LAND AT BARTON ROAD, THURSTON, SUFFOLK

DETAILED MAGNETOMETER SURVEY

Report Number: 1118

November 2015

LAND AT BARTON ROAD, THURSTON, SUFFOLK

DETAILED MAGNETOMETER SURVEY

Prepared for:
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c/o Max Short
Artisan Planning & Property Services
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Baylham
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November 2015

Site Code	THS028	**NGR**	TL 912 657
Event Number	ESF23270		
Planning Ref.	n/a	**OASIS**	britanni1-228016
Approved By:	Matthew Adams	**Date**	November 2015

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ABSTRACT

In November 2015 Britannia Archaeology Ltd (BA) undertook a detailed magnetometer survey on Land at Barton Road, Thurston, Suffolk, (NGR TL 912 657). The survey was conducted over the footprint of proposed housing on an area of 5.0 ha.

The survey was been successful in detecting anomalies of possible archaeological interest within the site, which are located in three main areas. All these areas contain a series of weak positive trends with possible archaeological origins. Maybe the most significant result from these three areas is 1007, which relates to a sub-oval shaped anomaly possibly representing an early ring ditch.

The survey has successfully highlighted the known history of the site with regards to the buildings that are present on the historic OS maps. Areas of ferrous response are located in these areas and so can be related to those buildings.

1.0 INTRODUCTION

In November 2015 Britannia Archaeology Ltd (BA) undertook a detailed magnetometer survey on behalf of Bovis Homes Ltd, c/o Max Short, Artisan Planning & Property Services, Berwick House, Baylham, Ipswich, Suffolk. The survey was conducted over the footprint of proposed housing (5.0 ha) on Land at Barton Road, Thurston, Suffolk, (NGR TL 912 657).

2.0 SITE DESCRIPTION

The site is located in one agricultural field to the west Barton Road in Thurston, Suffolk. It is bound to the east by Barton Road, to the south and west by residential properties and to the north by agricultural fields.

The bedrock geology is Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk. This sedimentary bedrock was formed approximately 71 to 94 million years ago in the Cretaceous period when the local environment was previously dominated by warm chalk seas (BGS, 2015).

Superficial deposits are described as Head - Clay, Silt, Sand and Gravel. These superficial deposits formed up to 3 million years ago in the Quaternary period when the local environment was previously dominated by subaerial slopes (BGS, 2015).

2.1 Site Visit 27th October 2015

A site visit was undertaken to assess the suitability of the field for detailed geophysical survey and to undertake a risk assessment. The field was in the process of being harvested (DP1) leaving short stubble across the site. Ground conditions were suitable for survey.

DP 1: *Site Shot, Looking South-west.*

3.0 PLANNING POLICIES

The archaeological investigation is to be carried out on the recommendation of the local planning authority, 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 *Mid Suffolk Local Plan; (1998)*.

4.0 ARCHAEOLOGICAL BACKGROUND

The proposed development site is in an area of high archaeological interest, on former heathland (Thurston Heath). This was a focus for prehistoric activity, and a Neolithic site was recorded immediately to the east of the development area (County Historic Environment Record THS 011), whilst Iron Age finds were made to the south (THS 004). In addition, the site lies c 100m to the north-west of the suspected line of a Roman road (THS 007 & THS 002). As a result, there is high potential for the discovery of important hitherto unknown heritage assets of archaeological interest at this site. (Brief, Section 2.1). A pre application investigation undertaken on the site will help to define and quantify any archaeological assets that may be present allowing targeted trial trenching of these features.

5.0 PROJECT AIMS

A non-intrusive geophysical survey is required of the development; this is likely to lead to a programme of trial trenching to enable the archaeological resource, both in quality and extent, to be accurately quantified. However, any decision about the need for, and extent of, trial trenching will be taken following the geophysical survey (Brief Section 3.1).

6.0 METHODOLOGY

The survey grid was be set out to the Ordnance Survey OSGB36 datum to an accuracy of ±0.01m using a Leica Viva Glonnass Smart Rover GS08.

A Bartington Dual Grad 601-2 fluxgate gradiometer was used to undertake the survey, because of its high sensitivity and rapid ground coverage. The soils and underlying geology are receptive to magnetometer survey, but good results are heavily dependent on the contrast between the fills of a feature (with humic and charcoal rich deposits providing the best results) and the relative weakness of the local magnetic background field.

Only minimal processing of the datasets has been undertaken, typically de-spike and zero mean traverse. The raw and processed greyscale plots have been produced for comparison. An XY trace plot consisting of the processed data will be used in combination with raw and processed greyscale data. An interpretation plan characterising the anomalies has been produced based on the evidence collated from the greyscale and XY trace plots.

7.0 RESULTS (Figs. 2-6)

The site proved well suited to magnetometery and the field conditions were not prohibitive. The location of the houses along the western boundary and the associated fencing required some traverses be shortened in order to cut down on interference. Some areas along the southern boundary were not suitable for survey due to large amounts of undergrowth that would have dragged on the sensors and caused misleading readings to be taken. Finally the proposed access footpath on the eastern boundary connecting the site to Barton road was not suitable for survey and was avoided due to the narrow nature of the area and the presence of metallic fences throughout the route. In total 127 grids proved suitable for survey (Fig. 2).

