

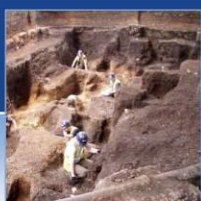
Proposed Solar Farm Suggenhall Rickingham, Suffolk

Archaeological Geophysical Survey

National Grid Reference: TM 04803 74238

AOC Project No: 40138

Date: October 2021



ARCHAEOLOGY

HERITAGE

CONSERVATION

Proposed Solar Farm Suggenhall

Rickinghall, Suffolk

Archaeological Geophysical Survey

On Behalf of:	AXIS Well House Barns Chester Road Bretton Chester CH4 0DH
National Grid Reference (NGR):	TM 04803 74238 (centre)
AOC Project No:	40138
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This document has been prepared in accordance with AOC standard operating procedures.

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Contents

Contents	ii
List of Plates	iii
List of Figures	iii
Non-Technical Summary	iv
1 Introduction.....	1
2 Site Location and Description.....	1
3 Archaeological Background.....	1
4 Aims	6
5 Methodology.....	7
6 Results and Interpretation	7
7 Conclusion.....	10
8 Statement of Indemnity.....	11
9 Archive Deposition	11
10 Bibliography.....	12
11 Plates	13
12 Figures	14
Appendix 1: Characterisation of Anomalies	A
Appendix 2: Survey Metadata.....	B
Appendix 3: Archaeological Prospection Techniques, Instrumentation and Software Utilised.....	C
Appendix 4: Summary of Data Processing	D
Appendix 5: Technical Terminology	E

List of Plates

- Plate 1 Field B – from the northeast facing south
Plate 2 Field B – from the northeast facing west

List of Figures

- Figure 1 Site Location
Figure 2 Location of survey areas - 1:3000
Figure 3 Summary Greyscale - 1:3000
Figure 4 Summary Interpretation - 1:3000
Figure 5 Fields A, B & C: Minimally processed gradiometer survey results – XY Trace - 1:1250
Figure 6 Field C: Minimally processed gradiometer survey results – XY Trace - 1:1250
Figure 7 Field C: Minimally processed gradiometer survey results – XY Trace - 1:1250
Figure 8 Fields A, B & C: Processed gradiometer survey results – greyscale image - 1:1250
Figure 9 Field C: Processed gradiometer survey results – greyscale image - 1:1250
Figure 10 Field C: Processed gradiometer survey results – greyscale image - 1:1250
Figure 11 Fields A, B & C: Interpretation of processed gradiometer survey results - 1:1250
Figure 12 Field C: Interpretation of processed gradiometer survey results - 1:1250
Figure 13 Field C: Interpretation of processed gradiometer survey results - 1:1250

Non-Technical Summary

AOC Archaeology Group was commissioned by AXIS to undertake an archaeological geophysical gradiometer survey on 23rd September and 12th-13th October 2021 to investigate the potential for buried archaeological remains ahead of a proposed development at Suggenhall, Rickingham, Suffolk (centred at TM 04803 74238).

A total of 12.21 hectares were surveyed and the results of the survey have identified the following.

The gradiometer survey has not identified any anomalies or features of a definitive archaeological nature.

In the south of the Site a number of linear trends were identified which are likely to be archaeological in origin. However, without the support of LiDAR, aerial photographic evidence or HER data, they cannot be definitively confirmed as being archaeological in nature although it is highly likely.

A series of linear trends have been detected which form a series of rectilinear enclosures aligned north-south / east-west in the south of the Site. Additional linear zones of enhanced magnetism have been noted which may indicate a possible associated trackway. Given the form of the anomalies and the known archaeology of the wider area it is possible they could relate to a Roman settlement.

Very ephemeral curving trends are discernible in the area of the postulated enclosures. If these are archaeological in nature, they may suggest a multiphase settlement.

In the northeast of the Site two large well-defined areas of enhanced magnetism, some 4m to 5m in diameter, have been detected. The origin of these is unclear, particularly as there are no associated anomalies. The responses are not strong enough to be indicative of kiln type features. They may indicate infilled extraction pits. However, they may have a natural or modern origin.

The survey has detected a known former field boundary which crosses the centre of the Site.

Modern agricultural ploughing trends have also been identified.

A modern service has been detected which runs predominately to the west of the development area but does cross the Site in the north and the southwest.

Several areas of magnetic disturbance of a likely modern date were also detected.

1 Introduction

- 1.1 AOC Archaeology Group was commissioned by Axis to undertake an archaeological geophysical gradiometer survey of a site at Suggenhall, Rickinghall, Suffolk. The survey was conducted during September and October 2021 as part of a wider scheme of archaeological assessment in advance of proposed development of the site.
- 1.2 Archaeological geophysical survey uses non-intrusive and non-destructive techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures or deposits, as far as is reasonably possible (ClfA, 2014).
- 1.3 The survey was carried out to provide information on the extent and significance of potential buried archaeological remains within the proposed development site.

2 Site Location and Description

- 2.1 The proposed development site (hereafter 'the Site') is located south-west of Rickinghall, Suffolk, between Church Lane in the north and Finningham Road (B1113) in the south, centred on TM 04803 74238 (Figure 1).
- 2.2 The Site covers approximately 12.21 hectares (ha) across three arable fields (Figure 2). The site is situated on relatively flat land at 59m Above Ordnance Datum (AOD).
- 2.3 The recorded geology within the site consists of Lewes Nodular Chalk Formation, Seaford Calk Formation, Newhaven Chalk Formation and Culver Chalk Formation, overlain by Lowestoft Formation-Diamicton (BGS, 2021). The soils of the area are slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscapes, 2021).
- 2.4 Gradiometer survey is suggested to provide a good response over limestones, especially over Cretaceous chalk (David *et al.* 2008, 15). In this case, the clarity of the geophysical results were good, and the local geology was deemed not to have had a detrimental effect on the visibility of trends within the dataset.

3 Archaeological Background

- 3.1 The archaeological background below is drawn from the Heritage Impact Assessment of the site, undertaken in by AOC in 2021 (AOC, 2021).

Prehistoric (8000 BC – AD 43)

- 3.2 A programme of fieldwalking was undertaken in the early 1990's along the preferred route of the A143 (Site 110) to the north of the Site. This work identified worked flint scatters (Site 33), of broadly prehistoric date to the north-east. A programme of excavation (Site 120), which extended into the 1km study area, to the north-east of the Site attempted to provide further information about the flints (Site 33), however it was found that modern agricultural activities had damaged earlier remains. Prior to the 1990's programme of fieldwalking, Neolithic and Bronze Age flints were recorded around Site 73, to the north of the Site and within the later corridor of investigation (Site 110).
- 3.3 Excavations at the Grade II Listed Facon's Hall (Site 17), c. 625m south-west of the Site identified worked flint flakes dated to the Neolithic period.
- 3.4 An evaluation (Site 115) c. 650m north-west of the Site identified heavily burnt flints and a possible secondary Neolithic or Bronze Age flint flake (Site 96).

- 3.5 Further prehistoric finds (Site 50), including burnt flakes and an arrowhead were recovered to the north of the Site in association with medieval and post-medieval finds from gardens. It is likely that these have been disturbed by later activity and building work. Also, to the north, two pits (Site 66) dated to the Bronze Age based on the pottery within them were identified in 1957 and a Bronze Age arrowhead (Site 74) was reported c. 220m north-west of the Site.
- 3.6 Prehistoric finds have been reported within the study area, largely to the north of the Site. The distribution of known remains seem to reflect the bias of previous archaeological investigations around Rickinghall and the Rickinghall Bypass. Previous archaeological invasive works (Site 120) have noted that later land use may have had a detrimental impact on the condition and survival of earlier remains. As such, there is judged to be a Medium potential for further prehistoric remains to survive on the Site. Any remains are likely to consist of artefacts scatters.

Romano-British (AD 43 – AD 410)

- 3.7 A large Roman brass coin reportedly of Marcus Aurelius (AD161-180) is recorded as being found near Suggenhall Farm and the HER records the findspot area (Site 64) of the coin as extending into the north-eastern corner of the Site. Approximately 75m north-east Roman pottery (Site 81) was identified around Suggenhall Farm in the 1930's.
- 3.8 The route of a Roman road (Site 99) has been historically recorded to the north-west of the Site, although excavations around the supposed road identified post-medieval activity and the HER notes that it is possible that the "road" remains have been misinterpreted.
- 3.9 A large Roman site (Site 67) which is documented as extending over two fields is located to the north of the Site, within the southern extent of Rickinghall. The area was investigated by Basil Brown over two decades and identified buildings remains and a kiln, as well as pottery and coins spanning the 2nd to 4th centuries. A Roman inhumation (Site 71) has also been reported from Rickinghall to the north-east of the Site.
- 3.10 Roman artefact scatters (Site 34 & 46) were reported from fieldwalking activities to the north and north-west of the Site respectively. An evaluation around the pottery sherds (Site 46) found a grave and ditches (Site 47) thought to date to the Roman period based on radiocarbon dates spanning the Roman period.
- 3.11 An oval, pedestal kiln (Site 78) was found in 1954 to the west of the Site. Pottery from the kiln has been dated to the early 2nd century AD.
- 3.12 Roman pottery sherds (Site 55) were also identified during excavations at the Grade II Listed Facon's Hall (Site 17) to the south-west of the Site.
- 3.13 A sherd of cordoned pot (Site 39), which dates from the 1st century AD has been recovered to the north of the Site. Further Roman pottery sherds have been identified to the north of the Site at Sites 41, 42, 61 and 89 and to the north-west at Site 80. Roman pottery scatters (Site 65) have also been documented to the west of the Site.
- 3.14 A site recorded as being a Roman and Early Historic (Saxon) site (Site 59 & 60) is recorded by the HER to the west of the Site. There are two sets of centre points for the site, Sites 59 & 60 and Sites 76 & 77, due to the way in which the works were originally recorded in the 1930's. The remains (Site 59) are described by the HER as a "Saxon hut and pottery site", with 7th and 8th century pottery being documented. Roman pottery and a coin of Constantine I were reported within the record of Site 76. Site 75, recorded c. 420m west of the Site, south of Site 59 & 60 and north of Site 76 & 77 is reported in the HER as a Roman hut site, occupation and pottery. No further information is recorded regarding Site 75.

- 3.15 Roman building remains have been identified to the north and west of the Site, and Roman finds have been recorded within the study area and in close proximity to the Site. There is judged to be a High potential for Roman remains to survive on the Site.

Early Historic (AD 410 – AD 1066)

- 3.16 The etymology of Rickinghall to the north of the Site suggests an Old English origin, which refers to a small area of dry land occupied by “Rica’s people” (University of Nottingham, 2021). Rickinghall Inferior and Superior are recorded as being in the hands of the Abbey of Bury St Edmonds, Edrc of Laxfield and Wulfwin son of Alfwin in 1066 (Powell- Smith, N.D.), which suggests that the area was being used and was probably partially settled in part by the end of the Early Historic period.
- 3.17 The remains to the west of the Site between Sites 59 & 60 and 76 & 77 within Long Meadow, are described as including an Early Historic hut and pottery site. Pottery from the 7th and 8th centuries AD was recovered along within animal bone c. 0.91m below the ground surface.
- 3.18 Early Historic pottery (Site 56) was reportedly found at Facon’s Hall a Grade II Listed Building (Site 17) to the south-west of the Site. To the north a brooch dated to the Early Historic period was recovered in the 1940’s.
- 3.19 It is likely that settlement and activities in the vicinity of the Site continued from earlier periods. The settlement at Rickinghall to the north of the Site may have originated in its later medieval form during this period. Due to the proximity of Early Historic settlement remains west of the Site, Early Historic activity within the Site cannot be discounted and there is judged to be a Medium potential for Early Historic remains to survive on the Site.

