GEOPHYSICAL SURVEY REPORT G1629

Geophysical Survey Report
Barking Road,
Needham Market
Suffolk

GSB PROSPECTION Ltd

Celebrating over 25 years at the forefront of Archaeological Geophysics

sumo Survey Services

Client:

CgMs CONSULTING

On Behalf Of:

HOPKINS HOMES

GEOPHYSICAL SURVEY REPORT

Project name:	Barking Road, Needham Market, Suffolk
Job ref:	G1629
Client:	CgMs Consulting Ltd.
Survey dates:	12 April – 13 April 2016
Report date:	19 April 2016
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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

The former Sprite's Hall was located as an area of magnetic disturbance due to demolition rubble. Weak trends within and around the disturbance may represent external walls and other divisions. Former field boundaries were detected, as were recent ploughing, anomalies of natural origin and a pipe.

2 INTRODUCTION

2.1 Background synopsis

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

2.2 Site Details

HER Parish Code	NDM 040
HER Event Number	ESF23797
OASIS ref. No.	Gsbprosp1-247096 (see Appendix D)
NGR / Postcode	TM 087 540 / IP6 8JF
Location	The site is located *c.*1km south-west from the centre of Needham Market, and is bounded to the south-east by the B1078 Barking Road. Properties on Foxglove Avenue form the eastern boundary.
HER/SMR	Suffolk
District	Mid-Suffolk
Parish	Needham Market CP
Topography	Moderate slopes down from plateau in centre of survey area.
Current Land Use	Young crop (wheat).
Weather Conditions	Sunny spells with occasional thunderstorms.
Soils	Ludford (571x) association deep well drained fine loamy, coarse loamy and sandy soils, locally flinty and in places over gravel. Slight risk of water erosion (SSEW 1983).
Geology	Bedrock - White Chalk Subgroup - Chalk. Superficial deposits - glacial sand and gravel (BGS 2016).
Archaeology	None known within the application area. Sprite's Hall is visible on historic OS mapping in the approximate centre of the survey area. Refer to the Desk-Based Assessment (CgMs 2016).
Survey Methods	Detailed magnetometer survey (fluxgate gradiometer).
Study Area	7ha

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 used as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	CARTEASY^{N} cart system (Bartington Grad 601 sensors)	0.75m	0.125m

More information regarding this technique is included in Appendix A.

This project was carried out in accordance with a Method Statement submitted to Suffolk CC (Appendix C).

3.3 Data Processing

Data processing was performed as appropriate using a commercial software package CARTEASY^{N} as outlined below.

Magnetic Data – CART
Zero Mean Traverse, Gridding

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 is 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 An area of magnetic disturbance [**1**] in Area 1 probably represents demolition rubble as it corresponds to the location of Sprite's Hall as shown on early edition OS mapping. The building is absent by 1955, but a pond is shown on the 1958 Edition OS map and a surrounding enclosure is depicted as late as 1985. This may be represented by weak responses classified as *Uncertain Trends*. Other trends are visible within the magnetic disturbance; however, they do not correspond to the mapped position of the Hall and could simply be due to debris being drawn out by ploughing, and they have been also been classified as *Uncertain Trends*.

4.2 Within the magnetic disturbance [**1**] a very strong response was recorded. This could be a large ferrous object, or it may be due the presence of burnt or fired material.

4.3 A second area of magnetic disturbance [**2**] does not correspond to any mapped feature and is likely to be of relatively modern origin.

4.4 Three former field boundaries converging on the site of Sprite's Hall and recorded on historic mapping, were identified.

4.5 Several weak trends are visible in the dataset. Whilst possibly natural, these may result from past agricultural activity.

4.6 A relatively magnetically weak and poorly-defined response [**3**] is of natural origin.

4.7 Relatively modern ploughing evidenced in the form of closely spaced linear anomalies, barely visible above the magnetic background.

