

ARCHAEOLOGICAL EVALUATION REPORT:
GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND NEAR FOLLY LANE, NORTON DISNEY,
LINCOLNSHIRE

NGR: SK 861 602
AAL Site Code: NDFL 20
OASIS Reference Number: allenarc1-409940



Report prepared for the Norton Disney History and Archaeology Group

By
Allen Archaeology Limited
Report Number AAL 2020140

December 2020



Allenarchaeology



Contents

Executive Summary	1
1.0 Introduction.....	2
2.0 Site Location and Description.....	2
3.0 Planning Background.....	2
4.0 Archaeological and Historical Background	2
5.0 Methodology	3
Summary of Survey Parameters	3
Data Collection and Processing	3
6.0 Results	4
7.0 Discussion and Conclusions.....	5
8.0 Effectiveness of Methodology.....	5
9.0 Acknowledgements	6
10.0 References.....	6

List of Appendices

Appendix 1: Figures	7
---------------------------	---

List of Figures

Figure 1: Site location outlined in red	7
Figure 2: Greyscale raw data and processed trace plot	8
Figure 3: Processed greyscale plot and interpretation	9
Figure 4: Processed greyscale location.....	10
Figure 5: Geophysical interpretation location.....	11
Figure 6: Geophysical interpretation superimposed over 1887 OS map	12
Figure 7: Combined geophysics results for NDNR 20 and NDFL 20	13
Figure 8: Site boundary superimposed over Lidar data	14

Document Control

Element:	Name:	Date:
Report prepared by:	Robert Evershed BSc (Hons)	04/12/2020
Illustrations prepared by:	Robert Evershed BSc (Hons)	04/12/2020
Report edited by:	Chris Clay BA MA (Hons)	08/12/2020
Report Reviewed by:	Mark Allen BSc (Hons) MCIfA	08/12/2020
Version no:	1.0	08/12/2020

Cover image: View across the site, looking southeast

Executive Summary

- Norton Disney History and Archaeology Group commissioned Allen Archaeology Limited to undertake a geophysical survey using magnetometry on land near Folly Road, Norton Disney, Lincolnshire, to help provide information into the historic environment of the Norton Disney landscape.
- The site lies within an area of significant archaeological activity, with a scheduled Roman villa lying in the field immediately to the west. Iron Age activity has also been identified by geophysical survey and trial trenching to the southwest of the site.
- The survey has identified several features of archaeological interest. A potential small enclosure feature extended from the western edge of the field, possibly relating to the Roman villa activity adjacent to the site. The survey also identified several areas of magnetic noise towards the southern edge of the site which could relate to former industrial activity, possibly Iron Age iron smelting.
- The survey also identified a number of modern land drains aligned roughly west-northwest to east-southeast across the site.

1.0 Introduction

- 1.1 Norton Disney History and Archaeology Group commissioned Allen Archaeology Limited (AAL) to undertake a geophysical survey using magnetometry on land near Folly Road, Norton Disney, Lincolnshire, to provide information into the historic environment of the Norton Disney landscape and potentially inform the location of future seasons of excavation by the group.
- 1.2 The site works and reporting conform to current national guidelines, as set out in '*EAC Guidelines for the Use of Geophysics in Archaeology*' (EAC 2016), '*The Use of Geophysical Techniques in Archaeological Evaluations*' (Gaffney *et al.* 2002), and the Chartered Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (CIfA 2014).

2.0 Site Location and Description

- 2.1 Norton Disney is located approximately 15.2km to the southwest of Lincoln and 10.3km to the north-northeast of Newark. The area of investigation lies approximately 2.7km to the west-northwest of the centre of Norton Disney and comprises 5.5 hectares of farmland, bounded by Hill Holt Wood to the north and farmland on the other sides, centred on NGR SK 861 602 (Figure 1).
- 2.2 The local geology comprises a bedrock geology of Scunthorpe Mudstone Formation, with no superficial geology recorded (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). The bedrock of mudstone can give a variable response to magnetometry (English Heritage 2008).

3.0 Planning Background

- 3.1 This scheme of work is being undertaken to aid understanding of the historic environment of this part of Norton Disney within the wider archaeological landscape and to potentially inform future excavations for a community project, and therefore lies outside the planning system.

4.0 Archaeological and Historical Background

- 4.1 Within the field immediately to the west of the site is a Roman villa, which survives solely as below-ground remains and is designated as a Scheduled Monument (No. 1005018, LHER No. 60745). Excavations undertaken between 1934 and 1937 identified a multiphase development of the villa site from the 1st century AD through to the middle of the 4th century AD. A geophysical survey (Bunn 2018) of the entire field containing the villa, using both magnetometry and resistivity techniques, revealed anomalies associated with the primary villa complex, as well as features potentially associated with prehistoric occupation of the site.
- 4.2 A geophysical survey (Bunn 2017) to the west of Folly Lane revealed potential pits and ditches. A follow up evaluation (Brocklehurst 2017) established these features as being Iron Age in origin, therefore pre-dating the villa.
- 4.3 At the northwest corner of the site, several large blocks of slag have been identified, likely to be iron smelting slag of a middle Iron Age date (LHER Reference 67072).
- 4.4 To the southwest of the site, cropmarks recorded in the Lincolnshire Historic Environment Record (Monument No. 1067645) suggest the location of a probable prehistoric or Roman

settlement consisting of enclosures and a possible hut circle. A geophysical survey (Jefferson 2019) on the northern part of the site identified a possible roundhouse and enclosures.

