

Project name: Mersea Island Holiday Park, Essex

Client: Chris Butler Archaeological Services

Job ref: **J10721** 

January 2017

# **GEOPHYSICAL SURVEY REPORT**

Project name:	Job ref:	
Mersea Island Holiday Park, Essex	J10721	
Client:		
<b>Chris Butler Archaeological Services</b>		
Survey date:	Report date:	
21-22 December 2016	January 2017	
Field team:	Project Manager:	
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Version number and issue date:	Amendments:	
<b>V1</b> 25/01/2017		

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# 1 SUMMARY OF RESULTS

A detailed gradiometry survey was conducted over approximately 3 hectares of grassland. Several features relating to a later prehistoric settlement have been detected, and include a roundhouse or barrow, boundary ditches and pits. A former field boundary and areas of magnetic disturbance have also been identified.

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# **2 INTRODUCTION**

# 2.1 Background synopsis

Stratascan were commissioned to undertake a geophysical survey of an area outlined for the extension of the existing holiday park through the installation of 67 static caravans. This survey forms part of an archaeological investigation being undertaken by Chris Butler Archaeological Services (CBAS) on behalf of Away Resorts Ltd.

#### 2.2 Site Details

NGR / Postcode	TM 064 144 / CO5 8UB		
Location	The site is located to the east of Mersea Island Holiday Park, Mersea Island, Essex.		
District	Colchester		
Parish	East Mersea CP		
Topography	Sloping down very gently from north to south		
<b>Current Land Use</b>	Grassland		
Weather Conditions	Overcast, dry		
Soils	The overlying soils are known as Ratsborough (572r) which are typical stagnogleyic argillic brown earths. These consist of fine silty and fine loamy over clayey soils (Soil Survey of England and Wales, Sheet 6 South East England).		
Geology	The underlying geology consists silty clay of the Thames Group.  Superficial deposits of River Terrace Deposits, 3 – sand and gravel, are present across the site (British Geological Survey website).		
Archaeology	Extract from "An Archaeological Desk Based Assessment for Land at Mersea Island Holiday Park, Colchester" (CBAS, 2016):  "This desk-based assessment has established that the Site has high archaeological potential to contain below ground remains of prehistoric date. This potential is based on the Site's location within an area known to contain Pleistocene (Palaeolithic) deposits, and the assumption that some of the cropmarks identified from aerial photographs of the Site, may be archaeological in origin and represent field boundaries, a burial mound/roundhouse and a possible enclosure of likely Bronze Age and/or Iron Age date. The Site also has high potential for producing features related to farming in the Post Medieval and Modern periods."		
Survey Methods	Detailed magnetic survey (gradiometry)		
Study Area	c. 3 hectares		

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#### 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 (2008) and the Chartered Institute for Archaeologists (2002 & 2014).

Stratascan Ltd are a Registered Organisation with the CIfA and are committed to upholding its policies and standards.

#### 3.2 Survey methods

Due to the high potential for Bronze Age or Iron Age remains identified through cropmark evidence, detailed magnetic survey was used as an efficient and effective method of locating archaeological anomalies.

More information regarding this technique is included in Appendix A.

#### 3.3 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 plot of the minimally processed data as a greyscale plot and a colour plot showing extreme magnetic values. Magnetic anomalies have been identified and plotted onto the 'Interpretation of Anomalies' drawing.

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".

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#### 4 **RESULTS**

The detailed magnetic gradiometer survey conducted at Mersea Island has identified a number of anomalies that have been characterised as being of *probable* archaeological origin. The following list of numbered anomalies refers to numerical labels on the interpretation plots.

#### 4.1 Probable Archaeology

A positive, circular anomaly [1] in the north of the site corresponds with a circular cropmark, visible on aerial photography. The response is likely indicative of a former roundhouse or barrow, and appears to contain small, pit-like anomalies. A further sub-circular response [2] in the southeast of the area may also be associated with a barrow or roundhouse.

Two moderate strength, positive linear responses [3] are indicative of former cut features, such as ditches, and combined with the large number of further linear, and curvilinear anomalies [4] provide evidence of later prehistoric settlement activity. Some of the linear anomalies, oriented approximately north-south, may relate to former field boundaries, similar to [5].

Several small, discrete positive responses across the area are indicative of former backfilled pits, or post-holes, and provide further evidence of settlement activity. However, the anomalies are similar to natural responses seen across deposits of sand and gravel meaning that it is difficult to distinguish between archaeological and natural pit-like features.

