



# Grange Road Netley Abbey, Southampton

Detailed Gradiometer Survey Report

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## Summary

A detailed gradiometer survey was conducted over land at Grange Road, Netley (centred on NGR 445679 109193). The project was commissioned by Stratland Estates Ltd with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the residential development of the site.

The site comprises two arable fields located north-east of Netley Abbey, covering an area of 3.5 ha. The geophysical survey was undertaken on 13 and 19 March 2019 has demonstrated the presence of a number of anomalies across the site.

The detailed gradiometer survey has not identified any anomalies that can confidently interpreted as archaeology. However, several possible archaeological anomalies have been identified. These are evident as rectilinear and linear anomalies in the dataset that could indicate former ditched enclosures and undocumented field boundaries. While an exact date cannot be ascribed, it is likely such features would pertain to the medieval period and be further evidence of the agricultural activity noted in the surrounding medieval landscape during this period.

## Acknowledgements

Wessex Archaeology would like to thank Stratland Estates Ltd for commissioning the geophysical survey. The assistance of Andy Wright is gratefully acknowledged in this regard.

The fieldwork was undertaken by Patricia Voke, Jenna Jackson and Thom King. Alexander Schmidt processed and interpreted the geophysical data and prepared the report and illustrations. The geophysical work was quality controlled by Tom Richardson and Ben Urmston. The project was managed on behalf of Wessex Archaeology by Simon Woodiwiss.



# Grange Road, Netley, Hampshire

## Detailed Gradiometer Survey Report

### 1 INTRODUCTION

#### 1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Stratland Estates Limited to carry out a geophysical survey at Grange Road, Netley, Hampshire (centred on NGR 445679 109193) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for a residential development at the site.

#### 1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

#### 1.3 The site

1.3.1 The site is located north of Grange Road, at the northern edge of Netley and 4.9 km south-east of Southampton in the county of Hampshire.

1.3.2 The survey comprises 3.5 ha of agricultural land, currently under rough pasture. The site is bounded by mature hedgerows to the south-east and east. On the northern side the site is bounded by woodland, a part of West Wood which extends to the north. On the west side the site is bounded by garden hedgerows and trees associated with a farmhouse.

1.3.1 The local topography is relatively level with a low combe situated to the north-west of the site, extending towards Netley Abbey to the south-west. The area slopes gently downwards to the north-west, from the highest point at the south-eastern corner at 23 m above Ordnance Datum (aOD), to 18 m aOD at the north-west corner.

1.3.2 The site is situated on bedrock comprising sand, silt, and clay of the Selsey Sand Formation. This is overlain by a River Terrance Deposit of sand and gravel. Borehole records from 450m to the south-west of the site recorded approximately 4.4 m of flint gravel overlaying the sand below. (BGS 2018).

1.3.3 The soils underlying the site are likely to consist of typical argillic brown earths of the 571z (Hamble 2) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

### 2 ARCHAEOLOGICAL BACKGROUND

#### 2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a desk-based assessment (DBA) (Wessex Archaeology 2015), which considered the recorded historic environment resource within a 1 km study area of the proposed development. The DBA used information from the Hampshire Historic Environment Record (HHER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The



following background is not exhaustive but is summarised from aspects of the DBA that are considered relevant to the interpretation of the geophysical survey data.