- 4.5 Within the field to the south of the site, cropmarks have been identified suggesting former boundaries and enclosures (HER No. 67050) of uncertain date and origin.
- 4.6 A geophysical survey (AAL 2020) was conducted in the field immediately to the south of the site, and revealed a number of linear features corresponding to former a potential small enclosure feature or settlement activity, as well as former field boundaries. The survey also identified a few areas of magnetic noise that likely related to Iron Age iron slag within the field.

5.0 Methodology

- 5.1 The geophysical survey consisted of a detailed gradiometer survey totalling approximately 5.3 hectares. The survey was undertaken in a series of 30m grids across the site. It was not possible to survey a small area at the eastern end of the site as maize crop was present there.

Summary of Survey Parameters

5.2 Fluxgate Magnetometer

Instrument:	Bartington Grad601-2 Dual Fluxgate Gradiometer
Sample Interval:	0.25m
Traverse Interval:	1.00m
Traverse Separation:	1.00m
Traverse Method:	Zigzag
Resolution:	0.01nT
Processing Software:	3.0.36.0
Surface Conditions:	Stubble
Area Surveyed:	5.3 hectares
Date Surveyed:	Thursday 26 th and Friday 27 th November 2020
Surveyor:	Robert Evershed BSc (Hons)
Survey Assistant:	Louise Clempson MSc
Data Interpretation:	Robert Evershed BSc (Hons)

Data Collection and Processing

- 5.3 The grids were marked using pre-programmed grids on the Leica GS08 Net rover. Magnetic data was collected close on a north to south alignment. A traverse pattern close to north-south is preferable as the fluxgate gradiometer is set up and balanced with respect to the cardinal points. Since the data is plotted as north-south traverses there is considerable merit sampling the north-south response of a magnetic anomaly with as many data points as is possible, this is accomplished as the density collected along the traverse line is greater than that between traverses (Aspinall *et al.* 2008). On this occasion the grids were aligned exactly north to south.
- 5.4 The data collected from the survey has been analysed using Terrasurveyor 3.0.36.0. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripping
 - Clipping
 - De-staggering
- 5.5 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.
- 5.6 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.
- 5.7 The de-staggering process compensates for data correction errors caused by the operator commencing the recording of each traverse too soon or too late. It shifts each traverse either forward or backwards by a specified number of intervals.
- 5.8 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

6.0 Results

- 6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -1 to 1 nT/m (Figure 3). This enhances faint anomalies that may otherwise not be noted in the data, with a number of anomalies identified across the data set. These are discussed in turn and noted as single- or double-digit numbers in square brackets. The site proved to be generally very magnetically quiet, and whilst normally data would be processed to values of -3 to 3 nT/m, on this occasion values of -1 to 1 nT/m were used to further enhance the anomalies.
- 6.2 Along the northern and part of the eastern edges of the survey area there was an area of magnetic noise [1], producing readings of -20 to 20 nT/m with some spikes as high as -100 to 100 nT/m. This noise was likely a combination of a build-up of modern waste along the field edge and the metal fence running along the field boundary.
- 6.3 The areas of magnetic noise [2] and [3], -5 to 5 nT/m and -3 to 3 nT/m respectively, likely correspond with a slight build-up of modern waste at the entrance points to the field and potentially where a former trackway (Figure 6) met the entrance points to the field.
- 6.4 The small area of magnetic noise [4] at the southwestern corner of the survey area, -20 to 10 nT/m, corresponds to the location of the eco-toilet brought in for the duration of the survey.
- 6.5 Aligned roughly west-northwest to east-southeast were parallel positive linear features [5], the majority of which were located and more pronounced in the southern half of the field, although there were a few within the northern half of the site. These features produced readings of 1 to 2 nT/m, and represent modern land drains. The slight difference in appearance between the different land drains may well indicate there several different phases of land drains within the field, although all on the same alignment. The field also slopes upwards from the south, with the more pronounced land drains on the lower part of the site (Figure 8).

- 6.6 Along the same alignment as the land drains is a potential positive linear feature [6], 1 to 1.5 nT/m, which corresponds well with a former field boundary seen on the 1887 OS map (Figure 6).
- 6.7 Extending from the western edge of the field is a semi-circular curvilinear positive feature [7], 1 to 2 nT/m. This feature likely represents a small enclosure, potentially relating to the Roman villa in the adjacent field. There also appears to be a small gap in the northeast part of the feature, measuring approximately 2m in size, that could represent a former entrance/exit to the enclosure.
- 6.8 Close to the southern edge of the site are a couple of areas of magnetic noise with amorphous and linear positive anomalies within them [8]. These produced readings of -4 to 10 nT/m, and may represent small areas of industrial activity (AAL 2020) (Figure 7).
- 6.9 Scattered randomly throughout the site are several weak and strong dipolar responses, examples of which are highlighted as [9]. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near-surface ferrous metal or other highly fired material in the topsoil, which could represent small pieces of metal such as nails, horseshoes or parts of a tractor. There do appear to be a great density of dipolar spikes corresponding with the former location of the field boundary and trackway across the field (Figure 6).

