GEOPHYSICAL SURVEY REPORT G1674

Land East of Longfield Road
Capel St. Mary
Suffolk

Client:

On Behalf Of:
Persimmon Homes Anglia

GSB PROSPECTION Ltd

Celebrating over 30 years at the forefront of Archaeological Geophysics

sumo Survey Services

GEOPHYSICAL SURVEY REPORT

Project name:	Land East of Longfield Road, Capel St. Mary, Suffolk.	
Job ref:	G1674	
Client:	CgMs Consulting Ltd.	
Survey dates:	24 August 2016	
Report date:	02 September 2016	
Field Co-ordinator:	James Slater BSc	
Field team:	Stephen Weston BA, Tom Hynd BSc	
Report written by:	Dr John Gater MCIfA FSA	
CAD illustrations by:	Jon Tanner BSc MSc PCIfA	
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Project Director:	Dr John Gater MCIfA FSA	
Version number and issue date:	V1	02/09/16
Amendments:		

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SUMO Survey Services
SUMO Group Member

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DIGITAL CONTENT (CD)

- Minimally Processed Greyscale Images and XY Trace Plots in DWG format
- DWG Viewer
- Digital Copies of Report Text and Figures (both PDF and native formats)

1 SUMMARY OF RESULTS

No responses of archaeological interest were recorded in the data. Two old field boundaries were identified.

2 INTRODUCTION

2.1 Background synopsis

GSB Prospection Ltd. was commissioned to undertake a geophysical survey of an area proposed for residential development. This survey forms part of an archaeological investigation being undertaken by **CgMs Consulting Ltd**. on behalf of **Persimmon Homes Anglia**.

2.2 Site Details

HER Parish Code	CSM 047
HER Event Number	ESF24430
OASIS ref. No.	gsbprosp1-259301
NGR / Postcode	TM 0985 3865 / IP9 2UF
Location	The site is located approximately 9km south-west of the centre of Ipswich on the north-eastern edge of Capel St. Mary. The survey area is bounded to the west by residential properties on Longfield Drive and to the east, in part, by properties and gardens on London Road; the A12 lies beyond. Agricultural fields lie to the north of the site.
HER/SMR	Suffolk CC
District	Babergh DC
Parish	Capel St. Mary CP
Topography	Generally level
Current Land Use	Arable - stubble
Soils	Beccles 3 (711t) association slowly permeable seasonally waterlogged fine loamy over clayey soils and similar soils with only slight seasonal waterlogging. Some calcareous clayey soils especially on steeper slopes (SSEW 1983)
Geology	Crag Formation sand. Superficial deposits are Lowestoft Formation – Diamicton (BGS 2016).
Archaeology	There are no designated or undesignated heritage assets on or close to the site. It is considered to have low to moderate potential for as yet to be discovered archaeological assets (CgMs 2013).
Survey Methods	Detailed magnetometer survey (fluxgate gradiometer)
Study Area	5.4 ha

2.3 Aims and objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage) and the Chartered Institute for Archaeologists (IfA 2002 & CIfA 2014).

3.2 Survey methods

Detailed magnetic survey was chosen as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

More information regarding this technique is included in Appendix A

This project was carried out in accordance with a WSI (Appendix C) submitted to and agreed by Suffolk CC (GSB 2016).

3.3 Data Processing

The following schedule shows the basic processing carried out on the data used in this report:

1. *De-stripe*
2. *De-stagger*

3.4 Presentation of results and interpretation

The presentation of the data for each site involves a greyscale plot of processed data. Magnetic anomalies have been identified, interpreted and plotted onto the 'Interpretation' drawings. The minimally processed data are provided as a greyscale image on the CD together with an XY trace plot in CAD format. A CAD viewer is also provided.

When interpreting the results several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to very specific known features documented in other sources, this is done (for example: Abbey Wall, Roman Road). For the generic categories levels of confidence are indicated, for example: probable, or possible archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification "possible".

4 RESULTS

4.1 No archaeological type responses have been identified in the data from Capel St. Mary.

4.2 Two old field boundaries have been recorded and these are visible on old mapping. There is an area of magnetic disturbance where the two boundaries originally met; the disturbance is presumably a result of their removal.

4.3 A network of field drains covers a large proportion of the field.

4.4 There are a couple of faint linear trends in the data near to a now infilled pond; they have been classified as having an uncertain origin, but on balance are likely to be agricultural or related to the pond. The former pond has resulted in strong magnetic responses associated with ferrous debris incorporated into the infill. A further uncertain curvilinear trend is marked on the interpretation; given the wider context of the results, this too is likely to be agricultural or natural.

4.5 Modern plough lines are discernible in the data.

4.6 Ferrous responses around the survey edges are due to fences, gates and adjacent buildings. Smaller, isolated ferrous anomalies or 'magnetic spikes' indicate ferrous metal objects and are likely to be modern rubbish.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

5.1 Historic England (then English Heritage) Guidelines (EH 2008) Table 4 states that the average magnetic responses to magnetometer survey are variable on drift deposits. The magnetic contrasts seen within the data from Capel St Mary indicate that the underlying geology and site formation processes are conducive to magnetic geophysical survey in that old boundaries have been recorded.

6 CONCLUSION

6.1 Two old field boundaries have been identified in the data but there are no indications of any responses which could be interpreted as being of archaeological interest.

7 REFERENCES

BGS 2016 British Geological Survey *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 08/08/2016]

CgMs 2013 *Archaeological Desk-Based Assessment: Land east of Longfield Road, Capel St. Mary, Suffolk*. Unpublished draft report, CgMs Consulting, London.