7.1 Gradiometer Results

An abundance of 'iron spike' responses were recorded through the dataset. It is possible that some of these responses may have archaeological derivation however it is extremely likely that these represent nothing more than ferrous debris introduced into the topsoil during episodes of manuring. Larger areas of ferrous response were recorded along the south eastern and southern boundaries of the site. These locations are known to have had standing buildings on them and the increased number of ferrous responses could relate to material from these structures that has been subsequently spread across the area through ploughing and other intervention. Response 1003 relates to an area where a temporary building is believed to have stood in the 1970's (pers. comms) while response 1004 is in the vicinity of a large temporary structure, possibly a makeshift barn believed to have stood in the years immediately following the war, (pers. Comms). It is also worth noting that the area surveyed did contain a large number of trees certainly until the latter half of the 20th century and was known as Thurston Heath.

Three areas of weak positive responses were recorded in the dataset. Area of response 1005 identified a number of weak positive trends which have a slightly irregular and diffuse form and as a result have been classed as possible archaeology to reflect the uncertainties in interpretation. 1006 relates to 4 anomalies, given the form and spacing of these responses they can be interpreted as a series of possible discreet and intercutting pits. The final area of weak positive response relates to a sub-oval shaped enclosure present at 1007; this feature appears to represent a ditch. The interior of this enclosure does not appear to show many internal features, and there are no more pit-like positive anomalies inside the enclosure than there are outside that might suggest occupation. This anomaly cannot be linked to any mapped features on early Ordnance

Survey (OS) (Fig. 7) maps and is classed as archaeology as its curved shape may suggest an early date.

Two weak negative responses (1008 and 1009) were picked up in the data set. 1008 is a ditch-like anomaly. Similar to the anomalies at 1005 it is not clear whether this anomaly represent fragments of an earlier field system or are geological features. This features has been classed as possible archaeology due to its magnetic values and regularity in form.

Anomaly 1009 is also a weak negative response. This could also be interpreted as a ditch however when cross referenced with the map regression (Fig. 7) the anomaly can be seen to be on the same alignment and in the same location as the northern boundary of the former Thurston Heath. The boundary is visible in the 2nd edition OS and revised OS maps giving us a probable date range of 1903 to 1950. Anomaly 1009 could also in have an alternative interpretation due to the presence of a known fowl sewer running across the site on the same alignment as this anomaly, and no other response picked up in the data set being indicative of such a service, this has only been interpreted as possibly archaeology. There is some probability that this represents a ceramic fowl sewer as a ferrous pipe would produce a much stronger, magnetic response. It is entirely possible that this fowl sewer could follow the boundary line of the former heath.

Three of the ferrous responses (1000, 1001 and 1002) picked up in the data set relate to the former position of pylons supporting an overhead cable. While there is no evidence on the surface of the former line of these supports one is still standing on the eastern boundary of the site and fits in well with the east–west alignment of the indicated responses.

Four geo-technical trial pits were cut on the site. These were located in the north, centre south-east and south west of the site. The locations of these test pits correlate with some of the responses that were picked up in the data set, specifically 1010, 1011, 1012 and 1013.

8.0 CONCLUSIONS

The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest within the site, these are located in three main areas (1005, 1006 and 1007). All these areas contain a series of weak positive trends with possible archaeological origins. Maybe the most significant result from these three areas is 1007, which relates to a sub-oval shaped anomaly representing an early ring ditch.

The survey has successfully highlighted the known history of the site with regards to the buildings that are present on the historic OS maps. Areas of ferrous response 1004 and 1005 are located in these areas and so can be related to those buildings.

The site is in an area of high archaeological interest, on former heathland which was a focus for prehistoric activity, and a Neolithic site was recorded immediately to the east of the development area (THS 011), whilst Iron Age finds were made to the south (THS 004). Given this information and the form of anomaly 1007, an early date for this response has been suggested. Unfortunately no results in the data set suggest the presence of an auxiliary track or branch to the Roman road (THS 007 & THS 002) which supposedly lies roughly 100m to the north west.

Numerous anomalies were identified within the greyscale plot. It is difficult to discriminate between anomalies of geological and possibly archaeological origins. Whilst it is considered likely that significant archaeological remains would have produced identifiable anomalies, the confidence with which these anomalies can be interpreted is somewhat reduced given the site's known history.

9.0 PROJECT ARCHIVE AND DEPOSITION

A full archive will be prepared for all the work undertaken in accordance with 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 Mr Max Short and Mr Leslie Short of Artisan Planning & Property Services for commissioning the project and Bovis Homes for funding the work. Our thanks also to Rachael Abrahams at Suffolk County Council for her input and advice.

The survey was undertaken by Martin Brook and Adam Leigh.

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APPENDIX 1 OASIS FORM

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: britanni1-228016

Project details

Project name	Land at Barton Road, Thurston, Suffolk
Short description of the project	In November 2015 Britannia Archaeology Ltd (BA) undertook a detailed magnetometer survey on Land at Barton Road, Thurston, Suffolk, (NGR TL 912 657). The survey was conducted over the footprint of proposed housing on an area of 5.0 ha. The survey was been successful in detecting anomalies of possible archaeological interest within the site, which are located in three main areas. All these areas contain a series of weak positive trends with possible archaeological origins. Maybe the most significant result from these three areas is 1007, which relates to a sub-oval shaped anomaly possibly representing an early ring ditch.
Project dates	Start: 16-11-2015 End: 18-11-2015
Previous/future work	No / Yes
Any associated project reference codes	THS028 - Sitecode
Type of project	Recording project
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	RING DITCH Uncertain
Significant Finds	NONE None
Investigation type	"Geophysical Survey"
Prompt	Direction from Local Planning Authority - PPG16
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	LACUSTRINE CLAYS, SILTS AND SANDS
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK MID SUFFOLK THURSTON Land at Barton Road, Thurston, Suffolk
Postcode	IP31 3NT
Study area	5 Hectares

