

**Byers Gill Solar  
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# 6.4.8.3 Environmental Statement

## Appendix 8.3 Detailed Gradiometer Survey Report

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# Byers Gill Solar Farm, Great Stainton, County Durham

Detailed Gradiometer Survey Report

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## Summary

A detailed gradiometer survey was conducted over land at Byers Gill Solar Farm, Great Stainton, County Durham (centred on NGR 434060 521253). The project was commissioned by Arup Group on behalf of JBM Solar to establish the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as a solar farm.

Due to the size of the overall site, it has been split into four separate evaluation areas, to better discuss the information. The individual areas are centred on: Area 1 (NGR 430305 520633); Area 2 (NGR 433177 520712); Area 3 (NGR 434462 521450); and Area 4 (NGR 437377 521585).

The overall site covers an area of land between Middlesborough, 6.8 km east of the eastern extremity of the site; Darlington, 5 km south-west of the western extremity of the site; and Newton Aycliffe, 3 km north-west of the western extremity of the site, in County Durham. The survey comprises 551 ha of agricultural land, currently utilised for arable crops and pasture.

The geophysical survey has been successful at identifying anomalies associated with a wide range of archaeological features. The salient geophysical anomalies identified are briefly summarised below for each area.

### Area 1

A small number of linear anomalies associated with ditch-like features and a possible trackway were identified in Area 1. This was surrounded by widespread evidence of ridge and furrow and former field boundaries, many of which do not appear to conform to the modern layout of fields or the post-medieval ridge and furrow, a medieval or earlier date.

Most other anomalies identified across Area 1 relate to the post-medieval agricultural landscape. As well as the aforementioned areas of ridge and furrow, three former field boundaries have been identified that are recorded on 1888 – 1913 OS mapping. There is limited evidence for extraction activity across the area, but isolated areas of backfilling could relate to small-scale post-medieval quarrying activity.

### Area 2

There is widespread evidence for anomalies associated with archaeological activity across Area 2, predominantly in the form of enclosure ditches and associated pit-like and roundhouse features that are indicative of possible settlement activity visible in the northern portion of the area. These are characterised by linear and curvilinear features which indicate multi-phase occupation. The curvilinear features suggest Bronze Age to Romano-British activity, with the linear features more respectful of the medieval and post-medieval field boundaries. These enclosures are surrounded by more ephemeral features immediately to the south which may infer more extensive activity.

In the south of Area 2, there are fewer anomalies of archaeological interest, but the area is still traversed by numerous linear features. These are more respectful of the medieval and post-medieval field boundaries as well as to the existing field layout. Further linear anomalies have also been noted across the entirety of the area, which pertain to former field systems. Most of the anomalies relate to the post-medieval agricultural landscape and areas of ridge and furrow corresponding with the first edition 1888 – 1913 OS mapping.

There is limited evidence for extraction activity across Area 2, but there are isolated areas of backfilling which could relate to small-scale post-medieval quarrying activity. The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to made ground, agricultural activity, drainage, and services.



### Area 3

Area 3 contains a small number of anomalies thought to be associated with archaeological remains. These are primarily associated with isolated linear anomalies across the west and a potential enclosure of uncertain date in the north-east of the eastern part of Area 3. In addition, there are a small number of large-pit-like features that are likely associated with extraction activity or backfilled ponds.

The geophysical survey has identified areas of ridge and furrow and former field boundaries, which appear to respect mostly respects the modern arrangement of field boundaries, or that noted on 19th-century mapping. This combined with the ridge and furrow, suggests that the majority relate to the medieval – post-medieval agricultural landscape.

### Area 4

The survey of Area 4 has identified a small number of features which may pertain to archaeological activity. This includes possible boundary ditches that have been detected in the south of the area and north-west, surrounded by extensive ridge and furrow cultivation.

In the west of the survey area, an anomaly interpreted as possible channel modification has been identified within an area of enhancement related to flood plain activity related to a Beck adjoining the field boundary. The linearity of the anomaly suggests an anthropogenic origin; however, it may be the result of natural processes.

In the north of the survey area, an area of strong enhancement has been identified, within which are possible linear and curvilinear anomalies. These may pertain to enclosures or settlement activity, however, their proximity to a farm may suggest that these result from more modern agricultural structures and backfilling.

Evidence of ridge and furrow cultivation is present across the survey area and appears to conform to the orientation and layout of the modern field systems, suggestive of a post-medieval date. Further evidence of agricultural activity has been identified in the form of field boundaries visible on 1830 – 1952 OS mapping.

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The fieldwork was undertaken by Jo Instone-Brewer, Andres Perez Arana, Cameron Ray, Davor Cakanic, Phoebe Baker, Jack Trueman, and Amy Dunn. Brett Howard processed, interpreted, and produced illustrations of the geophysical data. Brett Howard, Lydia Jones, Bethan Healey and Amy Dunn wrote the report. The geophysical work was quality-controlled by Tom Richardson and Nicholas Crabb. The project was managed on behalf of Wessex Archaeology by Chris Breedon.





# Byers Gill Solar Farm Great Stainton, County Durham

## Detailed Gradiometer Survey Report

### 1 INTRODUCTION

#### 1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Arup Group, on behalf of JBM Solar, to carry out a geophysical survey at Byers Gill, Great Stainton, County Durham (centred on NGR 434060 521253) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the site as a solar farm.

#### 1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

#### 1.3 The site

1.3.1 The site covers an area of land between Middlesborough, 6.8 km east of the eastern extremity of the site; Darlington, 5 km south-west of the western extremity of the site; and Newton Aycliffe, 3 km north-west of the western extremity of the site, in County Durham.

1.3.2 The survey comprises 513.4 ha of agricultural land, currently utilised for arable crop and pasture.

##### Area 1

1.3.3 Area 1 is bounded by the High House Lane and pasture to the north, pasture to the west, with further arable land to the south and east. The area is on an incline from 67 m above Ordnance Datum (aOD) at the eastern edge to 95 m aOD at the western edge.

1.3.4 The solid geology comprises Dolostone of the Ford Formation with overlying superficial geological deposits of Diamicton till (BGS 2023).

1.3.5 The soils underlying the area are likely to consist of Pelo-stagnogley soils of the 712f (Crewe) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

##### Area 2

1.3.6 Area 2 is bounded by Lodge Lane and arable land to the north, Bishopton Lane to the east, with woodland and further arable land to the south and west. This part of the site is on an incline from 57 m aOD at the eastern edge to 95 m aOD at the western edge.

1.3.7 The solid geology comprises Dolostone of the Ford Formation with overlying superficial geological deposits of Diamicton till (BGS 2023).

1.3.8 The soils underlying the area are likely to consist of Stagnogley soils of the 711n (Clifton) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material



have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

#### Area 3

- 1.3.9 Area 3 is bounded by an unnamed lane to the north and east, arable land to the south, with Elstob Lane to the west. The area is on an incline from 46 m aOD at the eastern edge to 68 m aOD at the western edge.
- 1.3.10 The solid geology comprises Mudstone of the Edlington Formation with overlying superficial geological deposits of Diamicton till (BGS 2023).
- 1.3.11 The soils underlying the area are likely to consist of Pelo-stagnogley soils of the 712f (Crewe) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

#### Area 4

- 1.3.12 Area 4 is bounded by a ditch to the north, Whiton Road and Letch Lane to the east, Red Marshall Road to the south, with Bishopton and an unnamed lane to the west. The area is on an incline from 55 m aOD at the southern edge to 41 m aOD at the northern edge.
- 1.3.13 The solid geology comprises Mudstone, Argillaceous Rocks, and Subordinate Sandstone of the Yoredale Group with overlying superficial geological deposits of Diamicton till (BGS 2023).
- 1.3.14 The soils underlying the area are likely to consist of Pelo-stagnogley soils of the 712f (Crewe) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

## 2 ARCHAEOLOGICAL BACKGROUND

### 2.1 Introduction

- 2.1.1 The archaeological background was assessed in a desk-based assessment (DBA) (Wessex Archaeology 2022), which considered the recorded historic environment resource. This document has used this information to determine historic assets relevant to geophysical interpretation within a 2 km study area of the proposed development. The DBA used information from the County Durham, Stockton-on-Tees, and Historic Environment Record (HER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The findings of the DBA are summarised below.

### 2.2 Summary of the archaeological resource

- 2.2.1 The scheduled area of the well-preserved Norman motte and bailey castle remains located to the south of Bishopton (NHLE1008668) is immediately adjacent to Area 4.
- 2.2.2 There are no other designated heritage assets within the survey areas; however, Area 3 the survey area encompasses the Grade II listed building of Longpasture House (NHLE1116414).
- 2.2.3 Within the 2 km study area, scheduled monuments listed as medieval in origin include the shrunken medieval village of Sadberge (NHLE1011073) located 1.5 km to the south-west of Area 4; Coatham Mundeville medieval village, fishpond, and areas of ridge and furrow



(NHLE1016109) located 1 km to the east of Area 1; and the deserted village at Mordon (NHLE1002335) located 1.9 km to the north-west of Area 2. Ketton Bridge (NHLE1002345) located 800 m to the south of Area 1 is also within the Study Area.

- 2.2.4 There are two Grade I listed buildings in the study area. The Church of St Cuthbert (NHLE1140001) is located 60 m to the south of Area 4, and the Church of St Andrew, Great Aycliffe (NHLE1322806) is located 1.8 km to the north-west of Area 1.
- 2.2.5 Within the Study Area, there are a total of 74 Grade II listed buildings. These are mainly centred in the villages of Coatham Mundeville, Aycliffe, Ketton, Great Stainton, Sadberge, Bishopton, Stillington, Thorpe Thewles, Redmarshall, and Carlton. Sadberge, Bishopton, Coatham Mundeville, and Aycliffe also have Conservation Areas.
- 2.2.6 There is limited evidence for early prehistoric (Palaeolithic – Mesolithic) activity within the north-east of England. There is however evidence for a large glacial lake close to Preston-le-Skerne in the north-west of the study area. Two findspots from this period are recorded in the study area near Newton Ketton, these consist of flint arrowheads, knives, and scrapers.
- 2.2.7 Recent research suggests that Neolithic and Bronze Age activity was relatively sparse throughout County Durham. However, the Magnesian Limestone Ridge stretching from Nottingham to Durham, and covering the study area, is of potential importance as home to Neolithic long barrows. A flint scraper discovered to the north of Letch Lane is the only evidence of Neolithic activity within the study area. It is also possible that some of the flint findspots, and features identified as 'prehistoric' in the HERs may date from this period.
- 2.2.8 Many Bronze Age barrows are located within the north-east of England, particularly upon the Magnesian Limestone ridge of the East Durham Plateau (Radford and Pallant 2008). A round barrow is located in the north of the study area, to the south of Mordon. It survives as a levelled mound and infilled ditch identified via cropmarks. A worked flint was also found in the same field, however, whether it is related to the barrow is unknown. Further lithic tools in the form of an arrowhead, discoidal knife, and an axe head have also been identified to the east of Carlton.
- 2.2.9 In the north-east of England, the Tees Valley has the greatest density of known and excavated Iron Age sites, dominated by rectilinear enclosures (Haselgrove 2016). Within the south-west of Area 4 an Iron Age rectangular enclosure and settlement has been recorded. Seven other rectangular enclosures have also been identified as cropmarks in the surrounding study area. An excavation in Faverdale identified another enclosure which contained pottery dating to the Iron Age. Two Iron Age findspots include a sword found near Barmpton and a Late Iron Age – Romano-British coin found north-east of Darlington.
- 2.2.10 There are several records dated to the prehistoric period, but which have not been ascribed to a particular period. These consist of earthwork and cropmark features, as well as flint findspots. Several prehistoric enclosures have been identified 120 m – 220 m to the south of Area 1. Concentrations of cropmarks of prehistoric enclosures and linear features have been identified near to Sadberge. A circular cropmark enclosure with a hut circle is located at Thorpe Lewis, a large rectangular enclosure is located north-west of Thorpe Lewis, and a possible ring ditch was discovered during a geophysical survey in the south of the study area. The majority of these features lie on lower ground often close to river channels.
- 2.2.11 In the centre of Area 3 a Roman coin findspot is recorded. In the north-east of Area 2 and the north-west of Area 3, are also records of a Roman road (Cade's Road). The



hypothesised route of this road is near, and possibly aligned with, Elstob Lane. In the south of the surrounding study area Cade's Road is also recorded near Sadberge. No actual physical evidence has been discovered to prove the existence of the road in these locations. In the east of the study area, to the east of California Farms, two-sub-rectangular enclosures with a potential drove way have been identified via cropmarks. These are likely Romano-British and were also seen in a geophysical survey in 2007. Pottery scatters have also been identified in the wider area near Kenilworth and Hardwick.

- 2.2.12 The evidence of Saxon activity within the study area is limited to place name analysis and Saxon masonry within churches in Great Stainton, Aycliffe, and Sadberge.
- 2.2.13 The study area is dominated by the remnants of a medieval – post-medieval agricultural landscape. Medieval ridge and furrow is recorded in the north-west and south of Area 1, south of Area 2, and north and centre of Area 3, as well as in the surrounding study area. The villages of Aycliffe, Newton Ketton, Bishopton, East and West Newbiggin, and Haughton-le-Skerne have medieval origins. There are also 28 deserted/shrunken villages within the study area. One at Great Stainton is located 160 m to the east of Area 3.
- 2.2.14 Post-medieval activity within the study area is widespread and in the form of settlement areas, singular farmsteads, agriculture, and industry. In general, the area remained agricultural in nature during this period evidenced by the large amount of ridge and furrow recorded as well as many farmsteads, some with associated gin-gangs. Map regression has shown that many of the fields containing ridge and furrow were the product of Parliamentary enclosure, many of which have not changed up to the present day. Medieval origin villages including Aycliffe, Coatham Mundeville and Brafferton (amongst others) continued to develop during the post-medieval period.
- 2.2.15 The industrialisation of the north-east of England was focused mainly on coal and lead mining. This is reflected in the records of quarries and watermills found in the study area including a series of large limestone quarries to the south of Aycliffe; Carlton Ironworks in the north of the study area; and a concentration of watermills along the banks of the river at Aycliffe, Brafferton, and Coatham Mundeville. The remains of railways are located in the east and west of the study area.
- 2.2.16 Ridge and furrow dating to the post-medieval period is recorded in Areas 1, 2, and 3. In the far east of Area 4 some of the survey area sits on either side of the route of the former Castle Eden Branch of the North East Railway. The survey area is also located close to post-medieval buildings at Brafferton, Great Stainton, Redmarshall, Carlton, and Longpasture Farm.
- 2.2.17 Within the south-east of Area 2, a brick and tile works including clay pit was recorded in historical mapping (OS one inch 1885-1900 and OS 1:25,000 1945-1965). Within the survey areas and the study area there is a gradual loss of ponds and field boundaries between the earliest mapping (OS six inch 1888-1913) and present day. There is also the loss of Woodgra plantation in Area 3. Two former gravel pits in the south of Area 4, just to the south of Bishopton, are recorded in the 1937 – 61 (OS 1:25,000) and 1949 – 1971 (OS 1:10,560) mapping and are marked as disused. They are also visible in aerial imagery taken in 1946 (Historic England). In current satellite imagery (Google 2023) the land is in agricultural use.
- 2.2.18 Modern activity within the survey area is limited to the former Bishopton Landing Ground located in the east of Area 3. This was a First World War airfield which originally covered 60 acres; however, no extant remains were visible within the survey area. Modern activity in the wider study area is dominated by both World War One and World War Two evidence



including war memorials in villages, pillboxes in the east, and recorded crash sites at Great Stainton.

- 2.2.19 In the north of Area 3 an undated rectangular enclosure is recorded, identified via cropmarks. It is possible that it is Iron Age in origin however further investigation would be needed to substantiate this.

### **2.3 Recent investigations in the immediate vicinity**

- 2.3.1 There have been numerous archaeological investigations in the south-western portion of the overall study area including geophysical surveys, archaeological excavation and evaluation, and fieldwalking. One such investigation included the excavation of 17 trial trenches in Faverdale by CFA Archaeology in 2013, targeted on magnetic anomalies identified during an earlier geophysical survey. The results of this work revealed evidence of gullies, pits, and ditches thought to represent an enclosed Iron Age settlement. In addition, an archaeological evaluation at Moor House Wind farm, Barmpton, by Solstice Heritage in 2016, revealed no evidence of any archaeological features, aside from some plough furrows of possible post-medieval or modern date.
- 2.3.2 In the north-western portion of the study area, several archaeological investigations have been undertaken to the south and east of Newton Aycliffe. These investigations largely produced negative results, except for the discovery of possible medieval features and 19th century walls.
- 2.3.3 In the southern part of the study area, there have been numerous archaeological investigations around the village of Sadberge. These investigations identified possible Iron Age/Romano-British features and possible evidence of the medieval (and earlier) court of Sadberge.
- 2.3.4 In the centre of the study area, at Bishopton, further archaeological investigations have been undertaken. However, only several instances of archaeological finds or features were identified, including medieval pottery findspots and features at Grange Farm.
- 2.3.5 In addition, several large-scale landscape projects have been undertaken across the area. In the western portion, the aggregate areas in the County Durham Archaeological Assessment (ALSF) Project was a landscape-scale assessment of the archaeology associated with areas of past, present, and future aggregate extraction in the county. In the north-western part of the area, a large number of fields were field walked as part of the Durham Archaeological Survey, undertaken by The University of Durham between 1983 – 87. The area surrounding Darlington and covered in the south-western portion of the overall evaluation area was investigated as part of a historical and archaeological survey by Durham University between 1976 – 1978.

## **3 METHODOLOGY**

### **3.1 Introduction**

- 3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team commencing 30 August 2022. Field conditions at the time of the survey were variable. An overall coverage of 400.1 ha has been achieved, with reductions and non-survey attributed to access restrictions, weather, ground, and crop conditions.
- 3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex Archaeology 2022), as well





as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

### 3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and
- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and
- Where possible, to determine the general nature of any anomalies of archaeological potential.

### 3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four SenSys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart, either hand pushed or towed by an all-terrain vehicle (ATV). Data were collected with an effective sensitivity of  $\pm 8 \mu\text{T}$  over  $\pm 1000 \text{ nT}$  range at a rate of 100 Hz, producing intervals of 0.02 m along transects spaced 4 m apart.

### 3.4 Data processing

3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a background removal median function with an effective window of 50 m, applied to correct for any variation between the sensors, a discard overlaps function where transects have been collected too close together and an interpolation used to grid the data.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

## 4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

### 4.1 Introduction

4.1.1 The detailed gradiometer survey has identified magnetic anomalies across the site. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:15,000 (**Figures 2 – 7**) for overview plots and at a scale of 1:2000 (**Figures 8 – 107**) for more detailed results. The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images.



- 4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**all odd numbered Figures**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.
- 4.1.5 Gradiometer survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g., CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

## 4.2 Gradiometer survey results and interpretation

General intro to the locations of main concentrations of archaeology.

### **Area 1**

- 4.2.1 Area 1 contains a relatively sparse distribution of anomalies considered to be archaeological in origin. These are primarily associated with linear features, most likely relating to ditch-like features and former field boundaries. However, a possible trackway has also been identified in the centre of the southern portion of the area.

### Area 1 (North)

- 4.2.2 In the north-east of the area, several positive linear have been identified (**1000 – 1008; Figure 11**). These are all indicative of ditch features and may relate to archaeological activity.
- 4.2.3 The anomalies at **1000** and **1001** likely form two parts of a singular anomaly, 125 m long north-east to south-west and 3 m wide. The anomaly at **1002** presents as a partial rectilinear, 32 m north-east to south-west by 15 m south-east to north-west, and 2 m wide, which likely continues beyond the survey extent to the south-west. These anomalies probably relate to former boundary features, with that at **1001** appearing to coincide with a known former boundary. Their weak nature is likely related to natural variation in the underlying superficial (Head) deposits, which are recorded traversing this area on a north-south orientation on BGS mapping.
- 4.2.4 A pair of parallel positive linear anomalies are evident at **1003**. The eastern anomaly is 50 m north – south, the western anomaly is 37 m north – south, and both are 1 – 2 m wide. A linear anomaly, which appears to split into two, is evident at **1004**. The anomalies cover an area 132 m east – west by 31 m and are 2 – 3 m wide. These may be evidence of former boundary features, but they could equally relate to modern land drains. This is supported by the anomalies at **1004** sharing an alignment with a modern drain immediately to the east.
- 4.2.5 A partial rectilinear anomaly is present at **1005**. The anomaly covers an area 20 m north – south by 34 m east – west and is 2 m wide. Similar to **1005**, but on a different orientation, is another partial rectilinear anomaly at **1006**. The anomaly covers an area of 35 m by 1 m. These anomalies have some potential to relate to the remains of archaeological enclosures. However, they are weak and generally sinuous, so are considered could equally relate to natural variations in the underlying geology. Similarly, the anomaly at **1007**, which is 20 m east – west by 1 m wide, is likely to relate to natural variation.



- 4.2.6 A pair of linear anomalies have been identified at **1008** on a north-east to south-west orientation. The anomalies are 124 m long by 6 m wide and separated by 2.5 m. This may relate to a former boundary feature of unknown date. However, it could equally relate to modern agricultural activity, such as tyre tracks.
- 4.2.7 A scatter of discrete positive anomalies is present in the north-east of the area, with examples at **1009 (Figure 11)**. The anomalies range between 2 – 10 m in diameter. These anomalies could be indicative of pit features such as extraction pits or more likely relate to natural variations in the underlying geology. This area is located at the interface between a series of superficial deposits including Lacustrine, Glaciofluvial and Head and Till material of variable composition (BGS 2023).

