ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
Swaledale and Arkengarthdale Archaeology Group

Grinton Mound East and Cogden Hall Swaledale North Yorkshire

geophysical surveys

report 2959
(revised) February 2013

Durham University

Contents

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1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted at two archaeological sites in Swaledale, North Yorkshire. The works comprised earth resistance survey and ground penetrating radar (GPR) survey at Grinton Mound East and Cogden Hall to complement the results of earlier geomagnetic surveys.

1.2 The works were commissioned by Swaledale and Arkengarthdale Archaeology Group (SWAAG) and conducted by Archaeological Services Durham University with SWAAG members.

Results

1.3 The surveys combined training for members of SWAAG and continued research into the historic landscape of Swaledale.

1.4 Initial geomagnetic survey of Grinton Mound East suggested two concentric defensive ditches and possible stone banks. Earth resistance and ground penetrating radar (GPR) surveys have enabled further interpretation and it now appears that the enclosure at Grinton Mound East comprises two stone revetment walls with a large defensive ditch between them. A single entrance to this enclosure is apparent at the east side. The remains of at least one stone-founded circular structure have been detected within the enclosure, with the possible presence of others, and surfaces or rubble across much of the interior of the enclosure. It is considered likely that the surviving earthworks and geophysical anomalies at Grinton Mound East reflect the remains of a significant defended settlement.

1.5 A double walled, or at least revetted, rectilinear enclosure has been surveyed at Cogden Hall. At least one long-house survives within the enclosure.

1.6 Targeted trial trenching and/or excavation of some of the features identified at both sites has the potential to enhance our understanding of the surviving archaeological deposits.

2. Project background

Location (Figure 1)

2.1 Geophysical surveys were conducted at two sites in Swaledale, North Yorkshire. The first was at Grinton Mound East which is situated just east, south of the River Swale (NGR: SE 05032 98465); the second was at Cogden Hall situated south of the B6270, south-east of Grinton (NGR centre: SE 05673 97813).

Objective

2.2 Geomagnetic surveys have already identified a number of sub-surface features of potential archaeological significance at each site (ASDU 2012a). The aim of this phase of works was to increase the understanding of the extent and nature of these features as part of ongoing research by the Swaledale and Arkengarthdale Archaeology Group (SWAAG). An additional aim was to provide geophysical survey training to SWAAG members.

Methods statement

2.3 The geophysical surveys were undertaken in accordance with a project design prepared by Archaeological Services Durham University, and to national standards and guidance (below, para. 5.1).

Dates

2.4 Fieldwork was undertaken on 25th and 26th June 2012. This report was originally prepared in August 2012 and revised in February 2013.

Personnel

2.5 Fieldwork was conducted by Duncan Hale, Natalie Swann and Richie Villis with members of SWAAG. The geophysical data were processed by Richie Villis and Duncan Hale. This report was prepared by Richie Villis, with illustrations by Janine Watson, and subsequently revised by Duncan Hale, the Project Manager.

Archive/OASIS

2.6 The site codes are **SGM12** for **S**waledale **G**rinton **M**ound East 20**12** and **SCH12** for **S**waledale **C**ogden **H**all 20**12**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (**OASIS**). The OASIS ID number for this project is **archaeol3-130284**.

Acknowledgements

2.7 Archaeological Services is grateful for the assistance of SWAAG, the Yorkshire Dales National Park Authority (YDNPA) and the landowners in facilitating this scheme of works.

3. Historical and archaeological background

3.1 Grinton Mounds sit on the floodplain on the south side of the River Swale and consist of two glacial terminal moraine mounds that have been modified by man. The mounds have been known by various names including Ox Hill, Grinton How, and Grinton Fort. The mounds appear to have been fortified but no archaeological

investigations have been conducted to establish the date of these features and they have been interpreted as everything from prehistoric to medieval.

3.2 The western mound is the site of a 'Cold War' Royal Observer Corps bunker used from 1965 to 1991. Although most of the exterior of the mound appears to be intact the presence of the bunker would have an adverse effect on a geomagnetic survey and its construction may have impacted on any archaeological remains; this mound was therefore excluded from the present study.

3.3 An earthwork survey of the field east of Cogden Hall conducted by SWAAG identified a number of earthworks of probable archaeological origin suggesting multiple phases of occupation. Cogden Hall itself is a Grade II listed building.

3.4 Geophysical surveys have previously been conducted by Archaeological Services and SWAAG at both Grinton Mound East and Cogden Hall (Archaeological Services 2012a). The results are summarised below.

3.5 A series of defensive ditches and stone banks was identified at Grinton Mound East, enclosing an area of approximately 40m by 40m. Within this enclosure a number of possible structures were provisionally identified. External features, such as possible trackways and ditches, were also identified. It is considered likely that the surviving earthworks and geophysical anomalies detected at Grinton Mound East reflect the remains of a significant fortified settlement. Sub-surface archaeology outside the earthworks, especially to the south, may have been impacted upon by later landscaping activity, specifically in the use of this area as a golf course.

3.6 Several features were detected at Cogden Hall, where a number of geomagnetic anomalies complemented previously recorded earthworks. Series of enclosures and concentrations of fired or ferrous debris, possibly reflecting occupation or small-scale industrial activity, were identified. A modern service was detected.

4. Landuse, topography and geology

4.1 At the time of the survey both sites were sheep and cow-grazed pasture.

4.2 Grinton Mounds sit on the floodplain south of the River Swale at a mean elevation of approximately 185m OD. The Grinton Mounds consist of two terminal moraine mounds that appear to have been modified by man as defensive structures. Survey was conducted over the east mound, which comprises a flat rectangular area enclosed by an earth bank. Beyond the bank there is a step down and a further earth bank. The mound is bounded by very steep slopes on the north and west sides. The earthworks are most visible on the north, west and south sides of the mound; on the eastern side there is a more gradual slope.

4.3 The site at Cogden Hall is situated on a north-facing hillside, which slopes from 200m OD at the Hall down to approximately 180m OD at the B6270 road in the north. The survey was conducted over a probable enclosed settlement platform east of the Hall.

4.4 The underlying solid geology at both sites comprises limestone and subordinate sandstone of the Alston Formation, overlain by glaciofluvial deposits of sand and gravel.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists (IfA) *Standard and Guidance for archaeological geophysical survey* (2011); the IfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Guide to Good Practice: Geophysical Data in Archaeology* (Schmidt & Ernenwein 2011).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 Previous geomagnetic survey at both sites (Archaeological Services 2012a) has identified probable archaeological remains including cut features such as ditches and pits, and other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths).

5.4 Given the anticipated depth and nature of the targets, two further geophysical techniques were considered appropriate: earth electrical resistance survey and ground-penetrating radar (GPR) survey.

5.5 Earth electrical resistance survey can be particularly useful for mapping stone features and can also detect soil-filled features in certain conditions. When a small electrical current is injected through the earth it encounters resistance which can be measured. Since resistance is linked to moisture content and porosity, stone features will typically give relatively high resistance values while soil-filled features, which often retain more moisture, will provide relatively low resistance values.

5.6 GPR generates a short high-frequency radar pulse which is transmitted into the ground via an antenna; the energy is reflected by buried interfaces and the return signal is received by a second antenna. The amplitude of the return signal relates to the electromagnetic responses of different sub-surface materials and conditions, which can be features of archaeological interest. The time which elapses between the transmission and return of energy to the surface can be used to provide depth information.

Field methods

5.7 A 20m grid was established across each area for the resistance survey and tied-in to known, mapped Ordnance Survey points and the National Grid using a Leica TS15i total station survey instrument.

5.8 Measurements of earth electrical resistance were determined using Geoscan RM15D Advanced resistance meters and MPX15 multiplexers with a mobile twin probe separation of 0.5m. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was 0.1ohm, the sample interval was 0.5m and the traverse interval was 1m, thus providing 800 sample measurements per 20m grid unit.

5.9 Data were downloaded on site into laptop computers for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

5.10 The GPR survey was conducted using a Malå Ramac X3M radar unit with 500MHz antenna. Returned energy wavelets were recorded from many depths in the ground to produce a series of reflections generated at one location, called a reflection trace. At Grinton Mound East data traces were collected at 50mm intervals along transects in a 60m x 60m grid. At Cogden Hall a 20m x 13m grid was established over a probable medieval long-house. Data traces were logged at 0.1m intervals along traverses 1m apart; two sets of data were collected along two sets of perpendicular traverses, which were then combined to form one dataset.

Data processing

5.11 The GPR transects for Grinton Mound East were imported into the Malå Geoscience Object Mapper v.1.0.13 software and a selection are presented as greyscale profiles in Figure 12. At Cogden Hall a Malå Ramac XV11 unit was used to process the GPR data and to stack the resulting radar profiles to create a 3D model. The model has then been sampled horizontally to view the results in plan form at different depths, known as time-slices. Samples of the data are presented as time-slices and profiles in Figure 22.

5.12 Geoplot v.3 software was used to process the resistance data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The geomagnetic surveys have also been reviewed and reassessed in light of the resistance and GPR surveys.

5.13 The greyscale images, filtered data, shaded relief plots, trace plots and interpretations are presented in Figures 2-13 (Grinton) and 14-23 (Cogden). In the greyscale images, positive magnetic/high resistance anomalies are displayed as dark grey, while negative magnetic/low resistance anomalies are displayed as light grey. Palette bars relate the greyscale intensities to anomaly values in nT/ohm as appropriate. Palette bars with the filtered images relate the greyscale intensities to standard deviations rather than absolute values.

5.14 The following basic processing functions have been applied to the resistance data:

clip	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
add	adds or subtracts a positive or negative constant value to defined blocks of data; used to reduce discontinuity at grid edges
despike	locates and suppresses spikes in data due to poor contact resistance
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

5.15 The following filter has been applied to the resistance data (Figures 7-8, 17-18):

low pass filter	(applied with Gaussian weighting) to remove high frequency, small-scale spatial detail, such as near surface rubble and rock; for enhancing larger weak features

5.16 The following filter has been applied to the geomagnetic data (Figures 3-4):

low pass filter	(applied with Gaussian weighting) to remove high frequency, small-scale spatial detail, such as some near-surface ferrous debris; for enhancing larger weak features

Interpretation: anomaly types

5.17 Colour-coded geophysical interpretation plans are provided. Two types of resistance anomaly have been distinguished in the data:

high resistance	regions of anomalously high resistance, which may reflect foundations, tracks, paths and other concentrations of stone or brick rubble
low resistance	regions of anomalously low resistance, which may be associated with soil-filled features such as pits and ditches

Interpretation: features

5.18 Colour-coded archaeological interpretation plans combining the geomagnetic, resistance and GPR data are provided in Figure 13 (Grinton) and Figure 23 (Cogden).

Grinton Mound East

5.19 An 80m x 60m resistance survey grid was established across the interior of the enclosure, extending eastwards. GPR data was collected along 1m transects across a 60m x 60m grid over the interior of Grinton Mound East.

5.20 The geomagnetic survey identified three concentric sub-rectangular anomalies. The central, stronger magnetic anomaly broadly corresponds to a region of low electrical resistance. This is likely to reflect an organic ditch fill, which would account for the relatively strong and even magnetic response.

