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HAILEYBURY SPORTS PARK, HERTFORDSHIRE

GEOPHYSICAL SURVEY

Authors: Mark Blagg-Newsome, Matthew Baker, Dr David Bescoby Andrew Peachey (background research)	
NGR: TL 3575 1040	Report No: 5025
District: East Herts	Site Code: AS1805
Approved: Claire Halpin MCIfA	Project No: P6492
Signed:	Date: 14th January 2016

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Project dates (fieldwork)	*10th-15th December 2015*		
Previous work (Y/N/?)	*N*	Future work	*TBC*
P. number	*6492*	Site code	*AS1805*
Type of project	*Geophysical Survey*		
Site status	-		
Current land use	*Agricultural*		
Planned development	*Sports facilities development*		
Main features (+dates)	*Four linear anomalies of likely archaeological origin (undated).* *Two historical field boundaries identified on the 1883 Ordnance Survey map (post-medieval).*		
Significant finds (+dates)	-		
Project location			
County/ District/ Parish	*Hertfordshire*	*East Hertfordshire*	*Hertford Heath*
HER/ SMR for area	*Hertfordshire HER (HHER)*		
Post code (if known)	*SG13 7NU*		
Area of site	*c.8ha*		
NGR	*TL 3575 1040*		
Height AOD (max/ min)	*Max: c.87m AOD; Min: c.74m AOD*		
Project creators			
Brief issued by	*Hertfordshire County Council*		
Project supervisor/s	*Matthew Baker*		
Funded by	*Haileybury and Imperial Service College*		
Full title	*Haileybury Sports Park, Hertfordshire: Geophysical Survey*		
Authors	*Blagg-Newsome, M., Baker, M. and Bescoby, D., Peachey, A.*		
Report no.	*5025*		
Date (of report)	*January 2016*		

HAILEYBURY SPORTS PARK, HERTFORDSHIRE

GEOPHYSICAL SURVEY

SUMMARY

In December 2015, Archaeological Solutions Limited (AS) carried out a geophysical survey of land at Haileybury and Imperial Service College, Hertford Heath, Hertfordshire (NGR TL 3575 1040). The survey was required to provide further information prior to the submission of planning proposals for a sports park.

The geophysical survey identified four parallel positive anomalies of possible archaeological origin. Their parallel, equally spaced appearance is perhaps suggestive of surviving remnants of medieval ridge and furrow, although this is tentative based on the present evidence. In addition two historic field boundaries, present on the 1883 Ordnance Survey map, were identified in the centre of the survey. The survey results were dominated by two high amplitude linear magnetic responses relating to the presence of modern services.

1 INTRODUCTION

1.1 In December 2015, Archaeological Solutions Limited (AS) carried out a geophysical survey of land at Haileybury and Imperial Service College, Hertford Heath, Hertfordshire (NGR TL 3575 1040; Figs 1 - 2). The survey was required to provide further information prior to the submission of planning proposals for a sports park.

1.2 The survey was carried out in accordance with a specification compiled by AS (dated 9th November 2015) and approved by the Hertfordshire County Council Historic Environment Advisor. The geophysical survey was carried out in accordance with the Historic England document *Geophysical Survey in Archaeological Field Evaluation*, 2008, and CIfA, *The use of Geophysical Techniques in Archaeological Evaluations* and *CIfA Standard and Guidance for Archaeological Geophysical Survey (published 2014).* It also adhered to Gurney (2003) *Standards for Field Archaeology in the East of England.*

Objectives

1.3 The evaluation of the site by geophysical survey was designed to determine the extent and significance of sub-surface features in order to identify whether further mitigation would be required in association with development proposals (such as trial trench evaluation).

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 Haileybury College is situated close to the south-east of the village of Hertford Heath, *c.*1.5km to the south-east of Hertford, Hertfordshire. The site of the proposed sports park is situated to the south of the college buildings, bounded by Hailey Lane to the north and London Road to the south, with Dells Wood adjacent to the south-east. The site comprises a sub-rectangular arable field with a minor watercourse (heavily overgrown ditch) passing through the eastern half of the site.