4.8 A pipe was detected in Area 2.

4.9 Ferrous responses adjacent to boundaries are due to fences, gates and adjacent buildings. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data, and their form is best illustrated in the XY trace plots. These responses are characteristic of small pieces of ferrous debris in the topsoil and are commonly assigned a modern origin. The most prominent of these are highlighted on the interpretation diagram.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

5.1 Historic England (then English Heritage) Guidelines (EH 2008) Table 4 states that the average response chalk is generally good. The presence of anomalies due to the former field boundaries and features associated with Sprite's Hall suggests that the survey would have detected any archaeological features, if present.

5.2 Site conditions were generally acceptable for survey.

6 CONCLUSION

6.1 The location of the former Sprite's Hall was identified as a spread of magnetic disturbance. The surrounding enclosure and possible internal divisions may be visible as trends, and possible burnt or fired material was detected, although these are tentative interpretations.

6.2 Former field boundaries were located, and past ploughing was recorded.

6.3 An anomaly of natural origin and a pipe were detected.

7 REFERENCES

BGS 2016 British Geological Survey *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 19/04/2016]

CgMs 2016 *Archaeological Desk-Based Assessment: Barking Road, Needham, Suffolk*. Unpublished report. CgMs Consultin Ltd. London.

CIfA *Standard and Guidance for Archaeological Geophysical Survey*. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/node-files/CIfAS&GGeophysics_1.pdf

EH 2008 *Standard and Guidance for Archaeological Geophysical Survey*. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/node-files/CIfAS&GGeophysics_1.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

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

Site Location

N

Title:

Site Location Plan

Client:

CgMs Consulting

Project:

G1629 Barking Road, Needham Market, Suffolk

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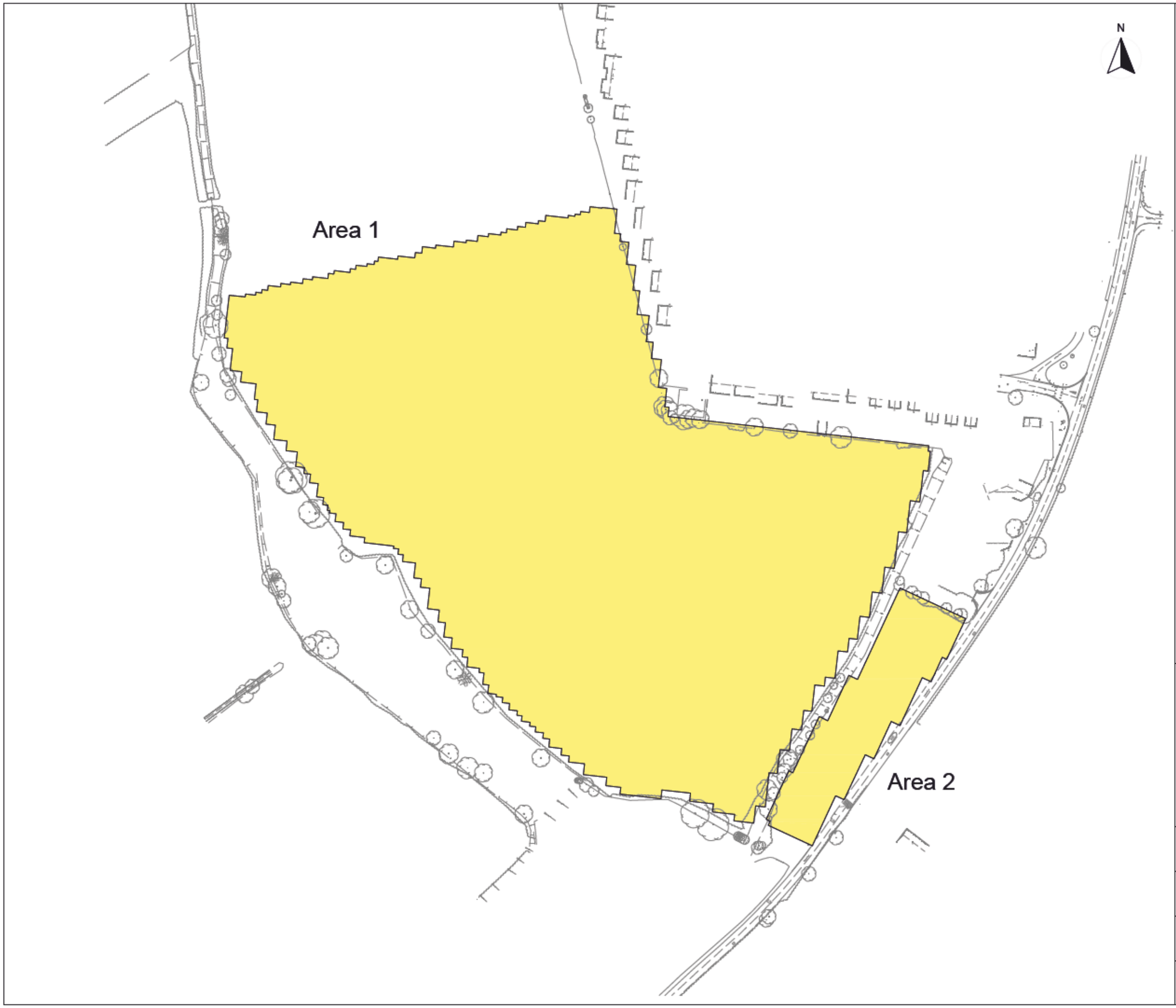
Scale: 0 metres 2000