#### Area 1 (South)

- 4.2.8 Across the southern part of Area 1, several further positive linear anomalies are present across the survey area (**1010 – 1023; Fig. 15 – 27**), which are also indicative of ditch features and likely relate to archaeological activity.
- 4.2.9 In the north-west of Area 1, the anomaly at **1010** is 104 m east – west, the anomaly at **1011** is 33 m north – south, and that at **1012** is 140 m long east – west, with all anomalies 2 m wide. While there is no continuity between these anomalies due to a gap in the survey area, they likely form part of the same arrangement of features, potentially indicating a field system of an unknown date. They do not conform to the modern field layout and are at a different orientation to ridge and furrow cultivation, suggesting an early medieval or earlier origin.
- 4.2.10 The anomalies at **1013 – 1018 (Fig. 19 – 23)**, located across the centre of Area 1, suggest another area of boundary features. The anomaly at **1013 (Figure 19)** is 185 m long south-east to north-west by 6 m wide. The anomaly at **1014 (Figure 19)** is 240 m long north-east to south-west by 2 m. The anomaly at **1015 (Figure 23)** is a pair of linear anomalies on a predominantly north – south orientation and covers an area 83 m long, with each anomaly measuring 2 m wide separated by a gap of 10 m. Although these features relate to ditch features, they may delineate a former track or routeway of uncertain date. This potentially continues to the south at **1016**, where a further linear anomaly is 85 m long north – south and 2 m wide. South-west of **1016** are **1017** and **1018 (Figure 21)**, these anomalies cover an area of 146 m by 66 m. Combined these anomalies may delineate a field system of unknown date. However, the ridge and furrow in the area are on a broadly similar alignment, suggesting a medieval – post-medieval origin. The anomalies at **1017** appear to form a funnel shape suggestive of a drove way for animal management.
- 4.2.11 Further positive linear anomalies are present across the area at **1019 – 1022**. These are indicative of ditch features and may be associated with former field boundaries. However, they are generally more fragmented or isolated, making confident interpretation difficult. The largest of these areas of anomalies is present at **1022** in the south-eastern portion of the area (**Figure 25**). The anomalies cover an area of 111 m north-east to south-west by 55 m. These likely represent the remains of a field system of unknown date. A discrete positive anomaly is noted in the area at **1023**, which may relate to an archaeological pit feature, for refuse or storage. These features do not appear to respect current field orientations or alignment and so suggest a pre-medieval date. Equally, however, these features may pertain to later agricultural activity, such as land drains or ploughing, or are associated with natural variation in the local geology.
- 4.2.12 Several positive linear anomalies are present in the northern and western portions of the area, at **1024 – 1026 (Fig. 11 and 17)**. The anomaly at **1024** is 90 m long north-west to south-east by 2 m wide, the anomaly at **1025** is 67 m long north – south by 3 m wide, and





the anomaly at **1026** is 88 m long east – west and 2 m wide. These anomalies all correspond to former field boundaries noted on the OS Six-inch map 1888 – 1913.

- 4.2.13 Parallel positive linear anomalies are evident across most of the area (**1027 – 1054**). These anomalies are spaced between 4 – 6 m and respect many contemporary field boundaries or recorded former field boundaries on historical mapping. These anomalies have been interpreted as ridge and furrow ploughing. The regular spacing and generally straight nature of the anomalies suggest a post-medieval date.

#### Area 1 (General)

- 4.2.14 Several areas of amorphous increased magnetic response are noted across the area, at **1055 – 1066**. These anomalies range in size but are indicative of areas of made ground or backfilling. These may relate to extraction activity, which is recorded in the surrounding area, or modern agricultural activity.
- 4.2.15 Numerous strong dipolar linear anomalies are evident across the site, at **1067 – 1080**. These anomalies are indicative of modern services.
- 4.2.16 Multiple weak positive and dipolar linear anomalies are evident across the area, with examples at **1081 – 1085**. Due to their pattern and form, these have been interpreted as land drains.
- 4.2.17 Numerous amorphous areas of weak variation in the magnetic response have been identified across the area. The weak nature and lack of shape or pattern to these anomalies suggest they relate to natural variation in the local geology.
- 4.2.18 Numerous weak linear anomalies were noted across the area. These are too weak to interpret confidently, however, they may indicate archaeological activity which cannot be further identified through the geophysical data.

#### **Area 2**

- 4.2.19 Various concentrations of anomalies are thought to be associated with archaeological remains in Area 2. These are all thought to be associated with enclosures, some of which potentially indicate multi-phased archaeological activity and evidence for a possible settlement in the form of internal pit-like anomalies and roundhouses, indicating an Iron-Age to Romano-British date. These occur in the northwest and northeast corners of Area 2, as well as in the centre and northern portion of the southern part of Area 2.
- 4.2.20 Combined the anomalies from **2000 – 2008** form an area of multiphase settlement activity. Enclosures and possible roundhouses are noted, potentially spanning the Bronze Age through to the medieval period.

#### Area 2 (North)

- 4.2.21 Extensive evidence of archaeological activity is apparent in the north-eastern portion of the area (**2000 – 2008; Figure 35**). This comprises an area of positive linear and curvilinear anomalies, that are indicative of ditch features and likely form multiple phases of archaeological enclosures and boundaries.
- 4.2.22 A positive penannular anomaly is present at **2000**. The anomaly is 24 m in diameter with a width of 3 m. A similar anomaly was noted at **2001**, 40 m north of **2000**. This anomaly is 20 m in diameter with a width of 2 m. These anomalies have been interpreted as Bronze Age or Iron Age enclosures, possibly associated with the extensive Iron Age activity noted in the wider landscape.
- 4.2.23 The anomalies at **2000** and **2001** are accompanied by a series of slightly stronger positive linear anomalies (**2002 – 2005**). The anomaly at **2002** is 49 m long north – south by 2 m

wide; the anomaly at **2003** is 101 m long north – south, with a spur to the west for 28 m, and is 2 m wide; the anomaly at **2004** is 38 m long north – south by 3 m wide; the anomaly at **2005** is 51 m long north – south, with a 35 m long east – west intersection at the northern end, and is 2 – 3 m wide. These anomalies appear to form a complex of enclosures that may be associated with settlement activity of unknown date. The anomalies at **2002** and **2003** are two parallel ditches separated by 4 m, which is suggestive of a trackway along the eastern edge of the boundary features. The anomalies at **2002** to **2005** probably represent a different phase of activity to the penannular features (**2000**, **2001**), evidenced by the difference in magnitude and overlapping nature of the anomalies at **2001** and **2005**. However, further investigation would be required to confirm this.

- 4.2.24 A strong positive curvilinear anomalies is apparent to the west of **2005** at **2006**, which forms a 69 m long arc extending from north-west round to south-west. Collectively, **2005** and **2006** may form an enclosure, and the funnel shape is suggestive of an entrance to an Iron Age Banjo enclosure, with the remainder of the enclosure more poorly represented in the geophysical data to the south. In addition, a possible partial roundhouse is also present at **2007**, which is apparent as a strong positive 2 m wide anomaly, which is 11 m long (8 m diameter).
- 4.2.25 A positive broken rectilinear anomaly has been identified at **2008**. The anomaly covers an area of 24 m east – west by 36 m north – south, with an anomaly width of 2 m. This indicates the remains of a rectangular enclosure of unknown date. The feature is oriented on the same alignment as **2002**, **2003**, and **2004**, suggesting a possible contemporary relationship. However, as the ridge and furrow noted across the area is broadly on the same alignment, a medieval date is equally plausible.
- 4.2.26 Surrounding **2000** – **2008**, numerous weaker linear and curvilinear anomalies are apparent. These may relate to further settlement activity, such as boundary ditches and roundhouses, but their weak nature makes confident interpretation difficult (**Figure 35**). For example, at **2009** and **2010**, there are very weak curvi-linear anomalies that may relate to further roundhouses. In addition, to the south of **2000** – **2008**, **several** ditch-like features have also been identified at 2011 – 2026 (**Fig. 35**), which may be associated with former field boundaries or settlement activity. However, they are generally more fragmented or isolated, again making confident interpretation difficult. Despite this, as the examples of penannular anomalies at **2011** – **2013** measure between 8 – 10 m in diameter and 2 m wide, they may represent roundhouses, with linear anomalies, such as **2014** and **2015**, associated with enclosing boundary ditches. Nonetheless, the ephemeral nature of the anomalies suggests that they could equally relate to natural geological variation or agricultural activity.
- 4.2.27 A curvilinear anomaly at **2016** is similar in form to that in the north at **2006**, forming a 45 m arc north – south. However, this is much weaker in the survey data and may relate to a modern agricultural trend. Two linear anomalies at **2017** and **2018** may be associated with **2016** and together cover an area of 84 m east – west by 52 m north – south. The two anomalies appear to form a funnel shape suggestive of a drove way for animal management, with **2016** forming the eastern end of an enclosure. These features do not appear to respect current field orientations or alignment and so suggest a pre-medieval date, inferring further Iron Age activity. However, the anomalies at **2017** and **2018** are broad (5 – 9 m) with poorly defined edges. This is more suggestive of natural geological variation than archaeological activity.
- 4.2.28 In the west of this north easterly portion of Area 2, an area of more coherent rectilinear and curvilinear anomalies has been identified at **2019** – **2020**. These anomalies are generally aligned north-west to south-east and cover an area 43 m by 38 m. The more coherent layout

of anomalies suggests they may relate to enclosures of an unknown (but separate, possibly later) date. While this may be associated with the probable settlement to the north-east, they are arranged on different alignments, suggesting separate phases of activity.

- 4.2.29 Areas of magnetically strong dipolar anomalies are evident at **2021 – 2026**. These are indicative of made ground, possibly associated with backfilling. The strength of the anomalies may suggest that these anomalies may contain burnt material or relate to large backfilled extraction pits; however, they could equally relate to modern agricultural activity.
- 4.2.30 In the southern part of the north-eastern portion of Area 2, strong positive linear anomalies have been identified at **2027** and **2028 (Figure 35)**. The anomaly at **2027** is 33 m south-east to north-west by 19 m north-east to south-west, the anomaly at **2028** is 36 m long south-east to north-west, and both anomalies are 3 m wide. These are likely associated with ditch features pertaining to field boundaries and given their similar alignment may be parts of a singular field system.
- 4.2.31 Similar to **2027** and **2028** strong positive linear anomalies are present at **2029 (Fig. 35)**. The anomaly is 130 m long south-east to north-west, has a 22 m long spur to the west at the northern end, and ranges between 2 – 6 m. A likely associated anomaly is immediately to the east and is 97 m long north-east to south-west by is 3 m wide. These are likely associated with further field boundaries and may form part of the same field system. It is not clear from the geophysical survey data whether this field system has any relationship with the settlement activity identified to the north.
- 4.2.32 South of **2027 – 2029** are several weakly positive curvilinear anomalies at **2030 – 2038 (Fig. 35)**. These vary in diameter from 10 – 20 m and generally form crescent shapes. These may relate to the fragmented remains of ring ditches, possibly associated with roundhouses or enclosures. However, their weak and fragmented nature makes confident interpretation difficult. The anomalies could equally relate to natural geological variation or modern agricultural activity.
- 4.2.33 Further south, at **2039**, there is a short positive linear anomaly (**Figure 37**). This is likely associated with a ditch feature, but it is difficult to identify whether it is associated with a wider aspect of a field system surrounding the anomalies to the north west (at **2027 – 2038**) due to the narrow extent of the survey in this area.
- 4.2.34 In the northwestern part of Area 2, multiple positive linear anomalies are present at **2040–2049 (Fig. 29)**. These are indicative of ditch features and may be associated with former field boundaries. However, they are generally more fragmented or isolated, making confident interpretation difficult. The longest of these is at **2048 (Fig. 29)** which is 92 m long broadly north – south, by 2 m wide. The majority of the anomalies do not appear to respect current field orientations or alignment and so suggest a pre-medieval date. Equally, however, these features may pertain to later agricultural activity, such as land drains or ploughing, or be associated with natural variation in the local geology.
- 4.2.35 In the south of the north-western portion of Area 2, there is a dense concentration of rectilinear anomalies (**Figs. 29 and 31**). This comprises an area of positive linear and curvilinear anomalies (**2050 – 2057**), which are indicative of ditch features and form an area of archaeological enclosures and boundaries.
- 4.2.36 At **2050**, the anomaly is 60 m in length north – south and 2 m in width, with a long spur traversing east – west extending from the centre of the anomaly measuring 59 m in length and 2 m in width. A further positive rectilinear anomaly has been identified directly to the south at **2051** measuring 57 m in length east-west and 1 m in width, with a long spur

extending from the west 21 m in length north – south and 1 m in width. These two anomalies form a singular rectangle anomaly most likely an enclosure of unknown origin, although the recti-linear form may suggest a Romano-British date.

- 4.2.37 The anomalies at **2050** and **2051** are accompanied by a further cluster of positive linear and curvilinear anomalies at **2052 – 2053** following the same orientation and could suggest a large area of settlement activity. The anomaly at **2052** is a broken positive linear rectangular anomaly and covers an area of 32 m north – south and 36 m east – west, with an anomaly width of 2 m. A further positive linear anomaly at **2053** traverses parallel to **2052** at the western edge. This anomaly is 38 m in length north – south and 2 m in width and is most likely a continuation of the rectangular anomaly at **2052**. This indicates the remains of a rectangular enclosure, which is likely related to the possible Romano-British example to the west at **2050 – 2051**.
- 4.2.38 In the western part of **2052**, there is a strong positive curvilinear anomaly bisects the eastern part of the enclosure. This anomaly is 18 m in length traversing on a curve north-east to south-east and 2 m in width. It is also likely associated with a ditch feature, but the stronger in magnitude suggests an alternative phase of function to the surrounding features. Although it is difficult to speculate whether this is contemporary with the rectangular enclosure, the fill of this ditch probably contains more magnetically enhanced material such as burnt deposits.
- 4.2.39 Between the anomalies at **2050 – 2053** there are numerous positive circular anomalies, which measure between 1 and 3 m in diameter (**2055**). These are associated with possible pit-like features and are likely associated with activity relating to the enclosures. Similarly, surrounding the rectangular enclosures, are several weaker linear and pit-like anomalies are also evident at **2056 – 2063**.
- 4.2.40 A weak linear anomaly at **2056** is directly north of **2052** and traverses a length of 11 m north-east – south-west, and has a width of 1 m. To the east of this at **2057** is a weak positive two-part fragmented linear anomaly. The fragment traversing north – south measures 18 m in length and 1 m in width, with a perpendicular linear traversing east – west measuring 20 m in length east – west and 1 m in width.
- 4.2.41 To the east at **2058** a further linear anomaly has been identified measuring 15 m in length east – west and 1 m in width. Directly between **2050** and **2052** is a weakly positive U-shape anomaly (**2059**) measuring 10 m in length and 3 m in width. At **2060** a pair of linear anomalies run parallel to the direct south of **2100**. The northernmost has a slight arc measuring 9 m in length and 2 m in width, below this a linear measuring 24 m in length and 1 m in width. To the south-west of this at **2061** is a long linear anomaly measuring 38 m in length north-east – south-west, and 2 m in width.
- 4.2.42 To the south of **2051** a large linear has been identified at **2063** measuring 50 m in length north-east to south-west, with two perpendicular linear anomalies measuring 62 m and 53 m in length respectively, measuring 1 m in width. The anomalies **2056 – 2063** follow the same orientation as the anomalies seen between **2050 – 2052** and could be a continuation of the ditches and enclosures identified (**Figure 31**). However, they are generally weaker and more fragmented, making confident interpretation difficult.
- 4.2.43 A scatter of discrete positive anomalies has been identified east of **2061** at **2062** with a diameter between 1.5 m and 2 m. These anomalies could be indicative of pit features such as extraction pits or relate to natural variations the underlying geology.



4.2.44 To the north-west of the enclosures at **2050** and **2052**, are several further positive linear anomalies (**2064 – 2069**). These are also thought to relate to ditch-like features and may be related to the enclosures, but as they are situated on an alternative alignment, may simply relate to more isolated ditch-like features or a part of a wider field system surrounding these features (**Figure 29**).

#### Area 2 (Central)

4.2.45 Further evidence for possible archaeological activity is present in the central portion of the Area 3 at **2070 – 2075**. This comprises an area of positive linear and curvilinear anomalies, which are indicative of ditch features and could form an area of archaeological enclosures and boundaries (**Fig. 37**).

4.2.46 An irregularly shaped, slightly sinuous, anomaly at **2070** covering an area of 44 m by 35 m has been identified. This is orientated on a north-east to south-west alignment and is indicative of a potential ditch feature, which could form an area of enclosures or boundaries. However, because of the weakness of the anomaly, its origins cannot be determined solely from the geophysical data alone.

4.2.47 The weak positive linear anomaly at **2071** is 184 m in length and 1 m wide on an NNE – SSW orientation. This is bisected by two parallel anomalies that transverse parallel to each other on a north-east to south-west orientation. To the east of **2071** a weak positive anomaly runs on an NNW – SSE orientation at **2072**. This anomaly measures 100 m in length and 1 m in width. A weak positive linear anomaly at **2073** runs diagonally NNW to SSE and crosses into the northern parallel linear of **2071**. This anomaly is 35 m in length and 1 m wide and is a potential ditch that may relate to **2071**. The weak positive anomaly at **2074** consists of two rectilinear ditches that comprise an area of 60 m in length and 25 m in width and is on the same orientation of **2070 – 2073**.

4.2.48 The anomalies at **2071 – 2074** are indicative of potential ditch features and appear to form a possible archaeological field system or series of enclosures. However, due to the weak nature of the anomaly the origins are not clear from the geophysical data alone. Further investigation would be needed.

4.2.49 To the northwest of **2071 – 2074** there are numerous small circular and subcircular positive anomalies. These range in size between 1 and 5 in diameter but may be associated with pit-like features. Some of these are arranged linearly and could relate to a short pit-alignment (**2075**), but the majority are likely more discrete pits. However, it is also possible that these may relate to natural pitting in the underlying superficial geology.

4.2.50 At **2076** an irregular positive anomaly has been identified to the south-west of the area, measuring 34 m in length and 15 m in width. This anomaly is indicative of a large pit-like or ditch feature. The origins are not clear from the geophysical data alone, it may be caused due to natural changes in geology, extraction, or agricultural reasons. Further investigation would be needed as the anomaly has poorly defined edges which is more suggestive of natural geological variation than archaeological activity.

4.2.51 A positive linear anomaly at **2077** measures 154 m in length on a north-east to south-west orientation and 1 m in width. This may relate to a former boundary feature of unknown date. However, it could relate to modern agricultural activity, or be an undated footpath.

#### Area 2 (South)

4.2.52 Evidence for archaeological activity in the southern part of Area 2 is primarily located in the west of the area at **2078 – 2079**. This comprises an area of positive linear and rectilinear



anomalies, which are indicative of ditch features potentially relating to enclosures and boundaries (**Figure 45**).

- 4.2.53 A strong positive trapezoidal anomaly at **2078** covers an area of 92 m by 53 m, with the eastern side fragmented into further linear anomalies at **2079 – 2081**. This is comprised of a strong positive linear anomaly has also been identified at **2079** stemming from the middle of the northern boundary of **2078**. This anomaly measures 28 m in length orientated NNW – SSE with a further 18 m orientated north – south, and 1 m in width. Below this a strong positive T-shape anomaly at **2080**, the top measuring 19 m in length running east – west with a longer spur stemming centrally measuring 28 m in length running north – south, with a width of 1 m. To the south of **2080** another T-shape anomaly at **2081** has been identified. The western linear running north – south measuring 24 m in length, with a longer spur extending off centre measuring 35 m running east – west, with 1 m in width. Collectively, the anomalies at **2078 – 2081** relate to an enclosure of unknown data, though the rectilinear form may suggest an Iron Age to Romano-British date. However, further investigation would be required to clarify the precise nature of this feature.
- 4.2.54 To the direct north of **2080** a short weak positive anomaly at **2082** has been identified. This anomaly runs east – west and measures 14 m in length and 1 m in width. This anomaly is indicative of a large pit-like or ditch feature and due to it having a similar orientation to the surrounding anomalies, it could form a part of the enclosures identified. In addition, there are also numerous small circular anomalies surrounding these features which may relate to further pit-like features, which may be contemporary with the enclosure.
- 4.2.55 Another anomaly of possible archaeological nature has been identified to the south of **2081** at **2083**. This weak positive linear anomaly measures 22 m in length, with a small spur at the centre measuring 3 m in length, with 1 m in width. This linear has an orientation of NNW – SSE, similar to the previous enclosures identified within the field. However, due to the fragmented and isolated nature of the anomaly, the origins are unclear and further investigation would be needed to determine the archaeological nature.
- 4.2.56 To the south-west of **2083** a further weak positive linear anomaly has been identified at **2084**. This anomaly has a length of 30 m running north – south, with a width of 1 m. This linear has a similar orientation to the previous enclosures identified within the field. However, due to the ephemeral nature of the anomaly, the origins are unclear and further investigation would be needed to determine the archaeological nature. The anomaly may be caused due to natural changes in geology or agricultural reasons.
- 4.2.57 A singular positive anomaly has been identified south of **2084** at **2085**. This anomaly is circular with a diameter of 3 m, typical of small pit-like features. The origins are not clear from the geophysical data alone, it may be due to natural pitting in the underlying deposits, caused by agricultural processes, or potentially be refuse or post hole pit.
- 4.2.58 In the northernly point of the southern area, a weak positive linear anomaly has been identified at **2086 (Fig. 47)**. This anomaly transverses across the northern corner of the southern area on a north-east to south-west orientation, and measures 87 m in length and 1 m in width. This anomaly most likely is the remainder of a historical field boundary. However, due to the ephemeral nature of the anomaly, the origins are unclear and further investigation would be needed to determine the archaeological nature.
- 4.2.59 A further positive anomaly has been identified to the south of **2086** at **2087**. This anomaly extends from the eastern boundary of the area in a north-westerly direction at a length of 131 m and a width of 2 m. At the western end of this linear, it bifurcates in two directions



one running north-east, at a length of 54 m and a width of 1 m, and the other curved south-west at a length of 100 m. This anomaly most likely is the remainder of an historical field boundary. As the anomaly does not have the same features or same orientation of the identified ridge and furrow it can be assumed that it is the remains of a former field boundary. However, further investigation would be needed to determine the archaeological nature. The anomaly may be caused due to other agricultural reasons.

