WYAS Archaeological Services

A47/A11 Thickthorn Junction

Hethersett

Norfolk

ENF143424

Geophysical Survey

Report no. 3121
April 2018

Client: Mott MacDonald Sweco Joint Venture

West Yorkshire Joint Services

A47/A11 Thickthorn Junction
Hethersett
Norfolk
ENF143424

Geophysical Survey

Summary

A cart-based geophysical (magnetometer) survey, covering approximately 17.5 hectares was undertaken on land within the vicinity of the Thickthorn Junction on the A47, Hethersett, Norfolk. Anomalies of archaeological origin have been recorded, some of which correspond to cropmarks. Possible archaeological anomalies have also been recorded which may be associated with ring ditches. A former field boundary has also been detected in the eastern part of the site which corresponds well with recorded boundaries on Ordnance Survey mapping. Responses associated with a gravel pit in the eastern part of the site are present. The archaeological potential of the site would be characterised as high in the north and low elsewhere.

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Archaeological
Services

Report Information

Client:	Mott MacDonald Sweco Joint Venture
Address:	22 Station Road, Cambridge, CB1 2JD
Report Type:	Geophysical Survey
Location:	Hethersett
County:	Norfolk
Grid Reference:	TG 1829 0515
Period(s) of activity:	?Prehistoric
Report Number:	3121
Project Number:	8234
Site Code:	AIP18
Event Number:	ENF143424
OASIS ID:	archaeol11-316373
Date of fieldwork:	March 2018
Date of report:	April 2018
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1 Introduction

Archaeological Services WYAS (ASWYAS) were commissioned by Mott MacDonald Sweco Joint Venture (the client), to undertake a geophysical (magnetometer) survey on land surrounding the Thickthorn Junction of the A47, near Hethersett, Norfolk. This is in advance of junction improvements as part of the A47 improvement programme. The survey was undertaken in line with current best practice (CIfA 2014; David *et al*. 2008) and also to the archaeological specification for geophysical survey prepared by the client on behalf of Highways England (MM 2018). There was a slight change in the survey areas from the original specification, due to the southern part of Thickthorn Park being recently planted with trees and design changes which meant that the areas around Cantley Stream were to be included. The survey was carried out between the 12th - 16th March 2018.

Site location, topography and land-use

The survey area is located at the Thickthorn Junction of the A47, Hethersett on the south western outskirts of Norwich (see Fig. 1). This section of the scheme comprises multiple small sites within the vicinity, bounded by Norwich Road (B1172) to the north, the A47 to the east and a railway line to the south. The survey area encompasses eight fields of varying ground conditions of arable and pastoral land. The areas total approximately 17.5 ha. The survey area is centred at TG 18296 05154. The height above Ordnance Datum (aOD) lies between 19m to 29m.

Soils and geology

The bedrock geology of the survey area predominantly belongs to the Lewes Nodular Chalk Formation. The sedimentary bedrock formed approximately 72 to 94 million years ago in the Cretaceous period. A variation of superficial deposits have been recorded over the survey area. The higher, north-eastern areas of the scheme are made up of the Lowestoft Formation, Diamicton. Whilst the southern portion of the survey area is overlain by the Sheringham Cliffs Formation comprising of sand and gravel deposits formed up to 3 million years ago (BGS 2018). The soils in the area are classified in the Burlingham association, characterised as stagnogleyic argillic brown soils, in addition to slightly acid loamy and clayey with impeded drainage (SSEW 1983).

2 Archaeological Background

Norfolk Historic Environment Record (NHER) data was provided by the client and has been marked on Figure 2. The following illustrates the wealth of archaeological monuments present both within and surrounding the proposed survey area.

To the west of the survey area, earthworks and cropmarks of an undated linear ditch and bank may suggest a possible post medieval drainage feature (NHER 54613).

A hollow way (NHER 11527) is visible as an earthwork and lies between survey areas. This is thought to be a former approach to Thickthorn Hall. Thickthorn Park (NHER 33732) lies within the survey area and is an early 19th-century landscaped park surrounding Thickthorn Hall. The park includes a medieval moat that was turned into an ornamental lake, a late 19th-century kitchen garden, early 19th-century lodges and concrete greenhouses from the 1930s.

To the south of 11527 lies NHER 18186 comprising cropmarks of linear ditches perhaps relating to the parish boundary, together with several possible fragmentary enclosures of an unknown date.

NHER number 54403 lies within the survey area consisting of cropmarks of possible field boundary ditches at right angles to each other as well as banks and a pit of unknown dates. NHER number 11820 also lies within the survey area and relates to a building of an unknown date. The building has internal divisions and is possibly a remnant of agricultural activity in the area.

A scheduled monument lies between the survey areas named as 'Two Tumuli in Big Wood', list entry 1003977. These consist of two Bronze Age round barrows (NHER 9463 and 9464) and both survive as earthworks.

Another possible large ring ditch (NHER 54618) lies to the southeast of the survey area and is visible on aerial photographs measuring approximately 28m in diameter.

To the north of the survey area lies a possible Bronze Age round barrow (NHER 9395) surviving as a low mound and visible as cropmarks. The mound measures approximately 24m in diameter with the ring ditch measuring 42m in external diameter. This ring ditch is situated within another HER monument (NHER 54404) which relates to cropmarks of possible prehistoric field boundaries, respecting the position of the round barrow.

To the immediate north of the survey area, surrounding the Thickthorn Junction lies NHER 9396 described as an undated enclosure or field system, prehistoric flint artefacts, Iron Age and Roman coins, medieval pottery sherds and a post-medieval seal.

South of the survey area NHER 54614 consists of cropmarks of a possible double ditched enclosure. It is possible that they represent medieval features and are perhaps associated with Cantley deserted medieval village, 100m to the south.

3 Aims, Methodology and Presentation

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of the development on potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to

be recommended. To achieve this aim, a magnetometer survey covering all amenable parts of the PDA was undertaken (see Fig. 2).

The general objectives of the geophysical survey were:

- Locate and identify the nature and extent of previously unknown archaeological features along the proposed route option;
- Establish whether any features associated with known archaeological remains can be traced within the current survey areas;
- Establish whether any remains identified during previous geophysical surveys can be traced continuing into the current survey areas;
- Establish the condition of any archaeological deposits, particularly their level of preservation; and,
- Identify any areas of modern disturbance.