Medieval (AD 1066 – 1540)

- 3.20 The Domesday Book (1086) records two settlements to the north of the Site; Rickinghall Inferior and Rickinghall Superior, which were both tenanted by Robert Malet. The Lord of the settlements is recorded as Hubert of Mont- Canisy in 1086. The Abbey of Bury St Edmonds is also recorded as owner and tenant of both settlements in 1086 which suggests an ecclesiastical interest in the area. Another landowner in 1086 is documented at Rickinghall Superior, Adelem of Burgate whose tenant was Aubrey de Vere. Resources recorded in 1086 include meadows, woodland, livestock and a church and churchlands, most likely a graveyard (Powell-Smith, N.D.). The church recorded in the Domesday Book is likely the Grade I Church of St Mary which was built in the 12th century in what is now the Botesdale Conservation Area (centred Site 1) which incorporates the settlements of Rickinghall Superior and Inferior.
- 3.21 Medieval pottery, dating to the 13th and 14th centuries (Site 82) was recovered from Suggenhall Farm in the 1930’s. The area of the finds extends to within 70m of the Site. Large foundation stones and oyster shells were also reported at Site 82.
- 3.22 Botesdale (centred Site 36) the settlement to the north-east of the Site is recorded as being granted a market charter in 1227, and as such a market in the town is likely to pre-date the early 13th century. The charter was made out to the abbot and monks of St Edmonds of Bury which suggests that the ecclesiastical interest in the area continued past the 11th century. Botesdale Conservation Area (Site 1) now covers the three settlements to the north of the Site, including Rickinghall Inferior and Superior.
- 3.23 The Grade I Listed Church of St Mary (Site 10) located c. 400m north-west of the Site was constructed in the mid- late 14th century, altered in the 15th century and restored in the 1860’s. Based on later mapping, this Church of St Mary’s was located in Rickinghall Superior. The Grade II Botesdale Lodge (Site 3), c.1.415km east of the Site was initially constructed in the 16th century and later extended. Waterwell Cottage and 4 Kiln Farm Cottage (Site 5) c. 560m north-west of the Site were originally constructed as a single dwelling in the mid-16th century. Garden Cottage, a Grade II Listed Building c.

760m north of the Site dates from the 16th century, although it was altered and extended in later centuries.

- 3.24 The Grade II Falcon's Hall (Site 17) to the south-west of the Site is thought to have earlier origins in the medieval period. At least two buildings (Site 57), potentially previous versions of the manor house at Facon's or Falcon's Hall were uncovered between 1961 and 1964. Pottery recovered largely dates from the 14th to 15th centuries, although 13th and 16th-18th sherds were also identified. The etymology of Falcon's Hall, now a Grade II Listed Building (Site 17) recorded by the HER suggests an association with Walter Fawkon, a landowner in the 14th century and as such an earlier version of Facon's Hall may indeed exist in the area.
- 3.25 The Scheduled Moated site at Stubbing's Entry (centred Site 2) extends to within c. 1.21km east of the Site. The monument is recorded as the home of the De Stebbing family in the 13th and 14th centuries. A post-medieval Grade II Listed 17th century house, Stubbings Entry indicates the long durée of the Scheduled Monument.
- 3.26 Medieval pottery scatters (Site 84, 85 & 97) were identified in an area c. 355m north-west, c. 375m north-east and 270m north of the Site during fieldwalking activities prior to the construction of the Rickinghall Bypass (Site 110).
- 3.27 Community Test Pitting (Site 112) within Rickinghall to the north identified medieval activity (Site 37) within the settlement. Medieval pottery (Site 43, 45, 50-52 & 102), medieval metal finds including a coin and a long cross (Site 70) and a silver groat (Site 53) have also been found to the north of the Site in Rickinghall. The south-western corner of the medieval Church of St Mary, within the Botesdale Conservation Area (centred Site 1) was archaeologically investigated in 1953. The archaeological investigations identified the footings of a medieval chapel including its flooring, window glass and parts of a tomb.
- 3.28 A medieval green (Ste 35), recorded by the HER as being depicted and surviving on later historic mapping is recorded as extending into the eastern 1km study area.
- 3.29 A map by Saxton dated 1583 (Figure 4) annotates "Rickingale", most likely Rickinghall and "Buddlesdale" most likely Botesdale suggesting that the two settlements to the north of the Site were two separate entities in the late medieval period. The Site is located between annotated settlements and as such no details about the Site are recorded on this map.
- 3.30 The settlements of Rickinghall Inferior, Rickinghall Superior and Botesdale to the north, now included within the Botesdale Conservation Area (centred Site 1) were formed in the medieval period. The Site was likely located in the surrounding land, which was most likely in agricultural use. As such there is judged to be a High potential for medieval agricultural remains and a Medium potential for other medieval remains to survive on the Site.

Post- Medieval (AD 1540 – 1900)

- 3.31 Early pre-Ordnance Survey maps tend to be schematic and lack detail, although these maps can give some idea of the nature of settlement. Blaeu's 1646 map records no further information about the Site than Saxton's 1583 map.
- 3.32 A map by Stanley dated 1820 records the roadways around the Site. The location of St Mays Church (Site 10) is noted by a pictogram and Church Lane to the north of the Site is depicted aligned roughly east-west. A road to the west of the Site, roughly aligned north-west, south-east and is likely a precursor to Finningham Road, the B1113. A road is depicted to the east of the Site and another to the south, which roughly follow the existing roads known as Potts Lane and Bull Lane respectively. A small collection of buildings appears to be illustrated to the north of Church Lane in the vicinity of the Grade II

Listed 17th century Suggenhall Farm House (Site 220 and associated farm buildings (Site 106)). The land use on the Site is not depicted.

- 3.33 The Tithe map for the parish of Rickinghall Superior (Figure 5) is dated 8th September 1840. The Site is depicted in three plots, from north to south Plot 166, 164 and 155. The Genealogist online does not hold the apportionment for this map. A copy of the appointment is held at the Ipswich Branch of Suffolk Record Office (Reference FB122/C/2/3(a & b)) although this branch is currently closed and as such the items could be consulted during the period of this project. The road to the north of the Site is annotated "Suggen Hall Lane" in 1840 and Suggenhall Farm (Site 106) is depicted to the north-east of the Site as a farm centred on a courtyard. The Grade II Listed
- 3.34 Suggenhall Farmhouse (Site 22) is depicted within the collection of buildings illustrated. Potential extraction pits are depicted to the east and south of the southern Site boundary. Chalk extraction pits (Sites 91 & 93) have been recorded to the north of the Site. A roughly aligned north-south lane is depicted along the eastern Site boundary on the Tithe map of 1840.
- 3.35 The Ordnance Survey (OS) map published in 1885 (Figure 6) records the Site similarly to the Tithe map, although there has been a change to a field boundary in the central area of the Site. The fields within the Site are illustrated to suggest that they were lined with vegetation in the 1880's. A pond is depicted immediately west of the Site's south-western corner on the OS map published in 1885. This pond's location corresponds to what appeared to be an extraction pit on the tithe map (Figure 5). The OS map published in 1885 (Figure 6) depicts the Site within an agricultural landscape, occupied by dispersed individual settlements, which based on place names may have medieval antecedents. To the north, the settlements of Rickinghall Inferior, Rickinghall Superior and Botesdale are not individually separated and appear as one long ribbon development along a roughly aligned north-east, south- west road.
- 3.36 Samuel Lewis' Topographical Dictionary of England (1848) records Botesdale as a town and notes the inclusion of the parishes of Rickinghall Superior and Inferior within the town by the mid-19th century. Lewis (1848) notes that the houses within the town are indifferently built and that the town centres on one long street, suggesting that it was difficult to locate the different parishes by eye by the mid-19th century. Botesdale Conservation Area (centred Site 1) to the north of the Site similarly encompassed the smaller parishes. A post-medieval windmill (Site 31) is recorded in the Conservation Area and the Conservation Area appraisal (Mid Suffolk, 2009) notes that by the post- medieval period the area had long since been a centre of human activity.
- 3.37 The HER records numerous post-medieval buildings (Sites 31, 48) and artefact scatters (Sites 32, 44, 62, 69, 72, 88, 101, 104) within Botesdale and Rickinghall to the north of the Site. Eighteenth and nineteenth century pits (Site 98) containing kitchen waste were identified in the rear of a former public house. A brick kiln (Site 40), in use between 1830 and 1900 and a silver penny (Site 100) are recorded to the north-west of the Site. Post-medieval pottery was found during excavations at Facon's Hall (Site 58) to the south-west of the Site.
- 3.38 A number of post-medieval farmsteads have been recorded within the 1km study area following the Suffolk Countryside Project. These include Abbot's Hall (Site 38) to the south; Potter's Farm (Site 105) to the east; and Brick Kiln Farm (Site 107) and Highways (Site 108) to the west of the Site.
- 3.39 The Site is depicted within agricultural land, to the south of the Grade II Listed Suggenhall Farm House (Site 22) and was likely part of the lands associated with Suggenhall Farm (Site 106). As such there is judged to be a High potential for post-medieval agricultural remains and a Low potential for other post-medieval remains to survive.

Modern (1900 – present)

- 3.40 The OS maps published between 1904 and 1958 (not illustrated) suggest that there was no change to the Site or to the layout of Suggenhall Farm (Site 106) in that period. The lane to the north of the Site is annotated as Church Lane on 20th century mapping. Further ancillary buildings are depicted around Suggenhall Farm (Site 106) on maps of the late 20th century, although these maps do not record any changes to the Site. A reservoir is recorded to the north of the Site and Bull Lane to the south is illustrated as a dead end road on the OS plan dated 1976-77 (not illustrated).
- 3.41 A Cold War underground bunker (Site 95) recorded as being open between 1958 and 1968 was located c. 510m east of the Site. The bunker is noted in the HER as being demolished.

Undated Evidence

- 3.42 Approximately 950m east of the Site a large area of burnt flints (Site 30) found in association with a black earth path is recorded within the HER. The HER has recorded the feature as a burnt mound of unknown date and without further investigation the feature cannot be securely dated.
- 3.43 A small bronze object (Site 63) was reportedly found in the garden of Basil Brown in 1969 to the north of the Site. The object is recorded as having a “classical” head however the object cannot be confidently dated and is not in any known archive.
- 3.44 Approximately 470m east of the Site three circular, black patches (Site 83) found in association with a lump of blue glass was originally interpreted as possibly of prehistoric date. However, the exact date of the feature has not been confirmed and no other information is reported within the archive.
- 3.45 To the north of the Site undated ditches (Site 86) and two small pits containing burnt flakes, baked clay and undated pottery (Site 87) were reported in association with works along the Rickinghall Bypass (Site 110).
- 3.46 An archaeological evaluation (Site 118) c. 1km north-east the Site identified seven undated pits (Site 93) which has been interpreted as mineral extraction pits however their exact use or date is unknown.
- 3.47 A tannery (Site 103) has been recorded to the north-west of the Site, in the vicinity of a Roman road (Site 99). The tannery (Site 103) has not been confidently dated, however it is likely that the tannery is medieval and post- medieval in date based on historic records.

4 Aims

- 4.1 The aim of the geophysical survey was to identify any potential archaeological anomalies that would enhance the current understanding of the archaeological resource within the proposed survey area.
- 4.2 Specifically, the aims of the gradiometer survey were;
- To locate, record and characterise any surviving sub-surface archaeological remains within the survey area,
 - To help determine the next stage of works as per the client’s instruction,
 - To provide an assessment of the potential significance of any identified archaeological remains in a local, regional and (if relevant) national context,
 - To produce a comprehensive site archive (Appendix 2) and report.