Site coordinates	TL 912 657 52.255721077619 0.80166381608 52 15 20 N 000 48 05 E Point

Project creators

Name of Organisation	Britannia Archaeology Ltd
Project brief originator	Local Planning Authority (with/without advice from County/District Archaeologist)
Project design originator	Martin Brook
Project director/manager	Martin Brook
Project supervisor	Martin Brook
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Bovis Homes Ltd

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Suffolk HER
Digital Archive ID	THS028
Digital Contents	"none"
Digital Media available	"Database","GIS","Geophysics","Images vector","Spreadsheets","Survey","Text"
Paper Archive recipient	Suffolk HER
Paper Archive ID	THS028
Paper Contents	"none"
Paper Media available	"Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at Barton Road, Thurston, Suffolk
Author(s)/Editor(s)	Brook. M
Other bibliographic details	R1118
Date	2015
Issuer or	Britannia Archaeology LTD

publisher	
Place of issue or publication	Bury St Edmunds
Description	A4 bound report with A3 pullout Figures
URL	www.britannia-archaeology.com
Entered by	Martin Brook (martin@britannia-archaeology.com)
Entered on	14 December 2015

Appendix 2 Approved Written Scheme of Investigation

LAND AT BARTON ROAD, THURSTON, SUFFOLK

WRITTEN SCHEME OF INVESTIGATION
DETAILED MAGNETOMETER SURVEY

Project Number: 1126 October 2015

LAND AT BARTON ROAD, THURSTON, SUFFOLK

Written Scheme of Investigation
Detailed Magnetometer Survey

Prepared for:
Bovis Homes Ltd
c/o Max Short
Artisan Planning & Property Services
Berwick House
Baylham
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By:
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October 2015

Site Code	THS028	**NGR**	TL 912 657
Event Number	ESF23270		
Planning Ref.	n/a	**OASIS**	britanni1-228016
Approved By:	Matthew Adams	**Date**	October 2015

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Figure 2	**Proposed Survey Grid Location Plan**	**1:1250**

2.0 INTRODUCTION

This Written Scheme of Investigation (WSI) has been prepared by Britannia Archaeology Ltd (BA) on behalf of Bovis Homes Ltd, c/o Max Short, Artisan Planning & Property Services, Berwick House, Baylham, Ipswich, Suffolk in response to a brief (Abraham, R. 8th October 2015) for a geophysical survey over the footprint of proposed housing (5.0 ha) on Land at Barton Road, Thurston, Suffolk, (NGR TL 912 657).

2.0 SITE DESCRIPTION

The site is located in one agricultural field to the west Barton Road in Thurston, Suffolk. It is bound to the east by Barton Road, to the south and west by residential properties and to the north by agricultural fields.

The bedrock geology is Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk. This sedimentary bedrock was formed approximately 71 to 94 million years ago in the Cretaceous period when the local environment was previously dominated by warm chalk seas (BGS, 2015).

Superficial deposits are described as Head - Clay, Silt, Sand and Gravel. These superficial deposits formed up to 3 million years ago in the Quaternary period when the local environment was previously dominated by subaerial slopes (BGS, 2015).

2.1 Site Visit 27th October 2015

A site visit was undertaken to assess the suitability of the field for detailed geophysical survey and to undertake a risk assessment. The field was in the process of being harvested (DP1) leaving short stubble across the site. Ground conditions are suitable for survey.

DP 1: *Site Shot, Looking South-west.*

3.0 PLANNING POLICIES

The archaeological investigation is to be carried out on the recommendation of the local planning authority, 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 *Mid Suffolk Local Plan; (1998)*.

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 Mid Suffolk Local Plan (1998).

The local plan for Mid Suffolk deals with the development on archaeological sites in policy HB14, this states the following:

- Where there is an overriding case for preservation, planning permission for development that would affect an archaeological site or setting will be refused.
- Having taking archaeological advice, the district planning authority may decide that development can take place subject to either satisfactory measures to

preserve the archaeological remains in situ or for the site to be excavated and the findings recorded. In appropriate cases the district planning authority will expect a legally binding agreement to be concluded or will impose a planning agreement to be concluded or will impose a planning condition requiring the developer to make appropriate and satisfactory provision for the excavation and recording of the archaeological remains.

In section 2.2.3 of the Local Plan the Heritage and Listed Building objectives are:-

- To maintain or enhance the quality of Mid Suffolk's heritage, particularly through safeguarding its Conservation Areas and Listed Buildings.
- To protect ancient monuments and their settings.
- To give protection to parks and gardens of historic or landscape importance.
- To control change in ways that will protect the character of towns and villages and their settings.
- To give protection to archaeological sites and to ensure they are properly investigated and recorded if such sites are disturbed by development.

4.0 ARCHAEOLOGICAL BACKGROUND

The proposed development site is in an area of high archaeological interest, on former heathland (Thurston Heath). This was a focus for prehistoric activity, and a Neolithic site was recorded immediately to the east of the development area (County Historic Environment Record THS 011), whilst Iron Age finds were made to the south (THS 004). In addition, the site lies c 100m to the north-west of the suspected line of a Roman road (THS 007 & THS 002). As a result, there is high potential for the discovery of important hitherto unknown heritage assets of archaeological interest at this site. (Brief, Section 2.1).