- 4.2.60 Two positive linear anomalies have been identified at **2088** and **2089** crossing the site from the eastern boundary towards the west. The anomaly at **2088** is 214 m in length and 2.5 m in width, and **2089** is 204 m in length and 1 m in width. A field boundary is recorded on the 1898 OS mapping (Durham XLIX.SE) in the same location as **2088** and is still visible in part on Google satellite imagery. Therefore, this anomaly is thought to be the remnants of this field boundary. Although there are no corresponding boundaries visible on historic mapping, given the parallel orientation, the anomaly at **2089** is also thought to be associated with such a feature but likely predates the first edition OS mapping.
- 4.2.61 Two large positive anomalies have been identified at **2090** and **2091 (Figure 47)**. Both anomalies are amorphous in form but measure 16 m in diameter. The anomalies are indicative of large pit features and may be associated with extraction activity, which is widely recorded in the surrounding area. They could equally relate to natural pitting, although this does not appear to be prevalent in the surrounding area.
- 4.2.62 In the south of the area, positive linear anomalies have been identified at **2092 – 2094 (Fig. 49 – 51)**. The anomalies cover an area of 200 m east – west by 96 m north – south and indicate ditch features. Combined, these anomalies may form part of an undated field system. While they do not appear to respect the ridge and furrow noted in the area an accurate date cannot be attributed to the geophysical survey data alone.
- 4.2.63 A positive curvilinear anomaly is present in the southern portion of the area at **2095**. This anomaly is 60 m north – south by 6 m east – west, in an arc from the north-west to the south-west. The anomaly doesn't appear to conform to any present field systems or ridge and furrow noted in the area. Further investigations would be required as the origins are not clear from the geophysical data alone.
- 4.2.64 Several positive linear anomalies are present in the northern and southern portions of the area at **2095 – 2105** These all correspond to former field boundaries noted on the OS Six-inch map 1888 – 1913. Much of the ridge and furrow noted across the area respects these boundaries, inferring that the field boundaries are at least medieval to post-medieval in date. The anomaly at **2104** does have a curving northerly extension that is not recorded on available mapping. This may form part of an earlier iteration of the field layout, or, given that it is formed of two parallel linear anomalies, an associated trackway.
- 4.2.65 A long positive linear runs the length of the east side of the field from the north to the south boundary at **2106**. This anomaly has a length of 352 m on a curve and has a width of 1 m. A path is recorded on the 1898 OS mapping (Durham XLIX.SE) and 1952 OS mapping in the same location. The path is no longer visible by the 2000 Google satellite imagery. The anomaly is considered to be the remnants of this path.

#### Area 2 (General)

- 4.2.66 Parallel positive linear anomalies are evident across most of the area (**2107 – 2119**). These anomalies are spaced between 4 – 6 m and respect many current field boundaries or former boundaries on historical mapping. These anomalies have been interpreted as ridge and

furrow ploughing. The regular spacing and generally straight nature of the anomalies suggest a post-medieval date.

- 4.2.67 Several areas of amorphous increased magnetic response are noted across the area, at **2120 – 2125**. These anomalies range in size but are indicative of areas of made ground or backfilling. These may relate to extraction activity, which is recorded in the surrounding area, or modern agricultural activity. The example at **2123 (Figure 35)** is 39 m in diameter east – west and contains a dipolar linear anomaly interpreted as a service. This anomaly likely pertains to the former building noted on OS Six-inch map 1888 – 1913, with the service continuing to serve water to that point.
- 4.2.68 Multiple weak positive and dipolar linear anomalies are evident across the area. Due to their pattern and form, these have been interpreted as land drains.
- 4.2.69 Numerous amorphous areas of weak variation in the magnetic response have been identified across the area. The weak nature and lack of shape or pattern to these anomalies suggest they relate to natural variation in the local geology.
- 4.2.70 Several areas of weak positive linear anomalies are evident across the site. These have been interpreted as modern ploughing.

### **Area 3**

- 4.2.71 Area 3 contains a small number of anomalies thought to be associated with archaeological remains. These are primarily associated with isolated linear anomalies across the west of Area 3 and a potential enclosure in the north-east of the eastern part of Area 3. In addition, there are a small number of large-pit-like features that are likely associated with extraction activity or backfilled ponds.

#### Area 3 (West)

- 4.2.72 In the north eastern part of Area 3, a coaxial arrangement of weakly positive linear anomalies have been identified at **3000 (Figure 57)**. This extends for 32 m east-south-east to west-north-west and 35 m north-north-east to south-south-west and forms a cross shape. These anomalies are indicative of ditch features and could relate to an undated enclosure complex or form part of a wider field system. It is likely they continue beyond the survey extent to the north, but do not appear to continue further south.
- 4.2.73 Numerous other positive linear anomalies have also been identified to the south of **3000** at **3001 – 3007**. These anomalies are also indicative of ditch features, with the majority likely associated with former field boundaries. These are more isolated and fragmentary but may form part of a field system on a broadly north-south and east-west alignment. However, as the anomalies generally respect current boundaries, or the general pattern of boundaries noted on the OS Six-inch map 1888 – 1913, they are probably post-medieval or modern in origin, although an earlier origin cannot be discounted.
- 4.2.74 Across the centre of Area 3, there are several large, strong positive anomalies (**3008 – 3014**). These measure between 7 and 20 m in diameter and are amorphous in form (**Figs. 57 and 61**). They are also often located on or adjacent to existing or historic field boundaries and are most likely associated with pit-like features. Given their proximity to these boundaries, it is likely that they are associated with post-medieval extraction or quarrying. However, none of these are recorded on the available historic mapping for the area.
- 4.2.75 Along the western edge of Area 3, the three smallest pit-like anomalies (**3012 and 3013**) are closely clustered together, potentially suggesting more intensive extraction activity. In



addition, a short sinuous weakly positive linear anomaly has also been located running between these anomalies at **3015**. This ditch-like is 33 m long and 2 m wide and is potentially associated with the pit features but does not appear to continue further east into the survey area and is of uncertain date.

- 4.2.76 In the approximate centre of Area 3, two further positive linear anomalies have been identified, which traverse across the middle of an existing field on a west-south-west to east-north-east alignment (**3016** and **3017**). These extend for 65 and 85 m respectively and are both 3 m wide, most likely relating to ditch-like features. Neither of anomaly is visible on historic mapping but they closely aligned to existing layout of fields, potentially suggesting a degree of contemporaneity, although they may also relate to earlier archaeological features.
- 4.2.77 Close to **3016** and **3017** are moderately strong positive sub-circular anomalies that are between 5 and 6 m in diameter (**3018** and **3019**). In the adjacent field to the east are two slightly larger and further such anomalies, measuring up to 10 m in diameter (**3020** and **3021**). These are all likely associated with pit-like features and their amorphous form suggests they relate to mineral extraction or backfilled ponds. None of these are recorded on historic mapping, but they are most likely post-medieval in date, though an earlier origin cannot be ruled out.
- 4.2.78 Several positive linear anomalies have been identified across the eastern part of Area 3 at **3022 – 3034**. These are generally weak but are thought to relate to former field boundaries. The examples of these anomalies at **3026 – 3031** (**Figure 61**) cover an area 330 m north – south by 225 m east – west and intersect with each other. These features all correspond to former field boundaries noted on the OS Six-inch map 1888 – 1913. Much of the ridge and furrow noted across the area respects these boundaries, inferring that the boundaries are likely medieval – post-medieval in date.
- 4.2.79 In the south of the eastern part of Area 3, in a narrow portion of survey area, there are several further linear anomalies at **3035 – 3037**. The most easterly of these (**3037**) comprises two 15 m x 2 m linear anomalies perpendicular to one another on a northwest to southeast and northeast to southwest alignment. A slightly more complex rectilinear arrangement is apparent at **3036**, whereas **3037** is a 1.5 m wide curvilinear anomaly extending for 35 m. These likely all represent ditch-like feature, but it is difficult to provide a more definitive interpretation due to the limited size of the survey area in this part of the site. Nonetheless, as they do not conform to the existing field boundaries or those identified on historic mapping, they are probably archaeological in origin.

#### Area 3 (East)

- 4.2.80 The eastern part of Area 3 comprises a single field, which contains numerous weakly positive linear anomalies (**3038 – 3042**). These are 2-5 m wide and are associated with ditch features situated on an alternative alignment to the existing field layout, which are therefore considered to be of possible archaeological origin (**Fig. 73**).
- 4.2.81 In the northwest corner of the western part of Area 3, there is an 108 m long linear anomaly, which is orientated on a northeast to southwest alignment (**3038**). This bifurcates at the northeastern end, forming a slight 'Y' shape, possibly indicating that it is comprised of two ditches, or potentially recut.
- 4.2.82 At **3039** there is a short linear anomaly extending for 31 m on a north-south orientation. This is thought to be archaeological in origin but may be associated with the extensive ridge and furrow in this area. To the east of this, there is a curvi-linear anomaly (**3040**), which arcs



from east to west. This is approximately 80 m in length and may continue further to the east but is obscured by the presence of a modern service. This may form part of an enclosure, but it is not clear precisely what this may represent from these geophysical survey results alone.

- 4.2.83 A further weakly positive slightly curving linear anomaly has been identified in the eastern part of this part of Area 3 (**3041**). This is positioned on a northeast to southwest alignment and extends for 116 m. As the surrounding ridge and furrow (number) appear to partially respect this, this probably relates to a former field boundary, which could date to any period from medieval onwards. In the southern part of the eastern portion of Area 3 a similar anomaly has also been identified at **3042**, which is also on a northeast to southwest alignment but is shorter, measuring 74m long.
- 4.2.84 Across the western part of Area 3, there are a small number of discrete, moderately positive sub-circular anomalies. The examples at **3043 – 3046** are the clearest of these, which measure 5- 8 m in diameter, and are thought to relate to pit-like features. The size of the anomalies and amorphous form are indicative of extraction activity, potentially of post-medieval date, though further investigation would be required to confirm this.
- 4.2.85 There are several weakly positive linear anomalies traversing the western part of Area 3 that correspond with former field boundaries visible on first edition OS mapping (**Fig. 73**). These traverse the entirety of the field and have been identified at **3047 – 3050**. They are typically around 2-3 m wide and orientated on a similar alignment to the existing field layout.

#### Area 3 (General)

- 4.2.86 Parallel positive linear anomalies are evident across most of the area, with examples at **3051 – 3079**. These anomalies are spaced between 4 – 6 m and respect many contemporary field boundaries or recorded former field boundaries. These anomalies have been interpreted as ridge and furrow ploughing. The regular spacing and generally straight nature of the anomalies suggest a post-medieval date.
- 4.2.87 Three areas of amorphous increased magnetic response are noted across the area at **3080 – 3073**. The example at **3080 (Figure 57)** corresponds to a trackway running up the field in this location, with made ground to the north. The anomaly at **3081 (Figure 61)** is 22 m in diameter. This is indicative of an area of backfilling and may relate to extraction activity, which is recorded in the surrounding area. The anomaly at **3082 (Figure 67)** is an area of dipolar anomalies alongside a linear anomaly. This is likely an area of made ground alongside a modern service.
- 4.2.88 A linear dipolar anomaly has been located in the south of the western part of Area 3 at **3083**. In the north of the area two magnetically strong, dipolar, linear anomalies have also been identified **3084 and 3085 (Figure 57)**. These appear to be joined by a weakly positive anomaly at **3085**. Combined these anomalies likely relate to a modern service, with the strong responses at either end relating to ferrous elements of the service and the weaker area between representing the service trench with no ferrous material present. Further magnetically strong anomalies have been identified across the area at **3077 – 3086** and are thought to relate to modern services.
- 4.2.89 Multiple weak positive and dipolar linear anomalies are evident across the area. Due to their pattern and form, these have been interpreted as land drains.



4.2.90 Numerous amorphous areas of weak variation in the magnetic response have been identified across the area. The weak nature and lack of shape or pattern to these anomalies suggest they relate to natural variation in the local geology.

#### Area 4

4.2.91 The survey has identified areas of potential archaeological activity across Area 4, in the form of linear and curvilinear anomalies that may reflect possible enclosures, channel modification and potential settlement activity. However, as they lack further archaeological context, they may instead relate to modern or unmapped post-medieval agricultural activity.

4.2.92 A positive rectilinear anomaly is present in the centre of the southern portion of the area, at **4000 (Figure 89)**. The anomaly is 43 m east – west with a 23 m long return toward the north at the western end. This anomaly may indicate a ditch feature potentially associated with a small enclosure. The north – south oriented part of the feature is aligned with the ridge and furrow cultivation and may be an enhanced part of that activity. The feature does not provide enough information or context to be confidently interpreted. However, it may be a part of the wider field systems noted in the other areas of the site.

4.2.93 In the approximate centre of Area 4, a further weak, positive rectilinear anomaly has been detected at **4001 (Figure 77)**. From the most north-eastern point it traverses 60 m WNW, before turning 50 m SSE and returns ESE for 33 m and is around 2 – 2.5m in width. The anomaly forms a partial sub-square shape, and it may indicate a ditched feature forming an enclosure. Both the ridge and furrow at **4009** and the former field boundary at **4018** cross-cut this enclosure, suggesting that they are not contemporaneous features, and therefore may suggest an earlier archaeological origin. However, further investigation would be required to confirm the precise origin of this anomaly.

4.2.94 A weak, diffuse positive anomaly has been detected at **4002** in the north-west of the area (**Fig. 81**). The anomaly is rectilinear and extends 41 m to the south-east, before continuing 40 m south-west, turning west 57 m and finally turning 19 m north. Its width varies between 2 – 4m. The anomaly has weakly defined edges and is located within an area of magnetic enhancement resulting from the presence of alluvial sediment surrounding the beck running along the west of the field area. The rectilinear shape of the anomaly suggests an anthropogenic origin, and therefore it may be a former channel modification or drainage ditch. Alternatively, it may also be an enclosure washed out over time, or a paleochannel that appears rectilinear in the geophysical data.

4.2.95 In the north-east of the area, two weak, positive anomalies have been detected at **4003 (Fig. 79)**. They are parallel, and both oriented NNW to SSE, and are 1 – 1.5 m wide. The western-most anomaly is 30 m in length, and in the south turns WSW for 8 m. The easternmost anomaly is 36 m in length and curves toward the north-east. Both anomalies are weak and diffuse and may indicate cut features such as ditches related to unmapped field boundaries.

4.2.96 A series of positive and negative rectilinear anomalies have been detected in the north of the area at **4004 (Fig. 83)**. The anomalies cover an area of 150 m x 77 m and are between 2 – 3 m in width. They are within an area of strong magnetic enhancement at **4030**, situated near a large band of anomalies that are thought to relate to variation in the underlying bedrock. The noise within the area and the natural anomalies may be obscuring the full extent and shape of these anomalies, but their form may pertain to boundaries or enclosure systems of archaeological origin. This could reflect settlement activity, enclosed by a natural geological boundary. However, nearby farm buildings may indicate that these are instead



related to modern agricultural structures. Consequently, further investigation would be required to clarify the exact nature and origin of these anomalies.

- 4.2.97 Parallel positive linear anomalies, on multiple orientations, are evident across the area, at **4005 – 4017**. These anomalies are spaced between 4 – 6 m and respect many current field boundaries. These anomalies have been interpreted as ridge and furrow ploughing. The regular spacing and generally straight nature of the anomalies suggests a post-medieval date.
- 4.2.98 Several positive linear anomalies are present across the area at **4018 – 4027**, which all correspond to former field boundaries noted on the OS Six-inch map 1830 – 1952. Some of the ridge and furrow in the south-west respects these boundaries, which may suggest they are contemporaneous.
- 4.2.99 Positive and negative magnetic enhancement in the south of the area has been detected at **4028 (Figure 89)**, covering an amorphous area of approximate 38 m x 25 m. This area collocates with a pond visible in 1830 - 1952 OS mapping.
- 4.2.100 Areas of increased magnetic response have been detected in the south-east at **4029** and in the north-east at **4030**. The anomaly at **4029 (Figure 89)** covers an amorphous area of 28 x 25 m and is indicative of made ground or backfilling, likely modern in origin. At **4030 (Figure 83)**, the enhanced material surrounds possible archaeological anomalies **4004**, and is likely related to this activity. However, it may reflect more modern backfilling or dumping of material, as it is situated close to West House Farm.
- 4.2.101 Two strong dipolar anomalies have been detected at **4031** and **4032** and are indicative of modern services.
- 4.2.102 Weak positive and dipolar linear anomalies have been detected across the area and have been interpreted as land drains.
- 4.2.103 Large swathes of weak variation in the magnetic response have been identified across the area. The weak nature and lack of shape or pattern to these anomalies suggest they relate to natural variation in the local geology.

## 5 DISCUSSION

- 5.1.1 The geophysical survey has been successful at identifying anomalies associated with a wide range of archaeological features. These largely comprise pit and ditch-like features, some of which form probable enclosures. The densest concentration of anomalies thought to be associated with archaeological remains is in the north and centre of Area 2, where at least four multiphase enclosures have been identified. Across the remainder of the site, the anomalies are more spurious, relating to past agricultural activity including boundary ditches and ridge and widespread ridge and furrow cultivation.

### *Area 1*

- 5.1.2 A small number of linear anomalies associated with ditch-like features and a possible trackway were identified in Area 1. This was surrounded by widespread evidence for ridge and furrow and former field boundaries, many of which do not appear to conform to the modern layout of fields or the post-medieval ridge and furrow, suggesting a medieval or earlier date.



- 5.1.3 Most other anomalies identified across Area 1 relate to the post-medieval agricultural landscape. As well as the aforementioned areas of ridge and furrow, three former field boundaries have been identified that are recorded on 1888 – 1913 OS mapping. There is limited evidence for extraction activity across the area, but isolated areas of backfilling could relate to small scale post-medieval quarrying activity. There is limited evidence for extraction activity across the area. Isolated areas of backfilling could relate to small scale post-medieval quarrying activity, which is recorded in the surrounding area.
- 5.1.4 The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to made ground, agricultural activity, drainage, and services.

#### *Area 2*

- 5.1.5 There is widespread evidence for anomalies associated with archaeological activity across Area 2, predominantly in the form of enclosure ditches and associated pit-like and roundhouse features that are indicative of possible settlement activity is visible in the northern portion of the area. These are characterised by linear and curvilinear features which indicate multi-phase occupation. The curvilinear features suggest Bronze Age to Romano-British activity, with the linear features more respectful of the medieval and post-medieval field boundaries. These enclosures are surrounded by more ephemeral features immediately to the south which may infer more extensive activity.
- 5.1.6 In the south of Area 2, there are fewer anomalies of archaeological interest, but the area is still traversed by numerous linear features. These are more respectful of the medieval and post-medieval field boundaries as well as to the existing field layout. Further linear anomalies have also been noted across the entirety of the area, which pertain to former field systems. Most of the anomalies relate to the post-medieval agricultural landscape and areas of ridge and furrow corresponding with the first edition 1888 – 1913 OS mapping.
- 5.1.7 There is limited evidence for extraction activity across Area 2, but there are isolated areas of backfilling which could relate to small scale post-medieval quarrying activity. The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to made ground, agricultural activity, drainage, and services. Further linear anomalies have been noted across the entirety of the area. These are mostly thought to relate to former field systems. Many of these do not appear to conform to the modern layout of the fields or ridge and furrow. This would suggest a medieval or earlier date, possibly associated with the multiphase settlement activity identified by the survey.
- 5.1.8 The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to made ground, agricultural activity, drainage, and services.

#### *Area 3*

- 5.1.9 The survey has identified areas of ridge and furrow and former field boundaries across Area 3, with a small number of anomalies thought to be associated with archaeological remains. These are primarily associated with isolated linear anomalies across the west and a potential enclosure of uncertain date in the north-east of the eastern part of Area 3. In addition, there are a small number of large-pit-like features that are likely associated with extraction activity or backfilled ponds.
- 5.1.10 The geophysical survey has identified areas of ridge and furrow and former field boundaries, which appear to respect mostly respect the modern arrangement of field boundaries, or that noted on 19th century mapping. This combined with the ridge and furrow, suggests that the majority relate to the medieval – post-medieval agricultural landscape.



5.1.11 There is more limited evidence for extraction activity across the area, although isolated areas of backfilling could relate to small scale post-medieval quarrying activity, which is recorded in the surrounding area. The remaining anomalies are thought to be modern or natural in origin. The modern anomalies relate to made ground, agricultural activity, drainage, and services.

*Area 4*

5.1.12 The survey of Area 4 has identified a small number of features which may pertain to archaeological activity. This includes possible boundary ditches that have been detected in the south of the area and north-west, surrounded by extensive ridge and furrow cultivation.

5.1.13 In the west of the survey area, an anomaly interpreted as possible channel modification has been identified within an area of enhancement related to floodplain activity related to a Beck adjoining the field boundary. The linearity of the anomaly suggests an anthropogenic origin; however it may be the result of natural processes.

5.1.14 In the north of the survey area, an area of strong enhancement has been identified, within which are possible linear and curvilinear anomalies. These may pertain to enclosures or settlement activity, however, their proximity to a farm may suggest that these result from more modern agricultural structures and backfilling.

5.1.15 Evidence of ridge and furrow cultivation is present across the survey area and appears to conform to the orientation and layout of the modern field systems, suggestive of a post-medieval date. Further evidence of agricultural activity has been identified in the form of field boundaries visible on 1830 – 1952 OS mapping.

5.1.16 The remaining anomalies are thought to relate to natural geological variation, as well as modern land drains and services.





