ARCHAEOLOGICAL EVALUATION REPORT:

GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND AT ST. JOHNS SCHOOL, ORTON GOLDHAY, PETERBOROUGH, CAMBRIDGESHIRE

Planning Reference: 14/00353/R4FUL
NGR: TL 1545 9506
AAL Site Code: PESJ 14
OASIS Reference Number: allenarc1-179467

Report prepared for the Kier Group

By
Allen Archaeology Limited
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Allenarchaeology

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Cover Image: View of the site taken from the southeastern corner looking northwest

Executive Summary

- A geophysical survey by magnetometry was undertaken by Allen Archaeology Limited on behalf of the Kier Group as part of planning permission for an extension to the existing St. Johns School, Orton Goldhay, Peterborough.

- There was no evidence for deposits of archaeological interest recorded within the survey area. This may be due to modern activity relating to the construction of the school, and potential landscaping of the school playing field. All geophysical anomalies identified on the survey were of modern origin.

- The development is unlikely to impact upon any archaeological deposits of significance.

1.0 Introduction

1.1 A geophysical survey by magnetometry was undertaken by Allen Archaeology Limited for the Kier Group as a condition of planning permission for an extension to the existing St. Johns School, Orton Goldhay, Peterborough.

1.2 The site works and reporting conform to current national guidelines, as set out in '*Geophysical Survey in Archaeological Field Evaluation*' (English Heritage 2008), '*The Use of Geophysical Techniques in Archaeological Evaluations*' (IFA Paper 6) and the Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (IfA 2011). Regional guidelines set out in '*Research and Archaeology Revisited: a revised framework for the East of England'* (Medlycott 2011) was also followed.

2.0 Site Location and Description

2.1 The proposed development area is located at St Johns School in the parish of Orton Goldhay, to the southwest of central Peterborough. The survey area comprised the school grounds and playing fields, centred on NGR TL 1545 9506, and extends to approximately 1ha.

2.2 The site is situated on a bedrock geology of Oxford Clay, with no superficial geology recorded (http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

3.0 Planning Background

3.1 Planning permission has been granted for the '*Demolition of existing school buildings and construction of new single infant and junior school building together with improved access, hard and soft landscaping, car and cycle parking and other associated infrastructure'* (Reference 14/00353/R4FUL). Permission was granted subject to conditions, including for a programme of geophysical survey, plus any follow intrusive investigations that may be required, dependent upon the results of the geophysical survey.

3.2 The approach adopted is consistent with the recommendations of the current National Planning Policy Framework (NPPF), with the particular chapter of relevance being 'Chapter 12: Conserving and enhancing the historic environment' (Department for Communities and Local Government 2012).

4.0 Archaeological and Historical Background

4.1 Prehistoric activity is well represented in the vicinity of the site, generally in an area to the north and northeast of the site. Excavations at Orton Longueville Sports Hall, c.1.5km to the northeast identified a number of ditched enclosures and droveways of Neolithic to Bronze Age date, with later enclosures of Late Bronze Age to Early Iron Age date (PHER Reference 51125). Gravel quarrying nearby in the early 20th century exposed hut circles producing Neolithic Peterborough Ware pottery, as well as Bronze Age cremations in Collared Urns and Iron Age and Roman pottery (PHER Reference 01807b, c, d), and further scattered lithic finds of Neolithic and Bronze Age date have been made in the same broad area (PHER References 00853, 07861, 51277).

4.2 Aerial photographs have also identified a group of five further probable barrow ditches, located c.1.4km to the north northwest and sealed by medieval ridge and furrow (PHER Reference

01436). Some limited investigation of the features has been undertaken indicating ring ditches c.1m wide containing small quantities of worked flint.

4.3 Extensive Iron Age to Roman activity is also evident in the vicinity of the site, such as an extensive area of enclosure cropmarks located 1km to the east-northeast (PHER Reference 01434). Excavation exposed a number of hut circles of late Iron Age to Roman date as well as a group of Roman inhumations.

4.4 Post-Roman activity is also generally located in a broad swathe to the north and northeast of the site. In the same area of gravel quarrying in the 20th century where quantities of prehistoric and Roman material was recovered, pottery of 6th to 7th century date has been identified, along with bone pins, spindle whorls and bone combs (PHER Reference 01807f). A little to the northwest of this findspot, two possible grubenhaus are also recorded (PHER Reference 02016), and excavations of Cherry Orton Road exposed further grubenhaus, enclosure ditches, pits and postholes of early Saxon date (PHER Reference 51270, 51271 and 51282).

