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**Land at Needingworth Road, St Ives,  
Cambridgeshire**

Geophysical Survey

CHER: ECB4501

Authors: Matthew Baker & Dave Bescoby	
NGR: TL 3277 7204	Report No: 4925
District: St Ives	Site Code: ECB4501
Approved: Claire Halpin MCIfA	Project No: P6266
Signed:	Date: 24 August 2015

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### **OASIS SUMMARY SHEET**

OASIS SUMMARY SHEET			
<b>Project details</b>			
Project name	Land at Needingworth Road, St Ives, Cambridgeshire		
<p><i>In August 2015, Archaeological Solutions Limited (AS) carried out a geophysical survey of land at Needingworth Road, St Ives, Cambridgeshire (NGR TL 3277 7204). The survey was undertaken in association with a planning application for construction of a new storage building and use of land for open storage with surfacing, drainage works and landscaping on land north of Needingworth Industrial Estate, Needingworth Road, Holywell-cum-Needingworth, Cambridgeshire.</i></p> <p><i>The geophysical survey identified an enclosure and possible associated linear anomalies, which may be of prehistoric date. The data also showed several regular linear magnetic anomalies, concentrated in the eastern portion of the study area. These are likely to represent eroded ridge and furrow. There is some correlation between the geophysical data and cropmarks identified from aerial photographs. Post-medieval/ modern activity was recorded in the form of a drainage pond identified from the 1888 Ordnance Survey map. Modern activity was identified as regular linear responses across the central portion of the site may represent land drains.</i></p>			
Project dates (fieldwork)	11th-13th August 2015		
Previous work (Y/N/?)	N	Future work	TBC
P. number	6266	Site code	ECB4501
Type of project	Geophysical Survey		
Site status	-		
Current land use	Agricultural		
Planned development	Industrial development		
Main features (+dates)	<p><i>Two linear anomalies of likely archaeological origin (undated).</i></p> <p><i>One possible sub-oval ditched enclosure with internal features (undated, although may be prehistoric in origin).</i></p> <p><i>Eroded ridge and furrow cultivation (medieval?).</i></p> <p><i>Historical drainage pond which correspond with the 1888 Ordnance Survey map (post-medieval).</i></p>		
Significant finds (+dates)	-		
<b>Project location</b>			
County/ District/ Parish	Cambridgeshire	St Ives	Holywell-cum-Needingworth
HER/ SMR for area	Cambridgeshire HER (CHER)		
Post code (if known)	PE27 3ND		
Area of site	c.5ha		
NGR	TL 3277 7204		
Height AOD (max/ min)	Approximately 5m AOD		
<b>Project creators</b>			
Brief issued by	Cambridge County Council		
Project supervisor/s	Matthew Baker		
Funded by	Burgess & Walker Transport		
Full title	Land at Needingworth Road, St Ives, Cambridgeshire: Geophysical Survey		
Authors	Baker, M. & Bescoby, D.		
Report no.	4925		
Date (of report)	August 2015		

# Land at Needingworth Road, St Ives, Cambridgeshire

## GEOPHYSICAL SURVEY

### SUMMARY

*In August 2015, Archaeological Solutions Limited (AS) carried out a geophysical survey of land at Needingworth Road, St Ives, Cambridgeshire (NGR TL 3277 7204). The survey was undertaken in association with a planning application for construction of a new storage building and use of land for open storage with surfacing, drainage works and landscaping on land north of Needingworth Industrial Estate, Needingworth Road, Holywell-cum-Needingworth, Cambridgeshire.*

*The geophysical survey identified a sub-oval enclosure and possible associated linear anomalies, which may be of prehistoric date, and a further possible square enclosure of unknown date. The data also showed several regular linear magnetic anomalies, concentrated in the eastern portion of the study area. These are likely to represent eroded ridge and furrow. There is some correlation between the geophysical data and cropmarks identified from aerial photographs. Post-medieval/ modern activity was recorded in the form of a drainage pond identified from the 1888 Ordnance Survey map. Modern activity was identified as regular linear responses across the central portion of the site may represent land drains.*

### 1 INTRODUCTION

1.1 In August 2015, Archaeological Solutions Limited (AS) carried out a geophysical survey of land at Needingworth Road, St Ives, Cambridgeshire (NGR TL 3277 7204; Figs. 1 - 2). The survey was undertaken to provide for the initial requirement of a condition of planning approval for the development (Hunts DC Ref. 1401871OUT) on advice from CCC HET. It is proposed to construct of a new storage building and use of land for open storage with surfacing, drainage works and landscaping on land north of Needingworth Industrial Estate, Needingworth Road, Holywell-cum-Needingworth, Cambridgeshire. The geophysical survey is to be followed by a trial trench evaluation of the site.

