SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Land at High Road

Trimley St Martin, Suffolk

Client:
Pigeon (Trimley) Ltd

Date:
November 2017

TYN 134
Geophysical Survey Report
SACIC Report No. 2017/094
Author: Catherine Douglas

Land at High Road, Trimley St Martin
TYN 134

Geophysical Survey Report

SACIC Report No. 2017/094

Author: Catherine Douglas

Contributions By: Timothy Schofield

Illustrator: Catherine Douglas

Editor: Timothy Schofield

Report Date: November 2017

HER Information

Site Code:	**TYN 134**
Site Name:	**Land at High Road, Trimley St Martin**
Report Number:	**2017/094**
Date of Fieldwork:	**8th – 9th November 2017**
Grid Reference:	**TM 269 380**
Oasis Reference:	**suffolka1-245441**
Curatorial Officer:	**Rachael Abraham**
Project Officer:	**Catherine Douglas**
Client/Funding Body:	**Pigeon (Trimley) Ltd**

Digital report submitted to Archaeological Data Service:
http://ads.ahds.ac.uk/catalogue/library/greylit

Disclaimer

Any opinions expressed in this report about the need for further archaeological work are those of Suffolk Archaeology CIC. Ultimately the need for further work will be determined by the Local Planning Authority and its Archaeological Advisors when a planning application is registered. Suffolk Archaeology CIC cannot accept responsibility for inconvenience caused to the clients should the Planning Authority take a different view to that expressed in the report.

Prepared By: Catherine Douglas
Date: November 2017

Approved By: Timothy Schofield
Position: Project Officer
Date: November 2017
Signed: 

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Summary

In November 2017 Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed fluxgate gradiometer survey on land at High Road, Trimley St Martin, Suffolk. A field comprising *c*.3 hectares of arable land was prospected for anomalies of archaeological derivation.

The detailed fluxgate gradiometer survey recorded a variety of geophysical anomalies, including those indicative of archaeological pits and a linear area of magnetic disturbance interpreted as a potential field drainage ditch. The results of this non-intrusive survey do not suggest that the site contains archaeological deposits of major importance, and that should further work be recommended it would be appropriate for it to be carried out as a condition of future planning consent.

1. Introduction

From the 8th - 9th of November 2017, a detailed fluxgate gradiometer survey covering *c*.3 hectares within a single field to the northeast of High Road, Trimley St Martin, Suffolk (Fig.1) was undertaken by Suffolk Archaeology Community Interest Company (SACIC).

The detailed fluxgate gradiometer survey was undertaken to inform the Suffolk County Council Archaeological Service as part of planning application DC/16/1919. Suffolk Archaeology CIC were commissioned by Pigeon (Trimley) Ltd ('Pigeon') on behalf of the landowners A. Talman, R.E. Stennett, B.E. Hewitt and J.A. Walsh.

This report has been prepared for the joint benefit of Pigeon and the landowners and the contents should not be relied upon by others without the express written authority of SACIC. If any unauthorised third party makes use of this report they do so at their own risk and SACIC owes them no duty of care or skill.

2. Geology and topography

The site is located to the north-west of Trimley St Martin within a single arable field that comprises a total area of *c*.3 hectares. It is situated *c*.3km from the east coast and *c*.1km east of the River Orwell, on a low-lying plateau that ranges in height from between 25 and 26m AOD. The site is bounded to the north by hedgerows and another arable field, to the southwest by High Road, to the southeast by a modern residential development and to the east by allotment gardens.

The field is believed to have been under intermittent agricultural use over the last few centuries for both grazing and crop production. Today the site remains in agricultural use and has been recently cropped of sugar beet.

The bedrock geology is described as Red Crag Formation Sand, formed approximately 2 to 4 million years ago in the Quaternary and Neogene Periods, deposited as mud, silt, sand and gravel in shallow seas. Superficial deposits are described as Glaciolacustrine Deposits, Mid Pleistocene clay and silt formed approximately 2 million years ago in the Quaternary Period, deposited by glaciers as till with outwash and gravel (British Geological Survey, 2017).

Figure 1. Site Location

3. Archaeology and historical background

The site lies within an area of archaeological interest defined by information held within the Suffolk Historic Environment Record and in a brief issued by SCCAS/CT (Abraham, 2016), a geophysical survey followed by a subsequent targeted trial trench evaluation was requested to be undertaken, at the pre-planning application stage. The following archaeological background has been summarised from the desk based assessment undertaken by Archaeology Risk Management (Tindall, 2016).

There is little evidence of prehistoric or Roman settlement within the survey area, however immediately surrounding the site are undated cropmarks of potential later prehistoric or Romano-British date. A probable Bronze Age barrow (TYN 046) 250m to the west and a possible drip gully (TYN 054) is recorded 200m to the west-northwest. Undated rectilinear enclosures and trackway cropmarks (TYN 012, TYN 043) are recorded 250m to the north. A co-axial field system and possible enclosure (TYN 122) are recorded to the south of High Road. An irregular field system (TYN 013) consisting of small enclosures and crofts is located to the southwest. To the north (TYN 065) and northwest (TYN 067) are a series of boundaries and crofts. Fieldwalking and metal detecting to the southwest has recovered prehistoric flints, Roman, Saxon and medieval pottery (TYN 013), Roman bronze and silver coins (TYN 101), Saxon silver coins (TYN 101), a Saxon bronze mount (TYN 102) and a medieval bronze buckle.

4. Methodology

Instrument type

A Bartington DualGRAD 601-2 fluxgate gradiometer was employed to undertake the detailed geophysical survey. The weather, ground and geological soil conditions were found to be suitable.

Instrument calibration

The background magnetic signature across the site was found to be relatively low, a suitable zero station was located with relative ease to correct diurnal drift. One hour was allowed for the instruments sensors to reach a suitable operating temperature before the commencement of the first survey grid. The weather was mostly overcast, with a period of precipitation.

Instrument settings

The survey was undertaken within 20m grids (Fig. 2, blue grid), positioned on an east to west alignment that were georeferenced using a Leica Viva GS08 Smart Rover RTK GLONNASS/GPS, allowing an accuracy of ± 0.03m, with data converted to National Grid Transformation OSTN15. Sampling intervals were set to 0.25m recorded at 1m traverse intervals, providing 4 readings per metre.

Data capture

Data points were recorded on an internal data logger that were downloaded and checked for quality at midday and also in the evening, allowing any grids to be re-surveyed if necessary. A survey sheet was completed to allow the data composites to be created. Data were filed in unique project folders and backed-up onto an external storage device and also onto a remote server in the evening.

Data software, processing and presentation

The site had a relatively low magnetic background allowing good quality raw survey data to be collected with minimal data processing required. Datasets were composited and processed using DW Consulting's Terrasurveyor v.3.0.33.6; the raw grid files, composite and raster graphic plots will be stored and archived in this format. Minimal processing algorithms were undertaken on the raw (Fig. 3) and processed datasets (Figs. 4 and 5); schedules are presented in Appendix 3.

Data composites were exported as raster images into AutoCAD. An interpretation plan based on the combined results of the raw, processed and xy trace plots (Figs. 3, 4 and 5) has been produced (Fig. 6). All figures are georeferenced to the National Grid and printed at an appropriate scale.

Survey grid restoration

Three virtual survey grid stations were placed on survey grid nodes along the baselines of the field in order to allow the location of the grid and the geophysical anomalies to be accurately retargeted (Fig. 2).

5. Results and discussion

The fluxgate gradiometer survey located a fairly narrow range of anomalies (Figs. 3, 4, 5 and 6). Areas of magnetic disturbance (grey shading) caused by ferrous material relating to agricultural practices and field boundary furniture were prospected across the survey area. Isolated dipolar responses (grey spots) were numerous and are likely to be caused by buried ferrous objects present within the topsoil horizon. The results are displayed at a scale of 1:1000 in Figure 6

At the time of survey, the beet had been harvested. Areas of magnetic disturbance (grey shading) located on the periphery of the survey area record ferrous material present within the field boundaries. There was a particularly large amount of magnetic disturbance from the housing development to the southeast of the site, where waste building material may have found its way into the field under the plough soil.

Fourteen positive discrete anomalies (orange shading) indicative of archaeological pits have been recorded across the survey area, five of which form a broad cluster in the southeast part of the site.

A linear weak positive anomaly (red line) aligned northwest-southeast may be indicative of a ditch; however, given the weakness of the anomaly, it could alternatively be indicative of a geologial variation or event within the Red Crag Formation Sand. It is worth noting that the linear is on the same orientation as the existing site boundary, and runs parallel to High Road, but it does not appear on any Ordnance Survey mapping.

6. Conclusions and recommendations for further work

The geophysical survey results indicate that a low degree of archaeological activity may be present within the survey area. A fairly narrow range of anomalies were recorded, those with the greatest archaeological potential being the discrete positive anomalies and the linear positive anomaly. The background search revealed that no known archaeological sites are recorded within the boundary, but that undated cropmarks of potential later prehistoric or Romano-British date have been identified in fields surrounding the site. Evaluation trenching, carried out as a condition of a future application, to target both the blank areas and the full range of geophysical anomalies recorded, would be a proportional next stage of intrusive archaeological investigation.

7. Archive deposition

The paper and digital archive will be kept at the SACIC office in Needham Market, before deposition in the Suffolk County Council Stores in Bury St Edmunds.

8. Acknowledgements

The fieldwork was carried out by Catherine Douglas and Cameron Bate and directed by Catherine Douglas.

Project management was undertaken by Rhodri Gardner and Timothy Schofield provided advice during the production of the report.

The report illustrations were created by Catherine Douglas and the report was edited by Timothy Scofield.