5.0 PROJECT AIMS

A non-intrusive geophysical survey is required of the development; this is likely to lead to a programme of trial trenching to enable the archaeological resource, both in quality and extent, to be accurately quantified. However, any decision about the need for, and extent of, trial trenching will be taken following the geophysical survey (Brief Section 3.1).

6.0 METHODOLOGY

6.1 Fieldwork

A detailed fluxgate gradiometer survey is required over *c.*5.0 Hectares, scheduled to be undertaken in November 2015.

6.2 Instrument Type Justification

Britannia Archaeology Ltd will employ a Bartington Dual Grad 601-2 fluxgate gradiometer to undertake the survey, because of its high sensitivity and rapid ground coverage. The soils and underlying geology are receptive to magnetometer survey, but good results are heavily dependent on the contrast between the fills of a feature (with humic and charcoal rich deposits providing the best results) and the relative weakness of the local magnetic background field.

6.3 Instrument Calibration

The Magnetometer will be left on for a minimum of 20 minutes in the morning for the sensors to settle before any recorded survey takes place. Sensor heights will be measured and equalised at the start of the first day so that a consistent height above the ground is maintained during the survey. Each sensor shall be positioned on the same side of the instrument throughout the survey. The instrument shall be zeroed after every ten grids to minimise the effect of sensor drift. An area shall be chosen with low magnetic susceptibility to calibrate the instruments sensors, this same point shall be used to zero the sensors throughout the survey providing a common zero point.

6.4 Sampling Interval and Grid Size

The sampling interval shall be 0.25m along 1m traverse intervals, within 20 x 20m grids.

6.5 Survey Grid Location

The survey grid shall be set out to the Ordnance Survey OSGB36 datum to an accuracy of ±0.01m employing a Leica Viva Glonnass Smart Rover GS08. Data will be converted to the National Grid Transformation OSTN02, and the instrument will be regularly tested using stations with known ETRS89 coordinates. The grid will be located parallel to the long axis of the proposed development to allow for ease of survey.

6.6 Data Capture

The grid order will be recorded on a BA pro-forma so that the composite plan can be inputted at the close of the day. Instrument readings will be recorded on an internal data logger, downloaded to a laptop at midday and in the evening. Data will be filed in job specific folders, broken up into daily data sets. All data will then be backed up onto an external storage device and finally a remote server. Raw data composites will be uploaded into an AutoCAD drawing and then printed out daily. This will allow BA to check data quality and to re-survey any grids if necessary.

6.7 Data Presentation and Processing

Only minimal processing of the datasets shall be undertaken, typically de-spike and zero mean traverse. Raw and processed greyscale plots shall be produced for comparison, this ensures that no anomalies are processed out of the original data set. An XY trace plot consisting of raw and processed data will be used in combination with raw and processed greyscale data. An interpretation plan characterising the anomalies shall be

produced drawing on the evidence collated from the greyscale and XY trace plots. All figures will be tied into the National Grid and printed at an appropriate scale.

6.8 Software

The software used to process the data and produce the composites will be DW Consulting's Terrasurveyor v2.0. Datasets will be exported into AutoCAD and placed onto their corresponding grid positions. An interpretation plot will then be produced using AutoCAD.

7.0 PRESENTATION OF RESULTS

The prepared client/archive report will be commensurate with the results of the fieldwork, and will be consistent with the principles of the *Management of Research Projects in the Historic Environment* (*MoRPHE*), English Heritage, Edmund Lee, 2006 (minor revisions 2009), *Geophysical Survey In Field Evaluation,* English Heritage, Andrew David *et al*, 2008, and the *Standard and Guidance for Archaeological Geophysical Survey*, Institute for Archaeologists, 2011, containing the following:

- *Summary*. A concise summary of the work undertaken and the results.
- *Introduction*. Introduction to the project including the reasons for work, funding, planning background.
- *Background*. The history, layout and development of the site.
- *Aims and Objectives.*
- *Methodology*. Survey strategy and techniques used.
- *Results*. Detailed description of findings outlining the nature, location and extent of the anomalies.
- *Discussion and Conclusions.* A synopsis interpreting the anomalies, impact assessment, site potential, possible locations of subsequent trial trenches.
- *Bibliography.*
- *Appendices.* Technical Details, Geo-referencing Information, Metadata Sheet, HER/OASIS Summary Sheet.
- *Illustrative Material.* Raw Data Plots, Processed Data Plots, XY Trace Plots, Interpretation Plots, Photographs.

Digital copies will be supplied to the client and the digital version of the final report will be submitted to the Suffolk Historic Environment Record in due course (including a

vector plan and AutoCAD .dxf file) and the National Monuments Record (NMR). A .pdf version will be uploaded to the ADS website and an OASIS form will be completed online and sent to the HER.

8.0 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.

9.0 HEALTH AND SAFETY

BA operates a comprehensive Health and Safety Policy in accordance with the Health and Safety Executive. BA operates under the Federation of Archaeological Managers and Employers (FAME) *Health and Safety Field Manual*, which is regularly updated by supplements.

BA are covered by employer's liability, public liability and professional indemnity insurance arranged through Towergate Insurance (see Appendix 2).

9.1 Code of Practice, Risk Assessment and Site Induction

BA's Code of Practice covers all aspects of survey work and ensures all risks are adequately controlled. A site visit will be undertaken and an assessment of the potential risks highlighted, a full site risk assessment will be produced based on this information. The assessment of risk is continually monitored and this document can be updated if any change in risk occurs. A copy of the Risk Assessment is kept on site, read and countersigned by all staff and visitors during the BA site induction.