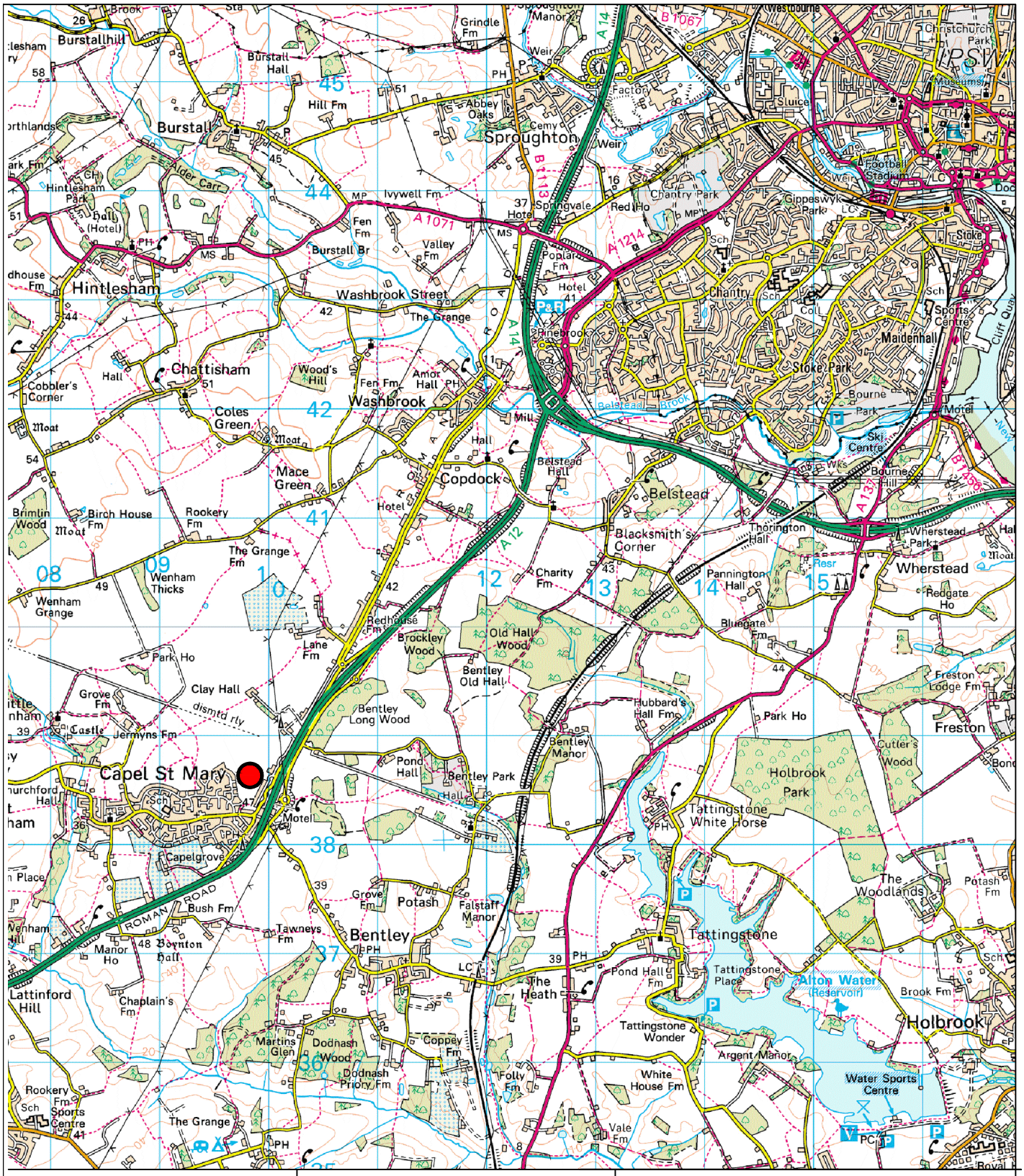
CIfA *Standard and Guidance for Archaeological Geophysical Survey.* CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf

EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/

GSB 2016 *Geophysical Survey: Written Scheme of Investigation G1674 Land East of Longfield Road, Capel St. Mary, Suffolk*. Unpublished report, GSB Prospection Ltd. Thornton, Bradford.

IfA 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No 6, C. Gaffney, J. Gater and S. Ovenden. Institute for Archaeology, Reading

SSEW 1983 *Soils of England and Wales. Sheet 5, Eastern England*. Soil Survey of England and Wales, Harpenden.



N

Site Location

Title:

Site Location Diagram

Client:

CgMs Consulting Ltd.

Project:

G1674 Land East of Longfield Road, Capel St. Mary, Suffolk

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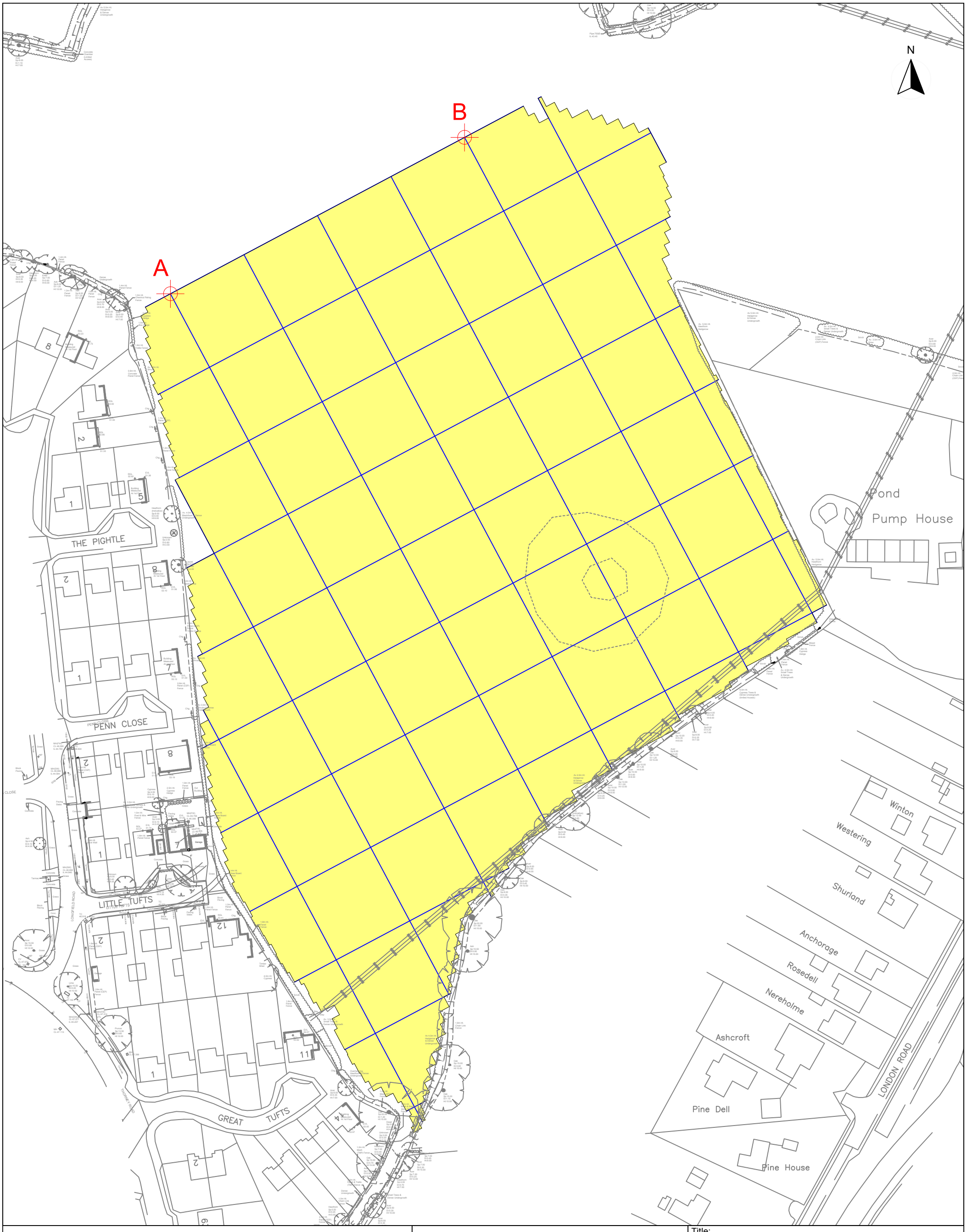
Scale: 0 metres 2000

1:50000 @ A4

Fig No: 1



Magnetometer Survey Area
Showing 30m Grids

Point	Easting	Northing
A	609716.879	238690.789
B	609822.828	238747.134

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Title: Location of Survey Area

Client: CgMs Consulting Ltd.

Project: G1674 Land East of Longfield Road, Capel St. Mary, Suffolk

Scale: 0 metres 50
1:1250 @ A3

Fig No: 2

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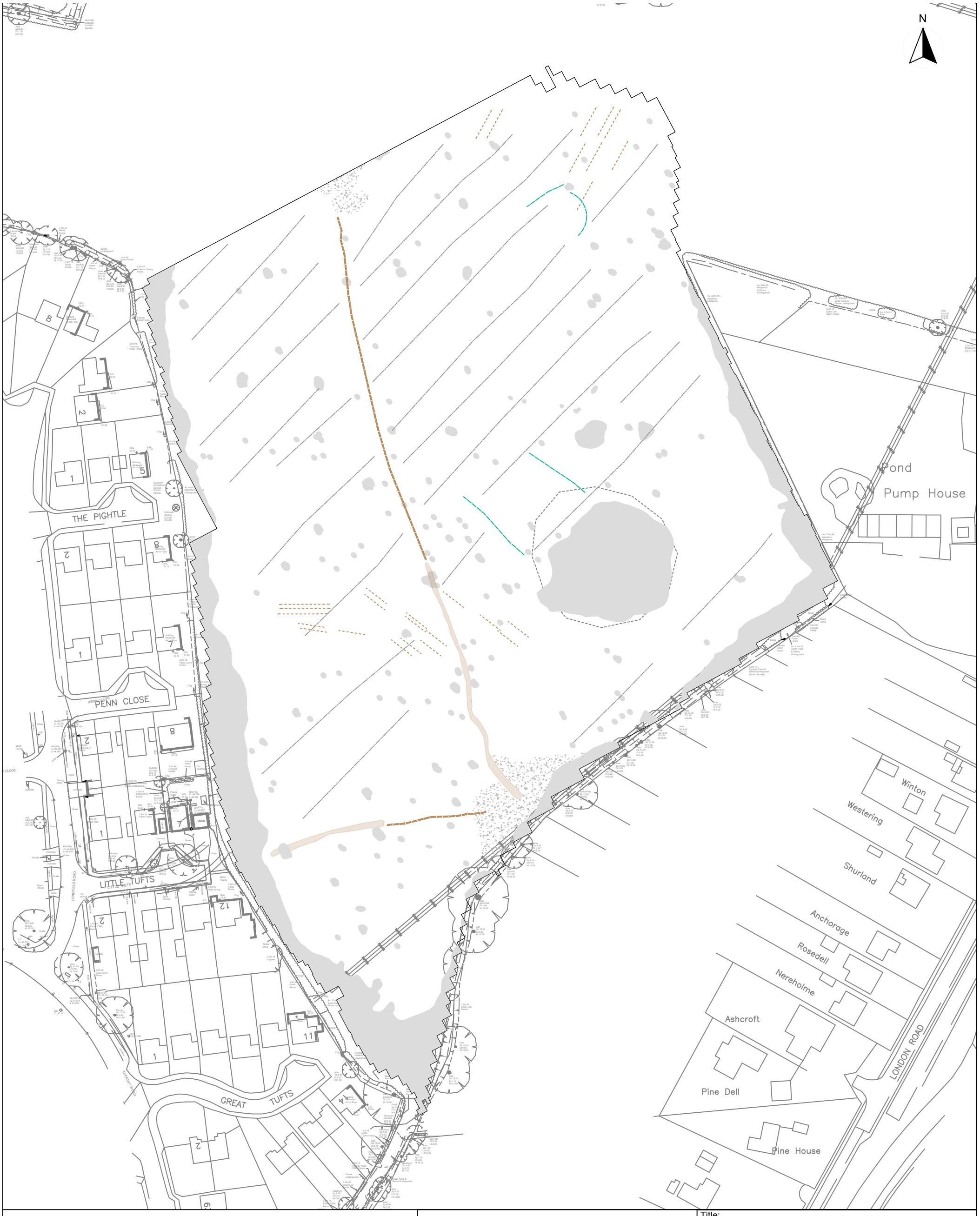
Title: Magnetometer Survey Greyscale Plot