5 Methodology

- 5.1 The geophysical survey was undertaken in September and October 2021.
- 5.2 All geophysical survey work was carried out in accordance with recommended good practice specified in the EAC guideline documents published by Historic England (Schmidt et al. 2016) and the Chartered Institute for Archaeologists Standard and Guidance for archaeological geophysical survey (2014).
- 5.3 Parameters and survey methods were selected that were suitable for the prospective aims of the survey and in accordance with recommended professional good practice (Schmidt et al. 2016).
- 5.4 Digital photographs of every survey parcel were taken before, during and after geophysical survey to show any changes to field conditions following the programme of works. The photos were downloaded and stored off site.
- 5.5 The gradiometer survey was carried out using a Bartington Non-Magnetic Cart. The cart system utilises two Grad-01 fluxgate gradiometer sensors mounted upon a carbon fibre frame, along with data logging equipment and batteries (see Appendix 3). Before each session of use, the cart system was balanced around a single set up point within the Site specifically chosen for being magnetically quiet. In balancing the machine around this point, it produces a more uniform dataset throughout and allows all data to be plotted with ease.
- 5.6 Data was collected using zig-zag traverses alongside a constant stream of GPS data collected through a Trimble R10 GPS, enabling the collected data to be spatially georeferenced without the need for a pre-determined grid system. The data was collected through a laptop mounted to the cart using Geomar MLGrad601 software.
- 5.7 A total of 12.21ha were surveyed using the Bartington cart.
- 5.8 Care was taken to attempt to avoid metal obstacles present within the survey area, such as metal fencing around hedge boundaries as gradiometer survey is affected by 'above-ground noise' and avoiding these improves the overall data quality and results obtained.
- 5.9 The data was downloaded from MLGrad601 and converted into a .xyz file in Geomar MultiGrad601 before being processed along with the GPS data in TerraSurveyor v3.0.34.10. The details of these processed can be found in Appendices 3 and 4.
- 5.10 Interpretations of the data were created in ArcGIS Pro and the technical terminology used to describe the identified features can be found in Appendix 5.

6 Results and Interpretation

- 6.1 The gradiometer survey results have been visualised as greyscale images and XY traces. Figure 2 shows the areas which were surveyed and their assigned field prefix. The processed data is displayed as a summary greyscale image in Figure 3 with an accompany overview interpretation in Figure 4, both at a scale of 1:3,000. Minimally processed XY Trace plots (plotted at 25nT/cm), processed greyscale images (plotted at -1nT to 2nT), and interpretations are displayed in the archive section at 1:1250 in Figures 5 - 13.
- 6.2 Individual characterisation of the identified anomalies can be seen in Appendix 1. Anomaly numbers are prefixed with the field letter, which are indicated on Figure 2. For the most part, only trends of a possible archaeological or historical origin have been assigned an anomaly number on the interpretation figures. Trends that are integral to the discussion have also been assigned anomaly numbers.

6.3 For ease of discussion the results are discussed by field.

Field A (Figures 3, 4, 5, 8 & 11)

Archaeology

6.4 No anomalies indicating the presence of definitive archaeological remains have been identified in the dataset.

Possible Archaeology

6.5 No anomalies indicating the presence of a possible archaeological remains have been identified in the dataset.

Unclear Origins

6.6 Two large well-defined areas of enhanced magnetism (**A1**), some 4m to 5m in diameter, have been detected in the northwest of this field. The origin of these is unclear, particularly as there are no associated anomalies. The responses are not strong enough to be indicative of kiln type features but could be archaeologically significant. They may indicate infilled extraction pits as potential mineral extraction pits of an unknown date have been excavated 1km to the north-east of the Site. However, they may have a natural or modern origin hence the unclear interpretation.

6.7 Additional smaller pit type anomalies (**A2**) have also been noted within this survey area. While an archaeological origin for these cannot be dismissed, natural variations or more deeply buried ferrous / fired material, is more likely.

6.8 A short linear trend (**A3**) has been detected in the west of the area. While this may simply be a ploughing trend, the nature of the response is more suggestive of a possible land drain.

Agricultural

6.9 Ephemeral fragmentary linear trends on a WSE-ENE alignment have been recorded within the survey area and are associated with modern agricultural activity.

Non - Archaeology

6.10 A modern service crosses the eastern half of the survey area on an NNW-SSE alignment.

6.11 Some magnetic disturbance is visible around the periphery of the field and relates to modern metallic boundary fencing, and modern debris at the field edges.

6.12 A moderate level of isolated dipolar anomalies (ferrous / iron spikes) is visible throughout the dataset which are likely modern in origin.

Field B (Figures 3, 4, 5, 8 & 11)

Archaeology

6.13 No anomalies indicating the presence of definitive archaeological remains have been identified in the dataset.

Possible Archaeology

6.14 No anomalies indicating the presence of a possible archaeological remains have been identified in the dataset.

Unclear Origins

6.15 Two linear trends (**B1**) have been detected in the eastern half of this field. The trends are on an approximately north-south and east-west alignment. The origin of these is unclear. They may indicate

former field divisions although there is no map evidence for earlier field boundaries in the area. The nature of the responses suggest they may be associated with field drains. However, they may have an agricultural origin.

- 6.16 Fragmentary trends (**B2**) have also been recorded in this area. These are very poorly defined and while an archaeological origin cannot be dismissed, they may have natural or agricultural origins.
- 6.17 A few discrete areas of enhanced magnetism of an unclear origin (**B3**) have been noted. As with anomalies (A2) in Field A, an archaeological origin cannot be dismissed, but natural variations or more deeply buried ferrous / fired material is more likely.
- 6.18 An area of enhanced magnetism (**B4**) has been detected in the north of the field. This may be associated with the linear trend (B1) and could indicate a rubble spread of unknown date.

Agricultural

- 6.19 Linear trends on a southwest-northeast alignment have been recorded within the survey area and are associated with modern agricultural activity.

Non - Archaeology

- 6.20 A broad zone of magnetic disturbance (**B5**) has been detected in the northeast corner of this field. This is thought to be due to imported modern material, adjacent infrastructure, and site vehicles at the entrance of the field. The strength of the response in the northeast of the field is such that it may be masking weaker archaeological responses, if present. A large Roman brass coin is recorded as being found immediately to the east of this area of disturbance with the recorded findspot area extending into the north-eastern corner of the field.
- 6.21 Small zones of magnetic disturbance are visible around the periphery of the field and relate to modern metallic boundary fencing, and modern debris at the field edges.
- 6.22 A moderate level of isolated dipolar anomalies (ferrous / iron spikes) is visible throughout the dataset which are likely modern in origin.

Field C (Figures 3, 4, 5 - 13)

Archaeology

- 6.23 No anomalies indicating the presence of definitive archaeological remains have been identified in the dataset.
- 6.24 Trends have been identified which are indicative of archaeological remains however without the support of LiDAR, aerial photographic evidence or HER data, they cannot be definitively confirmed as being archaeological in nature.

Possible Archaeology

- 6.25 In the south of the area a series of linear trends (**C1**) have been detected. These trends form a series of rectilinear enclosures aligned north-south / east-west.
- 6.26 Additional linear zones of enhanced magnetism have been noted which appear to be associated with the postulated enclosures. Zones (**C2**) appear to indicate fragmentary remnants of enclosures, while responses (**C3**) may indicate a possible associated trackway.
- 6.27 A curving trend (**C4**) has been noted which appears to be associated with a better defined rectilinear enclosure immediately to the south.

Unclear Origins

- 6.28 Several linear trends of an unclear origin have been noted in the south of the area and appear to be associated with the postulated enclosures. The parallel trends (**C5**) may potentially indicate a westwards continuation of the postulated trackway.
- 6.29 Very ephemeral curving trends (**C6**) are discernible in the data. If these are archaeological in nature they may suggest a multiphase settlement.
- 6.30 A cluster of discrete areas of enhanced magnetism (**C7**) have been detected in the area of the trends (C6). It is possible that these are archaeologically significant, but interpretation is tentative given the complexity of the results in this area.
- 6.31 Additional trends and pit type areas of enhanced magnetism have been noted throughout the survey area. While some of these may have an archaeological origin, many may have natural or agricultural origins.
- 6.32 A linear trend (**C8**) crosses the northern half of this field. This lies just to the north of a known former field boundary and the nature of the response is suggestive of a field drain.

Agricultural

- 6.33 A relatively strong linear trend (**C9**) crosses the centre of this field and corresponds with a former field boundary indicated on the OS map of 1885, which is still depicted on the OS map of 1949 – 1970 (NLS, 2021).
- 6.34 Linear trends on a northwest-southeast alignment have been detected within the survey area and are associated with modern agricultural activity.

Non - Archaeology

- 6.35 Amorphous areas of slightly enhanced magnetism have been recorded in the north of this field and are thought to be associated with geological variations.
- 6.36 A modern service crosses the southwest corner of this field on an NNW-SSE alignment and appears to be a continuation of the service detected in Field A. The service lies immediately to the west of the postulated archaeologically significant enclosures, and the zone of magnetic disturbance associated with the service may be masking weaker responses of an archaeological origin.
- 6.37 Some magnetic disturbance is visible around the edges of the field and relates to modern metallic boundary fencing, and modern debris at the field edges.
- 6.38 A moderate level of isolated dipolar anomalies (ferrous / iron spikes) is visible throughout the dataset which are likely modern in origin.

7 Conclusion

- 7.1 The gradiometer survey has not identified any anomalies or features of a definitive archaeological nature.
- 7.2 Several linear trends were identified which are could be archaeological in origin. However, without the support of LiDAR, aerial photographic evidence or HER data, they cannot be definitively confirmed as being archaeological in nature.
- 7.3 In the south of the Site a series of linear trends have been detected which form a series of rectilinear enclosures aligned north-south / east-west. Additional linear zones of enhanced magnetism have been noted which may indicate a possible associated trackway. Given the form of the anomalies and the known archaeology of the wider area it is highly likely they are archaeological and could relate to a Roman settlement.

- 7.4 Very ephemeral curving trends are discernible in the area of the postulated enclosures. If these are archaeological in nature, they may suggest a multiphase settlement.
- 7.5 In the northeast of the Site two large well-defined areas of enhanced magnetism, some 4m to 5m in diameter, have been detected. The origin of these is unclear, particularly as there are no associated anomalies. The responses are not strong enough to be indicative of kiln type features. They may indicate infilled extraction pits. However, they may have a natural or modern origin.
- 7.6 The survey has detected a known former field boundary with crosses the centre of the Site.
- 7.7 Modern agricultural ploughing trends have also been identified.
- 7.8 A modern service has been detected which runs predominately to the west of the development area but does cross the Site in the north and the southwest.
- 7.9 Several areas of magnetic disturbance of a likely modern date were also detected.
- 7.10 In assessing the results of the geophysical survey against the specific aims set out in Section 4;
- The survey has succeeded in locating, recording and characterising surviving sub-surface remains within the Site, though more remains may be present that are not suitable for detection through magnetometry;
 - The survey will help in determining the next stage of works as it has provided evidence that remains of an uncertain origin are most likely present on site, and has provided a number of targets for further investigation;
 - It is not possible to provide an assessment of the potential significance of the identified remains in a local, regional or national context as it has not been possible to definitively characterise the nature of the anomalies identified through survey alone;
 - The survey has resulted in a comprehensive report and archive.
- 7.11 The geophysical survey has produced good quality gradiometer results which have successfully helped to clarify whether archaeological or uncertain remains are present across the Site. There is a high confidence level that the methodology and survey strategy chosen were appropriate to assess the archaeological potential across the Site.

8 Statement of Indemnity

- 8.1 Although the results and interpretation detailed in this report have been produced as accurately as possible, it should be noted that the conclusions offered are a subjective assessment of collected data sets.
- 8.2 The success of a geophysical survey in identifying archaeological remains can be heavily influenced by several factors, including geology, seasonality, field conditions and the properties of the features being detected. Therefore, the geophysical interpretation may only reveal certain archaeological features and not produce a complete plan of all the archaeological remains within a survey area.