7.0 Discussion and Conclusions

- 7.1 The geophysical survey has identified a few features of archaeological interest. The semi-circular positive curvilinear feature extending from the western edge of the site likely represents a small enclosure feature, possibly relating to the Roman villa site in the field immediately to the west. There do appear to be some ephemeral features revealed close to the hedge by the geophysical survey on the adjacent field which may correspond with this enclosure (Bunn 2018). These features appear on a slightly different alignment to the Roman villa itself, so may suggest a different phase of activity, possibly Iron Age in date. Potentially a small gap within the curvilinear feature may represent an entrance/exit.
- 7.2 The areas of magnetic noise close to the southern edge of the survey may represent small areas of industrial activity, possibly relating to Iron Age iron smelting. During a previous survey (AAL 2020), iron slag was noted within the northern part of the field immediately to the south, which was identified as being Iron Age in date, corresponding to areas of similar magnetic noise immediately south of the field boundary. The two areas of magnetic noise are separated by a substantial ditch, and it is possible that the noise is the result of buried material from upcast from cleaning out the ditch. However, it is likely that the magnetic noise in this again relates to Iron Age smelting activity. Whether this activity is in situ, or represents material derived from upcast from the boundary ditch is unclear. Several large blocks of slag, typical of a middle Iron Age date have previously been recovered from the field margin, close to this location (LHER Reference 67072).
- 7.3 The survey also identified a potential former field boundary/former trackway within the field as well as modern land drains running across the field.

8.0 Effectiveness of Methodology

- 8.1 The non-intrusive evaluation methodology employed was particularly appropriate to the scale and nature of the site to be surveyed. Magnetometry was the prospection technique best suited

to the identification of archaeological remains on the site. Other techniques would have required further justification and may have proved too time consuming or cost prohibitive.

9.0 Acknowledgements

- 9.1 Allen Archaeology Limited would like to thank Norton Disney History and Archaeology Group for this commission.

10.0 References

Allen Archaeology, 2020, *Archaeological Evaluation Report, Geophysical survey by magnetometry on land off Newark Road, Norton Disney, Lincolnshire, Allen Archaeology Ltd, Report Number 2020097*

Aspinall, A, Gaffney, C, and Schmidt, A, 2008, *Magnetometry for Archaeologists*, Plymouth: Altamira Press

Brocklehurst, L, 2018, *Land at Villa Farm, Norton Disney, North Kesteven, LN6 9JL – Interim Archaeological Evaluation Report (unpublished)*, PCAS Ltd, Job No. 2045

Bunn, D, 2017, *Archaeological Geophysical Survey: Land at Villa Farm, Norton Disney, Lincolnshire. Pre-Construct Geophysics*, Grey literature report (unpublished)

Bunn, D, 2018, *Archaeological Geophysical Survey: Ancient Scheduled Monument, Villa Farm, Folly Lane, Norton Disney, Lincolnshire. Pre-Construct Geophysics*, Grey literature report (unpublished)

CIfA, 2014, *Standard and guidance for archaeological geophysical survey*, Reading: Chartered Institute for Archaeologists

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

Europae Archaeologiae Consilium (EAC), 2016, *EAC Guidelines for the use of geophysics in Archaeology, Questions to Ask and Points to Consider. EAC Guidelines 2*. European Archaeological Council

Gaffney, C, Gater, J, and Ovenden, S, 2002, *The Use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No. 6, Reading: The Institute for Archaeologists

Jefferson, N, 2019, *Norton Disney, Lincolnshire. Geophysical Survey. Work undertaken for Norton Disney History and Archaeology Group*. Contour Geophysics