Client: CgMs Consulting Ltd.

Project: G1674 Land East of Longfield Road, Capel St. Mary, Suffolk

Scale: 0 metres 50
1:1250 @ A3

Fig No: 3



Former Field Boundary - Mapped (discrete anomaly / trend)

Field Drain

Uncertain Origin (trend)

Ploughing

Magnetic Disurbance

Ferrous

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Title:	Magnetometer Survey Interpretation
Client:	CgMs Consulting Ltd.
Project:	G1674 Land East of Longfield Road, Capel St. Mary, Suffolk
Scale:	0 metres 50
Fig No:	

Appendix A - Technical Information: Magnetometer Survey Method

Grid Positioning
For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

For CARTEASY^{N} collected data each data point had its position recorded using a Trimble R10 Real Time Kinematic (RTK) VRS Now GNSS GPS system. The geophysical survey area is georeferenced relative to the Ordnance Survey National Grid.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m
Magnetometer	CartEasy^{N} cart system (Bartington Grad 601 sensors)	0.75m	0.125m

Instrumentation: Bartington *Grad*601-2 / GSB CARTEASY^{N} Cart system
Both the Bartington and CARTEASY^{N} instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The CARTEASY^{N} system has four gradiometer units mounted at 0.75m intervals across its frame – rather than working in grids, the cart uses an on-board survey grade GNSS for positioning. The cart system allows for the collection of topographic data in addition to the magnetic field measurements.

The readings are logged consecutively into the data logger which in turn is daily down- loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (Destagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points along a traverse (the x axis) and/or between traverses (the y axis) and results in a smoother greyscale image.

Display

XY Trace Plot	This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane.
Greyscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Probable Archaeology	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains will often lead and empty into larger diameter pipes and which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
Service	Magnetically strong anomalies usually forming linear features indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) cause weaker magnetic responses and can be identified from their uniform linearity crossing large expanses.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* and *Possible Natural* or (in the case of linear responses) *Possible Archaeology* and *Possible Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

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Geophysical Survey: Written Scheme of Investigation

G1674 Land East of Longfield Road, Capel St Mary, Suffolk

03/08/2016

Contents

1.0 Introduction

This document has been produced to describe the Archaeological Geophysical Survey required at land east of Longfield Road, Capel St. Mary, Suffolk (NGR TM 0985 3865). The site is located approximately 9km south-west of the centre of Ipswich on the north-eastern edge of Capel St. Mary. The survey area is bounded to the west by residential properties on Longfield Drive and to the east, in part by properties and gardens on London Road: the A12 lies beyond. Agricultural fields lie to the north of the site.

The underlying geology within the survey area consists of Crag Formation sand. Superficial deposits are Lowestoft Formation – Diamicton (BGS 2016).

Soils are Beccles 3 (711t) association slowly permeable seasonally waterlogged fine loamy over clayey soils and similar soils with only slight seasonal waterlogging. Some calcareous clayey soils especially on steeper slopes.

2.0 Scope of Works and Archaeological Background

The geophysical survey forms part of a wider archaeological assessment being carried out by CgMs Consulting Ltd. on behalf of Mr D. Baker. The work will be carried out with two objectives: to confirm the presence or absence of previously recorded sites and to attempt to identify additional sites of archaeological potential not previously recorded.

A Bronze Age/Middle Iron Age settlement is recorded at Days Road *c*. 850m west of the site; occupation continued into the 1st/2nd centuries AD including a field system. The Roman road (Pye Road) from Colchester to Caistor St. Edmund runs approximately 150m east of the north-eastern part of the site. Romano-British activity is also indicated by a building or villa 1km to the south-west, and re-used material within the fabric if St. Mary's church. A number of isolated finds are recorded within the vicinity of the survey area and two cremation burials were identified at the church *c.*1km to the west, suggesting a Roman-British cemetery. The site therefore appears to have lain to the east of a concentration of Romano-British settlement activity and was probably utilised for agricultural activity. Evidence of Romano-British roadside activity in the north-east of the site cannot be ruled out. A possible Medieval hall was located at Days Road apparently representing a wealthy farmstead. The site remained in agricultural use, with a possible clay pit forming a pond within the survey area. Former field boundaries are depicted on historic mapping (CgMs 2013).

3.0 Method

Although remains from any period may exist within the site, the periods most likely to be represented are Late Bronze Age/Iron Age and the Romano-British: former field boundaries are likely to be identified. Also taking into consideration the size of the survey area and the geology, magnetometer survey has been selected as the most suitable technique.