# 4.2 Medieval/Post-Medieval Agriculture

A single, positive linear anomaly [5], running approximately north-south down the centre of the area is related to a former field boundary. The boundary is visible on available historic OS mapping from 1874 to 1967.

#### 4.3 Other Anomalies

Three areas of scattered magnetic debris [6] are likely to be modern in origin, and likely reflect ferrous debris and rubbish within the topsoil. It is possible that the debris is related to the settlement activity, possibly indicating debris or rubbish from industrial activity, though this interpretation is tentative at best.

Areas of magnetic disturbance are the result of substantial nearby ferrous metal objects such as fences. These effects can mask weaker archaeological anomalies, but on this site have not affected a significant proportion of the area. Smaller ferrous responses, or 'magnetic spikes' are likely to be modern rubbish.

#### 5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

Underlying geologies of clay generally provide average to poor responses for magnetic survey, while superficial deposits of sand and gravel provide variable results. In this instance, a large number of probable archaeological anomalies have been detected. Though it may be possible that weaker responses cannot be seen, it can be determined that the data collected provide a good indicator of buried archaeological features.

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# 6 **CONCLUSION**

The survey at Mersea Island has identified a large number of archaeological anomalies, the majority of which correspond with cropmark features visible on aerial photographs. The features comprise a likely barrow or roundhouse, several linear and curvilinear responses and numerous pit-like anomalies. The archaeological responses are likely of later prehistoric (Bronze Age / Iron Age) date, supporting information from the desk-based assessment of the site having a high potential for remains of this period.

# 7 REFERENCES

British Geological Survey, n.d., website: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer. [Accessed 24/01/2017]

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Chartered Institute For Archaeologists. *Standard and Guidance for Archaeological Geophysical Survey*. (http://www.archaeologists.net/sites/default/files/CIfAS&GGeophysics 1.pdf)

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English Heritage, 2008. Geophysical Survey in Archaeological Field Evaluation.

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

Soil Survey of England and Wales, 1983. Soils of England and Wales, Sheet 6 South East England

# **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.

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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	

#### Instrumentation: Bartington Grad601-2

Bartington 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 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 Step Correction (Destagger) 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. 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.

# Display

Greyscale/ Colourscale 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. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

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#### **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.

Archaeology/Probable This term is used when the form, nature and pattern of the response are clearly or very Archaeology 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 / Strong magnetic anomalies that, due to their shape and form or the context in which they Burnt-Fired are found, suggest the presence of kilns, ovens, corn dryers, metal- working areas or

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 Anomalies that correspond to former boundaries indicated on historic mapping, or which

(probable & possible) 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 Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with

(ploughing) 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.

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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.

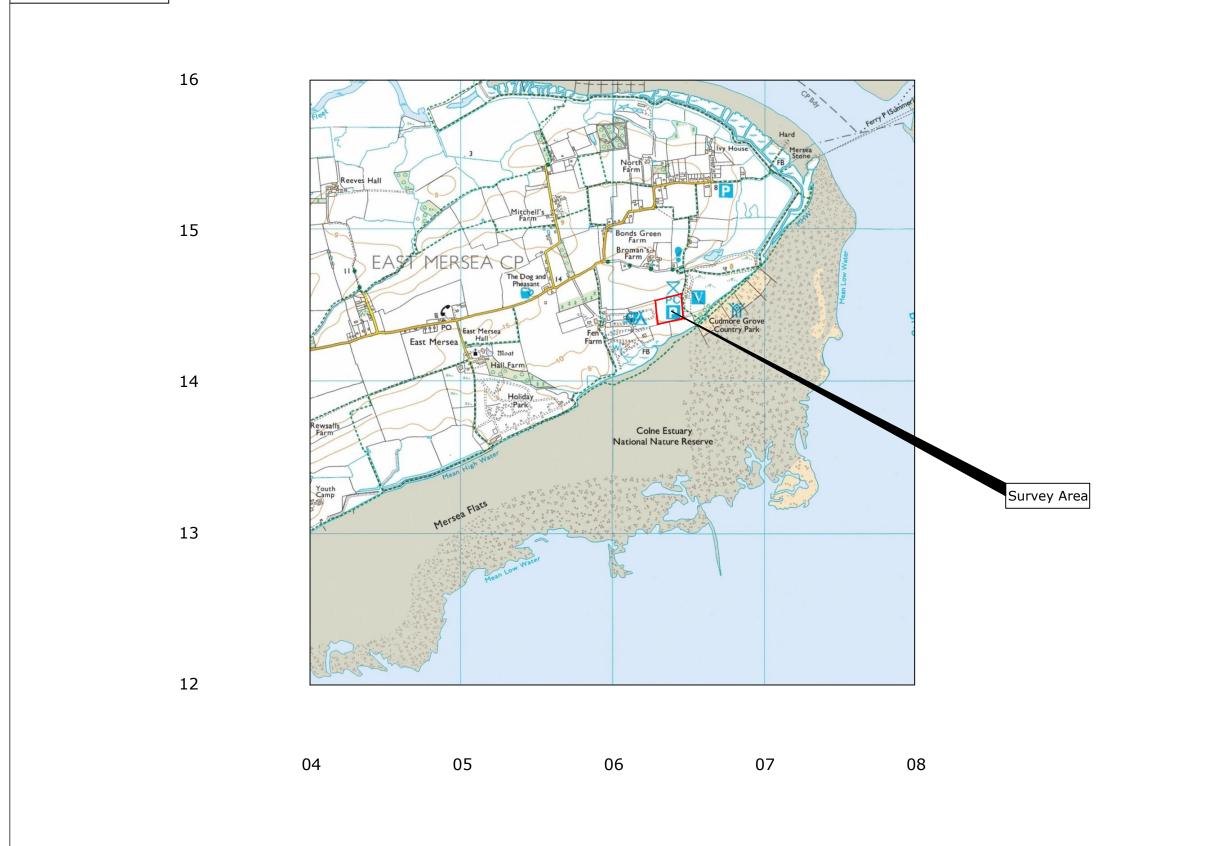
Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same 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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LOCATION PLAN OF SURVEY AREA

