Archaeology South-East

ASE

Detailed Magnetometer Survey Report
Land South Of Gayles Farm
Near Friston
East Sussex, BN20 0BA

NGR: TV 52691 97351 to 53732 96849

Site Code: AMR 17
OASIS ID: archaeol6-280485
ASE Project No: 160557
ASE Report No: 2017147

By Chris Russel

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With illustrations by John Cook and Justin Russell

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Abstract

Archaeology South-East was commissioned by The National trust to conduct a magnetometer survey on a site totalling approximately 10.5 hectares of land south of Gayles Farm, near Friston, East Sussex. The work was undertaken on the 13th and the 17th of March 2017.

The majority of the detected anomalies were linear in nature (both positive and negative) and grouped in the east of the survey. There appeared to be a strong correlation between detected linear anomalies and upstanding earthworks noted in previous work at the site. Also present were discrete positive anomalies and dipolar features. Two of the dipolar anomalies may be thermoremanent in nature. These anomalies have the potential to relate to buried archaeology although a geological origin should not be ruled out.

Statement of Indemnity

Geophysical survey is the collection of data that relate to subtle variations in the form and nature of soil and which relies on there being a measurable difference between buried archaeological features and the natural geology. Geophysical techniques do not specifically target archaeological features and anomalies noted in the interpretation do not necessarily relate to buried archaeological features. As a result, magnetic and earth resistance detail survey may not always detect sub-surface archaeological features. This is particularly true when considering earlier periods of human activity, for example those periods that are not characterised by sedentary social activity.

CONTENTS

1.0 INTRODUCTION

1.1 Site background

1.1.1 Archaeology South-East (ASE) were commissioned by The National Trust to undertake a magnetometry survey on land south of Gayles Farm, near Friston, East Sussex, hereafter 'the site' (centred on NGR 53368 97053; Figure 1).

1.1.2 The survey formed part of the Seven Sisters Archaeology Project which was set up in 2014 to document and investigate archaeological features in danger of loss through coastal erosion.

1.1.3 According to the online British Geological Survey 1:50,000 mapping, the survey area crossed solid geology of Newhaven Chalk and also Seaford Chalk with localised Head Deposit drift geology in the dry valley bottoms. An extensive deposit of Clay- With- Flint is shown to the north of the survey area (BGS 2017).

1.1.4 A brief for the survey was prepared by the National trust Archaeologist NT 2016) and the work was carried out in accordance with this document as well as the relevant Chartered Institute for Archaeologists (CIfA) procedural documents (CIfA 2014a and 2014b).

1.2 Aims and Objectives

1.2.1 The general aim of the programme of geophysical survey was to inform the future investigations of the project and management of the area, and to establish the nature and extent of archaeological features identified in existing datasets and noted during walkover survey (NT 2016).

1.2.2 The geophysical survey comprised a detailed magnetometer survey within all accessible areas shown on Figure 2. The survey aimed to detect any anomalies of archaeological origin that are within the boundaries of the survey area. The features detected were naturally limited to those features that produce a measurable response to the instrumentation used.

1.3 Scope of report

1.3.1 The scope of this report is to detail the findings of the survey. The project was conducted by John Cook and Chris Russel with the help of Lucy May and Jake Wilson. Additional help was provided by the volunteers of the Seven Sisters Archaeology Project. The project was managed by Neil Griffin (fieldwork) and Jim Stevenson (post-fieldwork).

2.0 ARCHAEOLOGICAL BACKGROUND

2.1 The following information on the background of the survey area is taken from the National Trust brief for the work (NT 2016) and the Archaeological Management plan for the site (ASE 2017) and is reproduced with due acknowledgement.

2.2 The survey area is thought to contain portions of a Prehistoric or Romano-British field system and Post medieval quarries and lime kilns and Romano – Birtish pottery was recovered during fieldwalking at Gayles farm (ASE 2017).

2.3 A walkover survey in undertaken in 2015 identified a number of additional earthworks and structural remains within the survey area, including a possible barrow cemetery on Brass Point and the remains of Post-medieval coast guard cottages at Brass Point .