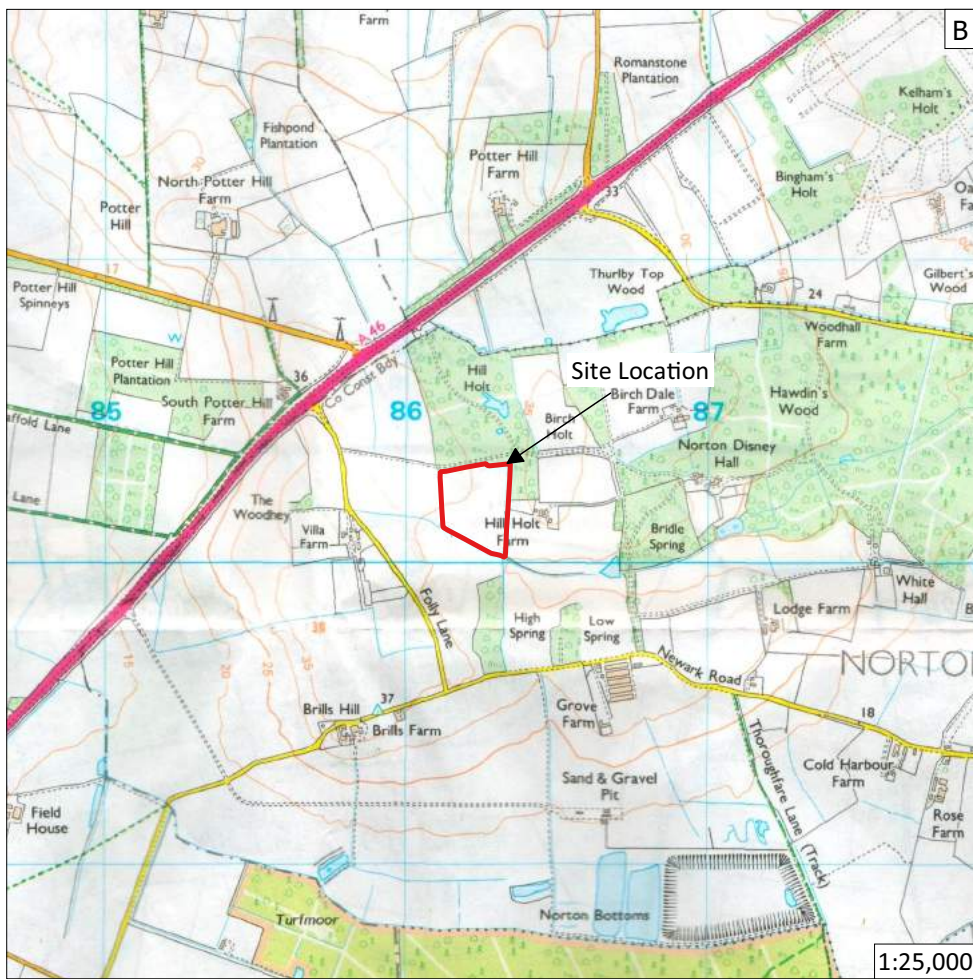
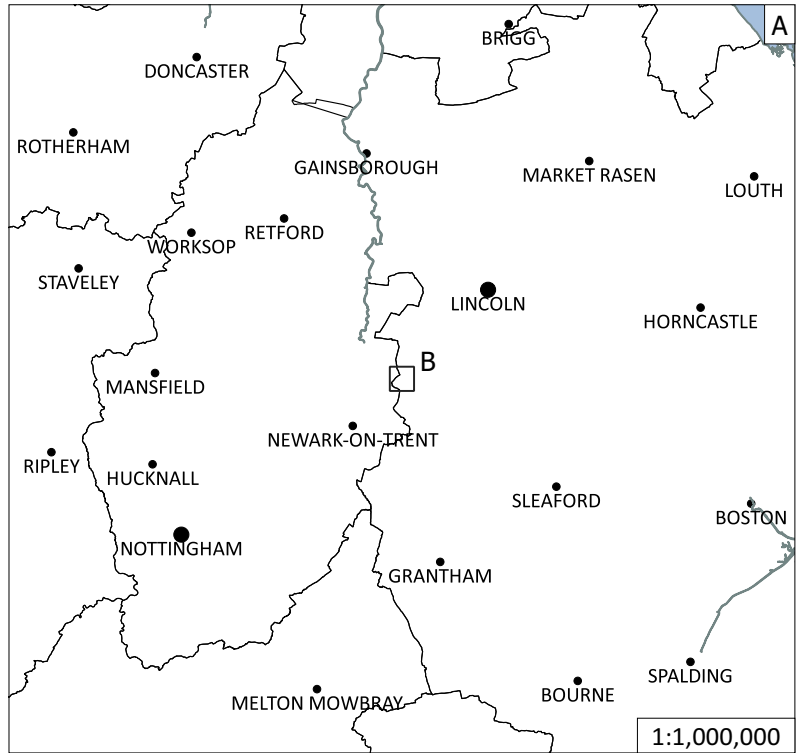
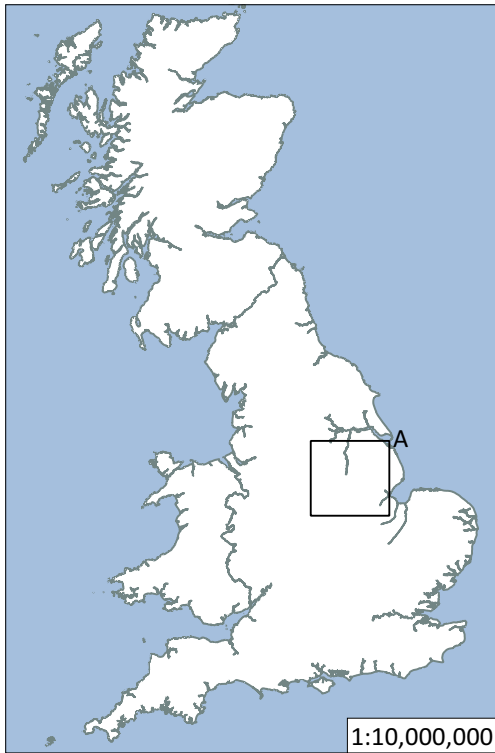
