TIGERGEO

Land at Sand Hill, Boxford, Sudbury, Suffolk

Geophysical Survey Report
(Caesium Vapour Magnetic – Archaeology)
Version 1.1

Project code: SHB171
HER Event: BOX 036
OASIS: tigergeo1-309157 (1)

Produced for:

CgMs Limited (Part of the RPS Group)

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REGISTERED CIfA ORGANISATION

21st February 2018

Environmental Geophysics – Survey, Research and Consultancy

TIGERGEO

Land at Sand Hill, Boxford, Sudbury, Suffolk

Digital data

Item and version	Sent to	Sent date
CAD – Vector Elements 1.0	Matthew Smith, Manca Petric	14th February 2018

Audit

Version	Author	Checked	Date
Interim			
1.1	MJ Roseveare	ACK Roseveare	14th February 2018

Project metadata

Project Code	SHB171
Client	CgMs Limited (Part of the RPS Group)
Fieldwork Dates	1st February, 2018
Field Personnel	J Wild, J Almendros
Data Processing Personnel	ACK Roseveare, J Almendros
Reporting Personnel	MJ Roseveare, D Lewis
Report Date	21st February 2018
Report Version	1.1

TigerGeo Limited

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TIGERGEO

Non-Technical Summary

A magnetic survey was commissioned by CgMs Limited (Part of the RPS Group) to prospect land at Sand Hill, Boxford, Sudbury, Suffolk for buried structures of archaeological interest. Survey was undertaken using an ATV-towed and GNSS-tracked non-gradiometric array of caesium vapour magnetometers on a non-magnetic platform.

Full coverage of the survey area was achieved and with reasonable magnetic contrast. However, no anomalies of potential archaeological interest were observed. Magnetic contrast was sufficient to allow the likely detection of a former field boundary plus there is striation from modern cultivation and geological variations.

TIGERGEO

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Drawing	**Title**
DWG 01	Site Location
DWG 02	Magnetic Data – Total Magnetic Intensity
DWG 03	Magnetic Data – 1m Vertical Pseudogradient
DWG 04	Interpretation
DWG 05	Interpretation – Vector Only

1 Introduction

TigerGeo was commissioned by CgMs Limited (Part of the RPS Group) to undertake a geophysical survey of land at Sand Hill, Boxford, Sudbury, Suffolk. Survey was undertaken using an array of caesium vapour magnetometers to prospect for buried features possibly of archaeological interest.

Survey was undertaken within a single field, covering an area of approximately 3.3 hectares.

Country	England
County	Suffolk
Nearest Settlement	Boxford
Central Co-ordinates	596602, 240345

2 Context

2.1 Environment

Soilscapes Classification	Freely draining slightly acid loamy soils (6)
Superficial 1:50000 BGS	Lowestoft Formation (LOFT) – Sand and Gravel (East) Lowestoft Formation (LOFT) – Diamicton (West) Head (HEAD) - Clay, Silt, Sand And Gravel (Western tip) Kesgrave Catchment Subgroup (KGCA) - Sand And Gravel (Central southern)
Bedrock 1:50000 BGS	London Clay Formation - Clay, Silt And Sand (LC)
Topography	Descends from the south-east corner to the north of the site
Hydrology	Presumed natural. A watercourse is to the west of the site
Current Land Use	Agricultural - mixed
Historic Land Use	Agricultural - mixed
Vegetation Cover	Fallow land
Sources of Interference	Possible ferrous interference from vehicular movement on the southern and eastern boundaries

The character of the data is likely to be dominated by the superficial deposits above the London Clay Formation, which are likely to have generally low magnetic susceptibility. The BGS G-Base 5km soil iron component is about 2.7%, so fairly low, and anomaly strength from archaeological sources can be expected to be muted. The thickness of the superficial deposits is unknown and and variations in its depth and character may influence the background geological character of the data.

2.2 Heritage

An archaeological desk-based assessment has previously been prepared for the site (CgMs (Part of the RPS Group), 2017).

The following paragraph is extracted from the executive summary of the report and states that:

"The study site is considered to have a low to moderate archaeological potential for Early Prehistoric, Bronze Age and Roman evidence, and a generally low archaeological potential for all other past periods of human activity. Any archaeological evidence, if it occurs, is likely to be of local/low archaeological significance."

3 Discussion

3.1 Character & Principal Results

3.1.1 Introduction

The following paragraphs represent an interpretive summary of the survey. The numbers in square brackets refer to individual anomalies described in detail in the catalogue below and shown on DWG 04 onwards.

3.1.2 Data

Data quality is reasonable with low but useful magnetic contrast, e.g. previous cultivation is magnetically apparent. Natural sources tend to dominate, overlaid by cultivation and scatters of debris. Survey noise is low and there are some localised disturbances near the field margins from passing traffic but nothing that obscures the archaeological interpretation.

3.1.3 Geology

There is no magnetic evidence of the east to west transition from Lowestoft Formation Diamicton in the west to Sand and gravel in the east. As expected, the Kesgrave Catchment Subgroup sands and gravels, assuming they extend this far north, are not magnetically distinguishable. The predominant texture, at [5], is typical of sands and gravels with the normal lateral variations apparent. In the northern part of the site more variable texture [4] seems indicative of silty or similar pockets in the sands and gravels.