4.5 The settlements of Orton Longueville and Orton Waterville appear in the Domesday Book of 1086, with Orton Goldhay being a later development associated with the expansion of Peterborough in the 20th century. Orton Longueville was owned by Eustace the Sherriff, and populated by seven villagers of varying status, along with their dependents. Orton Waterville was split between the Bishop of Lincoln and Peterborough Abbey, with the estates belonging to St. Peters reserved *'for the sustenance of the monks'*. This parish was also populated by seven villagers (Williams and Martin 2002). The place name Orton is probably of Old English derivation but of uncertain meaning, possibly meaning '*higher/ridge/bank settlement'*. The suffixes refer to feudal tenants of the estates, the de Longaville and de Waltreville families (http://kepn.nottingham.ac.uk).

4.6 The current site lies well beyond the core of these settlements, and this is attested by ridge and furrow recorded c.500m to the north-northwest (PHER References 51593 and 51918), a similar distance to the northeast (PHER Reference 50374) and also a little further to the west and southwest of the site (PHER References 51131, 51344 and 51854).

5.0 Methodology

5.0.1 The geophysical survey consisted of a detailed gradiometer survey of the area to be affected by the proposed development and adjacent land, totalling approximately 1.1 hectares. The survey was undertaken in a series of 30m x 30m grids across the site.

5.0.2 The fieldwork was carried out by a team of two experienced geophysicists from AAL over a period of one working day, Tuesday 20th May 2014. The survey area was accurately located using a Leica GS08 Netrover receiving RTK corrections. This accurately 3D plotted the area of investigation and tied it into the National Grid.

5.0.3 The survey was carried out using a Bartington Grad601-2 Dual Fluxgate Gradiometer with an onboard automatic DL601 data logger. This instrument is a highly stable magnetometer which utilises two vertically aligned fluxgates, one positioned 1m above the other. This arrangement is then duplicated and separated by a 1m cross bar. The 1m vertical spacing of the fluxgates provides for deeper anomaly detection capabilities than 0.5m spaced fluxgates. The dual arrangement allows for rapid assessment of the archaeological potential of the site. Data storage from the two fluxgate pairs is automatically combined into one file and stored using the onboard data logger.

5.0.4 Data collection was undertaken in a zigzag traverse pattern, using a sample interval of 0.25m and a traverse interval of 1m.

5.0.5 The fieldwork and reporting was carried out in accordance with the procedures in 'Geophysical Survey in Archaeological Field Evaluation' (English Heritage 2008) and 'The Use of Geophysical Techniques in Archaeological Evaluations: IfA Paper 6' (Gaffney et. al. 2002).

5.1 Summary of Survey Parameters

5.1.1 Fluxgate Magnetometers

Instrument 1:	Bartington Grad601-2 Dual Fluxgate Gradiometer
Sample interval:	0.25m
Traverse interval:	1.00m
Traverse separation:	1.00m
Traverse method:	Zigzag
Resolution:	0.01 nT
Processing software:	Terrasurveyor 3.0.24.1
Surface conditions:	Short grass
Area surveyed:	1.1 ha
Date surveyed:	Tuesday 20st May 2014
Surveyor:	Robert Evershed
Survey assistants:	Jedlee Chapman
Data interpretation:	Robert Evershed

5.2 Data Collection and Processing

5.2.1 The grids were marked out using pre-programmed coordinates on the Leica GS08 Netrover. The collection of magnetic data using a north – south traverse pattern is preferable for a magnetic survey, as enhancements to the magnetic field caused by buried features is mapped increasingly stronger the closer the traverse direction can get to a magnetic north – south direction (Breiner 1999). On this occasion magnetic data was collected very close to a north – south alignment due to the orientation of the pre-programmed survey grids and the fields.

5.2.2 The data collected from the survey has been analysed using the current version of Terrasurveyor 3.0.24.1. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripe
- Clipping
- De-staggering

5.2.3 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care however as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.

5.2.4 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.

5.2.5 The de-staggering process compensates for data correction errors caused by the operator commencing the recording of each traverse too soon or too late. It shifts each traverse forward or backwards by a specified number of intervals.