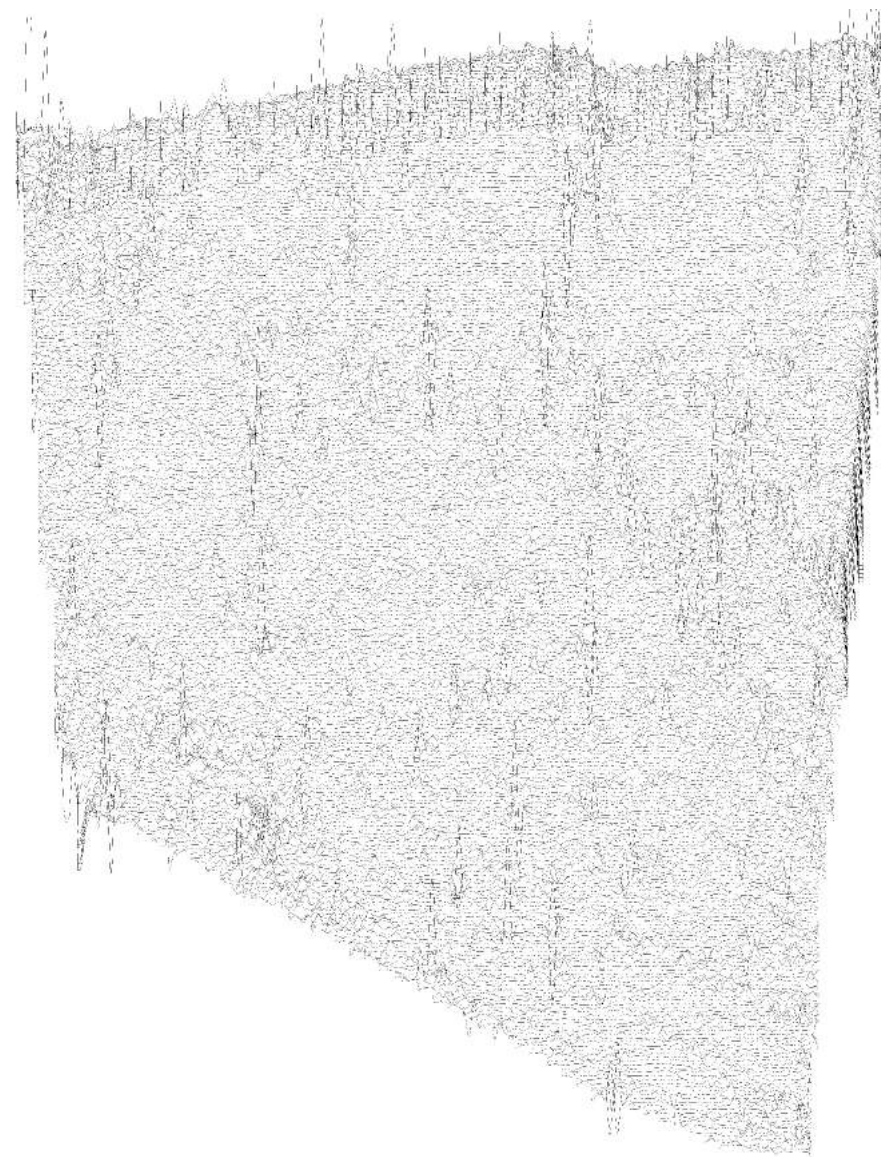
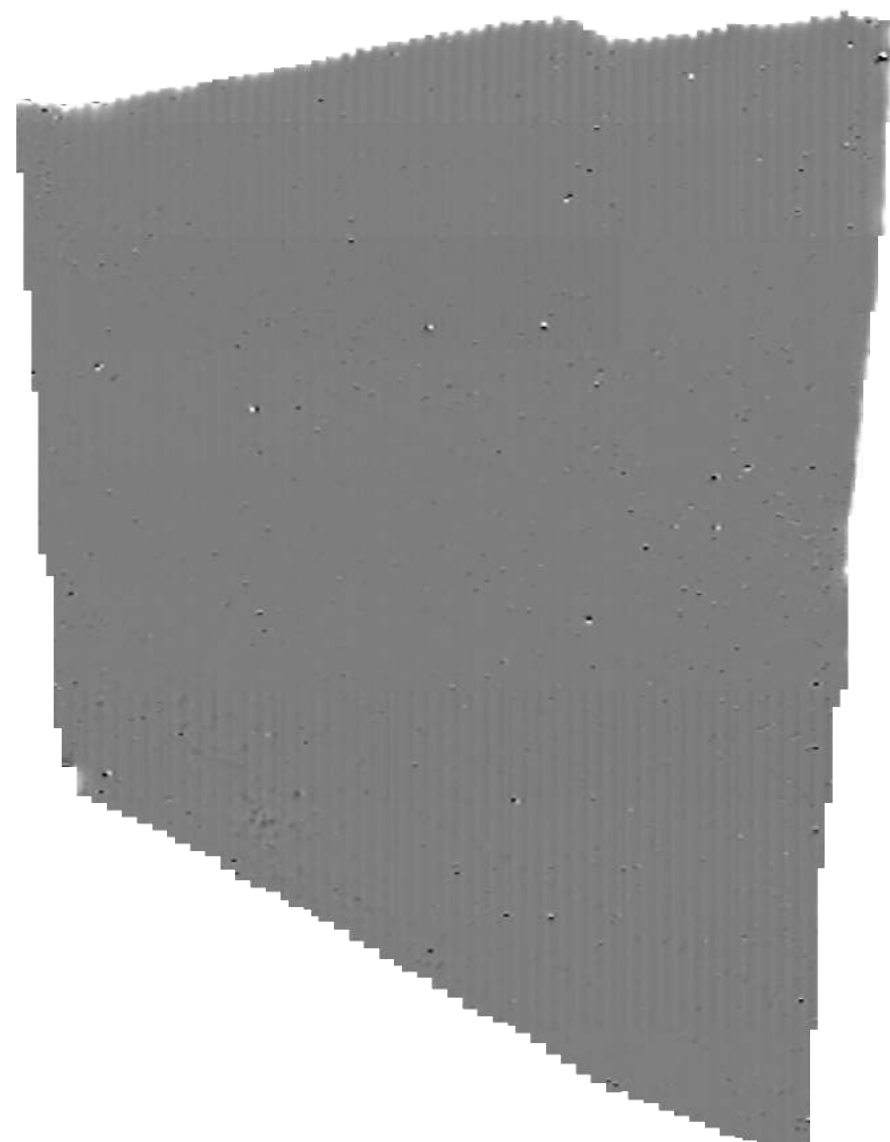