2.4 A large portion of the property at Gayles Farm to the north of the survey area was given over during the Second World War as an airfield, (RAF Friston), initially serving as an emergency landing strip and later as a fully operational airfield.

2.3 The Archive

2.3.1 The archive derived from this project will be housed at Archaeology South-East's Sussex offices and will be combined with any additional archive generated in the event of further fieldwork being required.

3.0 SURVEY METHODOLOGY

3.1 Geophysical survey

3.1.1 A fluxgate gradiometer (magnetometry) survey was undertaken across three distinct areas of Seven Sisters, as depicted on Figure 2.The work was undertaken between the 13th and the 17th of March 2017. The weather clear and sunny (although often windy) except for the 16th which was very foggy.

3.2 Applied geophysical instrumentation

3.2.1 The Fluxgate Gradiometer employed was the Bartington Instrumentation Grad 601-2. The Grad 601-2 has an internal memory and a data logger that store the survey data. This data is downloaded into a PC and is then processed in a suitable software package.

3.2.2 30m x 30m grids were set out on site using arbitrary co-ordinates and geo-referenced using a Leica Viva GNSSS (see below). Each grid was surveyed with 1m traverses; samples were taken every 0.25m.

3.2.3 Data was collected along north-south traverses in a zigzag pattern beginning in the south west corner of each grid, following the contours of the site.

3.3 Instrumentation used for setting out the survey grid

3.3.1 The survey grid for the site was geo-referenced using a Leica Viva Smartrover. The GNSS receiver collects satellite data to determine its position and uses the mobile phone networks to receive corrections, transmitting them to Leica SmartNet base stations to provide a sub centimetre Ordnance Survey position and height. Each surveyed grid point has an Ordnance Survey position; therefore the geophysical survey can be directly referenced to the Ordnance Survey National Grid.

3.4 Data processing

3.4.1 All of the geophysical data processing was carried out using TerraSurveyor published by DW Consulting. Minimally processed data was produced using the following schedule of processing. The first process carried out upon the data was to apply a DESPIKE to the data set which removes the random ‘iron spikes’ that occur within fluxgate gradiometer survey data. A ZERO MEDIAN TRAVERSE was then applied to survey data. This removes stripe effects within grids and ensures that the survey grid edges match.

3.5 Data presentation

3.5.1 Data is presented using images exported from TerraSurveyor into AutoCAD software and inserted into the geo-referenced site grid. Data is presented as raw and processed data greyscale plots.

4.0 GEOPHYSICAL SURVEY RESULTS

4.1 Description of site

4.1.1 The survey area was comprised of approximately 10.6 hectares of pasture south of Gayles Farm situated with the Seven Sisters area of the South Downs. The site was surrounded on three sides by agricultural land with the chalk cliffs of the South Downs to the south. The South Downs Way runs along the southern edge of the survey area.

4.2 Survey limitations

4.2.1 Several limitations were experienced during the survey. Obstructions were encountered in all areas (Figs 3-11). These chiefly took the form of impenetrable Gorse bushes but an electric fence was also present in Area 3 which was also a barrier to survey.

4.2.2 In addition to these physical obstructions the topography also acted as a constraint to the survey. In certain areas, the dry valley sides were so steep that it became difficult to maintain a foothold. These areas were omitted on health and safety grounds. In addition to this survey was not carried out close to the cliff edge also on health and safety grounds

4.2.3 In the dry valley bottoms it was not possible for the GNSS to acquire sufficient signal to lay out a grid in these areas and they were omitted from the survey.

4.2.4 It should also be noted the effectiveness of magnetometer surveys depends on a contrast between the absolute magnetic susceptibility of the topsoil to the underlying subsoil (Clark 1996). Features may also be difficult to detect where there has been significant primary silting and development of significant overburden. Magnetometry is 'recommended' for sedimentary geology such as chalk but an 'average to poor' response on colluvium (which presumably exists in the dry valleys of the survey area) (English Heritage 2008).

4.3 Introduction to results

4.3.1 The results should be read in conjunction with the figures at the end of this report. The types of features likely to be identified are discussed below.

4.3.2 *Positive Magnetic Anomalies*
Positive anomalies generally represent cut features that have been in-filled with magnetically enhanced material.