2.2 The site is situated in the upper slopes of the River Lea, whose course passes *c.*2km to the east. The site slopes down towards the river, with the north-west corner at *c.*87m AOD and the south-west corner at *c.*85m AOD, descending to *c.*78m AOD at the north-east corner and *c.*74m and the south-west corner. The valley continues to rise for a short distance to the west, before cresting on the western side of Hertford Heath and gradually descending towards Hertford and the River Lea. A minor watercourse passes through the eastern side of the site on a south-easterly course, eventually

feeding into a tributary of the Rivers Lea and Stort, but appears to predominantly comprise a heavily overgrown ditch.

2.3 The underlying geological formation consists of the Eocene London Clay formation, predominantly of clay, silt and sand (British Geological Survey 1978). The overlying soils are of the Beccles 3 association, described as slowly permeable, seasonally wet, slightly acidic, but base-rich loamy and clayey soil (Soil Survey of England and Wales 1983).

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistory

3.1 Evidence for prehistoric activity in the close vicinity of the site is very limited, including a single Neolithic chipped flint axe recovered in the Hertford Heath area to the north (HER 233). Fields c.700m to the north-east, between Haileybury College and Golding's Wood contain a series of circular or sub-circular cropmarks, which have been interpreted as possible early Bronze Age ring ditches or barrows (HER 2180-3), although investigations over one did not record any archaeological features (Pozorski *et al* 2013).

Late Iron Age to Romano-British

3.2 Settlements at Ware and Braughing to the north were foci of late Iron Age and Roman activity in the local landscape, and while a late Iron Age 'chieftain' burial and late iron Age to Roman cemetery have been recorded to the north of Hertford Heath, in the area of Priory Wood, relatively little has been recorded in the vicinity of the assessment site. The major route of Ermine Street (HER 9271) passes *c*.700m to the west, running on a northerly course towards Ware; while Roman finds are limited to a puddingstone quern recovered in the area of Hertford Heath to the north (HER 170).

Medieval

3.3 There have been no Anglo-Saxon or medieval finds within the vicinity of the site, although documentary evidence has shown that Brides Farm c.400m to the west has origins extending back at least as far as 1392 (HER 18157), although the current farm is of 19th century design. A pond located close to Brides Farm is also marked on late 19th century cartographic sources, but may similarly have much older origins as a flooded gravel pit (HER 30099).

Post-medieval

3.4 The landscape surrounding the site saw significant development in 1806 when the East India College, designed by William Wilkins, was built. The college opened in 1809 but closed in 1858 when the East India Company

was wound up; only to re-open as a public school in 1862, which was amalgamated with the Imperial Service College in 1942. The college (HER 15994), situated on the north side of Hailey Lane is a fine example of neo-Classical and Greek Revival architecture, and was supplemented by gardens designed by Repton (HER 9575) that included two pools, which may have been connected to the stream that runs through the eastern side of the site (possibly parkland in the 19th century). Early cartographic sources, including the 1883 Ordnance Survey Map (**Fig. 3**), depict the external field boundaries of the site and the stream (ditch) as they remain in the present day; albeit with a further sinuous boundary running parallel to the south-west of the ditch, and with an additional north-south boundary bisecting the centre of the site. The 1880 map demonstrates that the landscape of the site, comprising Haileybury College, High Wood, Dells Wood and Box Wood has been altered little to the present day, despite the development of the A10 road and Stansted St. Margaret's to the east.

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 Historic England and by the Chartered Institute for Archaeologists (Historic England 2008; CIfA 2014) and with the method statement for the project (Archaeological Solutions, dated 09/11/ 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.

4.3 A small proportion of the site, comprising 2 full grids and 3 partial grids, in the south-eastern portion of the main field of the survey area was not surveyed due to a combination of wet conditions and thick surface clay geology, impeding the ability to walk this area (**Fig. 4**). In addition, an area of overgrowth and a ditch between the two survey areas was unable to be examined, as were overgrown areas along some of the boundaries.