## 2.2 Summary of the archaeological resource

- 2.2.1 There are five scheduled monuments noted in the study area of the DBA, including Netley Abbey (NHLE 1001960), founded in 1239. Surrounding Netley Abbey are the precinct wall and moat (NHLE 1005536), and the western (NHLE 1008703) and eastern (NHLE 1008704) aqueducts. Furthermore, Netley Castle (NHLE 1336957/1001884) is a scheduled monument and Grade II\* listed building described as a Tudor coastal fort dating to 1542. The Netley Abbey Conservation Area encompasses the abbey, its associated surroundings, part of the Victorian seafront, and buildings within Netley itself.
- 2.2.2 Eight Grade II listed buildings are recorded in the study area. These mostly comprise houses, cottages, and farm houses dating to the 16th to 19th century, located in and around the settlement of Netley.
- 2.2.3 Very little is recorded in the surrounding area dating to the Palaeolithic and Mesolithic periods, although a high level of early prehistoric activity is noted in southern Hampshire. A single Palaeolithic find spot lies in the study area, comprising a possibly unfinished axe head found in a garden in Netley 585 m east of the site. Mesolithic activity is represented by collections of tools with the study area of the DBA, both on the Netley foreshore 800 m west of the site and inland 600 m south of the site.
- 2.2.4 There is no evidence dating to the Neolithic to Bronze Age period in the study area. The closest recorded assets dating to this period comprise several extant barrows noted some 3 km north-east of the site at Netley Common, which are rare across southern Hampshire. Similarly, there is no evidence for Iron Age activity within the study area.
- 2.2.5 A single record pertaining to the Romano-British period is noted in the study area. This consists of a ditch recorded during a watching brief containing Roman pottery and a *crota* bell possibly dating to the Romano-British period. This is noted some 885 m north-west of the site.
- 2.2.6 The site is located within the parish of Hound, originally named 'Hound with Netley' recorded in the Domesday book. Hound is located 1.8 km east-south-east of the site and consists of several farmsteads dating to the 13th century. It is likely that the settlement had its origins as a small Saxon farmstead, although no archaeological sites or finds are recorded within the site or study area dating definitely from the early medieval period.
- 2.2.7 Netley is named in the Domesday Book as '*Latelie*', although this is likely to be the medieval settlement situated at the modern village of Old Netley, approximately 1.8 km to the north-east of the site. The medieval village is distinct from the settlement to the east of Netley Abbey, which largely developed in the Victorian period. The Cistercian abbey was founded in 1239, and included an extended precinct, fishponds, and a water management system based around a number of aqueducts extending to the north-east. The DBA notes that the site lies in what was probably the agricultural hinterland of the abbey, with the Cistercian order being known for sheep rearing and wool production.
- 2.2.8 The post-medieval period saw the dissolution of the abbey and the construction of a number of buildings in the 16th and 17th centuries, most notably Netley Castle. More intensive development occurred during the 19th century with the creation of the new settlement at Netley, and subsequent gravel extraction and landfill in the 19th and 20th centuries is likely to have resulted in the total loss of archaeological remains in those areas of Netley.





## **2.3 Archaeological investigations in the area**

- 2.3.1 No previous archaeological investigations are known for the development area, though it lies within an Area of Archaeological Potential (as defined by Hampshire County Council) relating to buried remains of rural settlement within the parish of Hound.
- 2.3.2 There have been a number of investigations in the vicinity of the development area. Netley Abbey itself has been investigated at various times from the 19th century onwards. A number of watching briefs have also been undertaken, though most did not record any significant deposits. Of those that recorded deposits of interest, these included a section of the Abbey moat, Roman field boundaries, a 19th century floor surface, undated pits and a post-medieval ditch, as well as undated features.
- 2.3.3 Various archaeological watching briefs have been carried out within the study area. Of these most recorded no archaeological remains.
- 2.3.4 In 1999 a watching brief undertaken during the rebuilding of a house called 'The Hermitage', located to the immediate west of the site recorded a section of the abbey's medieval moat (Southern Archaeological Services).
- 2.3.5 In 1992 a watching brief at Tickleford Drive recorded several field boundaries, one of which contained Romano-British artefacts (Southampton City Council Archaeology Unit).
- 2.3.6 In 1995 a watching brief at Netley Grange, prior to the construction of housing, recorded a ditch containing artefacts suggesting a post-medieval date (Hampshire Archaeology).

## **3 METHODOLOGY**

### **3.1 Introduction**

- 3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 13 and 19 March 2019. Field conditions on 13th March were very poor, and survey was postponed due to persistent heavy rain. Conditions on 19th March were improved sufficiently to resume fieldwork. An overall coverage of 2.8 ha was achieved, although the northern corner and western edge of the survey area could not be surveyed due to overgrown vegetation, and was limited around the peripheries by encroaching hedgerows.
- 3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex archaeology 2019), as well as to current best practice and guidance outlined by the Chartered Institute for Archaeologists (CIfA 2014) and European Archaeologiae Consilium (EAC; Schmidt *et al.* 2015).

### **3.2 Aims and objectives**

- 3.2.1 The aims (or purpose) of the geophysical survey, in compliance with the CIfA's *Standards and guidance for archaeological geophysical survey* (2014), are:
- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and



- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and
- Where possible, to determine the general nature of any anomalies of archaeological potential.