5.2.6 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

6.0 Results

6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -5 to 5 nT/m (Figure 3). This enhances faint anomalies that may otherwise not be noted in the data. The survey results revealed a number of anomalies across the data set, and these are discussed in turn and noted as single digit numbers in square brackets on Figure 4.

6.2 Immediately noticeable are the large areas of magnetic noise [1] surrounding the survey areas, producing readings of +/- 100nT/m. The majority of this noise is produced by large metal fences enclosing the playing field on all four sides and on three sides of the school playground area. The area of magnetic noise at the northern edge of the survey area in the playground is the result of modern disturbance/playground equipment. The non-surveyed area was occupied by part of a small assault course/playground equipment.

6.3 The sinuous positive curvilinear anomaly [2], 5-10 nT/m, represents a bank of identical shape produced by modern landscaping. This is related to the area of magnetic noise directly to the west [3], -8 – 10 nT/m which represents another modern bank following a similar course and shape (although in this case less well defined on the geophysical survey results, possibly due to more vegetation on the top of the bank inhibiting smooth perambulation during the surveying).

6.4 [4] is a small curvilinear dipolar feature, -50 – 60nT/m, likely representing a small modern service of some type.

6.5 The large dipolar spike [5], and the other four to the east relate to modern playground equipment.

6.6 Scattered randomly throughout the site are a number of strong and weak dipolar responses, examples of which are highlighted as [6]. The characteristic dipolar response of pairs of positive and negative ‘spikes’ suggest near surface ferrous metal or other highly fired material.

7.0 Discussion and Conclusions

7.1 There was no evidence for deposits of archaeological interest recorded within the survey area. This may be due to modern activity associated with the construction of the school, and potentially landscaping of the school playing field. All features identified on the survey were of modern origin.

7.2 Overall, the survey has indicated a negligible archaeological potential for the site and it is unlikely that the proposed development will impact upon deposits of archaeological signficance.

8.0 Effectiveness of Methodology

8.1 The non-intrusive evaluation methodology employed was particularly appropriate to the scale and nature of the site to be surveyed. Magnetometry was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required further justification and may have proved too time consuming or cost-prohibitive.

9.0 Acknowledgements

9.1 Allen Archaeology Limited would like to thank the Kier Group for this commission and the cooperation of the staff at St. Johns School.

10.0 References

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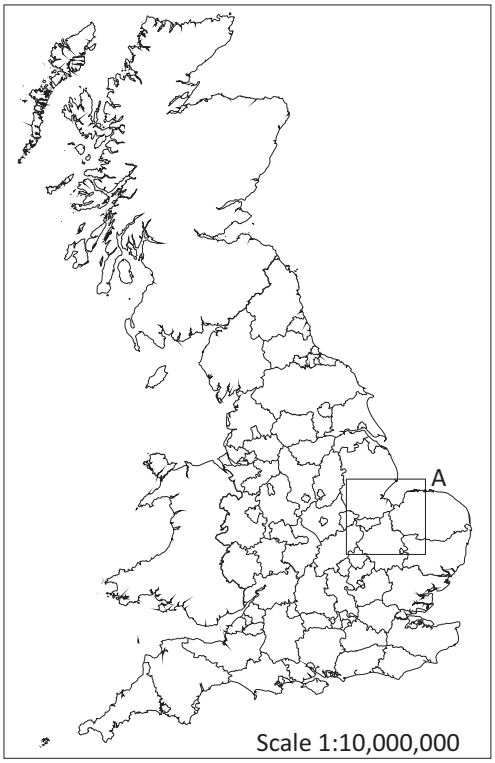