Magnetometer survey

The survey was undertaken using a Sensys Magneto®MXPDA cart-based magnetometer system. This system has five FGM650 fluxgate gradiometers mounted at 0.5m intervals with readings of between ±0.1nT and ±10,000nT recorded at 20Hz. The gradiometers are linked to a Trimble R6 Real Time Kinetic (RTK) differential Global Positioning System (dGPS) allowing for the geo-referencing of all measurement points within ±1cm accuracy. The data is recorded by Sensys Magneto®MXPDA software on a Personal Data Assistant (PeDA) device and stored on a Secure Digital (SD) memory card within the PeDA. Terrasurveyor (DW Consulting) software was used to process and present the data. Further details are given in Appendix 1.

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays an overview of the processed magnetometer data at a scale of 1: 5000, with the overall interpretation, at the same scale in Figure 3. The minimally processed data, together with an interpretation of the survey results are presented in Figures 4 to 17 inclusive at a scale of 1:1250.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive. A copy of the completed OASIS form is included in Appendix 4. Repeat traverses of the data are included in Appendix 5.

The survey methodology, report and any recommendations comply with guidelines outlined by Historic England (David *et al.* 2008) and by the Chartered Institute for Archaeologists

(CIfA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

4 Results and Discussion (see Figures 4 to 17)

Modern anomalies

Ferrous anomalies, as individual 'spikes', or as large discrete areas are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution in this survey to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Areas of magnetic disturbance within Area 3 have been caused by metal fencing surrounding trees. A service pipe has been recorded in the west of Area 1 and also running along the western boundary of Area 6.

A large area of magnetic disturbance in the east of Area 8 appears to be a large area of dumping or made ground. Review of the 1995, 1:10,000 Ordnance Survey Map (OM 2018) shows this area to have been a gravel pit, likely to be associated with the construction of the A47.

Geological anomalies

The survey has detected a number of low magnitude anomalies in Areas 1 and 5 that have been interpreted as geological in origin. It is thought that the responses have been detected because of the variation in the composition and depth of the deposits of superficial material in which they derive and also topographical variations.

Agricultural anomalies

A former field boundary has been identified in Area 3 which appears on Ordnance Survey mapping dating from 1966 (OM 2018).

Magnetically strong linear responses in Area 6 correspond to small field divisions as marked on the digital mapping and seen in aerial images.

Parallel linear trends have been recorded in Areas 4 and 7 and are associated with modern cultivation, field drains can be seen in Areas 2 and 5.

Possible archaeological anomalies

A strong magnetic response (**P1**) has been identified in Area 4 (Figs 7-9) within the cluster of archaeological anomalies (**A1**, see below). A preferred interpretation for this is that it is the remains of a kiln, or an area of intense burning. It is also possible that it is a buried ferrous object of modern origin, therefore the interpretation must be viewed with caution.

Weak curvilinear trends have been detected within Area 7 (Figs 13-15) such as those at **P2**. It is possible that these represent ring ditches or possibly barrows given the nearby evidence of the known barrows to the south. These measure in diameter from 9m to 15m.

Archaeological anomalies

Archaeological anomalies can be seen in Area 4 (Figs 7-9) and consist of ditches, linear trends and pits. Cropmark evidence survives in this area which some of the anomalies correlate, as stated below.

Group of anomalies (**A1**) appear to form a rectilinear enclosure with a number of pit-like features located in and out of the enclosure. These features do not correspond to any cropmarks but are on the same alignment as the tentative building (NHER 11820) to the immediate north.

Ditches (**A2**) to the southeast of **A1** are part of the complex of possible field boundaries, some of which are visible as cropmarks on aerial photographs (NHER 54403). The geophysical survey has detected further anomalies to add to the known archaeology within the area.

5 Conclusions

The magnetic survey has detected anomalies of archaeological and possible archaeological origin, some of which correspond to cropmark evidence. These anomalies consist of enclosures, ditches, pits and possible ring ditches.

A former field boundary has been identified which corresponds to former mapping. A handful of field drains and services pipes have also been located. A large area of magnetic disturbance relates to a gravel pit, likely to be associated with the construction of the A47.

The survey has worked well on this geology and land-use and has detected anomalies of interest. Based upon the results of the survey, the archaeological potential of the site is considered to be high in the northern half and low elsewhere.