5.21 The inner and outer concentric features have also been identified in the earth resistance data. At the north edge of the resistance survey a broad linear band of anomalously high resistance has been detected. This corresponds to an earthwork bank on the ground and to the northern magnetic anomaly previously interpreted as a possible soil-filled feature. This is likely to reflect a region of stonework, either a revetment or wall footing and/or tumble. After further analysis and review of the geomagnetic data the feature here is made up of closely spaced individual dipolar magnetic anomalies. Sandstone in particular can have a ferrous content which could produce a similar magnetic response as has been noted on sites with similar geology, such as Hagg Farm Site 101 (Archaeological Services 2012b) and the North Pennines Settlements project near Alston (Archaeological Services 2012c). Similar magnetic anomalies were also detected around the southern and eastern sides of the large ditch, which also broadly correspond to an earthwork and high resistance values, again probably reflecting stonework.

5.22 Relative increases in resistance have been identified along the east edge of the enclosure. These may reflect stonework along the edge of the ditches identified in the magnetic data. An entrance in the eastern side of the enclosure is clearly defined in the magnetic data, as is a north-west/south-east aligned trackway associated with the entrance. A similarly aligned region of high resistance has been identified, which may reflect stone or rubble track surfacing or compacted earth. Beyond the enclosure entrance the resistance data in this area is generally low, possibly reflecting a natural drainage change in the soils as the land slopes away to the east.

5.23 The *c*.10m diameter sub-circular positive and dipolar magnetic anomaly detected in the north-east corner of the enclosure broadly corresponds to a region of high resistance. This is similar in characteristics to the anomalies that make up the stone revetments or walls around the enclosure. The dipolar magnetic nature of the anomaly may reflect stonework, which would be consistent with the high resistance anomalies. Other magnetic anomalies originally tentatively interpreted as roundhouses have not been identified in the resistance data, since the majority of the interior of the enclosure is characterised by high resistance values which probably reflect stone or compacted earth surfaces.

5.24 The north-east/south-west aligned possible former land boundary has been detected in the resistance data as an intermittent band of higher resistance. This may reflect a stone component of the feature.

5.25 A narrow, linear, low resistance anomaly has been detected crossing the enclosure from west to east, possibly continuing eastward beyond the enclosure. This appears to cut through the high resistance anomalies and is not evident in the geomagnetic data. It is considered likely that this reflects the location of a more recent near-surface intrusion, such as a land drain or cable trench.

5.26 Radar profiles across Grinton Mound East show large concentrations of hyperbolic reflections up to depths of *c*.0.4m. It is considered likely that the vast majority of these reflections are from stone and rubble across the site. The suggested stone revetments are visible as concentrations of hyperbolic reflectors in the profiles. A slight parabola is visible to a depth of *c*.0.85m which almost certainly reflects the enclosure ditch. Hyperbolic reflections in the radar data are also visible in all the

profiles which crossed the circular feature (Figure 9, Profiles 2 & 3). These almost certainly reflect the stone-built component of this structure.

5.27 It is considered likely that Grinton Mound East is a defended settlement. Relatively few features have been identified within the enclosure. Although the probable location of one stone-built circular feature has been identified, the evidence for others is less convincing. If these circular features prove to be roundhouses then Grinton Mound East would be more likely to be a Romano-British settlement than a Roman military marching camp. If this were the case it may represent a defended centre for the nearby Romano-British farming settlements, such as at West Hagg. However, if the circular feature were to be the foundation of a turret or watch tower, offering views of the dale to both east and west, it might suggest a military presence at Grinton Mounds.

Cogden Hall

5.28 An 80m x 60m resistance survey grid was established across a probable enclosure system and building platforms (within the southern part of the geomagnetic survey Area 2), with GPR data collected across a 20m x 13m grid over a probable long-house earthwork.

5.29 The GPR survey has not been particularly useful in defining the probable building but it was useful to be able to demonstrate the technique to SWAAG members. The survey has detected reflectors over a broadly rectangular area corresponding to the earthworks. The somewhat irregular nature of the reflections will in part be due to the presence of wall tumble over the actual wall-footings. The time-slice plot in Figure 22 is a plan view at an estimated 0.28m depth.

5.30 The building was aligned north-east/south-west and measured approximately 13m x 7m. On the ground there appear to be two opposing entrances in the long sides of the building but these are not evident in the GPR data. A rectilinear area of high electrical resistance has also been detected here, along with a similarly aligned dipolar magnetic anomaly along the north-west wall. These anomalies almost certainly reflect the remains of a stone-built medieval long house. The north-east end of the building is less apparent in the surveys and on the ground, and may have been robbed out.

5.31 A second, similar but less pronounced earthwork was present on the ground approximately 10m to the north-west, presumed to be another building, but this has not been identified in the geophysical surveys.

5.32 Broadly concentric rectilinear bands of high resistance have been detected which broadly correspond to upstanding earthworks. These features also correspond to magnetic anomalies which were initially interpreted as soil-filled ditches or upcast against banks. These dipolar magnetic and high resistance anomalies are similar in nature to those interpreted as stone revetments or walls at Grinton Mound East. It is considered likely that the upstanding earthworks and corresponding geophysical anomalies reflect the remains of two concentric revetment walls forming an enclosure measuring approximately 50m square with an inner area of approximately 30m square. A 5m gap in the two revetment walls is apparent at the centre of the east side. This almost certainly reflects an entrance into the enclosure.

This enclosure system complete with rectilinear buildings is typical of a medieval farmstead.

5.33 A large area of low resistance has been detected at the north-west corner of the survey. This almost certainly reflects higher moisture content in the soils in this area, which appear to straddle the outer revetment wall.

6. Conclusions

6.1 Geophysical survey was undertaken at two sites of potential archaeological significance in Swaledale, North Yorkshire. Earth electrical resistance and GPR survey was undertaken at both Grinton Mound East and Cogden Hall to complement an earlier phase of geomagnetic survey.

6.2 The surveys combined training of members of SWAAG and continued research into the historic landscape of Swaledale.

6.3 Geomagnetic survey of Grinton Mound East originally suggested two concentric defensive ditches and possible stone banks. The earth resistance and ground penetrating radar (GPR) surveys have enabled further interpretation of these features and it now appears that the enclosure at Grinton Mound East comprised two stone revetment walls with a large defensive ditch between them. A single entrance to this enclosure is apparent at the east side. The remains of at least one stone-constructed circular structure have been detected within the enclosure, with the possible presence of others, and hard surfaces or rubble across the majority of the interior of the enclosure. The surviving earthworks and geophysical anomalies at Grinton Mound East reflect the remains of a significant defended settlement.

6.4 The site at Cogden Hall comprises a double walled or stone revetted rectilinear enclosure with an entrance to the east. The enclosure contains at least one long-house, which is more evident on the ground than in the geophysical surveys perhaps due to the amount of tumble in the soil. The site appears to be a medieval farmstead.

6.5 Targeted trial trenching and/or excavation of some of the features identified at both sites has the potential to enhance our understanding of the surviving archaeological deposits.

7. Sources

Archaeological Services 2012a *Grinton Mound East and Cogden Hall, Swaledale, North Yorkshire: geophysical surveys*. Unpublished report **2814**, Archaeological Services Durham University

Archaeological Services 2012b *Hagg Farm Site 101, Swaledale, North Yorkshire: archaeological investigations*. Unpublished report **2794**, Archaeological Services Durham University

Archaeological Services 2012c *Gossipgate, Harbut Lodge and Bridge End Farm, Alston, Cumbria: geophysical survey*. Unpublished report **2882**, Archaeological Services Durham University

David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper **6**, Institute of Field Archaeologists

IfA 2011 *Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists

Schmidt, A, & Ernenwein, E, 2011 *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service

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Figure 1: Site locations

location of electrical resistance surveys
A: Grinton Mound East B: Cogden Hall

0 1km
scale 1:25 000 for A4 plot

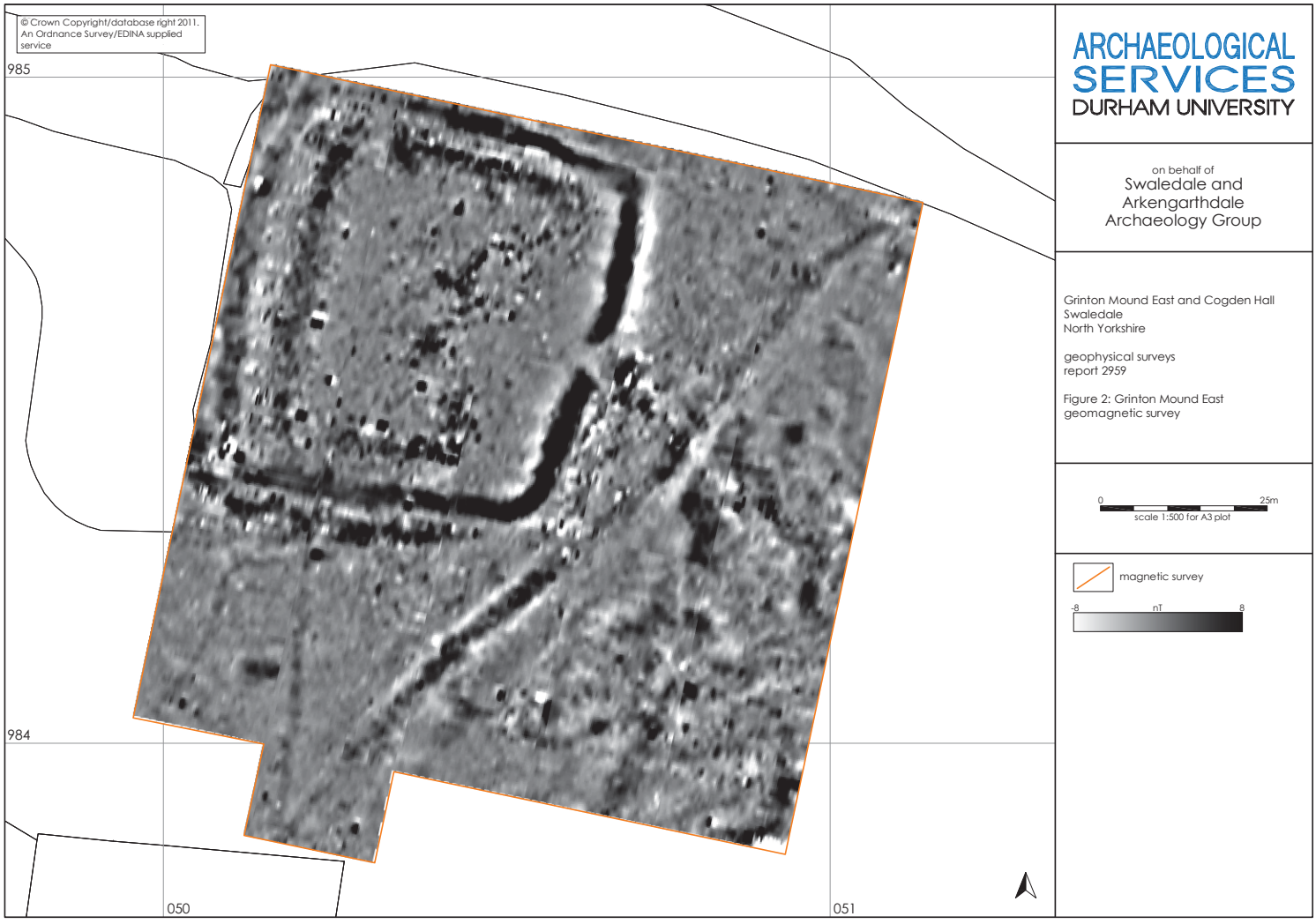

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Figure 2: Grinton Mound East geomagnetic survey