Prior to commencement of fieldwork, an OASIS reference number and a Suffolk HER event number and Parish Code will be obtained.

3.1 Detailed Recorded Survey - Grid Establishment / Relocation Data

All recorded survey data are collected with reference to a site survey grid or survey baselines. For hand-held instruments (gradiometer survey) this grid consists of individual 20mx20m or 30mx30m squares.

The survey grid is marked out by means of red plastic tent-pegs or brightly coloured/flagged canes and grid nodes are set out with a positional accuracy of at least 10cm (0.1m) as per HE guidelines.

As standard the survey grid will be established using Real Time Kinematic (RTK) differential GPS equipment. On rare occasions where this is not practical, a combination of Total Station, optical square, ranging rods and tape measures may be used.

Data are collected along regularly spaced traverses within the grid. These traverses are marked by "intermediate" plastic pegs or canes, set out using tape measures.

Either at this stage, or after data collection is complete, measurements will be taken which allow the re-location of the survey area. This is necessary for the production of maps in the report and for any subsequent re-establishment of the survey grid by other workers. Tie-in measurements are made to clear features (such as boundaries and buildings) *which appear on the mapping*.

If required, markers (pegs, canes, stakes or fluorescent spray-paint) can be left *in situ* at boundaries to mark grid baselines and assist in the subsequent re-establishment of the grid. The client should advise of any special arrangements/preferences in advance of survey.

On completion of the survey (i.e. when all data have been collected, downloaded to computer, visually examined, and backed up to an external device) all pegs/canes and any other temporary markers will be removed from the evaluation area, with the exception of any baseline markers specifically requested by the client (see above).

3.2 Detailed Recorded Survey - Data Collection: Gradiometer Survey

Standard Instrument: Bartington Grad 601-2
Standard sample interval (along traverse): 0.25m
Standard traverse interval: 1.00m
Total data points: 1600 readings per 20m x 20m grid square (3600 per 30m x 30m).
Data are stored within the instrument's memory.
For optimum data quality, it is imperative that the operator is able to walk at an even pace whilst holding the instrument steady. It is for this reason that the survey area needs to be free of obstructions such as dense vegetation.
Data are typically displayed as greyscale or colourscale images (where a given palette is applied to a defined range of data values) or XY trace plots (where each traverse is plotted as a continuous line with data values represented by a vertical offset from the centreline).

4.0 Reporting

4.1 General Data Handling

All data files (survey data and grid tie-in data) are transferred to the GSB server immediately upon returning to the office. Nightly off-site backups are made of all project work in progress. On completion of a project the entire archive is written to two CDs and an external hard disk drive, held at separate off-site locations.

4.2 Data Processing and Analysis

The interpretation is based on a variety of plotting formats and a range of data displays; it is undertaken by the Project Co-ordinator. Wherever possible, account is taken of the nature of the prevailing archaeological, pedological, geological, and land use conditions. These interpretations are independently checked by either the Senior Geophysicist or the Director.

In-house templates and guidelines and standard reference texts (e.g. English Heritage Thesaurus of Monument Types) are used to assist in the analysis of results.

The data will be interpreted and presented at suitable scales and located on *Ordnance Survey* base maps as appropriate, and will include location plans, greyscale plots and interpretation diagrams.

The survey methodology, report and any recommendations will comply with guidelines outlined by Historic England (then English Heritage) (EH 2008) and by the Chartered Institute for Archaeologists (previously Institute of Field Archaeologists) (IfA 2002), and *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2013). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office Crown copyright Licence No. 100018665.

4.3 Project Report

A standard GSB project report will be printed and bound and will contain the following sections: report text; list of figures; report figures; appendix detailing technical information. A CD is affixed to the inside front cover of the report. This will contain a pdf version of the printed report and additional reference plots of minimally processed data and XY Trace Plots in CAD format. Depending on the client's specifications, AutoCAD (dwg or dxf) versions of the report figures may also be included.

The report text will:

Describe the site and situation of a survey area and the prevailing local topography, land use, soils and geology.

Provide a brief description of any known archaeological remains in the vicinity, and their relevance to the survey results, will be made as necessary.

List and explain the display formats adopted.

Describe any general factors or complications which must be considered when viewing the data. These include any local factors which may hinder the collection or interpretation of the results.

Assess the results in accordance with the aims of the survey. In the majority of cases, the anomalies are interpreted from the perspective of their archaeological potential.

Provide the names of the project co-ordinator and all project assistants together with the dates of the survey and report.

All reports are proof read by at least two other qualified members of staff to ensure: completeness and quality of data interpretation, clarity and accuracy of expression,

consistency of format; good spelling and grammar; that references to figures and tables are complete, and that any external references are as full as possible.

The report figures will present the results of the survey accurately positioned on the site mapping. They are produced in AutoCAD and will include:

A diagram showing the location of the survey areas (with key, scale and north arrow).

Greyscale or colour plot(s) of the data-set(s) (with plotting levels, scale and north arrow).

Digitised interpretation(s) of the results (with key, scale and north arrow).

The scale of the above printed figures will vary depending on survey size but the scale of the data plots and interpretations will not exceed 1:2500.

The report will include the OASIS reference number and the Suffolk HER event reference number obtained before survey commencement (see 3.0 above). A copy of the online OASIS record will be included as an appendix to the report, together with a copy of the approved WSI.

The reference data plots on the CD are not positioned on the mapping and are presented in CAD format together with a CAD viewer. These will include at least one XY trace plot and one greyscale image of minimally processed data for each complete survey area/data-set.

The survey methodology, report and any recommendations will comply with guidelines outlined by *English Heritage* (*Geophysical Survey in Archaeological Field Evaluation*, Research and Professional Services Guidelines No 1, compiled by A David, April 2008), the (then) *Institute for Archaeologists* (*The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No 6, C Gaffney, J Gater and S Ovenden, 2002) and *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2014).