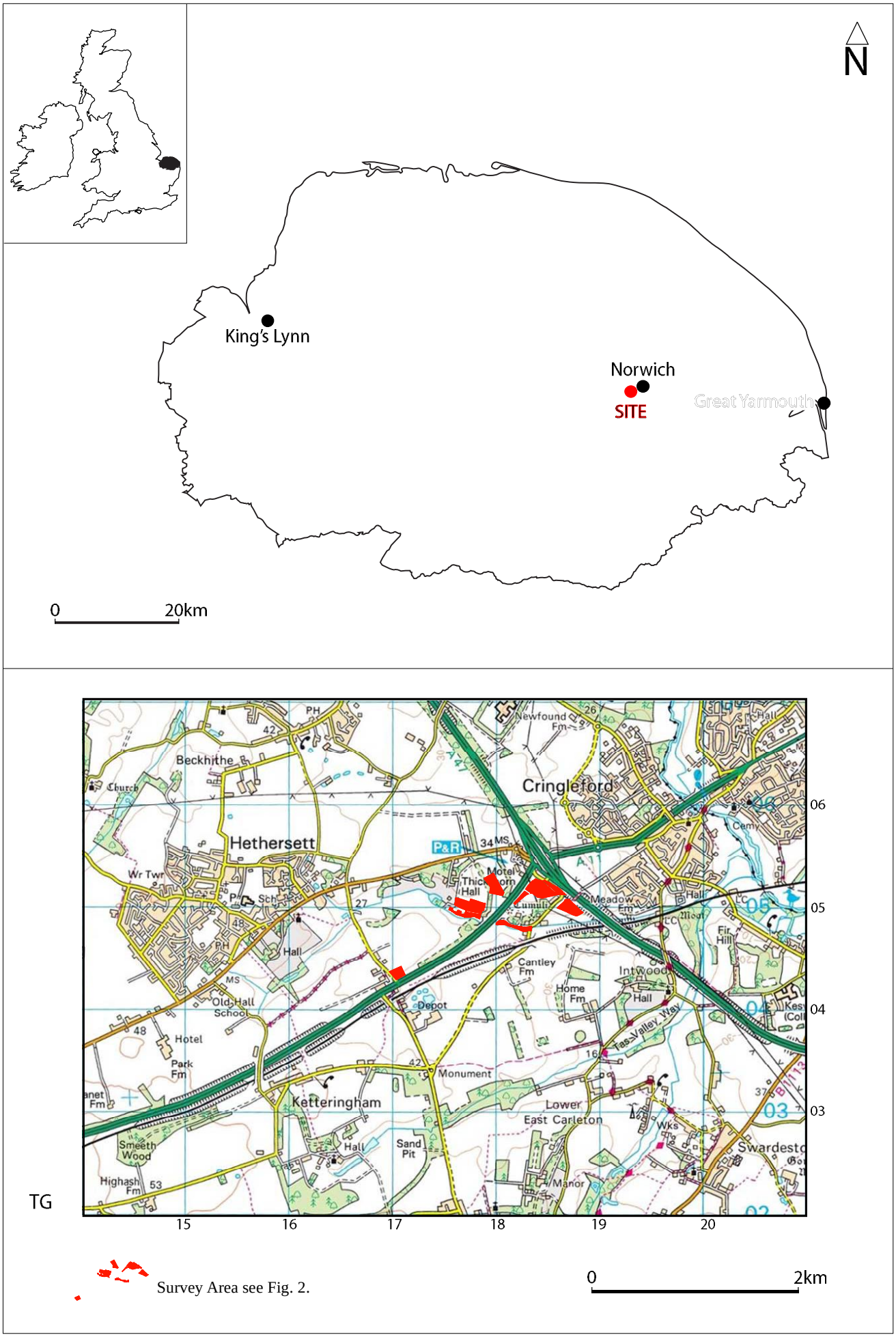

Fig. 1. Site location

PROJECT ID: 8234_AIP18: THICKTHORN

SURVEY AREA

LOCATION AND DIRECTION OF PLATES

LOCATION OF REPEAT TRAVERSE

AREA 1
SEE FIGS 4-5

AREAS 2 & 3
SEE FIGS 6-7

AREA 4
SEE FIGS 8-9

AREA 5
SEE FIGS 10-11

AREA 6
SEE FIGS 12-13

AREA 7
SEE FIGS 14-15

AREA 8
SEE FIGS 16-17

N

2.0

-1.0

nT

305000

617000

618000

0 200m

Fig. 2. Site location showing greyscale magnetometer data @ 1:5000

PROJECT ID: 8234_AIP18: THICKTHORN	
	SURVEY AREA
	CROPMARK DATA

AREA 4
SEE FIGS 8-9

AREA 7
SEE FIGS 14-15

AREA 8
SEE FIGS 16-17

AREAS 2 & 3
SEE FIGS 6-7

AREA 6
SEE FIGS 12-13

AREA 5
SEE FIGS 10-11

AREA 1
SEE FIGS 4-5

11820

54403

54613

9463

9464

11527

18186

54614

54618

N

3050 00

6170 00

6180 00

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	FORMER FIELD BOUNDARY
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	FORMER GRAVEL QUARRY
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?
	LINEAR TREND	ARCHAEOLOGY?
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY

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Fig. 3. Overall interpretation of magnetometer data, including client supplied cropmark data @ 1:5000

0 200m

Fig. 4. Processed greyscale magnetometer data: Area 1 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

N

TYPE OF ANOMALY		INTERPRETATION
•	DIPOLAR ISOLATED	FERROUS MATERIAL
——	DIPOLAR LINEAR	SERVICE PIPE
	MAGNETIC ENHANCEMENT	GEOLOGY

ard

Pond

ond

Station

4 Square

1to2

3

6 Station House

33.2m

A 11

5162 00

6170 00

6172 00

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0 50m

Fig. 5. Interpretation of magnetometer data: Area 1 (1:1000 @ A3)

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N

Pond

Pond

FB

2.0

-1.0

nT

305000

6176 00

6178 00

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0 50m

Fig. 6. Processed greyscale magnetometer data: Areas 2 and 3 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

N

3050 00

Pond

Pond

FB

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	FORMER FIELD BOUNDARY
	MAGNETIC ENHANCEMENT	GEOLOGY

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6176 00

6178 00

0 50m

Fig. 7. Interpretation of magnetometer data: Areas 2 and 3 (1:1000 @ A3)

Fig. 8. Processed greyscale magnetometer data: Area 4 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

Ward's Wood

N

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY?
	MAGNETIC ENHANCEMENT	ARCHAEOLOGY

A1

P1

A2

3052 00

6178 00

6180 00

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Tel: 0113 535 0163

0 50m

Fig. 9. Interpretation of magnetometer data: Area 4 (1:1000 @ A3)