9. Bibliography

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Websites

British Geological Survey

http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Survey Station	Easting	Northing
STN 01	627041.5871	237898.6144
STN 02	627188.4150	238002.7332
STN 03	627084.2983	238149.5652

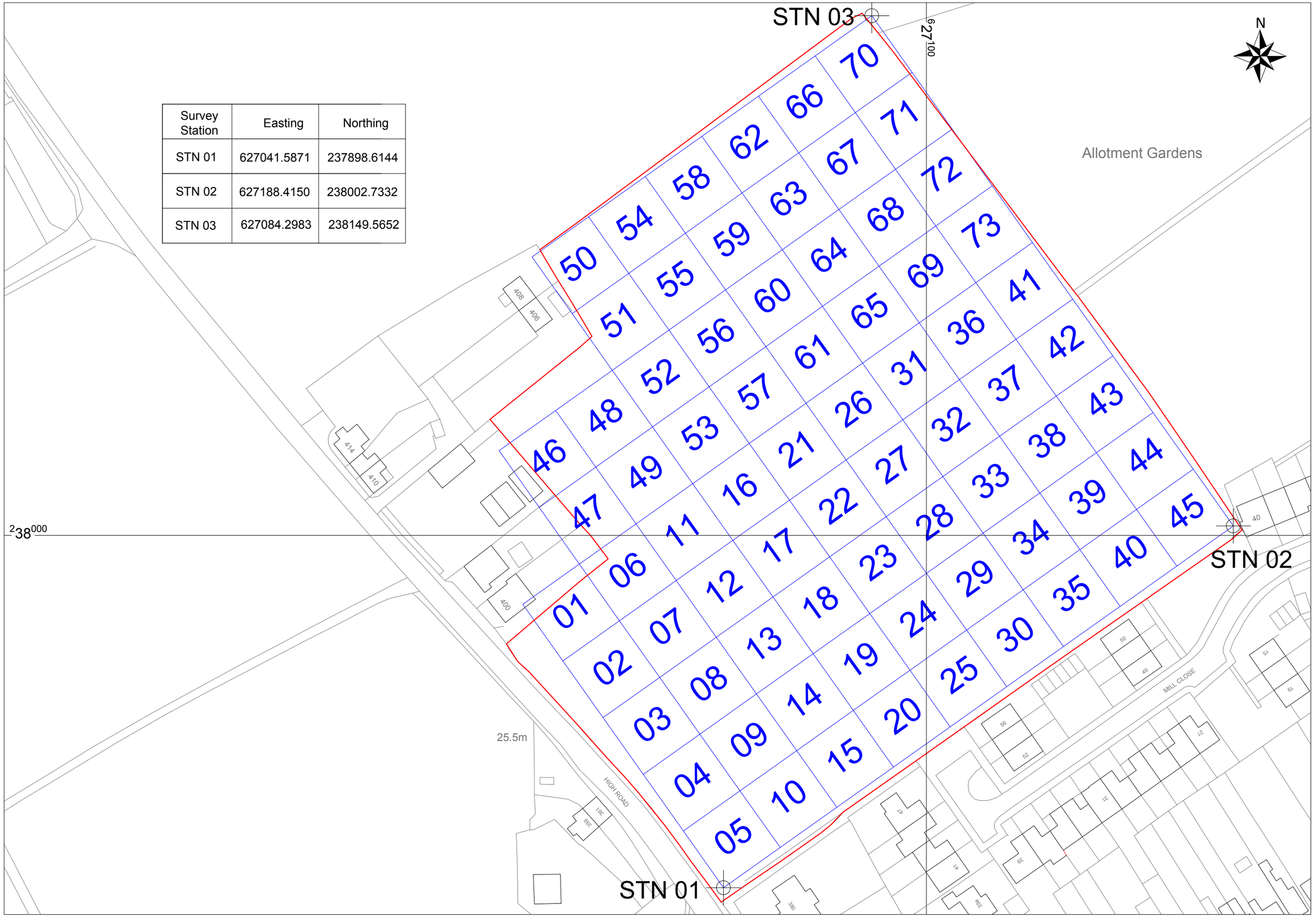

Figure 2. Survey grid and georeferencing

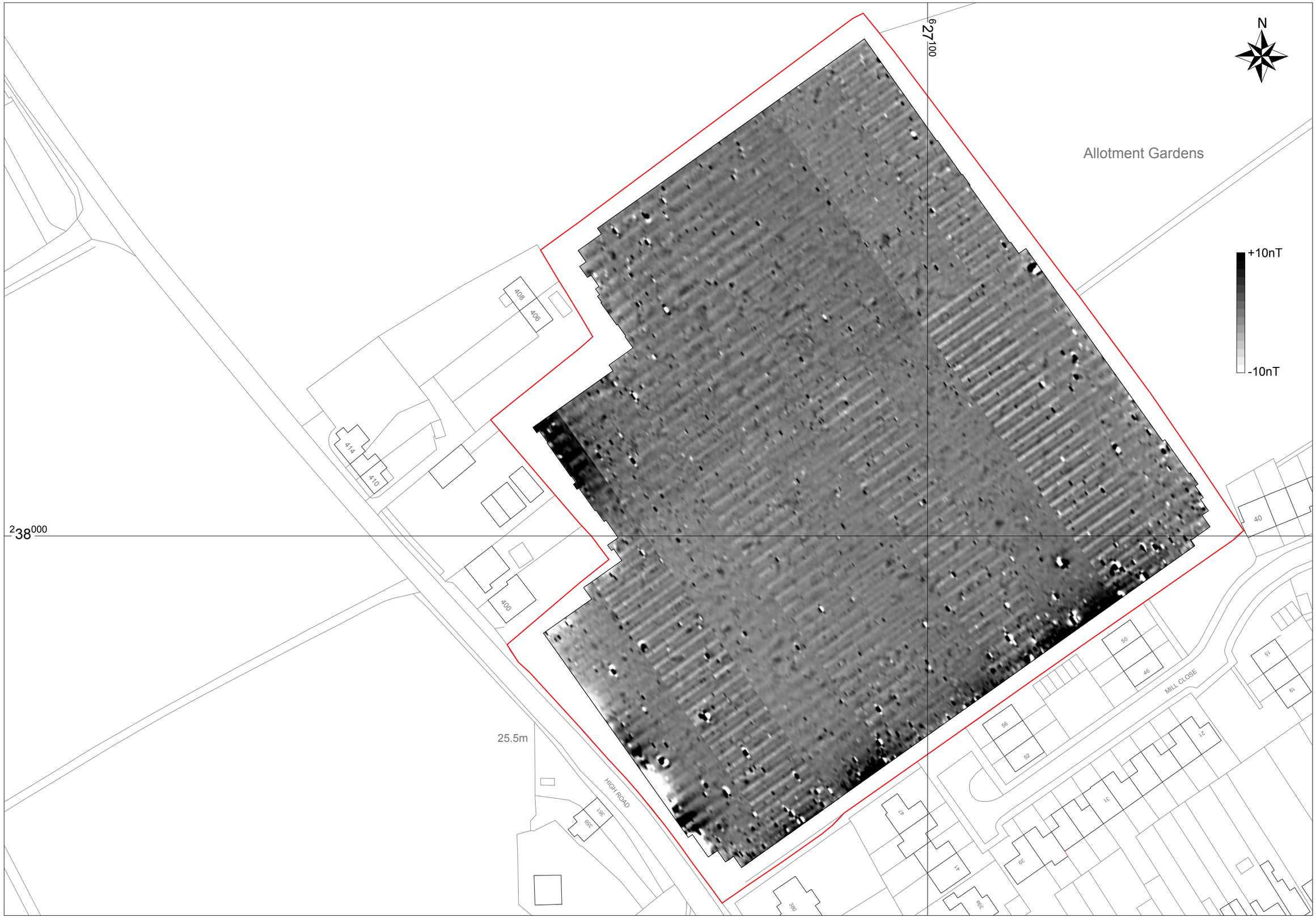

Figure 3. Raw magnetometer greyscale plot

Figure 4. Processed magnetometer greyscale plot

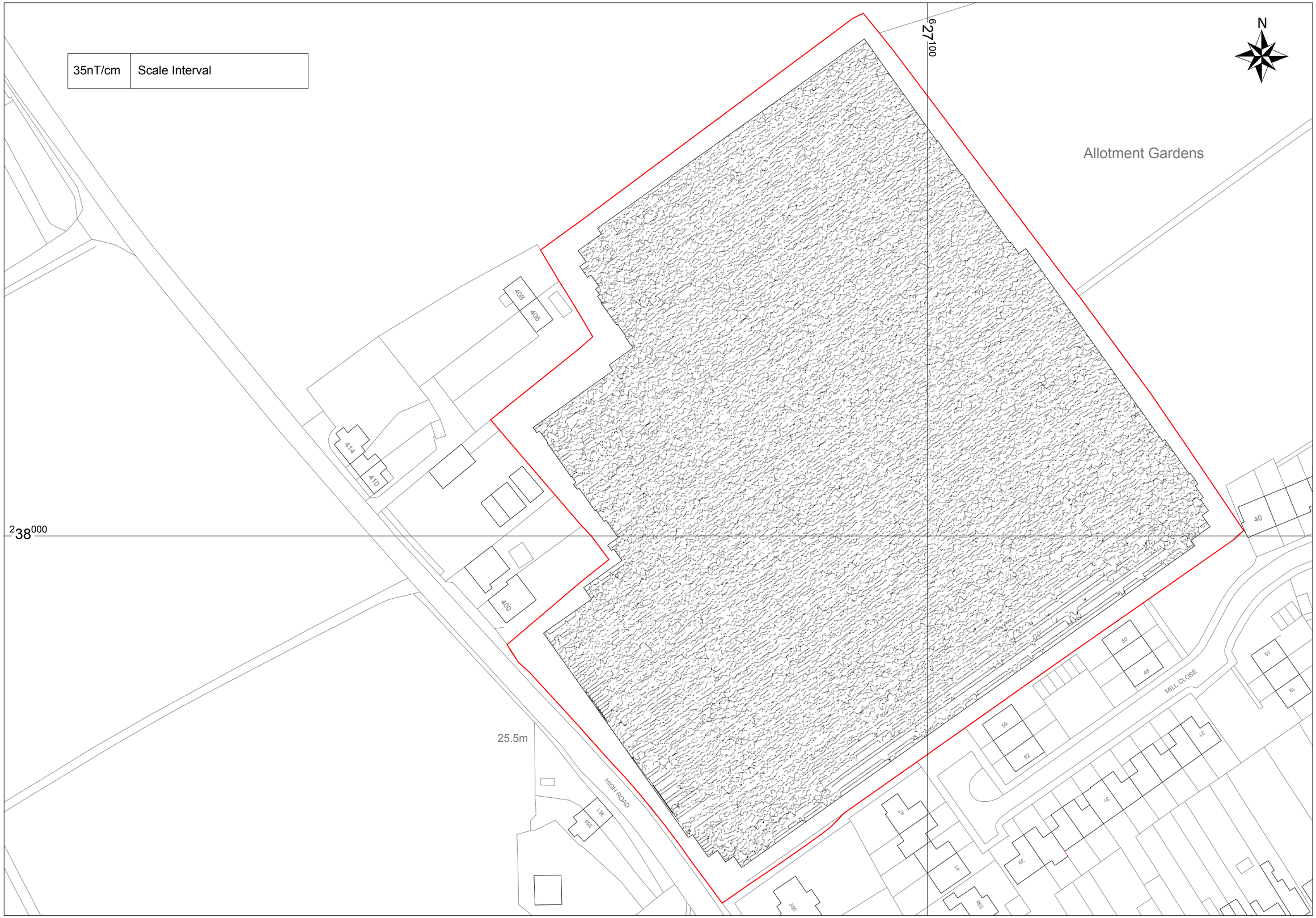

Figure 5. Processed magnetometer xy trace plot

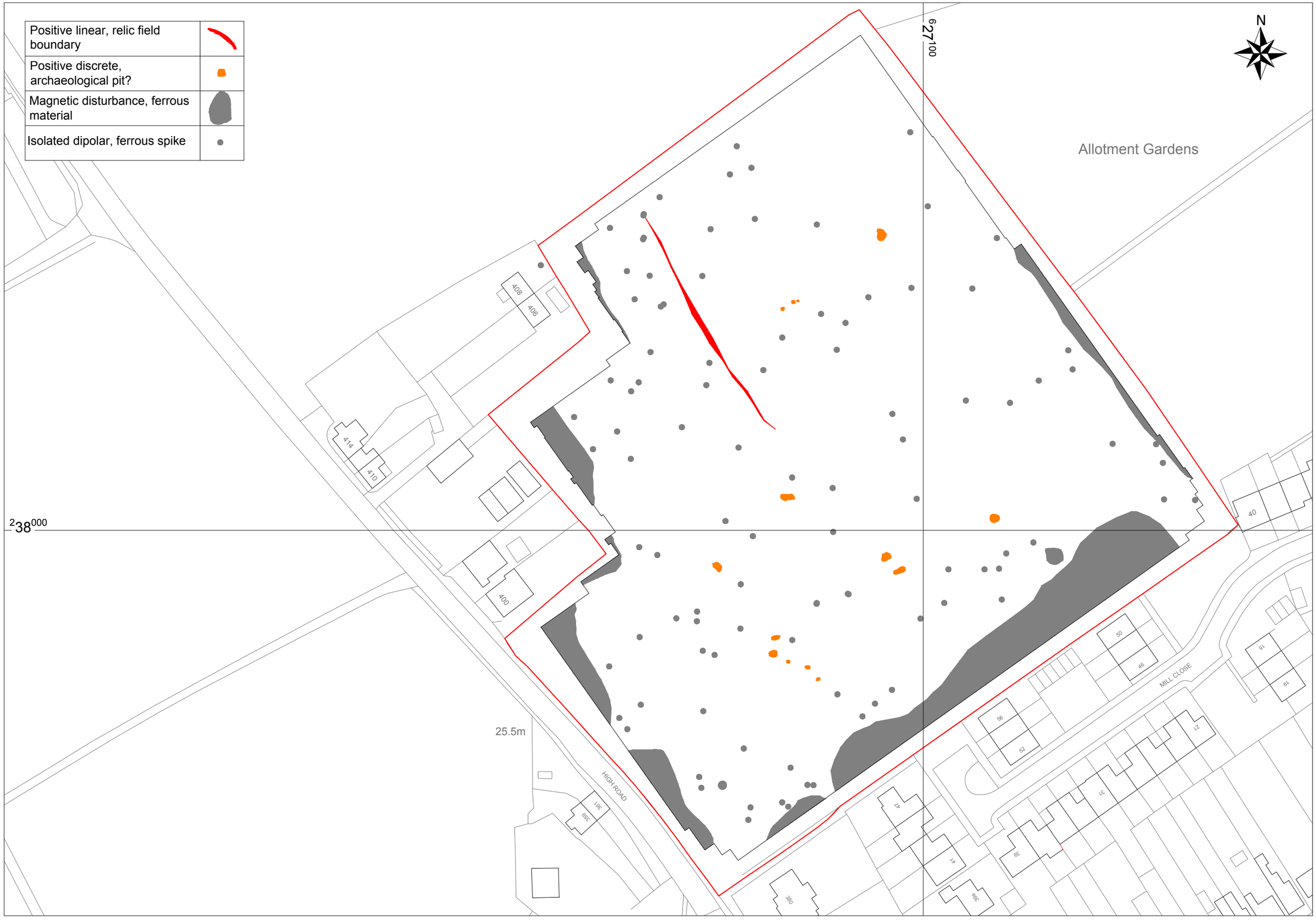

Figure 6. Interpretation plot of magnetometer anomalies

Appendix 1. Brief and specification

Suffolk County Council

The Archaeological Service
Conservation Team

Economy, Skills and Environment
9–10 The Churchyard, Shire Hall
Bury St Edmunds
Suffolk
IP33 1RX

Brief for an Archaeological Evaluation

AT

Land at High Road,
Trimley St Martin

PLANNING AUTHORITY:	Suffolk Coastal District Council
PLANNING APPLICATION NUMBER:	To be confirmed
HER NO. FOR THIS PROJECT:	To be arranged/confirmed with the Suffolk HER Officer (james.rolfe@suffolk.gov.uk)
GRID REFERENCE:	TM 270 380
DEVELOPMENT PROPOSAL:	Housing
AREA:	3ha
THIS BRIEF ISSUED BY:	Rachael Abraham Senior Archaeological Officer Conservation Team Tel. : 01284 741232 E-mail: Rachael.abraham@suffolk.gov.uk
Date:	20 January 2016

Summary

1.1 The applicant and Local Planning Authority (LPA) have been advised that the location of the proposed development could affect important archaeological deposits.

1.2 The applicant is required to undertake an archaeological field evaluation prior to consideration of the proposal, in accordance with a Written Scheme of Investigation. This information should be incorporated in the design and access statement, in accordance with paragraphs 128 and 129 of the National Planning Policy Framework, in order for the LPA to be able to take into account the particular nature and the significance of any below-ground heritage assets at this location.

1.3 The archaeological contractor must submit a copy of their Written Scheme of Investigation (WSI) or Method Statement, based upon this brief of minimum requirements (and in conjunction with our standard Requirements for Geophysical Survey 2011 Ver. 1.1 and Trenched Archaeological Evaluation 2011 Ver 1.3), to the Conservation Team of Suffolk County Council's Archaeological Service (SCCAS/CT) for scrutiny; SCCAS/CT is the advisory body to the LPA on archaeological issues.

1.4 The WSI should be approved before costs are agreed with the commissioning client, in line with Institute for Archaeologists' guidance. Failure to do so could result in additional and unanticipated costs.

1.5 Following acceptance, SCCAS/CT will advise the LPA that an appropriate scheme of work is in place.

1.6 The WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the brief will be met. If the approved WSI is not carried through in its entirety (particularly in the instance of trenching being incomplete) the evaluation report may be rejected.