BA will liaise with the contractor or client on arrival and will follow any additional Health and Safety instructions given.

A qualified First Aider will be present on every site.

All BA staff members are CSCS registered.

10.0 RESOURCES

All archaeological projects are undertaken by a team of professional qualified archaeologists, a synopsis can be found at Appendix 3. Full CV's are available on request.

All site work will be undertaken by a Project Officer (with a field team if required) in close communication with a Project Manager. This project officer will also be responsible for post-survey publication.

11.0 TIMETABLE AND PROGRAMME OF WORK

The geophysical survey is scheduled to be undertaken on 16th November 2015 and report production will commence thereafter. Preliminary greyscale and interpretation plots shall be issued at the end of the survey. It is understood that the client is aware of the working methods and provision has been made to allow access to undertake the survey as required.

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APPENDIX 1 TECHNICAL DETAILS

MAGNETOMETER

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 INSURANCE DETAILS

	Employers Liability Insurance	Public Liability	Professional Indemnity
Insurer	Towergate Insurance	Towergate Insurance	Towergate Insurance
Extent of Cover	£10,000,000	£5,000,000	£5,000,000
Policy Number	000436	000436	201101352/1236

APPENDIX 3 STAFF

The following members of staff have the skills and experience necessary to undertake the supervision of archaeological work as required in the brief. All have a wide range of experience on a variety of site types.

Archaeologist **Adam Leigh BA (Hons)**

Qualifications: University of Reading, BA (Hons) History (2008-2011)

Experience: Adam joined Britannia Archaeology in early 2015 as an Archaeologist and has four years experience within commercial archaeology. After graduating from Reading with First Class Honours, Adam began his career in archaeology processing finds recovered from sites across East Anglia. In 2012 he became responsible for supervising the processing of finds and working with specialists to produce post excavation assessments. Adam has also worked closely with archivists and has experience in preparing archives for deposition across the region. In his time within commercial archaeology he has learned a wide range of fieldwork skills on numerous sites within and beyond the East Anglia. Adam's main research interests lie in the archaeology and history of the medieval period that stemmed from his higher education studies.

Director **Dan McConnell BSc (Hons)**

Qualifications: University of Bournemouth, BSc (Hons) Archaeology (1995-1998)

Experience: Dan is a Director at Britannia Archaeology and has seventeen years commercial archaeological experience. He took part in several archaeological projects in the north of England from the late 1980's onwards, including the Wharram Percy Research Project and Mount Grace Priory excavations. Within commercial archaeology he has been involved with many small to large scale archaeological projects in the United Kingdom and Ireland including major infrastructure schemes. Since relocating to East Anglia in 2004 he has carried out and managed several small to large scale excavations across the south and east of England. In 2008 Dan became a County Archaeologist for the Cambridgeshire County Council Historic Environment Team before joining Britannia in 2014. His main research interests focus on the early pre-historic period (in particular the Neolithic) of the British-Isles and late post-medieval archaeology.

Director **Martin Brook BA (Hons) PCIfA**

Qualifications: University of Leicester, BA (Hons) Archaeology (2003 – 2006)

Experience: Martin is a Director at Britannia Archaeology and has ten years commercial archaeological experience. He specialises in logistical project management, archiving and fieldwork. He has carried out numerous excavations and evaluations throughout East Anglia and the Midlands, and works closely with local and national museums when

archiving sites. His research interests are focused on the British Iron age specifically funerary traditions in the south of England and in East Yorkshire. Martin specialises in metalwork finds from the period, specifically those associated with grave goods and personal adornment.