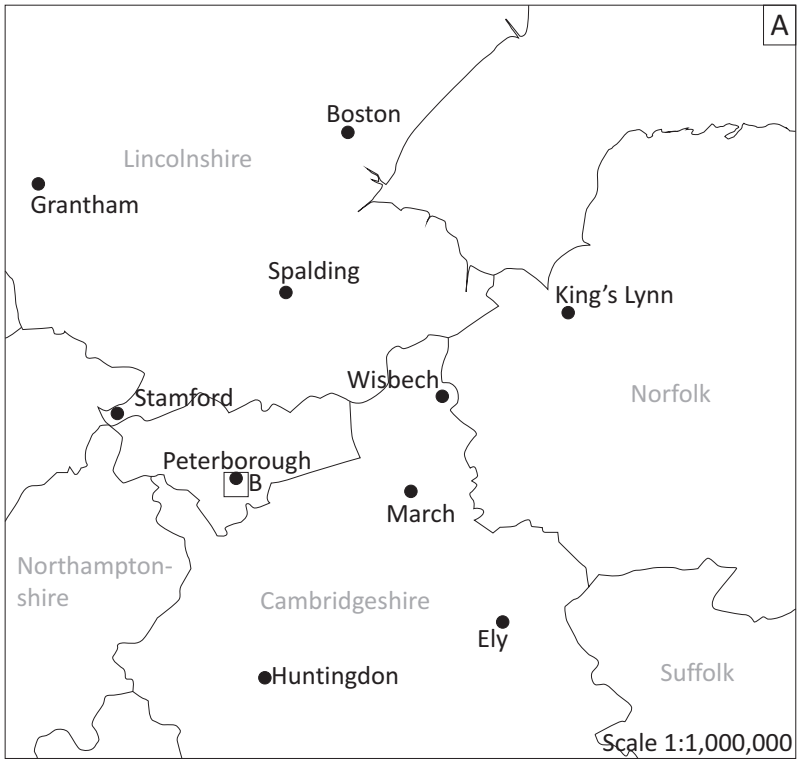

Figure 1: Site location outlined in red

Site Code	PESJ 14
Scales	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Eversheed
Date	21/05/14

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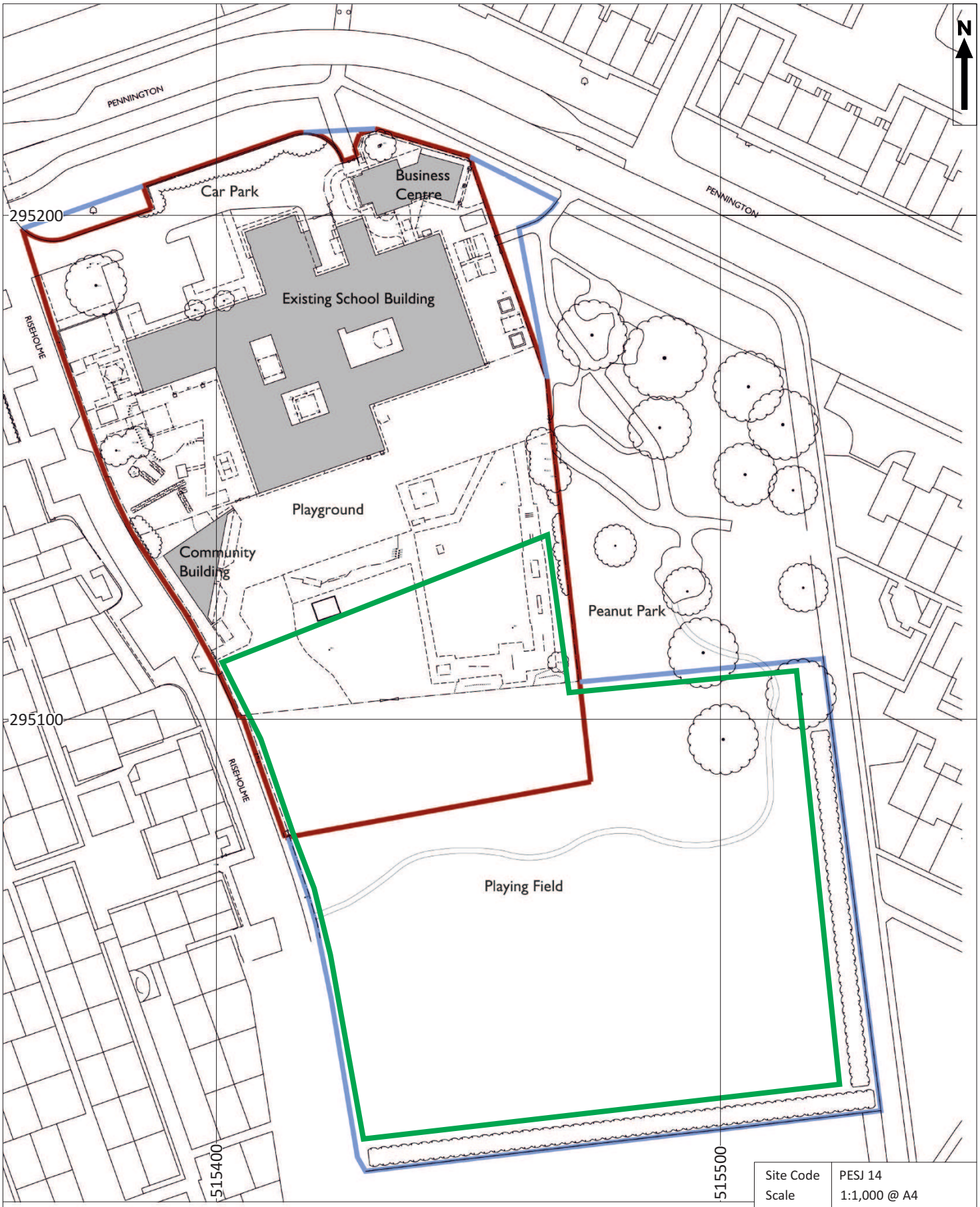

