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# **RUSHMERE SPORTS CLUB, THE STREET, RUSHMERE ST ANDREW, SUFFOLK**

## **DETAILED MAGNETOMETER SURVEY**



Report Number: 1032

August 2013

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**RUSHMERE SPORTS CLUB, THE STREET, RUSHMERE ST ANDREW,  
SUFFOLK**

**Detailed Magnetometer Survey**

Prepared for:  
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<b>Site Code</b>	RMA 033	<b>NGR</b>	TM 201 461
<b>Planning Ref.</b>	C/13/0519	<b>OASIS</b>	britanni1-156228
<b>Approved By</b>	Tim Schofield	<b>DATE</b>	August 2013



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**The results and interpretation of the report cannot be considered an absolute representation of the archaeological or any other remains. In the case of geophysical surveys the data collected, and subsequent interpretation is a representation of anomalies recorded by the survey instrument. Britannia Archaeology Ltd will not be held liable for any errors of fact supplied by a third party, or guarantee the proper maintenance of the survey stations.**



## **ABSTRACT**

*A range of anomalies were detected within the dataset, most of which were caused by modern activity or ferrous debris present on the site. Only one anomaly recorded within the dataset has been tentatively assigned as being of potential archaeological origin. It is possible that deep lying moraines of glacial till may be masking potential archaeological anomalies from being recorded with the magnetometer.*

*Subsequent phases of archaeological excavation should allow the interpretations given within this report to be qualified.*

## **1.0 INTRODUCTION**

On the 29<sup>th</sup> and 30<sup>th</sup> July 2013 Britannia Archaeology Ltd (BA) undertook detailed fluxgate gradiometer survey on 2.19 hectares of land at Rushmere Sports Club, The Street, Rushmere St Andrew, Suffolk (NGR TM 201 461) on behalf of Dr Tim Lodge of Agrostis Sports Surface Consulting and in response to a brief issued by Matthew Brudenell of Suffolk County Council Archaeology Service/Conservation Team (SCCAS/CT) (dated 8<sup>th</sup> July 2013). The evaluation was undertaken in advance of the proposed creation of outdoor artificial sports courts, parking and landscaping of the site as part of a programme of archaeological investigations (Figure 1).

## **2.0 SITE DESCRIPTION**

The site is located to the north-east of Ipswich, adjacent and to the west of The Street. Housing estates are present to the north and to the east, Ipswich Town Football Club Training pitches are located to the south and west. The survey area comprises grassed sports playing fields.

The bedrock is described as Red Crag Formation Sand; a sedimentary bedrock formed approximately 2 to 4 million years ago in the Neogene Period when the local environment was dominated by shallow seas, when siliclastic sediments were deposited as mud, silt, sand and gravel (BGS, 2013).

The superficial deposits are described as Glaciofluvial deposits of sand and gravel, and Lowestoft Formation Diamicton, both of which were formed in Ice Age conditions when glaciers scoured the landscape depositing moraines of till with outwash sand and gravel from seasonal and post glacial meltwaters (BGS, 2013).

## **3.0 PLANNING POLICIES**

The archaeological investigation was carried out on the recommendation of the local planning authority, in consultation with SCCAS/CT, following guidance laid down by the *National Planning and Policy Framework* (NPPF, DCLD 2012) which replaces *Planning Policy Statement 5: Planning for the Historic Environment* (PPS5, DCLG 2010). The



relevant local planning policy is the *Suffolk Coastal Local Plan; incorporating First and Second Amendments* (March 2006) which is due to be replaced with the *Suffolk Coastal Local Development Framework* in the near future.

### 3.1 *National Planning Policy Framework (NPPF, DCLG March 2012)*

The NPPF recognises that 'heritage assets' are an irreplaceable resource and planning authorities should conserve them in a manner appropriate to their significance when considering development. It requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. The key areas for consideration are:

- The significance of the heritage asset and its setting in relation to the proposed development;
- The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance;
- Significance (of the heritage asset) can be harmed or lost through alteration or destruction, or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification;
- Local planning authorities should not permit loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred;
- Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

### 3.2 *Suffolk Coastal District Council (Policy AP7, 31<sup>st</sup> March 2006)*

The local plan for the Suffolk Coastal District deals with development on archaeological sites in section AP7, this states the following:

In considering planning applications, outline or detailed, for development that might affect sites that are known or are likely to contain archaeological remains, the Council will require the following. Where necessary, these should be preceded by a professional archaeological assessment as to the likelihood that remains might be encountered and their importance.

- a field evaluation in those cases where the assessment suggests that important archaeological remains may exist but it is unable to be precise about their nature or extent. The field evaluation shall be carried out by an approved archaeological contractor in accordance with a specification agreed with the Council;
- the preservation of archaeological remains in situ where the assessment and/or field evaluation indicate that the remains are important. Even where lesser remains exist, consideration must be given to the desirability of preserving them in situ;
- adequate arrangements for "preservation by record" - a recording of the archaeological remains that would be lost in the course of works for which



permission is being sought - in those cases where arguments in favour of the development outweigh the significance of the remains;

- Development that would adversely affect a Scheduled Ancient Monument, its setting or remains will not be permitted.

#### **4.0 ARCHAEOLOGICAL BACKGROUND**

Detailed magnetometer survey was undertaken over c.2.19 hectares located on football pitches. Significant ground disturbance is expected during the development of the sports courts, parking and associated landscaping which has the potential to damage archaeological deposits that exist (Brief 3.1).

This site lies in an area of archaeological interest, recorded in the Suffolk Historic Environment Record (HER). There are a number of archaeological sites and find spots of Roman and Medieval date recorded in the near vicinity (HER nos. RMA 003, RMA 006, RMA 009 and RMA 019). Therefore there is the potential for encountering occupation deposits from these periods. The site also has a good potential for the discovery of important hitherto unknown archaeological features in view of its topographic location.

#### **5.0 PROJECT AIMS**

A geophysical survey was required of the development area to enable the archaeological resource, both in quality and extent, to be accurately quantified.

#### **6.0 METHODOLOGY**

##### *6.1 Instrument Type Justification*

Britannia Archaeology Ltd employed a Bartington Dual Grad 601-2 fluxgate gradiometer to undertake the survey, because of its high sensitivity and rapid ground coverage. The surveyors noted that the site had a fairly low magnetic background susceptibility possibly due to the nature of the glacial till that is predominant in this area.