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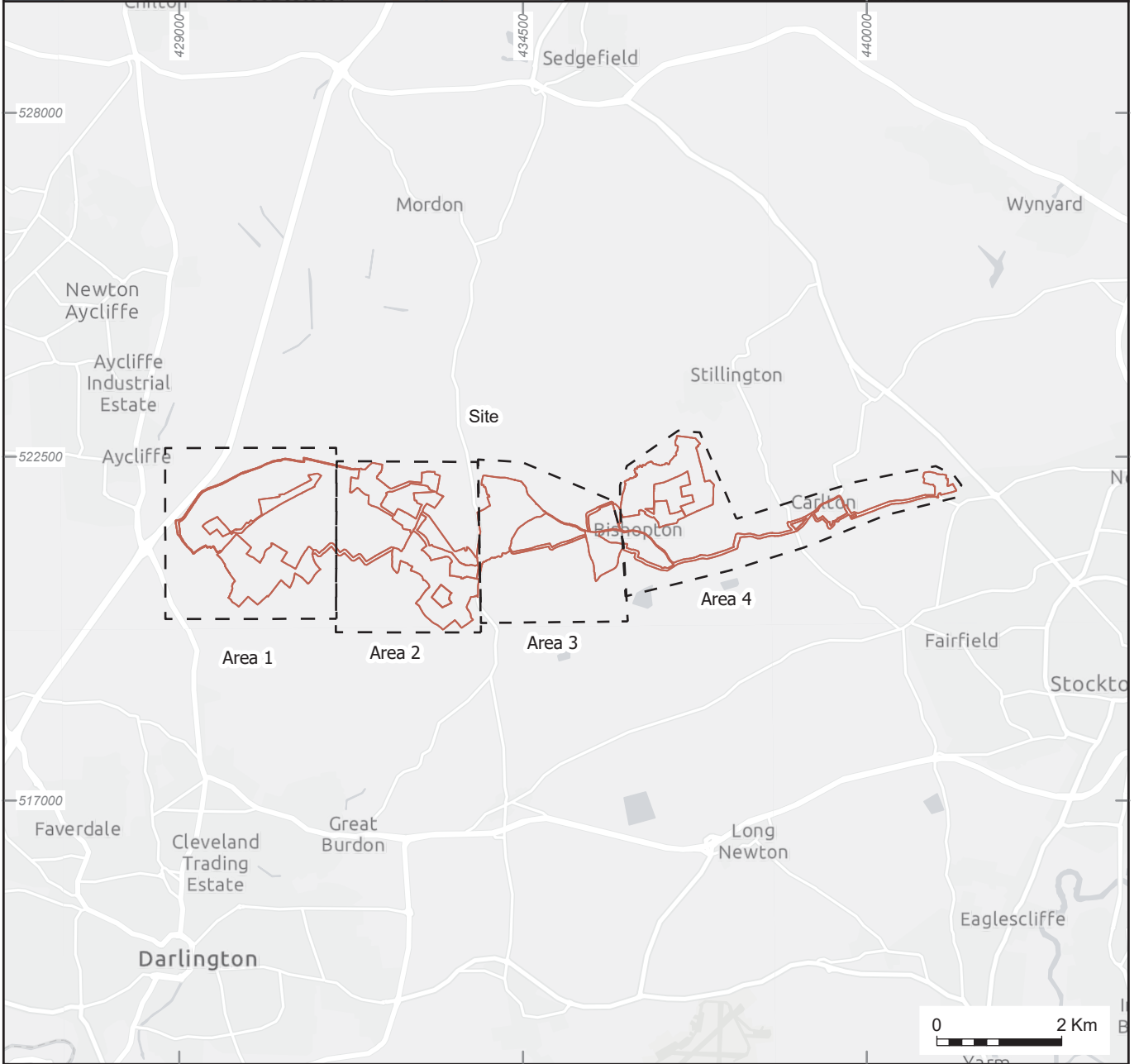
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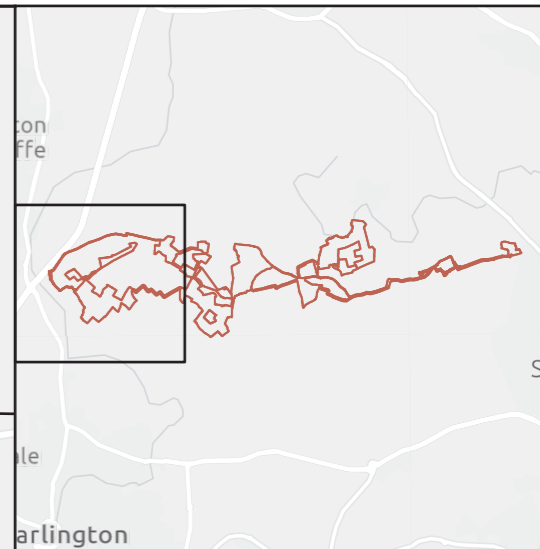
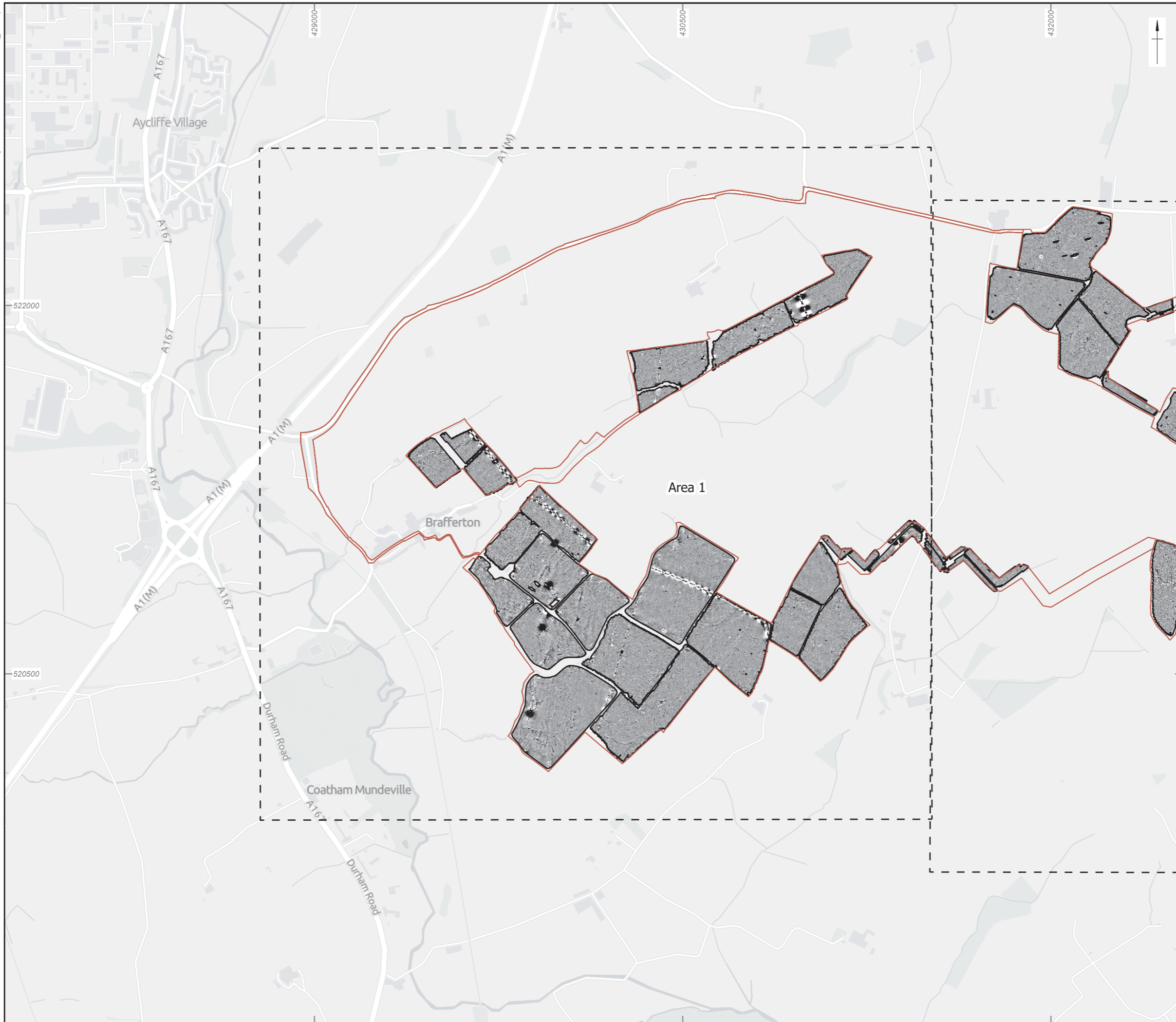
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Figure 1: Site location and survey extent








- Site boundary
- Detailed survey extent
- Area delineation

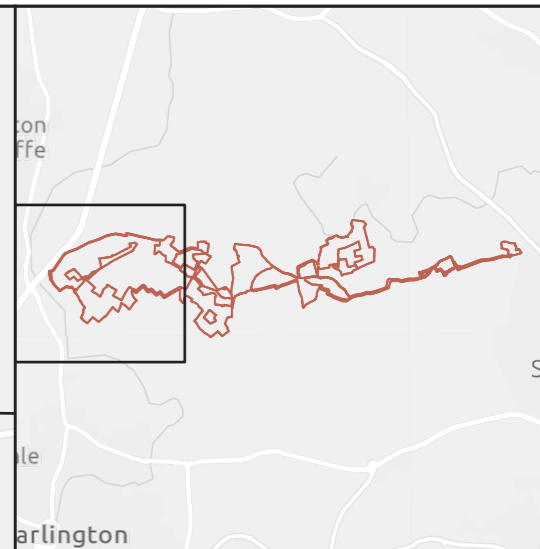
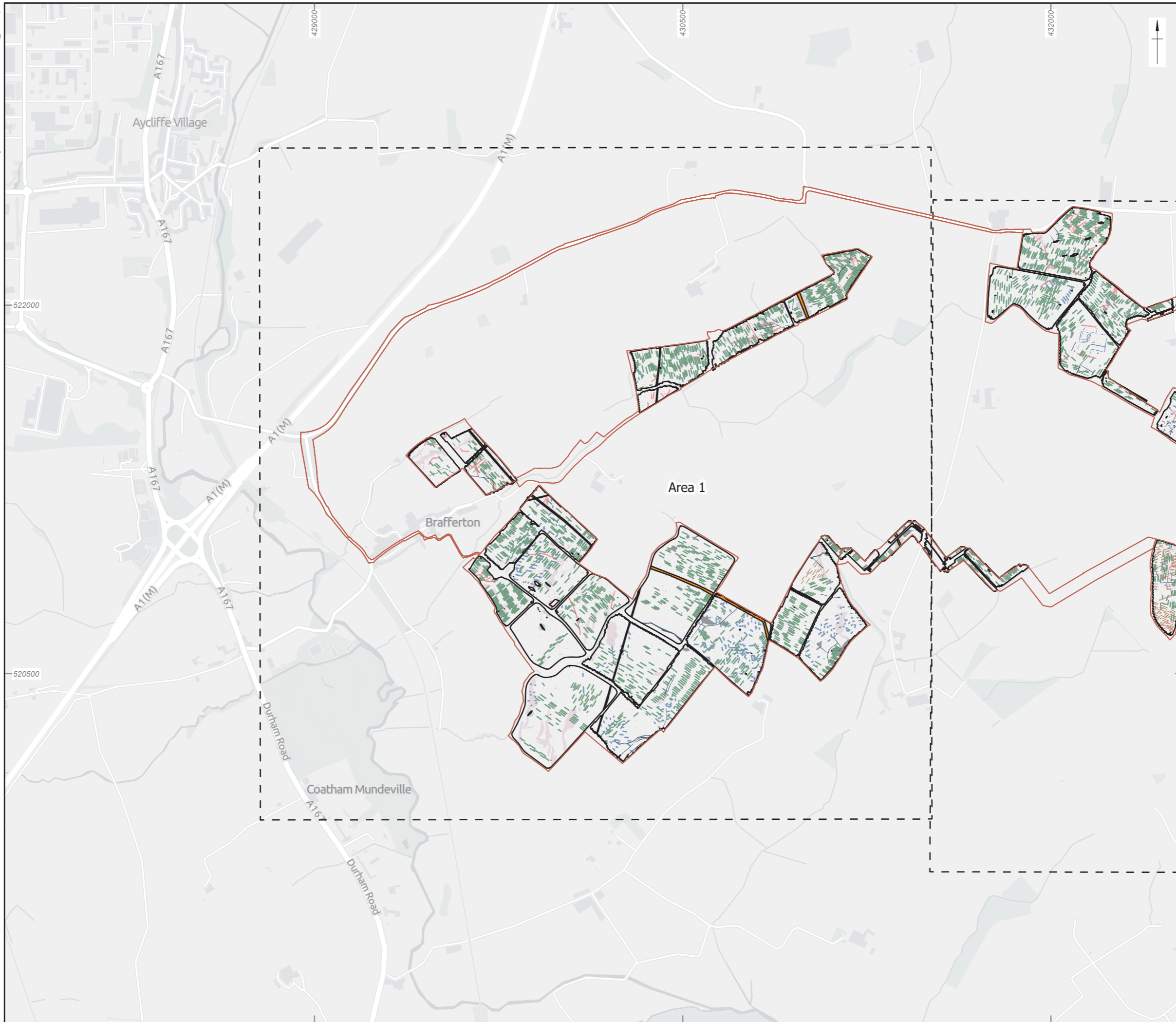


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Detailed gradiometer survey results: greyscale overview plot


Figure 2



- Site boundary
- Detailed survey extent
- Area delineation
- Archaeology
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Geology
- Agricultural feature
- Drain
- Trend
- Modern service
- Ferrous



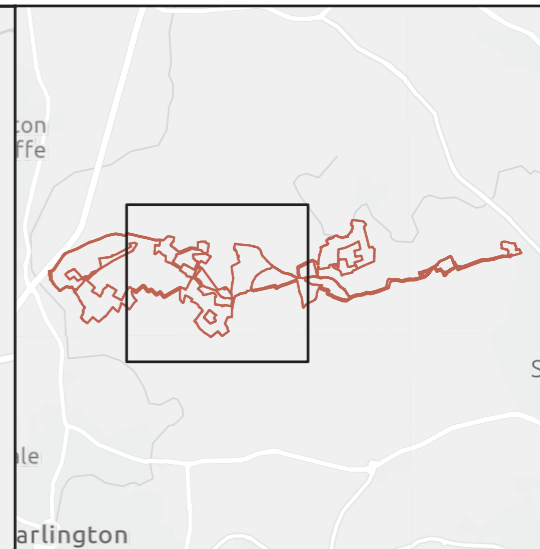
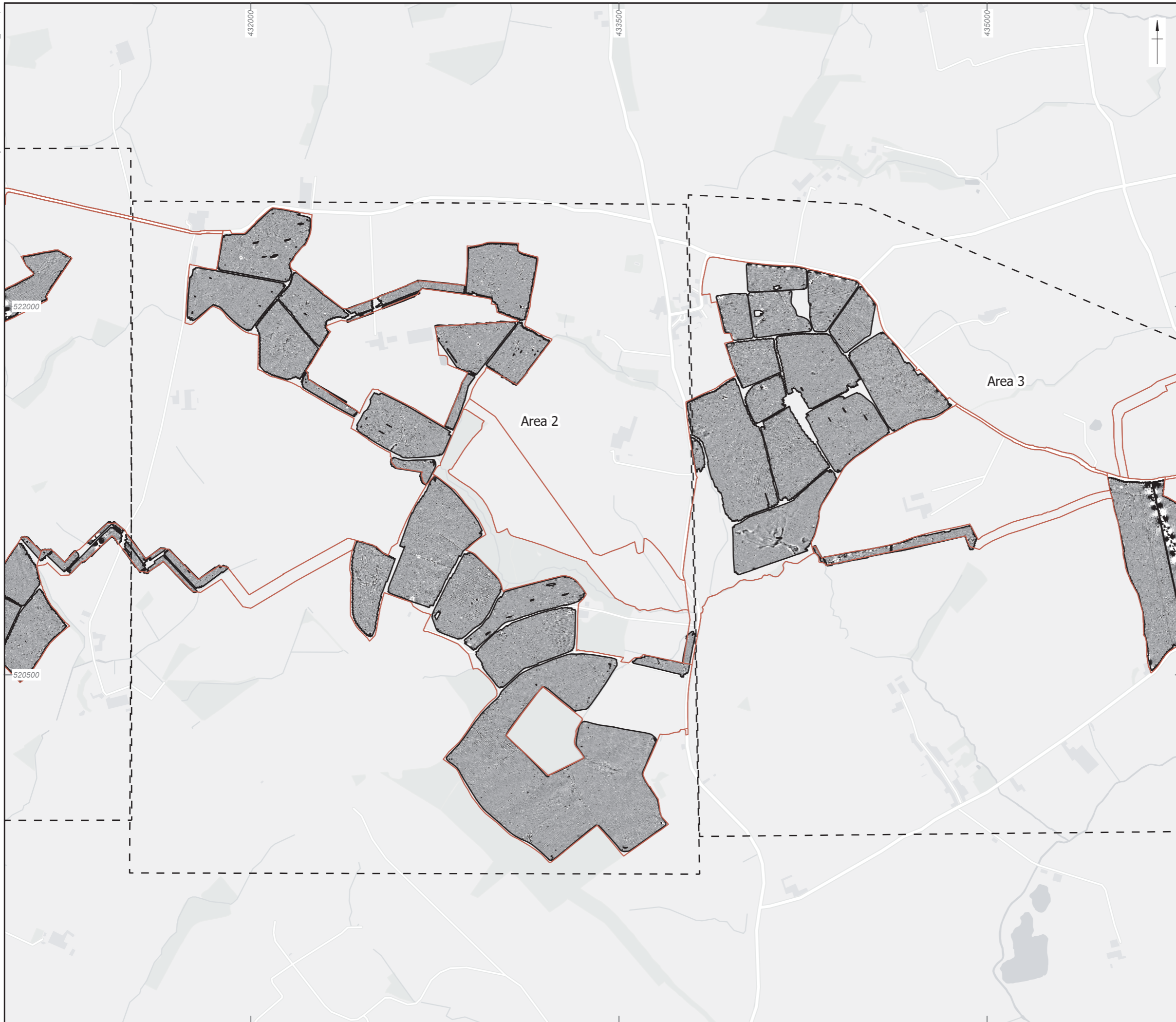
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Detailed gradiometer survey results: interpretation overview

Figure 3





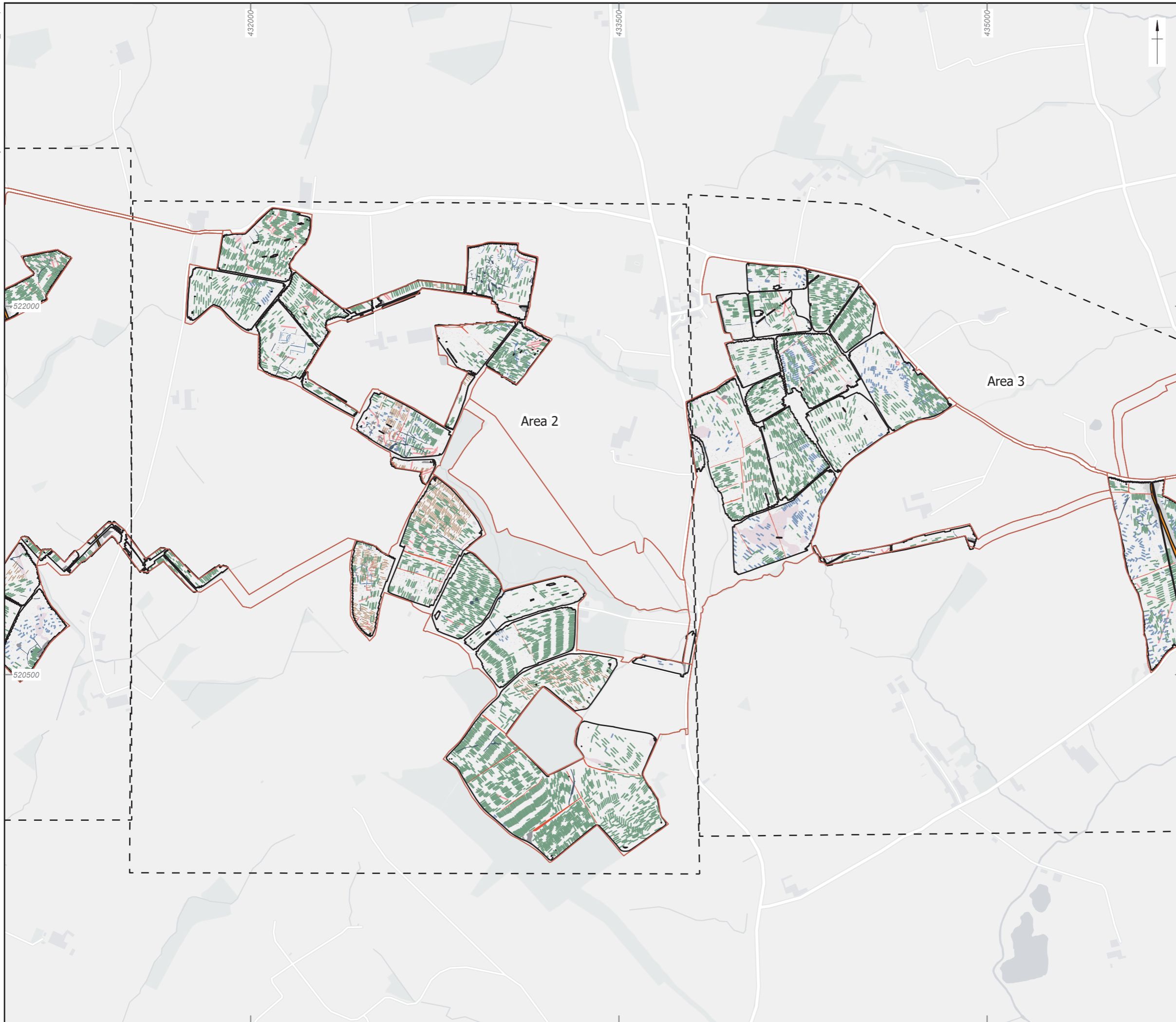
- Site boundary
- Detailed survey extent
- Area delineation



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Detailed gradiometer survey results: greyscale overview plot



- Site boundary
- Detailed survey extent
- Area delineation
- Archaeology
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Increased response
- Geology
- Agricultural feature
- Drain
- Trend
- Modern service
- Ferrous