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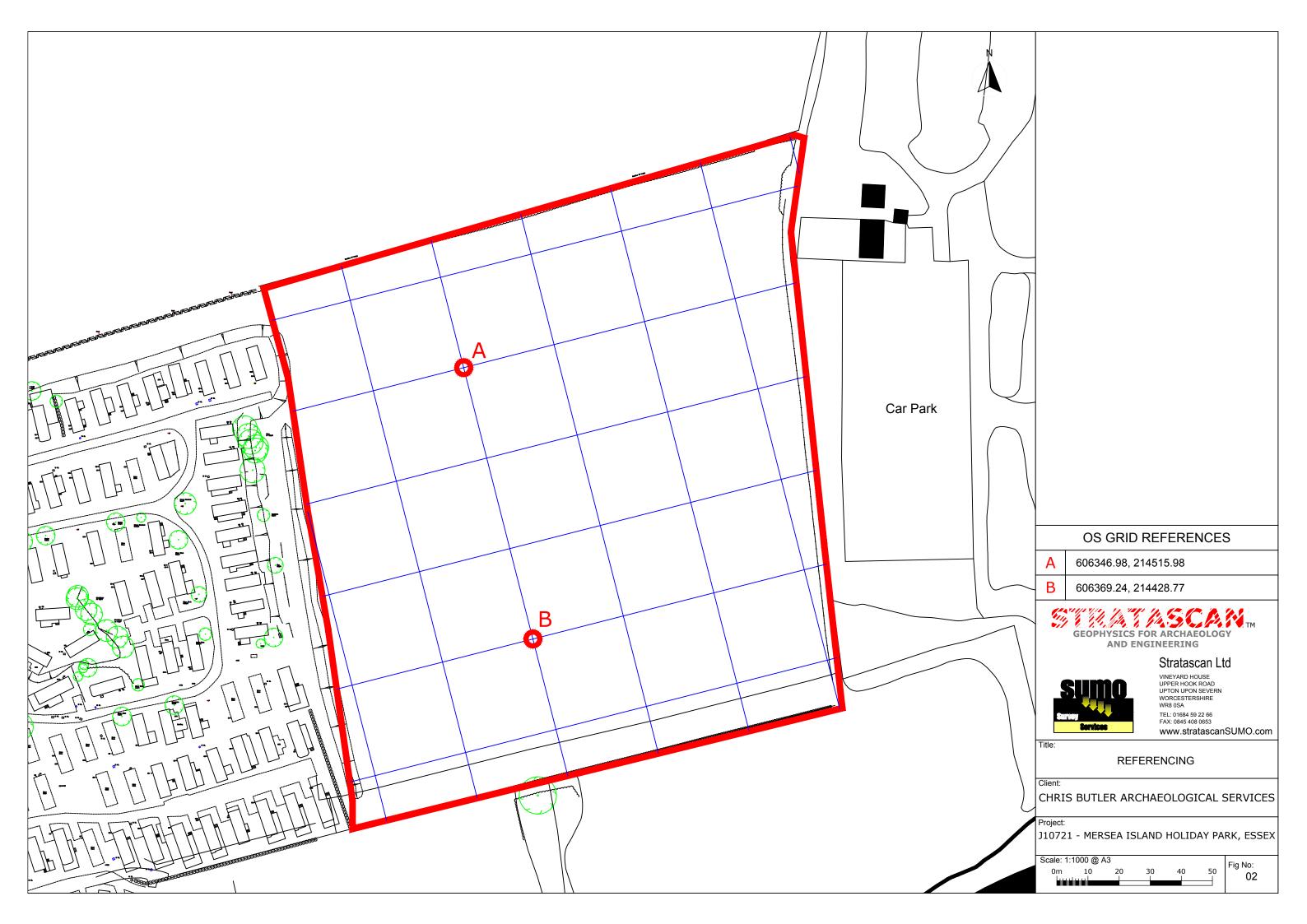
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