##### *6.2 Instrument Calibration*

One hour was allowed in the morning for the magnetometers sensors to settle before the start of the first grid. The instrument was zeroed after every three grids to minimise the effect of sensor drift. An area with a relatively low magnetic reading was chosen to calibrate the instrument; this same point was used to zero the sensors throughout the survey providing a common zero point. Sensor drift was noted throughout the two days by the surveyors, due to outbreaks of sunshine.



### 6.3 *Sampling Interval and Grid Size*

The sampling interval was set at 0.25m along 1m traverse intervals, providing 4 readings a metre, the magnetometer survey was undertaken on 20 x 20m grids.

### 6.4 *Survey Grid Location*

The survey grid was set out to the Ordnance Survey OSGB36 datum to an accuracy of  $\pm 0.1\text{m}$  employing a Leica Viva Glonass Smart Rover GS08 differential global positioning system (DGPS). Data were then converted to the National Grid Transformation OSTN02 and the instrument was regularly tested using stations with known ETRS89 coordinates. The grids were positioned on a north-east to south-west alignment (Figure 2).

### 6.5 *Data Capture*

Instrument readings were recorded on an internal data logger that were downloaded to a laptop at lunchtime and then also at the end of the day. The grid order was recorded on a BA pro-forma to aid in the creation of the data composites. Data were filed in job specific folders. These data composites were checked for quality on site by BA, allowing grids to be re-surveyed if necessary. The data were backed up onto an external storage device in the office and finally a remote server at the end of the day. A five metre exclusion zone was left between the boundaries and the survey area to reduce the amount of field boundary magnetic disturbance.

### 6.6 *Data Presentation and Processing*

Data are presented in both raw and processed data plots in greyscale format (Figures 3 and 4). An XY trace plot of the processed data has also been included (Figure 5). The raw data is presented with no processing, and was clipped to produce a uniform greyscale plot. The processed data schedule is displayed below.

#### *Raw Data:*

**Data Clipping:** -3/+3 standard deviation.

#### *Processed Data:*

**De-spike:** X diameter = 3, Y diameter = 3, Threshold = 1, centre value=mean, replace with = mean;

**Data Clipping:** 1 standard deviation;

**De-stripe:** Traverse, Median, X (Horizontal).

**Data Display:** Clip to -3/+3 standard deviation.

An interpretation plan characterising the anomalies recorded can be found at Figure 6, it draws together the evidence collated both from the greyscale and XY trace plots (Figures 3, 4 and 5). All figures are tied into the National Grid and printed at an appropriate scale.





## 6.7 Software

Raw data were downloaded using Bartington software Grad601 and will be stored in this format as raw data. The software used to process the data and produce the composites was DW Consulting's Archeosurveyor v2.0. Datasets were exported into AutoCAD and placed onto the local survey grid. An interpretation plot was then produced using AutoCAD.

## 6.8 Grid Restoration

Britannia Archaeology Ltd did not position any reference stations in the field due to its use as playing fields. The grid can be relocated using the geo-referenced stations printed in Figure 2, this can also enable the accurate locating of the geophysical anomalies.

## 7.0 RESULTS & DISCUSSION

The surveyors noted that the sites overall magnetic background was relatively low, causing no difficulty in locating a suitable zero station to set-up the instruments sensors. As expected the most numerous recorded anomalies were isolated dipolar ('iron spike') responses that were probably attributable to modern ferrous cultural debris being introduced into the topsoil, rather than being caused by archaeological artefacts. These responses seem to be fairly evenly spaced throughout the fields with no apparent concentration. It is likely that this ferrous debris was randomly lost during its use as football pitches, or previously as farmland, with material being deposited during episodes of manuring.

Many areas of magnetic disturbance were recorded, most of which are present on the survey boundaries. Even though the surveyors kept a five metre exclusion zone around from the boundaries, ferrous readings were still recorded, some of which were caused by the presence of goal posts moved to the sites extremities. Two smaller areas of magnetic disturbance were present within the dataset, and could indicate either areas of burning or buried ferrous debris.

Areas of magnetic disturbance caused by known modern cultural debris are hatched in blue (Figure 6). The discrete area of modern magnetic disturbance, located in the north-western end of the dataset locates an area where a fire had been recently lit. To the north-west of this and located on the boundary were modern areas of magnetic disturbance caused by the demolition of some brick dug-outs, and the presence of wooden fence panels.

Five strong dipolar discrete anomalies were also caused by the presence of modern furniture associated with the football pitches.



One area of magnetic disturbance (magenta hatching) is located to the north-east of the existing hockey pitches. This is likely to have been caused by the construction and subsequent landscaping previously undertaken within this area.

Five partial weak negative linear trends were also recorded within the dataset that are orientated north-east to south-west or perpendicular. These may define possible drainage or service runs associated with the football pitches or land drains associated with the preceding farm.

One small positive discrete anomaly was recorded within the dataset that is indicative of an archaeological pit-type feature, however a geological or more modern origin cannot be ruled out.

## **8.0 CONCLUSION**

A range of anomalies were detected within the dataset, however only one has been tentatively assigned as being of possible archaeological origin. It is clear from the data recorded that the superficial geology has a relatively low magnetic susceptibility; this geology could be present to a depth below that may be masking potential anomalies of potential archaeological origin from being recorded.

The subsequent phases of archaeological excavation should allow the interpretations given within this report to be qualified.

## **9.0 PROJECT ARCHIVE AND DEPOSITION**

A full archive will be prepared for all work undertaken in accordance with guidance from the *Selection, Retention and Dispersion of Archaeological Collections*, Archaeological Society for Museum Archaeologists, 1993. Arrangements will be made for the archive to be deposited with the relevant museum/HER Office.

## **10.0 ACKNOWLEDGEMENTS**

Britannia Archaeology Ltd would like to thank Dr Tim Lodge of Agrostis for arranging site access and Paul Wranek of Ipswich School for funding the project. Our thanks also to Katherine Scott of Suffolk Coastal District Council and Matthew Brudenhall of Suffolk County Council Archaeology Service/Conservation Team for writing the brief.