4.3.3 *Negative Magnetic anomalies*
Negative anomalies generally represent buried features such as banks or compacted ground that have a lower magnetic signature in comparison to the background geology.

4.3.4 *Magnetic Disturbance*
Magnetic disturbance is generally associated with interference caused by modern ferrous features such as fences and service pipes or cables.

4.3.5 *Magnetic Debris*
Low amplitude magnetic debris consists of a number of dipolar responses spread over an area and is indicative of ground disturbance.

4.3.6 *Dipolar Anomalies*
Dipolar anomalies are positive anomalies with an associated negative response. These anomalies are usually associated with discreet ferrous objects or may represent buried kilns or ovens.

4.3.7 *Bipolar Anomalies*
Bipolar anomalies consist of alternating responses of positive and negative magnetic signatures. Interpretation will depend on the strength of these responses; modern pipelines and cables typically produce strong bipolar responses.

4.3.8 *Thermoremanence*
Thermoremanence is most commonly encountered through the magnetizing of clay through the firing process although stones and soils can also acquire thermoremanence.

4.3.9 Magnetism from ferromagnetic materials (iron) and from thermoremanence are forms of permanent magnetism and in most cases a magnetometer will not enable the separation of anomalies into the two categories. The interpretation of these anomalies into either category relies on field strength within an area. Magnetic anomalies due to iron normally rise and fall rapidly, forming a 'spike' in the data.

4.4 Interpretation of fluxgate gradiometer results (Figures 3-12)

4.4.1 *Area 1 (Figs 3-5)*

4.4.1.1 Area 1 was situated in the very west of the survey up slope from Lime Kiln Bottom. Several anomalies were detected the majority of which were positive and linear in nature. Most of the linear anomalies are aligned north-east to south-west with the group shown at A2 can be seen in association with corresponding negative anomalies. The linear anomalies noted at A7 appear to turn towards the north-west. A single linear anomaly A3 seems to run north-west to south-east contrary to general trend.

4.4.1.2 Discrete positive anomalies are noted across all of Area 1 with the group of three noted at A4-A6 giving by far the strongest responses. Also noted are three Dipolar anomalies of which A1 is potentially thermoremanent. Also evident are two areas of magnetic debris.

4.4.2 *Area 2 (Figs 6-8)*

4.4.2.1 Area 2 was the smallest of the three survey areas and was situated in the south of Rough Brow with a smaller adjunct to the east of Rough Bottom. Area 2 contained the fewest number of detected anomalies which were generally linear in nature and positive in response. It is possible that subsoil conditions have affected results in Area 2 although superficially it appeared similar to the other surveyed areas. It is entirely possible that any buried archaeology present in this area has a similar magnetic signature to the surrounding subsoil making it harder to detect. As with Area 1 these linear

anomalies are on two approximate alignments. The majority follow a north-east to south-west course with a smaller number aligned north-west to south-east. Two parallel negative linear anomalies are noted towards the east of Area 2.

4.4.2.2 Several discrete positive anomalies are also seen in Area 2 with the greatest concentration of these seen in the west of the area. A number of dipolar anomalies are also present and are again concentrated in the west. Of these the anomaly noted at A8 has the potential to be thermoremanent in nature. A single concentration of magnetic debris is noted in the east.

4.4.3 *Area 3 (Figs 9-11)*

4.4.3.1 Area 3 was situated in the east of the survey and took place on the western flank of the dry valley between Brass Point and Flagstaff Point. A previous landscape survey (Butler. 2015) has identified a possible barrow cemetery in this area (Fig 11). The south of Area 3 contained the South Downs Way footpath. Area 3 contained the greatest concentration of anomalies.

4.4.3.2 Both linear positive and linear negative anomalies were detected. As with Areas 1 and 2 these took on two distinct alignments. One set are noted running north-east to south-west with a second set on a north-west to south-east course. These two sets of linear anomalies intersect most notably at A9.

4.4.3.3 Discrete positive anomalies are also noted across Area 3 with a distinct concentration visible in the north-east of the area. Dipolar anomalies were also detected with the majority in the east and south of the survey. Four areas of magnetic disturbance were also detected. These are localised in the south of the survey close to the public footpath.