Figure 1: Site location outlined in red

© Crown copyright 2000. All rights reserved. Licence Number 100047330

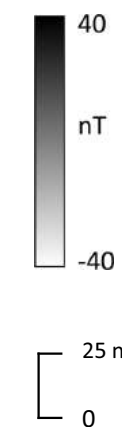
Site Code	NDFL 20
Scale	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	R Evershed
Date	04/12/2020





N
↑

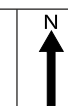
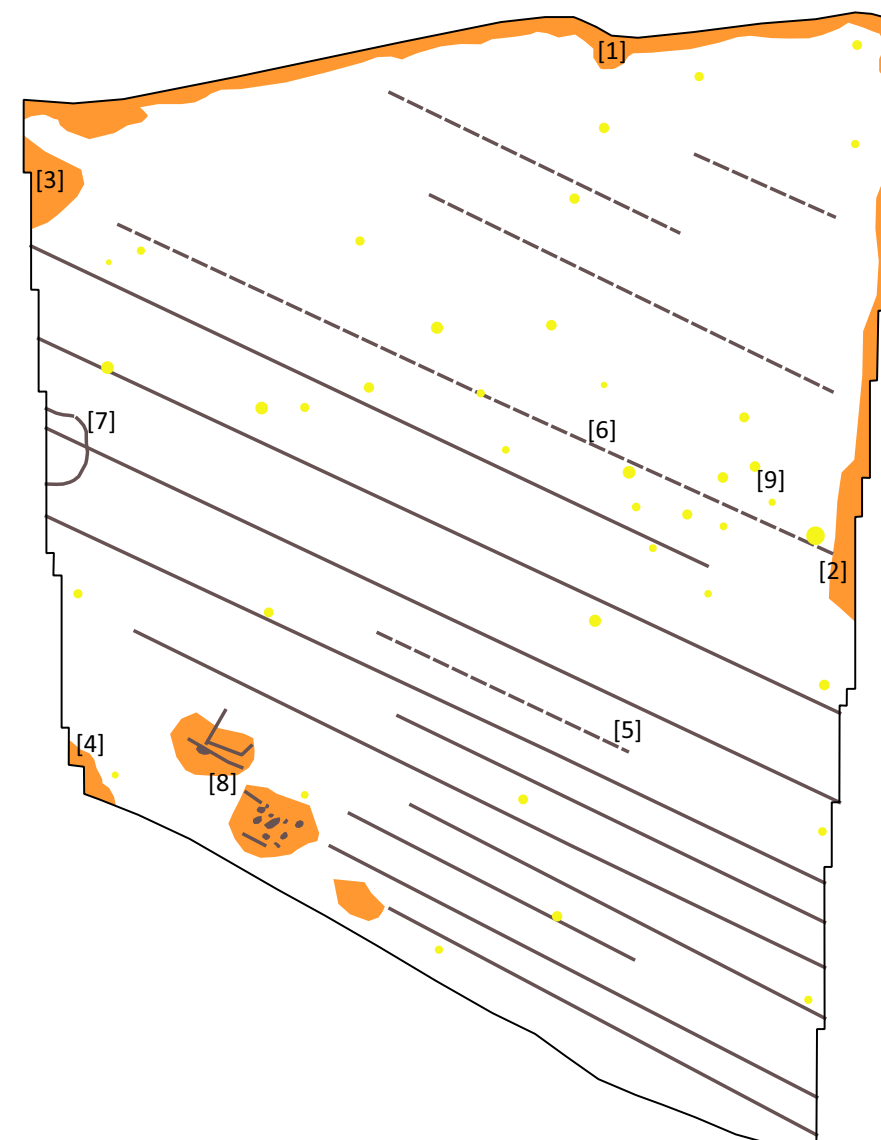
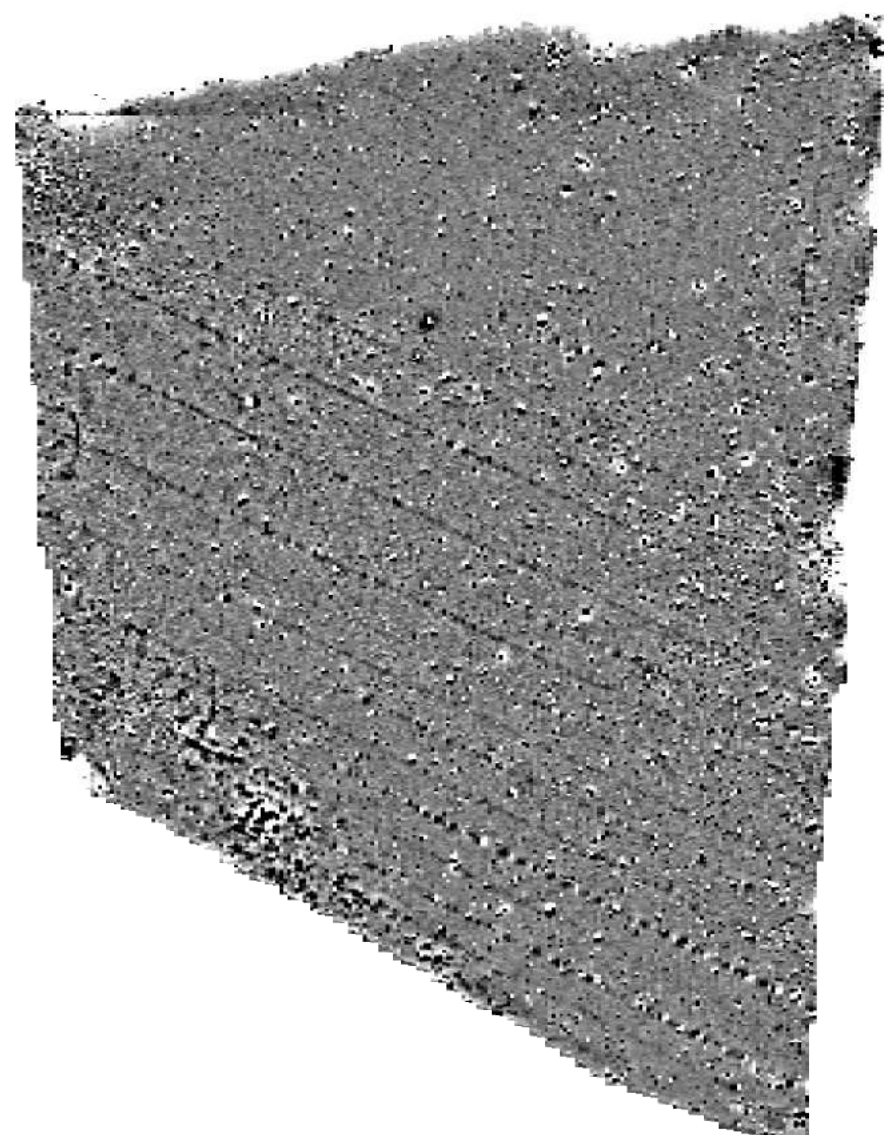
Key