### 3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m and therefore exceed EAC recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four Bartington Grad-01-1000L gradiometers mounted on a non-magnetic cart at 1 m intervals. Data were collected at a rate of 10 Hz with an effective sensitivity of 0.03 nT, producing intervals of 0.15 m along transects spaced 4 m apart.

### 3.4 Data processing

3.4.1 Data from the survey was subject to minimal data correction processes. These comprise a 'Destripe' function ( $\pm 5$  nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

### 3.5 Gradiometer survey results and interpretation

3.5.1 A small, positive rectilinear anomaly has been identified in the centre of the dataset at **4000**. The anomaly extends 7 m west – east, with northerly projections to the west (3 m) and east (5 m). The anomaly is 0.7 – 1.3 m wide and there is no apparent northern side to the anomaly, making a confident interpretation difficult. It is possible this anomaly indicates an early ditched enclosure. However, it could equally be the result of modern agricultural activity or associated with localised geological variation. A smaller rectilinear anomaly is noted 21 m to the south-west. This is on broadly the same alignment, measuring 3 m north – south and 3.1 m east – west. This anomaly could also indicate the corner of a small enclosure, though could equally be agricultural or natural in origin.

3.5.2 A weakly positive, broadly rectilinear anomaly has been identified towards the south-east of the dataset at **4001**. The anomaly measures 10.6 m north-west to south-east and 9.7 m north-east to south-west. This anomaly could indicate a shallow cut feature such as a ditch and due to its rectilinear form, and might be evidence of an enclosure. However, due to the weak contrast with the magnetic background, a more confident interpretation is not possible. The anomaly could equally be evidence of localised variation in the underlying geological deposits.



- 3.5.3 Several weak linear anomalies of possible archaeological origin have been identified. In the south of the survey area, a weak positive linear anomaly on a north-east to south-west alignment can be seen at **4002**. This anomaly is 69 m long, 1.3 m wide, and is oriented south-west to north-east, extending towards **4001**. This is likely to indicate a ditch feature and does not correspond to any documented former field boundaries; therefore this could indicate a former boundary or field system. However, the anomaly could equally relate to more recent agricultural activity.
- 3.5.4 In the south-west of the survey area, two weakly positive short linear anomalies have been identified. The first (**4003**) measures 18.8 m in length and is 0.7 m wide on a west-north-west to east-south-east alignment. The second (**4004**) is 6.3 m north-east of **4003** measuring 12.4 m long and 0.9 – 1.3 m wide on a north-west to south-east alignment. The anomalies could indicate cut features in the underlying deposits such as ditches. However, these anomalies could equally be modern in provenance and associated with agricultural activity.
- 3.5.5 Numerous discrete positive anomalies approximately 1 m in diameter have been identified throughout the survey area. These anomalies are likely to indicate small pit-like features, and have been interpreted as possible archaeology, as such features can be evidence of settlement activity such as refuse pits or extraction activity. However, these anomalies might be natural in origin, pertaining to natural variations in the underlying deposits.
- 3.5.6 A large area of increased magnetic response has been identified in the central portion of the survey data at **4005**. This type of response indicates localised variations in the background magnetic field, although its exact origin is not clear. It is possible that it indicates an area of archaeological activity, however it is most likely associated with natural variation or modern agricultural activity.
- 3.5.7 Several weak trends have also been identified by the survey. These cannot be confidently interpreted; however, an archaeological origin cannot be entirely excluded. Due to their weak magnitude, it is considered likely these anomalies are associated with agricultural activity and are likely to be modern in origin.
- 3.5.8 The remaining anomalies are thought to be modern in provenance. Numerous highly magnetic responses have been identified throughout the survey results, which can largely be attributed to modern debris noted on site during the survey. In addition, a strongly magnetic response is noted at the periphery of the survey area. This is attributed to ferrous fencing and external objects.

## 4 DISCUSSION

- 4.1.1 The detailed gradiometer survey has not identified any anomalies that can be confidently interpreted as archaeology. However, several possible archaeological anomalies have been identified. These are evident as rectilinear and linear anomalies in the dataset that could indicate former ditched enclosures and undocumented field boundaries. While an exact date cannot be ascribed, it is likely such features would pertain to the medieval period and be further evidence of the agricultural activity noted in the surrounding medieval landscape during this period. However, further investigation may be required to determine an exact origin of such features.
- 4.1.2 The remaining anomalies can be attributed to natural geological variation, agricultural activity, or modern debris across the site.