0 25m
scale 1:500 for A3 plot

magnetic survey

-8 nT 8

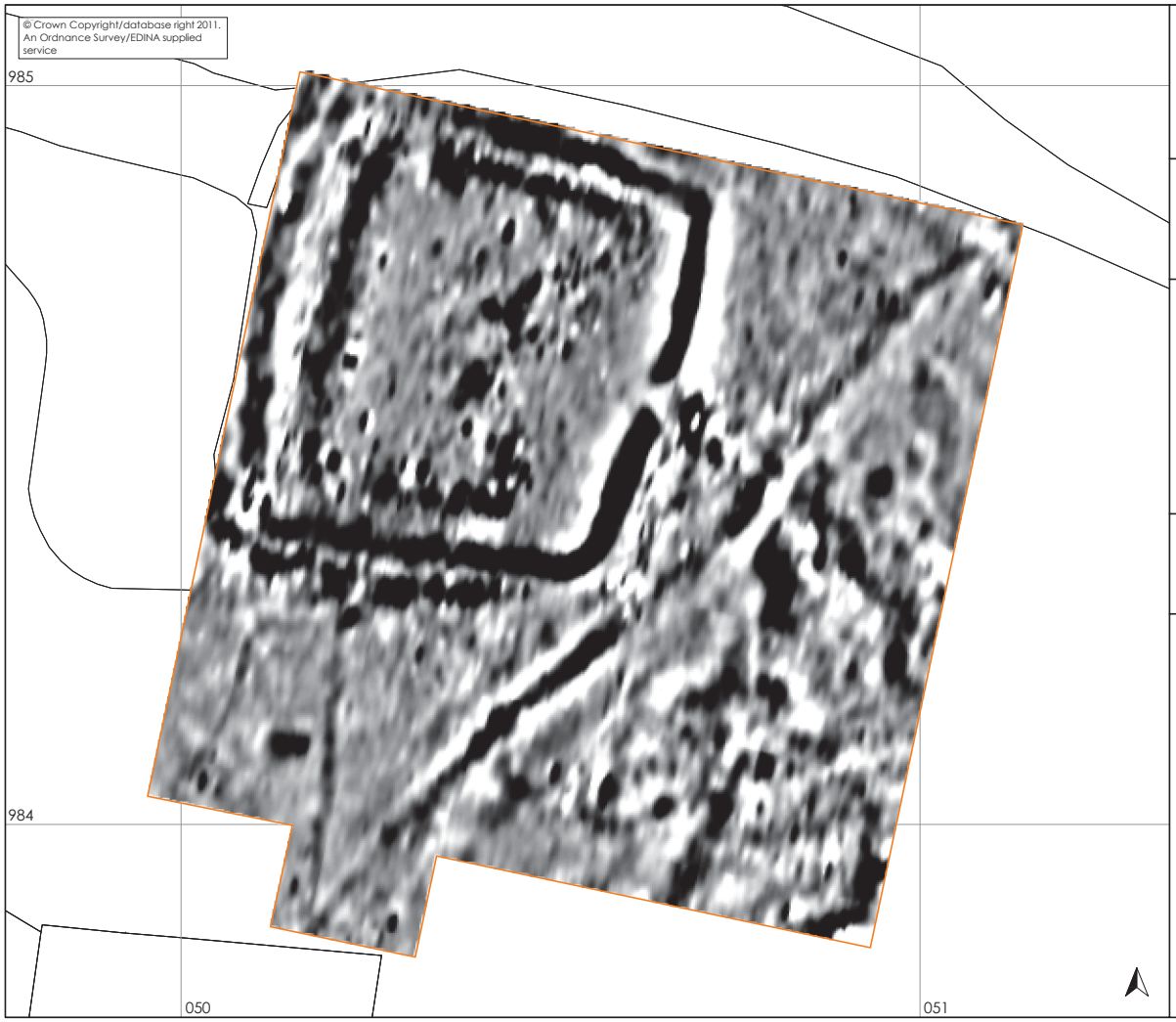

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Figure 3: Grinton Mound East
geomagnetic survey (filtered data)

0 25m
scale 1:500 for A3 plot

magnetic survey
-1 SD 1

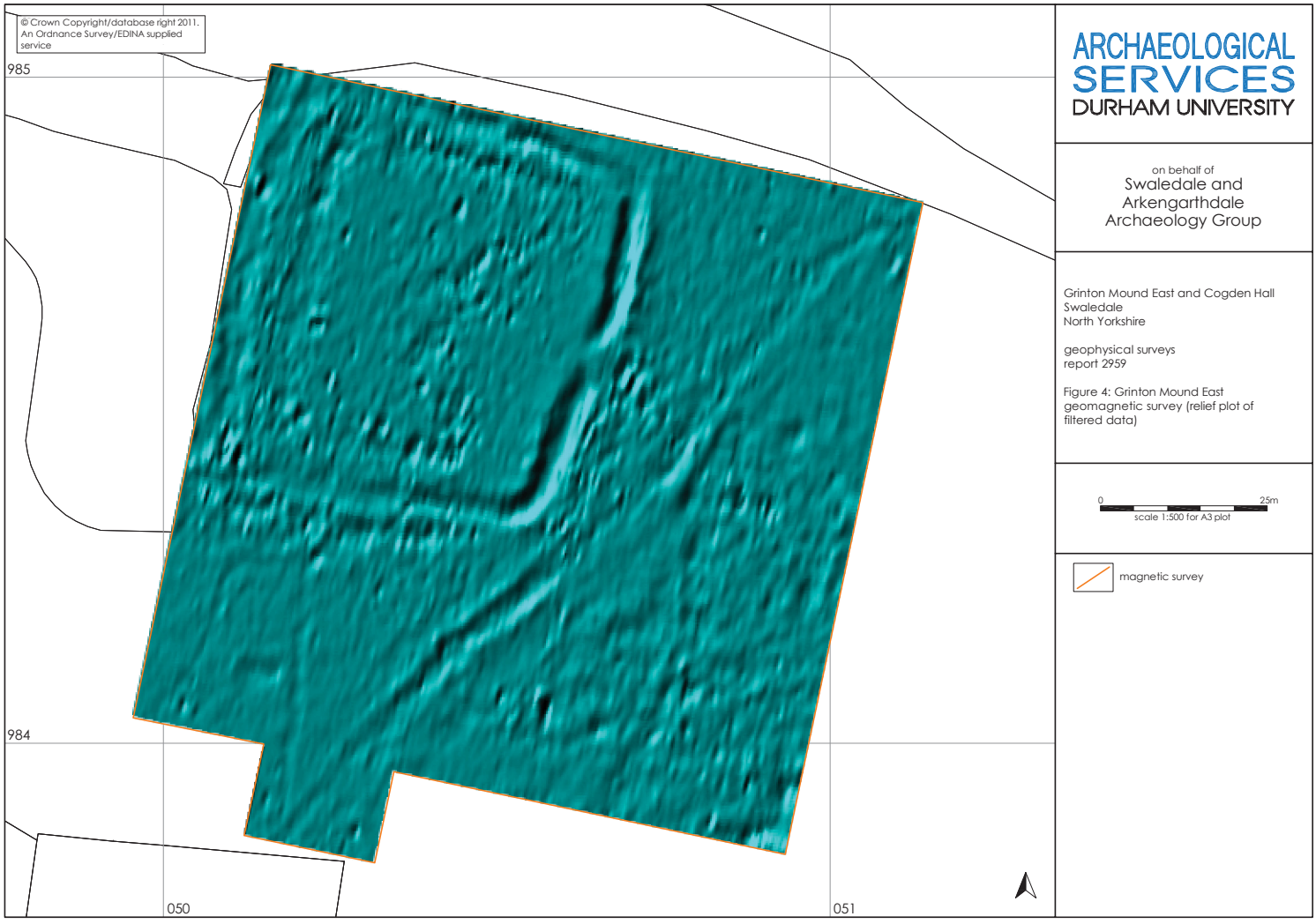

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Figure 4: Grinton Mound East geomagnetic survey (relief plot of filtered data)

0 25m
scale 1:500 for A3 plot

magnetic survey

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Figure 5: Grinton Mound East, geophysical interpretation of geomagnetic survey

0 25m
scale 1:500 for A3 plot

magnetic survey
dipolar magnetic anomaly
positive magnetic anomaly

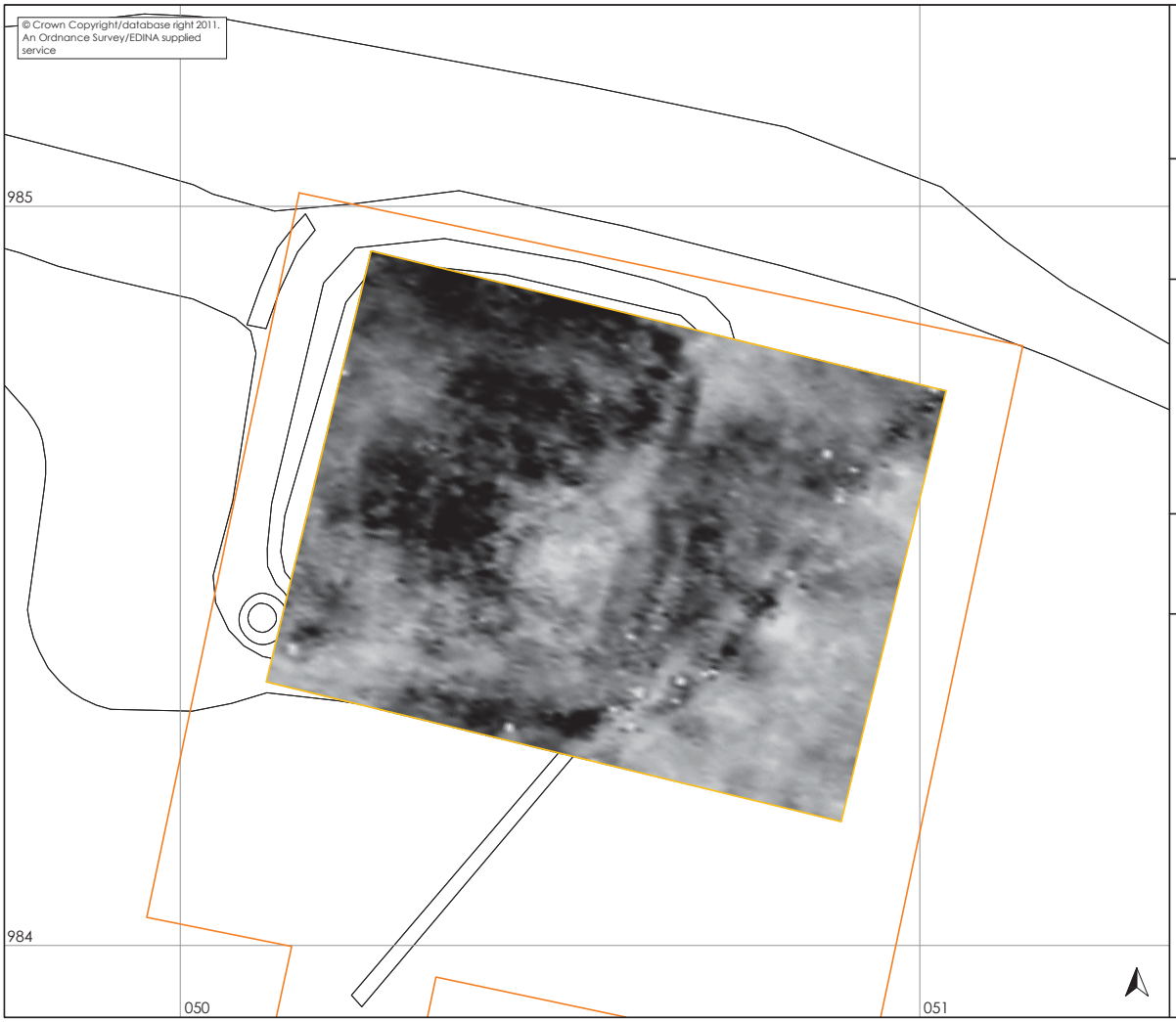

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Figure 6: Grinton Mound East resistance survey