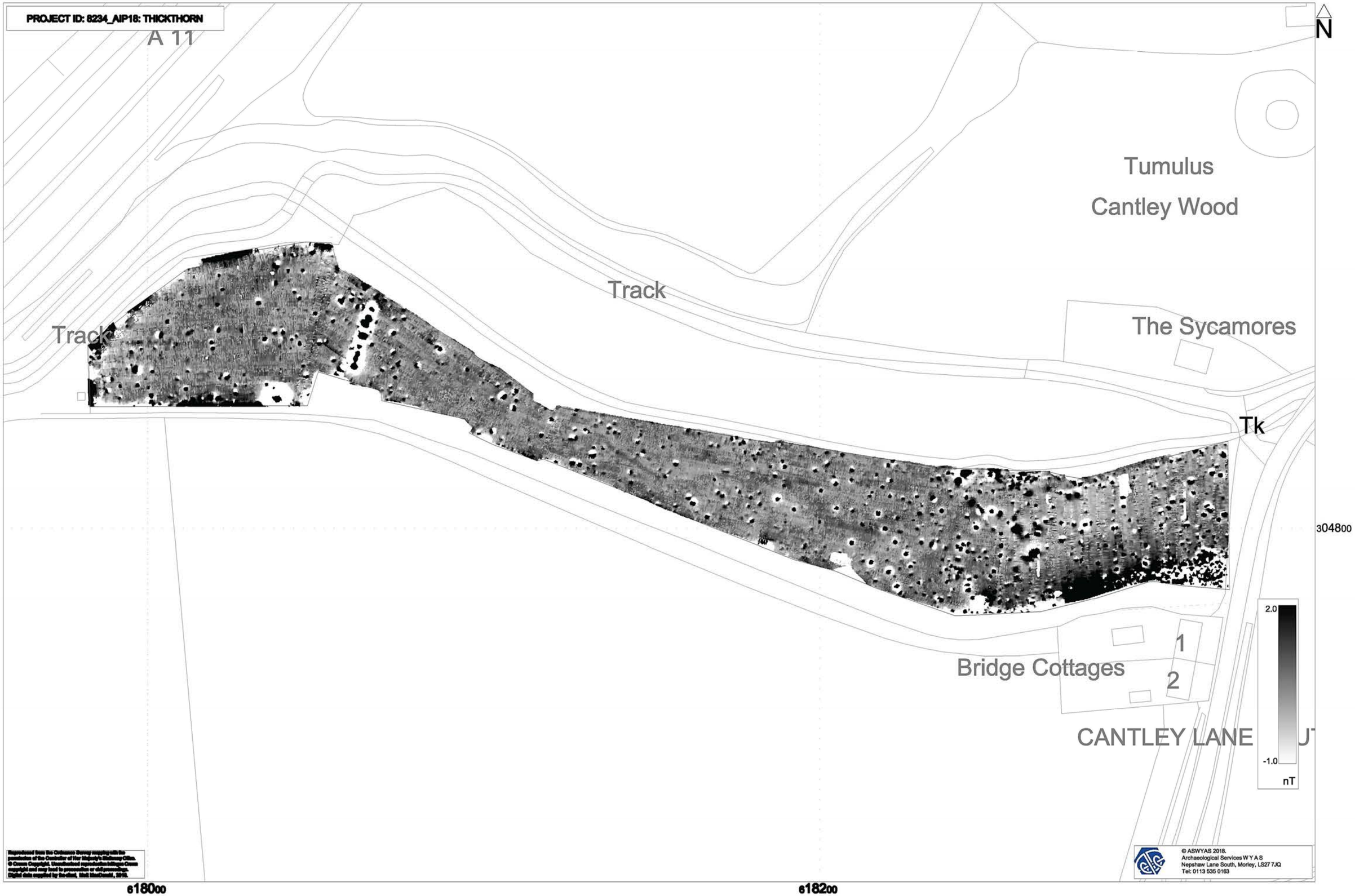
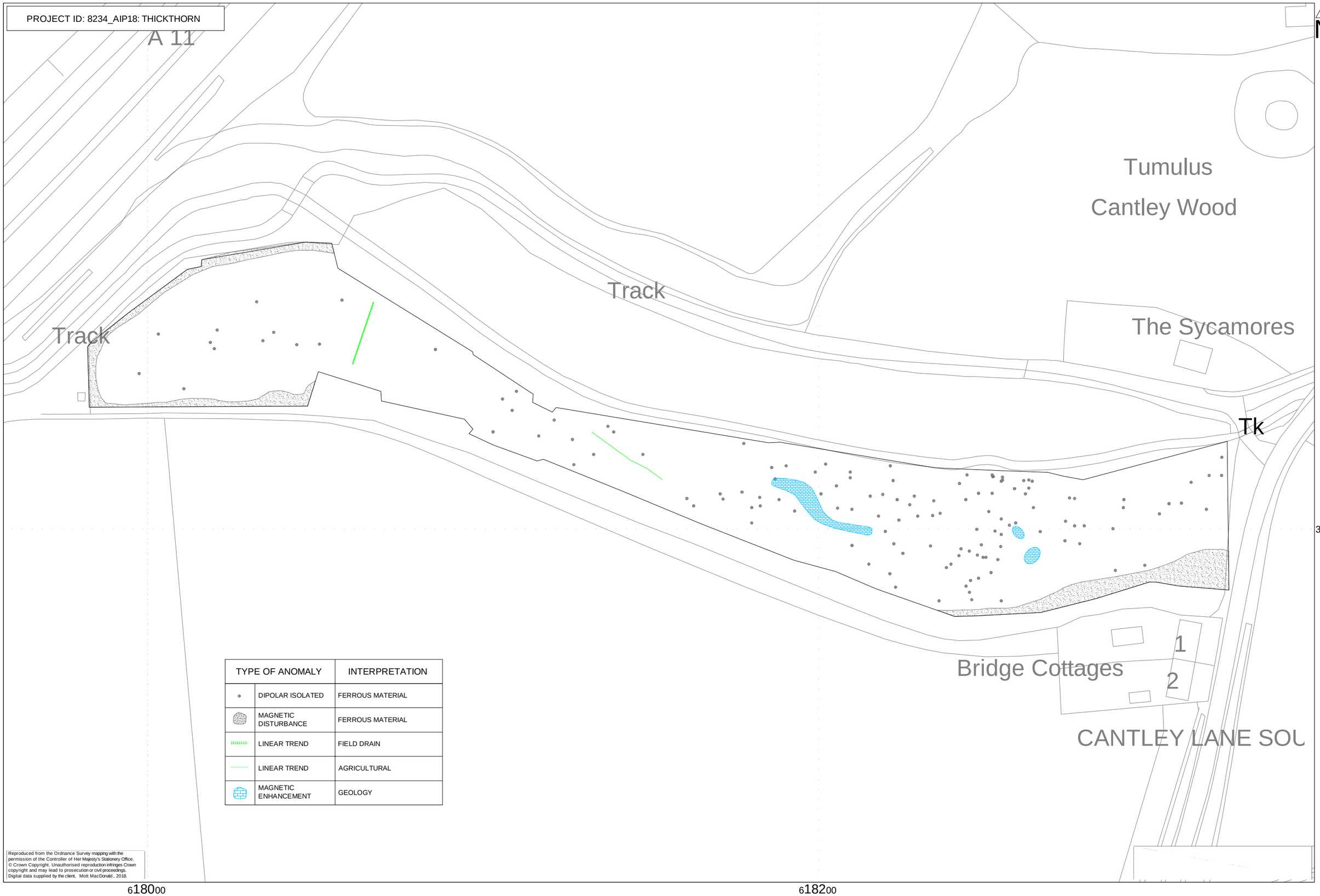


Fig. 10. Processed greyscale magnetometer data: Area 5 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN



TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	FIELD DRAIN
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	GEOLOGY

Fig. 11. Interpretation of magnetometer data: Area 5 (1:1000 @ A3)