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## **Appendix 1 – Technical Details**

### **Magnetometer Survey**

The magnetometer differs from the 'active' magnetic susceptibility meter by being a 'passive' instrument. Rather than injecting a signal into the ground it detects slight variations in the Earth's magnetic field caused by cultural and natural disturbance (Clark).

Thermoremanent magnetism is produced when a material containing iron oxides is strongly heated. Clay for example has a high iron oxide content that in a natural state is weakly magnetic, when heated these weakly magnetic compounds become highly magnetic oxides that a magnetometer can detect.

The demagnetisation of iron oxides occurs above a temperature known as the Curie point; for example haematite has a Curie point of 675 Celsius and magnetite 565C. At the time of cooling the iron oxides become permanently re-magnetised with their magnetic properties re-aligned in the direction of the Earth's magnetic field (Gaffney and Gater). The direction of the Earth's magnetic field shifts over time and these subtle alignment differences can be recorded. Kilns, hearths, baked clay and ovens can reach Curie point temperatures, and are the strongest responses apart from large iron objects that can be detected. Other cultural anomalies that can be prospected include occupation areas, pits, ditches, furnaces, sunken feature buildings, ridge and furrow field systems and ritual activity (David, 2011). Commonly recorded anomalies include modern ferrous service pipes, field drainage pipes, removed field boundaries, perimeter fences and field boundaries.

### **Fluxgate Gradiometers**

Fluxgate gradiometers are sensitive instruments that utilise two sensors placed in a vertical plane, spaced 1 metre apart. The sensor above reads the Earth's magnetic (background) response while the sensor below records the local magnetic field. Both sensors are carefully adjusted to read zero before survey commences at a 'zeroing' point, selected for its relatively 'quiet' magnetic background reading. When differences in the magnetic field strength occur between the two sensors a positive or negative reading is logged. Positive anomalies have a positive magnetic value and conversely negative anomalies have a negative magnetic value relative to the site's magnetic background. Examples of positive magnetic anomalies include hearths, kilns, baked clay, areas of burning, ferrous material, ditches, sunken feature buildings, furrows, ferrous service pipes, perimeter fences and field boundaries. Negative magnetic anomalies include earthwork embankments, plastic water pipes and geological features.

The instruments are usually held approximately 0.30m to 0.50m above the ground surface and can detect to a depth of between 1-2metres. Best practice dictates that the optimal direction of traverse in Britain is east to west.



## **Magnetic Anomalies**

### **Linear trends**

Linear trends can be both positive and negative magnetic responses. If they are broad, relatively weak or negative in nature they may be of agricultural or geological origin, for example periglacial channels, land drains or ploughing furrows. If the responses are strong positive trends they are more likely to be of archaeological origin. Archaeological settlement ditches tend to be rich in highly magnetic iron oxides that accumulate in them via anthropogenic activity and humic backfills. Conversely surviving banks will be negative in nature, the material is derived from subsoil deposits that is less likely to be positively magnetic. Curvilinear trends can also be recorded and are indicative of archaeological structures such as drip-gullies.

### **Discrete anomalies**

Discrete anomalies appear as increased positive responses present within a localised area. They are caused by a general increase in the amount of magnetic iron oxides present within the humic back-fill of for example a rubbish pit.

### **'Iron spike' anomalies**

These strong isolated dipolar responses are usually caused by ferrous material present in the topsoil horizon. They can have an archaeological origin but are usually introduced into the topsoil during manuring.

### **Areas of magnetic disturbance**

An area of magnetic disturbance is usually associated with material that has been fired. For example areas of burning, demolition (brick) rubble or slag waste spreads. They can also be caused by ferrous material, e.g. close proximity to barbwire or metal fences and field boundaries, buried services, pylons and modern rubbish deposits.