9 Archive Deposition

- 9.1 In accordance professional standard practice an 'Online Access to the Index of archaeological investigations' ('OASIS') record will be completed for submission to the HER and Archaeological Data Service (ADS) (Appendix 2).

- 9.2 One digital and hard copy of the report and data will be submitted to the relevant Historic Environment Record (HER) at the Client's discretion.
- 9.3 A digital copy of the report and data will also be submitted to the ADS at the Client's discretion.

10 Bibliography

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11 Plates



Plate 1. Field B – from the northeast facing south



Plate 2. Field B – from the northeast facing west

12 Figures

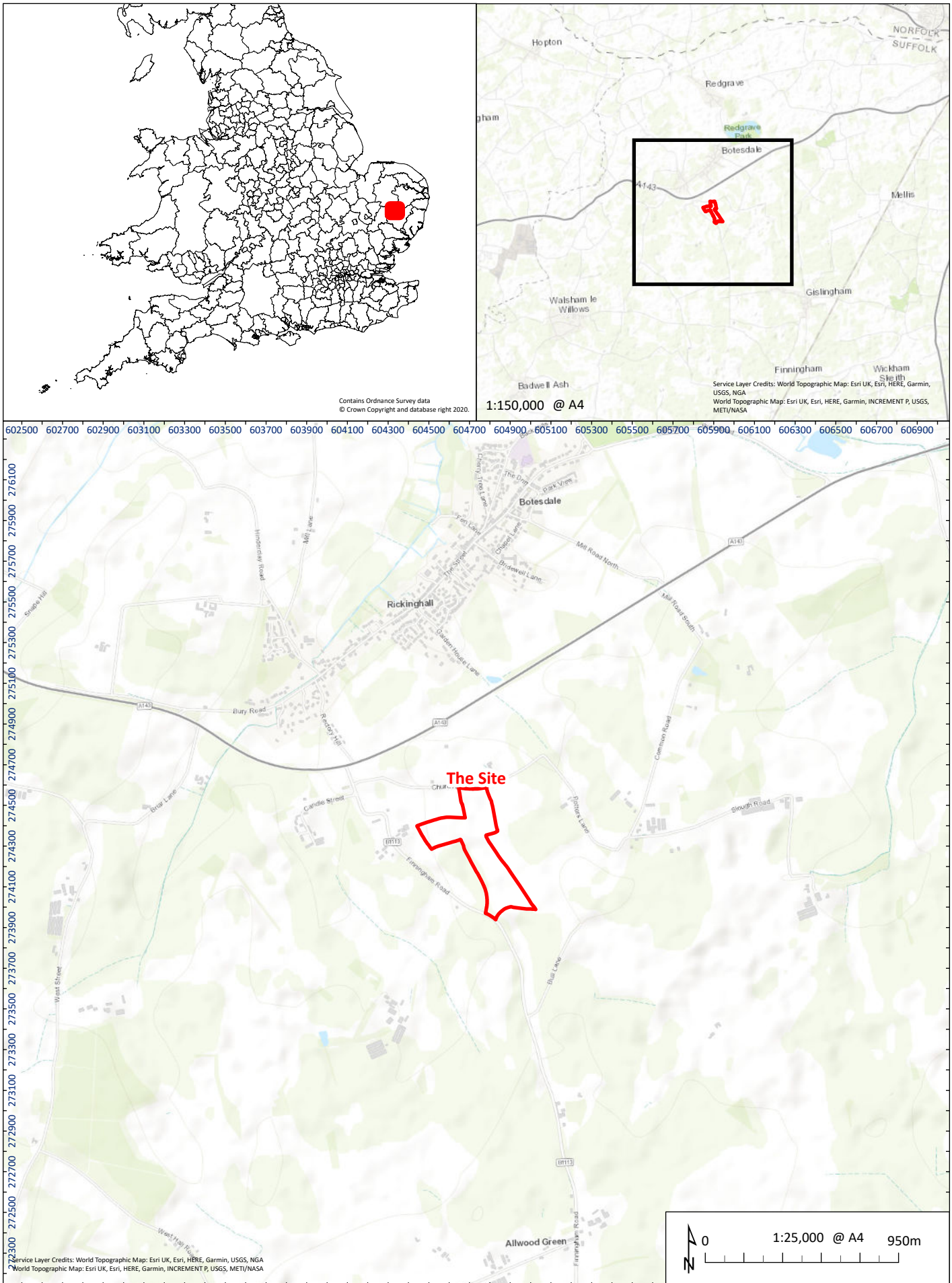


Figure 1: Site Location

05/40138/GEO/01/01

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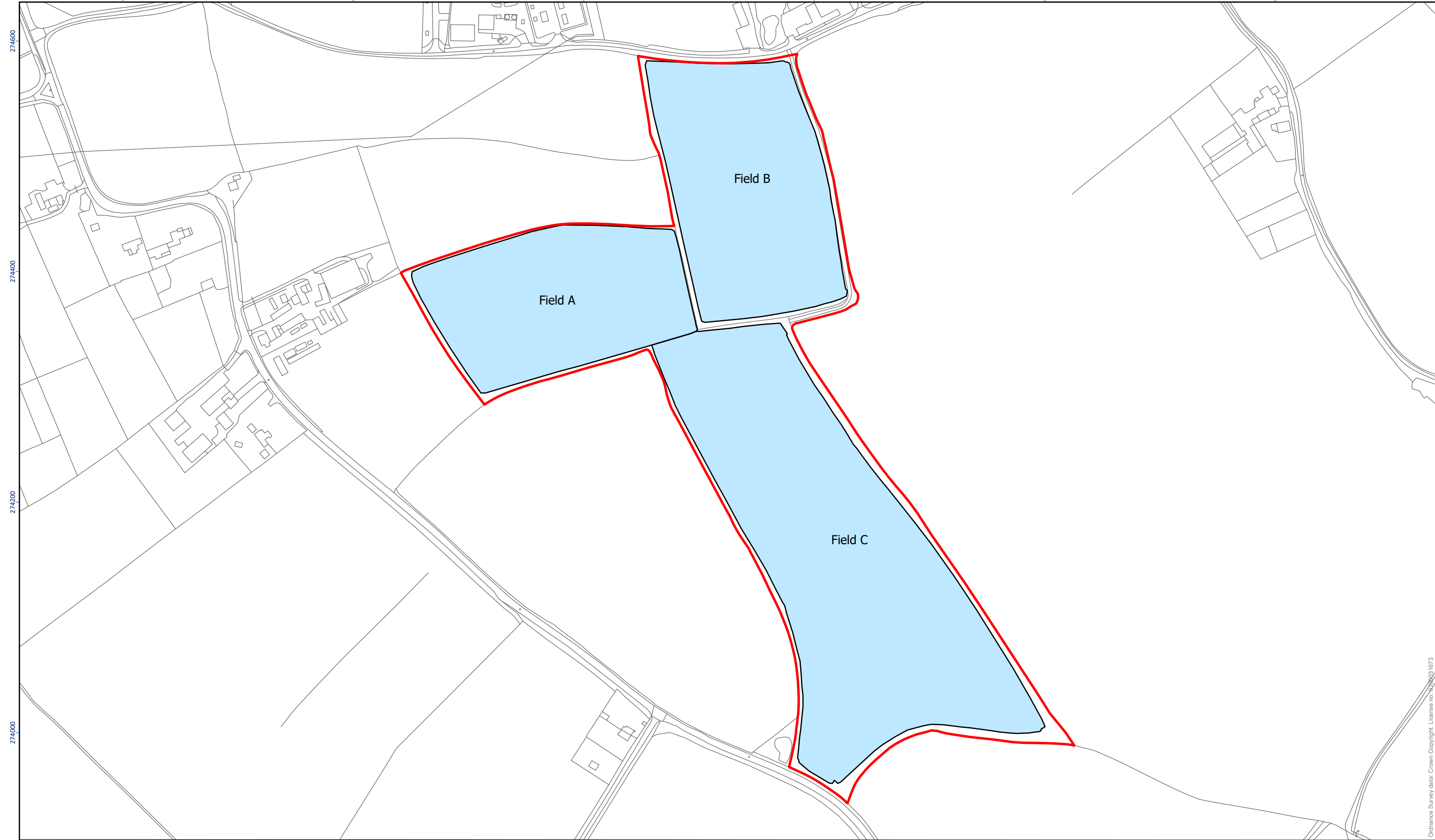
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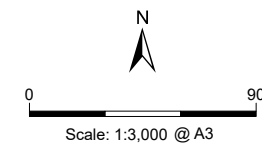
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Survey Areas

Figure
2

-  Red Line Boundary
-  Bartington Cart Survey Areas



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Checked by: JL Date: 22/10/2021
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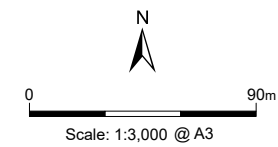
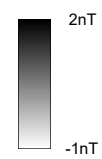


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Summary Greyscale Image of Processed Gradiometer Data

Figure
3



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Checked by: JL	Date: 22/10/2021
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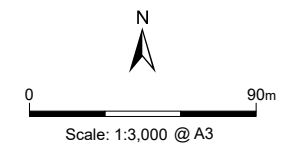
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Summary Interpretation of Processed Gradiometer Data

Figure
4

- | | | |
|---|-------------------------------------|------------------------------|
| Geology/Natural | Ferrous/Iron Spike | Linear Trend (Ploughing) |
| Enhanced Magnetism (Modern) | Enhanced Magnetism (Unclear Origin) | Trend (Possible Archaeology) |
| Linear Trend (Possible Archaeology) | Enhanced Magnetism (Utility) | Linear Trend (Utility) |
| Enhanced Magnetism (Possible Archaeology) | Linear Trend (Historic Feature) | Trend (Unclear Origin) |