5.0 Programme

The geophysical survey will commence in mid-August 2016 on a date yet to be confirmed and will take approximately two-three days. Our normal working hours will be between 9.00am & 5.30pm.

GSB will liaise with Lorraine Mayo (CgMs Consulting Ltd), regarding the progress of the survey.

6.0 Resourcing

The survey will be carried out by two or three suitably experienced surveyors.

7.0 Equipment

Trimble R8 Real Time Kinematic (RTK) VRS Now dGPS equipment / tapes / ranging poles / optical squares / plastic survey pegs.

Bartington Grad 601-2 handheld gradiometers

Laptop and netbook computers

Mobile telephones

Transport will be by car/van. Vehicles shall be parked in such a way so as to ensure that they do not obstruct any existing accesses, pathways or the highway. The parking of vehicles and all access to fields to be agreed in advance of the survey.

8.0 Supervision

The survey team will report their progress daily to the General Manager of GSB Prospection Ltd.

9.0 Environmental

Geophysical survey has little potential to effect the environment; however the following precautions will be taken:

Field gates to be secured & left in the same condition as found.
Litter to be removed from site
Noise to be kept to a minimum.

10.0 Insurance

GSB holds Public Liability Insurance & Employees Liability Insurance to a limit of £10,000,000; Professional Indemnity of £5,000,000. No claims have been made or are pending.

11.0 Archiving

GSB follows normal industry practice and maintains both hard and digital copies of all reports and survey data. All data files (survey data and grid tie-in data) are transferred to the GSB server immediately upon the return of a survey team to the office. Nightly off-site backups are made of all project work in progress. On completion of a project the entire archive is written to two CDs and held at separate off-site locations: all data is automatically backed-up nightly to a remote facility. All GSB reports include a "Digital Report CD" containing all report documents in both PDF and their native formats, and the reference plots in CAD format together with a CAD viewer. A copy of the survey report will be issued to Suffolk HER.

Prior to commencement of fieldwork, an OASIS reference number and a Suffolk HER event number will be obtained, and a copy of the report will be uploaded to OASIS.

GSB has advised ADS regarding geophysical archiving. GSB are committed to long-term storage of data and reports and are working towards full implementation of the '*ADS Guide to Good Practice*' (Schmidt, 2001). Our document will be updated when full implementation is achieved.

12.0 Health & Safety

High Visibility vests & clothing/footwear appropriate for the specialist nature of a magnetic survey will be worn at all times. ***It should be noted that no metal objects whatsoever can be carried or worn as these affect the instruments used on survey.***

All GSB field personnel hold current CSCS Health & Safety Passports. Several staff members are qualified First Aid representatives and at least one will be a member of the survey team for this project.

A Risk Assessment will be carried out for every project, in addition to the GSB Generic Risk Assessment. The former is in part informed by a Questionnaire completed by the client before commencement. It identifies potential hazards & the control measures required to minimize the potential for harm to our personnel. The Risk Assessment will be issued to the survey team and they will be briefed on its contents prior to the start of works. A Dynamic Risk Assessment proforma is provided with the Project Information Sheet, which all team members are required to read and sign their acknowledgment.

Welfare

Surveyors will make use of local amenities as there are no welfare facilities on site. The location of the nearest toilet facilities will be identified in a Project Information Sheet provided to the field team for every project.

Emergency Procedures

In the event of an accident, the Geophysical survey team will follow the procedure established for the site. Any accident or near miss is to be reported as soon as possible to the Director or General Manager, GSB Prospection Ltd. Details will be entered in GSB's Accident Book.

Several staff members are qualified First Aid representatives and at least one will be a member of the survey team for this project. A first aid kit will be carried in the vehicles & made available at all times whilst out on survey in the event of a minor injury.

The nearest accident and emergency department will be identified in a Project Information Sheet provide to the field team for every project, every week.

References

BGS 2016 — British Geological Survey *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 02/08/2016]

CgMs 2013 — *Archaeological Desk-Based Assessment: Land eat of Longfield Road., Capel St. Mary, Suffolk.* Unpublished draft report, CgMs Consulting, London.

CIfA 2014 — *Standard and Guidance for Archaeological Geophysical Survey.* Amended 2016. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf

EH 2008 — *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/

IfA 2002 — *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No 6, C. Gaffney, J. Gater and S. Ovenden. Institute for Archaeology, Reading