Overall, there is nothing about the geological character of the data within the site footprint to suggest that the detectability of features of archaeological interest may vary spatially.

3.1.4 Land use

There are weak indications of modern cultivation but none of earlier examples. e.g. no ridge and furrow. It is possible that a former field boundary depicted on the Tithe Map is visible as a weakly magnetic fill at [1] and at [2] there may be a second, parallel, linear anomaly but this is only tentative.

At [3] an area of debris is broadly coincident with a narrow band of woodland depicted on the Tithe Map, which might suggest a correlation.

3.1.5 Archaeology

No anomalies of potential archaeological interest were observed.

3.2 Catalogue

Label	Anomaly Type	Feature Type	Description
1	Weak linear enhanced intensity	Fill - Ditch?	Extremely weak, ill-defined but probably the line of a former field boundary depicted on the Tithe Map and removed prior to the 1880s OS mapping
2	Weak linear enhanced intensity	Fill? - Ditch?	Uncertain, parallel to [1] so maybe related and another former boundary?
3	Texture	Debris	This is the broad location of a narrow belt of woodland depicted on the Tithe Map and the debris may relate to this or clearance of the same
4	Texture	Natural	Irregularities in the magnetic texture of the superficial deposits suggests non-uniformity, probably within the sand and gravels in this case
5	Texture	Natural	The uniform background texture of much of the site is typical of these general superficial geology types in cultivated land

3.3 Conclusions

Magnetic contrast is fairly low but sufficient to allow the likely detection of a former field boundary plus there is striation from modern cultivation. Geological variations are evident but nothing of archaeological interest was seen in the data.

3.4 Caveats

Geophysical survey is reliant upon the detection of anomalous values and patterns in physical properties of the ground, e.g. magnetic, electromagnetic, electrical, elastic, density and others. It does not directly detect underground features and structures and therefore the presence or absence of these within a geophysical interpretation is not a direct indicator of presence or absence in the ground. Specific points to consider are:

- some physical properties are time variant or mutually interdependent with others;
- for a buried feature to be detectable it must produce anomalous values of the physical property being measured;
- any anomaly is only as good as its contrast against background textures and noise within the data.

TigerGeo will always attempt to verify the accuracy and integrity of data it uses within a project but at all times its liability is by necessity limited to its own work and does not extend to third party data and information. Where work is undertaken to another party's specification any perceived failure of that specification to attain its objective remains the responsibility of the originator, TigerGeo meanwhile ensuring any possible shortcomings are addressed within the normal constraints upon resources.

4 Methodology

4.1 Magnetic Principles

4.1.1 Physical concepts

Magnetic survey for any purpose relies upon the generation of a clear magnetic anomaly at the surface, i.e. strong enough to be detected by instrumentation and exhibiting sufficient contrast against background variation to permit diagnostic interpretation. The anomaly itself is dependent upon the chemical properties of a particular volume of ground, its magnetic susceptibility and hence induced magnetic field, the strength of any remanent magnetisation, the shape and orientation of the volume of interest and its depth of burial. Finally the choice and configuration of measurement instrumentation will affect anomaly size and shape.

Sites present a complex mixture of these factors and for some the causative affects are not known. However, depth of burial and size are usually fairly constrained and background susceptibility can be estimated (or measured). The degree of remanent magnetisation is harder to predict and depends on both the natural magnetic properties of the soil and any chemical processes to which it has been subjected. Fortunately heat will raise the susceptibility of most soils and topsoil tends to be more magnetic than subsoil, by volume.

It is hard to draw reliable conclusions about what sort of geology is supportive of magnetic survey as there are many factors involved and in any case magnetic response can vary across geological units as well as being dependent upon post-deposition and erosional processes. In general a relatively non-magnetic parent material contrasting with a magnetisable erosion product, i.e. one which contains iron in the form of oxides and hydroxides, will allow archaeological structures to exhibit strong magnetic contrast against their surroundings and especially if the soil has been heated or subjected to certain processes of fermentation. In the absence of either, magnetic enhancement becomes entirely reliant upon the geochemistry of the soil and enhancement will often be weaker and more variable.

Analysis of the British Geological Survey (BGS) Geochemical Atlas (G-Base) for total soil iron reveals that for England and Wales 50% of the samples (the interquartile range) lie between 1.9% and 3.6% percentage iron with the median at 2.7%.

The principal magnetic iron mineral is the oxide magnetite which sometimes occurs naturally but is more often formed during the heating of soil. Subsequent cooling yields a mixture of this, non-magnetic oxide haematite and another magnetic oxide, maghaemite. Away from sources of heat, other magnetic iron minerals include the sulphides pyrite and greigite while in damp soils complex chemistry involving the hydroxides goethite and lepidocrocite can create strong magnetic anomalies. There are thus a number of different geochemical reaction pathways that can both augment and reduce the magnetic susceptibility of a soil. In addition, this susceptibility may exhibit depositional patterns unrelated to visible stratigraphy.