Data Processing

4.4 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:

Data removal: Removal of very large amplitude responses from the data caused by buried modern services to allow correct processing of remaining data.

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.

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

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

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

4.5 The processed data are 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 Hertfordshire HER. 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 4.4, is shown in **Fig. 6.** The processed data revealed a number of positive responses of potential archaeological significance. Note that very large responses from buried modern services have been greyed out to aid interpretation. An interpretation of the most prominent anomalies is described below. An annotated plan of interpreted features referred to in the text is shown in **Fig. 7**.

Archaeological features

5.2 Located within the south-western section of the largest field, four NE-SW aligned parallel, positive trending linear anomalies of varying amplitudes were identified (**1 - 4**). These vary in length from *c*.32m (**2**) to *c*.120m (**3**). The proximity of these features to a modern gas pipeline has resulted in a degree of magnetic interference making evaluation difficult. However, the overall form of (**1**) to (**4**) would seem to indicate four surviving in-filled features of possible archaeological origin. Their parallel, equally spaced appearance is perhaps suggestive of surviving remnants of medieval ridge and furrow, although this is tentative based on the present evidence.

5.3 The survey revealed several positive trending linear anomalies of varying amplitudes, most of which were concentrated within the largest field of the surveyed area. Two of these positive linear anomalies in the north of the survey area appear to correspond to field boundaries identified on the 1883 Ordnance Survey map (**Fig. 3**). The most northern (**5**) is intermittent in nature, measuring *c*.230m in length, initially follows an E-W alignment, before turning to the SE and roughly parallel to the modern field boundary. A series of anomalous signals seem to define a broad band of responses of moderately high amplitude. The somewhat curved western section is associated with a diffuse spread of magnetic noise flanking its margins, which may reflect former agricultural activity. The second response is far more homogenous and measuring *c*.151m in length, it follows a N-S alignment (**6**). Recorded as a far weaker response, it may well relate to the truncated remains of an infilled cut feature (boundary ditch).

Geological features

5.4 Identified within the largest field of the survey area were seven irregular, weakly positive linear trending anomalies (**7 - 13**). Five are NE-SW aligned (**7 - 10, 12**), whilst the remaining two follow a NW-SE orientation (**11, 13**). They vary in length from *c*.44m (**13**), to *c*.99m (**7**). While an archaeological origin cannot be ruled out, these anomalous responses most likely represent natural geomorphological features.

Modern Disturbance

5.5 The data from the survey is dominated by two very high amplitude linear responses. The first (**14**) is characterised by regular alternating responses typical of that produced by buried modern services. It follows an NE-SW alignment for *c*.353m, running through the southern portion of the largest field surveyed. The second (**15**) is characterised by a tighter, more uniform magnetic response of equally high amplitude (±100nT), following a NW-SE alignment for *c*.304m and also likely to represent modern services such as gas pipes and water mains. Both these anomalies result in significant magnetic 'halos' which potentially mask weaker magnetic responses in the vicinity.

In the smallest field in the north-east section of the survey, a series of three well defined bipolar response (**17**) can be seen aligned at regular intervals. These result from iron manhole covers observed in the field. A faint negatively trending linear magnetic response (**16**) can be seen intermittently connecting these points and is likely to represent subsurface components of a pipeline.

5.6 Within the northern portion of the smaller field, *c*.33m to the west of modern service pipeline (**16**), an elongated band of small point, bipolar responses formed an area of magnetic noise (**18**). It appears to have an approximate N-S alignment and measures *c*.41m in length and is indicative of an area of disturbed ground.