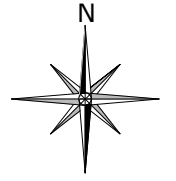
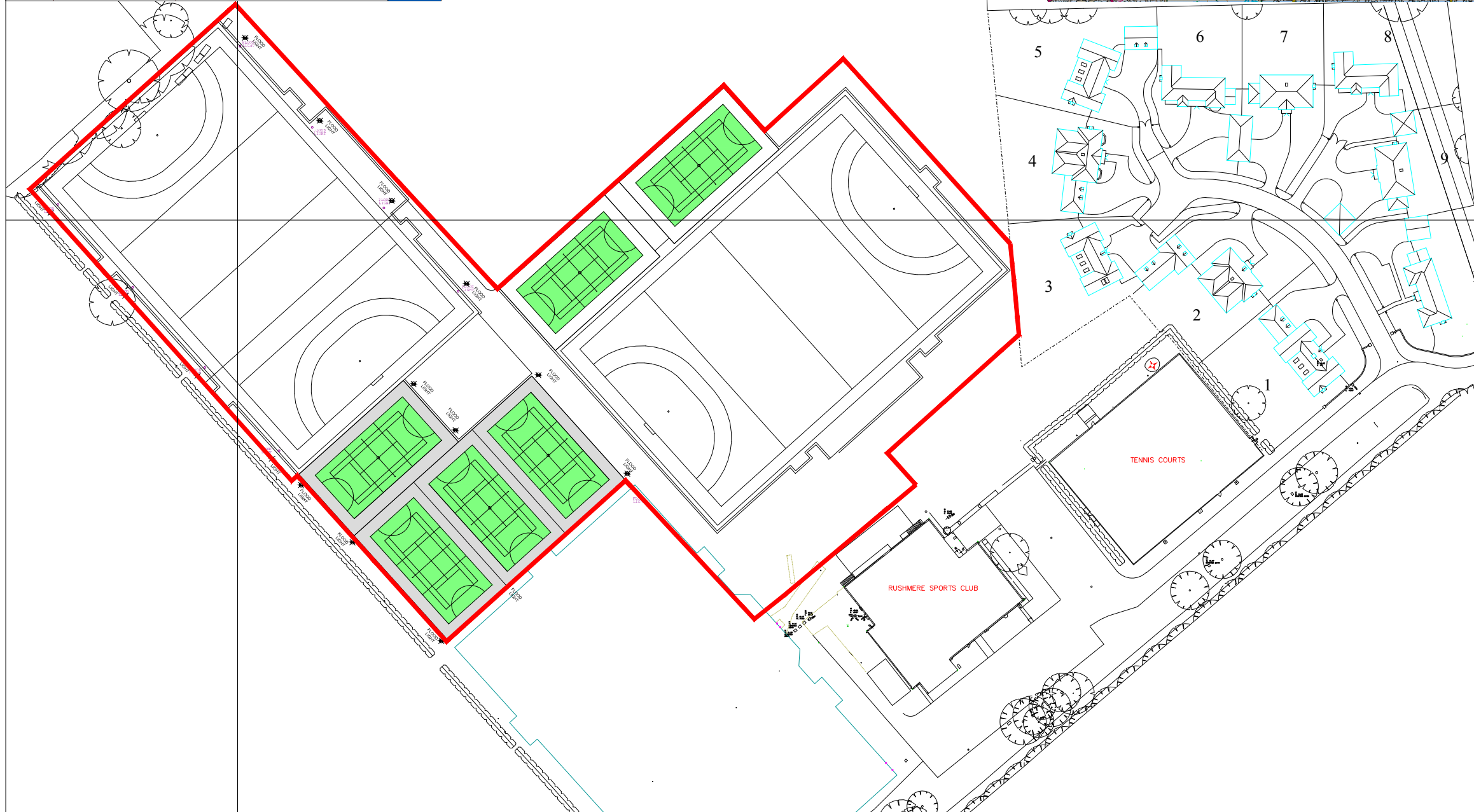
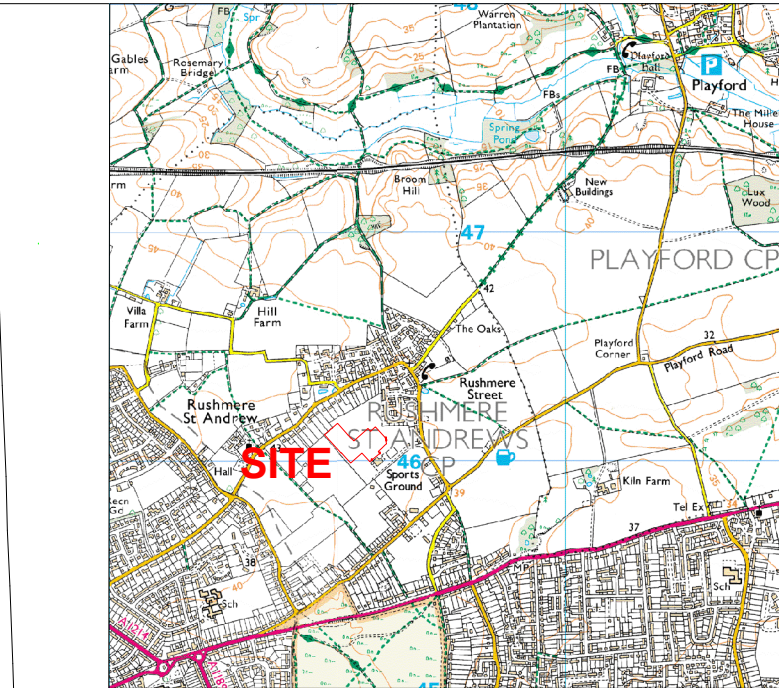


## Appendix 2 – OASIS Form

**OASIS ID: britanni1-156228**

### Project details

<b>Project name</b>	Rushmere Sports club, The Street, Rushmere St Andrew, Suffolk
<b>Short description of the project</b>	A range of anomalies were detected within the dataset, most of which were caused by modern activity or ferrous debris present on the site. Only one anomaly recorded within the dataset has been tentatively assigned as being of potential archaeological origin. It is possible that deep lying moraines of glacial till may be masking potential archaeological anomalies from being recorded with the magnetometer. Subsequent phases of archaeological excavation should allow the interpretations given within this report to be qualified.
<b>Project dates</b>	<b>Start:</b> 29-07-2013 <b>End:</b> 30-07-2013
<b>Previous/future work</b>	No / Yes
<b>Any associated project reference codes</b>	P1038 - Contracting Unit No.
<b>Type of project</b>	Field evaluation
<b>Site status</b>	None
<b>Current Land use</b>	Community Service 2 - Leisure and recreational buildings
<b>Monument type</b>	NONE None
<b>Significant Finds</b>	NONE None
<b>Methods &amp; techniques</b>	"Geophysical Survey"
<b>Development type</b>	Playing Fields
<b>Prompt</b>	Direction from Local Planning Authority – PPS
<b>Position in the planning process</b>	Pre-application
<b>Solid geology</b>	(other) Red Crag Formation Sand
<b>Drift geology</b>	(other) Glaciofluvial deposits of sand and gravel and Lowestoft Formation Diamicton
<b>Techniques</b>	Magnetometry
<b>Project location</b>	
<b>Country</b>	England
<b>Site location</b>	SUFFOLK SUFFOLK COASTAL RUSHMERE ST ANDREW Rushmere Sports Club, The Street, Rushmere St Andrew, Suffolk
<b>Study area</b>	2.19 Hectares
<b>Site coordinates</b>	TM 201 461 52 1 52 04 08 N 001 12 42 E Point
<b>Project creators</b>	
<b>Name of Organisation</b>	Britannia Archaeology Ltd
<b>Project brief originator</b>	Local Planning Authority (with/without advice from County/District Archaeologist)
<b>Project design originator</b>	Timothy Schofield
<b>Project director/manager</b>	Martin Brook
<b>Project supervisor</b>	Timothy Schofield
<b>Type of sponsor/funding body</b>	Developer
<b>Name of sponsor/funding body</b>	Ipswich School
<b>Project archives</b>	
<b>Physical Archive Exists?</b>	No
<b>Digital Archive recipient</b>	Suffolk HER
<b>Digital Contents</b>	"Survey"
<b>Digital Media available</b>	"Geophysics", "Images raster / digital photography", "Images vector", "Survey", "Text"
<b>Paper Archive recipient</b>	Suffolk HER
<b>Paper Contents</b>	"Survey"
<b>Paper Media available</b>	"Map", "Report", "Survey", "Unpublished Text"
<b>Entered by</b>	Tim Schofield ( <a href="mailto:tim@britannia-archaeology.com">tim@britannia-archaeology.com</a> )
<b>Entered on</b>	6 August 2013