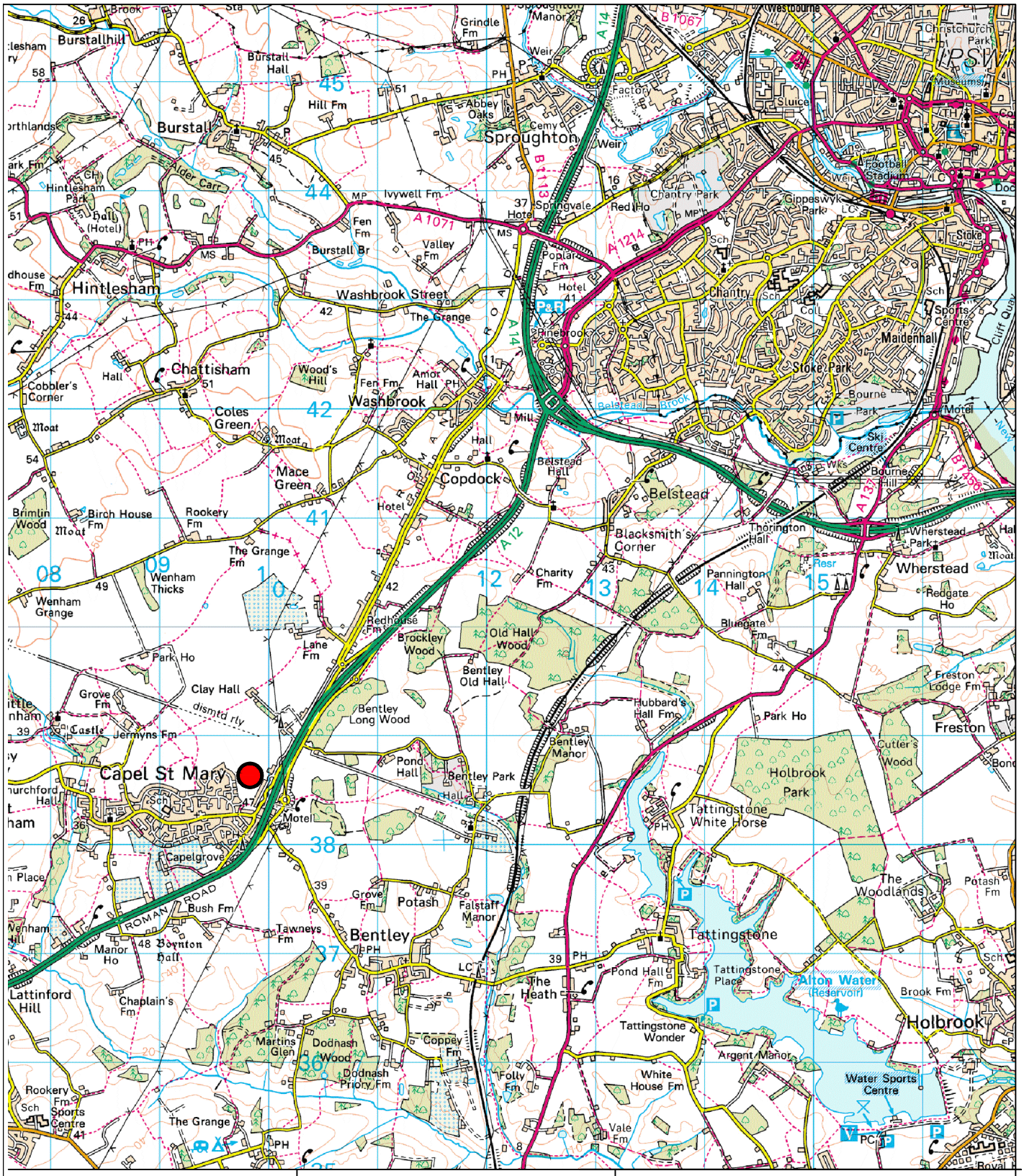
Schmidt.2001 — *Geophysical Data in Archaeology: A Guide to Good Practice,* Archaeology Data Service

SSEW 1983 — *Soils of England and Wales. Sheet 4, Eastern England*. Soil Survey of England and Wales, Harpenden.

FIELDWORK RISK ASSESSMENT

Project Name: Longfield Road, Capel St Mary, Suffolk					**Project No:** G1674			
Dates of survey: TBC	**Date of Assessment:** 02/08/16							
Level of Risk is determined by use of the calculator on the right. Risk = Likelihood multiplied by Severity	**Likelihood** 0= zero to very low 1 = very unlikely 2 = unlikely 3 = likely 4 = very likely 5 = almost certain	**Severity** 0 = no injury or illness 1 = First Aid injury or illness 2 = minor injury or illness 3 = illness or injury resulting in 3 or more days absence from work 4 = major injury or illness 5 = fatality, disabling injury etc.						
Hazards	Without control measures				With control measures			
	Possible Effect	L	S	R	Control Measures	L	S	R
Working in remote locations	Unobserved injuries or difficulties. Lack of access for emergency services. Delay in treatment of minor or moderate injuries.	2	5	10	Ensure all staff aware of location details e.g. NGR, access routes. Keep mobile phones to hand. Ascertain nearest A&E dept. All staff to stay within visual proximity of other members of the team.	0	5	0
Working in remote locations	Lack of washing facilities, hot water.	5	3	15	See 'contaminated land' below. Use portable water supply and soap. If not pos, use hand wash	0	3	0
Travel in vehicles	Collision/accident	2	5	10	Ensure vehicle serviced and maintained. Check tyre pressures, oil and water levels. Rotate driver/ensure adequate rest periods. Wear seatbelts. Do not overload vehicle or obstruct driver's view.	0	5	0
Exiting vehicles parked roadside	Severe injury/fatality from collision with passing vehicles	3	5	15	Selecting parking places carefully, park off road, avoid roadside if pos. Look carefully before opening doors. Wear high vis clothing. Use look-outs in unavoidable situations.	0	5	0
Lone working	Unobserved injury or difficulties	2	5	10	Avoid: try to work within sight of another person. If unavoidable, wear high vis clothing and carry mobile phone, set time to return.	0	5	0
Access to survey areas	Injury, tetanus infection from barbed wire fence, trauma injuries jumping ditches etc.	3	3	9	Ascertain access prior to survey. Only use proper access routes, gates etc.	0	3	0
Lightning strike	Severe injury/fatality	1	5	5	Get into vehicle if pos, crouch down if not. Do not work in thunderous conditions.	0	5	0
Wet and cold weather	Hypothermia	3	5	15	Appropriate clothing: layers, waterproofs, hat. Take spare dry clothing. Use weather forecast	0	5	0
Hot weather	Sunburn, dehydration	4	3	12	Appropriate clothing; cover bare skin, wide brimmed hat. Use sun cream. Ensure sufficient water available. Use weather forecast	0	3	0
Survey, grid setting out.	Trip hazards – pegs, tapes, ropes. Impaling injuries on pegs.	2	4	8	Use high-vis plastic pegs. Minimise point-up use, remove if public present. Remove as soon as possible.	0	4	0