Site Code	NDFL 20
Scale	1:2,000 @A3
Drawn by	Robert Evershed
Date	04/12/2020

Allenarchaeology
Lincoln
Birmingham
Cambridge
Southampton
www.allenarchaeology.co.uk

Figure 2: Greyscale raw data and processed trace plot



Key

- Positive anomaly
- Dipolar anomaly
- Magnetic noise
- Survey boundary



Site Code	NDFL 20
Scale	1:2,000 @A3
Drawn by	Robert Evershed
Date	04/12/2020

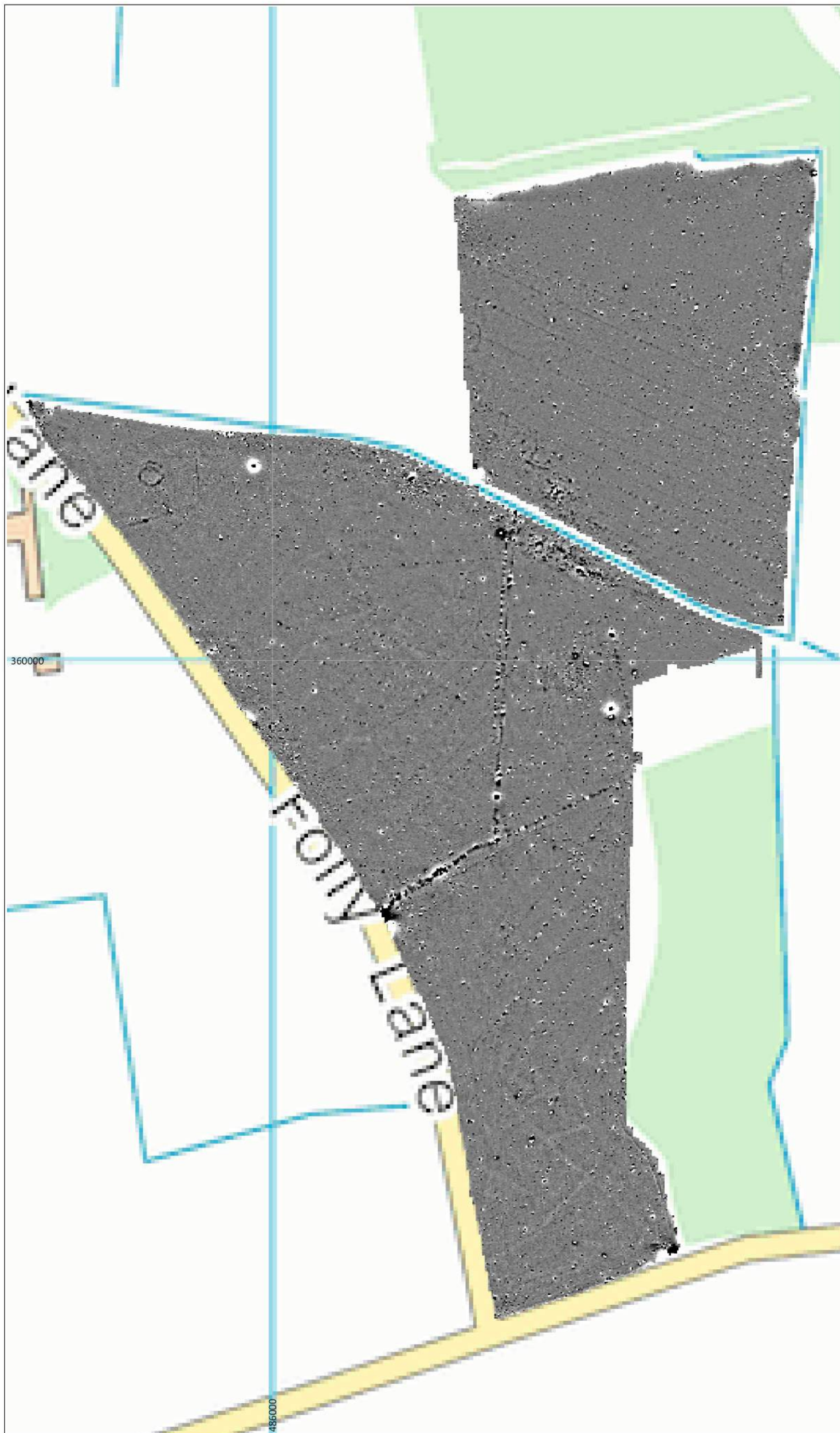
Figure 3: Processed greyscale plot and interpretation