1.2 The evaluation was conducted in accordance with advice from the Cambridgeshire County Council Historic Environment Team (CCC HET), and a specification compiled by AS (dated 01/07/2105), approved by CCC HET. The geophysical survey was carried out in accordance with the English Heritage document *Geophysical Survey in Archaeological Field Evaluation*, 2008, and IFA Paper 6: *The use of Geophysical Techniques in Archaeological Evaluations* and *CIfA Standard and Guidance for Archaeological Geophysical Survey* (revised 2014). It also adhered to Gurney (2003) *Standards for Field Archaeology in the East of England*.

## *Objectives*

1.3 The principal objectives for the evaluation were:

- To determine the location, date, extent, character, condition, significance and quality of any surviving remains liable to be threatened by the proposed development. In particular, it was important to establish the presence or absence of surviving sub-surface remains.
- To provide an adequately detailed project report to place the findings of the project in their local and regional context, with reference to the East Anglian Regional Research Frameworks and through relevant background research.

## *Planning policy context*

1.4 The National Planning Policy Framework (NPPF 2012) states that those parts of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest are heritage assets. The NPPF aims to deliver sustainable development by ensuring that policies and decisions that concern the historic environment recognise that heritage assets are a non-renewable resource, take account of the wider social, cultural, economic and environmental benefits of heritage conservation, and recognise that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term. The NPPF requires applications to describe the significance of any heritage asset, including its setting that may be affected in proportion to the asset's importance and the potential impact of the proposal.

1.5 The NPPF aims to conserve England's heritage assets in a manner appropriate to their significance, with substantial harm to designated heritage assets (i.e. listed buildings, scheduled monuments) only permitted in exceptional circumstances when the public benefit of a proposal outweighs the conservation of the asset. The effect of proposals on non-designated heritage assets must be balanced against the scale of loss and significance of the asset, but non-designated heritage assets of demonstrably equivalent significance may be considered subject to the same policies as those that are designated. The NPPF states that opportunities to capture evidence from the historic environment, to record and advance the understanding of heritage assets and to make this publicly available is a requirement of development management. This opportunity should be taken in a manner proportionate to the significance of a heritage asset and to impact of the proposal, particularly where a heritage asset is to be lost.

## **2 DESCRIPTION OF THE SITE**

2.1 The site is located to the north of the existing Needingworth Industrial Estate, south of the A1123 Needingworth Bypass, east of St Ives. It extends to c.3.8ha, with a further area proposed for open storage to the immediate east,

totalling c.5.2ha. The site lies on Oxford Clay, with overlying alluvial deposits, at c.6m AOD. It is currently a field.

### **3 ARCHAEOLOGICAL BACKGROUND**

3.1 The site lies within an area of archaeological potential, where known extensive evidence of multi-period landscape activity is recorded on the Cambridgeshire Historic Environment Record (HER).

3.2 Aerial photography has revealed enclosures adjacent to the proposed development area (HER 08272), recorded as medieval in date but potentially earlier. Cropmarks to the north of the site reveal a series of rectilinear enclosures which likely reflect late prehistoric or Roman settlement (HER 08275). Further similar enclosures are known to the south and east (HER 09179; HER 09180). Archaeological investigations in advance of the construction of the Needingworth Bypass north east of the site revealed features relating to Roman settlement and industry, sealed by later alluvial deposits (HER ECB 1042).

3.3 The alluvial deposits known from the area may mask the location of any further archaeological features.

3.4 An aerial photo graphic assessment has been prepared for the site. The report (Cox and Lang 2015; **Fig. 3**) concluded:

*"This assessment has demonstrated the presence of a D-shaped ditched probable settlement enclosure with other associated ditches, of unknown date, within the site. The site was ploughed in the medieval period and contains traces of eroded ridge and furrow and a possible buried feature of unknown type. Linear features previously recorded within the site are likely to be caused by modern field drainage rather than buried enclosures. The wider area was settled and used heavily in the past, and detailed cropmarks reveal traces of a former enclosed settlement, bounded by a substantial straight double ditched enclosure, which contains curvilinear enclosures, ditches, pits and small quarries, to the north of the site. Excavations in 1994 revealed a further Romano-British enclosure and palisade just outside the north east corner of the site. A further enclosure has been recorded to the immediate south of the site. It is therefore likely that the site will contain further archaeological features which are not visible on aerial photographs, or are masked by ridge and furrow and/or colluvial deposits."*

### **4 METHOD OF WORK**

#### *Introduction*

4.1 The magnetic survey was performed using a dual sensor Grad601-2 Magnetic gradiometer manufactured by Bartington instruments Ltd. The gradiometer measures small distortions in the earth's magnetic field caused



by the presence of magnetically susceptible buried objects. The instrument is extremely sensitive and capable of detecting changes in magnetic field strength of the order of 0.1 nanoTesla (nT).