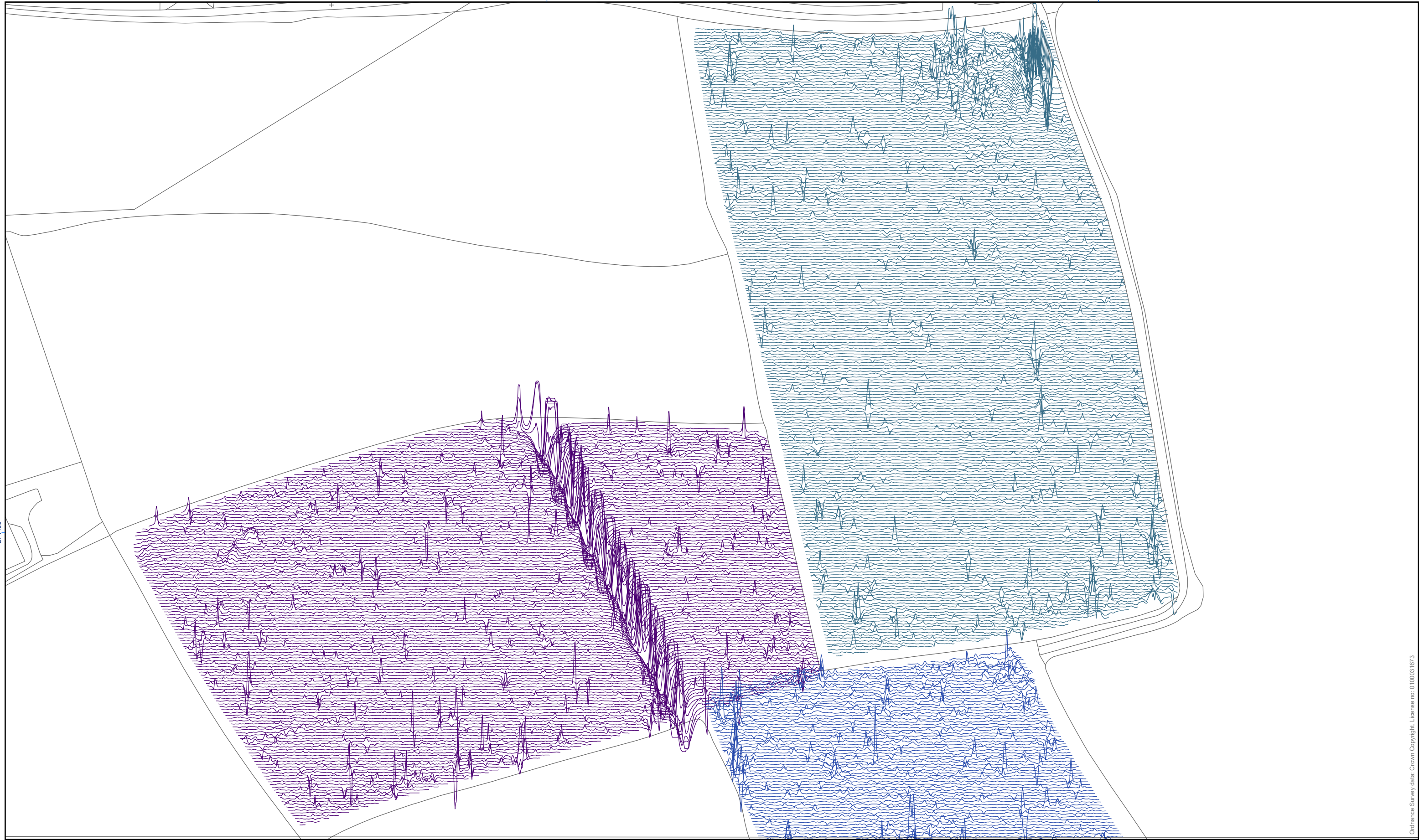


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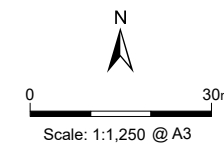
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Minimally Processed Gradiometer Data - XY Trace

Figure

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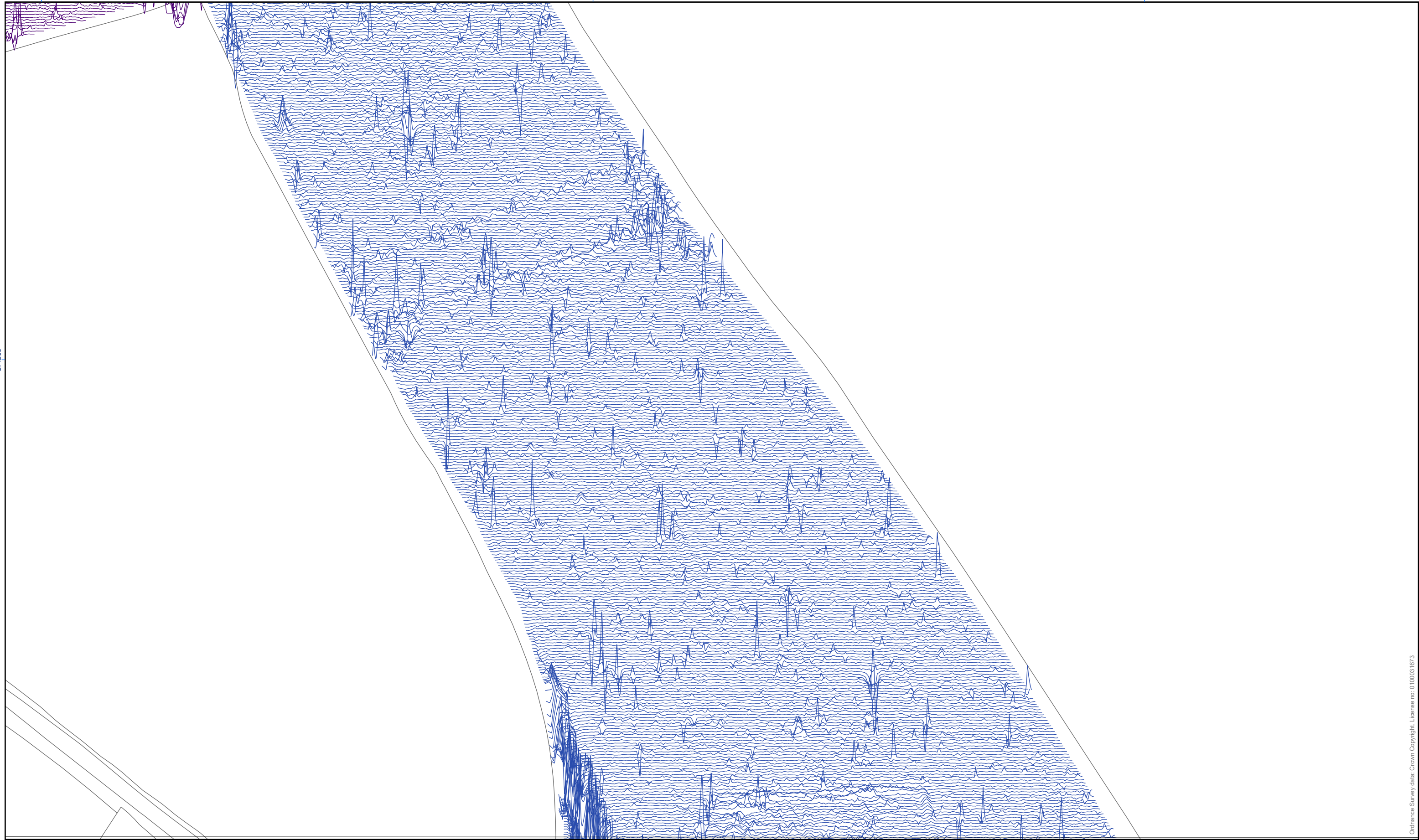
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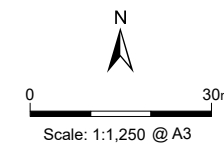
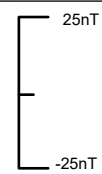
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Minimally Processed Gradiometer Data - XY Trace

Figure
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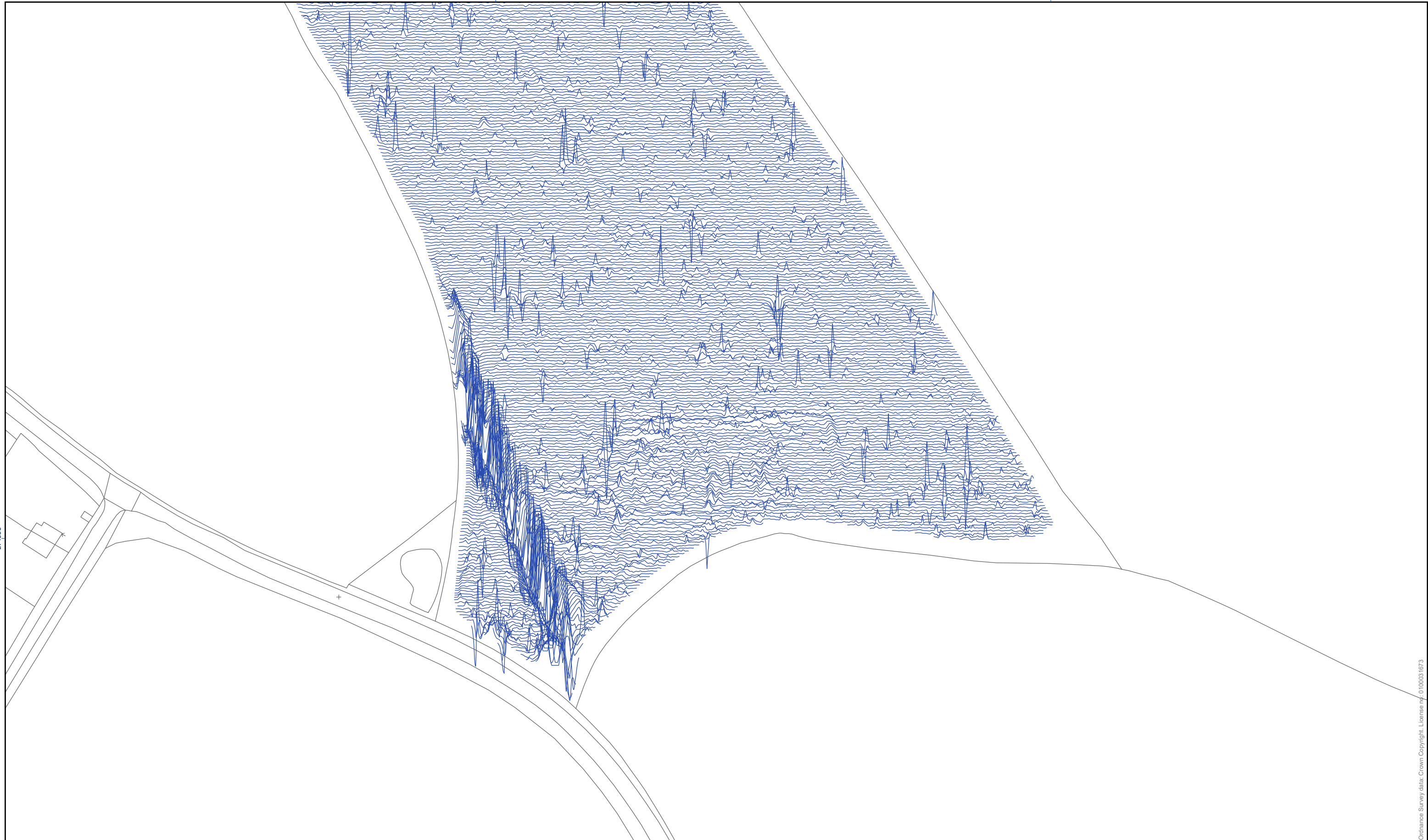
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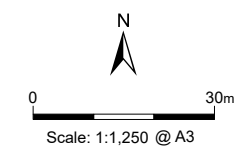
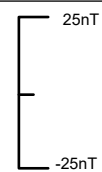
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Minimally Processed Gradiometer Data - XY Trace

Figure
7



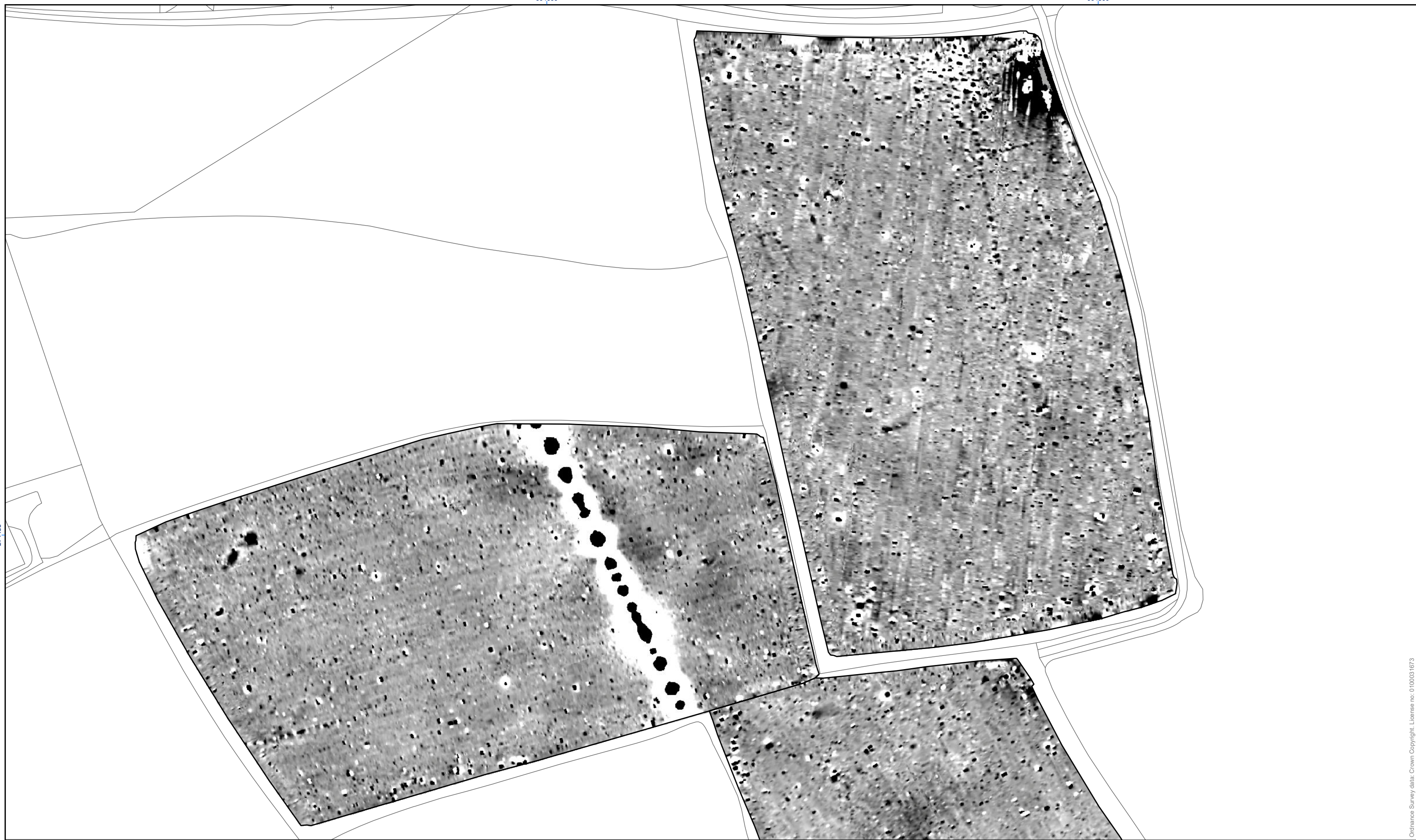
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Approved by: JL	Date: 22/10/2021