5.0 CONCLUSIONS

5.1 Discussion

5.1.1 The magnetometer survey south of Gayles Farm successfully detected anomalies with the potential to represent buried archaeology in all areas. The majority of these were linear in form with a positive response. Many were seen in close association with corresponding linear negative anomalies. A comparison with previous upstanding earthwork surveys (Fig 12) shows a strong correlation between these two data sets although no evidence of the possible barrows noted in the landscape survey could be seen in the results. Although they may, in some cases occupy areas that could not be surveyed. The magnetometer survey appears to have also detected features not now visible as upstanding earthworks.

5.1.2 The survey detected discrete positive anomalies in all areas. The group noted at A4-6 has the greatest potential to represent buried archaeology such as refuse or quarry pits.

5.1.3 Dipolar anomalies were present across the survey area with those noted at A1 and A8 potentially thermoremanent in nature.

5.1.4 Areas of magnetic disturbance are also noted to a greater or lesser degree. These may show areas of 19th Century industrial or 20th Century military activity although a more modern origin is equally plausible.

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Online Resources

BGS 2017. Geology of Britain Viewer
http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Accessed 21st March 2017

Acknowledgements

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HER Summary

HER enquiry number	N/A					
Site code	GAF 16					
Project code	160557					
Planning reference						
Site address	Land south Gayles Farm, Friston.					
District/Borough	East Sussex					
NGR (12 figures)	53368 97053					
Geology	Newhaven Chalk/Seaford Chalk					
Fieldwork type					**Survey**	
Date of fieldwork	13th-17th March 2017					
Sponsor/client	National Trust					
Project manager	Neil Griffin					
Project supervisor	John Cook					
Period summary						
Project summary						
Museum/Accession No.	N/A					

OASIS ID: archaeol6-280485

Project details	
Project name	Detailed Magnetometer Survey on Land South Of Gayles Farm, Near Friston,East Sussex, BN20 0BA
Short description of the project	Archaeology South-East was commissioned by The National trust to conduct a magnetometer survey on a site totalling approximately 10.5 hectares of land south of Gayles Farm, near Friston, East Sussex. The work was undertaken on the 13th and the 17th of March 2017. The majority of the detected anomalies were linear in nature (both positive and negative) and grouped in the east of the survey. There appeared to be a strong correlation between detected linear anomalies and upstanding earthworks noted in previous work at the site. Also present were discrete positive anomalies and dipolar features. Two of the dipolar anomalies may be thermoremnant in nature. These anomalies have the potential to relate to buried archaeology although a geological origin should not be ruled out.
Project dates	Start: 13-03-2017 End: 17-03-2017
Previous/future work	Not known / Not known
Any associated project reference codes	AMR 17 - Sitecode
Any associated project reference codes	160557 - Contracting Unit No.
Type of project	Recording project
Site status	National Trust land
Current Land use	Grassland Heathland 2 - Undisturbed Grassland
Monument type	NONE None
Significant Finds	NONE None
Investigation type	"Geophysical Survey"
Prompt	Research
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	CLAY WITH FLINTS
Techniques	Magnetometry
Project location	
Country	England
Site location	EAST SUSSEX EASTBOURNE EASTBOURNE Land South of Gayles Farm,near Friston, East Sussex
Postcode	BN20 0BA

Study area	10.5 Hectares
Site coordinates	TV 53368 97053 50.752192313147 0.174429504088 50 45 07 N 000 10 27 E Point
Project creators	
Name of Organisation	Archaeology South East
Project brief originator	National Trust
Project design originator	National Trust
Project director/manager	Neil Griffin
Project supervisor	John Cook
Type of sponsor/funding body	National Trust
Project archives	
Physical Archive Exists?	No
Physical Archive recipient	n/a
Digital Archive recipient	National Trust
Digital Contents	''Survey'',''none''
Digital Media available	''Geophysics'',''Survey''
Paper Archive recipient	National Trust
Paper Contents	''none''
Paper Media available	''Report''
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Detailed Magnetometer Survey on Land South Of Gayles Farm, Near Friston,East Sussex, BN20 0BA
Author(s)/Editor(s)	Russel,C
Other bibliographic details	report No:2017147
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Issuer or publisher	ASE