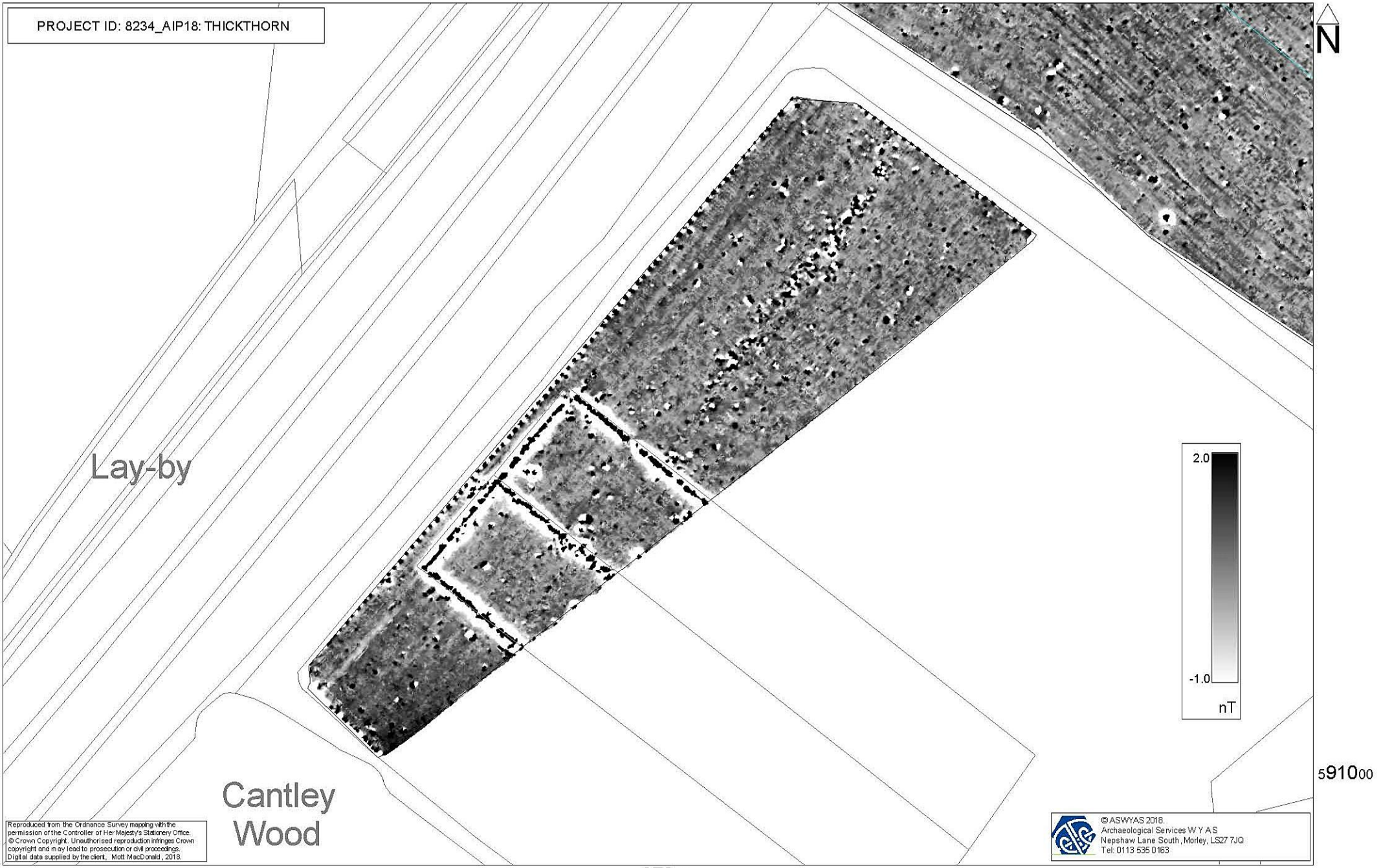


Fig. 12. Processed greyscale magnetometer data; Area 6 (1:1000 @ A4)