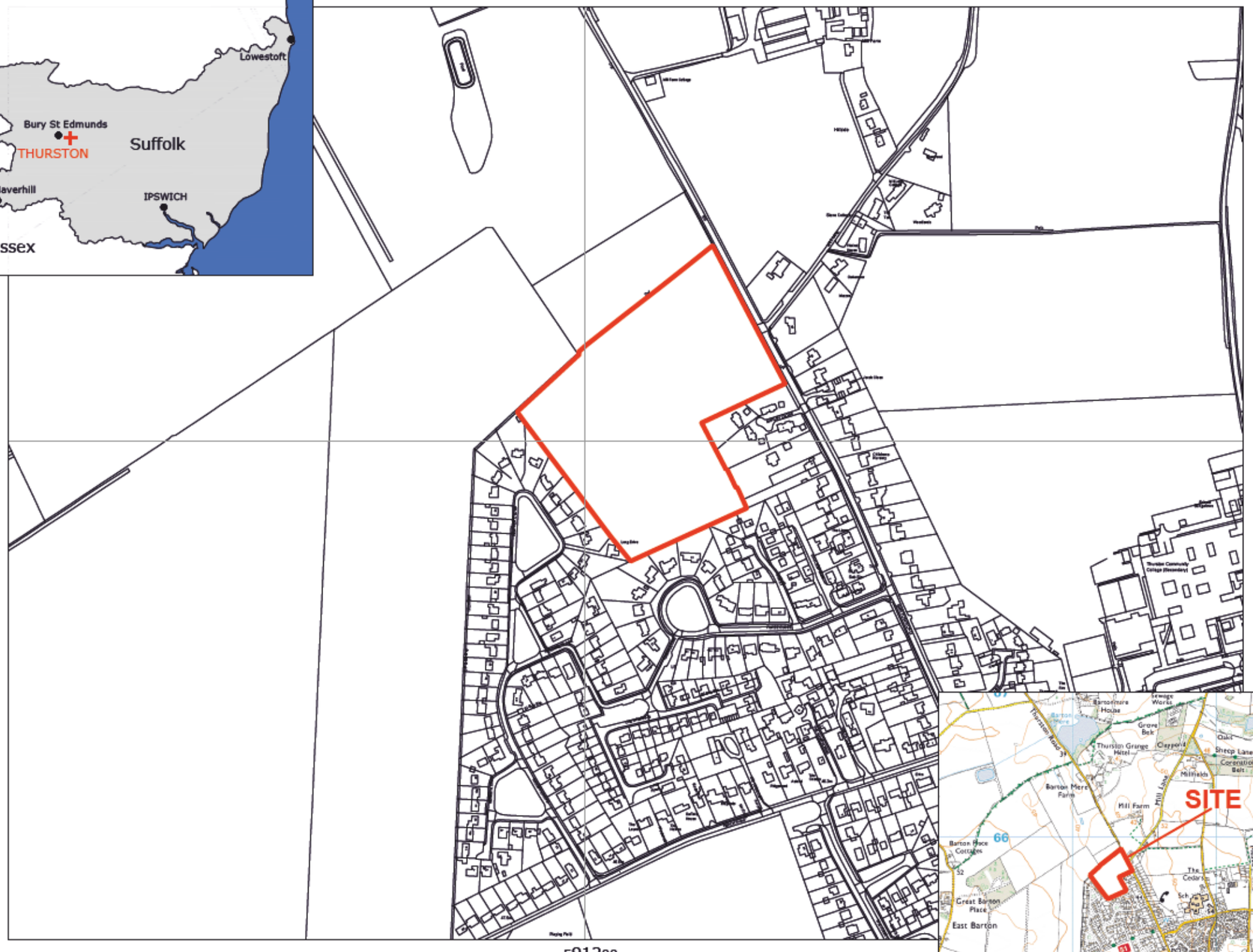
Director **Matthew Adams BA (Hons) ACIfA**

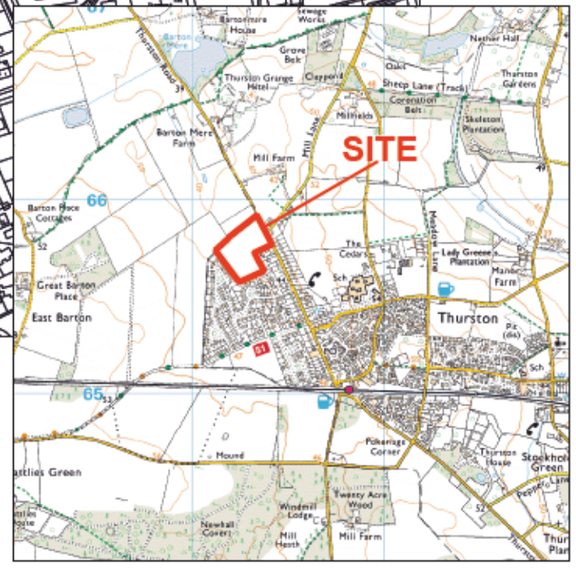
Qualifications: University of Durham, BA (Hons) Classical Studies (1997- 2000)

Experience: Matt is a Director of Britannia Archaeology and has ten years commercial archaeology experience. He was involved in several archaeological projects in the midlands from the mid 1990's onwards and in the North East of England as an undergraduate. Since 2007 he has been based in East Anglia where he has specialised in all areas of practical field work, running numerous projects both large and small. He is also an experienced surveyor, GIS and AutoCAD operator. Matt was an occasional contributor to the popular TV series Time Team and is experienced at presenting talks and seminars to interested organisations. His main research interests focus on transitional periods and include the late Iron Age and early Romano-British period, and the late Roman and early Anglo-Saxon period in Britain and the late Aegean Bronze Age in Crete.

APPENDIX 4 - SPECIALISTS

Prehistoric Pottery:	Ms Sarah Percival
Roman Pottery:	Ms Cathy Tester
Saxon and Medieval Pottery:	Ms Richenda Goffin
Post Medieval Pottery:	Ms Richenda Goffin
Flint:	Miss Justine Biddle
Animal Bone:	Dr Jim Morris and Dr Julia Cussans
Human Bone:	Dr Steph Leach
Environmental:	Ms Anne West
Pollen and Seeds:	Dr Steve Boreham
Charcoal and Wood:	Dr Roderick Bale
Soil Micromorphology:	Dr Steve Boreham
Carbon-14 Dating:	Archaeological Research Services Ltd
Conservation:	University of Leicester Archaeological Services (ULAS)
Metalwork and Leather:	University of Leicester Archaeological Services (ULAS)
Glass:	University of Leicester Archaeological Services (ULAS)
Small Finds:	University of Leicester Archaeological Services (ULAS)
Illustration:	Mr Dave Watt, Miss Charlotte Davies
Slag:	Ms Jane Cowgill
Geophysical Surveyors:	Dr Dave Bescoby
Air Photographic Assessments:	Alison Deegan (BSc)
Topographic Survey:	Mr Matt Adams (BA)
CAD:	Mr Dan McConnell & Mr Matt Adams (BA)
Coins & Medals:	British Museum, Department of Coins & Medals or Norfolk Museum Identification and Recording Service for Archaeological Finds