1:50000 @ A4

Fig No: 1



Location of Survey Areas

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Title: Location of Survey Areas

Client: CgMs Consulting Ltd

Project: G1629 Needham Market

Scale: 0 metres 80
1:2000 @ A3

Fig No: 2

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Title:
Magnetometer Survey
Greyscale Plots

Client:
CgMs Consulting Ltd

Project:
G1629 Needham Market

Scale:
0 metres 80
1:2000 @ A3

Fig No:
3

Area of Magnetic Disturbance

Possible Burnt / Fired Material

Uncertain Origin (Trend)

Old Field Boundary

Ploughing

Natural

Pipe

Ferrous

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Title: Magnetometer Survey Interpretation

Client: CgMs Consulting Ltd

Project: G1629 Needham Market

Scale: 0 metres 80
1:2000 @ A3

Fig No: 4

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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Barking Road, Needham Market, Suffolk
Geophysical (Magnetometer) Survey - Method Statement

1.0 Background Information

This document has been produced to describe the Archaeological Geophysical Survey required at Barking Road, Needham Market, Suffolk (NGR TM 087 540). The site of approximately 7ha is located at the southern edge of Needham Market, and is bounded to the south-east by the B1078 Barking Road. Properties on Foxglove Avenue form the eastern boundary.

The geophysical survey forms part of a wider archaeological assessment being carried out by CgMs Consulting. The work will be carried out with two objectives: to confirm the presence or absence of previously recorded sites (from working maps supplied to GSB) and to attempt to identify additional sites of archaeological potential not previously recorded.

Bedrock geology within the survey area consists of White Chalk Subgroup - chalk …
Superficial deposits are Glacial sand and gravel (BGS 2016).

Soils are Ludford (571x) association deep well drained fine loamy, coarse loamy and sandy soils, locally flinty and in places over gravel. Slight risk of water erosion (SSEW 1983)

2.0 Prior to Survey

GSB cannot commence survey until the following information has been received from the client/consultant:

- A written instruction for GSB to start works (an email is sufficient).

- Any site specific documentation where necessary; e.g. Section 42 licence.

- Mapping showing the site location and areas to be surveyed. At least one of the maps provided should be suitable for subsequent use in the production of the report i.e. *digital OS georeferenced vector map data in dxf or dwg format*. This can be either native OS vector data, or client generated site survey map data that is georeferenced to the OS national grid. Files that are backwardly compatible with AutoCAD versions 2002 or 2004 would be appreciated. If required, please advise of any client specific copyright notices that should appear on the completed diagrams.