### *Survey Methodology*

4.2 All fieldwork methods complied with the guidelines issued by English Heritage (now Historic England) and by the Chartered Institute for Archaeologists (EH, 2008; ClfA 2014) and with the method statement for the project (Archaeological Solutions, dated 01/07/ 2015). Grid squares measuring 30m x 30m were set out across the entirety of the survey area, forming a grid network – see **Fig. 4**. The exact spatial location of the survey grid was recorded using a Leica GS09 GPS smart rover. Geophysical data were collected systematically in a zig-zag pattern within each grid square along traverses spaced at 1 m apart. The gradiometers were configured to record readings at 0.25 m intervals along each traverse, giving a total of 3600 measurements per grid square.

### *Data Processing*

4.3 The remedial processing of the data can enhance anomalous responses caused by potential archaeological features and eliminate magnetic noise from natural/modern sources. Data processing also allows for the correction of spatial errors introduced during the survey and inherent instrument heading errors. The survey data were processed using Terrasurveyor LITE software, where the following data processing routines were applied:

Destripe: Removal of striping effects from the raw data caused by discrepancies between different sensors and walking directions.

Destagger: Correction of the displacement of anomalies caused by alternate zig-zag traverses. These displacements are often observable in gradiometer data collected with zig-zag traverses if the sample interval is less than 1m.

Compress: Weak anomalies of archaeological interest were further enhanced by applying an arctangent weighing to the data, accentuating small magnetic responses.

Despike: Removal of random, high amplitude 'iron spikes' present in the data caused by ferrous debris in the near surface.

Low-pass filter: A Gaussian low-pass filter was applied to the data to enhance the visibility of weak linear anomalies within the dataset.

Interpolation: Finally the overall appearance of the data were improved (smoothed) by adding interpolated data points between each traverse using a binomial function.



### *Display and interpretation*

4.4 The processed data were displayed as a greyscale magnetic map and the interpretation of anomalous magnetic responses undertaken manually with recourse to documented responses from subsequently excavated features along with reference to Cambridgeshire HER and an AP cropmark assessment of the study area. A graphical interpretative plan of the site identifying potential archaeological features was then produced in Autocad.

## **5 RESULTS**

5.1 The unprocessed data from the magnetic survey are shown in **Fig. 5**, displayed as an x-y trace plot indicating the overall range of magnetic values recorded within the study area. A greyscale plot of the processed data, following the application of the data processing methodology described in 5.3, is shown in **Fig. 6**, while **Fig. 7** shows the same data displayed as a contour plot. The processed data revealed a number of positive responses of potential archaeological significance, the interpretation of the most prominent anomalies are described below.

### *Interpretation*

5.2 The survey revealed several linear anomalies within the survey area, with a noticeable concentration in the north-eastern corner of the field. Some of these anomalies appear to correspond with cropmarks noted in the CHER (08272 and CB15347) and an aerial photographic assessment of the site (Cox and Lang 2015). The majority of the anomalies appear as weak positive trending responses. Some of the anomalies show intermittent responses along their length which is suggestive of a degree of truncation. The following numbered anomalies refer to numerical labels on the interpretation plot (**Fig. 8**).

5.3 In the western half of the study area, the data shows a pronounced positive trending linear anomaly **(1)**. The anomaly follows a NW-SE alignment for c.23m before being truncated by a modern land drain **(7)**. Immediately to the south east of anomaly **(1)** is a further positive trending linear anomaly of varying amplitudes **(2)**, which has a NW-SE alignment for c.21m before changing to a E-W orientation for c.13m. It is possible that this anomalous response represents a continuation of **(1)**.

5.4 To the immediate south west of anomaly **(2)** is a weakly positive sub-oval linear anomaly c.12m wide, with possible internal features **(3)**. Although no correlating feature has been identified in the cropmark data, its overall form

does seem to share similarities with CHER number **09180** which has identified an undated D-shaped ditched enclosure to the south of the survey area (**Fig. 3**).