0 25m
scale 1:500 for A3 plot

magnetic survey
resistance survey

40 ohm 170

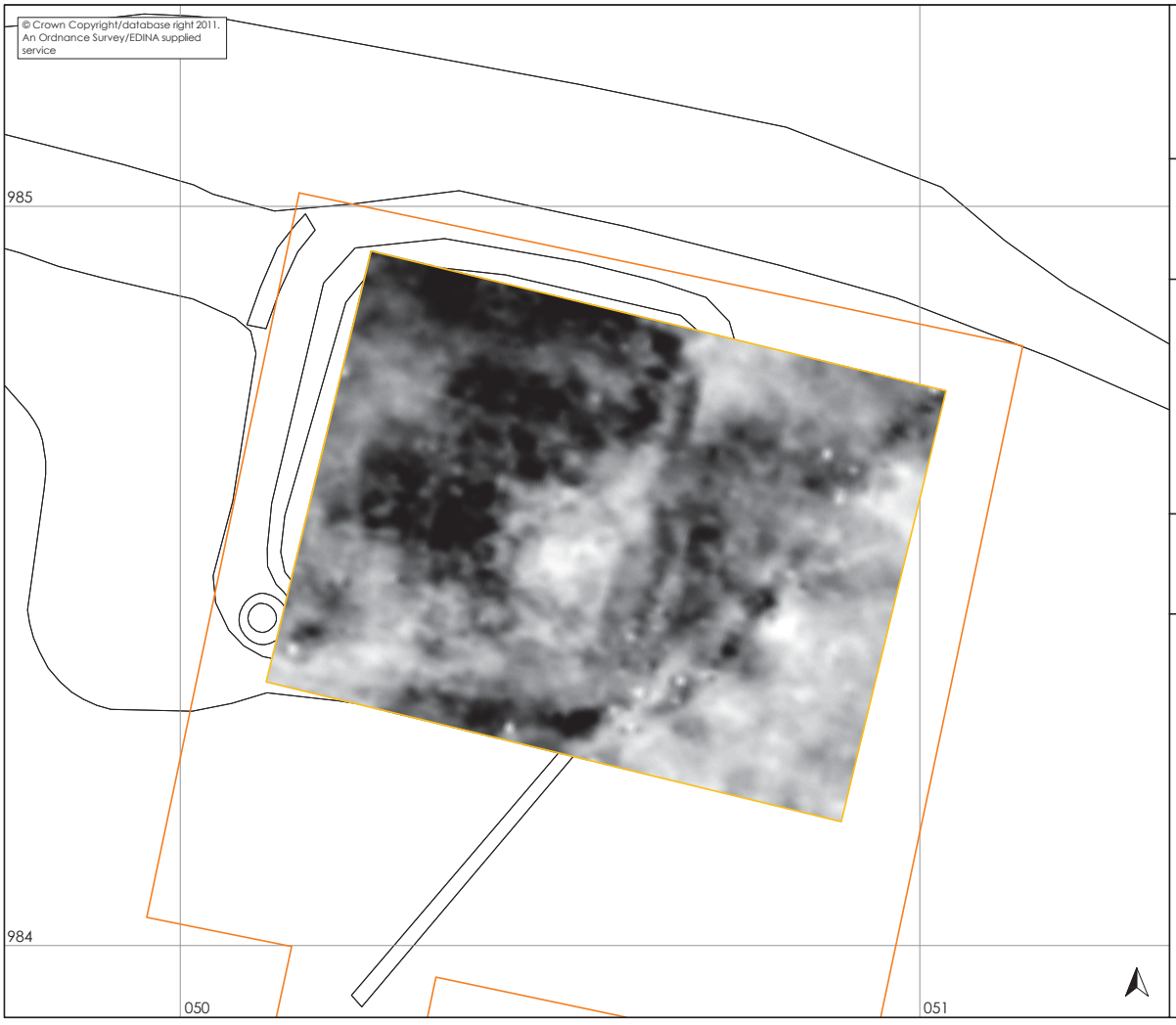

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Figure 7: Grinton Mound East resistance survey (filtered data)

0 25m
scale 1:500 for A3 plot

magnetic survey
resistance survey

40 ohm 170

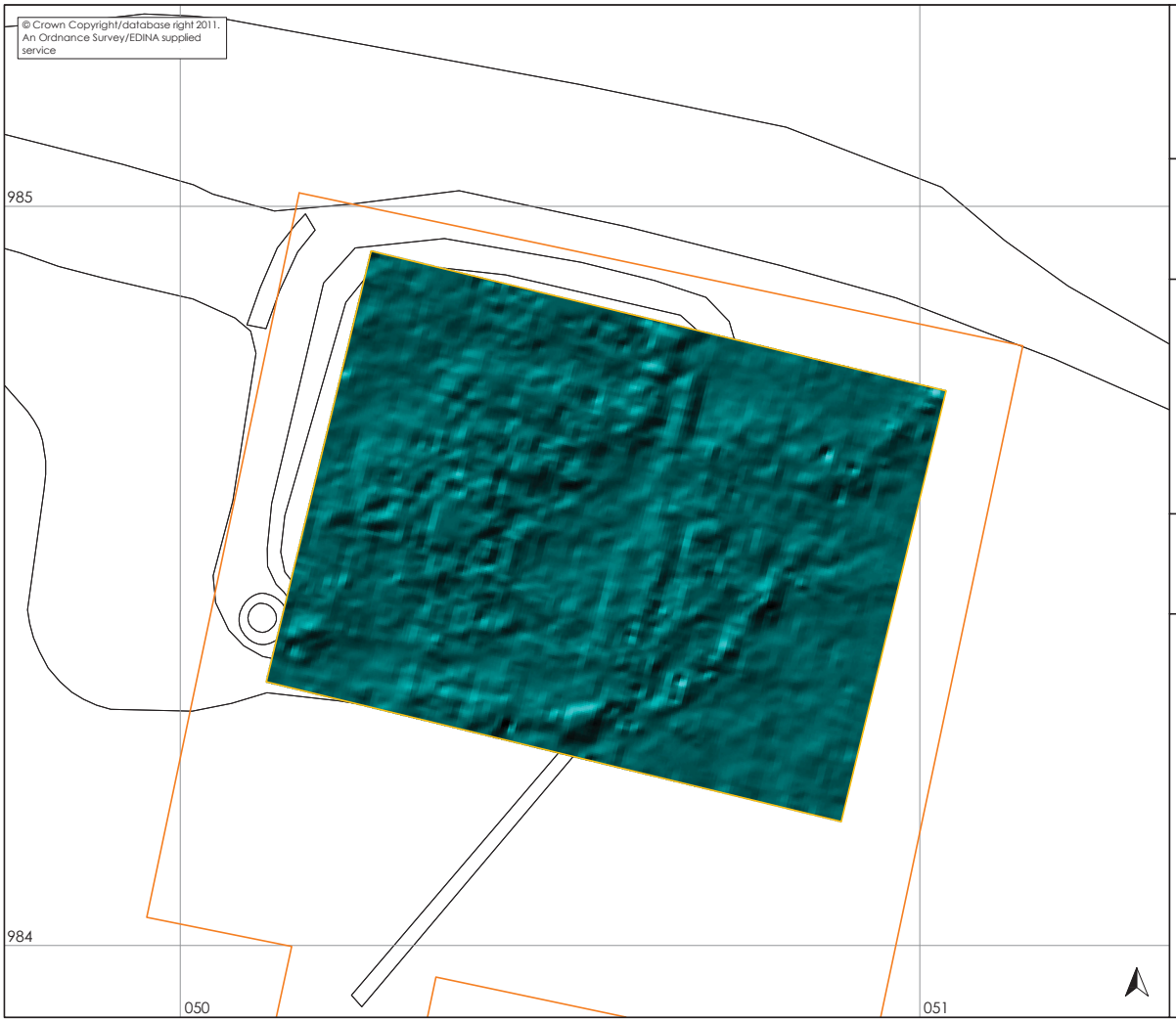

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Figure 8: Grinton Mound East resistance survey (relief plot of filtered data)

0 25m
scale 1:500 for A3 plot

magnetic survey
resistance survey

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Figure 9: Grinton Mound East geophysical interpretation of resistance data