- Confirmation that access to the site has been agreed between the client/consultant and all other relevant parties (e.g. landowners, tenant farmers). The client/consultant should clearly state whether or not vehicular access onto site is permitted. (If this can be arranged - e.g. in the case of a pasture or stubble field - it is greatly appreciated as it helps to speed up survey). An email is sufficient for this purpose, but if there are specific access routes that should be used mapping showing these would be needed.

- Confirmation that ground conditions are suitable for survey. This implies the absence of tall or dense vegetation, mature crop and other obstructions or unsafe conditions. In the case of gradiometer survey, the presence of ferrous objects and microwave sources within or immediately adjacent to, the survey area will produce magnetic disturbance and this will compromise the quality of the data. GSB can advise as to what constitutes 'suitable' conditions,

but please note that this advice relies on an *accurate and up to date* description of the site provided by the client/consultant.

3.0 Commencement of Project

One member of staff is designated as Project Co-ordinator (PC). All PCs will have minimum of three years fieldwork experience specifically in archaeological geophysics. The PC has the responsibility of overseeing the project from commencement of fieldwork to completion of the report. This includes:

Ensuring that all the necessary equipment and paperwork, mapping etc. is assembled prior to leaving the office (there is a checklist!).

Acting as main point of liaison in the field (NB on long projects the PC may not always be in the field in which case another member of staff will be the field contact).

Where necessary, decide on appropriate survey strategy (e.g. if the brief called for "targeted resistance survey based on the magnetic results", the decision on target areas would ultimately rest with the PC).

Keeping the office/director regularly updated on field progress and in particular of any problems that might arise.

Overseeing the production of the report. All members of staff collaborate on report production but the PC will usually take primary responsibility for the interpretation of the results and the accompanying report text.

An OASIS reference number has been obtained (gsbprosp1-247096). Prior to commencement of fieldwork, a Suffolk HER event number will be obtained.

4.0 Field Survey

4.1 Detailed Recorded Survey - Grid Establishment / Relocation Data

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

A broader grid is sufficient if using a cart based system with an RTK GPS feed: all recorded survey data are collected with reference to survey baselines. Data are collected along regularly spaced traverses between baselines set out at *c.*100m centres

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 EH guidelines.

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

For all techniques 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).

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).

4.2 Data Collection

Data may either be collected using hand-held instruments, or using cart-mounted sensors.

4.2.1 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 traverses is plotted as a continuous line with data values represented by a vertical offset from the centreline).

4.2.1 Detailed Recorded Survey - Data Collection: Cart Gradiometer Survey

Standard cart CARTEASY^{N} Mk 1
Standard Instrument: Bartington Grad 601-2 sensors
Standard sample interval (along traverse): 10Hz (approx. 0.125m)
Standard traverse interval: 0.75m

- All data points are located using RTK GPS to a sub-10cm accuracy.
- Data are stored within the instrument's memory.
- 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 traverses is plotted as a continuous line with data values represented by a vertical offset from the centreline).

Data are stored remotely using cloud computing

5.0 Data Storage - All techniques

While in the field, the data are regularly transferred from the instrument onto a laptop computer using the appropriate software. Magnetic and resistance results are viewed using a combination of Geoplot 3 and GSB in-house software. All data are copied to an external storage medium (RW disc or USB stick) as a back-up. This is kept by the PC and held separately from the laptops.

With the cart system, data are stored remotely using cloud computing.

6.0 Post-Fieldwork (Report Stage)

6.1 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.

6.2 Data Processing and Analysis

The results are analysed using a combination of commercial and in-house software. All data processing is kept to a minimum and any processed data files are stored in a separate directory or with different filenames. Thus the raw data are always available for reference when interpreting the results. Any processing which has been carried out, such as de-staggering or interpolation, is clearly stated in the report.

The interpretation is based on a variety of plotting formats and a range of data displays; it is undertaken by the PC. 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.

6.3 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, additional reference plots of data in pdf format and the tie-in information. 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.