Archaeological Background

2.1 This the site lies within an area of archaeological interest as defined by information held by the County Historic Environment Record (HER). It is located within a landscape of cropmarks and it is likely that these features extend into the proposed development area (TYN 012, 067 and 122). Recent archaeological investigations at Trimley Mushroom Farm have helped to ground truth the cropmark evidence and have revealed a series of pits and ditches in this area (TYN 132). Whilst dating evidence is limited, it is likely that these remains are prehistoric or Romano-British in date. Cropmarks of a number of ring ditches in the vicinity further attest to this (TYN 046 and 054). However, this site has never been the subject of systematic archaeological investigations and so we don't have any information about the nature of any surviving below ground heritage assets within the site.

Fieldwork Requirements for Archaeological Investigation

3.1 A geophysical survey and trial trenched evaluation is required of the development area to enable the archaeological resource, both in quality and extent, to be assessed.

3.2 A magnetometry survey is required over the entire application site. Where appropriate (where ground conditions permit), it is recommended that magnetometer surveys be conducted using cart mounted sensors. A scale plan showing the proposed survey grid should be included in the WSI for approval by SCCAS/CT.

3.3 Trial Trenching is required to:

- 'Ground-truth' the geophysical results.
- Identify the date, approximate form and purpose of any archaeological deposit, together with its likely extent, localised depth and quality of preservation.

- Evaluate the likely impact of past land uses, and the possible presence of masking colluvial/alluvial deposits.
- Establish the potential for the survival of environmental evidence.
- Establish the suitability of the area for development.

3.4 Trial trenches are to be excavated to cover 3.5% by area, which is 1050m^2. Linear trenches are thought to be the most appropriate sampling method, using, where possible, a systematic grid array. Trenches are to be a minimum of 1.80m wide unless special circumstances can be demonstrated; this will result in *c*. 580m of trenching at 1.80m in width. Provision for a trenching contingency of up to 0.5% (150m$^{2)}$ should be made, to enable further clarification of areas of archaeology defined during the evaluation if required.

3.5 A scale plan showing the proposed location of the trial trenches should be prepared on the basis of the geophysical survey and metal detecting results. This plan must be submitted to the SCCAS/CT for approval before trenching begins.

3.6 Decisions on the need for any further archaeological investigation (e.g. excavation) will be made by SCCAS/CT, in a further brief, based on the results presented in the evaluation report. Any further investigation must be the subject of a further WSI, submitted to SCCAS/CT for scrutiny and formally approved by the LPA.