5.5 Along the western boundary of the survey area another weakly trending positive anomalous response was recorded (**4**), forming a regular 'L' shape c. 10 m across. The proximity of this anomaly to a fenced boundary has resulted in an overlay of magnetic interference, seen as regular rippled patterns (aliasing) within the data. While this makes evaluation difficult, the overall form of (**4**) suggests it is derived from a surviving infilled feature of possible archaeological origin, although the close proximity of farm buildings to the west may indicate a more recent origin.

5.6 The easternmost part of the survey area revealed a series of positive trending linear anomalies of varying amplitude (**5**) and (**6**), the latter being weakest. All of these anomalies are orientated N-S and are consistently spaced c.9-10m apart from one another. It has been hypothesised that (**6**) appears weaker in amplitude due to truncation from modern land drains and modern ploughing activity. These anomalies correspond to eroded medieval ridge and furrow recorded under CHER numbers **08272** and **CB15347**, which have also been identified in aerial photographic survey (Cox and Lang 2015; **Fig. 3**).

#### *Modern Disturbance*

5.7 The data has displayed a number of weakly positive and negative magnetic linear anomalies running parallel to one another with E-W orientations in the western field and NE-SW orientations in the eastern field (**7**). These weak positive and negative anomalies are consistently spaced c.21m apart from one another, leading to the interpretation that they are man-made rather than geological in origin. The regularity of the spacing suggests that they are likely to relate to modern land drainage.

5.8 Two discrete areas of high-amplitude anomalous responses have been identified in the centre of the survey area (**8**). The shape of these responses is suggestive of magnetic sources such as dumped brick & tile rubble or other cultural debris with a high ferrous content. The 1888 ordnance survey map displays a feature in the western field which corresponds with the geophysical anomaly in this location. The feature is present in the mapping until the publication of the 1973 ordnance survey map. Discussions with the land owner indicate that this was a drainage pond back filled in the 1970s. The anomaly in the eastern field represents a comparable response but there is no evidence for a feature in this location within the historic mapping.

5.8 Numerous other high amplitude magnetic spikes can be seen in the data (**9**). Each of these discrete magnetic spikes consist of a well defined dipolar response, their high amplitudes suggest the presence of ferrous debris in the ploughsoil.

5.9 A large warehouse and farm buildings close to the south-western edge of the survey has produced a considerable distortion in the ambient magnetic field, leading to a 'halo' effect observed in the magnetic data **(10)**, which may obscure small anomalous responses derived from more local subsurface remains. The magnetic disturbance along the northern and south eastern edges of the survey is most likely due to disturbed ground from road construction, and the road itself, including passing vehicles **(11)**.

## **6 Conclusion**

6.1 The geophysical survey identified several anomalies which appear to be of archaeological origin. The central area of the survey identified two positive trending linear magnetic responses, synonymous with infilled ditch type features **(1 and 2)**. The survey also identified one sub-oval ditched enclosure with internal features **(3)**. None of these anomalies have been identified in the CHER or aerial photographic survey but appear comparable to cropmarks of an undated D-shaped ditched enclosure to the south of the survey area (CHER **09180**) (Cox and Lang 2015). The morphology of the enclosure **(3)** suggests a prehistoric date, although this is conjectural based only on the geophysical data.

6.2 A further possible square enclosure **(4)** of unknown date was identified close to the western boundary of the site.

6.3 Anomalies identified in the east of the survey area **(5 and 6)** correspond to eroded ridge and furrow recorded under **CHER 08272** and **CB15347**, which were also recognised in the aerial photographic survey of the site (Cox and Lang 2015).

6.4 The features recorded in the CHER and visible in the aerial photographic survey of the site (Cox and Lang 2015) were not fully identified in the geophysical data. It is possible that magnetic disturbance from the road **(10)** to the north of the site, coupled with modern ploughing and land drains have masked the eroded ridge and furrow in the western field. However, the clear magnetic contrasts seen within the data indicate that the underlying geology and site formation process are generally conducive to magnetic geophysical survey.

## **ACKNOWLEDGEMENTS**

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AS is also pleased to acknowledge the input and advice of Mr Andy Thomas of Cambridgeshire County Council Historic Environment Team.