- State the aims and objectives of the survey.

- 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 reference data plots on the CD are not positioned on the mapping and are presented at a scale of 1:500 unless otherwise indicated. For magnetic data these will include at least one XY trace plot and one greyscale image of raw data for each complete survey area/data-set.

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 MS.

6.4 Data 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 an "Archive CD" containing all report documents in both PDF and their native formats, and the reference plots. Copies of survey reports will be issued to the respective Local Authority Planning Archaeologist / HER by the client, together with all relevant archaeological documents, at the appropriate stage

A digital copy of the report will be submitted to the OASIS database.

6.5 Staffing

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

7.0 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 we cannot wear or carry any metal objects whatsoever as these affect the instruments used on survey.

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 sent to the client (or commissioning body) 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.

All GSB field personnel hold current CSCS Health & Safety Passports.

Welfare

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

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 Office 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, n.d., website: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 30/03/2016]

English Heritage (2008) *Geophysical Survey in Archaeological Field Evaluation.* Research and Professional Services Guideline AML/EH, London.

Gaffney, C., Gater, J. and Ovenden, S. (2002) *The use of geophysical techniques in archaeological evaluations*. Institute of Field Archaeologists Paper 6.

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

Site Location

N

Title:

Site Location Plan

Client:

CgMs Consulting

Project:

G1629 Barking Road, Needham Market, Suffolk

GSB PROSPECTION Ltd

SUMO Survey Services

GSB Prospection Ltd
COWBURN FARM
21 MARKET STREET
THORNTON
BRADFORD
BD13 3HW
TEL: 01274 835 016
FAX: 01274 830 282
www.gsbprospection.com

Scale: 0 metres 2000

1:50000 @ A4

Fig No: 1

Survey area

N

Title:
Location of Survey Area

Client:
CgMs Consulting

Project:
G1629 Barking Road, Needham Market, Suffolk

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COWBURN FARM
21 MARKET STREET
THORNTON
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TEL: 01274 835 016
FAX: 01274 830 212
www.gsbprospection.com

Scale: 0 metres 200
1:5000 @ A4

Fig No: 2

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

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OASIS ID: gsbprosp1-247096

Project details

Project name	Barking Road, Needham Market, Suffolk
Short description of the project	Geophysical survey
Project dates	Start: 13-04-2016 End: 14-04-2016
Previous/future work	Not known / Not known
Any associated project reference codes	G1629 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 1 - Minimal cultivation
Monument type	NONE None
Monument type	NONE None
Significant Finds	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	Planning condition
Position in the planning process	Not known / Not recorded
Solid geology	CHALK (INCLUDING RED CHALK)
Solid geology (other)	White Chalk Subgroup - Chalk
Drift geology	GLACIAL SAND AND GRAVEL
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK MID SUFFOLK NEEDHAM MARKET Barking Road, Needham Market, Suffolk
Postcode	IP6 8JF
Study area	7 Hectares
Site coordinates	TM 08 54 52.144547003678 1.04029040964 52 08 40 N 001 02 25 E Point
Lat/Long Datum	Unknown
Height OD / Depth	Min: 0m Max: 0m

Project creators

Name of Organisation	GSB Prospection Ltd
Project brief originator	Consultant
Project design originator	CgMs
Project director/manager	GSB Prospection Ltd
Project supervisor	GSB Prospection Ltd
Type of sponsor/funding body	Developer
Name of sponsor/funding body	unkown

Project archives

Physical Archive Exists?	No
Digital Archive recipient	GSB Prospection Ltd
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey"
Paper Archive recipient	GSB Prospection Ltd
Paper Contents	"Survey"
Paper Media available	"Drawing","Report","Unpublished Text"

Entered by	GSB Prospection Ltd (info@gsbsumo.com)
Entered on	31 March 2016

OASIS:

Please e-mail Historic England for OASIS help and advice

GSB PROSPECTION Ltd

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GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING

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Celebrating over 25 years at the
forefront of archaeological geophysics

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