Arrangements for Archaeological Investigation

4.1 The composition of the archaeological contractor's staff must be detailed and agreed by SCCAS/CT, including any subcontractors/specialists. Ceramic specialists, in particular, must have relevant experience from this region, including knowledge of local ceramic sequences.

4.2 All arrangements for the evaluation of the site, the timing of the work and access to the site, are to be defined and negotiated by the archaeological contractor with the commissioning body.

4.3 The project manager must also carry out a risk assessment and ensure that all potential risks are minimised, before commencing the fieldwork. The responsibility for identifying any constraints on fieldwork (e.g. designated status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites and other ecological considerations rests with the commissioning body and its archaeological contractor.

Reporting and Archival Requirements

5.1 The project manager must consult the Suffolk HER Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on all documentation relating to the work.

5.2 An archive of all records and finds is to be prepared and must be adequate to perform the function of a final archive for deposition in the Archaeological Service's Store or in a suitable museum in Suffolk.

5.3 It is expected that the landowner will deposit the full site archive, and transfer title to, the Archaeological Service or the designated Suffolk museum, and this should be agreed before the fieldwork commences. The intended depository should be stated in the WSI, for approval.

5.4 The project manager should consult the intended archive depository before the archive is prepared regarding the specific requirements for the archive deposition and curation (including the digital archive), and regarding any specific cost implications of deposition.

5.5 A report on the fieldwork and archive must be provided. Its conclusions must include a clear statement of the archaeological value of the results, and their significance. The results should be related to the relevant known archaeological information held in the Suffolk HER, and an HER search should be commissioned. In any instances where it is felt that an HER search is unnecessary, this must be discussed and agreed with the relevant Case Officer. **ANY REPORTS WHICH DO NOT INCLUDE AN UP TO DATE HER SEARCH WILL NOT BE APPROVED. ALL REPORTS MUST CLEARLY DISPLAY THE INVOICE NUMBER FOR THE HER SEARCH, OTHERWISE THEY WILL BE RETURNED.**

5.6 An opinion as to the necessity for further evaluation and its scope may be given, although the final decision lies with SCCAS/CT. No further site work should be embarked upon until the evaluation results are assessed and the need for further work is established.

5.7 Following approval of the report by SCCAS/CT, a single copy of the report should be presented to the Suffolk HER as well as a digital copy of the approved report.

5.8 All parts of the OASIS online form http://ads.ahds.ac.uk/project/oasis/ must be completed and a copy must be included in the final report and also with the site archive. A digital copy of the report should be uploaded to the OASIS website.

5.9 Where positive results are drawn from a project, a summary report must be prepared for the *Proceedings of the Suffolk Institute of Archaeology and History*.

5.10 This brief remains valid for 12 months. If work is not carried out in full within that time this document will lapse; the brief may need to be revised and re-issued to take account of new discoveries, changes in policy and techniques.

Standards and Guidance

Further detailed requirements are to be found in our Requirements for Trenched Archaeological Evaluation 2011 Ver 1.2.

Standards, information and advice to supplement this brief are to be found in *Standards for Field Archaeology in the East of England*, East Anglian Archaeology Occasional Papers 14, 2003.

The Institute for Archaeologists' *Standard and Guidance for archaeological field evaluation* (revised 2001) should be used for additional guidance in the execution of the project and in drawing up the report.

Notes

The Institute for Archaeologists maintains a list of registered archaeological contractors (www.archaeologists.net or 0118 378 6446). There are a number of archaeological contractors that regularly undertake work in the County and SCCAS will provide advice on request. SCCAS/CT does not give advice on the costs of archaeological projects.

The Historic Environment Records Data available on the Heritage Gateway and Suffolk Heritage Explorer is **NOT** suitable to be used for planning purposes and will not be accepted in lieu of a full HER search.

Appendix 2. WSI

SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Land at High Road

Trimley St Martin, Suffolk

Client:
Pigeon (Trimley) Ltd

Date:
March 2016

Written Scheme of Investigation and Risk Assessment – Geophysical Survey
Author: Timothy Schofield HND BSc MCIfA

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Project details

Planning Application No:	TBC
Curatorial Officer:	Rachael Abraham
Grid Reference:	TM 269 380
Area:	*c*.3ha
HER Event No/Site Code:	TBC
Oasis Reference:	TBC
Project Start date:	March 2016
Project Fieldwork Duration:	2 Days
Client/Funding Body:	Pigeon (Trimley) Ltd
SACIC Project Manager:	Rhod Gardner
SACIC Project Officer:	Tim Schofield
SACIC Job Code:	TBC

1. Introduction

- A geophysical survey is required on land for a proposed housing development at High Road, Trimley St Martin, Suffolk (Fig. 1) in accordance with paragraph 128, 129 and 141 of the National Planning Policy Framework.
- The Brief (dated 20/01/2016) produced by the archaeological adviser to the Local Planning Authority (LPA), Rachael Abraham of Suffolk County Council Archaeological Service/Conservation Team (SCCAS/CT) specifies the geophysical survey over an area of *c*.3 hectares.
- Suffolk Archaeology (SACIC) has been contracted to carry out the project. This document details how the requirements of the Brief and general SCCAS/CT guidelines (SCCAS 2011) will be met, and has been submitted to SCCAS/CT for approval on behalf of the LPA. It provides the basis for measurable standards and will be adhered to in full, unless otherwise agreed with SCCAS/CT.

2. The Site

- The site is located in a single *c*.3 hectare sub-rectangular field to the northwest of Trimley St Martin, on a low-lying plateau that ranges in height from between 25 and 26m AOD. It is bounded by allotment gardens to the northeast, a modern residential development to the southeast, High Road to the southwest and hedgerows to the northwest.
- The field is believed to have been under intermittent agricultural use over the last few centuries for both grazing and crop production, today the site remains in agricultural use and has been recently cropped of sugar beet.
- The bedrock geology is described as Red Crag Formation Sand, formed approximately 2 to 4 million years ago in the Quaternary and Neogene Periods, deposited as mud, silt, sand and gravel in shallow seas. Superficial deposits are described as Glaciolacustrine Deposits, Mid Pleistocene clay and silt formed approximately 2 million years ago in the Quaternary Period, deposited by glaciers as till with outwash sand and gravel (BGS, 2016).

3. Archaeological and historical background

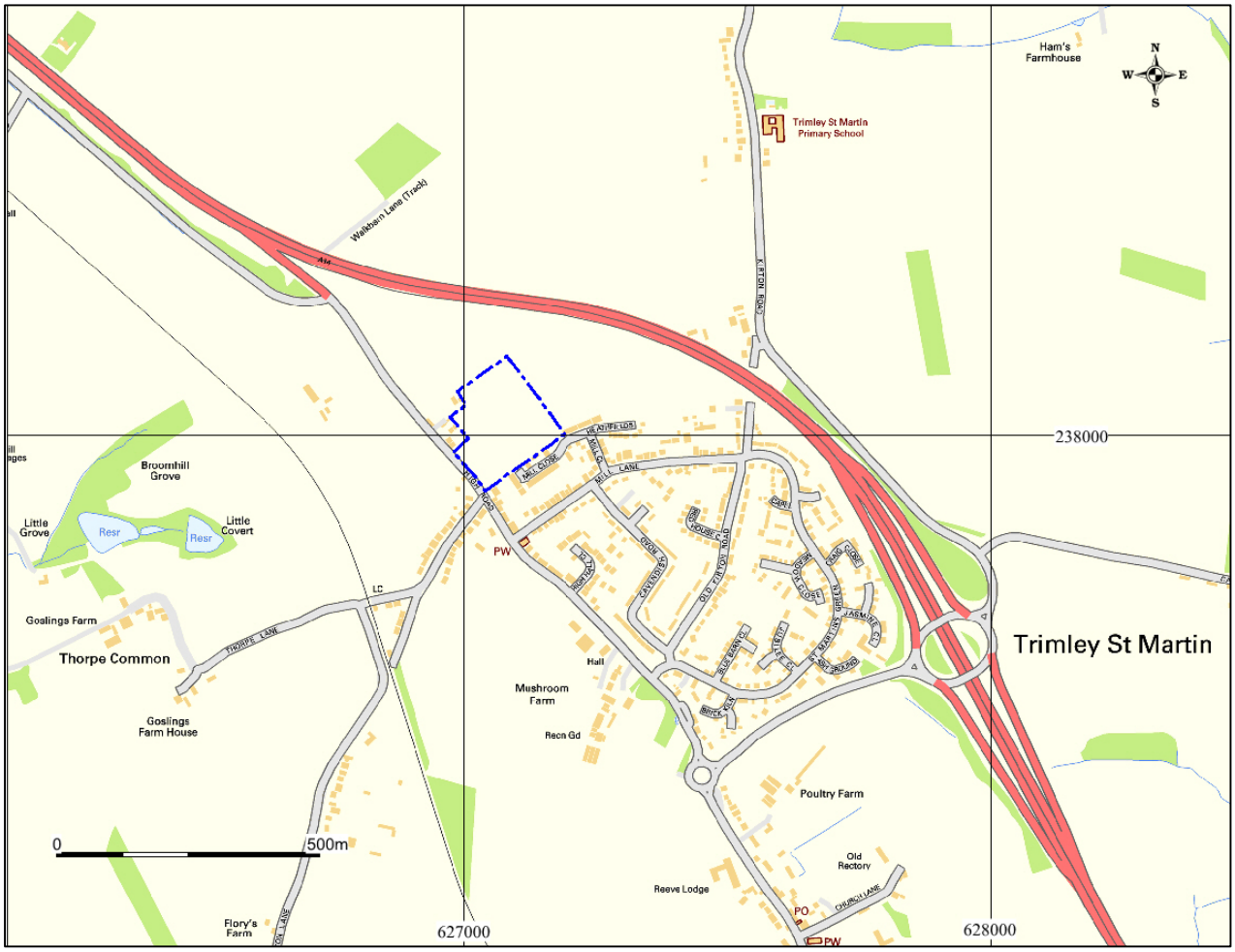
- The site lies within an area of archaeological interest defined by information held within the Suffolk Historic Environment Record and in a brief issued by SCCAS/CT (Abraham, 2016), a geophysical survey followed by a subsequent targeted trial trench evaluation (separate WSI) was requested to be undertaken, prior to consideration of the planning application.
- The following archaeological background has been summarised from the desk-based assessment undertaken by Archaeology Risk Management (Tindall, 2016).