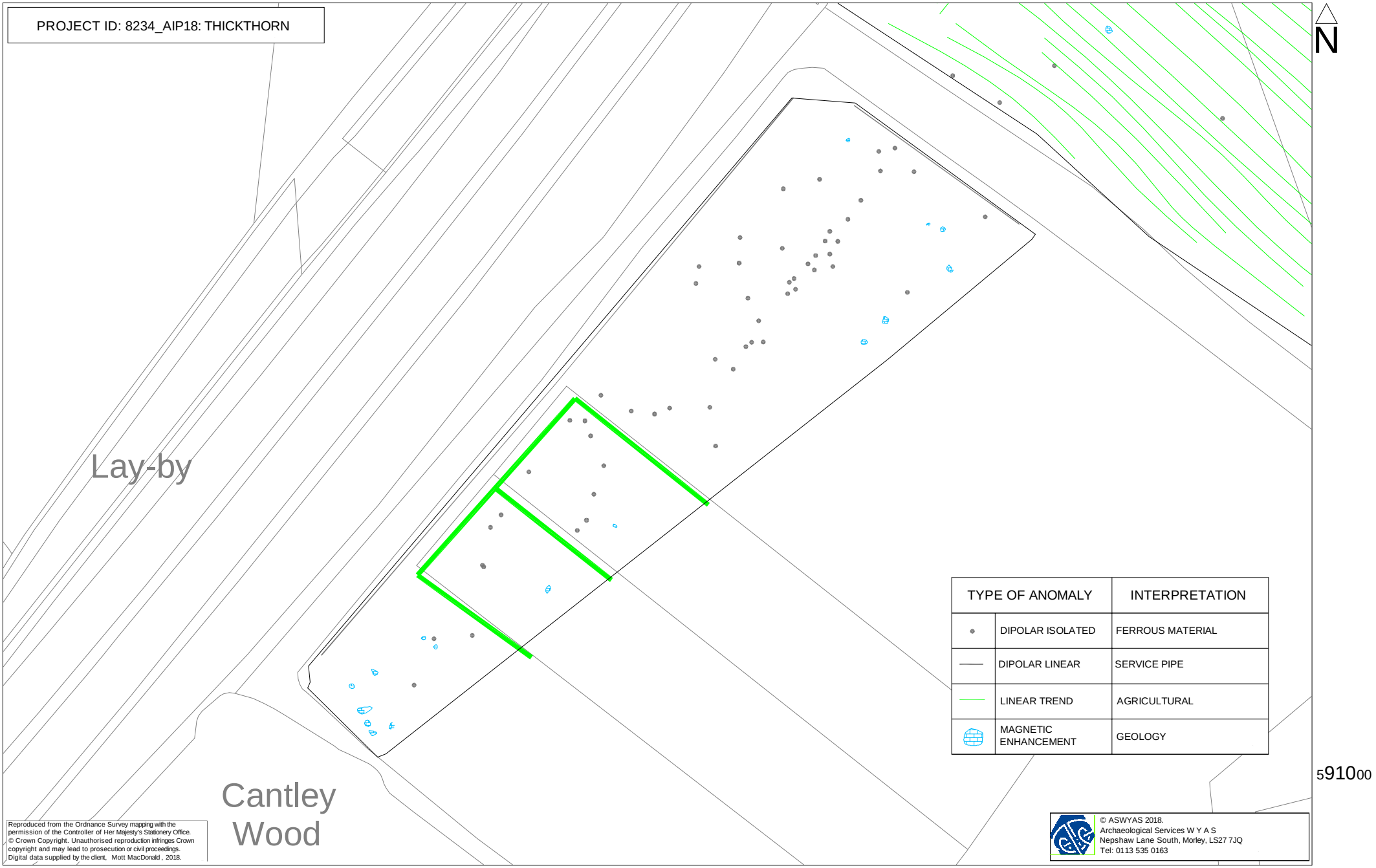


Fig. 13. Interpretation of magnetometer data; Area 6 (1:1000 @ A4)

PROJECT ID: 8234_AIP18: THICKTHORN

N

Path (um)

ED & Ward Bdy

d Bdy

305200

2.0

-1.0

nT

102

112

SOUTH CANTLEY LANE

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618400

618600

0 50m

Fig. 14. Processed greyscale magnetometer data: Area 7 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC DISTURBANCE	FERROUS MATERIAL
	LINEAR TREND	AGRICULTURAL
	MAGNETIC ENHANCEMENT	GEOLOGY
	LINEAR TREND	ARCHAEOLOGY?

N

Track

ED & Ward Bdy

d Bdy

P2

102

112

SOUTH CANTLEY LANE

3052 00

6184 00

6186 00

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Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 535 0163

0 50m

Fig. 15. Interpretation of magnetometer data: Area 7 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

N

112 SOUTH CANTLEY LANE

FB

124

Tre

305000

2.0

-1.0

nT

20.1m

ack

ETL

Track

Fishing Lake

FB

Pond

Archaeological Services WYAS
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Tel: 0113 535 0163

618600

618800

0 50m

Fig. 16. Processed greyscale magnetometer data: Area 8 (1:1000 @ A3)

PROJECT ID: 8234_AIP18: THICKTHORN

TYPE OF ANOMALY		INTERPRETATION
	DIPOLAR ISOLATED	FERROUS MATERIAL
	MAGNETIC ENHANCEMENT	GEOLOGY
	MAGNETIC ENHANCEMENT	FORMER GRAVEL QUARRY

N

112

SOUTH CANTLEY LANE

FB

124

Track

3050 00

20.1m

ack

ETL

Track

Fishing Lake

FB

Pond

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6186 00

6188 00

0 50m

Fig. 17. Interpretation of magnetometer data: Area 8 (1:1000 @ A3)

Plate 1. General view of Area 1, looking east

Plate 2. General view of Area 2, looking west

Plate 3. General view of Area 3, looking west

Plate 4. General view of Area 4, looking northeast

Plate 5. General view of Area 5, looking east

Plate 6. General view of Area 6, looking northeast

Plate 7. General view of Area 7, looking southeast

Appendix 1: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility of the topsoil because of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Gradiometer Survey

The magnetometer survey was undertaken using a Sensys Magneto MXPDA cart-based instrument. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording between 0.1nT and 10,000nT. They are linked to a Trimble R6 RTK dGPS system with data recorded by Sensys Magneto MXPDA software on a rugged PDA device. The data was stored on an SD memory card

within the PDA and later downloaded to a computer for processing and interpretation. MAGNETO (Sensys Gmbh) software was used to process and present the data

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in processed greyscale format. The data in the greyscale images has been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

MAGNETO was used to produce the greyscale images. All greyscale plots are displayed using a linear incremental scale.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits

Appendix 2: Survey location information

An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The data was geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better than 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

Appendix 3: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS6 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the Norfolk Historic Environment Record).

Appendix 4: Oasis form

OASIS DATA COLLECTION FORM: England

OASIS ID: archaeol11-316373

Project details

Project name	A47/A11 Thickthorn Junction
Short description of the project	A cart-based geophysical (magnetometer) survey, covering approximately 17.5 hectares was undertaken on land within the vicinity of the Thickthorn Junction on the A47, Hethersett, Norfolk. Anomalies of archaeological origin have been recorded, some of which correspond to cropmarks. Possible archaeological anomalies have also been recorded which may be associated with ring ditches. A former field boundary has also been detected in the eastern part of the site which corresponds well with recorded boundaries on Ordnance Survey mapping. Responses associated with a gravel pit in the eastern part of the site are present. The archaeological potential of the site would be characterised as high in the north and low elsewhere.
Project dates	Start: 12-03-2018 End: 16-03-2018
Previous/future work	No / Not known
Any associated project reference codes	8234 - Sitecode
Any associated project reference codes	54403 - Related HER No.
Any associated project reference codes	11820 - Related HER No.
Any associated project reference codes	ENF143424 - HER event no.
Type of project	Field evaluation
Monument type	RING DITCH Bronze Age
Monument type	HOLLOW WAY Medieval
Monument type	FIELD BOUNDARIES Late Prehistoric
Significant Finds	?RING DITCHES Uncertain
Significant Finds	DITCHES Uncertain
Methods & techniques	"Geophysical Survey"
Development type	Road scheme (new and widening)

Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Not known / Not recorded
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	SAND AND GRAVEL OF UNCERTAIN AGE OR ORIGIN
Techniques	Magnetometry

Project location

Country	England
Site location	NORFOLK SOUTH NORFOLK HETHERSETT A47/A11 Thickthorn Junction
Study area	17.5 Hectares
Site coordinates	TG 1829 0515 52.599726227778 1.223741812966 52 35 59 N 001 13 25 E Point
Height OD / Depth	Min: 19m Max: 29m