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Processed Gradiometer Data - Greyscale Image

Figure
8

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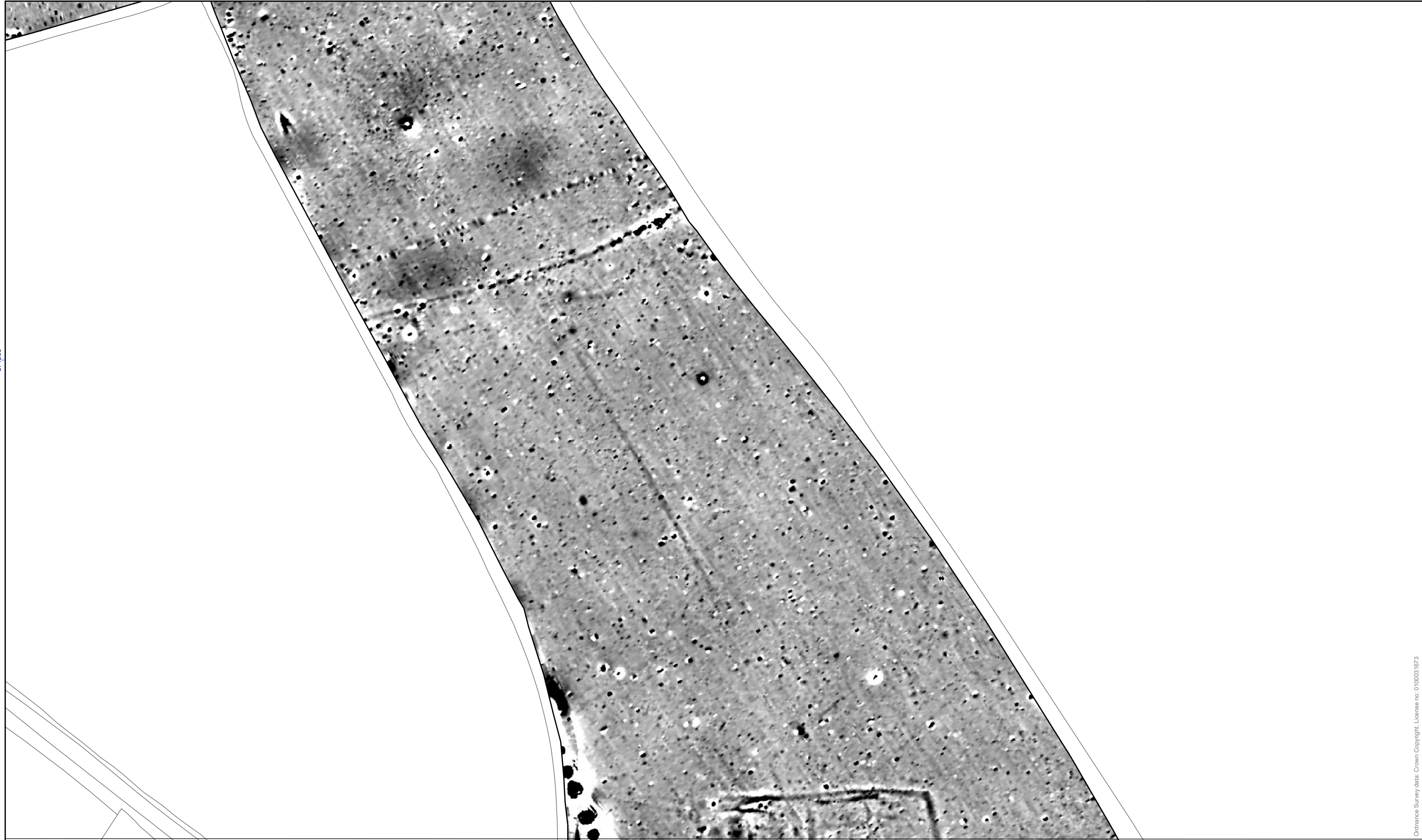
AOC
Archaeology
Group

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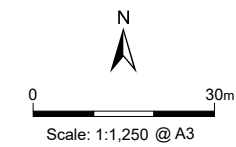
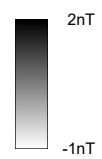
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Processed Gradiometer Data - Greyscale Image

Figure
9



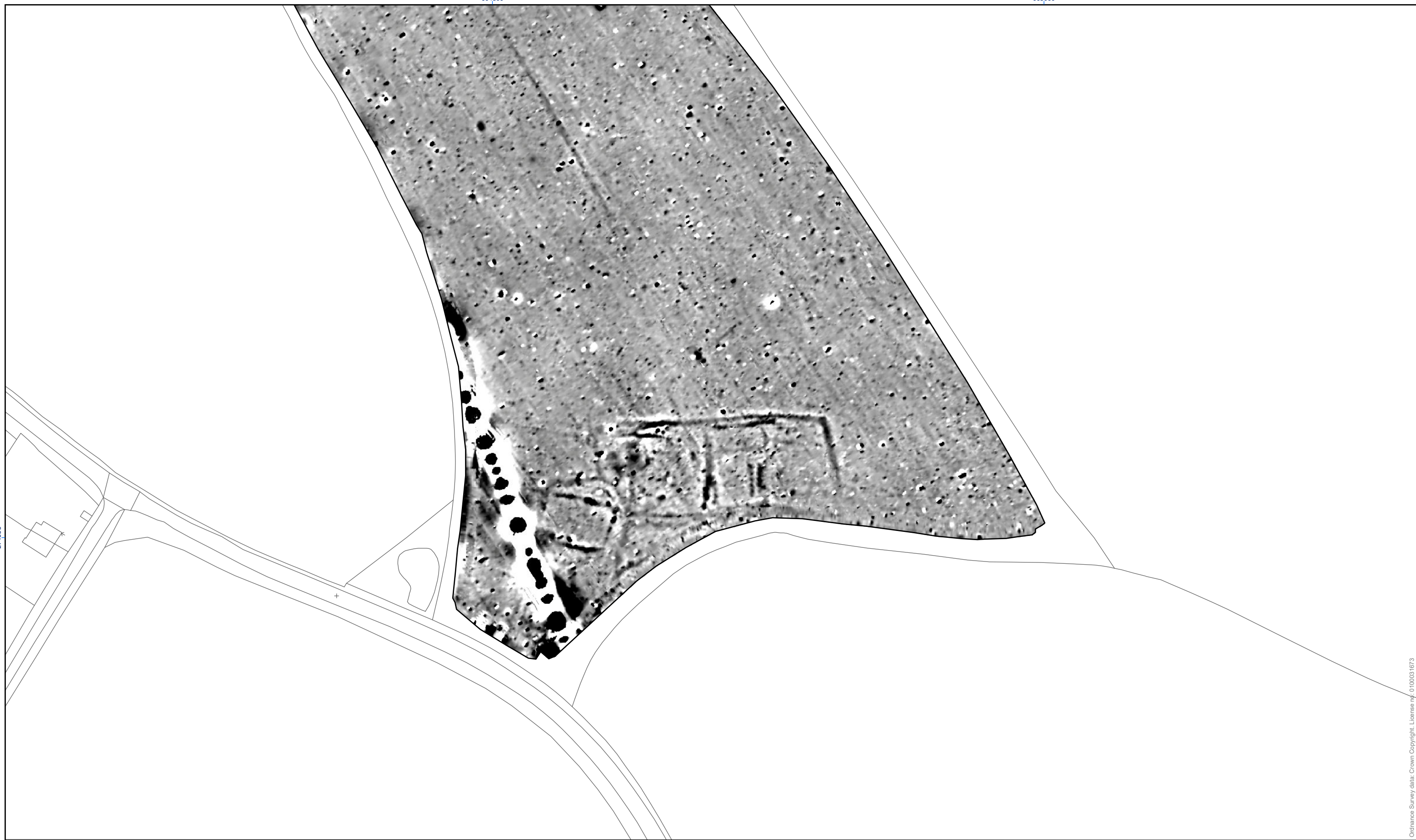
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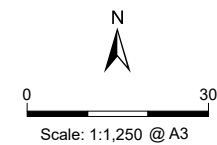
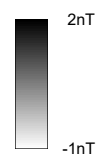
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Processed Gradiometer Data - Greyscale Image