0 25m
scale 1:500 for A3 plot

magnetic survey
resistance survey
high resistance anomaly
low resistance anomaly

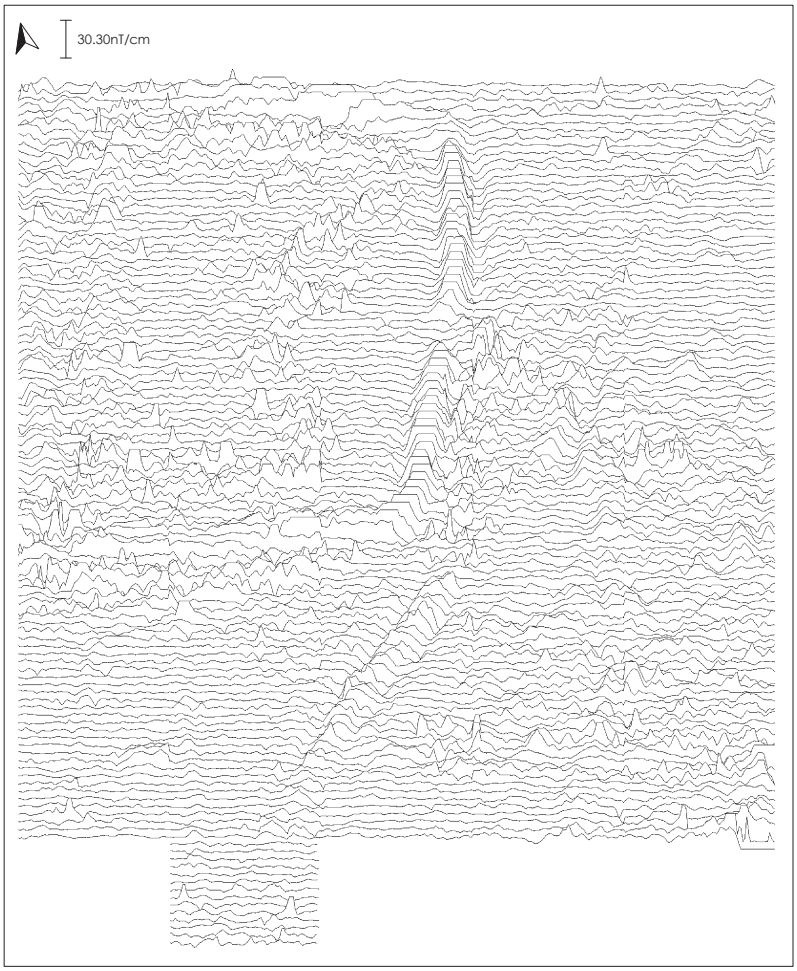

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Figure 10: Grinton Mound East trace plot of geomagnetic data

0 25m
scale 1:500 for A3 plot

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0 25m
scale 1:500 for A3 plot

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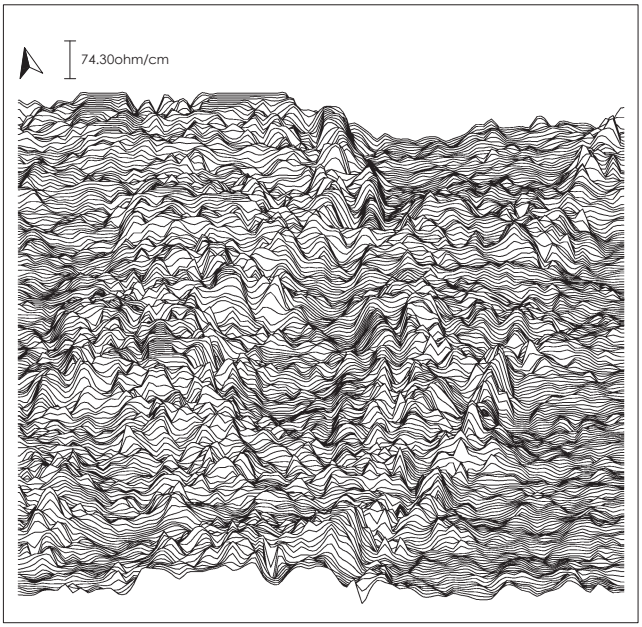
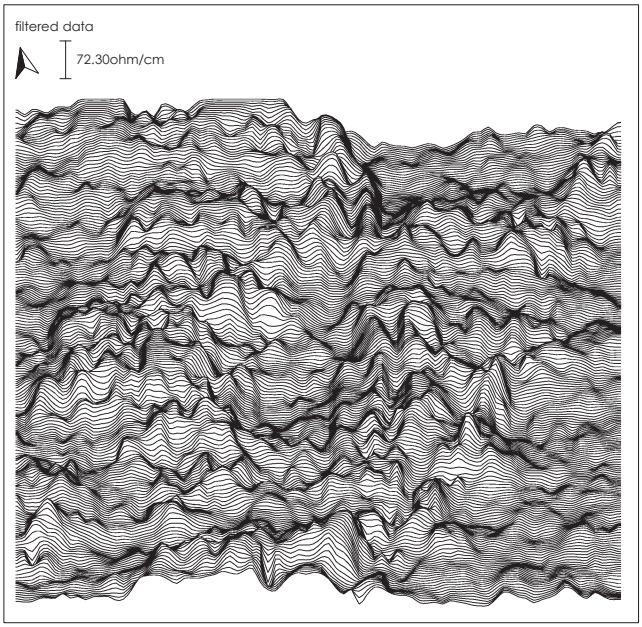
Figure 11: Grinton Mound East trace plots of resistance data





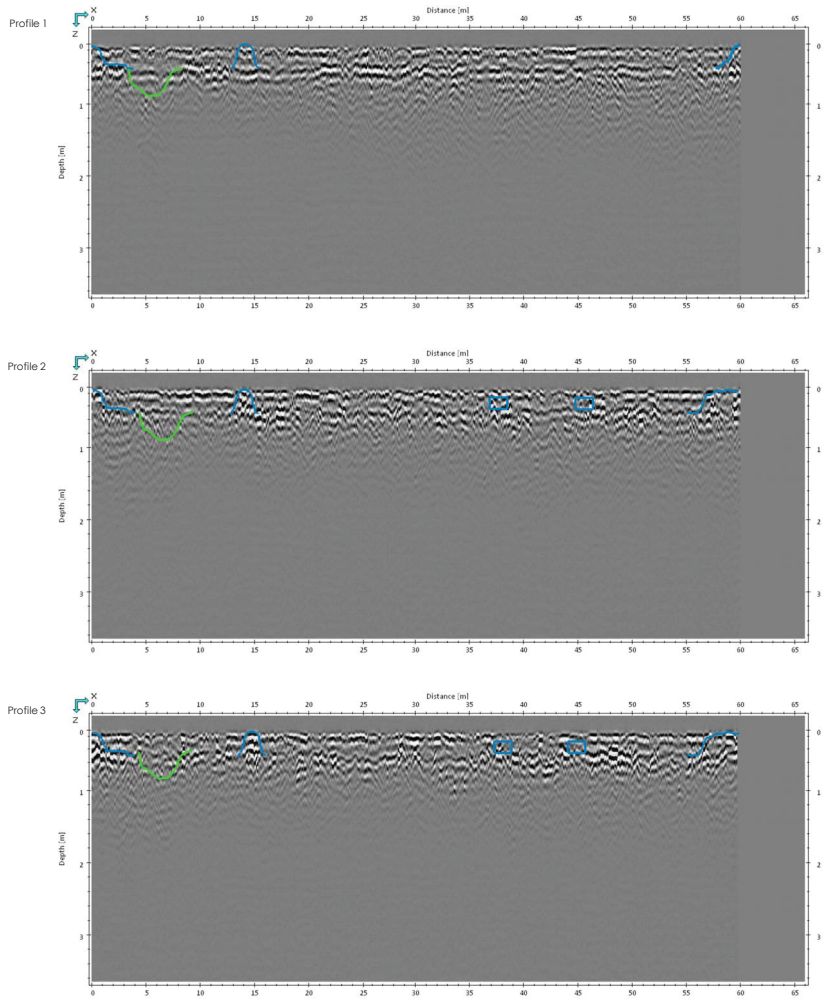


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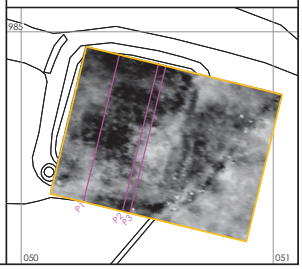
Figure 12: Grinton Mound East profiles of GPR data

0 14m
scale for profiles 1:350 for A3 plot

0 75m
scale for inset 1:1500 for A3 plot

resistance survey
location of GPR profile
stone
ditch



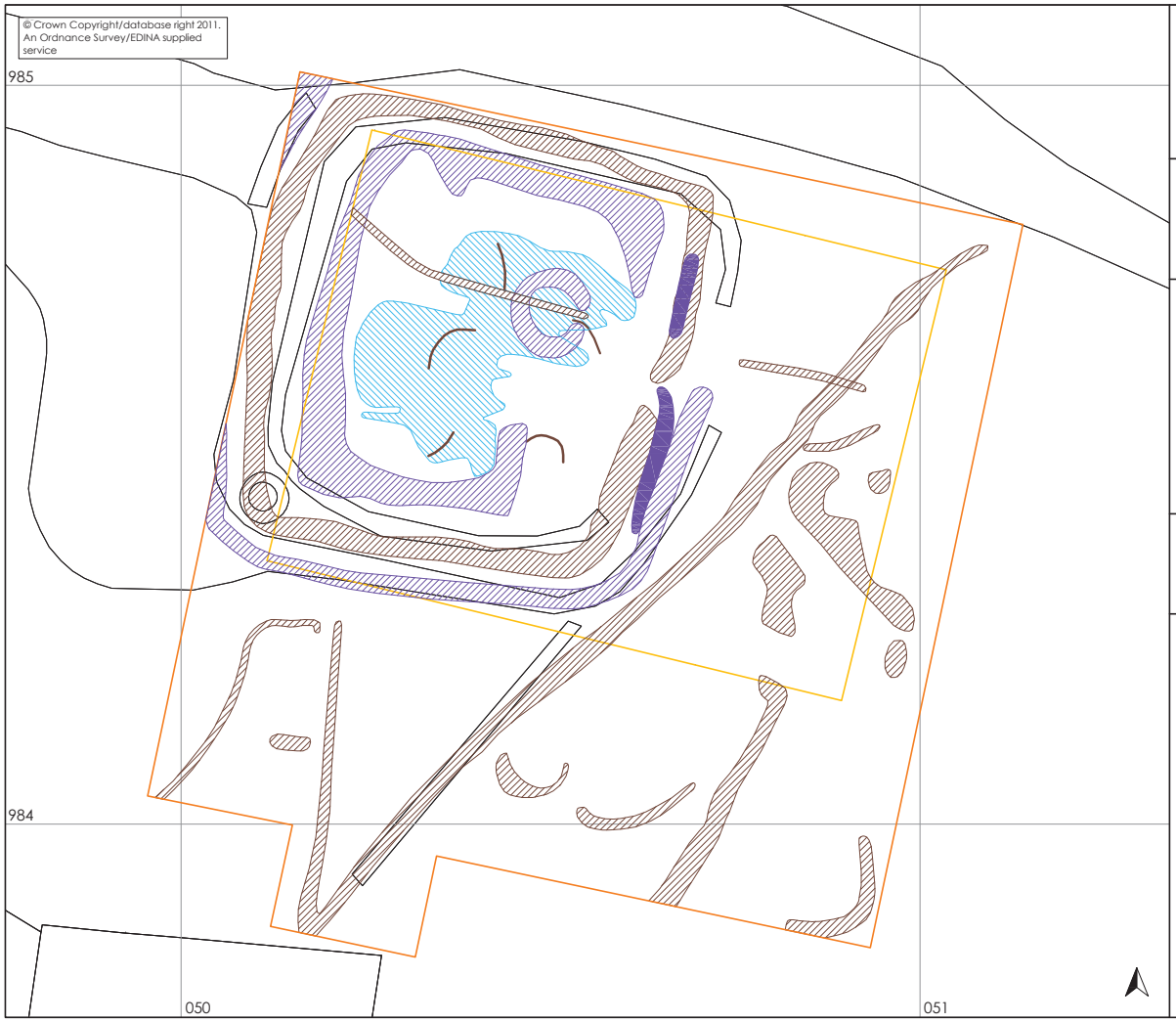


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Figure 13: Grinton Mound East
archaeological interpretation