Most structures of archaeological interest detected by magnetic survey are fills within negative or cut features. Not all fills are magnetic and they can be more magnetic or less magnetic than the surrounding ground. In addition, it is common for fills to exhibit variable magnetic properties through their volume, basal primary silt often being more magnetic than the material above it due to the increased proportion of topsoil within it. However, a fill containing burnt soil may be much more magnetic than this primary silt and sometimes a feature that has contained standing water can produce highly magnetic silts through mechanical depositional processes (depositional remanent magnetisation, DRM).

A third structural factor in the detection of buried structures is the depth of topsoil over the feature. As fills sink, the hollow above accumulates topsoil and hence a structure can be detected not through its own magnetisation but through the locally deeper topsoil above it. The volume of soil required depends upon the magnetic susceptibility of the soil but just a few centimetres are often sufficient. Such a thin deposit can, however, easily be lost through subsequent erosion by natural factors or ploughing.

4.1.2 Instrumentation

The use of the magnetic sensors in non-gradiometric (vertical) configuration avoids measurement sensitisation to the shallowest region of the soil, allowing deeper structures, whether natural or otherwise to

be imaged within the sensitivity of the instrumentation. This also allows the detection of shallow broad variations in magnetic susceptibility that might have archaeological significance. Suppression of ambient noise and temporal trends is reduced and therefore need reduction during processing.

The theoretical slightly reduced lateral resolution inherent to using non-gradiometric sensor arrays is practically not an issue and especially if processing includes a vertical pseudo-gradient conversion. The non-gradiometric system is thus overall a more capable configuration than the short gradiometers often used for archaeological studies.

Caesium instrumentation has a greater sensitivity than fluxgate instruments, however, at the 10 Hz sampling rate used here this increase in sensitivity is limited to about one order of magnitude. Greater benefit is obtained from a better signal-to-noise ratio meaning that sub-nanoTesla measurement is more practically achieved.

The array system is designed to be non-magnetic and to contribute virtually nothing to the magnetic measurement, whether through direct interference or through motion noise.

4.2 Magnetic Survey

4.2.1 Technical equipment

Measured variable	Magnetic flux density / nT (Total Magnetic Intensity / nT after removal of regional trend)
Instrument	Array of Geometrics G858 Magmapper caesium magnetometers
Configuration	Non-gradiometric transverse array (4 sensors, ATV towed)
Sensitivity	0.03 nT @ 10 Hz (manufacturer's specification)
QA Procedure	Continuous observation
Spatial resolution	1.0m between lines, 0.25m mean along line interval

4.2.2 Monitoring & quality assessment

The system continuously displays all incoming data as well as line speed and spatial data resolution per acquisition channel during survey. Rest mode system noise is therefore easy to inspect simply by pausing during survey, and the continuous display makes monitoring for quality intrinsic to the process of undertaking a survey. Rest mode test results (static test) are available from the system.

4.3 Magnetic Data Processing

4.3.1 Procedure

All data processing is minimised and limited to what is essential for the class of data being collected, e.g. reduction of orientation effects, suppression of single point defects (drop-outs or spikes) etc. The processing stream for this data is as follows:

Process	**Software**	**Parameters**
Measurement & GNSS receiver data alignment	Proprietary	
Temporal reduction, regional field suppression	Proprietary	Bandpassed 0.3 – 10.0s
Gridding	Surfer	Kriging, 0.25m x 0.25m
Smoothing	Surfer	Gaussian lowpass 3x3 data (0.75m)
Pseudo-gradient conversion	Proprietary	1m vertical

Potential field processing procedures are used where possible on gridded data from the above processing, allowing simulation of vertical gradient data, separation of deep and shallow magnetic sources, etc. The initial processing uses proprietary software developed in conjunction with the multisensor acquisition system. Gridded data is ported as data surfaces (not images) into Manifold GIS for final imaging, contouring and detailed analysis. Specialist analysis is undertaken using proprietary software.

4.4 Magnetic Interpretation

4.4.1 Introduction

Numerous sources are used in the interpretive process, which takes into account shallow geological conditions, past and present land use, drainage, weather before and during survey, topography and any previous knowledge about the site and the surrounding area. Old Ordnance Survey mapping is consulted and also older sources if available. Geological information (for the UK) is sourced only from British Geological Survey resources and aerial imagery from online sources. LiDAR data is usually sourced from the Environment Agency or other national equivalents, SAR from NASA and other topographic data from original survey.

Information from nearby surveys is consulted to inform upon local data character, variations across soils and near-surface geological contexts. Published data from other surveys may also be used if accompanied by adequate metadata.

Interpretation of magnetic data is undertaken using total intensity data, vertical pseudo-gradient and where relevant, shallow field, component models in parallel although for clarity only a subset of these may be presented in the report.

4.4.2 The contribution from geology and soils

On some sites, e.g. some gravels and alluvial contexts, there will be anomalies that can obscure those potentially of archaeological interest. They may have a strength equal to or greater than that associated with more relevant sources, e.g. ditch fills, but can normally be differentiated on the basis of anomaly form coupled with geological understanding. Where there is ambiguity, or relevance to the study, these anomalies will be included in this category.