	Proposed Development
	Site Boundary

NGR:	TM 201 461	REPORT NUMBER:	1032
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PROJECT:  
**RUSHMERE SPORTS CLUB, THE STREET,  
 RUSHMERE ST ANDREW, SUFFOLK**

CLIENT:

DESCRIPTION:  
**SITE LOCATION & PROPOSED  
 DEVELOPMENT PLAN**

**BRITANNIA ARCHAEOLOGY LTD**



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 SUFFOLK, IP14 5UX

T: 01449 763034  
 E: info@britannia-archaeology.com  
 W: www.britannia-archaeology.com

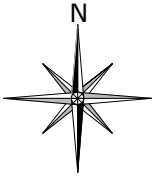
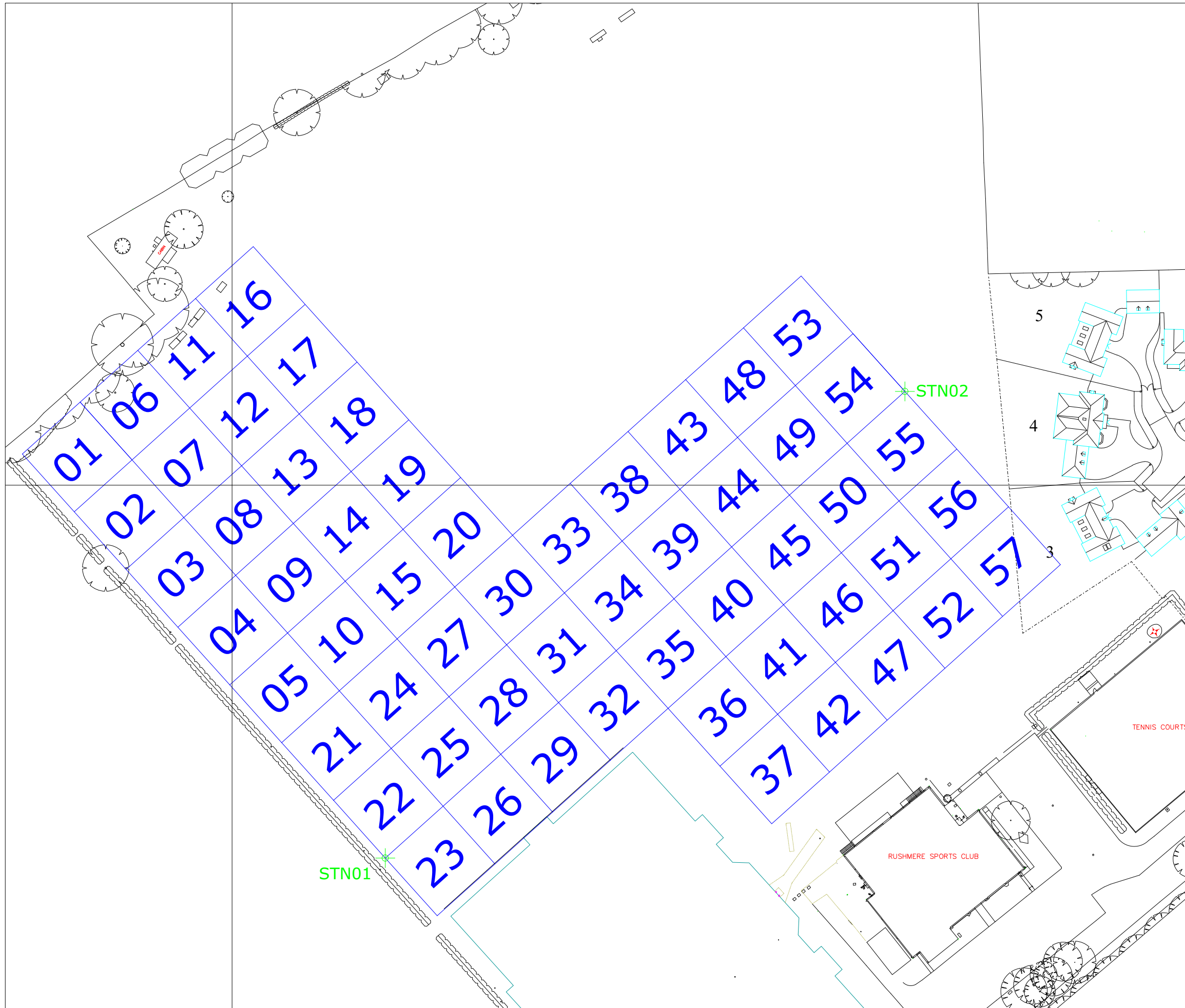
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DATE:	AUG 2013	AUTHOR:	TPS	FIGURE:	01
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620000



STATION	EASTING	NORTHING
01	620039.498	246003.879
02	620173.409	246124.179

 Site Boundary

NGR: TM 201 461      REPORT NUMBER: 1032

PROJECT:  
RUSHMERE SPORTS CLUB, THE STREET,  
RUSHMERE ST ANDREW, SUFFOLK

CLIENT:  


DESCRIPTION:  
SITE GRID LOCATION &  
REFERENCING PLAN


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T: 01449 763034  
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W: www.britannia-archaeology.com