Site Code	PESJ 14
Scale	1:1,000 @ A4
Drawn by	Robert Evershed
Date	21/05/14

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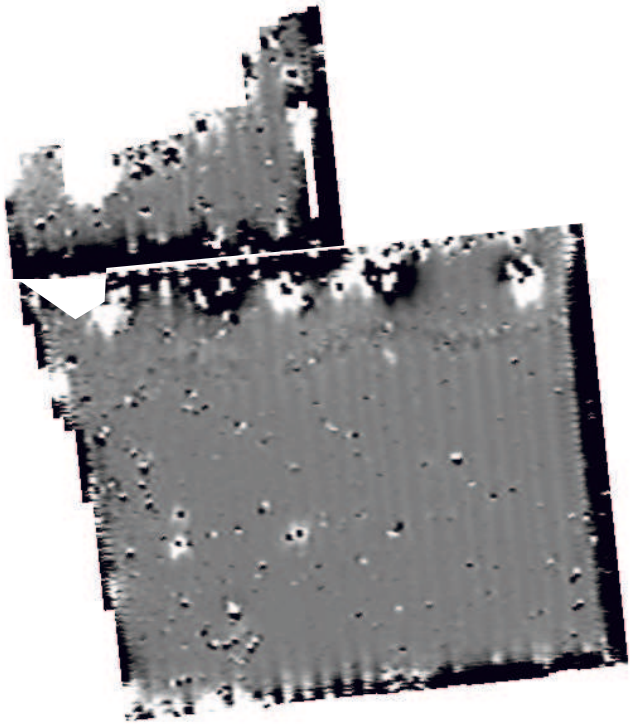
Figure 2: Site location with survey area outlined in green

Raw data (clipped to +/- 50 nT)

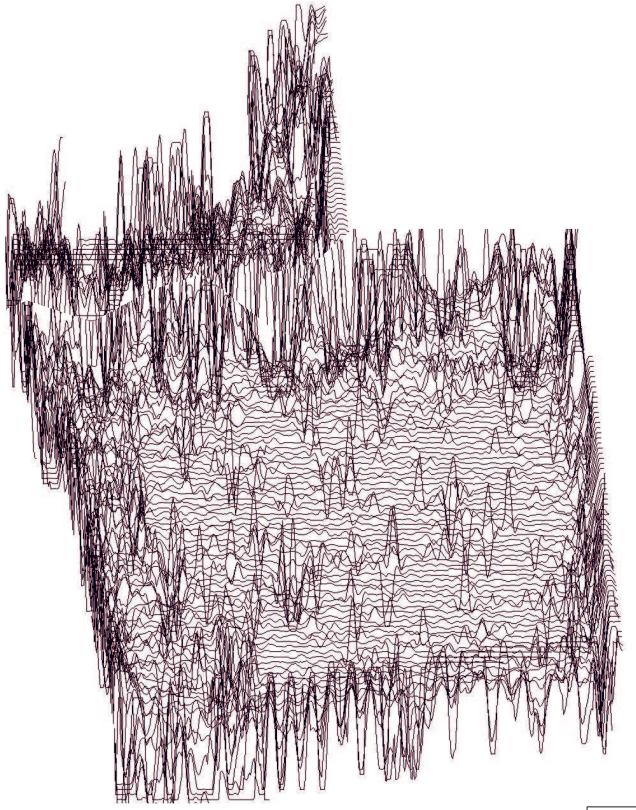


40

nT

-40

Trace Plot (ZMT and clipped to +/- 25nT)