Not all changes in geological context can be detected at the surface, directly or indirectly, but sometimes there will be a difference evident in the geophysical data that can be attributed to a change, e.g. from alluvium to tidal flat deposits, or bedrock to alluvium. In some cases the geophysical difference will not exactly coincide with the geological contact and this is especially the case across transitions in soil type.

Geophysical data varies in character across areas, due to a range of factors including soil chemistry, near surface geology, hydrology and land use past and present. These all contribute to the texture of the data, i.e. a background character against which all other anomalies are measured.

4.4.3 Agricultural inputs

Coherent linear dipolar enhancement of magnetic field strength marking ditch fills, narrow bands of more variable magnetic field or changes in apparent magnetic susceptibility, are all included within the category of former field boundaries if they correlate with those depicted on the Tithe Map or early Ordnance Survey maps. If there is no correlation then these anomaly types are not categorised as a field boundaries.

Banded variations in apparent magnetic susceptibility caused by a variable thickness of topsoil, depositional remanent magnetisation of sediments in furrows or susceptibility enhancement through heating (a by product of burning organic matter like seaweed) tend to indicate past cultivation, whether ridge-based techniques, medieval ridge and furrow or post medieval 'lazy beds'. Modern cultivation, e.g. recent ploughing, is not included.

In some cases it is possible to identify drainage networks either as ditch-fill type anomalies (typically 'Roman' drains), noisy or repeating dipolar anomalies from terracotta pipes or reduced magnetic field strength anomalies from culverts, plastic or non-reinforced concrete pipes. In all cases identification of a herring bone pattern to these is sufficient for inclusion within this category.

4.4.4 Features of archaeological interest

Any linear or discrete enhancement of magnetic field strength, usually with a dipolar character of variable strength, that cannot be categorised as a field boundary, cultivation or as having a geological origin, is classified as a fill potentially being of archaeological interest. Fills are normally earthen and include an often

invisible proportion of heated soil or topsoil that augments local magnetic field strength. Inverted anomalies are possible over non-earthen fills, e.g. those that comprise peat, sand or gravel within soil. This category is subject to the 'habitation effect' where, in the absence of other sources of magnetic material, anomaly strength will decrease away from sources of heated soil and sometimes to the extent of non-detectability.

Former enclosure ditches that contained standing water can promote enhanced volumetric magnetic susceptibility through depositional remanence and remain detectable regardless of the absence of other sources of magnetic enhancement.

Anything that cannot be interpreted as a fill tends to be a structure, or in archaeological terms, a feature. This category is secondary to fills and includes anomalies that by virtue of their character are likely to be of archaeological interest but cannot be adequately described as fills. Examples include strongly magnetic bodies lacking ferrous character that might indicate hearths or kilns. In some cases anomalies of ferrous character may be included.

On some sites the combination of plan form and anomaly character, e.g. rectilinear reduced magnetic field strength anomalies, might indicate the likely presence of masonry, robber trenches or rubble foundations. Other types of structure are only included if the evidence is unequivocal, e.g. small ring ditches with doorways and hearths. In some circumstances a less definite category may be assigned to the individual anomalies instead.

It is sometimes possible to define different areas of activity on the basis of magnetic character, e.g. texture and anomaly strength. These might indicate the presence of middens or foci within larger complexes. This category does not indicate a presence or absence of discrete anomalies of archaeological interest.

4.5 Glossary

Acronym / term	Type	Definition
A	Physical quantity	SI unit Amp of electric current
BGS	Organisation	British Geological Survey
CIfA	Organisation	Chartered Institute for Archaeologists
dB	Physical quantity	Decibel, unit of amplification / attenuation
DRM	Process	Depositional Remanent Magnetisation
EAGE	Organisation	European Association of Geoscientists and Engineers
EGNOS	Technology	European Geostationary Navigation Overlay Service
ERT	Technology	Electrical resistivity tomography
ETRS89	Technology	European Terrestrial Reference System (defined 1989)
ETSI	Organisation	European Telecommunications Standards Institute
EuroGPR	Organisation	European Ground Penetrating Radar Association, the trade body for GPR professionals
G-BASE	Data	British Geological Survey Geochemical Atlas
GeolSoc	Organisation	Geological Society of London, the chartered body for the geological profession
GNSS	Technology	Global Navigation Satellite System
GPR	Technology	Ground penetrating radar
GPS	Technology	Global Positioning System (US)
inversion	process	A combination of forward and backward modelling intended to construct a 2D or 3D model of the physical distribution of a variable from data measured on a 1D or 2D surface. It is fundamental to ERT survey
IP	Physical quantity	Induced polarisation (or chargeability) units mV/V or ms
m	Physical quantity	SI unit metres of distance
mbgl	Physical quantity	Metres below ground level
MHz	Physical quantity	SI unit mega-Hertz of frequency
MS	Physical quantity	Magnetic susceptibility, unitless
mS	Physical quantity	SI unit milli-Siemens of electrical conductivity