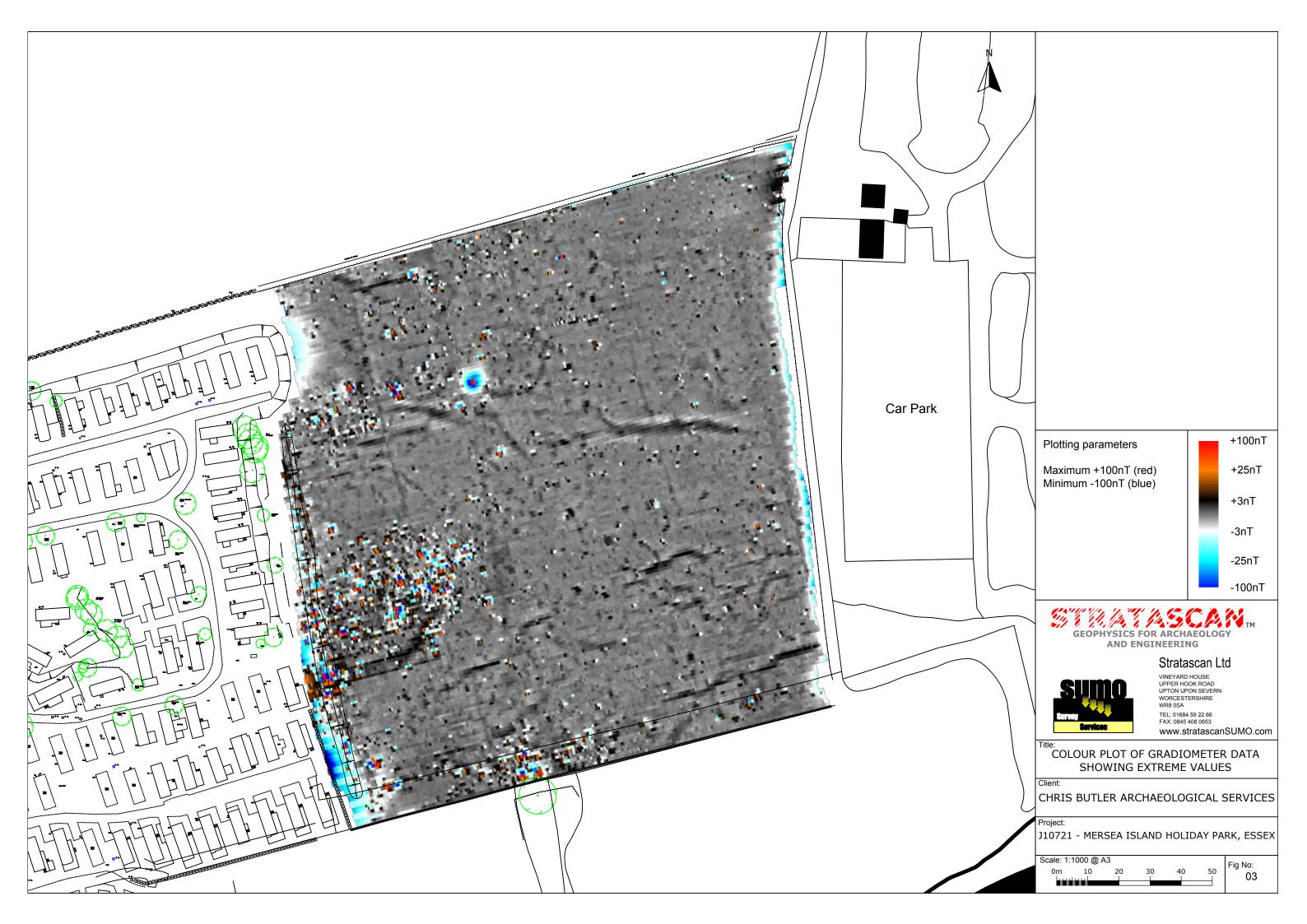
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**Appendix 2: OASIS Form** 