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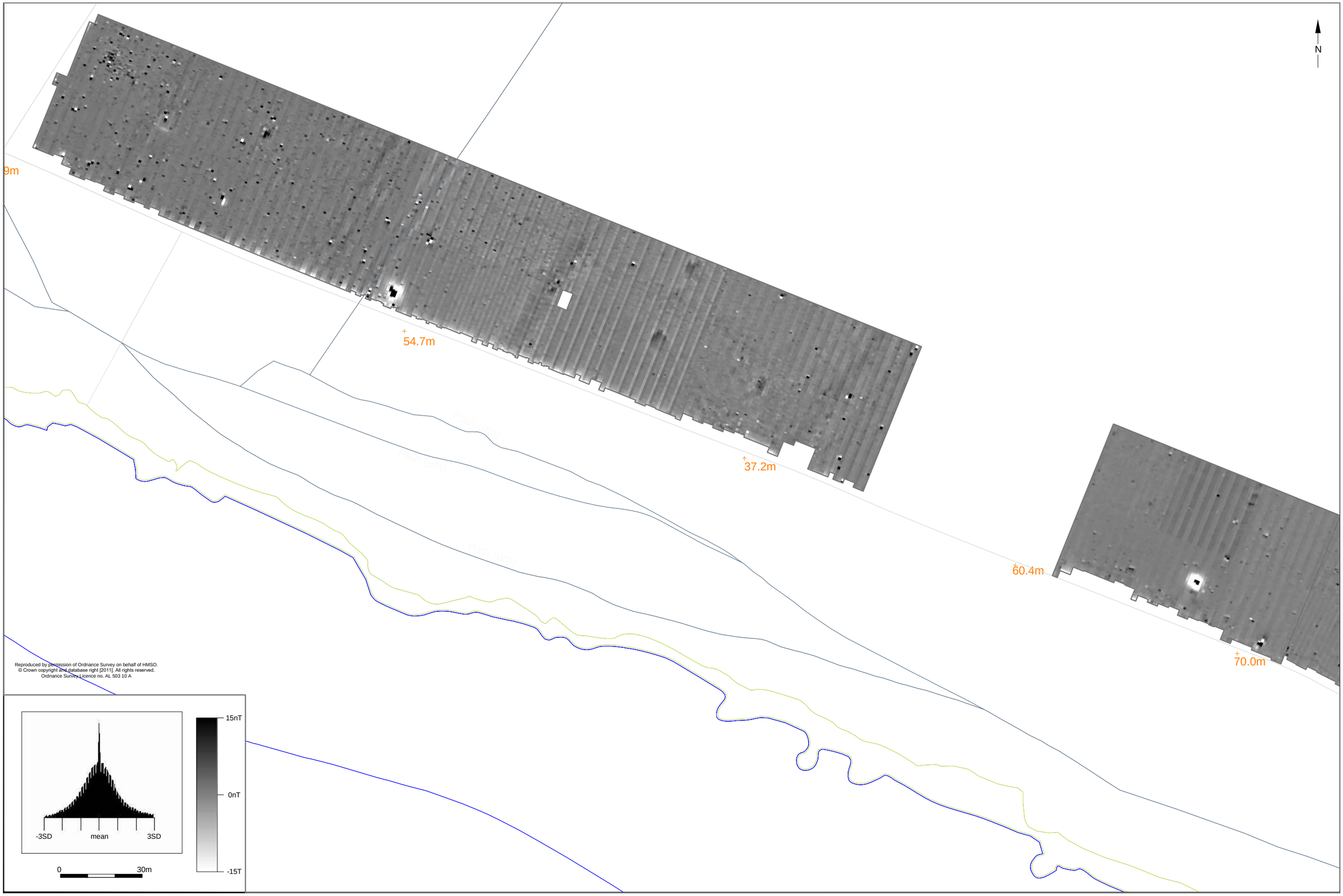
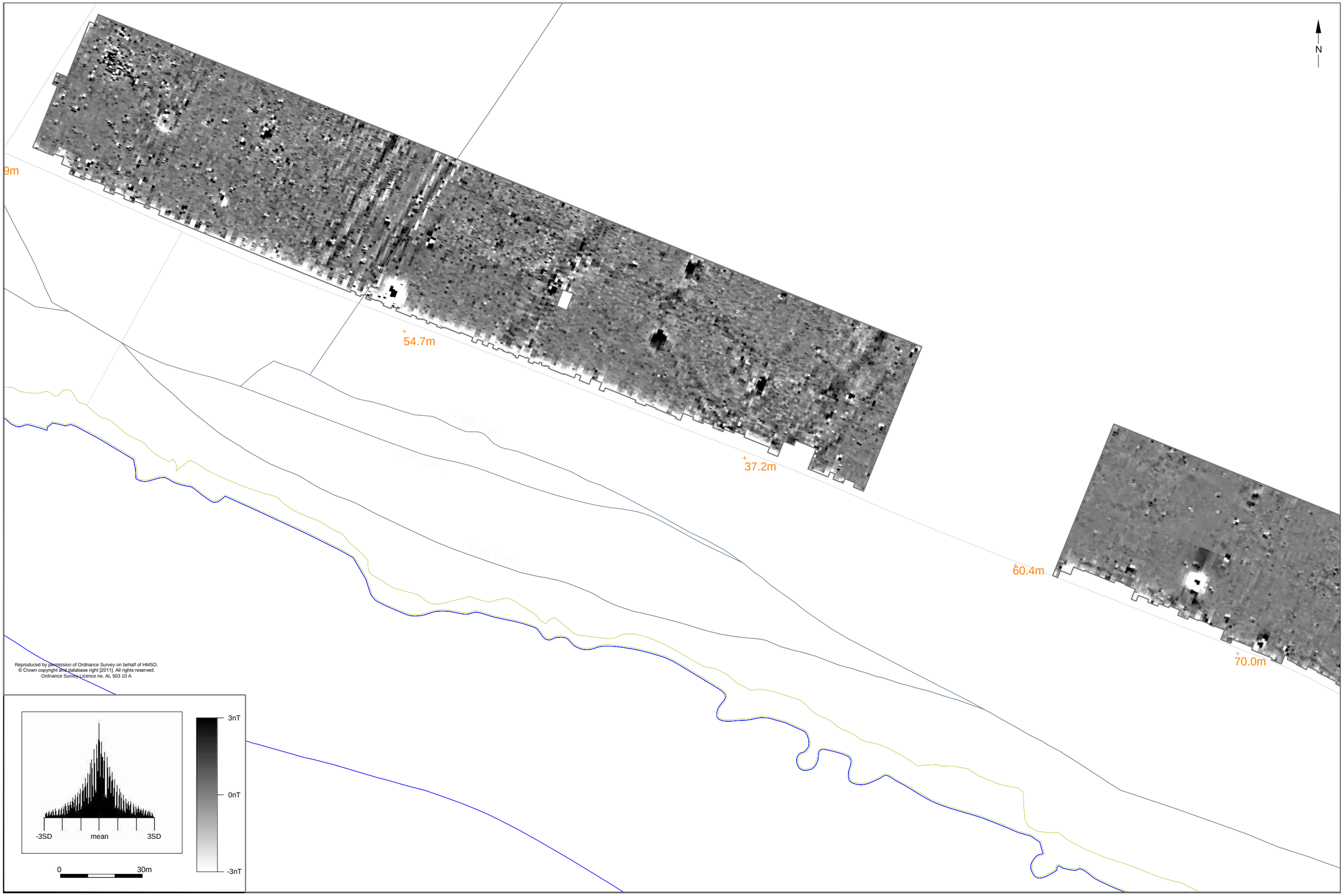
© Archaeology South-East		Seven Sisters Archaeology Project	Fig. 1
Project Ref: 160557	March 2017	Site location	
Report Ref: 2017147	Drawn by: JC		