  There is little evidence of prehistoric or Roman settlement within the survey area, however immediately surrounding the site are undated cropmarks of potential later prehistoric or Romano-British date. A probable Bronze Age barrow (TYN 046) 250m to the west and a possible drip gully (TYN 054) is recorded 200m to the west-north-west. Undated rectilinear enclosures and trackway cropmarks (TYN 012, TYN 043) are recorded 250m to the north. A co-axial field system and possible enclosure

(TYN 122) are recorded to the south of High Road. An irregular field system (TYN 013) consisting of small enclosures and crofts is located to the southwest. To the north (TYN 065) and northwest (TYN 067) are a series of boundaries and crofts.

Fieldwalking and metal detecting to the southwest has recovered prehistoric flints, Roman, Saxon and medieval pottery (TYN 013), Roman bronze and silver coins (TYN 101), Saxon silver coins (TYN 101), a Saxon bronze mount (TYN 102) and a medieval bronze buckle.

Figure 1. Location map



Contains Ordnance Survey data © Crown copyright and database right 2016

4. Project Objectives

- A non-intrusive geophysical survey is required of the development, followed by targeted trial trench evaluation to enable the archaeological resource, both in quality and extent, to be accurately quantified.

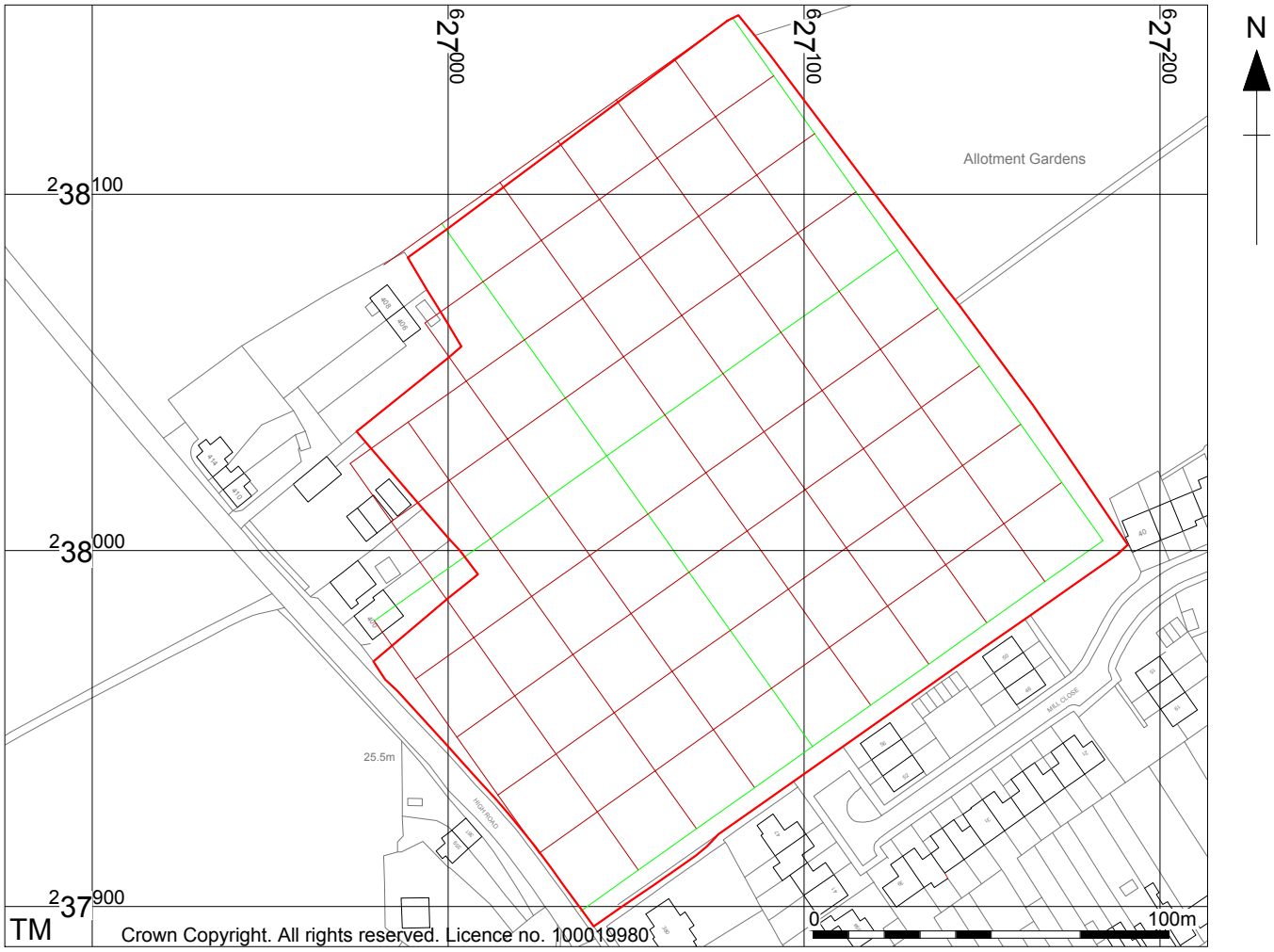


Figure 2. Survey Grid Location

5. Geophysical Survey method statement

5.1. Management

- The project will be managed by SACIC Project Officer Tim Schofield in accordance with the principles of *Management of Research Projects in the Historic Environment* (MoRPHE, Historic England 2015).
- SCCAS/CT will be given ten days' notice of the commencement of the fieldwork and arrangements made for SCCAS/CT site visit if required.
- Full details of project staff are given in section 6 below.

5.2. Project preparation

- An event number has been obtained from the SCCAS HER Officer and will be included on all future project documentation.
- An OASIS online record has been initiated and key fields in details, location and creator forms have been completed.
- A pre-site inspection and Risk Assessment for the project have been completed.

5.3. Fieldwork

- Fieldwork standards will be guided by 'Standards for Field Archaeology in the East of England', EAA Occasional Papers 14, and the Chartered Institute for Archaeology's (CIfA) paper 'Standard and Guidance for archaeological geophysical survey', December 2014.
- The fieldwork will be carried out by members of SACIC led by Project Officer Tim Schofield. The fieldwork team will be drawn from a pool of suitable staff at SACIC.
- The project Brief requires the survey of *c*.3 hectares over the development area (Fig. 2). Minor modifications to the survey area may be made onsite to respect any areas of disturbance/contamination or other obstacles.
- A 5m exclusion zone around the sites periphery will be kept to minimise the amount of magnetic disturbance associated with the hedge boundaries.

Instrument type and set-up

- The site will be surveyed using a Bartington Dual-Grad 601-2 which has high sensor sensitivity combined with rapid ground coverage. Good contrast between the magnetic susceptibility of a feature's fill (charcoal rich or humic deposits providing the best soil medium) and the local magnetic background signature of the superficial deposits will be important in achieving successful survey results.
- Best practice dictates that sensors will be secured on the same side of the instrument until the completion of the survey, and sensor heights equalised to achieve a consistent elevation across the area. The instrument will be switched on and left for at least 20 minutes before the survey of the first grid to allow the sensors to reach a suitable operating temperature.
- A zero station with low magnetic susceptibility shall be prospected on site to allow the correction of sensor diurnal drift. This unique station will be employed throughout the survey providing a common calibration location.

Sampling interval and grid size

- The 20m survey grid will be set-out using a Leica Viva Glonass Smart Rover GS08+ to the Ordnance Survey OSGB36, converted to the National Grid Transformation OSTN02 datum that has an accuracy of +/- 0.01m. Regular testing of the instruments accuracy will be undertaken employing stations with known ETRS89 coordinates. All raw data recorded by the GPS will be uploaded to the project folder, suitably labelled and kept as part of the project archive.
- A 1m traverse interval and 0.25m sample interval will be utilised.

Data capture and archiving

- A pro-forma survey sheet will be completed each day, unique grid numbers will be allocated to enable a data composite to be created. Instrument readings will be recorded on the internal data logger and downloaded to a laptop at midday and also in the evening, this will allow the data to be checked for quality on site and for grids to be re-surveyed if required.

- Data will be filed in project specific folders separated into daily datasets. The daily datasets will be combined into a single composite on completion of the fieldwork.
- Data will be stored in project specific folders that will be downloaded onto a laptop and then backed-up onto an external server in the evening of each day.
- Metadata sheets will be completed and inserted into the report as an appendix.
- All on-site derived site data will be entered onto a digital (Microsoft Access) SACIC database compatible with the Suffolk HER.

Data processing and presentation

- Raw survey data will collected to a high standard to enable only minimal processing of the datasets to be required. Typically these algorithms may comprise de-spike and zero mean sensor. The data will also be clipped at a suitable level to enable the anomalies to be presented with best clarity.
- Raw and processed greyscale plots and xy trace plots of the datasets shall be exported from Terrasurveyor into AutoCAD.
- An interpretation plan based on the combined interpretations of the raw, processed and xy trace plots will be produced using AutoCAD. All figures shall be georeferenced within the National Grid and printed at an appropriate scale.

Software

- The software used to process the data will be DW Consulting's Terrasurveyor v3.0.27 Images will be exported from Terrasurveyor into a geo-referenced grid within an AutoCAD drawing. Interpretation plans of the anomalies will then be digitised in AutoCAD.

Outreach

- Due to the small size and likely short duration of the project outreach activities such as an open day or tours for the general public, local schools, councillors, societies *etc.* are unlikely to be viable. If warranted, and the site is not deemed too

archaeologically sensitive, a press release will be issued to local media and information boards will placed on the site perimeter.