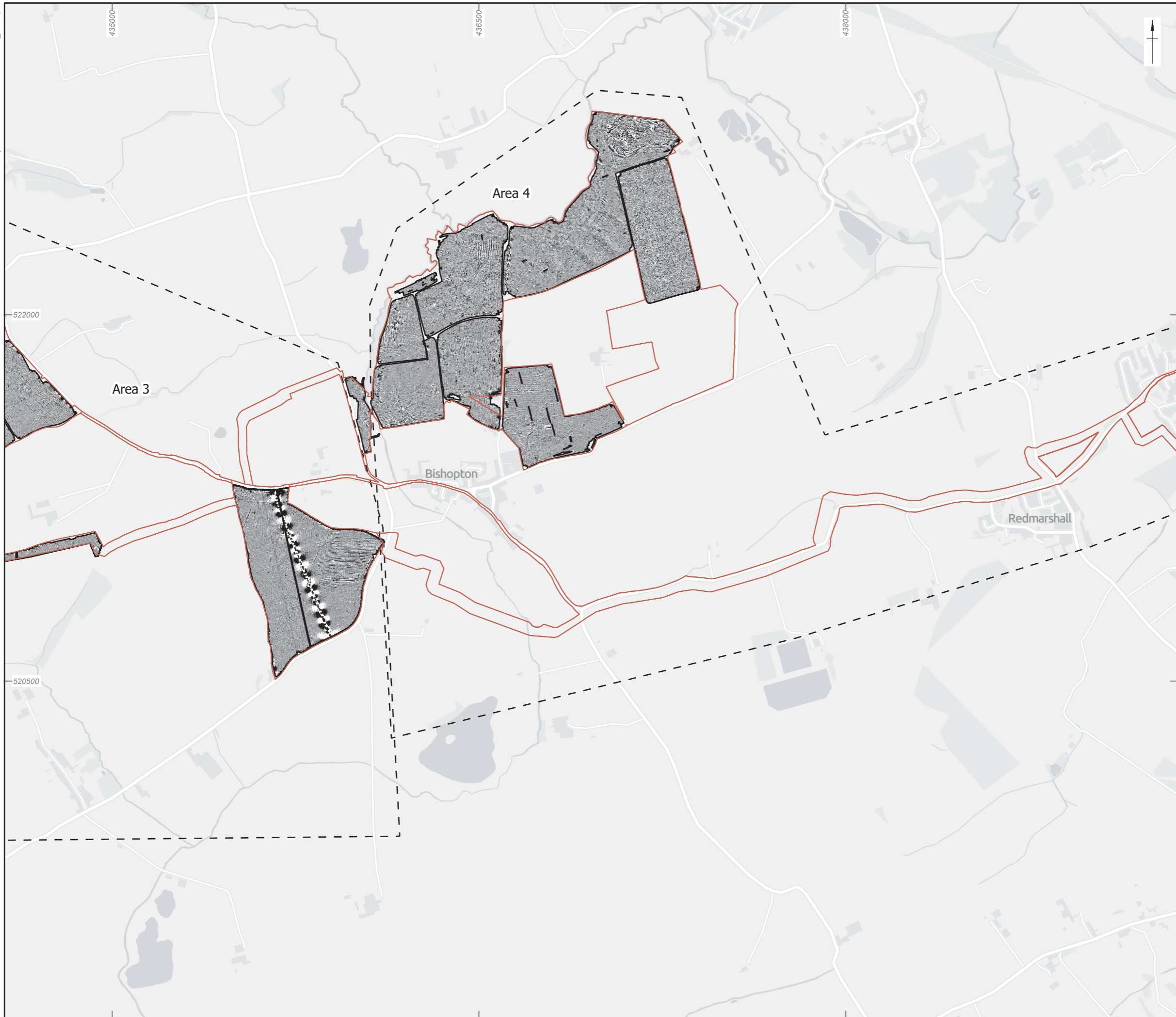
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Detailed gradiometer survey results: interpretation overview

Figure 5





- Site boundary
- Detailed survey extent
- Area delineation

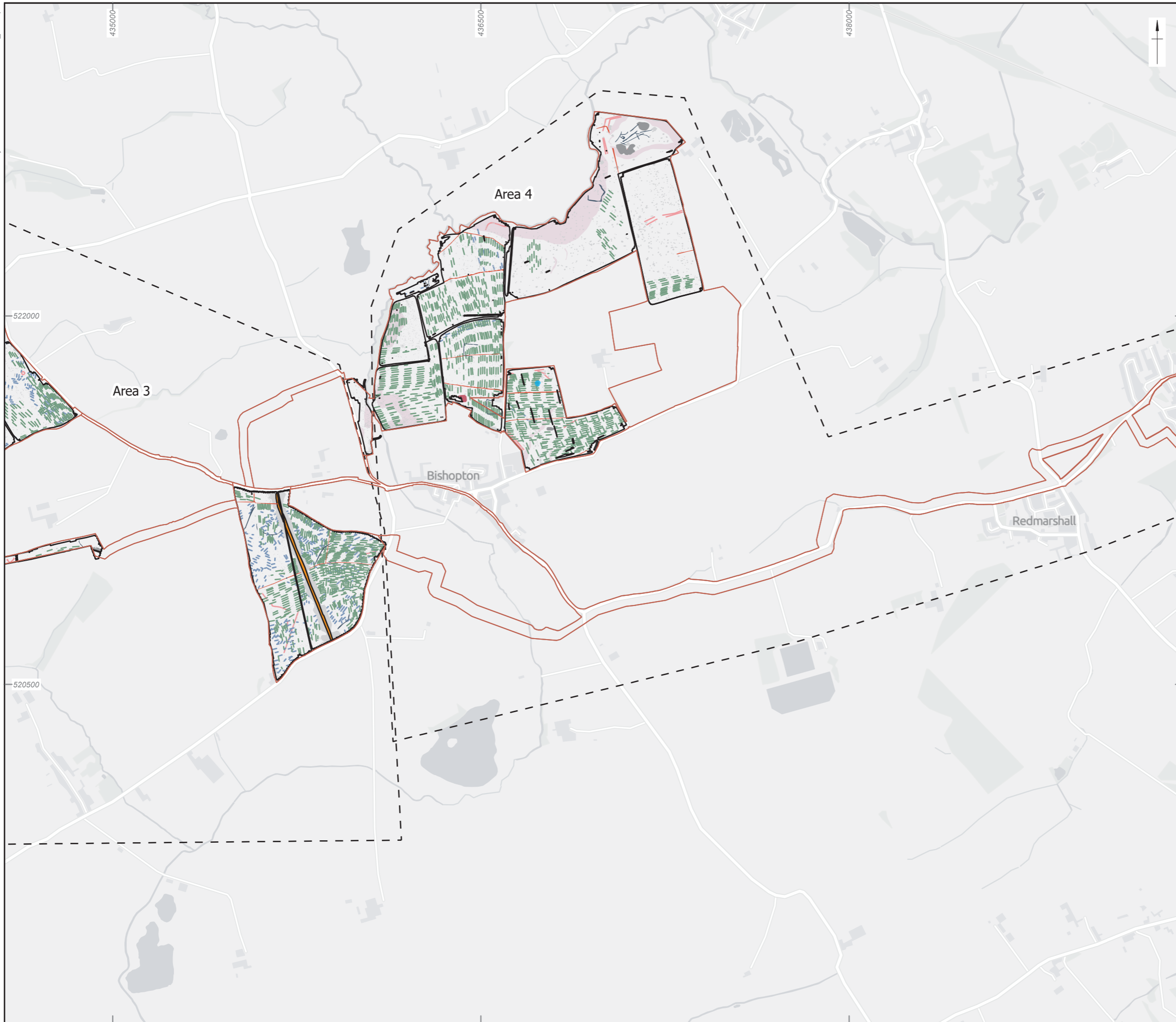


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Detailed gradiometer survey results: greyscale overview plot

Figure 6



- Site boundary
- Detailed survey extent
- Area delineation
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Increased response
- Geology
- Drain
- Trend
- Modern service
- Ferrous



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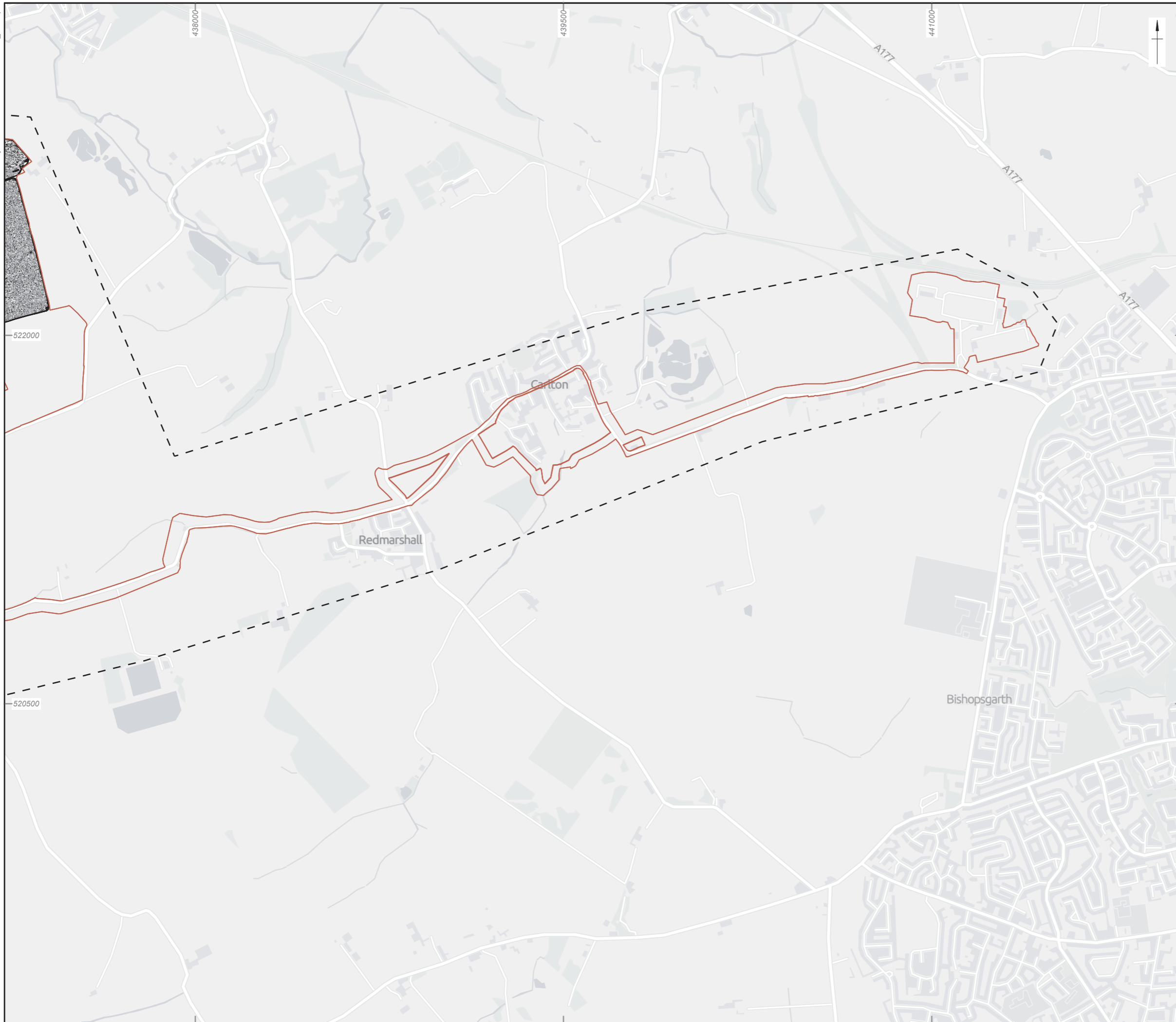
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Detailed gradiometer survey results: interpretation overview

Figure 7




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- Site boundary
- Detailed survey extent
- Area delineation

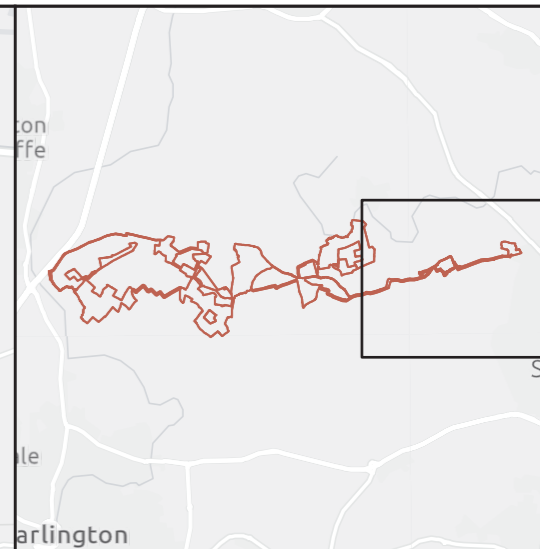
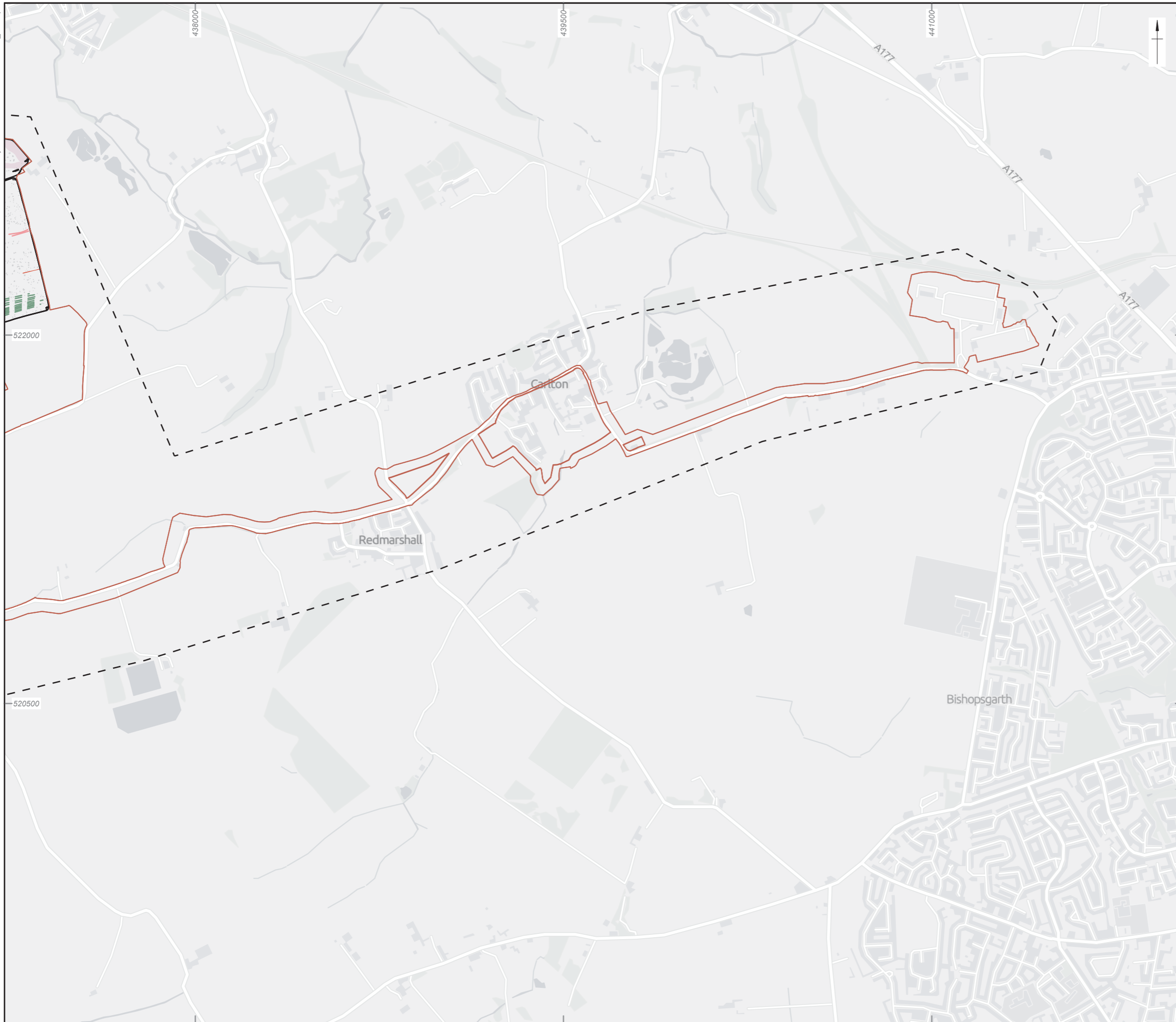


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- Site boundary
- Detailed survey extent
- Area delineation
- Former field boundary
- Historic cultivation
- Geology
- Trend
- Ferrous



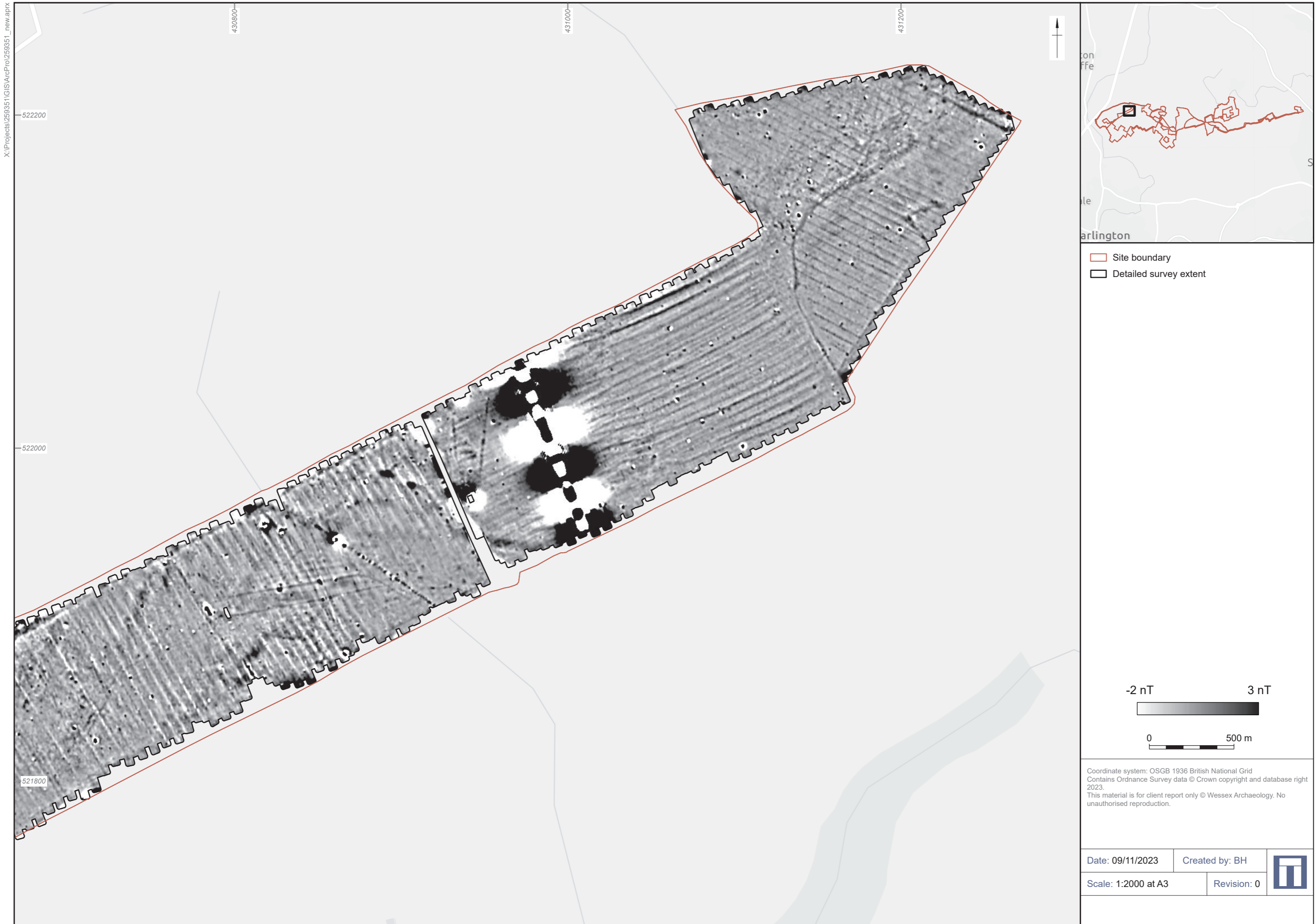
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Detailed gradiometer survey results: interpretation overview