25nT

N

0 150m

Scale 1:1,500

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Scale	1:1,500 @ A4
Drawn by	Robert Evershed
Date	21/05/14

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Figure 3: Greyscale raw data and processed trace plot

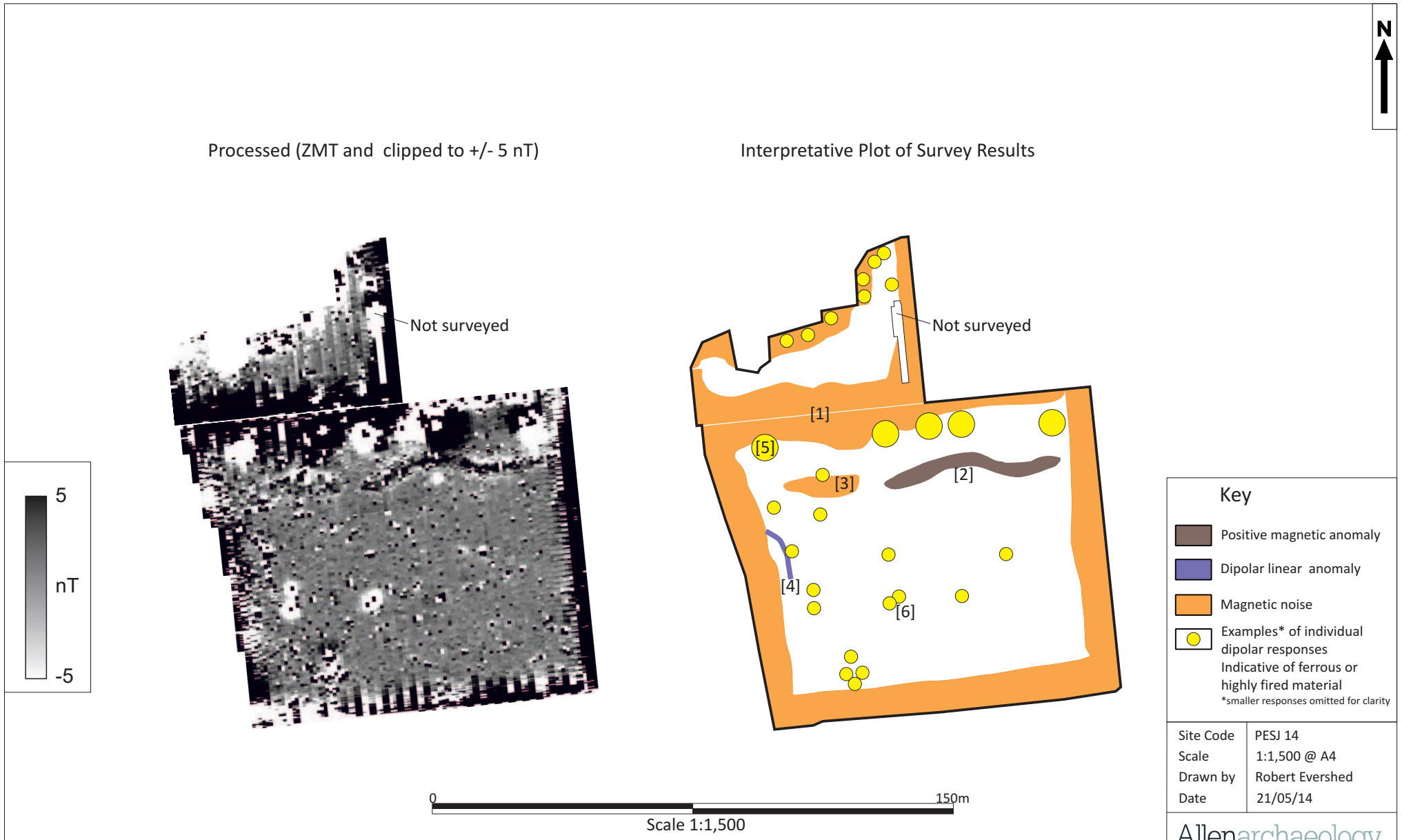

Figure 4: Processed greyscale of survey area with interpretative plot

Site Code	PESJ 14
Scale	1:1,000 @ A4
Drawn by	Robert Evershed
Date	21/05/14

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Figure 5: Processed greyscale located in real space