5.7 Along the western boundary of the larger field (**19**), the proximity of the London Road (B1197) resulted in a corresponding band of magnetic interference, potentially obscuring weaker anomalous signals. Similarly, a line of metal fencing along the southern boundary of the field generated a significant magnetic response capable of obscuring more ephemeral responses (**20**). The northern, eastern and southern margins of the smaller field are also subject to a degree of magnetic interference (**21**) as a result of further metal fencing (eastern and southern boundaries) and in the north from Hailey Lane which bounds the site. As above, the 'halo' effect associated with these large responses has the potential to obscure weaker signals.

5.8 Throughout the surveyed area, numerous high amplitude magnetic spikes can be seen in the data (**22**). Each of these discrete magnetic spikes consists of a well defined dipolar response, representing the presence of ferrous debris in the plough soil.

6 CONCLUSION

6.1 The geophysical survey identified four linear magnetic anomalies of possible archaeological origin (**1 - 4**), perhaps representing remnants of medieval ridge and furrow, although this is tentative based on the present data. Two linear anomalies (**5**, **6**) were recorded which correspond to field boundaries present on the 1883 Ordnance Survey map (**Fig. 3**). Seven other

weakly positive magnetic anomalies were also identified in the northern and central areas of the larger field, thought to be derived from natural geomorphological features (**7 - 13**).

6.2 Two very distinctive linear anomalies (**14**, **15**) were identified in the survey, resulting from buried modern services including a gas pipeline and water main. Anomalies (**14**) and (**15**) each had very strong associated "halo" effects which could mask smaller, weaker magnetic responses within the areas affected.

6.3 Five of the boundaries that surrounded the survey area (**19** - **21**) were also affected by magnetic interference. The smaller field surveyed was particularly affected due to proximity to the Hailey Lane, and to fencing along the eastern and southern boundaries of this field. In the largest field, only the western (**19**) and southern boundaries (**20**) were similarly affected, due to the close proximity to the London Road (west), and a fence line along the southern margin. All these areas of magnetic disturbance could result in smaller, weaker magnetic signals being obscured.

ACKNOWLEDGEMENTS

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Fig. 1 Site location plan

Scale 1:25,000 at A4

Haileybury, Hertford Heath (P6492)