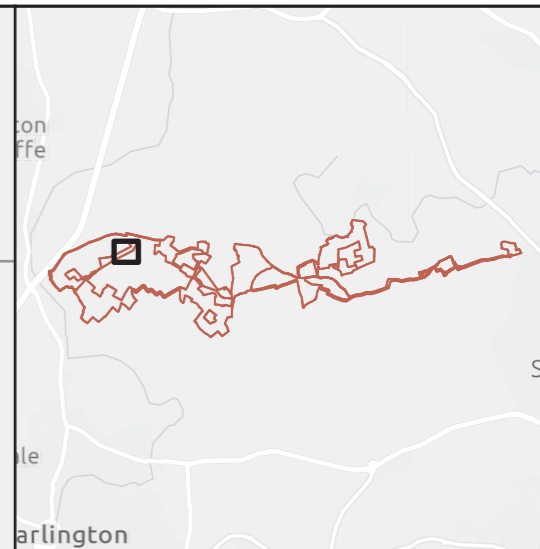
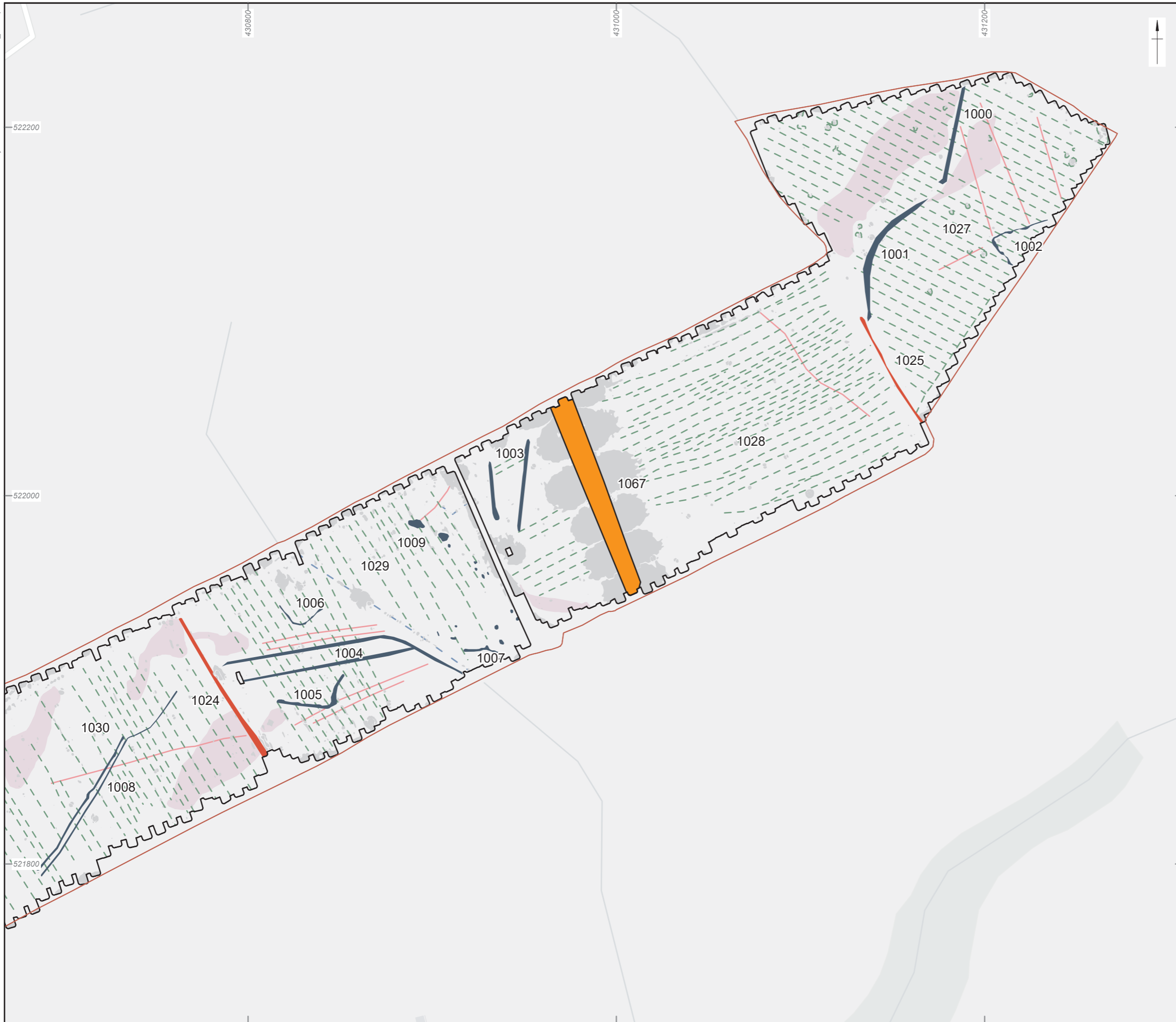
Figure 9





Area 1 detailed gradiometer survey results: greyscale plot


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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Geology
- Drain
- Trend
- Modern service
- Ferrous



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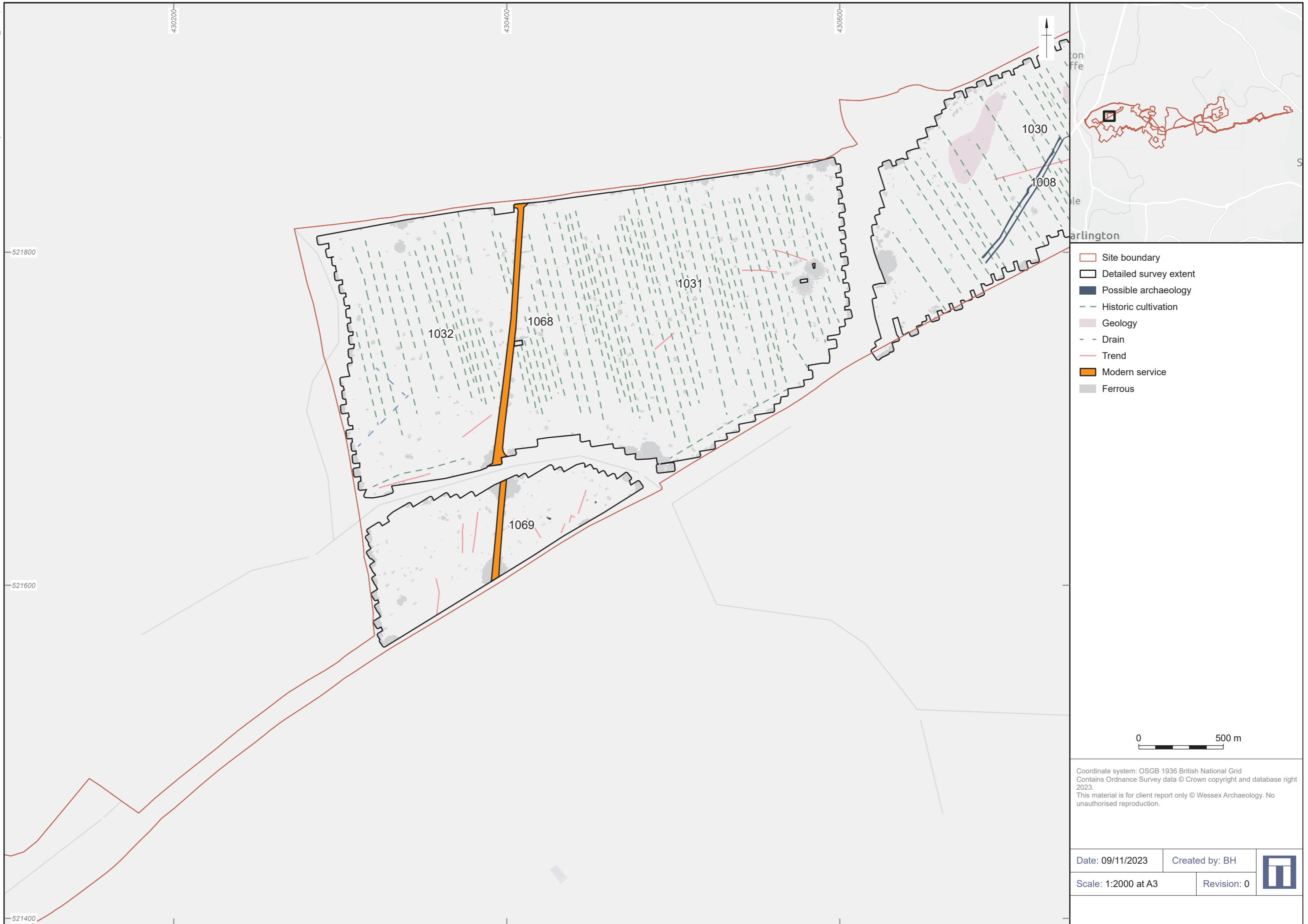
Area 1 detailed gradiometer survey results: interpretation

Figure 11





Area 1 detailed gradiometer survey results: greyscale plot



- Site boundary
- Detailed survey extent
- Possible archaeology
- - - Historic cultivation
- Geology
- - - Drain
- Trend
- Modern service
- Ferrous

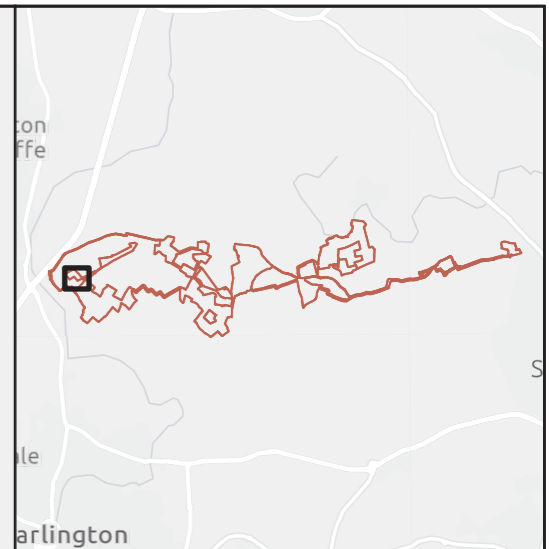
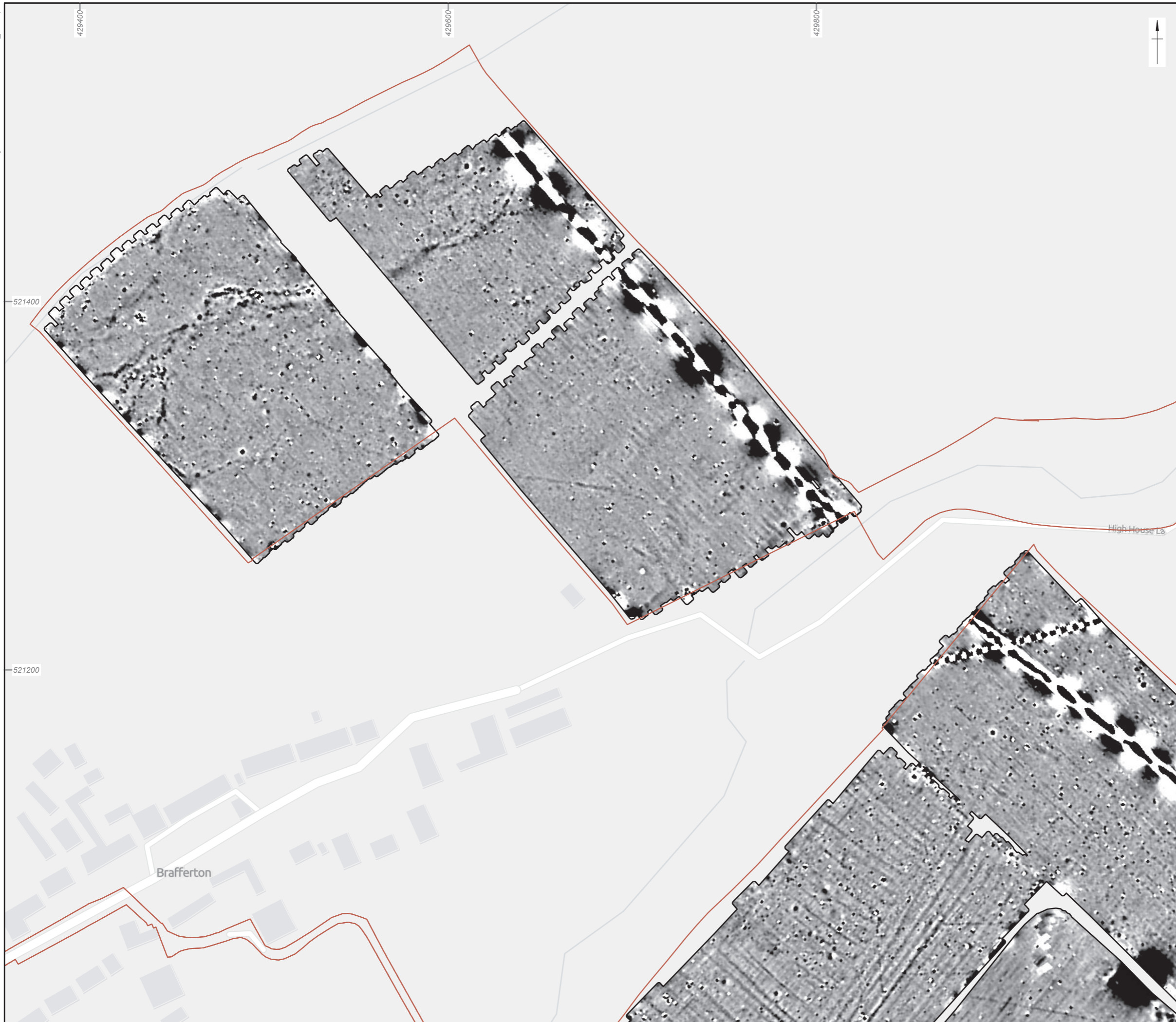
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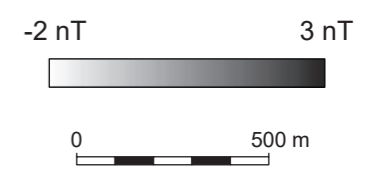
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Area 1 detailed gradiometer survey results: interpretation





- Site boundary
- Detailed survey extent

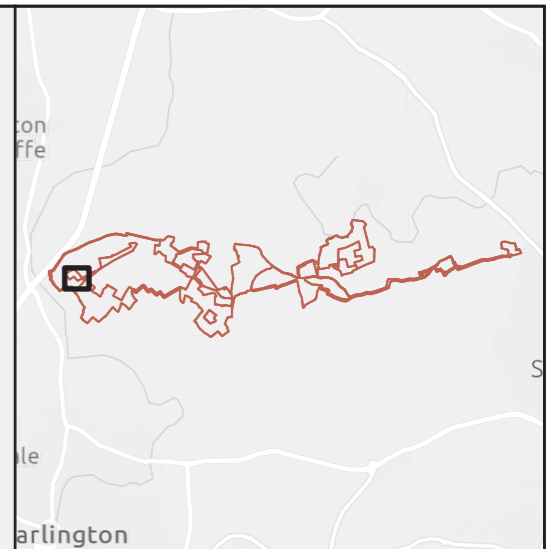
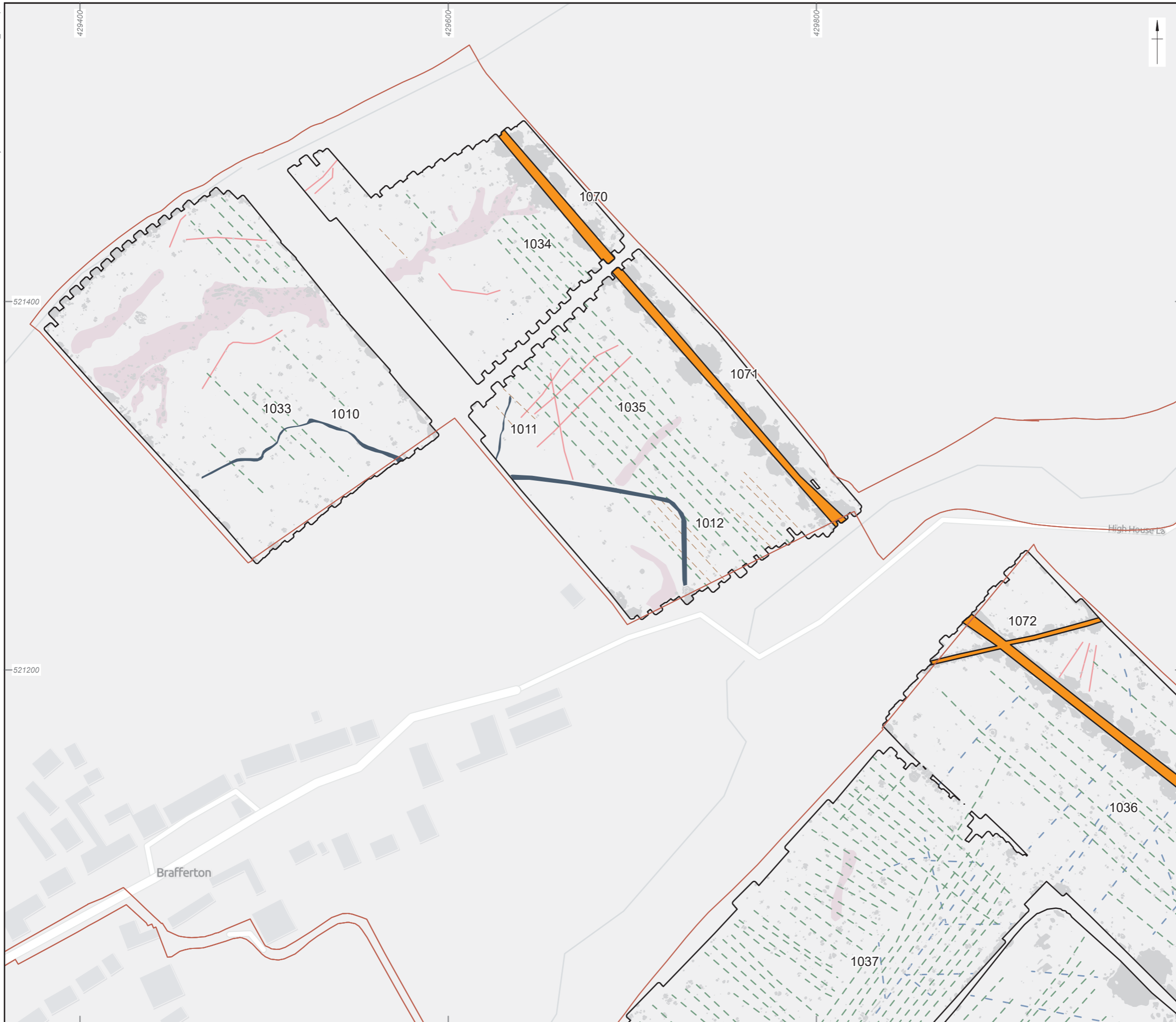


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Area 1 detailed gradiometer survey results: greyscale plot

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- Site boundary
- Detailed survey extent
- Possible archaeology
- Historic cultivation
- Geology
- Agricultural feature
- Drain
- Trend
- Modern service
- Ferrous



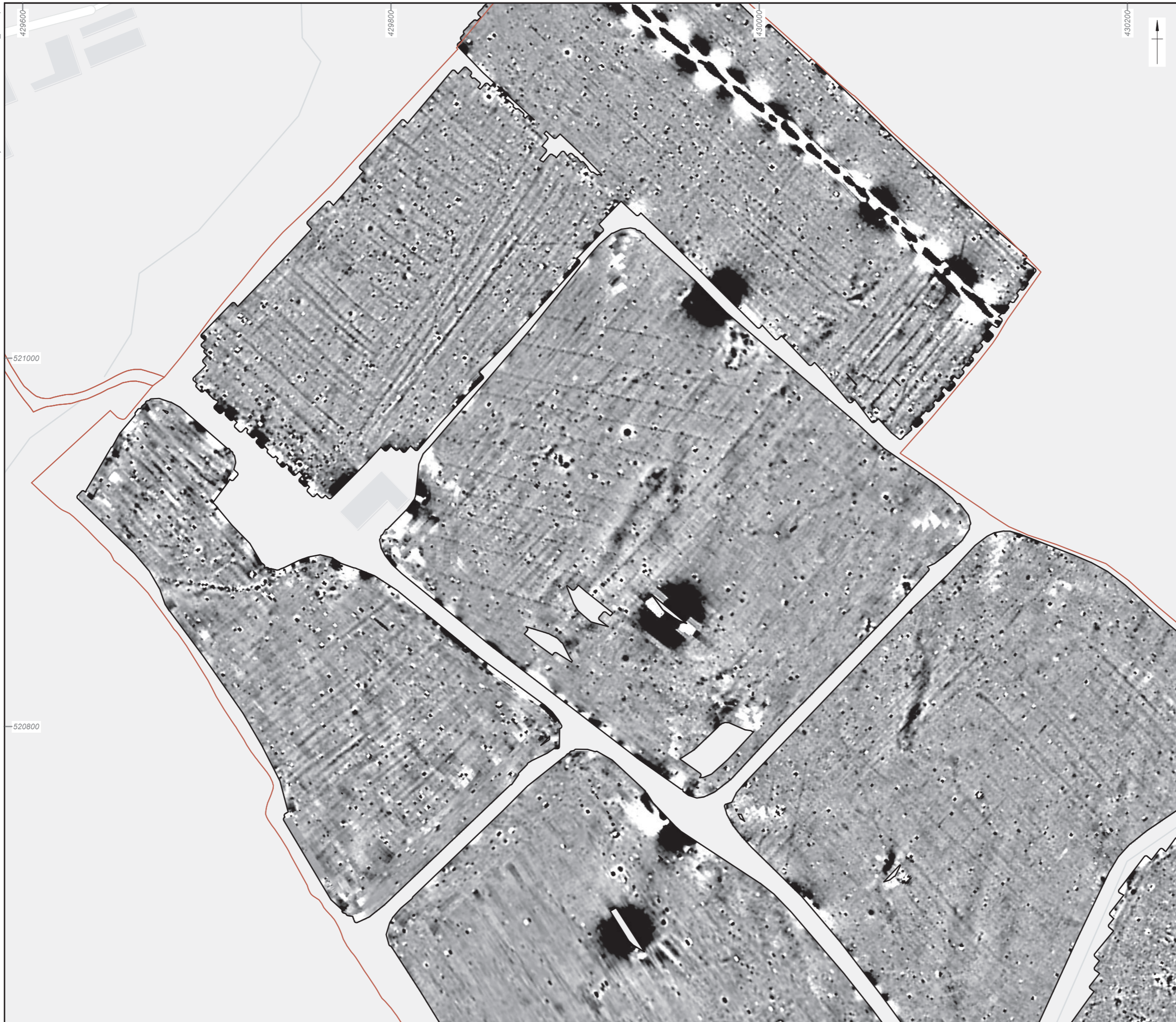
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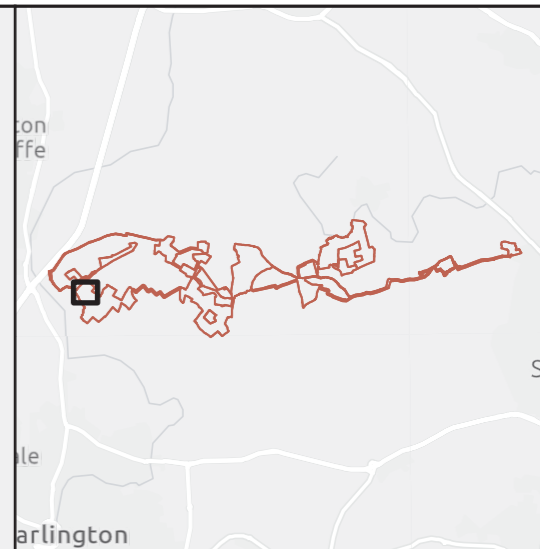
Area 1 detailed gradiometer survey results: interpretation



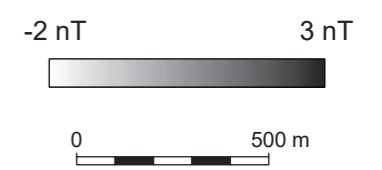
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429600  
429800  
430000  
521000  
520800