SCALE: 1:1000      0      40m



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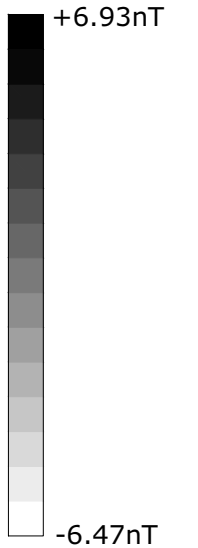
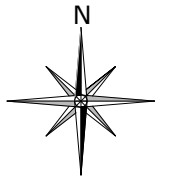
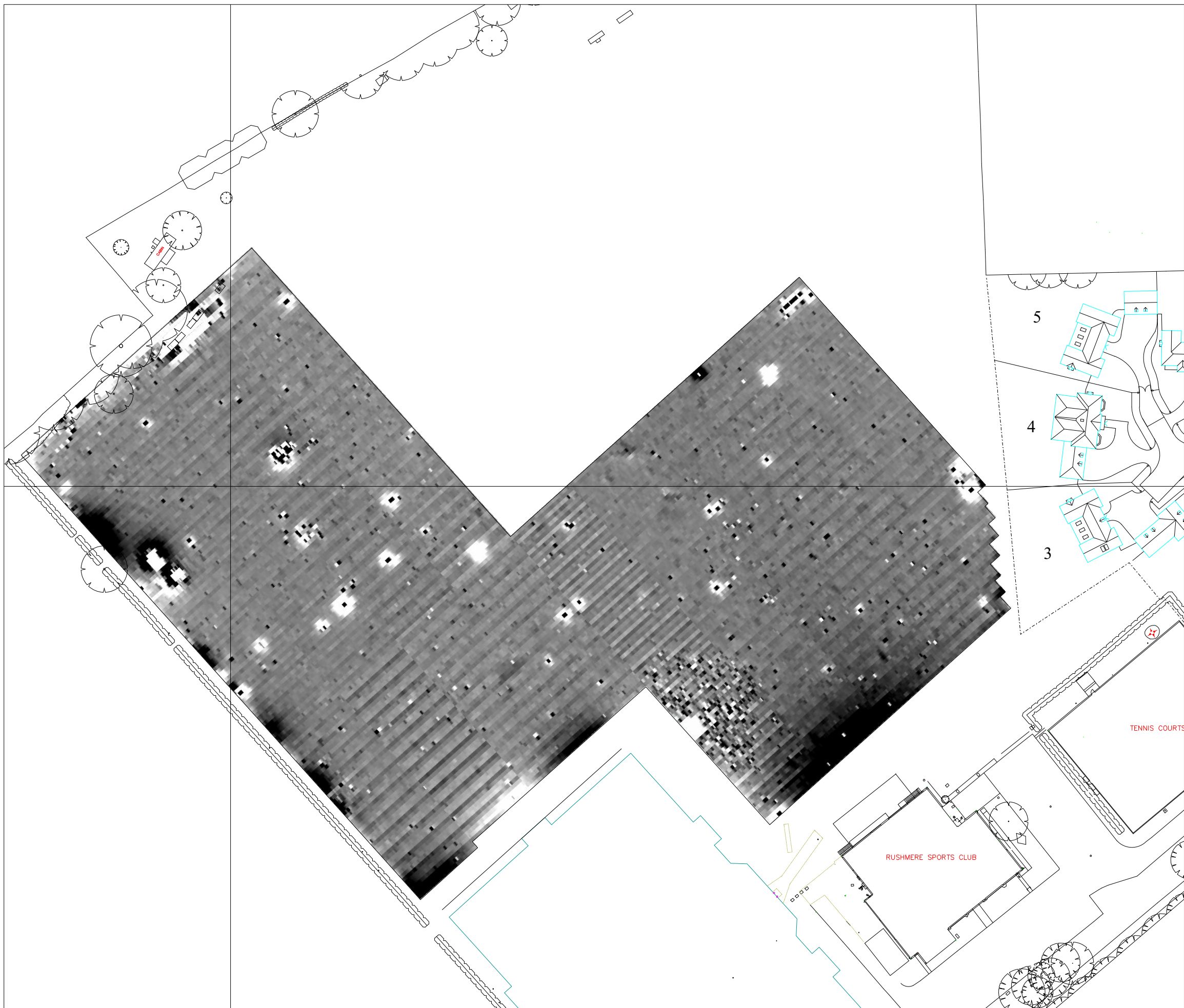
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62000

246100





NGR: **TM 201 461** REPORT NUMBER: **1032**

PROJECT:  
**RUSHMERE SPORTS CLUB, THE STREET,  
RUSHMERE ST ANDREW, SUFFOLK**

CLIENT:  


DESCRIPTION:  
**RAW MAGNETOMER  
GREYSCALE PLOT**

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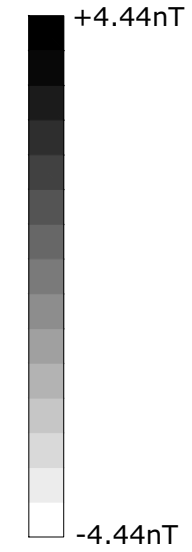
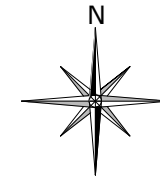
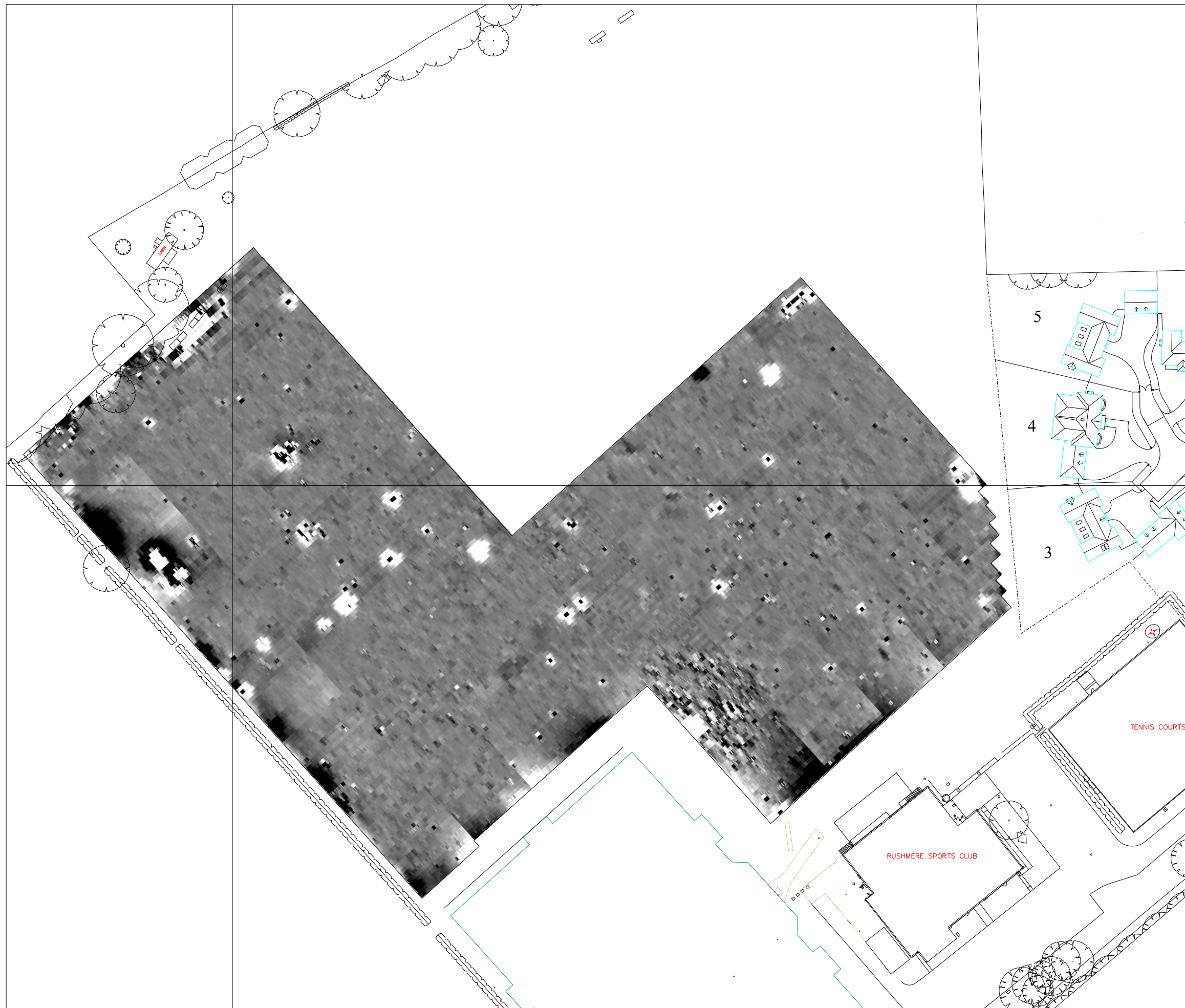
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PLOT: <b>A3</b>	APPROVED: <b>MB</b>	VERSION: <b>01</b>
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DATE: <b>AUG 2013</b>	AUTHOR: <b>TPS</b>	FIGURE: <b>03</b>
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TENNIS COURTS