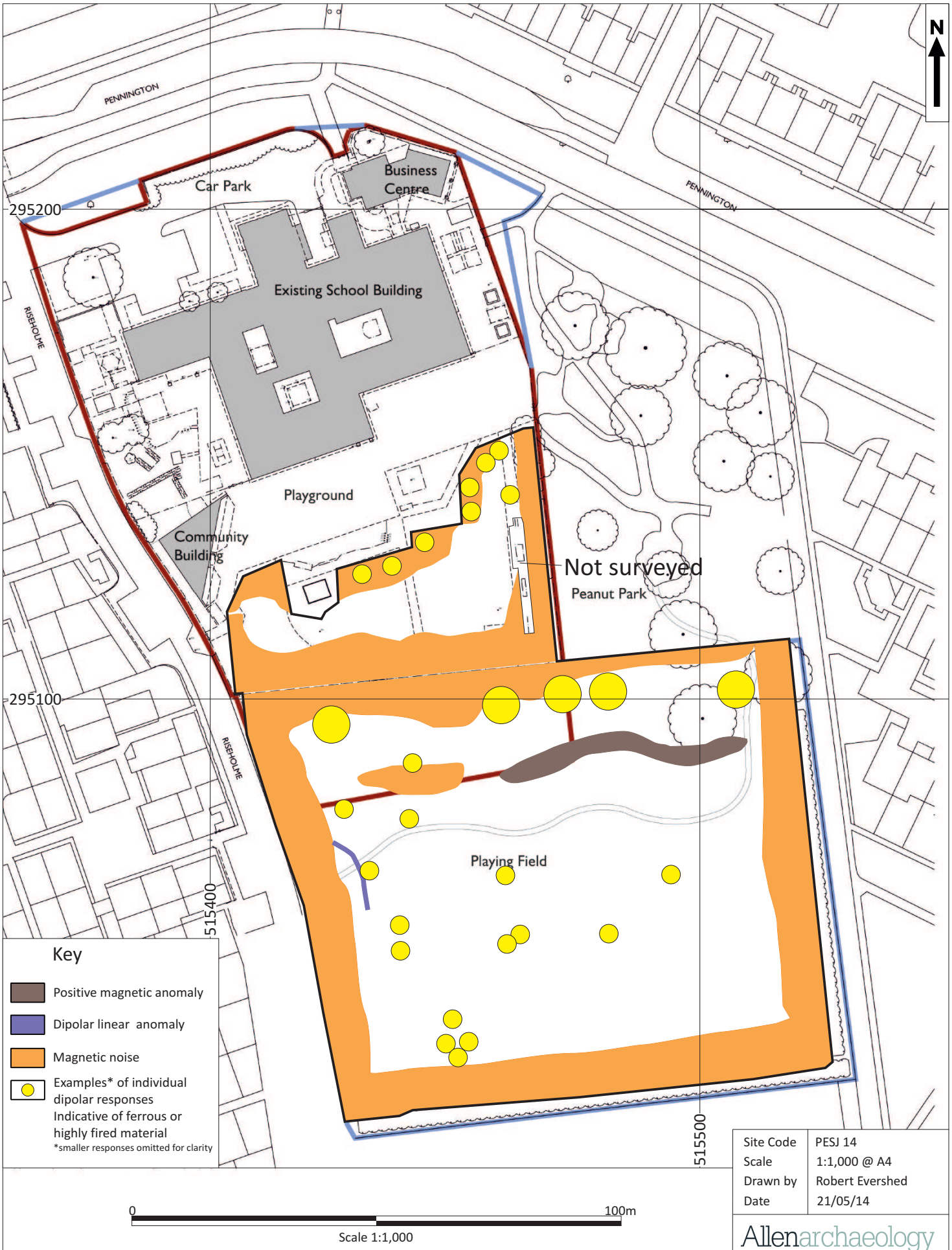

Figure 6: Interpretative plot located in real space

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