- Site boundary
- Detailed survey extent



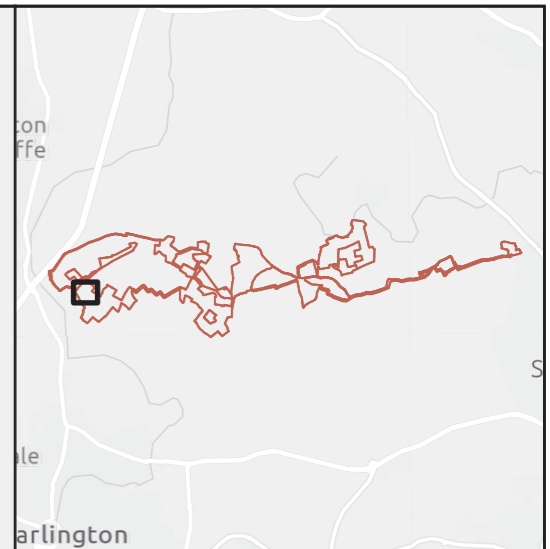
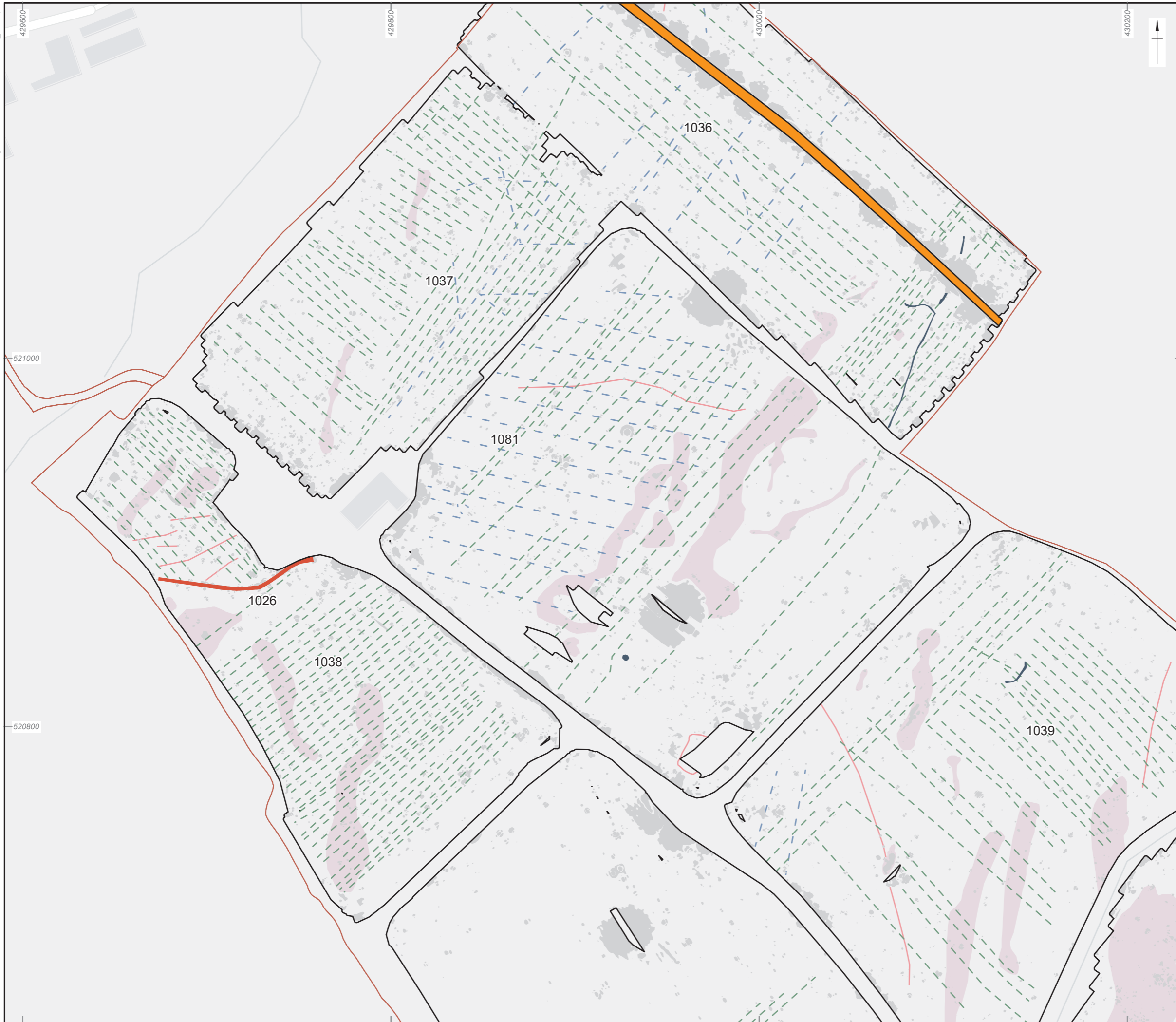
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Area 1 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Geology
- Drain
- Trend
- Modern service
- Ferrous

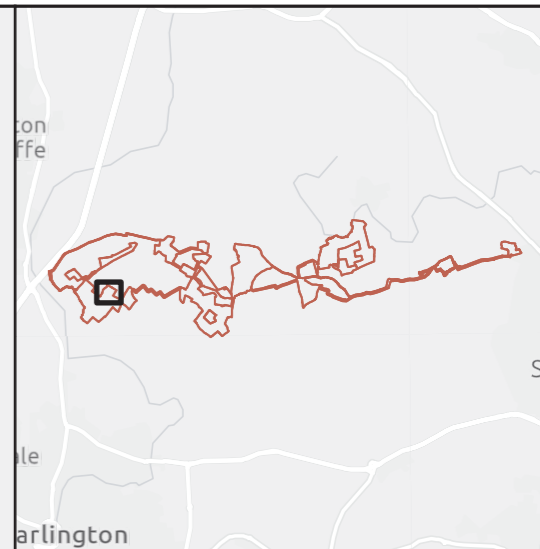
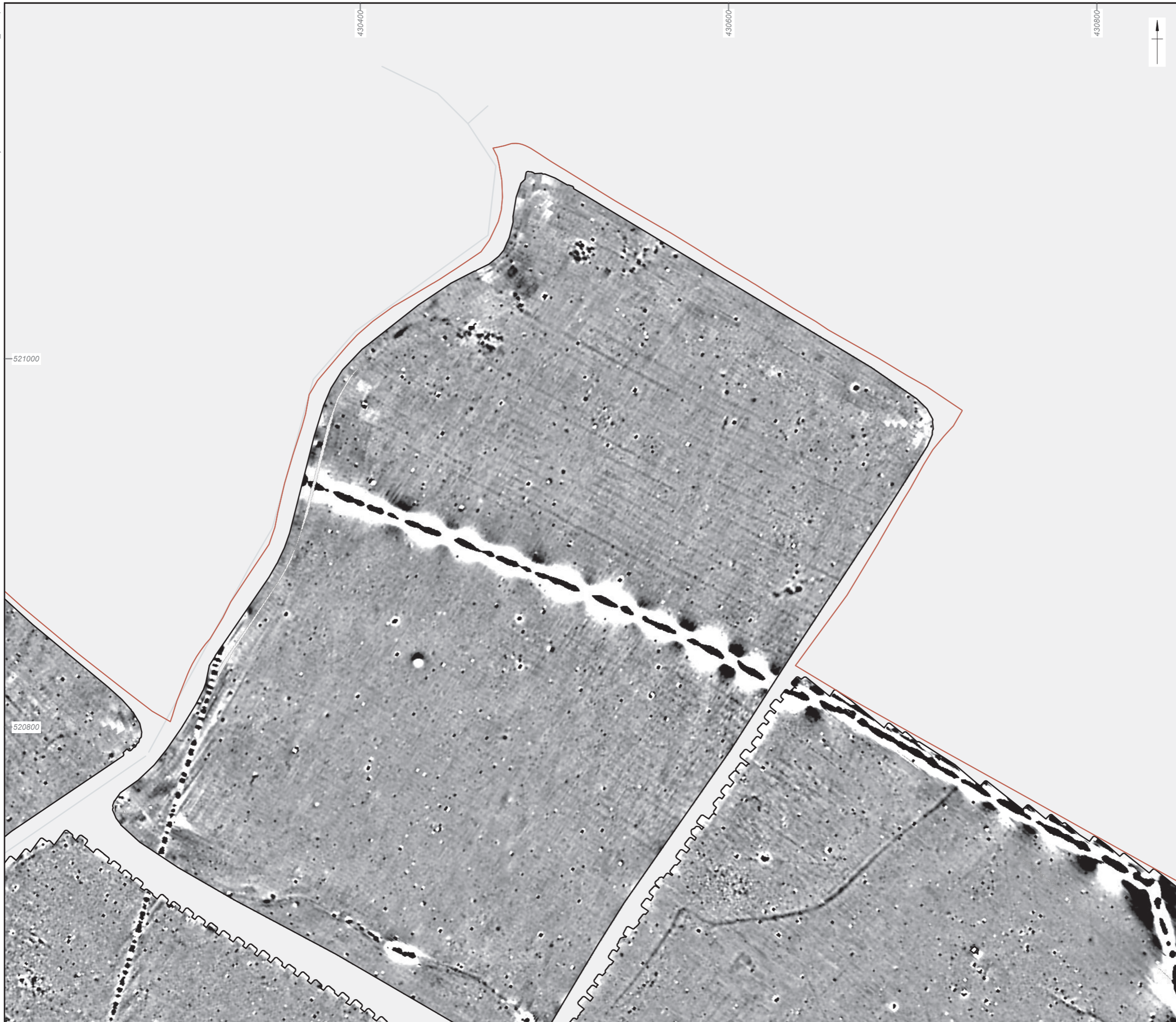


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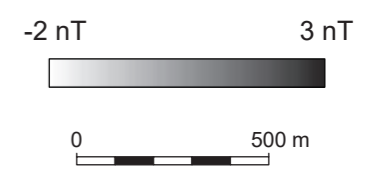
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Area 1 detailed gradiometer survey results: interpretation





- Site boundary
- Detailed survey extent

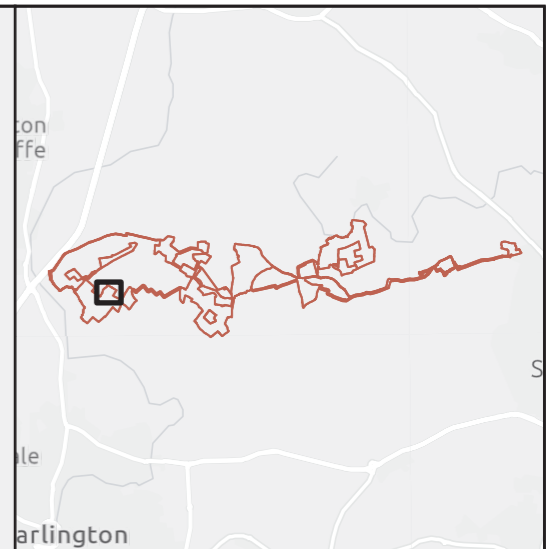


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Area 1 detailed gradiometer survey results: greyscale plot





- Site boundary
- Detailed survey extent
- Possible archaeology
- Historic cultivation
- Increased response
- Geology
- Drain
- Trend
- Modern service
- Ferrous

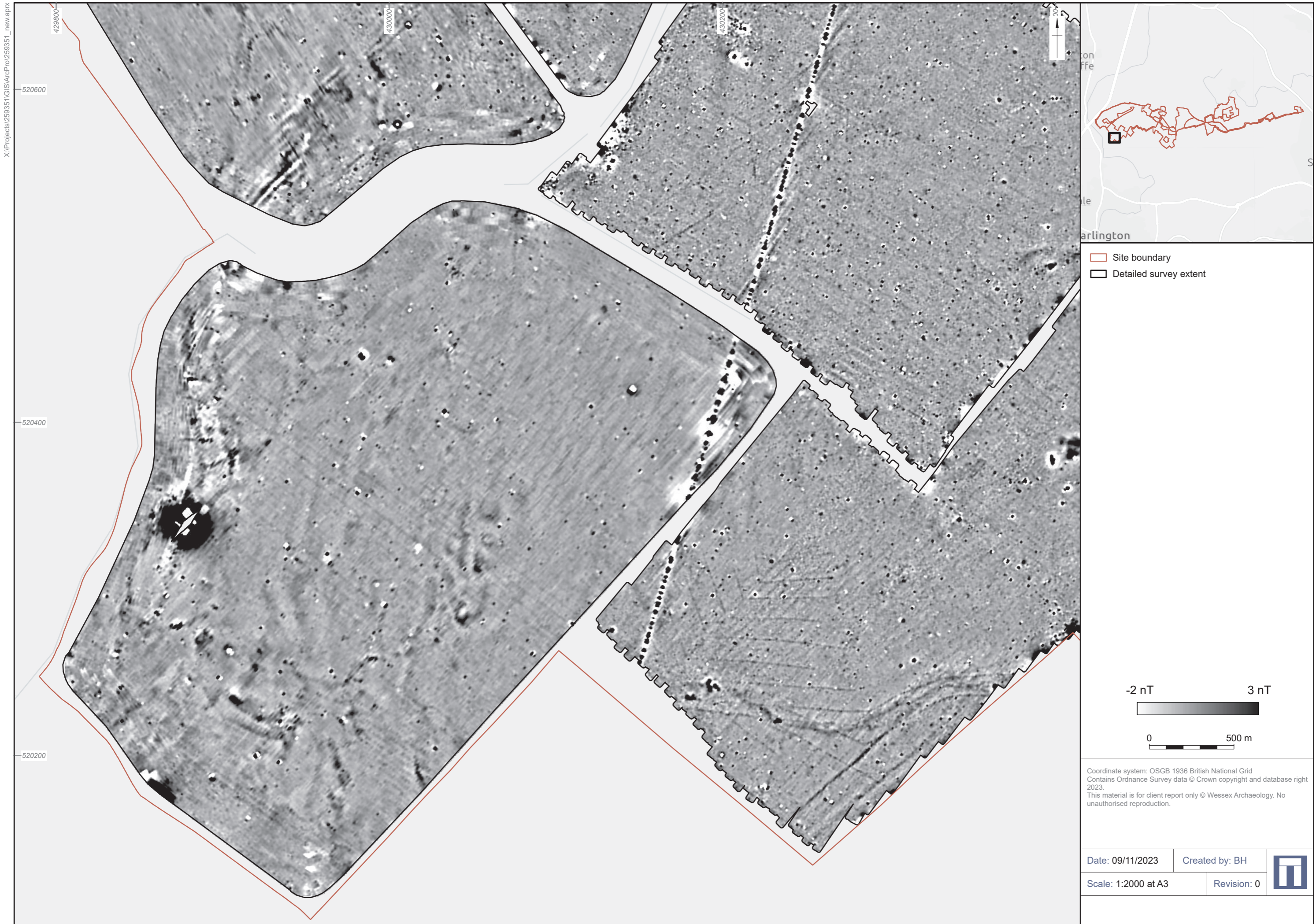


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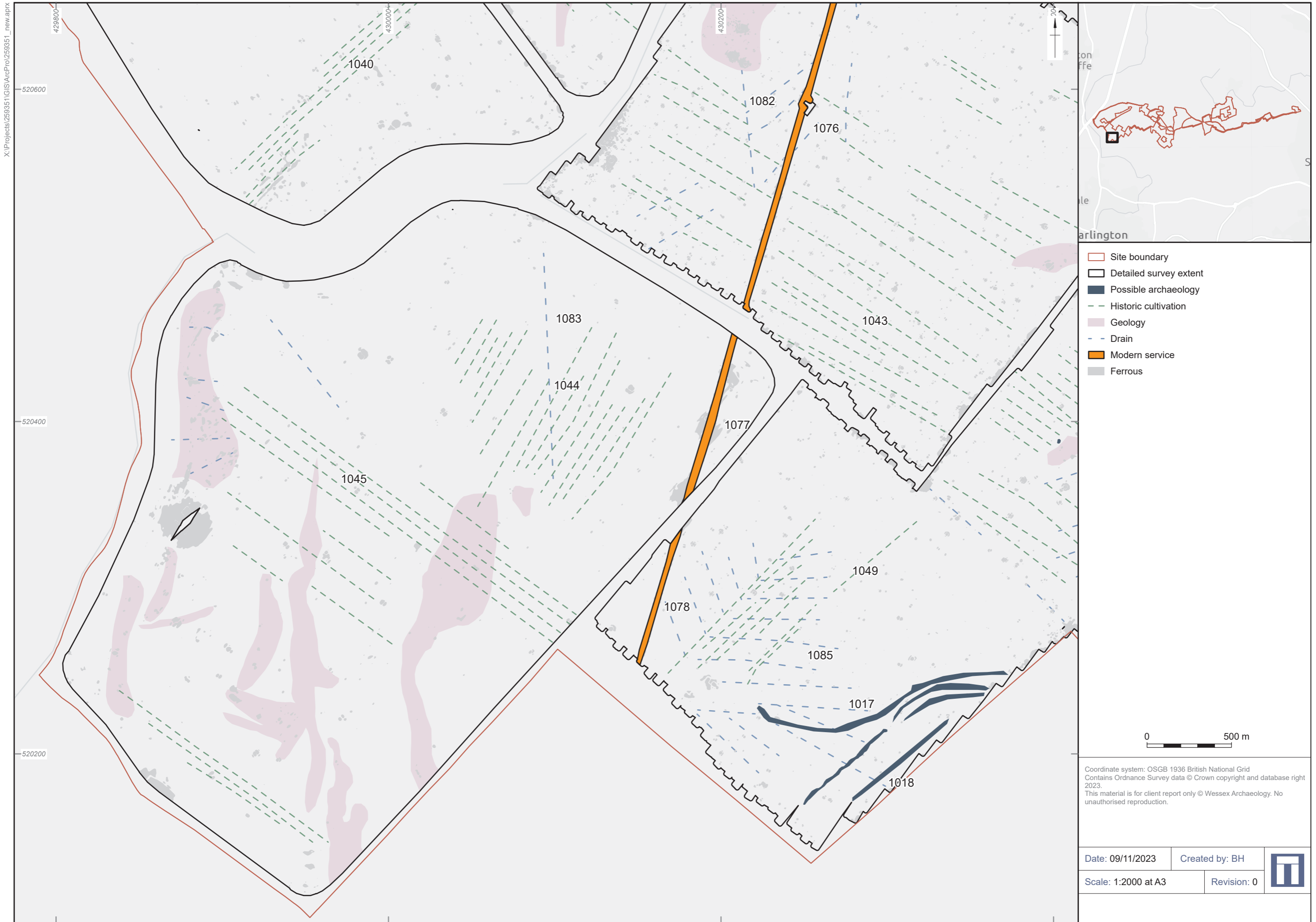
Area 1 detailed gradiometer survey results: interpretation





Area 1 detailed gradiometer survey results: greyscale plot

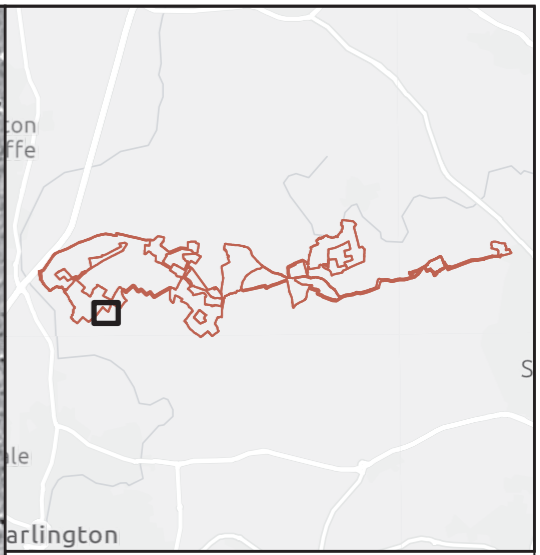




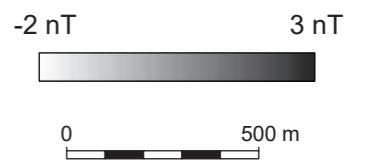
Area 1 detailed gradiometer survey results: interpretation

Figure 21

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- Site boundary
- Detailed survey extent

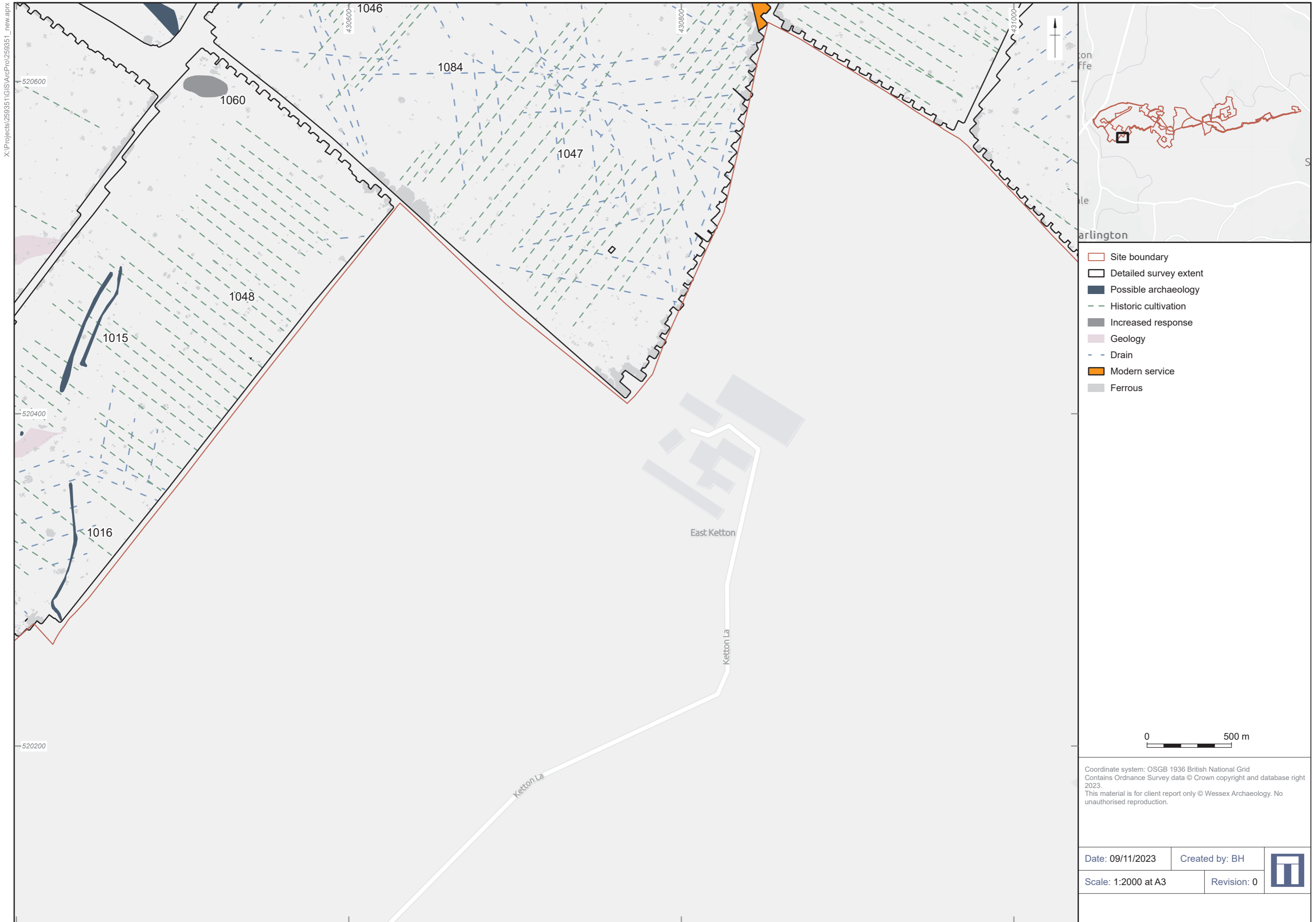


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Area 1 detailed gradiometer survey results: greyscale plot