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N

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: GENERAL LOCATION PLAN

BRITANNIA ARCHAEOLOGY LTD
UNIT 2
THE OLD WOOL WAREHOUSE,
ST ANDREWS STREET SOUTH,
BURY ST EDMUNDS,
SUFFOLK, IP33 3PH
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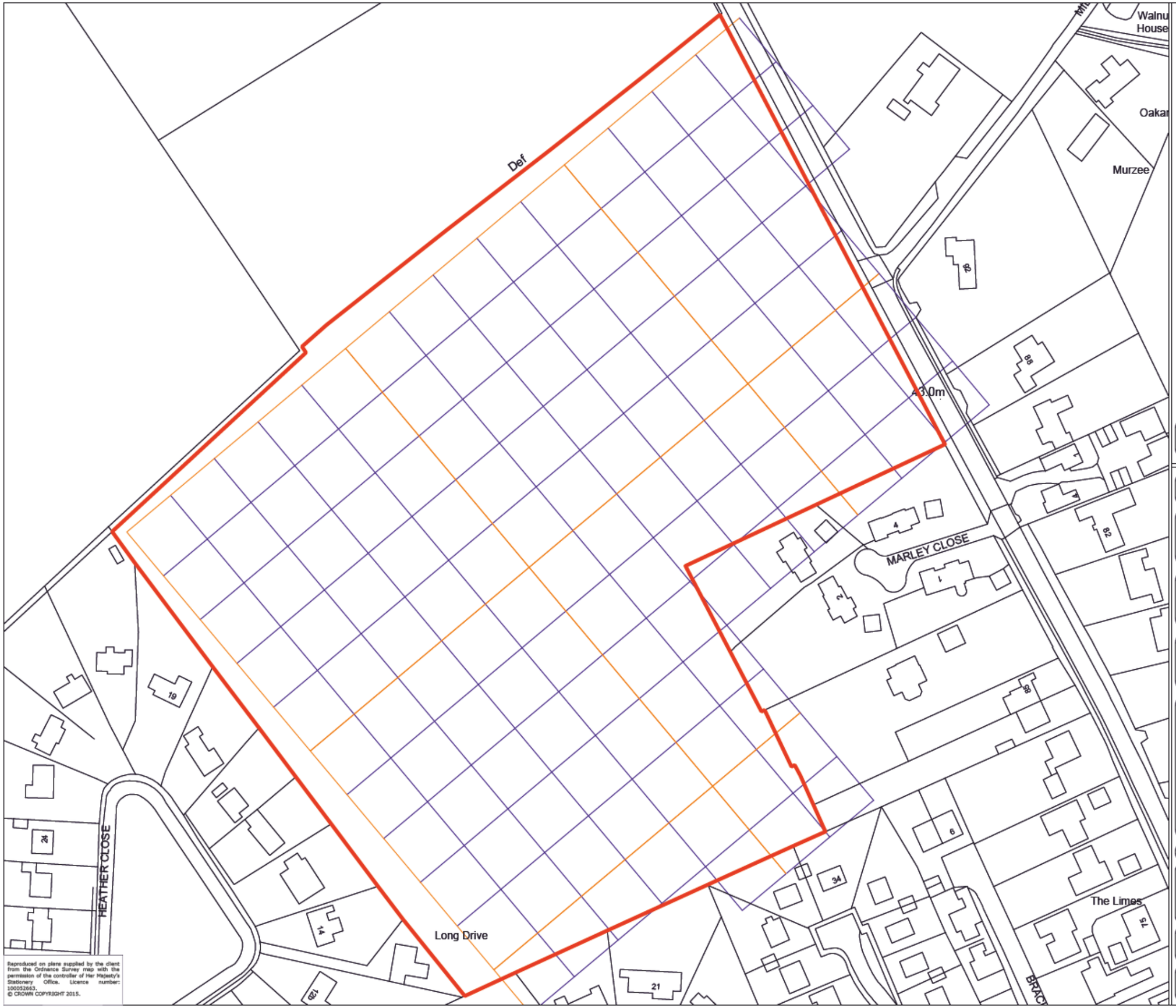
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:5000 — 0 Plans 200m

PLOT:	APPROVED:	VERSION:
A3	MB	01

DATE:	AUTHOR:	FIGURE:
NOV 2015	MCA	01



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Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: GRID PLAN

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SCALE: 1:1250

0 Plans 50m

PLOT:	APPROVED:	VERSION:
A3	MB	01

DATE:	AUTHOR:	FIGURE:
OCT 2015	MCA	02

N

100 nT

0 nT

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: XY TRACE PLOT PROCESSED

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SCALE: 1:1250

Plans 0 50m

PLOT:	APPROVED:	VERSION:
A3	MB	02

DATE:	AUTHOR:	FIGURE:
NOV 2015	MCA	03

N

+100nT

-100nT

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: GRAYSCALE DATA UNPROCESSED

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SCALE: 1:250

Plans 0 50m

PLOT: A3

APPROVED: MB

VERSION: 02

DATE: NOV 2015

AUTHOR: MCA

FIGURE: 04

N

+2nT

-2nT

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: GRAYSCALE PROCESSED

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SCALE: 1:1250

0 Plans 50m

PLOT: A3

APPROVED: MB

VERSION: 02

DATE: NOV 2015

AUTHOR: MCA

FIGURE: 05

N

Possible Archaeology (Weak Positive Response)

Possible Archaeology (Weak Negative Response)