## REFERENCES

### Bibliography

Chartered Institute for Archaeologists [CIfA] 2014 *Standards and guidance for archaeological geophysical survey*. Reading, CIfA

Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A and Fassbinder, J. 2015 *Guidelines for the use of geophysics in archaeology: questions to ask and points to consider*. EAC Guidelines 2, Belgium: European Archaeological Council.

Wessex Archaeology 2015 *Grange Road, Netley, Hampshire: Historic Environment Desk-Based Assessment*. Unpublished client report ref. 111680.01

Wessex Archaeology 2019 *Grange Road, Netley, Hampshire: Written Scheme of Investigation*. Unpublished client report ref. 111682.01

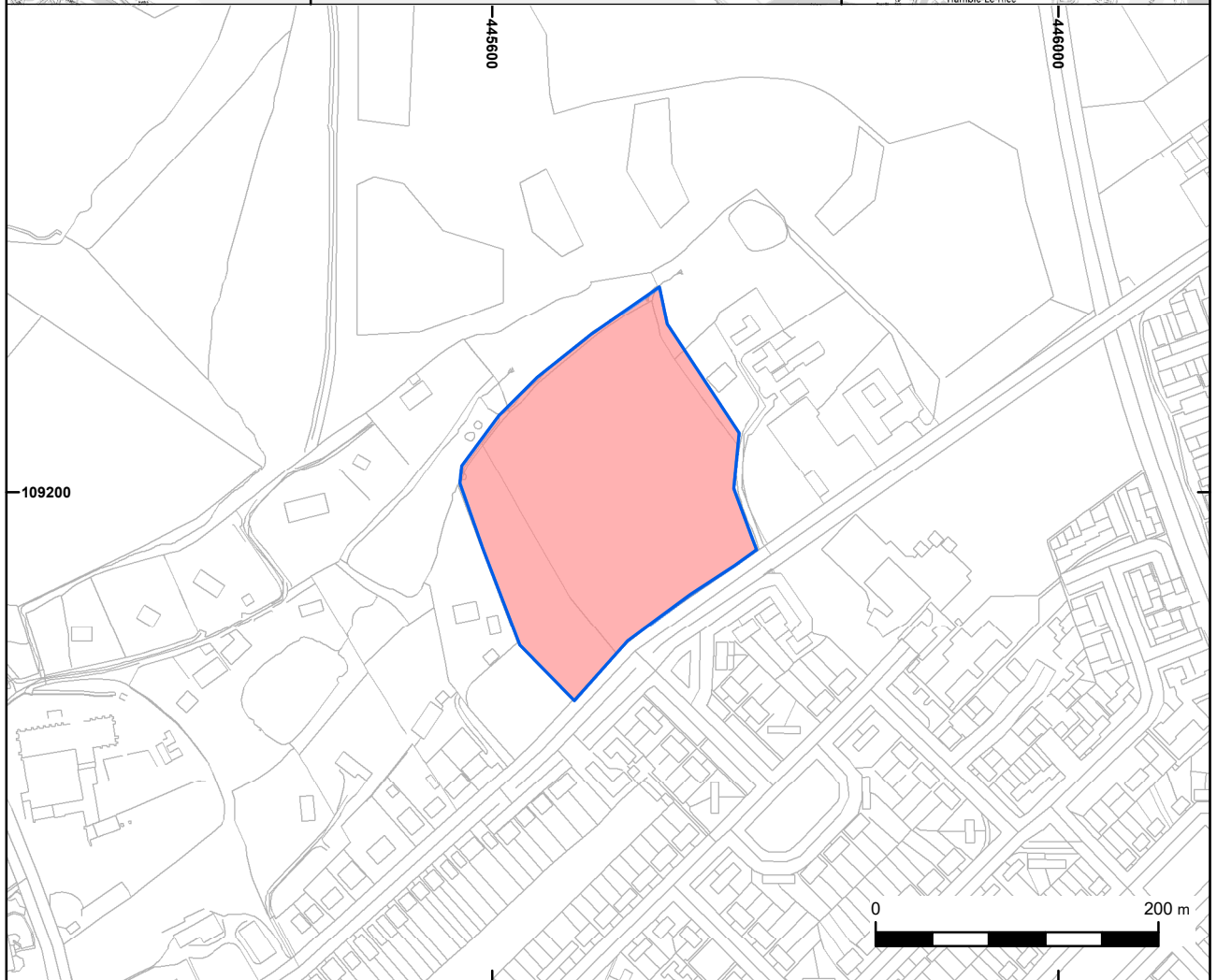
### Cartographic and documentary sources