Acronym / term	Type	Definition
nT	Physical quantity	SI unit nano-Tesla of magnetic flux density
OFCOM	Organisation	The Office of Communications, the UK radio spectrum regulator
Ohm	Physical quantity	SI unit Ohm of electrical resistance
OS	Organisation	Ordnance Survey of Great Britain
OSGB36	Data	The OS national grid (Great Britain)
OSTN15	Technology	Current coordinate transformation from ETRS89 to OSGB36 co-ordinates
RDP	Physical quantity	Relative Dielectric Permittivity, unitless
RTK	Technology	Real Time Kinematic (correction of GNSS position from a base station)
s	Physical quantity	SI unit seconds of time
TMI	Physical quantity	Total magnetic intensity (measured flux density minus regional flux density)
TRM	Process	Thermo-Remanent Magnetisation
V	Physical quantity	SI unit Volt of electric potential
WGS84	Data	World Geodetic System (defined 1984)

4.6 Selected reference

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4.7 Archiving and dissemination

An archive is maintained for all projects, access to which is permitted for research purposes. Copyright and intellectual property rights are retained by TigerGeo on all material it has produced, the client having full licence to use such material as benefits their project. Where required, digital data and a copy of the report can be archived in a suitable repository, e.g. the Archaeology Data Service, in addition to our own archive.

The archive contains all survey and project data, communications, field notes, reports and other related material including copies of third party data (e.g. CAD mapping, etc.) in digital form. Many are in proprietary

formats while report components are available in PDF format.

The client will determine the distribution path for reporting, including to the end client, other contractors, local authority etc., and will determine the timetable for upload of the project report to the OASIS Grey Literature library or supply of report or data to other archiving services, taking into account end client confidentiality.

TigerGeo reserves the right to display data rendered anonymous and un-locatable on its website and in other marketing or research publications.

5 Supporting information

5.1 Standards and quality (archaeology)

TigerGeo is developing an Integrated Management System (IMS) towards ISO certification for ISO9001, ISO14001 and OHSAS18001/ISO45001 and has appointed Alan Ward of Bigfoot Services Limited as our ISO/HSE Technical Advisor. For work within the archaeological sector TigerGeo has been awarded CIfA (Chartered Institute for Archaeologists) Registered Organisation status.

A high standard of client-centred professionalism is maintained in accordance with the requirements of relevant professional bodies including the Geological Society of London (GeolSoc) and the Chartered Institute for Archaeologists (CIfA). Senior members of TigerGeo are professional members of the GeolSoc (FGS), CIfA (MCIfA & ACIfA grades) and other appropriate bodies, including the European Association of Geoscientists and Engineers (EAGE) Near Surface Division (MEAGE) and the Institute of Professional Soil Scientists (MISoilSci).

In addition TigerGeo is a member of EuroGPR and all ground penetrating and other radar work is in accordance with ETSI EG 202 730.

The management team at TigerGeo have over 30 years of combined experience of near surface geophysical project design, survey, interpretation and reporting, based across a wide range of shallow geological contexts. Added to this is the considerable experience of our lead geophysicists in a variety of commercial and academic roles. All geophysical staff have graduate and in many cases also post-graduate relevant qualifications pertaining to environmental geophysics from recognised centres of academic excellence.

During fieldwork there is always a fully qualified (to graduate or post-graduate level) supervisory geophysicist leading a team of other geophysicists and geophysical technicians, all of whom are trained and competent with the equipment they are working with. Data processing and interpretation is carried out by a suitably qualified and experienced geophysicist under the direct supervision and guidance of the Senior Geophysicist. All work is monitored and reviewed throughout by the Senior Geophysicist who will appraise all stages of a project as it progresses.

Data processing and interpretation adheres to the scientific principles of objectiveness and logical consistency. A standard set of approved external sources of information, e.g. from the British Geological Survey, the Ordnance Survey and similar sources of data, in addition to previous TigerGeo projects, guide the interpretive process. Due attention is paid to the technical constraints of method, resolution, contrast and other geophysical factors.

There is a strong culture of internal peer-review within TigerGeo, for example, all reports pass through a process of authorship, technical review and finally proof-reading before release to the client. Technical queries resulting from TigerGeo's work are reviewed by the Senior Geophysicist to ensure uniformity of response prior to implementing any edits, etc.

Work is undertaken in accordance with the high professional standards and technical competence expected by the Geological Society of London and the European Association of Geoscientists and Engineers.

All work for archaeological projects is also conducted in accordance with the following standards and guidance:

- David et al, "Geophysical Survey in Archaeological Field Evaluation", English Heritage, 2008;
- "Standard and guidance for Archaeological Geophysical survey", Chartered Institute for Archaeologists, 2014 (Updated 2016);

and TigerGeo meets with ease the requirements of English Heritage in their 2008 Guidance "Geophysical Survey in Archaeological Field Evaluation" section 2.8 entitled "Competence of survey personnel".