5.4. Report

- The report will be commensurate with the results of the fieldwork and will be consistent with the principles of Management of Research Projects in the Historic Environment (MoRPHE, Historic England, 2015), Geophysical survey in Field Evaluation (Historic England, 2008) and the Standard and Guidance for Archaeological Geophysical Survey (Chartered Institute for Archaeologists, 2014), containing the following:
- The report will contain a summary, description of the project background, site location, survey methodology, detailed description of the nature, location and extent of anomalies, discussion of the anomalies, impact assessment, site potential and possible further work. Scaled raw, processed, xy data plans and an interpretation plan will also be included.
- The report will include a summary in the established format for inclusion in the annual *'Archaeology in Suffolk'* section of the Proceedings of the Suffolk Institute of Archaeology and History.
- A copy of this Written Scheme of Investigation will be included as an appendix in the report.
- Metadata sheet tables will form one of the appendices within the report.
- A technical data sheet will be included as an appendix.
- The report will include a copy of the completed project OASIS form as an appendix.
- An unbound draft copy of the report will be submitted to SCCAS/CT for approval within 6 months of completion of fieldwork.

5.5. Project archive

- On approval of the report a printed and bound copy will be lodged with the Suffolk HER. A digital .pdf file will also be supplied, together with a digital and fully georeferenced vector plan showing the application area and survey location,

compatible with MapInfo software.

- The online OASIS form for the project will be completed and a .pdf version of the report uploaded to the OASIS website for online publication by the Archaeological Data Service. A paper copy of the form will be included in the project archive.
- A second bound copy of the report will be included with the project archive.
- A digital .pdf copy of the approved report will be supplied to the client, together with our final invoice for outstanding fees. Printed and bound copies will be supplied to the client on request.
- The project archive, consisting of all paper and digital records, will be deposited in the SCCAS Archaeological Store at Bury St Edmunds within 6 months of completion of fieldwork. The project archive will be consistent with MoRPHE (Historic England, 2015) and ICON guidelines. The project archive will also meet the requirements of SCCAS (SCCAS 2010).
- All physical site records and paperwork will be labelled and filed appropriately. Digital files will be stored in the relevant SCCAS archive parish folder on the SCC network site.
- The project costing includes a sum to meet SCCAS archive charges. A form transferring ownership of the archive to SCCAS will be completed and included in the project archive.
- If the client, on completion of the project, does not agree to deposit the archive with, and transfer to, SCCAS, they will be expected to either nominate another suitable depository approved by SCCAS.

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http://mapapps.bgs.ac.uk/geologyofbritain/home.html

6. Project Staffing

6.1. Management

SACIC Manager	Dr Rhodri Gardner
SACIC Project Manager	Dr Rhodri Gardner
SACIC Finds Dept	Richenda Goffin

6.2. Fieldwork

The fieldwork team will be derived from the following pool of SACIC staff.

Name	Job Title	First Aid	Other skills/qualifications
Tim Schofield	Project Officer	Yes	Surveyor
Robert Brooks	Project Officer	Yes	Surveyor
Simon Cass	Project Officer	Yes	Surveyor
Michael Green	Project Officer	Yes	Surveyor
Laszlo Lichenstein	Project Officer	Yes	
Simon Picard	Project Officer		Surveyor
Preston Boyle	Project Assistant	Yes	
Tim Carter	Project Assistant	Yes	Metal detectorist
Sam Thomas	Project Assistant		Surveyor

6.3. Report production

The production of the site report, graphics and submission of the project archive will be carried out by Tim Schofield.

Appendix 1. Health and Safety

1. Introduction

The project will be carried out following the SACIC Health and Safety Management System at all times. The SACIC Health and Safety Policy Statement reads as follows:

Suffolk Archaeology Community Interest Company is committed to ensuring the health, safety and welfare of its employees, and it will, so far as is reasonably practicable, establish procedures and systems necessary to implement this commitment and to comply with its statutory obligations on health and safety. Our Personnel are informed of their responsibilities to ensure they take all reasonable precautions, to ensure the safety, health and welfare of those that are likely to be affected by the acts and emissions of our organisations undertakings.

Suffolk Archaeology Community Interest Company understands our duty to identify the significant hazards that may be created by our undertakings and to risk assess these accordingly to ensure that suitable and effective controls are implemented to minimise risk to a suitable level as far as is reasonably practicable.

We also acknowledge our duty, so far as is reasonably practicable:

- *To provide a safe working environment for our workforce, fulfil our statutory commitments and actively manage and supervise health and safety at work;*
- *To identify the risks associated with our business activities and ensure suitable and sufficient control measures are in place.*
- *Ensure regular consultation with our employees on matters which affect their health and Safety.*
- *To ensure that all plant and equipment used by our employees is fit for purpose and adequately maintained.*
- *To provide suitable storage and ensure safe handling of Hazardous substances.*
- *To ensure that all workers are competent to undertake their daily work activities by providing all relevant information and training, consideration will also be given to any employees who do not have English as a first language.*
- *To prevent accidents and cases of work related ill health by ensuring a robust reporting and investigation system is in place.*
- *To liaise and communicate effectively regarding health and safety matters when working on other persons premises.*
- *To ensure that there is an effective system of induction, training, communication and supervision to other persons visiting or working on our premises.*
- *To have access to competent advice, this will be provided by Agility UK (Training and Consultancy) Ltd. Who will assists us in the continuous improvement in our health and safety performance and management through regular review and revision of this policy; and to provide suitable resources required to make this policy and our Health and Safety arrangements effective.*

2. Specific project issues

Introduction

All SACIC staff will be aware that they have a responsibility to:

- Take care of their own health and safety and that of others who may be affected by what they do, or fail to do, at work.
- Follow safe systems of work and other precautions identified in the project risk assessments.
- Report any changes to personal circumstances that may affect their ability to work safely.
- Report potential hazards, incidents and near misses to the Project Officer/supervisor.

A pre-site inspection has been made of the site and applicable SACIC Risk Assessments for the project are included below.

All SACIC staff are experienced in working on a variety of archaeological sites and permanent staff all hold a CSCS (Construction Skills Certification Scheme) card. All staff have been shown the SACIC Health and Safety Manual, copies of which are held at the SACIC office in Needham Market. All staff will read the site WSI and Risk Assessments and receive a site safety induction from the Project Officer prior to starting work. All staff will be issued with appropriate PPE.

From time to time it may be necessary for site visits by other SACIC staff, external specialists, SCCAS/CT staff or other members of the public. All such staff and visitors will be issued with the appropriate PPE and will undergo the required inductions.

Site staff, official visitors and volunteers are all covered by SACIC insurance policies. SACIC also has professional negligence insurance. Copies of these policies are available on request.

Welfare facilities

Due to the limited nature of the project, it is proposed that SACIC staff will work from their vehicle and use client welfare facilities if available. If not staff will be able to travel to public facilities. Additional facilities, toilet, site accommodation etc, will be provided if the project

is extended. Fresh, clean water for drinking and hand washing is carried in SACIC vehicles. A vehicle will be on site at all times.

First Aid

A member of staff with the First Aiders at Work qualification will be on site at all times. A First Aid kit and a fully charged mobile will also be in vehicle/on site at all times.

Working within School Grounds

SACIC staff and sub-contractors will follow any requirements made by the school, such as sign in procedures.

All SACIC staff have passed an enhanced Criminal Records Bureau check.

Other than for access to welfare facilities staff will be working solely within the site and will have limited interaction with the school and pupils. Staff will be informed that they are not to go elsewhere on the school grounds unless authorized.

Site access and security

Access to the site is off High Road and has been agreed with the client and/or landowner. The site is bounded by hedgerows and not open to public access.

Contaminated ground

Details of any ground contamination have/have not been provided by the client. If any such is identified then groundworks will cease until adequate safety and environmental precautions are in place.

Advice will be sought from HSE and relevant authorities if required concerning any of these issues.

Hazardous Substances

No hazardous substances are specifically required in order to undertake the archaeological works.

Underground services

Details of known services have not been provided by the client.

Overhead Powerlines

No overhead powerlines cross the site.

Personal Protective Equipment (PPE)

The following PPE is issued to all site staff as a matter of course. Additional PPE will be provided if deemed necessary.

- Hard Hat (to EN397).
- High Visibility Clothing (EN471 Class 2 or greater).
- Safety Footwear (EN345/EN ISO 20346 or greater – to include additional penetration-resistant midsole).
- Gloves (to EN388).
- Eye Protection (safety glasses to at least EN 166 1F).

SACIC Environment Policy

Suffolk Archaeology is committed to the sustainable management of the local and global environment to support local communities and growth in our local economy. We will strive to reduce our carbon emissions, to protect and enhance the natural and historic environment and to tackle the issues of a changing climate. In delivering our services, we are committed to meeting all relevant regulatory, legislative and other requirements, and to the continual improvement of our environmental performance.

We will endeavour to:

- Prevent environmental pollution and minimise waste.
- Reduce our carbon emissions.
- Continually improve our energy efficiency and reduce our use of resources.
- Reduce the impact of vehicle travel by our employees
- Implement sustainable procurement practices where possible.
- Enhance biodiversity, conserve distinctive landscapes and protect the historic environment.

All existing and new SACIC subcontractors are issued annually with an Environmental Guidance Note For Contractors.

On site the SACIC Project Officer will monitor environmental issues and will alert staff to possible environmental concerns. In the event of spillage or contamination, e.g. from plant or fuel stores, EMS reporting and procedures will be carried out in consultation with the

SACIC EMS Officer.

The client and/or landowner has not informed SACIC of any environmental constraints upon the development area.

All rubbish will be bagged and removed either to areas designated by the client or returned to SACIC for disposal.