© **Archaeology South-East**		Seven Sisters Archaeological Project	Fig.2
Project Ref: 160557	March 2017	Site plan	
Report Ref: 2017147	Drawn by: JC		



© **Archaeology South-East**		Seven Sisters Archaeological Project	Fig. 3
Project Ref: 160557	March 2017	Raw- Area 1	
Report Ref: 2017147	Drawn by: JC		



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Project Ref: 160557	March 2017	Interpretation - Area 1	
Report Ref: 2017147	Drawn by: JC		

N

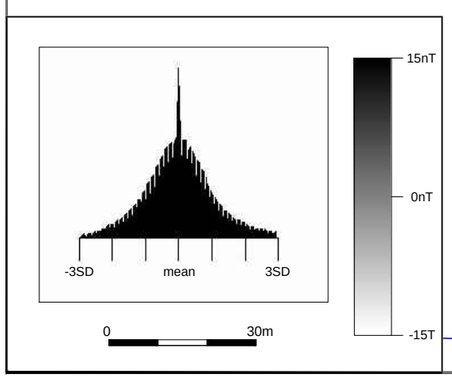
60.4m

70.0m

51.1m

68.3m

Mean High Water



© Archaeology South-East		Seven Sisters Archaeological Project	Fig. 6
Project Ref: 160557	March 2017	Raw- Area 2	
Report Ref: 2017147	Drawn by: JC		

N

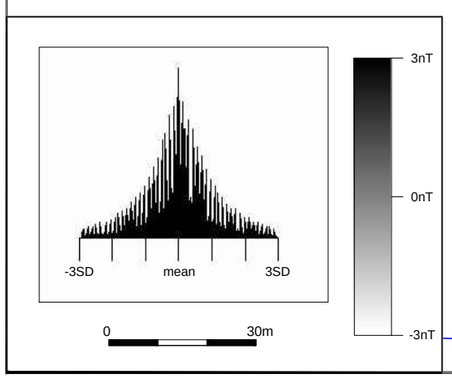
60.4m

70.0m

51.1m

68.3m

Mean High Water



© Archaeology South-East		Seven Sisters Archaeological Project	Fig. 7
Project Ref: 160557	March 2017	Processed - Area 2	
Report Ref: 2017147	Drawn by: JC		

N

60.4m

A8

70.0m

51.1m

68.3m

Mean High Water

- Strong positive anomaly (Possible archaeology)
- Moderate positive anomaly (Possible archaeology)
- Weak positive anomaly (Possible archaeology)
- Moderate negative anomaly
- Weak negative anomaly
- Magnetic disturbance
- Magnetic debris
- Dipolar anomaly (Possible archaeology/Modern)
- Possible thermoremanent anomaly
- Linear anomaly former field boundary or land drain
- Linear anomaly agricultural activity
- Possible service

0 30m

© Archaeology South-East		Seven Sisters Archaeological Project	Fig. 8
Project Ref: 160557	March 2017	Interpretation - Area 2	
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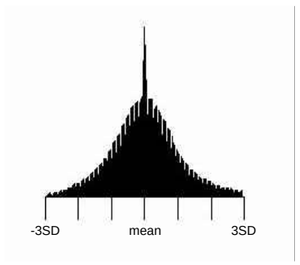
N

51.1m

68.3m

Path (un

Mean High Water



15nT
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-15T

0
30m

© Archaeology South-East		Seven Sisters Archaeological Project	Fig. 9
Project Ref: 160557	March 2017	Raw- Area 3	
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Project Ref: 160557	March 2017	Processed - Area 3	
Report Ref: 2017147	Drawn by: JC		

N

51.1m

68.3m

A9

Electric Fence

Mean High Water

- Strong positive anomaly (Possible archaeology)
- Moderate positive anomaly (Possible archaeology)
- Weak positive anomaly (Possible archaeology)
- Moderate negative anomaly
- Weak negative anomaly
- Magnetic disturbance
- Magnetic debris
- Dipolar anomaly (Possible archaeology/Modern)
- Possible thermoremanent anomaly
- Linear anomaly former field boundary or land drain
- Linear anomaly agricultural activity
- Possible service
- 'Barrow' found on CBAS survey

0 30m

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Project Ref: 160557	March 2017	Processed data with HER/NT line data overlain	
Report Ref: 2017147	Drawn by: JC		

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