0 25m
scale 1:500 for A3 plot

- magnetic survey
- resistance survey
- soil-filled / earthen
- stone / rubble
- possible surface

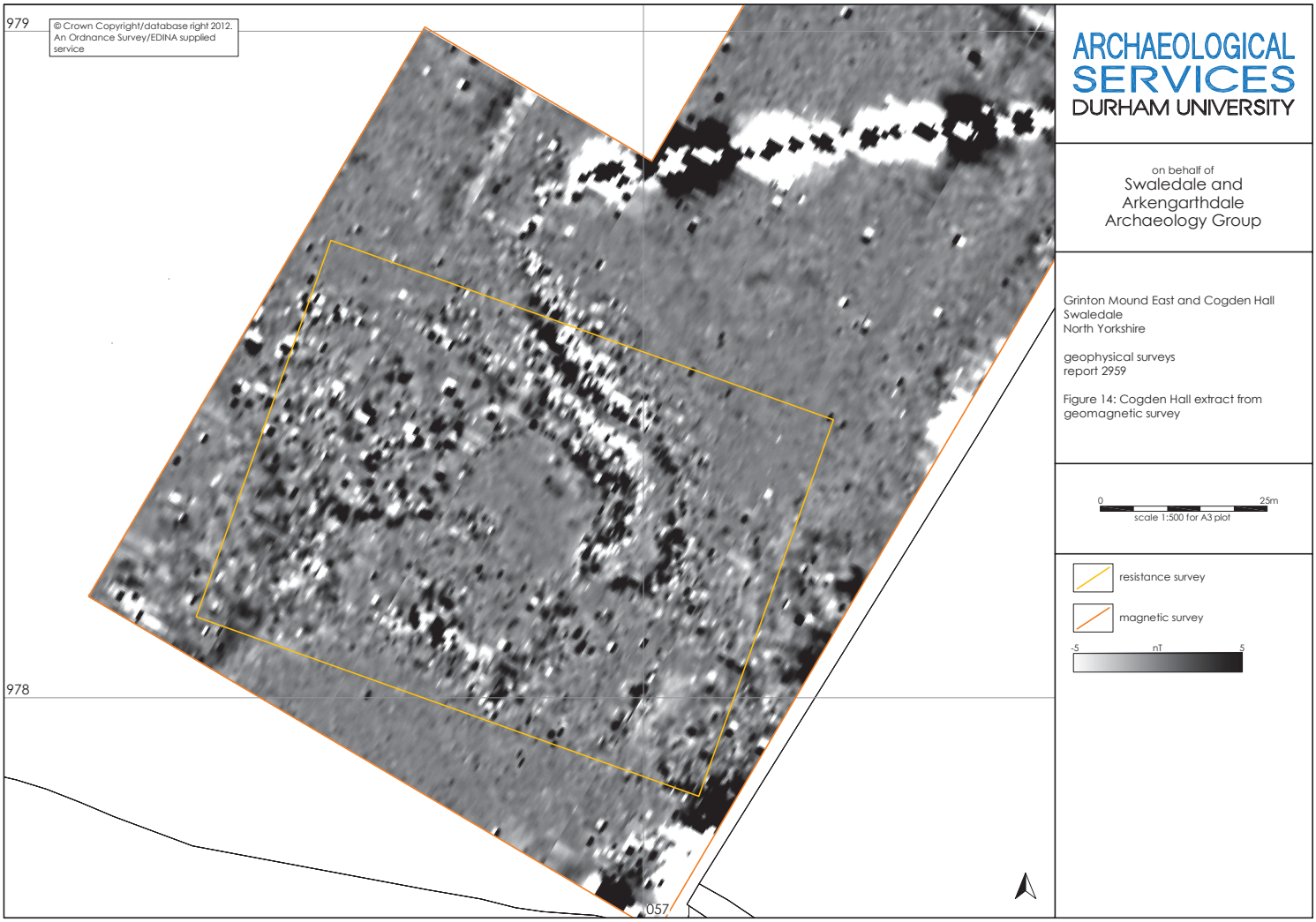

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Figure 14: Cogden Hall extract from geomagnetic survey

0 25m
scale 1:500 for A3 plot

resistance survey

magnetic survey

-5 nT 5

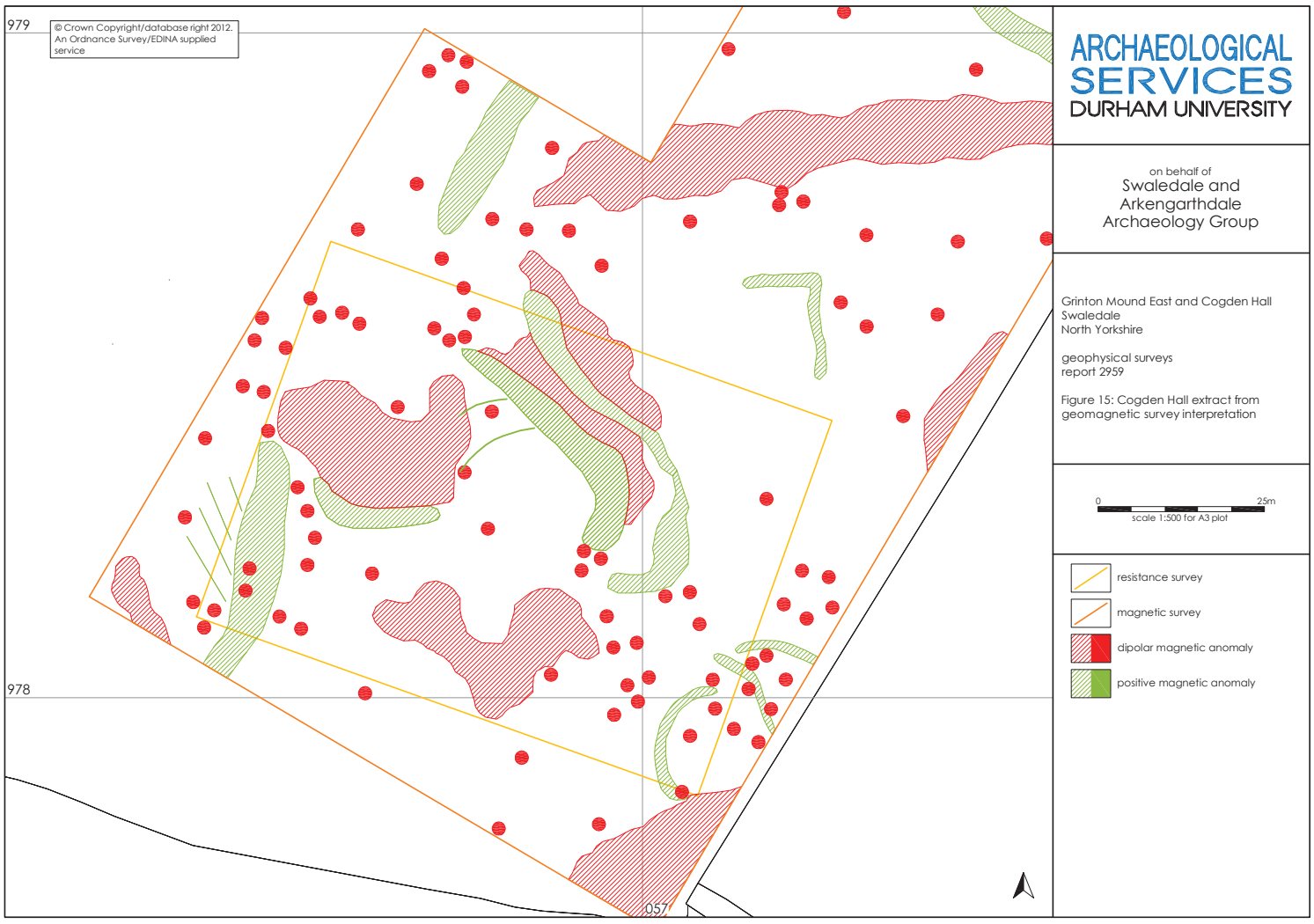
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Figure 15: Cogden Hall extract from geomagnetic survey interpretation
0
25m
scale 1:500 for A3 plot
resistance survey
magnetic survey
dipolar magnetic anomaly
positive magnetic anomaly

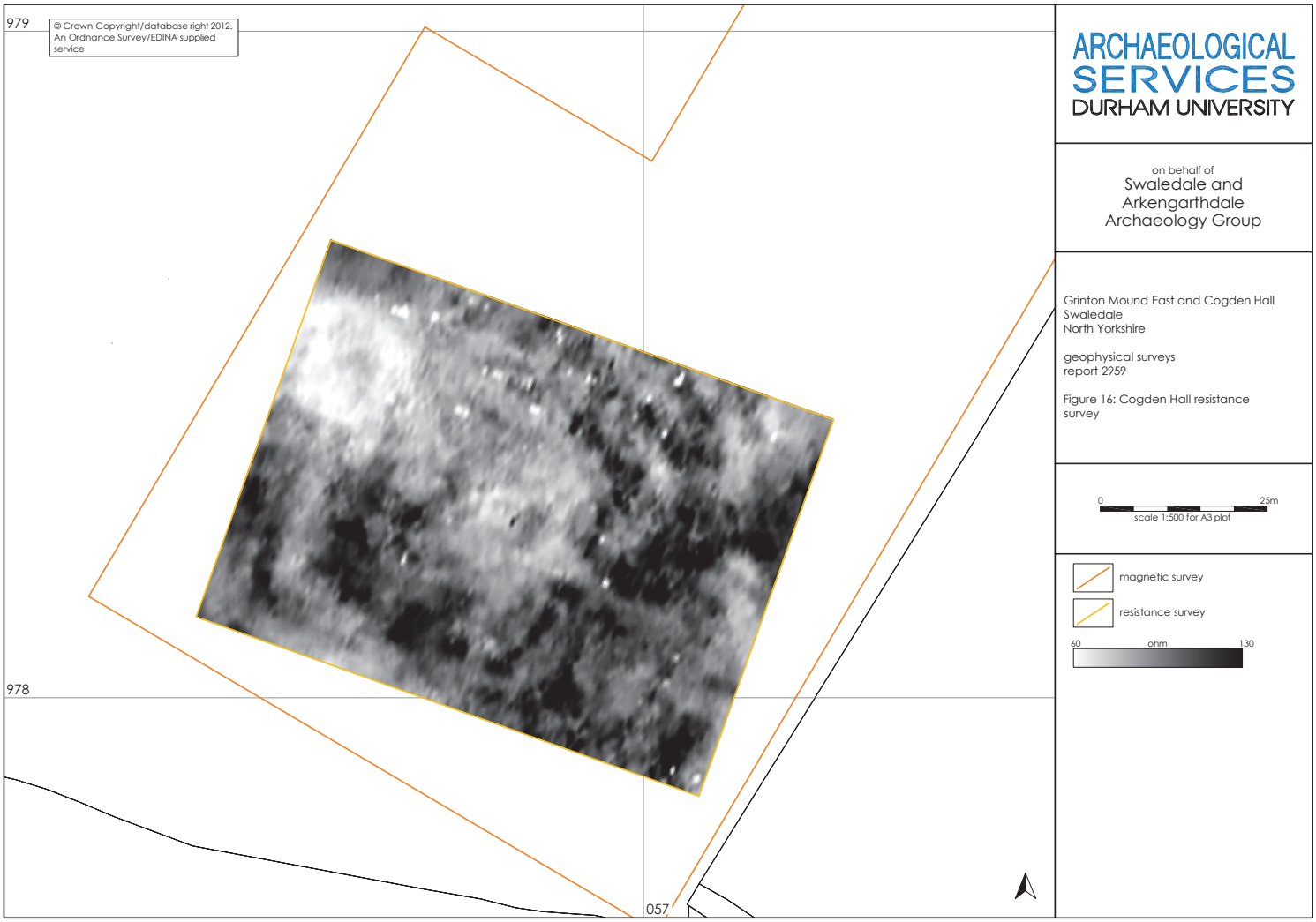
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Figure 16: Cogden Hall resistance survey
0
25m
scale 1:500 for A3 plot
magnetic survey
resistance survey
60
ohm
130