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## PHOTOGRAPHIC INDEX



1  
North-east view of site



2  
Rubbish in south-west corner of field



3  
Rubbish in south-west corner of field



4  
Ditch and bank forming northern site boundary



5  
Geological test pit



6  
Drainage ditch running N-S across the centre of the site

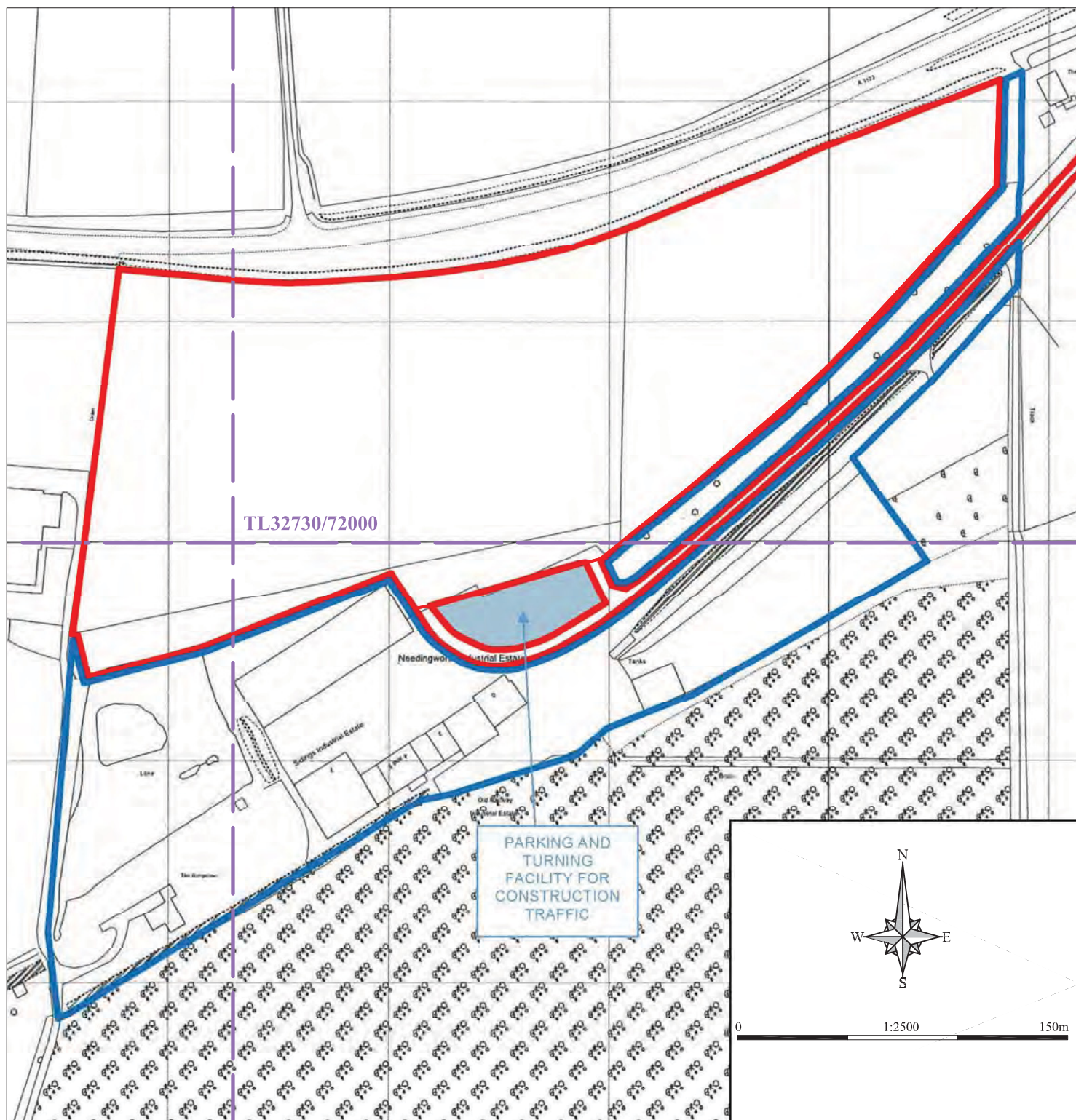




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**Fig. 1 Site location plan**  
 Scale 1:25,000 at A4  
 Land at Needingworth Road, St Ives, Cambridgeshire (P6266)





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**Fig. 2 Detailed site location plan**

Scale 1:2500 at A4

Land at Needingworth Road, St Ives, Cambridgeshire (P6266)





- Buried ditch
- Possible feature
- Former quarry
- Possible drains
- Pericardial feature
- The site
- Ridge and furrow
- Basemap



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**Fig. 3 Assessment of aerial photographs for archaeology**  
 Scale 1:5000 at A4  
 Land at Needingworth Road, St Ives, Cambridgeshire (P6266)







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**Fig. 6 Greyscale plot of processed gradiometer data**  
 Scale 1:1250 at A3  
 Land at Needingworth Road, St Ives, Cambridgeshire (P6266)



