 52.791199599632215, -0.128945027251755 12 Fig : 526267,323155
Administrative Areas	Country : England County/Local Authority : Lincolnshire Local Authority District : South Holland Parish : South Holland, unparished area
Project Methodology	The magnetic data for this project were acquired using a non-magnetic hand-pushed cart fitted with four SenSys FGM650/3 magnetic gradiometers. The instrument has four or eight sensor assemblies fixed horizontally at 1 m or 0.5 m apart allowing four or eight 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 $\pm 8 \mu\text{T}$ over $\pm 1000 \text{ nT}$ 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 FGM650/3 probes at a rate of 20 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 Carlson BRX-7 RTK system. This receives corrections from a network of reference stations operated by the Ordnance Survey (OS), 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).



Project Results	The survey has identified several previously mapped and unmapped agricultural features in the form of field boundaries, drainage and an area of former coppice and marshland. This is consistent with the known agricultural nature of the area from the early-medieval period onwards. Two ditches have been detected in the centre of the site which are possibly the remains of an unmapped former field boundary predating the available OS mapping, or a former drain. A much larger feature has been detected crossing the site north-west to south-east which is potentially a large man-made former drain or a natural channel which has likely been altered and straightened to better drain away excess water. There is however, the possibility that this is a natural feature. In the south of the site the remains of a marshland and two ditches within an area of coppice have been detected, with a former field boundary bordering them to the north. They were recorded on the historical OS mapping, and look to have since been infilled with strongly magnetic rubble or waste. A further previously mapped field boundary to the north has also been identified. Strong variations in the underlying Tidal Flat deposits have been detected across the site. As former field boundaries and ditches have been detected within the area of Tidal Flat deposits the survey has been effective at this site. However, due to the strength of these natural deposits there is the possibility they may be masking or reducing the detectability of weaker anomalies if present. The remainder of the anomalies pertain to likely modern agricultural features such as informal routeways and drainage.
Keywords	
Funder	Private or public corporation Envams Ltd
HER	Lincolnshire HER - unRev - STANDARD
Person Responsible for work	tom richardson
HER Identifiers	
Archives	