5.2 Key personnel

Senior Geophysicist (Quality manager)	Martin Roseveare MSc BSc(Hons) MEAGE FGS MCIfA
Martin specialised (MSc) in geophysical prospection for shallow applications and since 1997 has worked in commercial geophysics. Elected a GeolSoc Fellow in 2009 he is now working towards achieving CSci. A member of the European Association of Geoscientists & Engineers, he has served on the EuroGPR and CIfA GeoSIG committees and on the scientific committees of the 10th and 11th Archaeological Prospection conferences. He has reviewed papers for the EAGE Near Surface conference, was a technical reviewer of the Irish NRA geophysical guidance and is a founding member of the ISSGAP soils group. Professional interests include the application of geophysics to agriculture and the environment, e.g. groundwater and geohazards. He is also a software writer and equipment integrator with significant experience of embedded systems.	
Operations Manager (Safety manager)	Anne Roseveare BEng(Hons) DIS MISoilSci
On looking beyond engineering, Anne turned her attention to environmental monitoring and geophysics. She is a Member of the British Society of Soil Science (BSSS) and has specific areas of interest in soil physics & hydrology, agricultural applications and industrial sites. Amongst other contributions to the archaeological geophysics sector over the last 18 years, Anne was the founding Editor of the International Society for Archaeological Prospection (ISAP) and is a founding member of the ISSGAP soils group. Specifications, logistics, safety, data handling & analysis are integral parts of her work, though she is happily distracted by the possibilities of discovering lost cities, hillwalking and good food.	
Archaeological Consultant	Daniel Lewis MA BA(Hons) ACIfA
Daniel studied archaeology at the University of Nottingham and worked in field archaeology for many years, managing urban and rural fieldwork projects in and around Herefordshire. When the desk became more appealing he jumped into the world of consulting, working on small and large multi-discipline projects throughout England and Wales. At the same time, he returned to University, gaining an MA in Historic Environment Conservation. With over 15 years' experience in the heritage sector, Daniel has a diverse portfolio of skills. Here he ensures that geophysical work within the heritage sector is well grounded in the archaeology. His spare time includes much running up mountains.	
Environmental Geophysicist	Kathryn Cunningham BSc(Hons) FGS
Kathryn has been with TigerGeo since its inception and has undertaken over 100 surveys comprising total field magnetometry, twin probe resistivity, electrical resistance tomography, ground penetrating radar and laser-scanning. Her particular role is to ensure all aspects of fieldwork run smoothly, including site-specific paperwork, liaison, internal auditing and risk assessment. In addition she has increasing responsibilities in data processing and interpretation. She graduated with a BSc (Hons) in Applied Geology in 2015 from the University of Plymouth, is a Fellow of the Geological Society and enjoys acrobatics and sunny days.	
Environmental Geophysicist	Jack Wild BSc(Hons) FGS
Down to earth and a Plymouth University graduate in geology Jack entered the world of shallow geophysics with an Atkinson Leapfrog. Happiest when in the field he has undertaken geological projects Europe wide including in Sicily and the Spanish Pyrenees and closer to home has studied much of the Cornish and Devon coast. The mystery of what lies below drives his interest in the collection and interpretation of high quality data - be it from magnetometry or GPR he just cannot resist(ivity)! Jack is a Fellow of the Geological Society.	
Engineering Geophysicist	Jose Almendros BSc(Hons)

Jose studied geology in University of Granada developing a special interest in geophysics. When he finished his studies he went to Chile, where he worked two years in a geophysical company undertaking projects for agriculture, mining, ground flows and utilities. Jose likes all stages related with geophysics, from data collection and processing to interpretation. When he is not working he likes to watch series and films, cycling and walking in stunning landscapes.

6 Summary Oasis Form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: tigergeo1-309157

Project details

Project name	Land at Sand Hill, Boxford, Sudbury, Suffolk
Short description of the project	A magnetic survey was commissioned by CgMs Limited (Part of the RPS Group) to prospect land at Sand Hill, Boxford, Sudbury, Suffolk for buried structures of archaeological interest. Survey was undertaken using an ATV-towed and GNSS-tracked non-gradiometric array of caesium vapour magnetometers on a non-magnetic platform. Full coverage of the survey area was achieved and with good magnetic contrast. However, no anomalies of potential archaeological interest were observed.
Project dates	Start: 29-11-2017 End: 15-02-2018
Previous/future work	No / No
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 1 - Minimal cultivation
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"'Geophysical Survey"'
Development type	Not recorded
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology (other)	London Clay Formation - Clay, Silt And Sand
Drift geology (other)	Kesgrave Catchment Subgroup - Sand And Gravel (centre)
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK BABERGH BOXFORD Land at Sand Hill, Boxford, Sudbury, Suffolk
Postcode	CO10 5AD
Study area	3.3 Hectares

Site coordinates	TQ 596602 240345 50.992957014651 0.275347191031 50 59 34 N 000 16 31 E Point