Project creators

Name of Organisation	Archaeological Services WYAS
Project brief originator	Mott MacDonald
Project design originator	Mott MacDonald
Project director/manager	E Brunning
Project supervisor	C. Sykes

Project archives

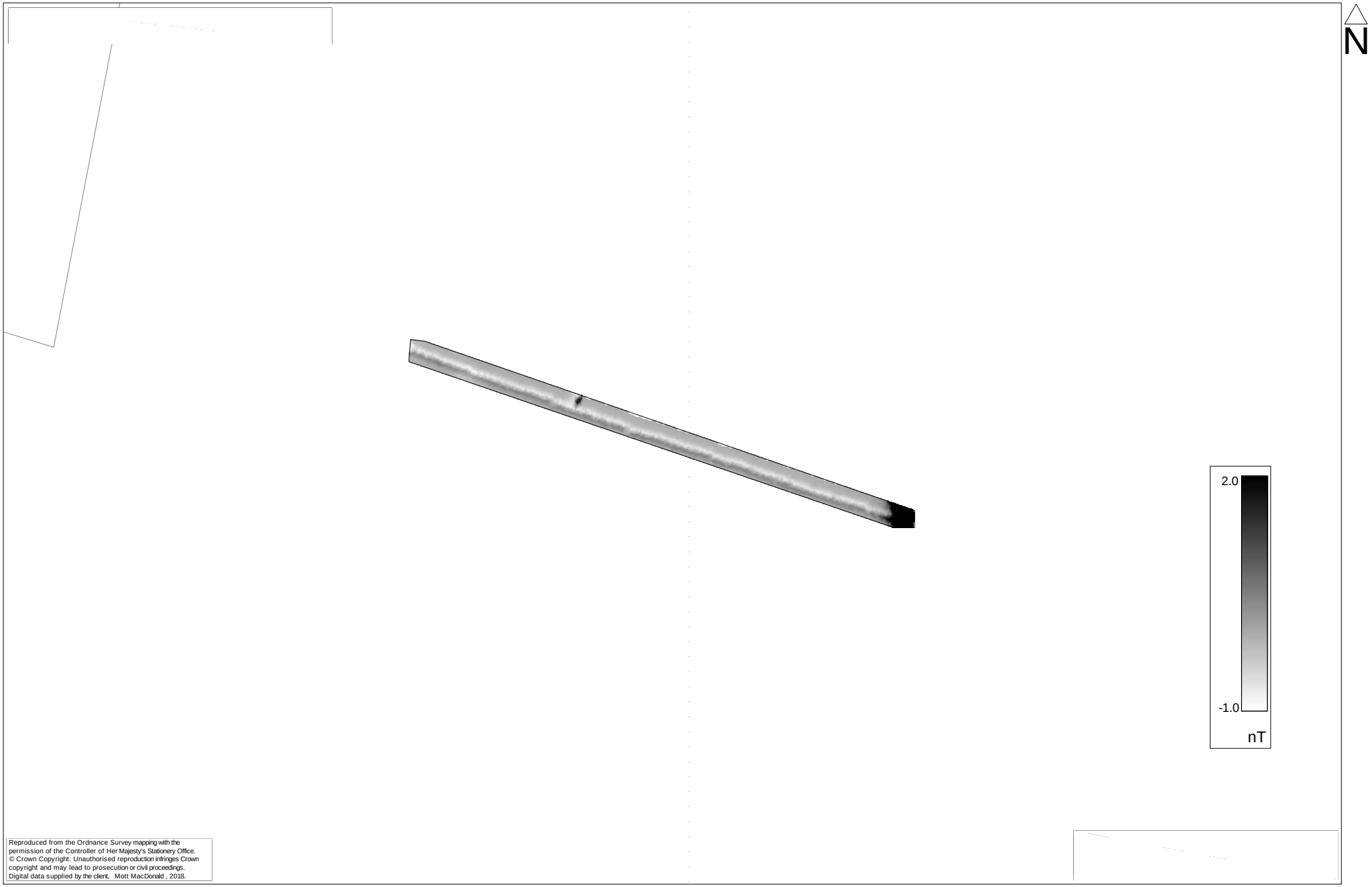
Physical Archive Exists?	No
Digital Archive recipient	Mott MacDonald
Digital Contents	"Survey"
Digital Media available	"Geophysics","Images raster / digital photography","Survey","Text"
Paper Archive Exists?	No