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

### Online resources

British Geological Survey Geology of Britain Viewer (accessed March 2019) <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

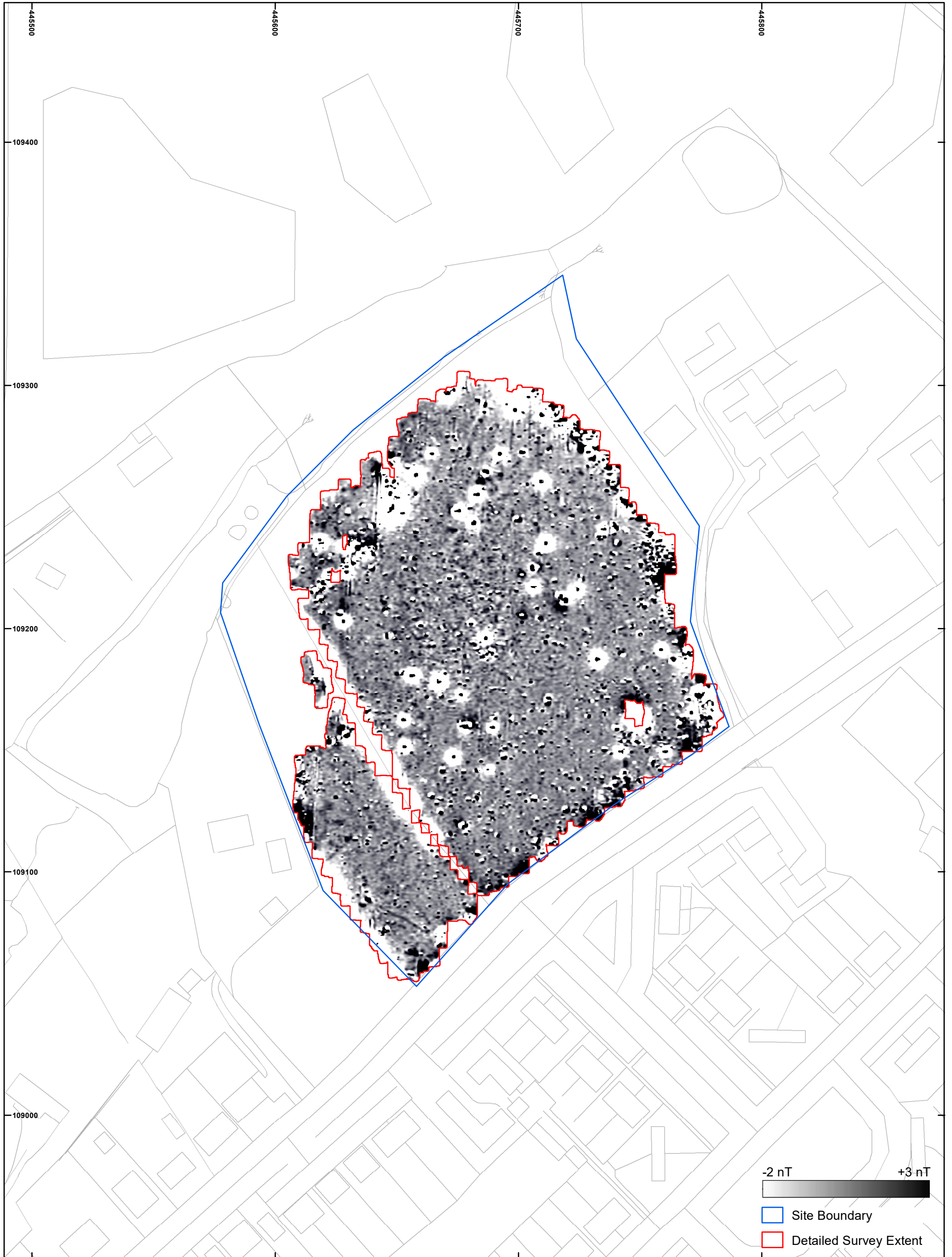
Old Maps (accessed March 2019) <https://www.old-maps.co.uk>