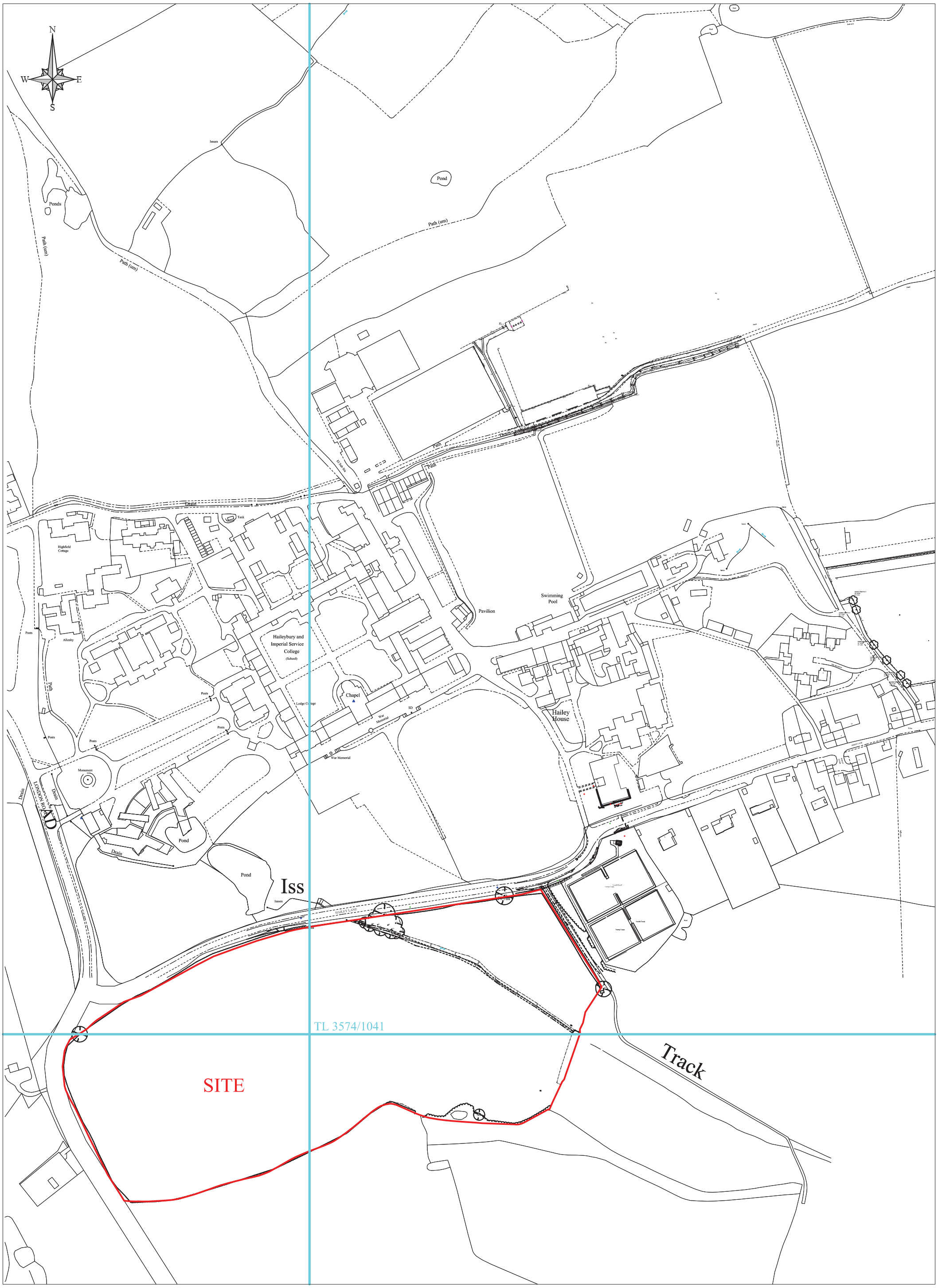

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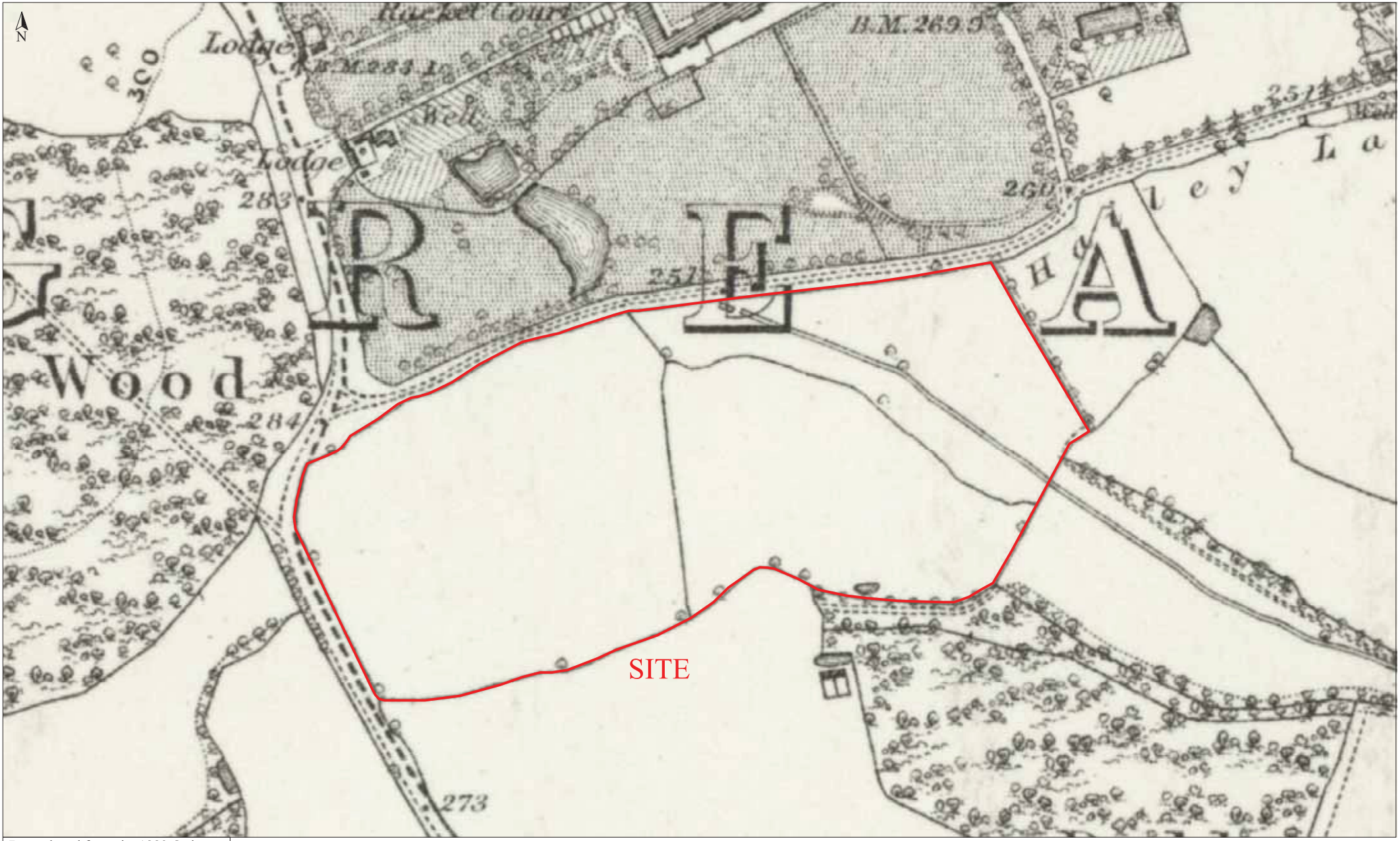
Fig. 2 Detailed site location plan

Scale 1:3000 at A3

Haileybury, Hertford Heath (P6492)



Reproduced from the 1883 Ordnance Survey 6" to 1 mile map with the permission of Her Majesty's Stationery Office. © Crown copyright Archaeological Solutions Ltd Licence number 100036680.

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Fig. 3 OS Map, 1883

Not to scale

Haileybury, Hertford Heath (P6492)

Point co-ordinates	
A	535607.52, 210340.87
B	535824.54, 210443.35
C	535895.48, 210488.68
D	535959.28, 210467.96

Drain

Pond

Iss

Issues

HAILEY LANE

76.8m

77.7m

A

B

C

D

N

W

E

S

0 1:1250 75m

Areas that could not be surveyed

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Fig. 4 Survey grid

Scale 1:1250 at A3

Haileybury, Hertford Heath (P6492)

Drain

Pond

Iss

Issues

HAILEY LANE

76.8m

N

W

E

S

0 1:1250 75m

100nT

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Fig. 5 X-Y plot of gradiometer data

Scale 1:1250 at A3

Haileybury, Hertford Heath (P6492)