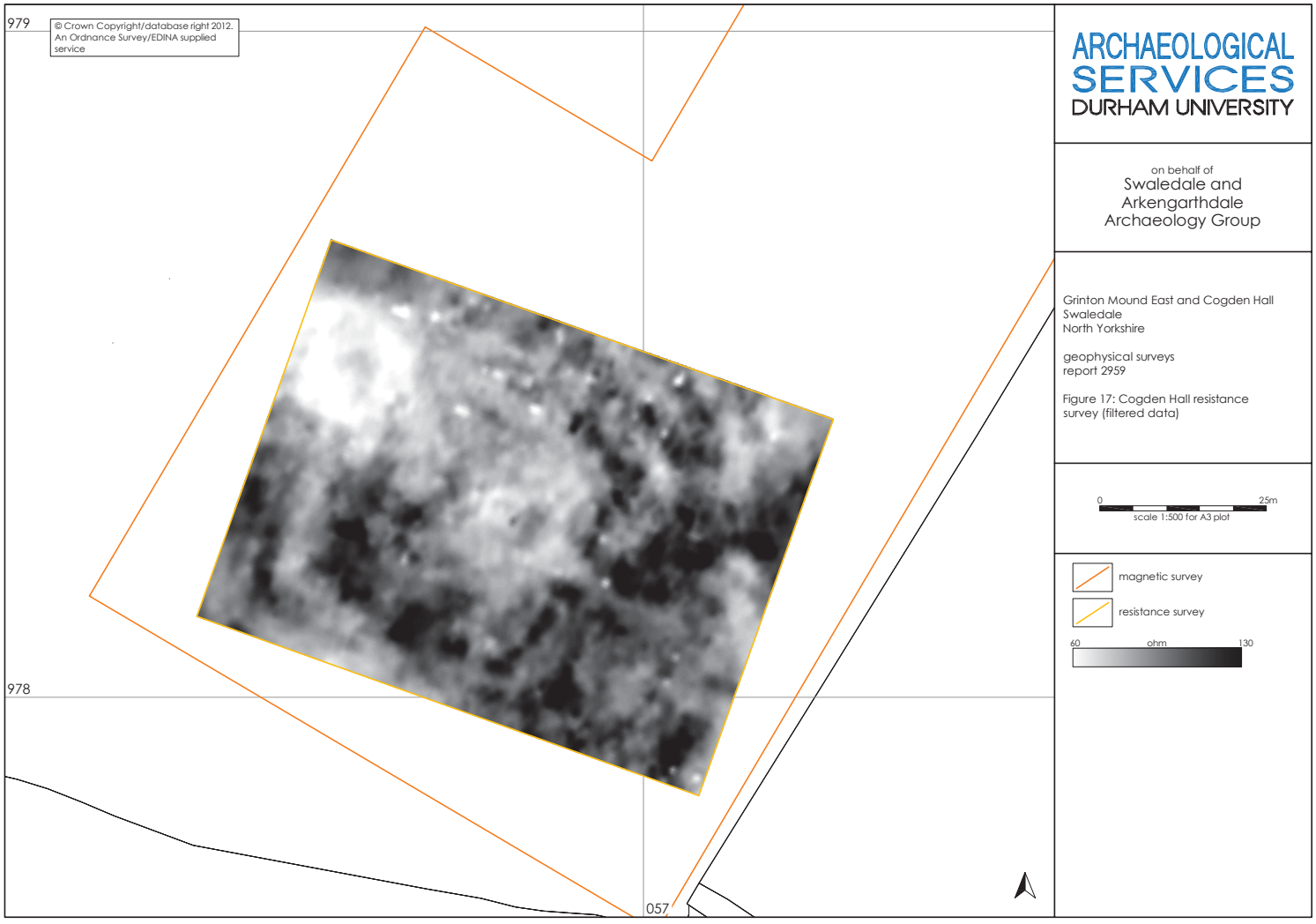
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Figure 17: Cogden Hall resistance survey (filtered data)
0
25m
scale 1:500 for A3 plot
magnetic survey
resistance survey
60
ohm
130

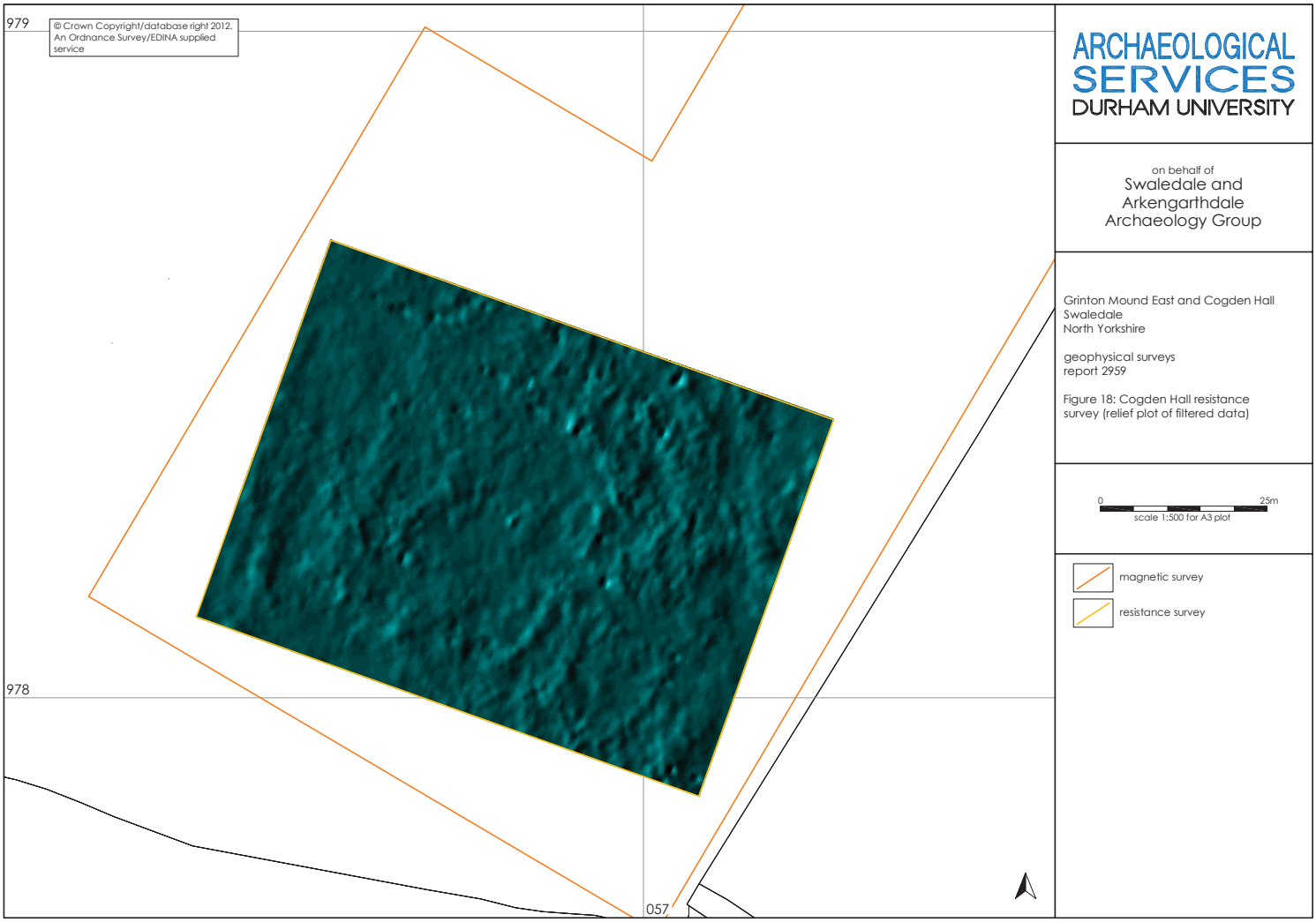
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Figure 18: Cogden Hall resistance survey (relief plot of filtered data)
0
25m
scale 1:500 for A3 plot
magnetic survey
resistance survey

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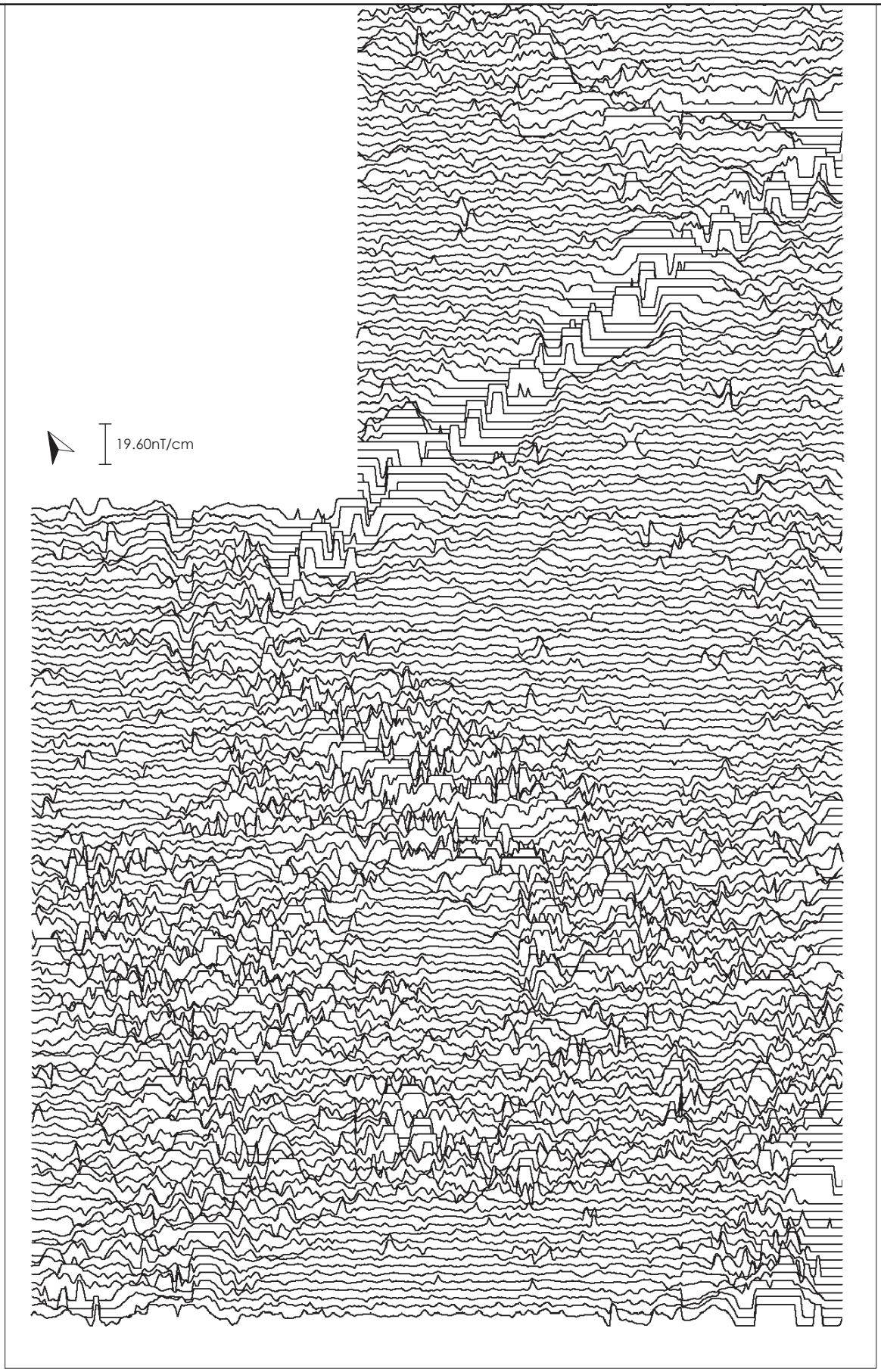
Figure 19: Cogden Hall geophysical interpretation of resistance data