3/27/2017

OASIS FORM - Print view

# **OASIS DATA COLLECTION FORM: England**

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

#### Printable version

#### OASIS ID: chrisbut1-280461

-				
Pro	Iec:	t de	itai	IS

Project name

Land at Mersea Island Holiday Park, Colchester, Essex, CO5 8UA

Short description of the project

A magnetometer survey was carried out on Site. The results support the findings of the desk-based assessment, in identifying the Site as having high archaeological potential to produce Bronze Age / Iron Age remains related to settlement, burial and farming, and Post-Medieval features reflecting the presence of field systems. The results have helped

identify areas for targeted trial trench evaluation.

Project dates

Start: 21-12-2016 End: 22-12-2016

Previous/future

codes

Yes / Yes

Any associated project reference CBAS0784 - Contracting Unit No.

Any associated project reference

ECC3928 - HER event no.

codes Type of project

Field evaluation

Current Land use Other 14 - Recreational usage RING DITCH Late Prehistoric Monument type

Monument type ROUND BARROW Late Prehistoric

ROUND HOUSE (DOMESTIC) Late Prehistoric Monument type FIELD SYSTEM Late Prehistoric

Monument type Monument type FIELD SYSTEM Post Medieval

Significant Finds NONE None

Methods & techniques "Geophysical Survey"

Development type Rural commercial

National Planning Policy Framework - NPPF Prompt

Position in the

planning process

Pre-application

Solid geology

Thames Group

(other) Drift geology

RIVER TERRACE DEPOSITS

Techniques

Magnetometry

#### **Project location**

Country

England

https://oasis.ac.uk/form/print.cfm

1/3

OASIS FORM - Print view 3/27/2017

ESSEX COLCHESTER EAST MERSEA Land at Mersea Island Holiday Park Site location

Postcode CO5 8UA 3 Hectares Study area

TM 06386 14484 51.790328741406 0.992982120526 51 47 25 N 000 59 34 E Point Site coordinates

Height OD /

Min: 8m Max: 11m Depth

**Project creators** 

Name of Organisation

Local Authority Archaeologist and/or Planning Authority/advisory body

Project brief originator

Chris Butler Archaeological Services Ltd Project design

Chris Butler Archaeological Services Ltd

originator

Project Caroline Russell

director/manager

Simon Haddrell, Project Manager for Stratascan Project supervisor

Type of

sponsor/funding

body

Name of

sponsor/funding

Away Resorts Ltd

Developer

#### **Project archives**

Physical Archive No

Exists?

Colchester HER

Digital Archive recipient

"Survey"

Digital Contents Digital Media available

"Geophysics"

Paper Archive recipient

Colchester and Ipswich Museums Service

Paper Contents "Survey"

Paper Media

"Unspecified Archive" available

Project bibliography 1

Grey literature (unpublished document/manuscript)

Publication type

An Archaeological Geophysical Survey of Land at Mersea Island Holiday Park, Title

Colchester, CO5 8UA

Author(s)/Editor(s) Russell, C.

bibliographic details

**CBAS0784** 

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Place of issue or

publication

Berwick

https://oasis.ac.uk/form/print.cfm

3/27/2017 OASIS FORM - Print view

The A4 report comprises three elements: a summary; the geophysical survey report (Appendix 1), and the OASIS form (Appendix 2). The eight-page summary comprises the following elements/chapters: Summary; Introduction; Aims and Objectives; Description

Archaeological and Historical Background; and Results of the Survey. It includes two figures. The 18-page geophysical survey report comprises the following chapters: Summary of Results; Introduction; Methods, Processing and Preparation; Results; Data Appraisal and Confidence Assessment; Conclusion; and References. It has two appendices: Appendix 1 (Technical Information: Magnetometer Survey Method) and

Appendix B (Technical Information: Magnetic Theory). It includes six figures.

Caroline Russell (caroline.russell@cbasltd.co.uk) Entered by

Entered on 27 March 2017

# **OASIS:**

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