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	Path:	X:\PROJECTS\117451\GIS\FigsMXD\Geophysics		

Site location

Figure 1

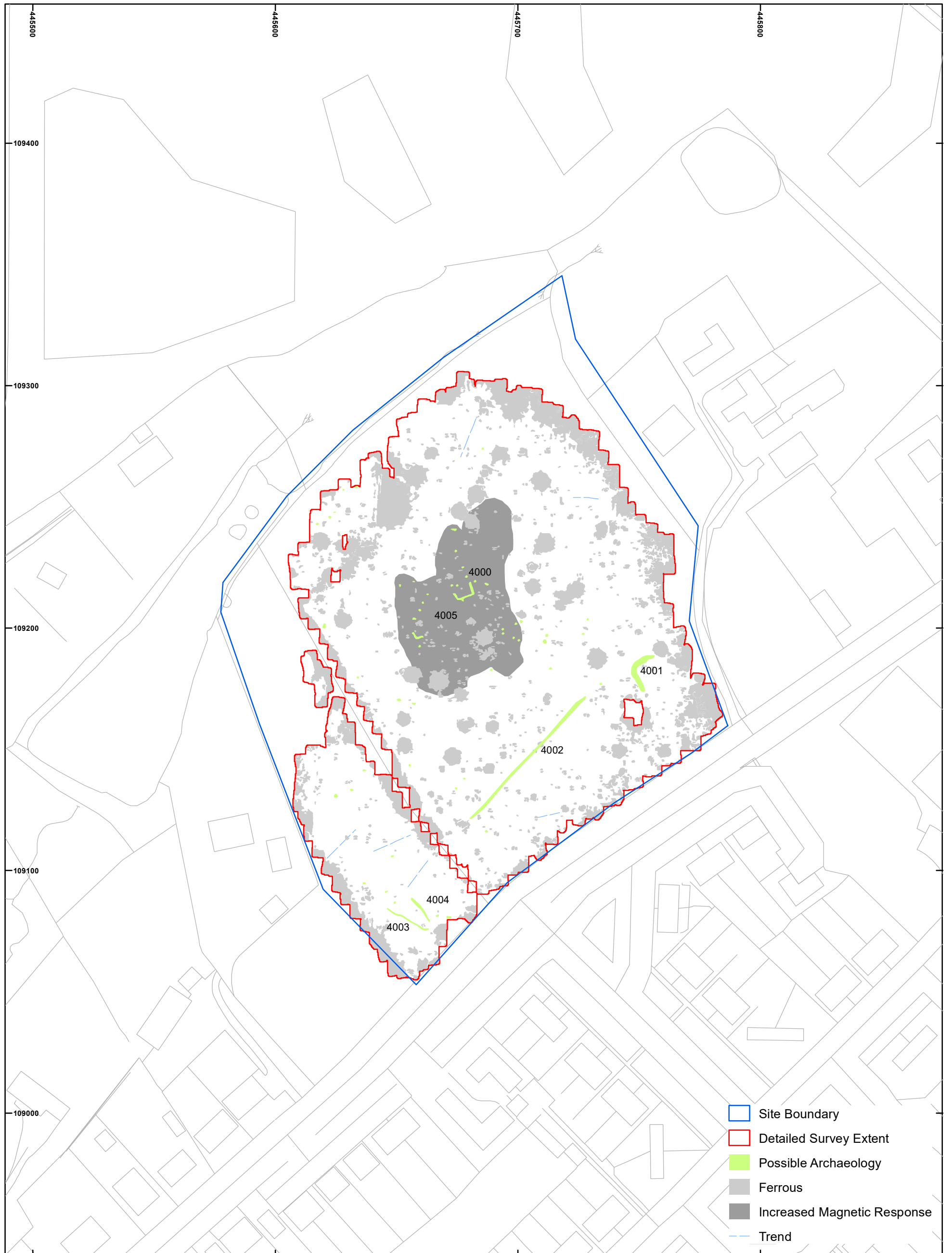


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Detailed gradiometer survey results: Greyscale plot