Project bibliography 1

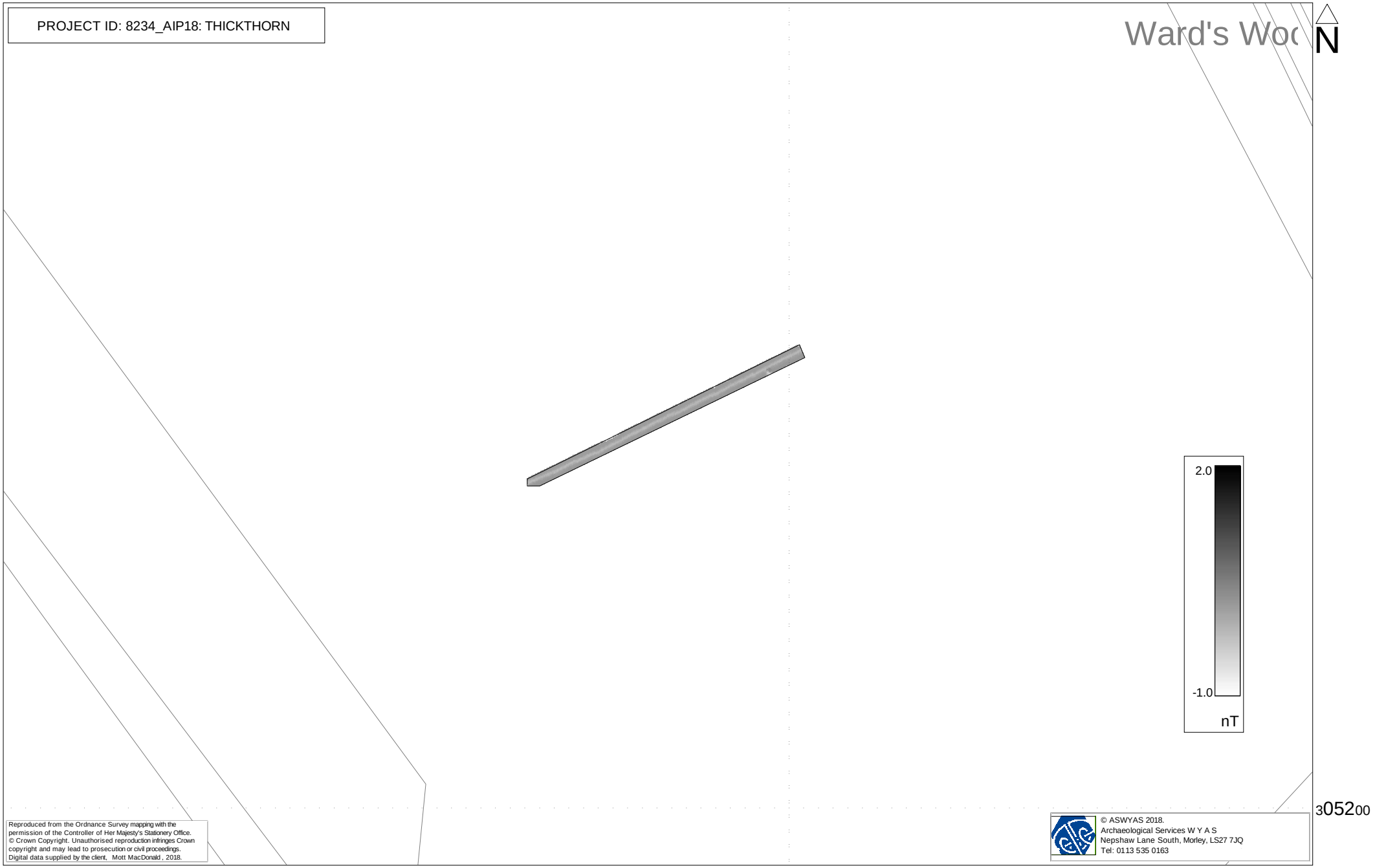
Publication type	Grey literature (unpublished document/manuscript)
Title	A47/A11 Thickthorn Junction, Hethersett
Author(s)/Editor(s)	Bruning, E
Date	2018
Issuer or publisher	ASWYAS
Place of issue or publication	Leeds

Appendix 5: Repeat tracks

Appendix 5. Repeat track; Area 1 (1:1000 @ A4)

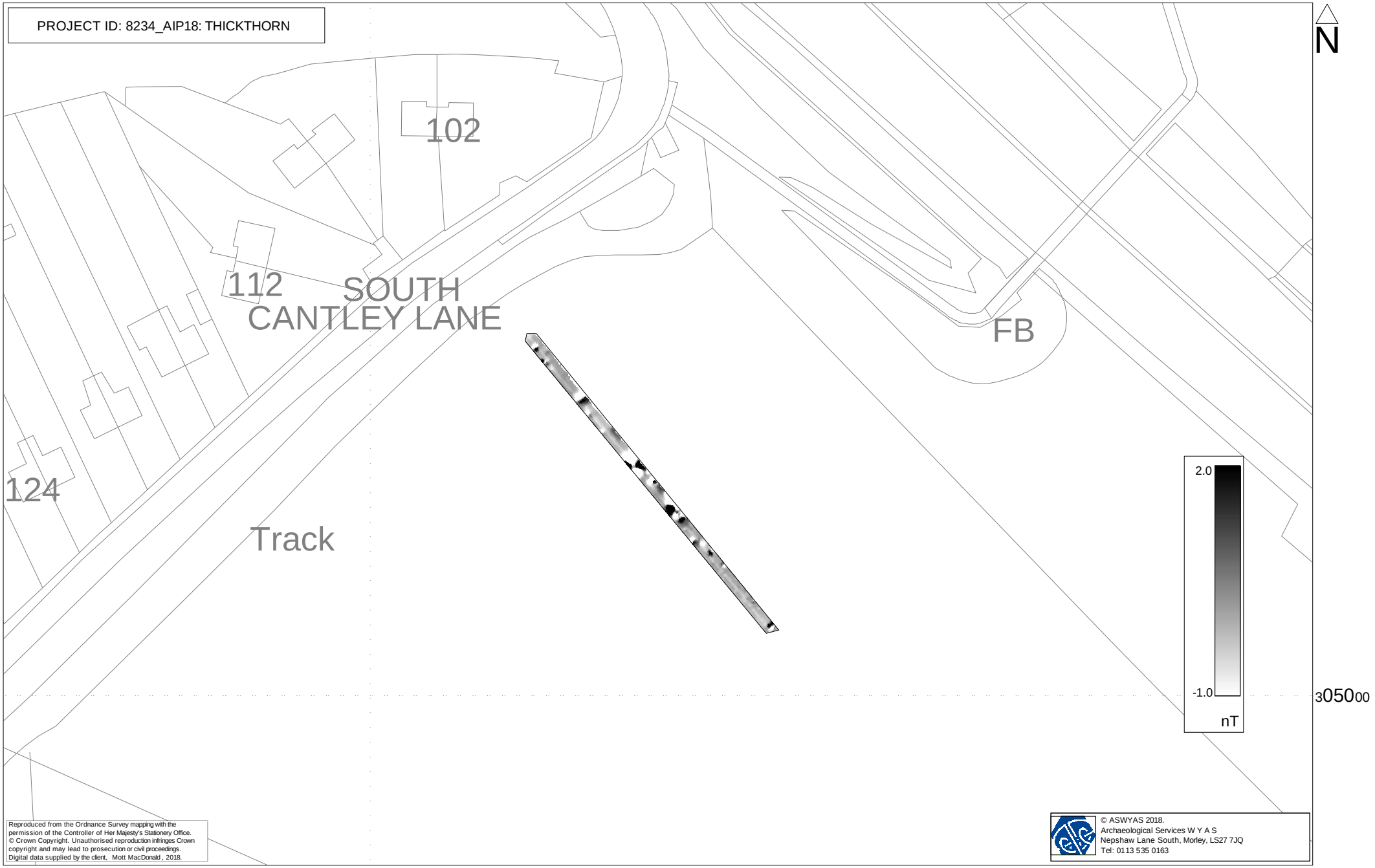


Appendix 5. Repeat track; Area 3 (1:500 @ A4)



Appendix 5. Repeat track; Area 4 (1:1000 @ A4)

Appendix 5. Repeat track; Area 7 (1:1000 @ A4)



Appendix 5. Repeat track; Area 8 (1:1000 @ A4)

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