RUSHMERE SPORTS CLUB

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NGR: TM 201 461      REPORT NUMBER: 1032

PROJECT:  
RUSHMERE SPORTS CLUB, THE STREET,  
RUSHMERE ST ANDREW, SUFFOLK

CLIENT:  


DESCRIPTION:  
PROCESSED MAGNETOMER  
GREYSCALE PLOT

**BRITANNIA ARCHAEOLOGY LTD**



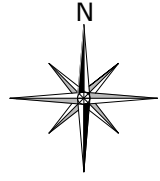
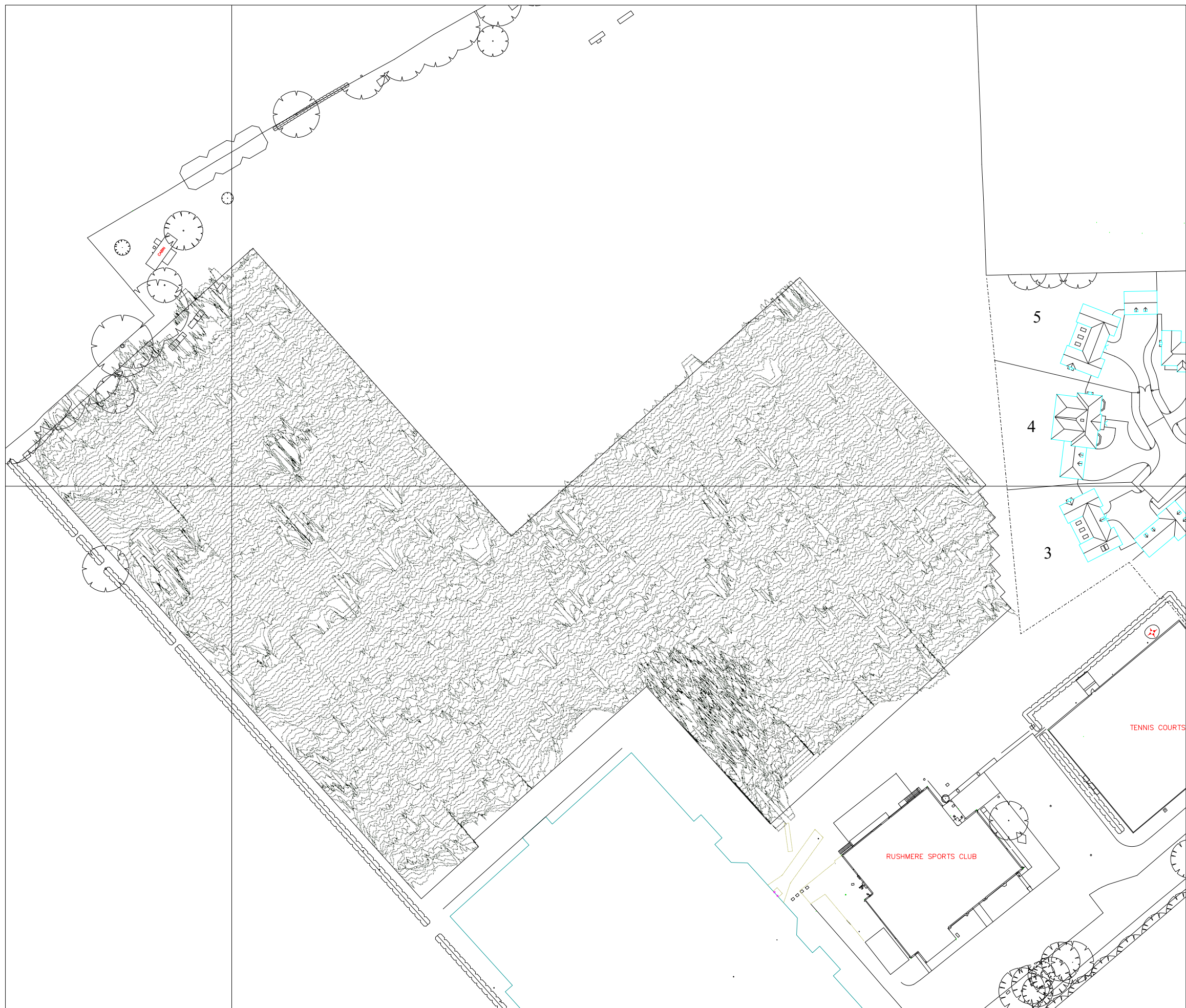
115 OSPREY DRIVE, STOWMARKET,  
SUFFOLK, IP14 5UX