Increased Magnetic Response

Ferrous Response

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: INTERPRETATION PLAN

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SCALE: 1:1250

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PLOT:	APPROVED:	VERSION:
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DATE:	AUTHOR:	FIGURE:
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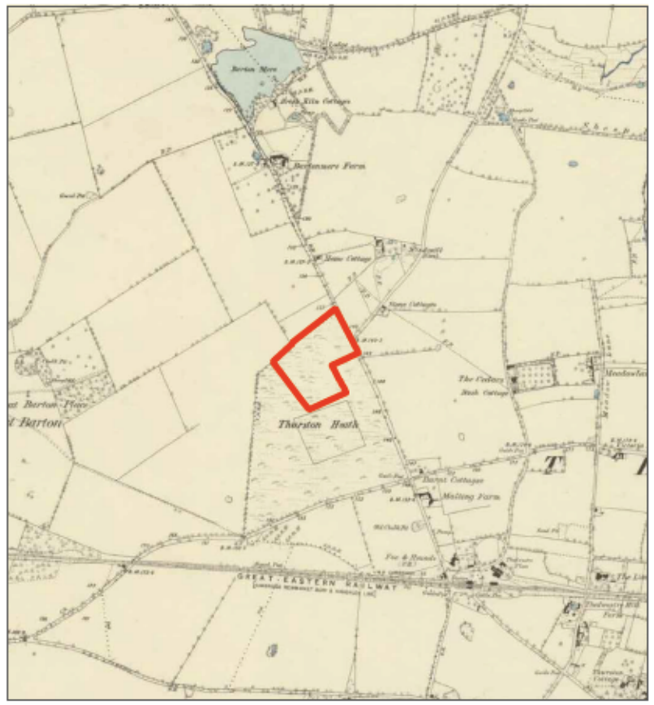
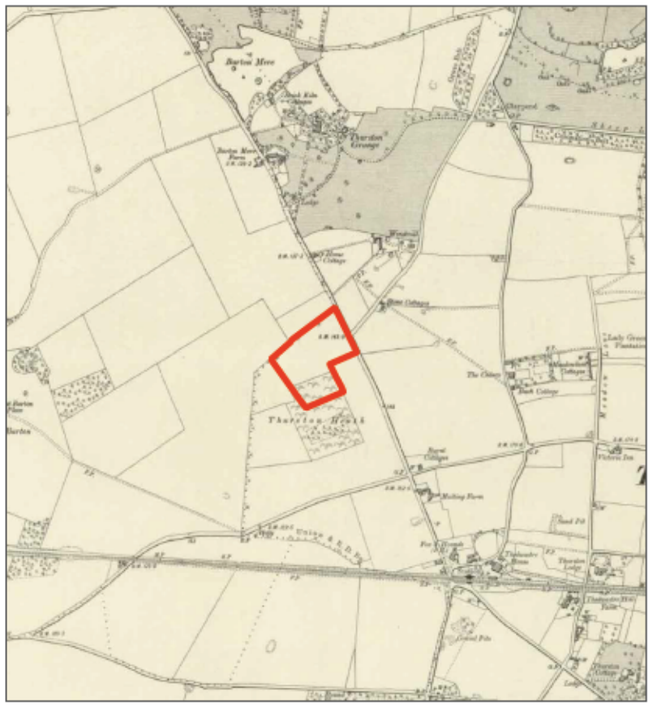


First Edition OS Map - 1884 Suffolk
XLV.NW (6 Inch)



Second Edition OS Map - 1903
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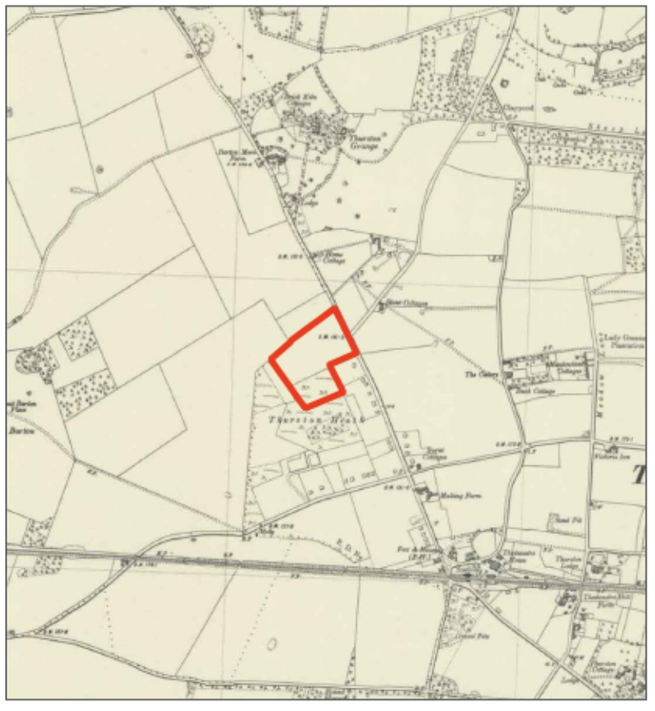

Revised Edition OS Map - 1950
Suffolk XLV.NW (6 Inch)

N

Site Boundary

NGR: 591200 265700

REFERENCE: P1126

PROJECT: LAND AT BARTON ROAD, THURSTON, SUFFOLK

CLIENT: BOVIS HOMES

DESCRIPTION: MAP REGRESSION

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SCALE: Not to Scale

PLOT:	APPROVED:	VERSION:
A3	MB	01

DATE:	AUTHOR:	FIGURE:
DEC 2015	MCA	07