Figure 2



- Site Boundary
- Detailed Survey Extent
- Possible Archaeology
- Ferrous
- Increased Magnetic Response
- - - Trend

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Path:	X:\PROJECTS\117451\GIS\FigsMXD\Geophysics		



Detailed gradiometer survey results: Interpretation

Figure 3



## APPENDICES

### Appendix 1: Survey Equipment and Data Processing

#### Survey methods and equipment

The magnetic data for this project were acquired using a non-magnetic cart fitted with 4x Bartington Grad-01-1000L magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03 nT over a  $\pm 100$  nT range, and measurements from each sensor are logged at intervals of 0.25 m. All of the data are then relayed to a Leica Viva CS35 tablet, running the MLgrad601 program, which is used to record the survey data from the array of Grad601 probes at a rate of 10 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Viva system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125 m intervals along traverses spaced up to 0.25m apart.

#### Post-processing

The magnetic data collected during the detail survey are downloaded from the Bartington cart system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

The cart-based system generally requires a lesser amount of post-processing than the handheld Bartington Grad 601-2 fluxgate gradiometer instrument. This is largely because mounting the gradiometers on the cart reduces the occurrence of operator error; caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

Typical data and image processing steps may include:

- GPS Destripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.
- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).
- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.





Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.



## Appendix 2: Geophysical Interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



### Appendix 3: OASIS form

#### Project Details:

<b>Project name</b>		Grange Road, Netley, Hampshire			
<b>Type of project</b>		Detailed gradiometer survey (Field evaluation)			
<b>Project description</b>		<p>The site comprises two arable fields located north of Grange Road, Netley, covering an area of 3.5 ha. The geophysical survey was undertaken on 13 and 19 March 2019 and has demonstrated the presence of a number of anomalies across the site.</p> <p>The detailed gradiometer survey has not identified any anomalies that can confidently interpreted as archaeology. However, several possible archaeological anomalies have been identified. These are evident as rectilinear and linear anomalies in the dataset that could indicate former ditched enclosures and undocumented field boundaries. While an exact date cannot be ascribed, it is likely such features would pertain to the medieval period and be further evidence of the agricultural activity noted in the surrounding medieval landscape during this period.</p> <p>The remaining anomalies can be attributed to natural geological variation, agricultural activity or modern debris littered across the site.</p>			
<b>Project dates</b>		<b>Start:</b> 13-03-2019		<b>End:</b> 19-03-2019	
<b>Previous work</b>		Yes			
<b>Future work</b>		Not Known			
<b>Project Code:</b>	111681	<b>HER event no.</b>	N/A	<b>OASIS form ID:</b>	wessexar1-346363
		<b>NMR no.</b>	N/A		
		<b>SM no.</b>	N/A		
<b>Planning Application Ref.</b>		O/16/78014			
<b>Site Status</b>		None.			
<b>Land use</b>		Cultivated Lane 2 – Operations to a depth of less than 0.25 m			
<b>Monument type</b>		N/A	<b>Period</b>	N/A	

#### Project Location:

<b>Site Address</b>	Grange Road, Netley, Hampshire			<b>Postcode</b>	SO31 5FE
<b>County</b>	Hampshire	<b>District</b>	Southampton	<b>Parish</b>	Southampton
<b>Study Area</b>	3.5 ha	<b>Height OD</b>	18 – 23 m aOD	<b>NGR</b>	445679 109193

#### Project Creators:

<b>Name of Organisation</b>		Wessex Archaeology			
<b>Project brief originator</b>		Stratland Estates Ltd.	<b>Project design originator</b>		Wessex Archaeology
<b>Project Manager</b>		Simon Woodiwiss	<b>Project Supervisor</b>		Patricia Voke
<b>Sponsor or funding body</b>		Stratland Estates Ltd.	<b>Type of Sponsor</b>		Client

#### Project Archive and Bibliography:

<b>Physical archive</b>	N/A	<b>Digital Archive</b>	Geophysical survey and report	<b>Paper Archive</b>	N/A
<b>Report title</b>	Grange Road, Netley, Hampshire: Detailed Gradiometer Survey Report			<b>Date</b>	2019
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