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W: www.britannia-archaeology.com

SCALE: 1:1000      0      40m

PLOT: A3	APPROVED: MB	VERSION: 01
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DATE: AUG 2013	AUTHOR: TPS	FIGURE: 04
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14 nT/cm      Scale Interval

NGR:      REPORT NUMBER:  
 TM 201 461      1032

PROJECT:  
 RUSHMERE SPORTS CLUB, THE STREET,  
 RUSHMERE ST ANDREW, SUFFOLK

CLIENT:  


DESCRIPTION:  
 PROCESSED MAGNETOMER  
 XY TRACE PLOT

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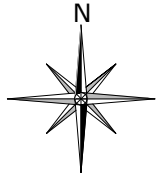
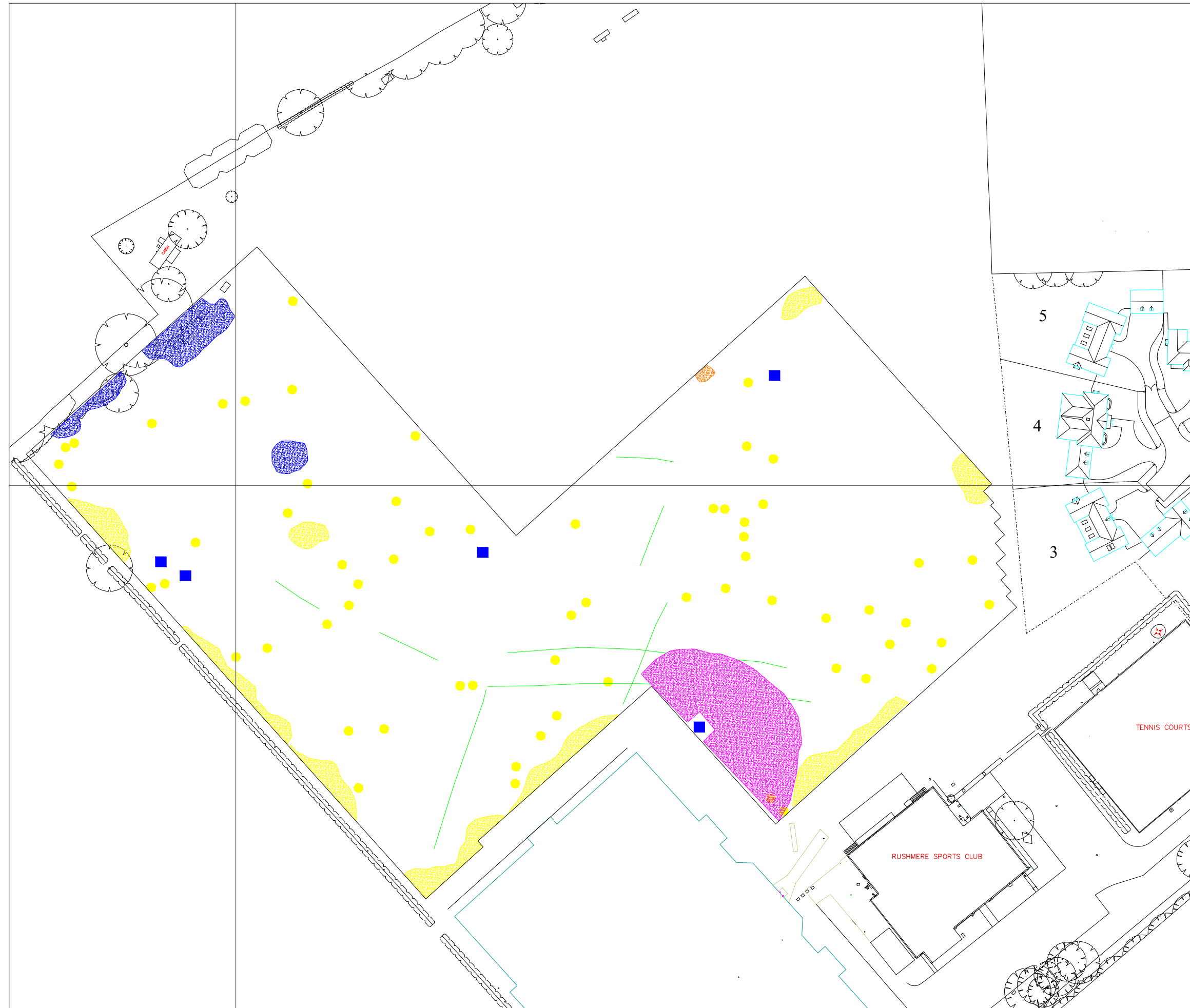
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PLOT:      APPROVED:      VERSION:  
 A3      MB      01

DATE:      AUTHOR:      FIGURE:  
 AUG 2013      TPS      05

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	Positive Discrete Anomaly, Archaeology?
	Very Weak Negative Linear Trend, Agricultural/Land Drain
	Area of Magnetic Disturbance, Landscaped Material
	Area of Magnetic Disturbance, Modern Demolition/Burning
	Strong Dipolar Discrete Anomaly, Modern Furniture
	Area of Magnetic Disturbance
	Isolated Dipolar Responses

NGR: TM 201 461	REPORT NUMBER: 1032
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PROJECT:  
RUSHMERE SPORTS CLUB, THE STREET,  
RUSHMERE ST ANDREW, SUFFOLK

CLIENT:  


DESCRIPTION:  
INTERPRETATION PLOT OF  
MAGNETOMER ANOMALIES

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SCALE: 1:1000	
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PLOT: A3	APPROVED: MB	VERSION: 01
DATE: AUG 2013	AUTHOR: TPS	FIGURE: 06

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