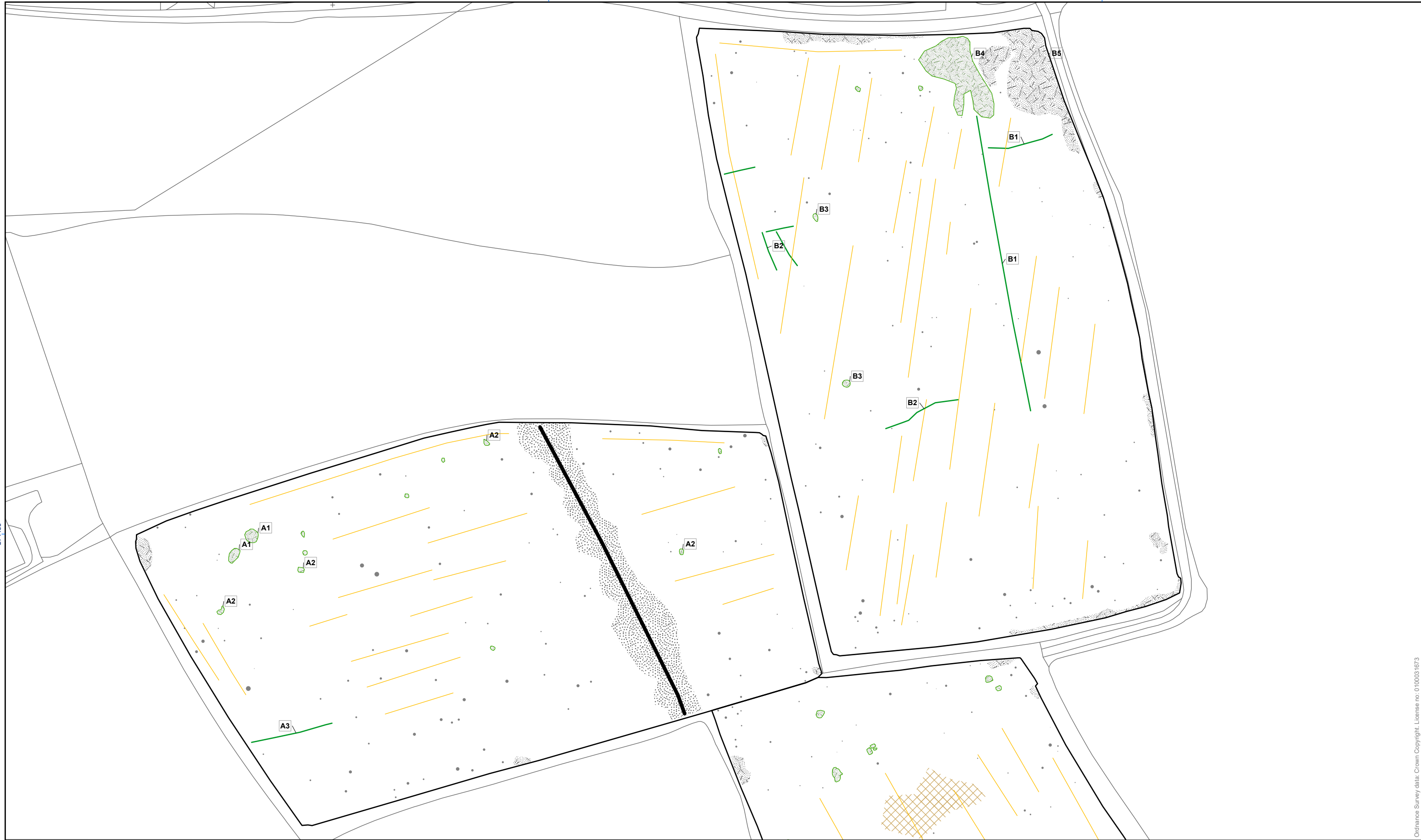
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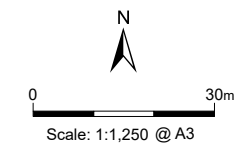
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Interpretation of Processed Gradiometer Data

Figure
11

- Geology/Natural
- Enhanced Magnetism (Modern)
- Ferrous/Iron Spike
- Enhanced Magnetism (Unclear Origin)
- Enhanced Magnetism (Utility)
- Linear Trend (Ploughing)
- Linear Trend (Utility)
- Trend (Unclear Origin)



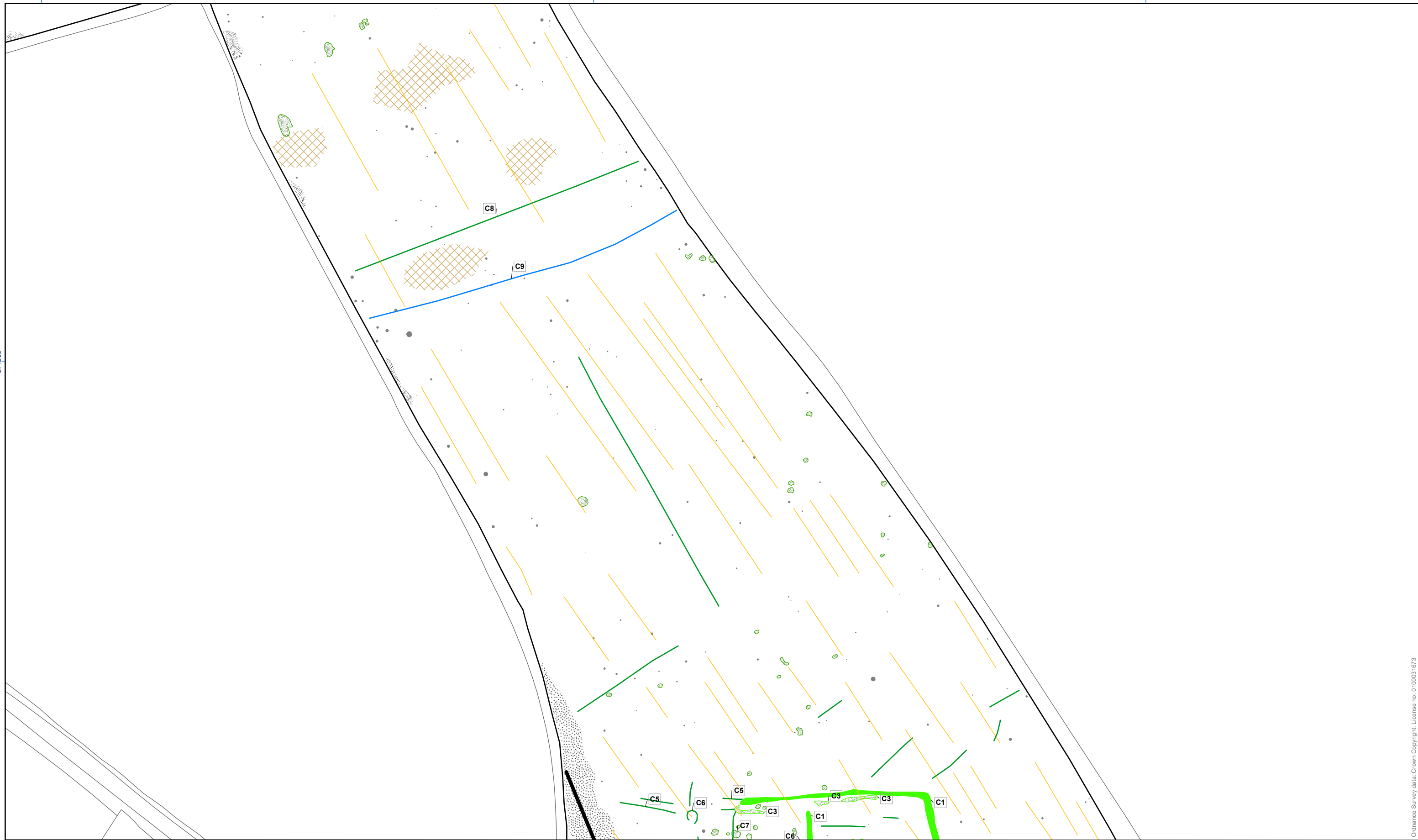
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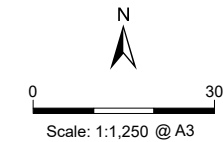
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Interpretation of Processed Gradiometer Data

Figure
12

- | | | |
|---|-------------------------------------|--------------------------|
| Geology/Natural | Ferrous/Iron Spike | Linear Trend (Ploughing) |
| Enhanced Magnetism (Modern) | Enhanced Magnetism (Unclear Origin) | Linear Trend (Utility) |
| Linear Trend (Possible Archaeology) | Enhanced Magnetism (Utility) | Trend (Unclear Origin) |
| Enhanced Magnetism (Possible Archaeology) | Linear Trend (Historic Feature) | |

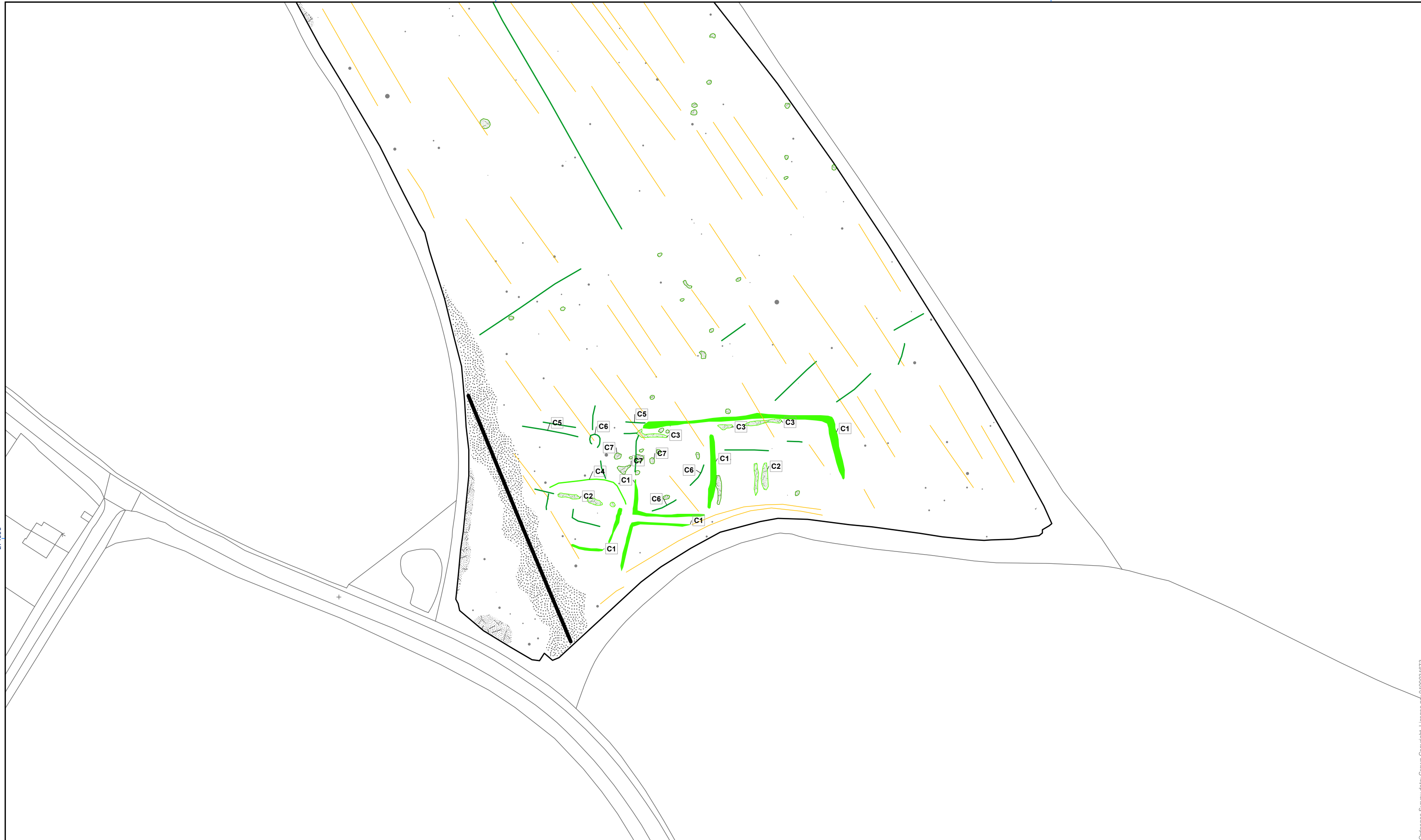


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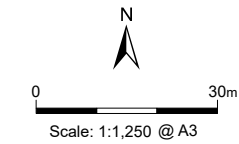
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Interpretation of Processed Gradiometer Data

Figure
13

- | | | |
|---|-------------------------------------|------------------------------|
| Enhanced Magnetism (Modern) | Enhanced Magnetism (Unclear Origin) | Linear Trend (Utility) |
| Linear Trend (Possible Archaeology) | Enhanced Magnetism (Utility) | Trend (Unclear Origin) |
| Enhanced Magnetism (Possible Archaeology) | Linear Trend (Ploughing) | Trend (Possible Archaeology) |
| Ferrous/Iron Spike | | |



Drawing Number: 05/40138/GEO/13/01	
Created by: SO	Date: 21/10/2021
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Approved by: JL	Date: 22/10/2021



Appendix 1: Characterisation of Anomalies

Field A

Anomaly	Type of Anomaly
A1	Enhanced Magnetism – Unclear Origin
A2	Enhanced Magnetism – Unclear Origin
A3	Linear trend – Unclear Origin