Agricultural equipment	Collision or accident with machinery	2	5	10	Liaise with farmer/landowner. Do not work in fields where machinery is in use. Stay clear of machinery.	0	5	0
Farm animals	Kicking, biting, goring	1	4	4	Liaise with farmer/landowner. Ensure livestock removed from fields. Do not work in fields with large animals present. `	0	4	0
Rivers, streams, ponds	Drowning, Weil's disease	2	5	10	Ascertain presence of rivers, streams and ponds and avoid.	0	5	0
Insects	Lyme's disease	2	4	8	Wear long sleeved garments. Long trousers tucked in. Be aware of symptoms.	0	4	0
Insects	Stings, bites, allergies	3	3	9	Clothing – as above. Record details of any persons with allergies. Ensure anti-histamine and bite cream available.	0	3	0
Animal burrows	Trip hazard	3	3	9	Take great care when walking. Mark known or observed holes.	0	3	0
Slipping	Slip hazard	2	1	2	Wear appropriate footwear. Avoid steep or muddy slopes, especially wet grass.	0	1	0
Deep Ploughed / Freshly ploughed ground	***Tripping, ankle and leg injuries***	***3***	***3***	***9***	***Assess ground conditions before survey. Do not work in unsuitable conditions. (Freshly ploughed & deep ploughed ground is unsuitable for survey because the operator has to hold the instruments vertically whilst walking at a steady/regular pace & observing the instruments LCD. This cannot be achieved if there is a trip hazard or risk of turning an ankle on "rutted" ground.***	**0**	**3**	**0**
Uneven ground	Tripping, ankle and leg injuries	3	3	9	Assess ground conditions before survey. Do not work in unsuitable conditions. Set instruments to speed appropriate for conditions	0	3	0
Contaminated land	Inhalation or ingestion of harmful substances. Poisoning, allergies, skin complaints from fertilizers, insecticides etc.	3	5	15	Liaise with farmer/landowner. Do not work in or adjacent to fields where fertilizers or insecticides are in use or have recently been used.	0	5	0
Contaminated land	Poisoning, allergies, skin complaints from industrial or other contaminants	2	5	10	Obtain assurances before survey. Stop work immediately upon suspicion of contamination	0	5	0
Contaminated land	Wild, farm or domestic animals (dogs etc.) urine and faeces	2	4	8	Wear gloves, maintain observation. Wash hands before eating, do not touch face when working	0	4	0
Overhanging branches	Cuts, impaling	1	3	3	Do not survey below low trees and bushes	0	3	0
Overhanging power cables	Electrocution	2	5	10	Asses site for presence of power cables. Do not carry long equipment (staff, ranging rods etc.) or zero mag sus coils in vicinity of overhead cables.	0	5	0
Plants, vegetation	Stinging, poisoning, allergies	2	3	6	Avoid any unrecognised plants. Wear gloves and long sleeved garments, long trousers.	0	3	0
Carrying heavy equipment	Back injury etc.	2	3	6	Follow standard procedures	0	3	0
Magnetometer survey	Back strain, repetitive strain injury	3	3	9	Ensure harness comfortable. Wear gloves if hand strain experienced. Cease survey if back pain experienced.	0	3	0



N

Site Location

Title:

Site Location Diagram

Client:

CgMs Consulting Ltd.

Project:

G1674 Land East of Longfield Road, Capel St. Mary, Suffolk

GSB PROSPECTION Ltd

GSB Prospection Ltd
COWBURN FARM
21 MARKET STREET
THORNTON
BRADFORD
BD13 3HW
TEL: 01274 835 016
FAX: 01274 830 212
www.gsbprospection.com

Scale: 0 metres 2000

1:50000 @ A4

Fig No: 1

Survey Area

N

Title:
Location of Survey Area

Client:
CgMs Consulting Ltd.

Project:
G1674 Land East of Longfield Road, Capel St. Mary, Suffolk

GSB PROSPECTION Ltd

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Scale: NTS

Fig No: 2

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: gsbprosp1-259301

Project details

Project name	Land East of Longfield Road, Capel St. Mary, Suffolk
Short description of the project	Geophysical (magnetometer) survey. No responses of archaeological interest were recorded in the data. Two old field boundaries were identified.
Project dates	Start: 09-08-2016 End: 10-08-2016
Previous/future work	No / Not known
Any associated project reference codes	G1674 - Contracting Unit No.
Any associated project reference codes	ESF24430 - HER event no.
Any associated project reference codes	CSM 047 - Related HER No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	NONE None
Monument type	NONE None
Significant Finds	NONE None
Significant Finds	N None
Methods & techniques	""Geophysical Survey""
Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology	Unknown
Solid geology (other)	Crag Formation sand
Drift geology	Unknown
Drift geology (other)	Lowestoft formation - Diamicton
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK BABERGH CAPEL ST MARY Land East of Longfield Road, Capel St. Mary, Suffolk
Postcode	IP9 2UF

Study area	5.4 Hectares
Site coordinates	TM 098 386 52.005591089733 1.05709175847 52 00 20 N 001 03 25 E Point

Project creators

Name of Organisation	GSB Prospection Ltd
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	GSB Prospection Ltd
Project director/manager	GSB Prospection Ltd
Project supervisor	GSB Prospection Ltd
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Persimmon Homes Anglia

Project archives

Physical Archive Exists?	No
Digital Archive recipient	CgMs
Digital Contents	"Survey"
Digital Media available	"Geophysics"
Paper Archive recipient	Suffolk CC
Paper Contents	"Survey"
Paper Media available	"Drawing","Report"

Entered by	GSB Prospection Ltd (info@gsbsumo.com)
Entered on	2 September 2016

OASIS:

GSB PROSPECTION Ltd

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forefront of archaeological geophysics

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