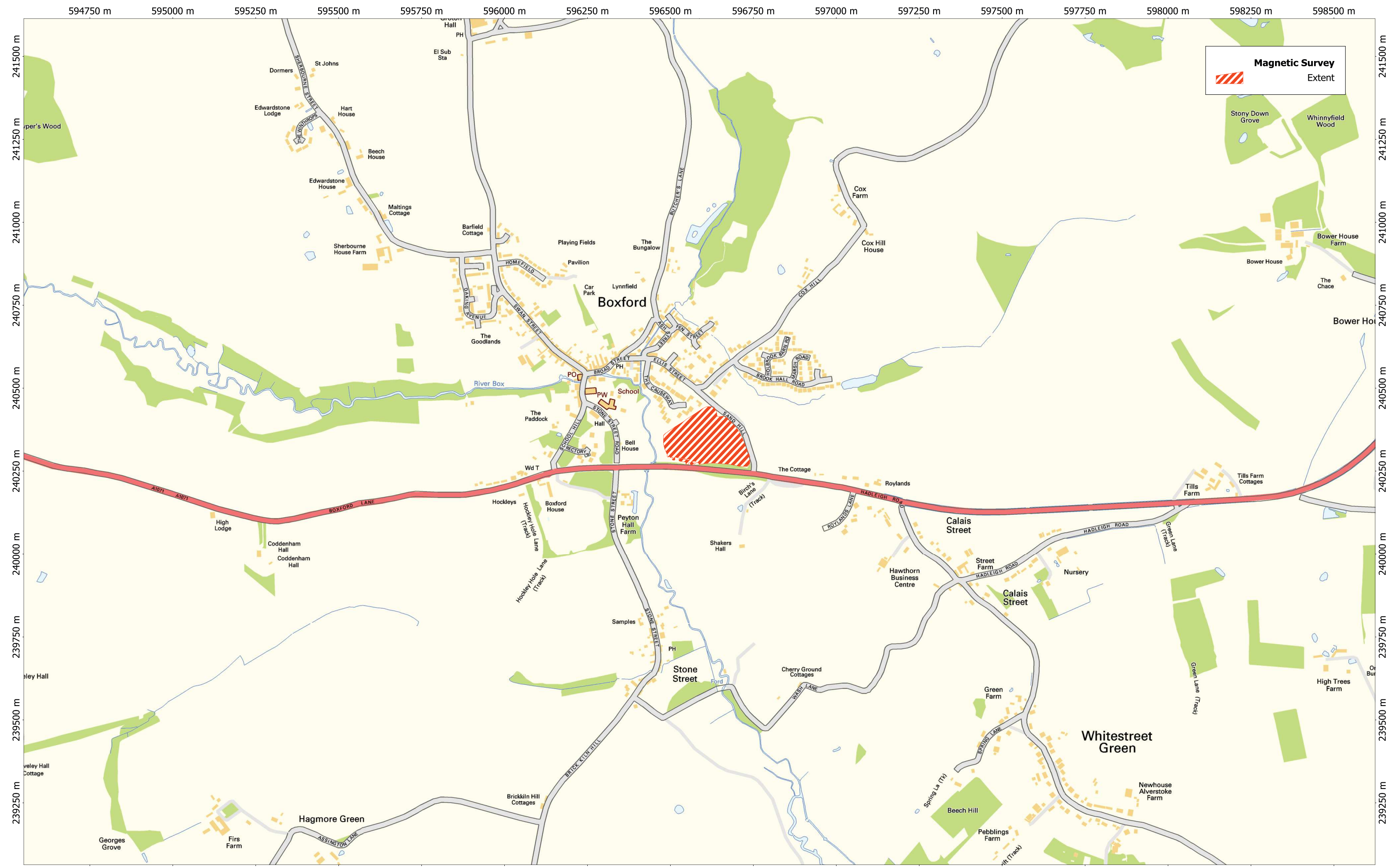
Project archives

Physical Archive Exists?	No
Digital Archive recipient	TigerGeo Ltd
Digital Contents	"none"
Digital Media available	"Geophysics"
Paper Archive Exists?	No

Entered by	Daniel Lewis (d.lewis@tigergeo.com)
Entered on	21 February 2018

OASIS:

Please e-mail Historic England for OASIS help and advice



SHB171 Land at Sand Hill, Boxford, Sudbury, Suffolk
DWG 01 Site Location

Orthographic Scale: 1:10000 @ A3 Spatial Units: Meter. Do not scale off this drawing

TIGERGEO

596400 m 596425 m 596450 m 596475 m 596500 m 596525 m 596550 m 596575 m 596600 m 596625 m 596650 m 596675 m 596700 m 596725 m 596750 m 596775 m 596800 m 596825 m

240525 m 240500 m 240475 m 240450 m 240425 m 240400 m 240375 m 240350 m 240325 m 240300 m 240275 m 240250 m 240225 m 240200 m 240175 m

Total Magnetic Intensity
Bandpass 0.3 - 10.0s / nT
0.75m Gaussian lowpass / nT
3
0
-3

596400 m 596425 m 596450 m 596475 m 596500 m 596525 m 596550 m 596575 m 596600 m 596625 m 596650 m 596675 m 596700 m 596725 m 596750 m 596775 m 596800 m 596825 m

SHB171 Land at Sand Hill, Boxford, Sudbury, Suffolk
DWG 02 Magnetic Data - Total Magnetic Intensity