0 25m
scale 1:500 for A3 plot

magnetic survey
resistance survey
gpr survey
high resistance anomaly
low resistance anomaly



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0 25m
scale 1:500 for A3 plot

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Figure 20: Extract from Cogden Hall trace plot of geomagnetic data

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0 25m
scale 1:500 for A3 plot

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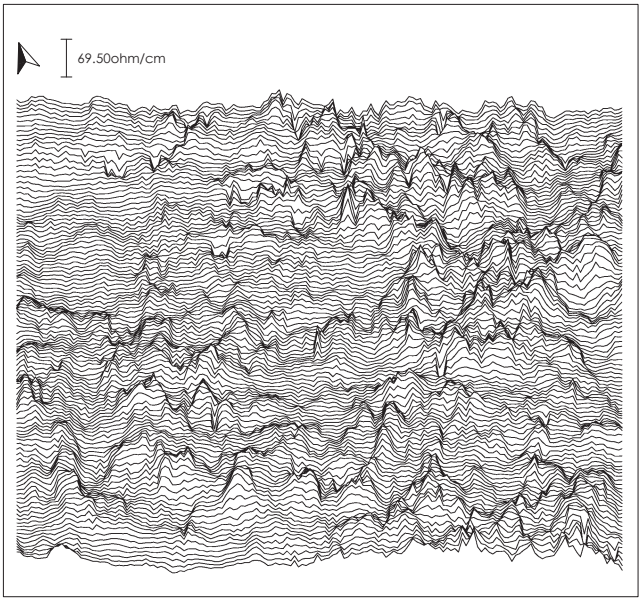
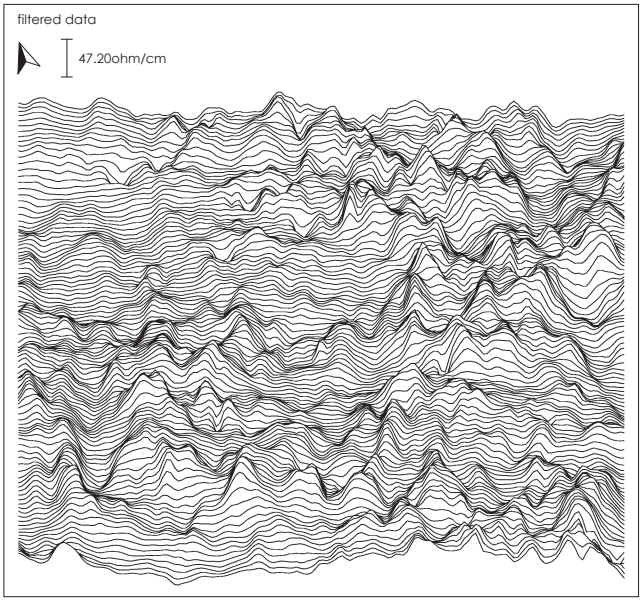
Figure 21: Cogden Hall trace plots of resistance data





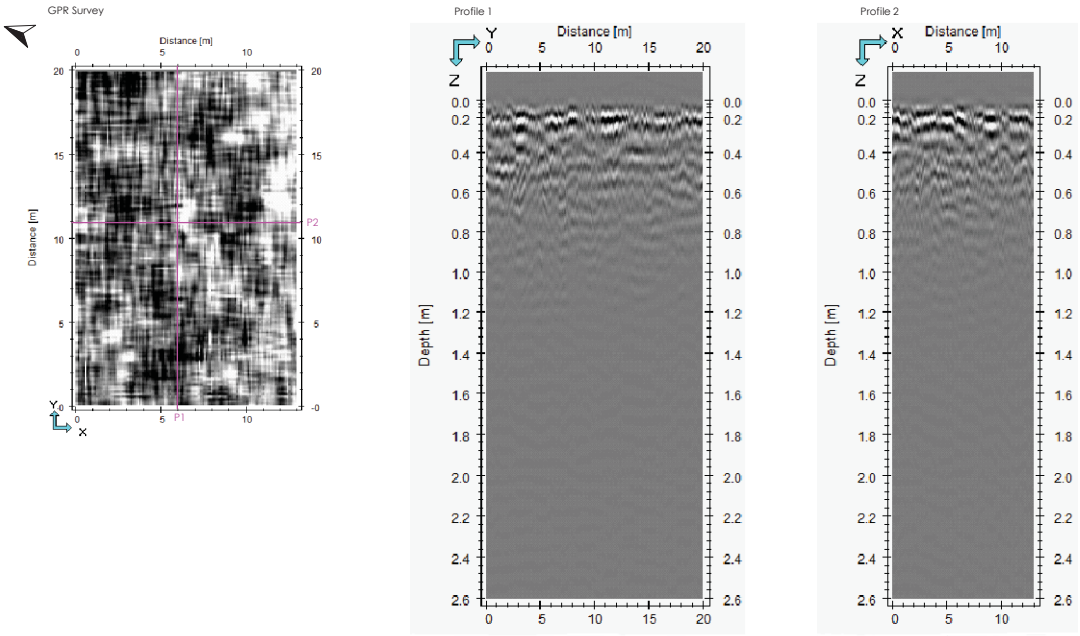


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Figure 22: Cogden Hall time-slice at 0.28m and profiles of GPR data

magnetic survey
resistance survey
gpr survey

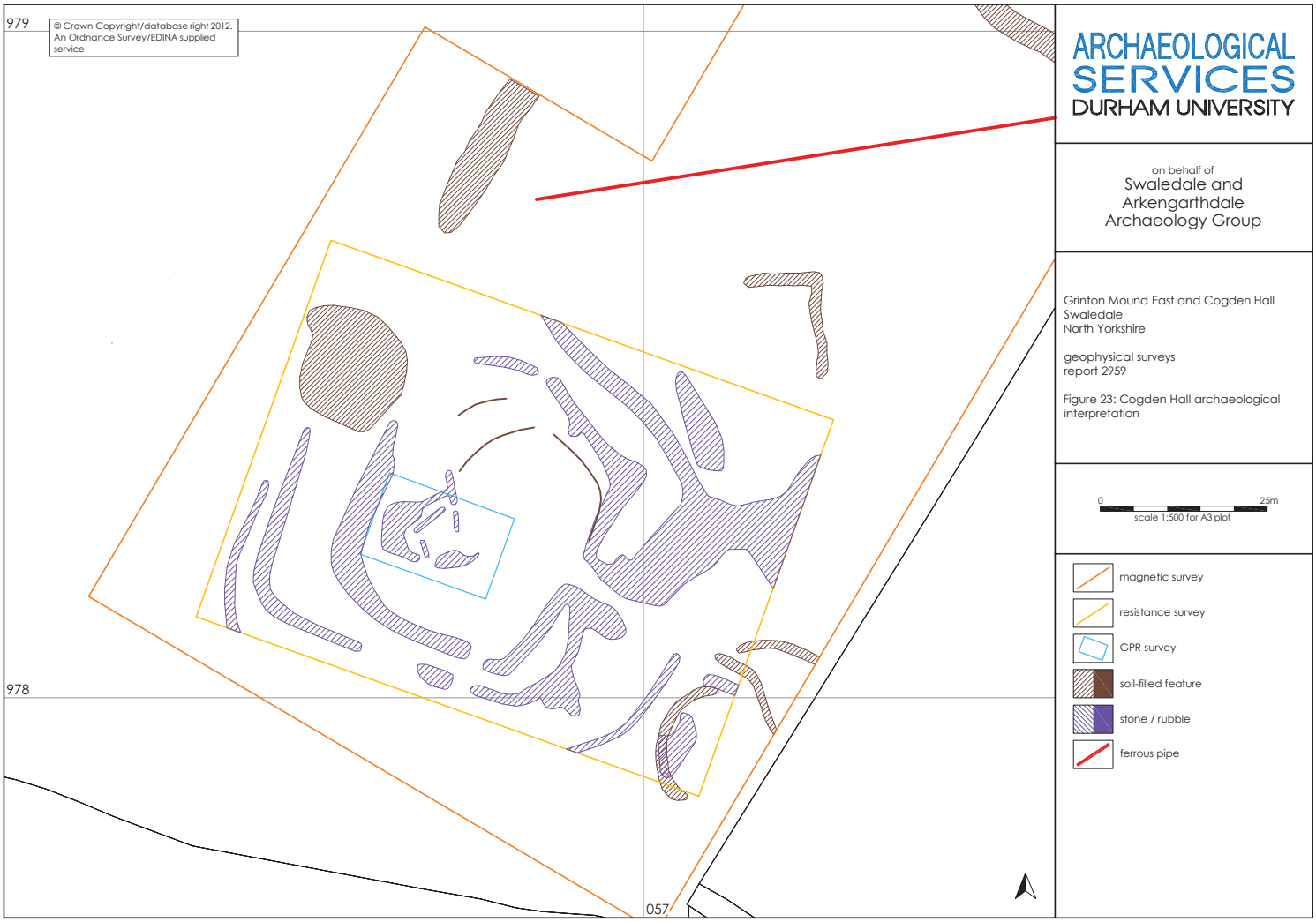
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Figure 23: Cogden Hall archaeological interpretation
0
25m
scale 1:500 for A3 plot
magnetic survey
resistance survey
GPR survey
soil-filled feature
stone / rubble
ferrous pipe