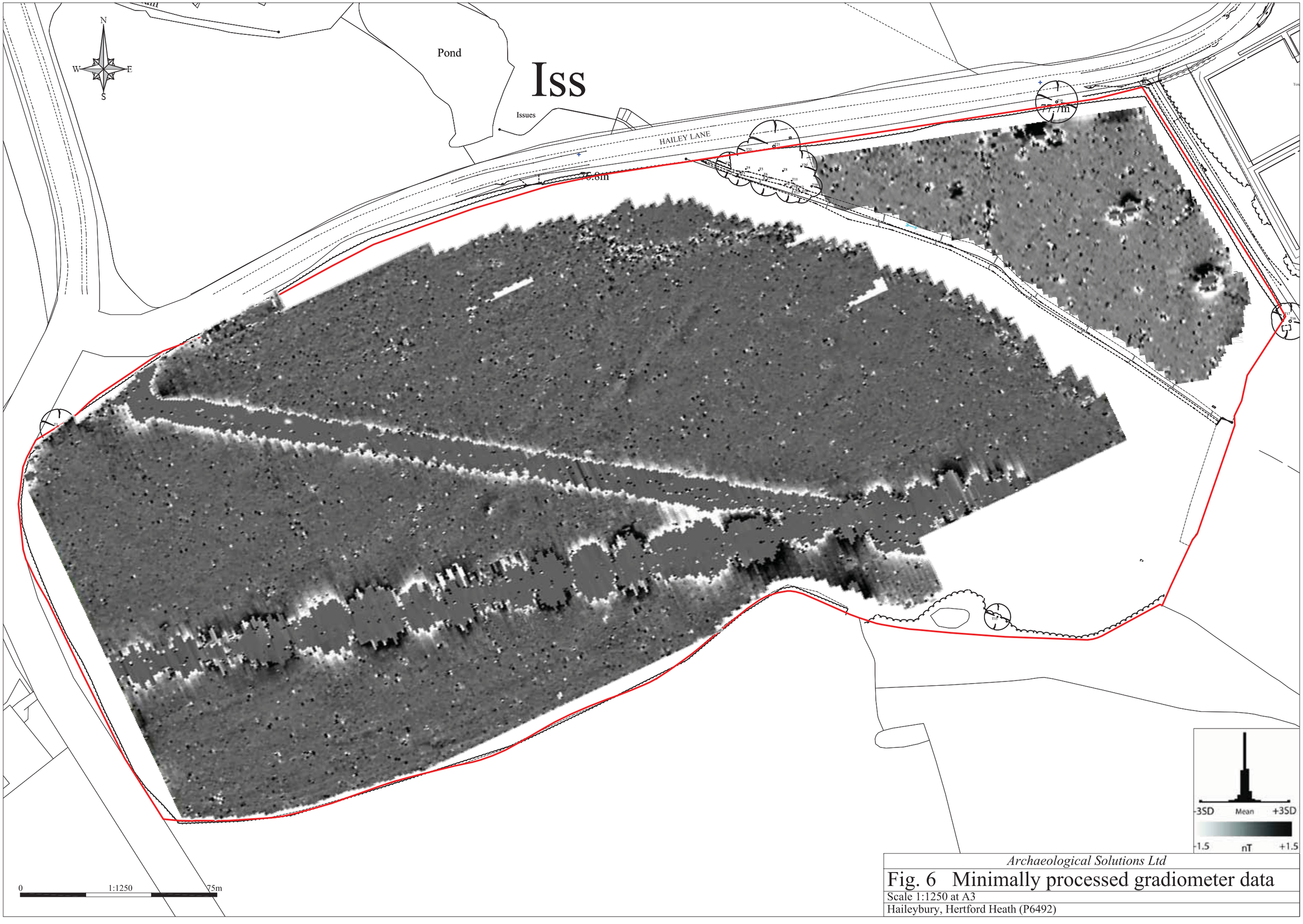

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Fig. 6 Minimally processed gradiometer data

Scale 1:1250 at A3

Haileybury, Hertford Heath (P6492)

Iss

Issues

HAILEY LANE

76.8m

77.7m

N

W E

S

KEY

ARCHAEOLOGY

- Positive anomaly, possible cut feature of archaeological origin, or surviving ridge and furrow
- Positive anomaly, probable cut feature of historic field boundaries

OTHER ANOMALIES

- Weak positive anomaly, probable feature of geological origin
- Bipolar magnetic disturbance- buried modern services e.g. water mains, gas pipeline
- Magnetic "noise" resulting from modern services
- Magnetic Spike- probable ferrous object
- Strong magnetic debris- probable disturbed ground
- Magnetic disturbance

0 1:1250 75m

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Fig. 7 Interpretation plot

Scale 1:1250 at A3

Haileybury, Hertford Heath (P6492)