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing

TIGERGEO

1m Vertical Pseudogradient

Bandpass 0.3 - 10.0s / nT

0.75m Gaussian lowpass / nT

Pseudogradient conversion / nT/m

2

0

-2

SHB171 Land at Sand Hill, Boxford, Sudbury, Suffolk

DWG 03 Magnetic Data - 1m Vertical Pseudogradient

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing

TIGERGEO

1m Vertical Pseudogradient

Bandpass 0.3 - 10.0s / nT

0.75m Gaussian lowpass / nT

Pseudogradient conversion / nT/m

- 2
- 0
- -2
- > 50 nT/m
- > 20 nT/m
- > 5 nT/m
- < -5 nT/m
- < -20 nT/m
- < -50 nT/m

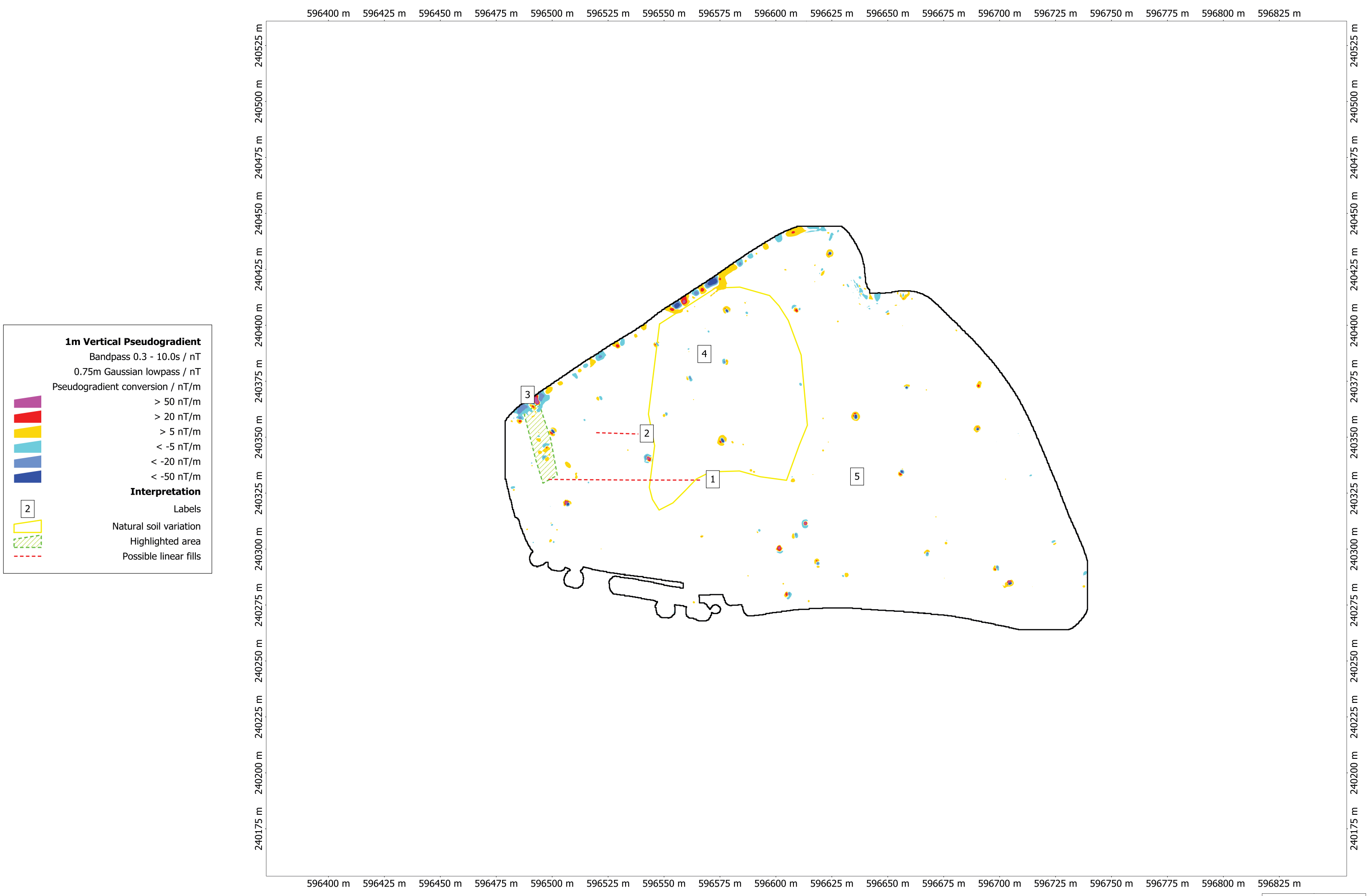
Interpretation

- 2 — Labels
- Natural soil variation
- Highlighted area
- Possible linear fills

SHB171 Land at Sand Hill, Boxford, Sudbury, Suffolk
DWG 04 Interpretation

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing

TIGERGEO



SHB171 Land at Sand Hill, Boxford, Sudbury, Suffolk
DWG 05 Interpretation - Vector Only

Orthographic Scale: 1:1500 @ A3 Spatial Units: Meter. Do not scale off this drawing

TIGERGEO