Field B

Anomaly	Type of Anomaly
B1	Linear trend – Unclear Origin
B2	Linear trend – Unclear Origin
B3	Enhanced Magnetism – Unclear Origin
B4	Enhanced Magnetism – Unclear Origin
B5	Enhanced Magnetism – Modern

Field C

Anomaly	Type of Anomaly
C1	Linear trend – Possible Archaeology
C2	Enhanced Magnetism – Possible Archaeology
C3	Enhanced Magnetism – Possible Archaeology
C4	Linear trend – Possible Archaeology
C5	Linear trend – Unclear Origin
C6	Linear trend – Unclear Origin
C7	Enhanced Magnetism – Unclear Origin
C8	Linear trend – Unclear Origin
C9	Linear trend – Historic Feature

Appendix 2: Survey Metadata**Oasis ID: aocarcha1-432981**

Field	Description
Surveying Company	AOC Archaeology
Data collection staff	Alistair Galt, Sacha O'Connor, N Holt, R Martin
Client	AXIS
Site name	Suggenhall
County	Suffolk
NGR	TM 04803 74238 (centre)
Land use/ field condition	Ploughed / Tilled
Duration	23 rd September & 12 th – 13 th October 2021
Weather	Overcast/Sunny
Survey type	Gradiometer Survey
Instrumentation	Bartington cart survey: Bartington Non-Magnetic Cart, two Bartington Grad 601-2, Trimble R10 GNSS System
Area covered	Approx. 12.21 ha
Download software	MLGrad601
Processing software	Geomar, MultiGrad601 and TerraSurveyor
Visualisation software	ArcGIS Pro
Geology	Lewes Nodular Chalk Formation, Seaford Calk Formation, Newhaven Chalk Formation and Culver Chalk Formation (BGS, 2021)
Soils	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscapes, 2021)
Scheduled Ancient Monument	No
Known archaeology on site	None
Historical documentation/ mapping on site	Rickinghall Inferior and Rickinghall Superior No 2 Tithe Map of 1840
Report title	Proposed Solar Farm Suggenhall, Suffolk: Archaeological Geophysical Survey
Project number	40138
Report Author	Susan Ovenden
Quality Checked by	James Lawton

Appendix 3: Archaeological Prospection Techniques, Instrumentation and Software Utilised

Gradiometer Survey

Gradiometer surveys measure small changes in the earth's magnetic field. Archaeological materials and activity can be detected by identifying changes to the magnetic values caused by the presence of weakly magnetised iron oxides in the soil (Aspinall et al., 2008, 23; Sharma, 1997, 105). Human inhabitation often causes alterations to the magnetic properties of the ground (Aspinall et al, 2008, 21). There are two physical transformations that produce a significant contrast between the magnetic properties of archaeological features and the surrounding soil: the enhancement of magnetic susceptibility and thermoremanent magnetization (Aspinall et al., 2008, 21; Heron and Gaffney 1987, 72).

Ditches and pits can be easily detected through gradiometer survey as the topsoil is generally suggested to have a greater magnetisation than the subsoil caused by human habitation. Areas of burning or materials which have been subjected to heat commonly also have high magnetic signatures, such as hearths, kilns, fired clay and mudbricks (Clark 1996, 65; Lowe and Fogel 2010, 24).

It should be noted that negative anomalies can also be useful for characterising archaeological features. If the buried remains are composed of a material with a lower magnetisation compared to the surrounding soil, the surrounding soil will consequently have a greater magnetization, resulting in the feature in question displaying a negative signature. For example, stone materials of a structural nature that are composed of sedimentary rocks are considered non-magnetic and so will appear as negative features within the dataset.

Ferrous objects – i.e. iron and its alloys - are strongly magnetic and are typically detected as high-value peaks in gradiometer survey data, though it is not usually possible to determine whether these relate to archaeological or modern objects.

Although gradiometer surveys have been successfully carried out in all areas of the United Kingdom, the effectiveness of the technique is lessened in areas with complex geology, particularly where igneous and metamorphic bedrock is present or thick layers of alluvium or till. All magnetic geophysical surveys must therefore take the effects of background geological and geomorphological conditions into account.

Bartington Non-Magnetic Cart Instrumentation and Software

AOC Archaeology's cart-based surveys are carried out using a Bartington Non-Magnetic Cart. The cart enables multiple traverses of data to be collected at the same time, increasing the speed at which surveys may be carried out and offers the benefits of reduced random measurement noise and rapid area coverage (Schmidt et al 2015, 60-62, David et al. 2008, 21).

The cart uses a configuration of four Grad-01-1000L sensors mounted upon a carbon fibre frame along with two DL601 dataloggers and one BC601 battery cassette. The sensors are normally positioned at 1m intervals on a horizontal bar, with the datalogger taking readings every 12.5cm along each traverse, though this can be altered to increase / reduce resolution if required. The data is georeferenced via a Trimble R10 Real Time Kinematic (RTK) VRS Now GNSS GPS which streams data throughout survey and allows the data to be recorded relative to a WGS1984 UTM coordinate system.

The gradiometer data is collected through Geomar MLGrad601 software on a laptop in real-time during the survey. The data is downloaded and converted into a .xyz file in Geomar MultiGrad601 before being processed along with the GPS data in TerraSurveyor v3.0.34.10 (see Appendix 4 for a summary of the processes used in Geoplot to create final data plots).

Appendix 4: Summary of Data Processing

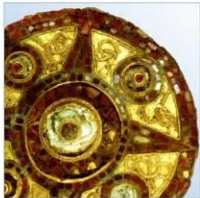
Process	Effect
Clip	Limits data values to within a specified range
De-spike	Removes exceptionally high readings in the data that can obscure the visibility of archaeological features. In resistivity survey, these can be caused by poor contact of the mobile probes with the ground. In gradiometer survey, these can be caused by highly magnetic items such as buried ferrous objects.
De-stagger	Corrects a misalignment of data when the survey is conducted in a zig-zag traverse pattern.
Discard Overlap (TerraSurveyor)	Removes datapoints which occur too closely together and can cause digital artefacts in the data which are caused by the overlapping of parallel traverses.
Edge Match	Counteracts edge effects in grid composites by subtracting the difference between mean values in the two lines either side of the grid edge.
Filter (MAGNETO)	Much like a zero mean traverse, it resets the median value of each point to zero, in order to address the effect of striping in the data and counteract edge effects. In MAGNETO the individual values take into account the value of all uncorrected points within a certain distance to create its own median.
GPS Filter (MAGNETO)	Used to either remove or reduce the appearance of constant and reoccurring features that are not consistent with the GPS signal in use by the cart system.
High pass filter	Removes low-frequency, large scale detail in order to remove background trends in the data, such as variations in geology.
Interpolate	Increases the resolution of a survey by interpolating new values between surveyed data points, creating a smoother overall effect.
Low Pass filter	Uses a Gaussian filter to remove high-frequency, small scale detail, typically for smoothing the data.
Periodic Filter	Used to either remove or reduce the appearance of constant and reoccurring features that distort other anomalies, such as plough lines.
Remove Turns (TerraSurveyor)	Uses analysis of the direction of travel derived from the GNSS data to break continuous streams of data into individual traverses.
Zero Mean Grid	Resets the mean value of each grid to zero, in order to counteract grid edge discontinuities in composite assemblies.
Zero Mean Traverse	Resets the mean value of each traverse to zero, in order to address the effect of striping in the data and counteract edge effects.

Processing Steps

Bartington Cart survey	
Process	Extent
Base Settings	Interval 0.13m, Track Radius 1.2m
Remove Turns	Threshold Angle 90°, Cut Length 5m
Discard Overlap	Threshold Distance 0.4m, Minimum Track 5, Newest
Despike	Mean Diameter 3 Threshold 1
Destripe	Mean Traverse SD 1.5
Clip	-30/30

Appendix 5: Technical Terminology

Type of Anomaly	Description
Archaeology	<i>Interpretation is supported by the presence of known archaeological remains or by other forms of evidence such as HER records, LiDAR data or cropmarks identified through aerial photography.</i>
Trend	Linear / curvilinear / rectilinear anomalies either characterised by an increase or decrease in values compared to the magnetic background.
Area of enhanced magnetism	A zone of enhanced magnetic responses over a localised area. These anomalies do not have the high dipolar response which are manifested in an 'iron spike' anomaly and likely have a relationship with nearby archaeological trends.
Pit	An anomaly composed of an increase in magnetic values with a patterning on the XY trace plot that is pit-like in appearance.
Possible Archaeology	<i>Trends are likely to have an archaeological origin, however without supporting evidence from known archaeological remains, HER records, LiDAR or aerial photography, they can only be classed as having a possible archaeological origin.</i>
Trend	Linear / curvilinear / rectilinear anomalies either characterised by an increase or decrease in values compared to the magnetic background.
Area of enhanced magnetism	A zone of enhanced magnetic responses over a localised area. These anomalies do not have the high dipolar response which are manifested in an 'iron spike' anomaly but lacks definitive records to be classed as being archaeological.
Pit-like anomaly	An anomaly composed of an increase in magnetic values with a patterning on the XY trace plot that is pit-like in appearance.
Burnt area	An anomaly with a patterning on the XY trace plot that is suggestive of industrial activity such as a kiln or hearth.
Unclear Origin	<i>Trends are magnetically weak, fractured or isolated and their context is difficult to ascertain. Whilst an archaeological origin is possible, an agricultural, geological or modern origin is also likely.</i>
Trend	Linear / curvilinear / rectilinear anomalies which are composed of a weak or different change in magnetic values. The trends do not appear to form a patterning that is suggestive of archaeological remains, such as enclosures or trackways.
Area of enhanced magnetism	A zone of enhanced magnetic responses which lack context for a conclusive interpretation. They do not appear to have a relationship with nearby trends of an archaeological origin. Can often be caused by areas of former woodland, geological variations or agricultural activity.
Agricultural	<i>Trends associated with agricultural activity, either historical or modern.</i>
Old Field Boundary	These isolated long linear anomalies, most often represented as a negative or fractured magnetic trend, relate to former field boundaries when their positioning is cross referenced with historical mapping.
Historical Features	Features observed on historical mapping that correspond with anomalies or trends in the data. Areas of enhanced magnetism could relate to former buildings, trackways, quarries or ponds.
Ridge and Furrow / Rig and Furrow	A series of regular linear or curvilinear anomalies either composed of an increased or decreased magnetic response compared to background values. The wide regular spacing between the anomalies is consistent with that of a ridge and furrow / rig and furrow ploughing regime. The anomalies often present as a positive 'ridge' trend adjacent to a negative 'furrow' trend.
Ploughing Trends	A series of regular linear anomalies either composed of an increased or decreased magnetic response compared to background values. Anomalies seen parallel to field edges are representative of headlands caused by ploughing.
Field Drainage	A series of magnetic linear anomalies of an indeterminate date, usually with a regular or herringbone patterning.
Non - Archaeology	<i>Trends which are likely to have derived from non-archaeological processes or activities.</i>
Geology / Natural	An area of enhanced magnetism that is composed of irregular weak increases or decreases in magnetic values compared with background readings. It is likely to indicate natural variations in soil composition or reflect variations in the bedrock or superficial geology.
Possible Modern Service	Anomalies of a linear form often composed of contrasting high positive and negative dipolar values. Such anomalies usually signify a feature with a high level of magnetisation and are likely to belong to modern activity such as pipes or modern services.
Magnetic Disturbance	A zone of highly magnetic disturbance that has been caused by or is a reflection of modern activity, such as metallic boundary fencing, gateways, roads, boreholes, adjacent buildings, rubbish at field edges or a spread of green waste material.
Isolated Dipolar Anomalies / Ferrous (iron spikes) and Ferrous Zones	A response caused by ferrous materials on the ground surface or within the subsoil, which causes a 'spike' in the data representing a rapid variation in the magnetic response. These generally represent modern material often re-deposited during manuring.



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