3. Project Contacts

SACIC

SACIC Manager	Dr Rhodri Gardner	01449 900120
SACIC Project Manager	Dr Rhodri Gardner	01449 900120
SACIC Finds Dept	Richenda Goffin	01449 900129
SACIC H&S	Stuart Boulter	01449 900122
SACIC EMS	Jezz Meredith	01449 900124
SACIC Outreach Officer	Duncan Allan	01449 900126

Emergency services

Local Police	Martlesham Heath, Ipswich, IP5 3QS	101
Local GP	Howard House Surgery, 31 Orwell Road, Felixstowe, IP11 7DD	01394 282706
Location of nearest A&E	Heath Road, Ipswich, IP4 5PD	01473 712233
Environment Agency	Customer Services Line (8am to 6pm)	03708 506 506
	24 hour Emergency Hotline	0800 807060
Essex and Suffolk Water	24 hour Emergency Hotline	**0845 782 0999**
National Gas Emergency Service	Gas emergency hotline	0800 111 999
UK Power Networks	East England electricity emergency hotline	0800 783 8838
Anglian Water	24 hour Emergency Hotline	08457 145 145

Client contacts

Client	Pigeon (Trimley) Ltd	01284 766 200
Client Agent	Adrian Tindall, ARM	01284 767 681
Site landowner		

Archaeological contacts

Curator		
Consultant		
EH Regional Science Advisor	Dr Zoe Outram	01223 582707

Sub-contractors

Plant hire		
Misc. Equipment hire		
Toilet/facilities hire		

4. Geophysical Technical Information

Detailed magnetometer survey

Detailed magnetometer survey is the most commonly employed archaeological geophysical prospection method in Britain, sensitive sensors can cost-effectively cover large areas of ground, rapidly recording anomalies that are indicative of cultural settlement activity. These anomalies can then be further investigated by field archaeologists to quantify a form and function. The magnetometer is a passive instrument that detects both permanent thermoremanent and temporary magnetic responses.

Thermoremanent Magnetism

When a material containing iron oxides, for example clay, is heated above the Curie point, weakly magnetic compounds transform in to highly magnetic oxides that can be detected by the sensors of a magnetometer (Clark). For instance the iron oxide haematite has a Curie temperature of 675 Celsius and magnetite 565 Celsius. Once these temperatures are reached, the oxides become demagnetised, on cooling their magnetic properties become permanently re-magnetised and align in the direction of the Earth's magnetic field (Gaffney and Gater). Over time the direction of the Earth's magnetic field changes allowing these directional differences to be detected by the magnetometer.

Strongly heated features such as hearths, kilns or furnaces frequently reach the materials Curie temperature and become permanently magnetised. These permanent magnetic responses are some of the strongest cultural features that can be recorded.

Temporary Magnetism

Magnetic susceptibility is the ease with which a magnetic field can pass through a material, therefore the higher the materials magnetic susceptibility, the stronger the induced magnetic field will be. Temporary magnetisation occurs within material that is magnetically susceptible, this material acquires its own local magnetic field that combine with the Earth's magnetic field causing an anomaly to stand out from the background noise (Clark). These anomalies are more subtle in nature, being derived from material that has been magnetically enhanced by cultural activity and become concentrated into features over time. Anomalies that have temporary magnetisation include backfilled pits,

ditches, field systems, occupation areas, land drains, remnant and existing field boundaries (David, 2011).

The key to a successful survey is having good contrast between the magnetic susceptibility of an archaeological feature with the surrounding superficial deposits. If there is no discernible difference between the two mediums it may be unlikely that the magnetometer will successfully prospect the feature. Archaeological features can also be masked by high magnetically susceptible topsoil, or deep overlying subsoil and colluvial deposits.

Ferrous anomalies

Ferrous objects are a common source of permanent magnetism, usually isolated with a strong dipolar signature. Some of these responses may have an archaeological derivation, however they are probably more indicative of modern iron objects introduced through manuring or lost within the topsoil.

Bartington DualGRAD 601-2 Fluxgate Gradiometers

Fluxgate gradiometers are the most commonly employed class of instrument in the UK. Two 1m sensitive sensors are affixed to a frame mounted 1m apart in a vertical plane and harnessed to the trunk of a geophysical surveyor or attached two a pulled cart. Each sensor contains two fluxgate magnetometers with 1m vertical separation. The sensor above records the Earth's magnetic field (magnetic background) while the sensor below records the local magnetic field. The two sensors need aligning before recording can begin, a zero station is located in an area with low magnetic variation for this purpose. After the sensors have been aligned, the survey can begin. When differences in the magnetic field strength occur between the two vertical magnetometers within each sensor, a positive or negative reading is recorded that is relative to the magnetic background of the zero station. Positive anomalies include pits, ditches and agricultural

furrows. Negative anomalies commonly prospected include earthwork embankments, land drains and geological features.

Sensors are normally mounted to a height of 0.30m above the surface, and can detect to a depth of between one and two metres below the ground. The first survey traverse is commonly undertaken in an east to west direction.

Magnetic Anomalies

Isolated dipolar responses

Isolated dipolar responses are commonly recorded throughout a dataset and are usually indicative of modern ferrous material deposited within the topsoil horizon. In some instances the anomalies may be of an archaeological derivation. They are isolated, strong and dipolar in character.

Areas of magnetic disturbance

These anomalies are usually caused by building demolition rubble, ferrous boundaries, slag waste dumps, modern buried rubbish, pylons and services. Strong and dipolar in character, they are commonly recorded over a wide area.

Linear trends

Linear trends can be either positive or negative magnetic responses depending on the nature of the material present within the feature. If the anomaly is broad and weak, it is more likely to be of geological origin. Stronger positive linear trends are more likely to be of archaeological derivation, caused by settlement activity washing rich humic, charcoal and fired deposits into a feature. Negative linear trends are more commonly associated with bank deposits or land drains, with the less magnetically susceptible superficial

deposits deposited at the top of the feature. Curvilinear trends are usually of archaeological origin, commonly interpreted as ring ditches or drip-gullies.

Discrete anomalies

Discrete anomalies can either be positive or negative in nature recorded within a localised area. Those that are positive are more likely to be of an archaeological origin, with negative discrete anomalies more commonly interpreted as natural geological variations.

Thermoremanent responses

These responses are caused by the heating of material containing iron to above the Curie temperature, they are strong and discrete in nature, in Britain high positive readings are recorded to the south of the feature, and high negative readings are recorded to the north.

SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Geophysical Survey Risk Assessments

A pre-site inspection and assessment has been made of the site and the following SACIC Risk Assessments apply to the project and are included below.

SACIC GSRA1	Manual handling and outdoor working
SACIC GSRA2	Use of hand tools and instrumentation

Geophysical Survey Risk Assessment 1 Manual handling and outdoor working

Activity	Location	Hazard	Risks	Persons affected	Initial risk	Control measures	Residual risk	Name	Date	Rescue procedures
Manual handling of survey instruments and working outdoors.	Various.	Extremes of heat, cold and wet weather. Trip hazards.	Hypothermia, heat stroke, sunburn. Minor injuries. Carrying heavy equipment for prolonged periods.	All field staff.	9	All staff provided with appropriate clothing for weather conditions. No staff to work alone in extreme conditions. Regular sweep for trip hazards.	2	T Schofield	01/03/16	First Aid if required. Call emergency services if necessary.

	Likelihood				
Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Initial Risk
Residual Risk

Likelihood	Severity	Risk (likelihood x severity)
1. Highly unlikely	1. Slight inconvenience	1-5 Low
2. May occur but very rarely	2. Minor injury requiring first aid	
3. Does occur but only rarely	3. Medical attention required	6-12 Medium
4. Occurs from time to time	4. Major injury leading to hospitalisation	
5. Likely to occur often	5. Fatality or serious injury leading to disablement	13-25 High

Geophysical Survey Risk Assessment 2 Use of hand tools and survey instruments

Activity	Location	Hazard	Risks	Persons affected	Initial risk	Control measures	Residual risk	Name	Date	Rescue procedures
Surveying, setting out and use of small hand tools and marker canes.	Various.	Splinters from poorly maintained equipment, trip hazards from unused equipment, trip hazards from uneven ground, some heavy lifting, tape winding.	Minor injuries.	All field staff.	8	Ensure all tools in serviceable condition. Careful policing of temporarily unused equipment (e.g. no discarded hand tools, hand tapes pegged down). Ensure all tools and instrumentation carried appropriately.	4	T Schofield	01/03/16	First Aid if required. Call emergency services if necessary.

	Likelihood				
Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Initial Risk
Residual Risk

Likelihood	Severity	Risk (likelihood x severity)
1. Highly unlikely	1. Slight inconvenience	1-5 Low
2. May occur but very rarely	2. Minor injury requiring first aid	
3. Does occur but only rarely	3. Medical attention required	6-12 Medium
4. Occurs from time to time	4. Major injury leading to hospitalisation	
5. Likely to occur often	5. Fatality or serious injury leading to disablement	13-25 High

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Needham Market | Suffolk | IP6 8NZ
Rhodri.Gardner@suffolkarchaeology.co.uk

01449 900120
www.suffolkarchaeology.co.uk

Appendix 3. Metadata sheets

Source Data

Source Grids: 73
1 Col:0 Row:4 grids\01.xgd
2 Col:0 Row:5 grids\02.xgd
3 Col:0 Row:6 grids\03.xgd
4 Col:0 Row:7 grids\04.xgd
5 Col:0 Row:8 grids\05.xgd
6 Col:1 Row:2 grids\46.xgd
7 Col:1 Row:3 grids\47.xgd
8 Col:1 Row:4 grids\06.xgd
9 Col:1 Row:5 grids\07.xgd
10 Col:1 Row:6 grids\08.xgd
11 Col:1 Row:7 grids\09.xgd
12 Col:1 Row:8 grids\10.xgd
13 Col:2 Row:2 grids\48.xgd
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15 Col:2 Row:4 grids\11.xgd
16 Col:2 Row:5 grids\12.xgd
17 Col:2 Row:6 grids\13.xgd
18 Col:2 Row:7 grids\14.xgd
19 Col:2 Row:8 grids\15.xgd
20 Col:3 Row:0 grids\50.xgd
21 Col:3 Row:1 grids\51.xgd
22 Col:3 Row:2 grids\52.xgd
23 Col:3 Row:3 grids\53.xgd
24 Col:3 Row:4 grids\16.xgd
25 Col:3 Row:5 grids\17.xgd
26 Col:3 Row:6 grids\18.xgd
27 Col:3 Row:7 grids\19.xgd
28 Col:3 Row:8 grids\20.xgd
29 Col:4 Row:0 grids\54.xgd
30 Col:4 Row:1 grids\55.xgd
31 Col:4 Row:2 grids\56.xgd
32 Col:4 Row:3 grids\57.xgd
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35 Col:4 Row:6 grids\23.xgd
36 Col:4 Row:7 grids\24.xgd
37 Col:4 Row:8 grids\25.xgd
38 Col:5 Row:0 grids\58.xgd
39 Col:5 Row:1 grids\59.xgd
40 Col:5 Row:2 grids\60.xgd
41 Col:5 Row:3 grids\61.xgd
42 Col:5 Row:4 grids\26.xgd
43 Col:5 Row:5 grids\27.xgd
44 Col:5 Row:6 grids\28.xgd