Report generated on: 17 Jan 2025, 15:38

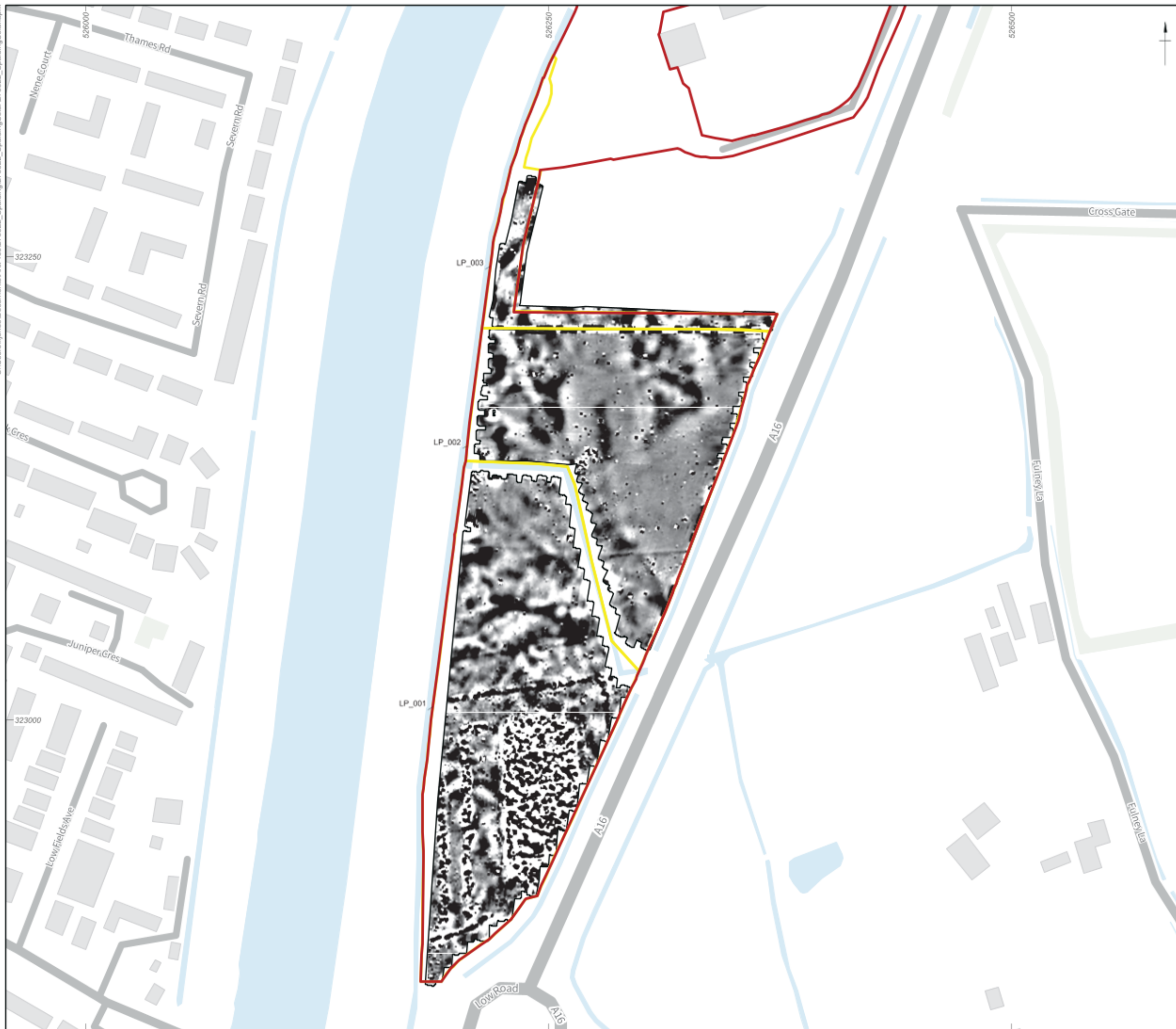


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Figure 1: Site location and boundary





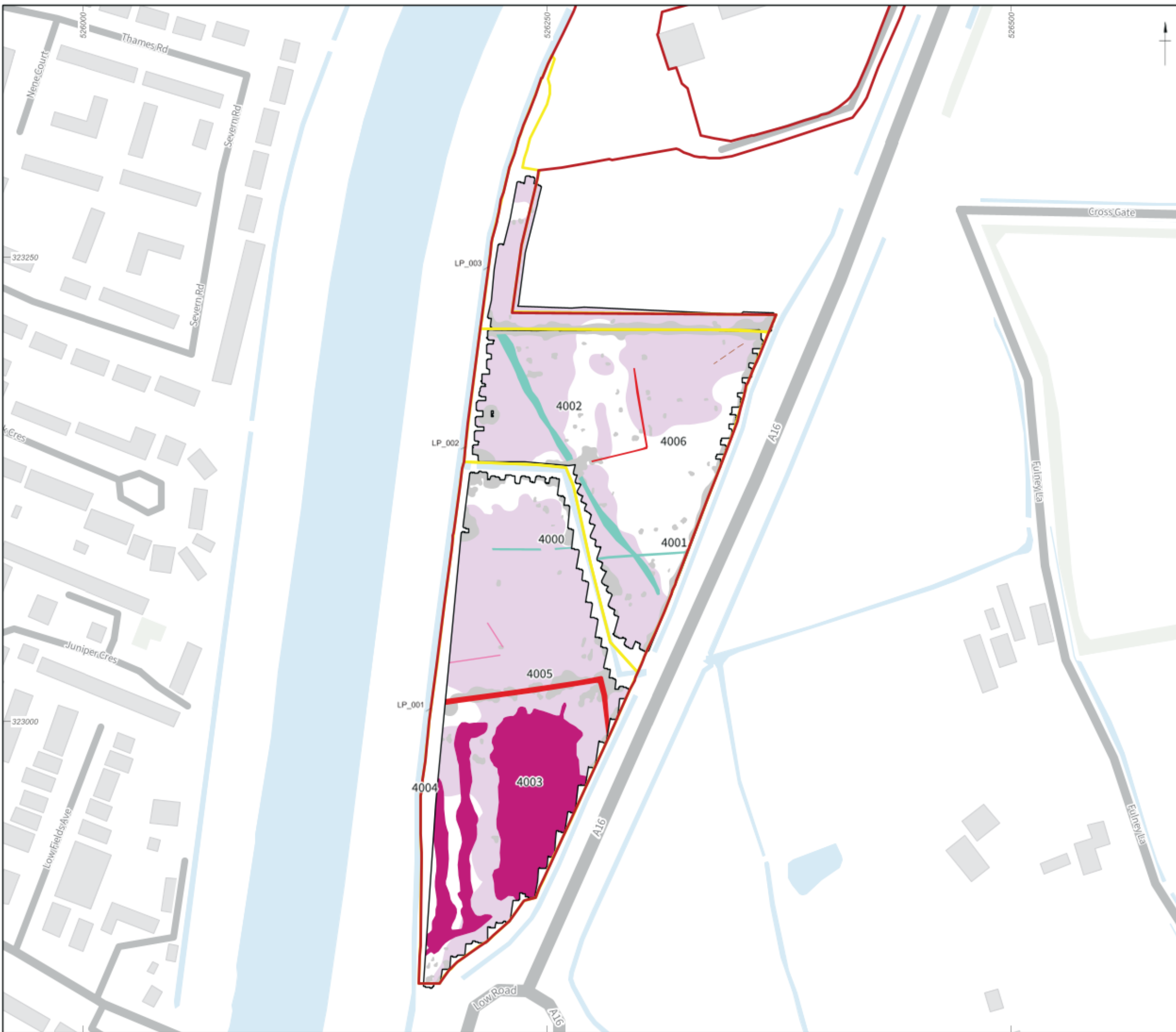
- Site boundary
- Land parcel
- Detailed survey extent



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Figure 2: Magnetic gradiometer survey - greyscale plots



Site boundary
Land parcel
Detailed survey extent
Possible archaeology
Former field boundary
Historic landscape feature
Ferrous
Agricultural feature
Trend
Geology

0 100 m

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Figure 3: Magnetic gradiometer survey - interpretation



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