Figure 4: Processed greyscale location







Key



Site Code	NDFL 20
Scale	1:2,500 @ A3
Drawn By	R Evershed
Date	08/12/2020

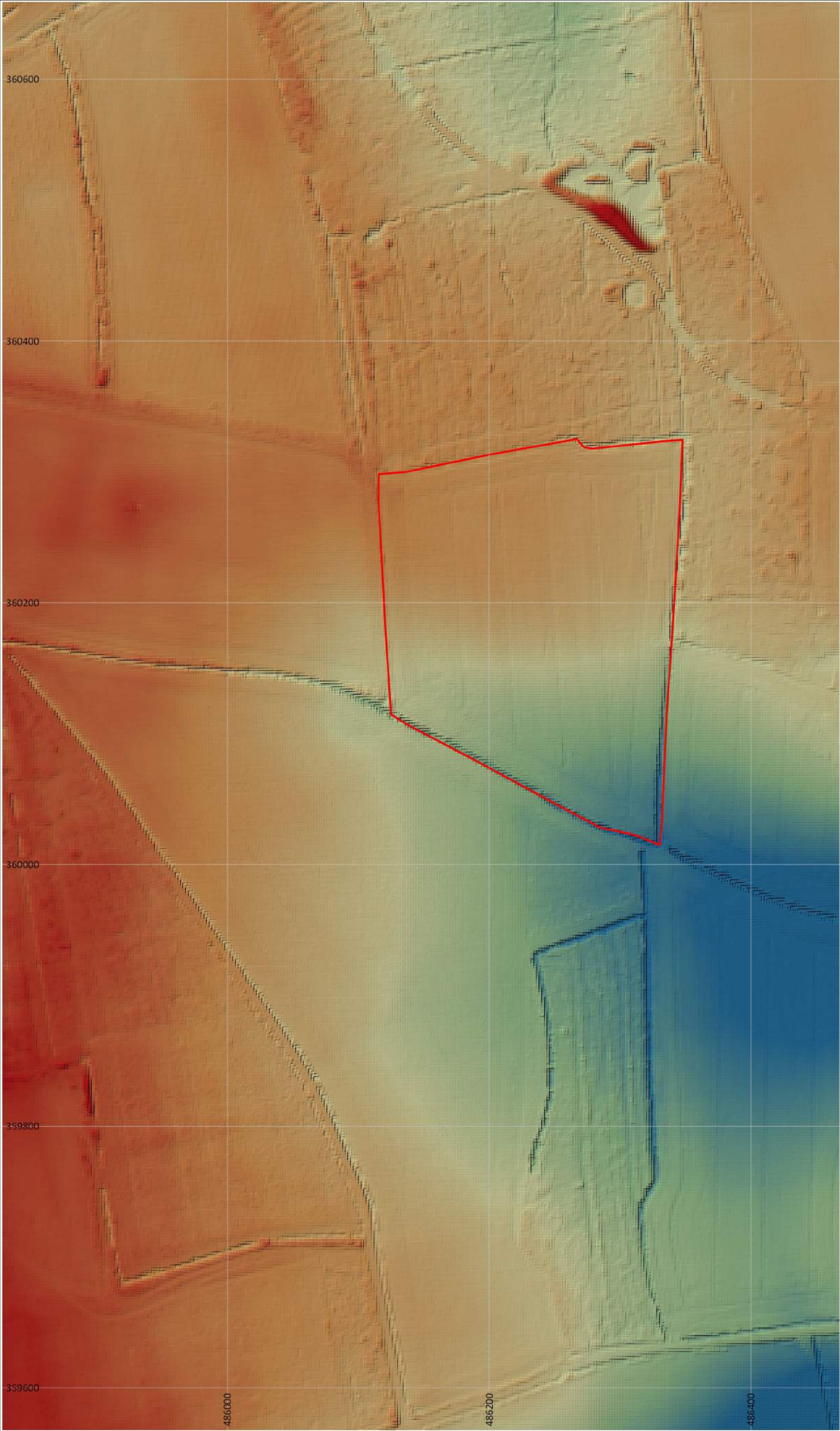
Allenarchaeology

Lincoln
Birmingham
Cambridge
Southampton

www.allenarchaeology.co.uk

Figure 7: Combined geophysics results for NDNR 20 and NDFL 20





N

Key

Height (m) OD

- 37
- 35.25
- 33.5
- 31.75
- 30

Site Code NDFL 20
Scale 1:3,000 @ A3
Drawn By R Evershed
Date 04/12/2020

Allenarchaeology

Lincoln
Birmingham
Cambridge
Southampton

www.allenarchaeology.co.uk

Figure 8: Site boundary superimposed over Lidar data





Allen Archaeology Limited
www.allenarchaeology.co.uk

Company Registered in England and Wales No: 6935529

Lincoln
Whisby Lodge
Hillcroft Business Park
Whisby Road
Lincoln
LN6 3QL
T: +44 (0) 1522 685356
E: info@allenarchaeology.co.uk

Northeast
1 Heathfield
Chester-le-Street
County Durham
DH2 2XN
T: +44 (0) 7710 099045
E: northeast@allenarchaeology.co.uk

Northwest
44 Little Lane
Longridge
Preston
PR3 3WS
T: +44 (0) 7710 099052
E: northwest@allenarchaeology.co.uk

West
Arion Business Centre
Harriet House
118 High Street
Birmingham
B23 6BG
T: +44 (0) 800 610 2545
E: birmingham@allenarchaeology.co.uk

East
Wellington House
East Road
Cambridge
CB1 1BH
T: +44 (0) 800 610 2550
E: cambridge@allenarchaeology.co.uk

South
International House
Southampton International Business Park
George Curl Way
Southampton
SO18 2RZ
T: +44 (0) 800 610 2555
E: southampton@allenarchaeology.co.uk