45 Col:5 Row:7 grids\29.xgd
46 Col:5 Row:8 grids\30.xgd
47 Col:6 Row:0 grids\62.xgd
48 Col:6 Row:1 grids\63.xgd
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55 Col:6 Row:8 grids\35.xgd
56 Col:7 Row:0 grids\66.xgd
57 Col:7 Row:1 grids\67.xgd
58 Col:7 Row:2 grids\68.xgd
59 Col:7 Row:3 grids\69.xgd
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62 Col:7 Row:6 grids\38.xgd
63 Col:7 Row:7 grids\39.xgd
64 Col:7 Row:8 grids\40.xgd
65 Col:8 Row:0 grids\70.xgd
66 Col:8 Row:1 grids\71.xgd
67 Col:8 Row:2 grids\72.xgd
68 Col:8 Row:3 grids\73.xgd
69 Col:8 Row:4 grids\41.xgd
70 Col:8 Row:5 grids\42.xgd
71 Col:8 Row:6 grids\43.xgd
72 Col:8 Row:7 grids\44.xgd
73 Col:8 Row:8 grids\45.xgd

Raw data

Filename	Trimley 1 R -10+10.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Direction of 1st Traverse	90 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	720 x 180
Survey Size (meters)	180 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	100.00
Min	-100.00
Std Dev	4.89

Mean	0.64
Median	0.43
Composite Area	3.24 ha
Surveyed Area	2.6714 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Raw data presentation

Display clip -10 +10

Graduated shade

Processed data

Filename	Trimley 1 P -2+2.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Direction of 1st Traverse	90 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	720 x 180
Survey Size (meters)	180 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	103.61
Min	-101.06
Std Dev	4.09
Mean	0.44
Median	0.08
Composite Area	3.24 ha
Surveyed Area	2.6714 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Processed data presentation

DeStripe Median Sensors

Notch Filter Min: 0 Max: 33

Despike Threshold: 1 Window size: 3x3

Graduated Shade

Display Clip -2 +2

Appendix 4. Geophysical technical information

Detailed magnetometer survey

Detailed magnetometer survey is the most commonly employed archaeological geophysical prospection method in Britain, sensitive sensors can cost-effectively cover large areas of ground, rapidly recording anomalies that are indicative of cultural settlement activity. These anomalies can then be further investigated by field archaeologists to quantify a form and function. The magnetometer is a passive instrument that detects both permanent thermoremanent and temporary magnetic responses.

Thermoremanent Magnetism

When a material containing iron oxides, for example clay, is heated above the Curie point, weakly magnetic compounds transform in to highly magnetic oxides that can be detected by the sensors of a magnetometer (Clark). For instance the iron oxide haematite has a Curie temperature of 675 Celsius and magnetite 565 Celsius. Once these temperatures are reached, the oxides become demagnetised, on cooling their magnetic properties become permanently re-magnetised and align in the direction of the Earth's magnetic field (Gaffney and Gater). Over time the direction of the Earth's magnetic field changes allowing these directional differences to be detected by the magnetometer.

Strongly heated features such as hearths, kilns or furnaces frequently reach the materials Curie temperature and become permanently magnetised. These permanent magnetic responses are some of the strongest cultural features that can be recorded.

Temporary Magnetism

Magnetic susceptibility is the ease with which a magnetic field can pass through a material, therefore the higher the materials magnetic susceptibility, the stronger the induced magnetic field will be. Temporary magnetisation occurs within material that is magnetically susceptible, this material acquires its own local magnetic field that combine with the Earth's magnetic field causing an anomaly to stand out from the background noise (Clark). These anomalies are more subtle in nature, being derived from material that has been magnetically enhanced by cultural activity and become concentrated into features over time. Anomalies that have temporary magnetisation include backfilled pits, ditches, field systems, occupation areas, land drains, remnant and existing field

boundaries (David, 2011).

The key to a successful survey is having good contrast between the magnetic susceptibility of an archaeological feature with the surrounding superficial deposits. If there is no discernible difference between the two mediums it may be unlikely that the magnetometer will prospect the feature. Archaeological features can also be masked by high magnetically susceptible topsoil, or deep overlying subsoil and colluvial deposits.

Ferrous anomalies

Ferrous objects are a common source of permanent magnetism, usually isolated with a strong dipolar signature. Some of these responses may have an archaeological derivation, however they are probably more indicative of modern iron objects introduced through manuring or lost within the topsoil.

Bartington DualGRAD 601-2 Fluxgate Gradiometers

Fluxgate gradiometers are the most commonly employed class of instrument in the UK. Two 1m sensitive sensors are affixed to a frame mounted 1m apart in a vertical plane and harnessed to the trunk of a geophysical surveyor or attached to a pulled cart. Each sensor contains two fluxgate magnetometers with 1m vertical separation. The sensor above records the Earth's magnetic field (magnetic background) while the sensor below records the local magnetic field. The two sensors need aligning before recording can begin, a zero station is located in an area with low magnetic variation for this purpose. After the sensors have been aligned, the survey can begin. When differences in the magnetic field strength occur between the two vertical magnetometers within each sensor, a positive or negative reading is recorded that is relative to the magnetic background of the zero station. Positive anomalies include pits, ditches and agricultural furrows. Negative anomalies commonly prospected include earthwork embankments, land drains and geological features.

Sensors are normally mounted to a height of 0.30m above the surface, and can detect to a depth of between one and two metres below the ground. The initial first traverse of is commonly undertaken in an east to west direction.

Magnetic Anomalies

Isolated dipolar responses

Isolated dipolar responses are commonly recorded throughout a dataset and are usually indicative of modern ferrous material deposited within the topsoil horizon. In some instances the anomalies may be of an archaeological derivation. They are isolated, strong and dipolar in character.

Areas of magnetic disturbance

These anomalies are usually caused by building demolition rubble, ferrous boundaries, slag waste dumps, modern buried rubbish, pylons and services. Strong and dipolar in character, they are commonly recorded over a wide area.

Linear trends

Linear trends can be either positive or negative magnetic responses depending on the nature of the material present within the feature. If the anomaly is broad and weak, it is more likely to be of geological origin. Stronger positive linear trends are more likely to be of archaeological derivation, caused by settlement activity washing rich humic, charcoal and fired deposits into a feature. Negative linear trends are more commonly associated with bank deposits or land drains, with the less magnetically susceptible superficial deposits deposited at the top of the feature. Curvilinear trends are usually of archaeological origin, commonly interpreted as ring ditches or drip-gullies.

Discrete anomalies

Discrete anomalies can also be positive or negative in nature, recorded within a localised area. Those that are positive are more likely to be of an archaeological origin, with negative discretes more commonly interpreted as natural geological variations.

Thermoremanent responses

These responses are caused by the heating of material containing iron to above the Curie temperature, they are strong and discrete in nature, in Britain high positive readings are recorded to the south of the feature with high negative readings being recorded to the north.

Appendix 5. OASIS form

OASIS ID: suffolka1-245441

Project details

Project name	High Road, Trimley St Martin, Suffolk, Detailed Geophysical Survey
Short description of the project	In November 2017 Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed fluxgate gradiometer survey on land at High Road, Trimley St Martin, Suffolk. An arable field comprising c.3 hectares of arable land was prospected for anomalies of archaeological derivation. The detailed fluxgate gradiometer survey recorded a variety of geophysical anomalies, including those indicative of archaeological pits and a linear area of magnetic disturbance interpreted as a potential field drainage ditch. The results of this non-intrusive survey do not suggest that the site contains archaeological deposits of major importance, and that should further work be recommended it would be appropriate for it to be carried out as a condition of future planning consent.
Project dates	Start: 08-11-2017 End: 09-11-2017
Previous/future work	No / Yes
Any associated project reference codes	TYN 134 - Sitecode
Type of project	Recording project
Site status (other)	Area of archaeological interest
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Investigation type	"Geophysical Survey"
Prompt	Direction from Local Planning Authority - PPS
Solid geology (other)	Red Crag Formation Sand
Drift geology (other)	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE - CLAY AND SILT
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK SUFFOLK COASTAL TRIMLEY ST MARTIN High Road, Trimley St Martin, Suffolk
Postcode	IP11 0SG
Study area	3 Hectares
Site coordinates	TM 627084 238002 51.85015478017 1.815086912253 51 51 00 N 001 48 54 E Point
Height OD / Depth	Min: 25m Max: 26m

Project creators

Name of Organisation	Suffolk Archaeology CIC
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Rachael Abraham
Project director/manager	Rhodri Gardner
Project supervisor	Catherine Douglas
Type of sponsor/funding body	Pigeon (Trimley) Limited
Type of sponsor/funding body	Development Corporation

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Suffolk HER
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey","Text"
Paper Archive recipient	Suffolk HER
Paper Contents	"Survey"
Paper Media available	"Plan","Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Land at High Road, Trimley St Martin
Author(s)/Editor(s)	Douglas, C.
Other bibliographic details	2017/094
Date	2017
Issuer or publisher	Suffolk Archaeology CIC
Place of issue or publication	Needham Market, Suffolk

Description	One A4 paper-bound report
Entered by	Catherine Douglas (catherine.douglas@suffolkarchaeology.co.uk)
Entered on	20 November 2017

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