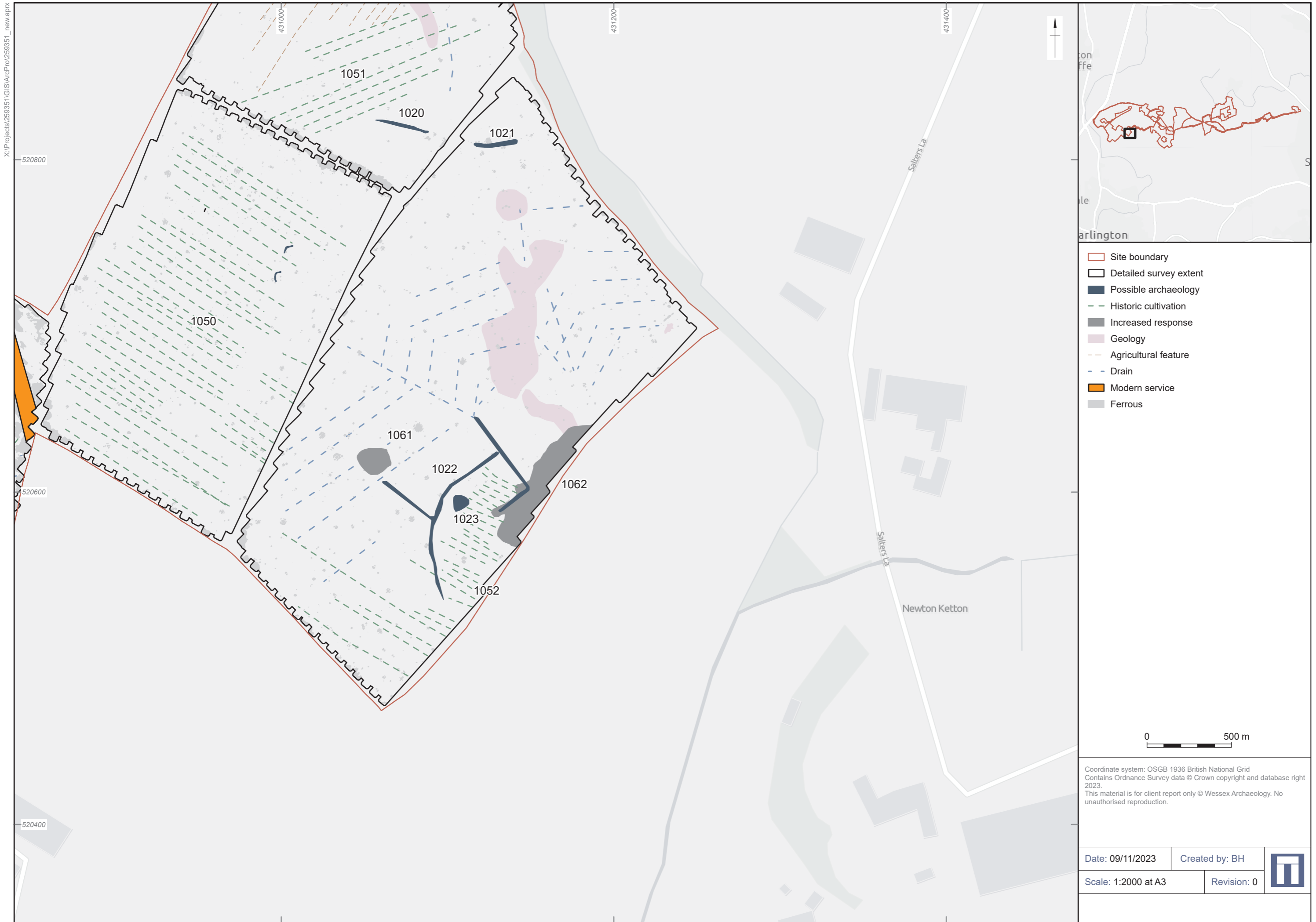


Area 1 detailed gradiometer survey results: interpretation



Area 1 detailed gradiometer survey results: greyscale plot

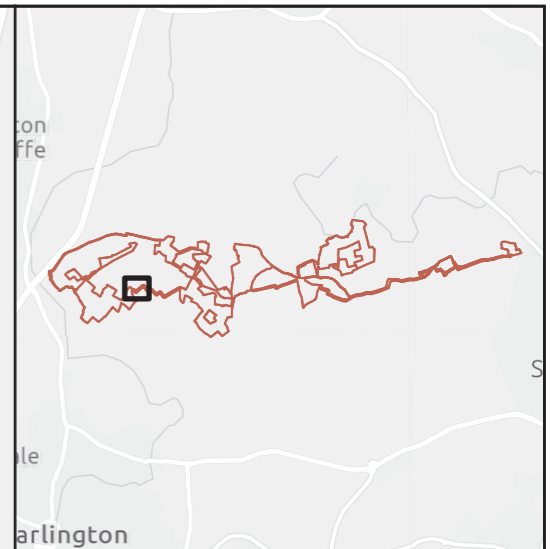




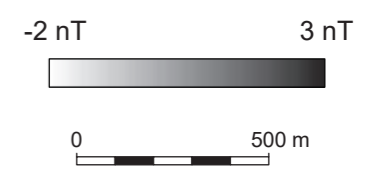
Area 1 detailed gradiometer survey results: interpretation



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- Site boundary
- Detailed survey extent

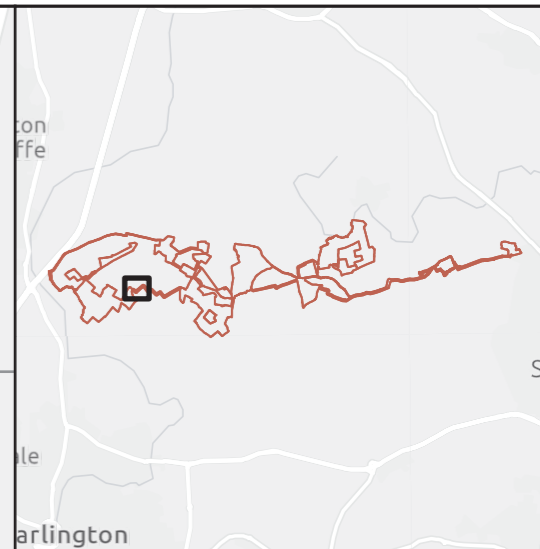
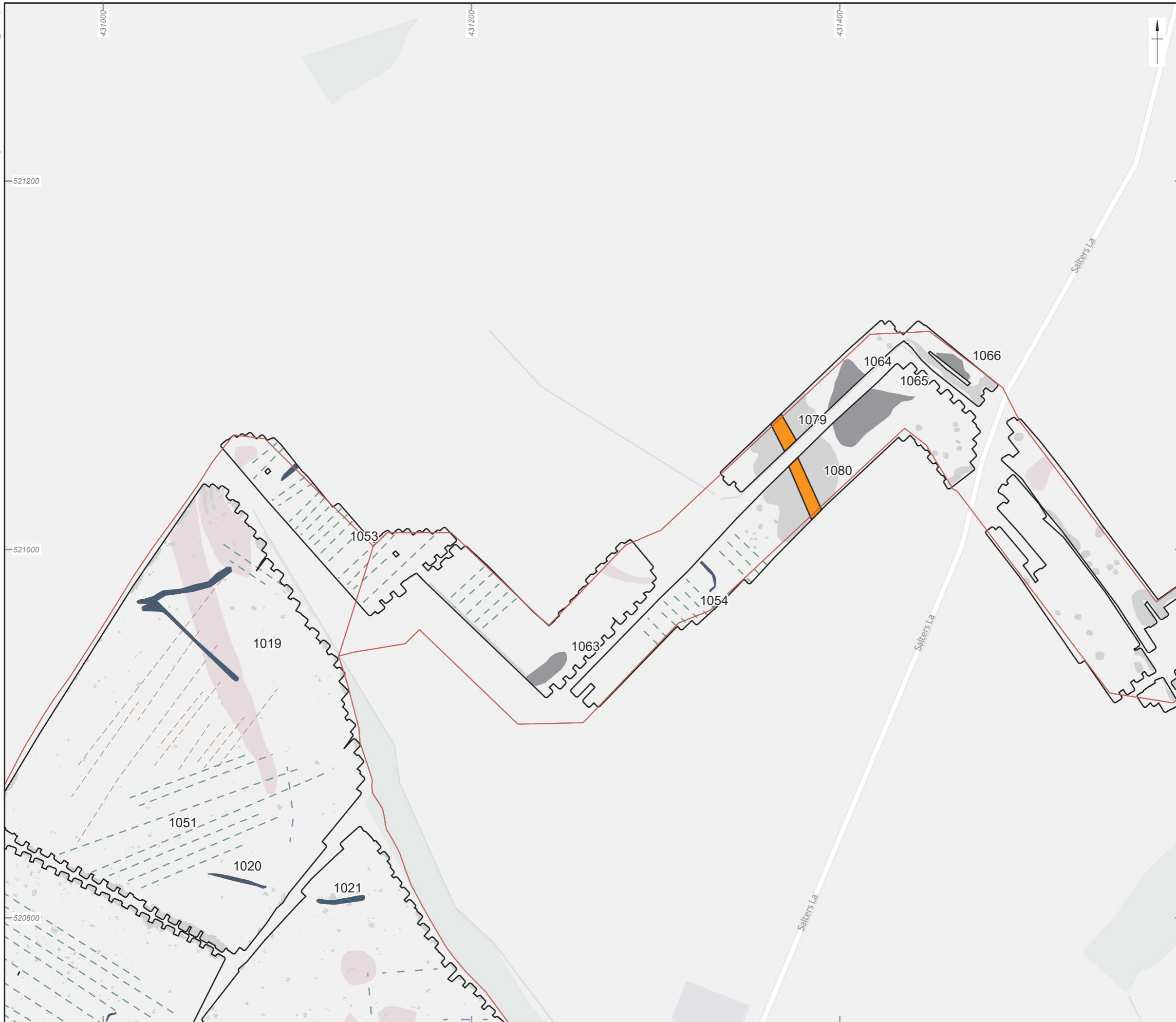


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Area 1 detailed gradiometer survey results: greyscale plot


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- Site boundary
- Detailed survey extent
- Possible archaeology
- Historic cultivation
- Increased response
- Geology
- Agricultural feature
- Drain
- Modern service
- Ferrous

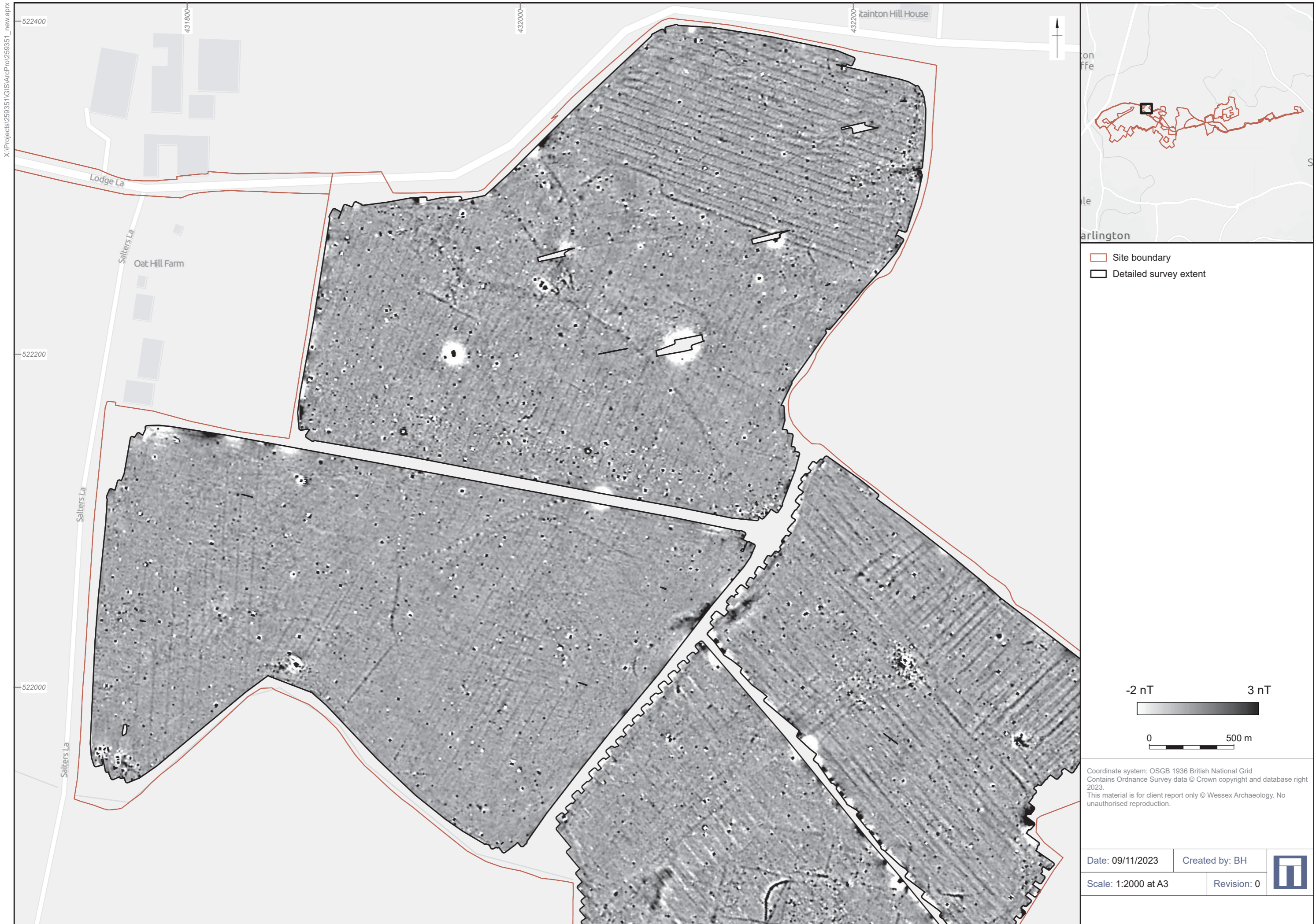


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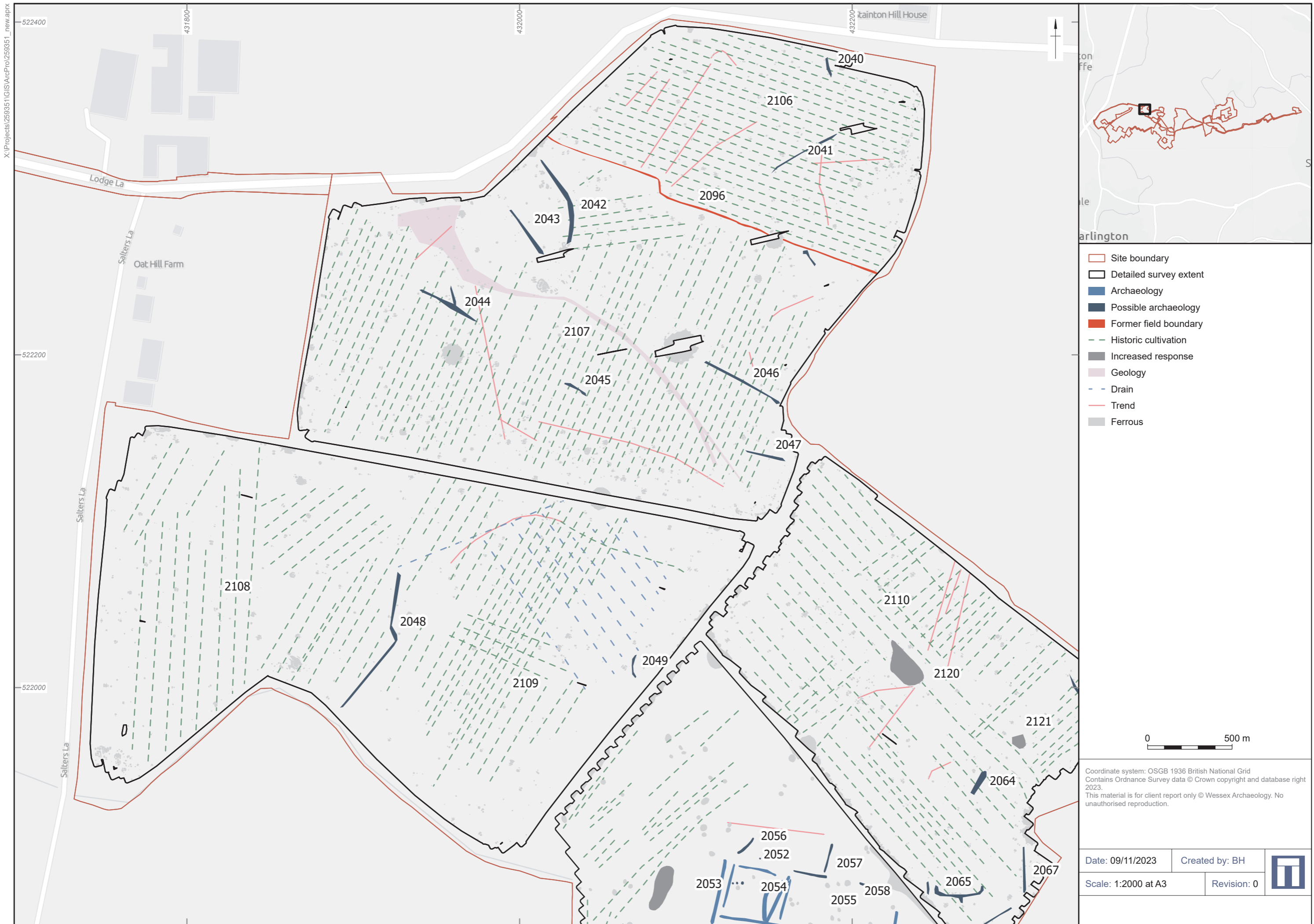
Area 1 detailed gradiometer survey results: interpretation





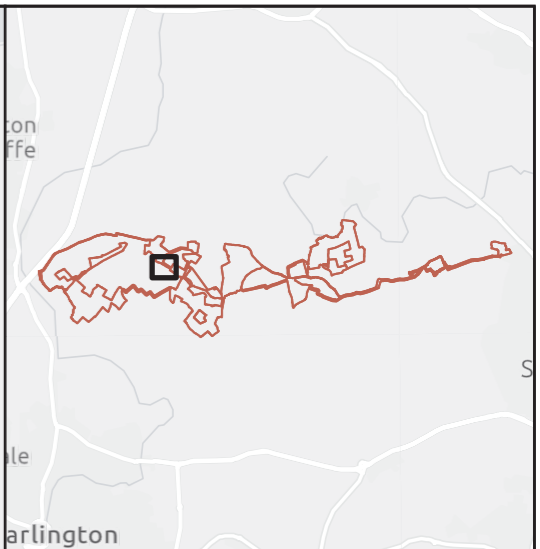
Area 1 detailed gradiometer survey results: greyscale plot



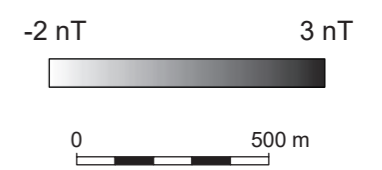


Area 1 detailed gradiometer survey results: interpretation

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- Site boundary
- Detailed survey extent

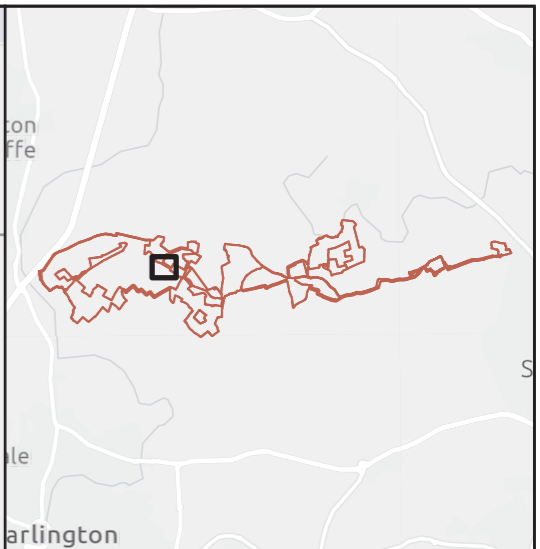


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Area 2 detailed gradiometer survey results: greyscale plot


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- Site boundary
- Detailed survey extent
- Archaeology
- Possible archaeology
- Historic cultivation
- Increased response
- Agricultural feature
- Drain
- Trend
- Ferrous

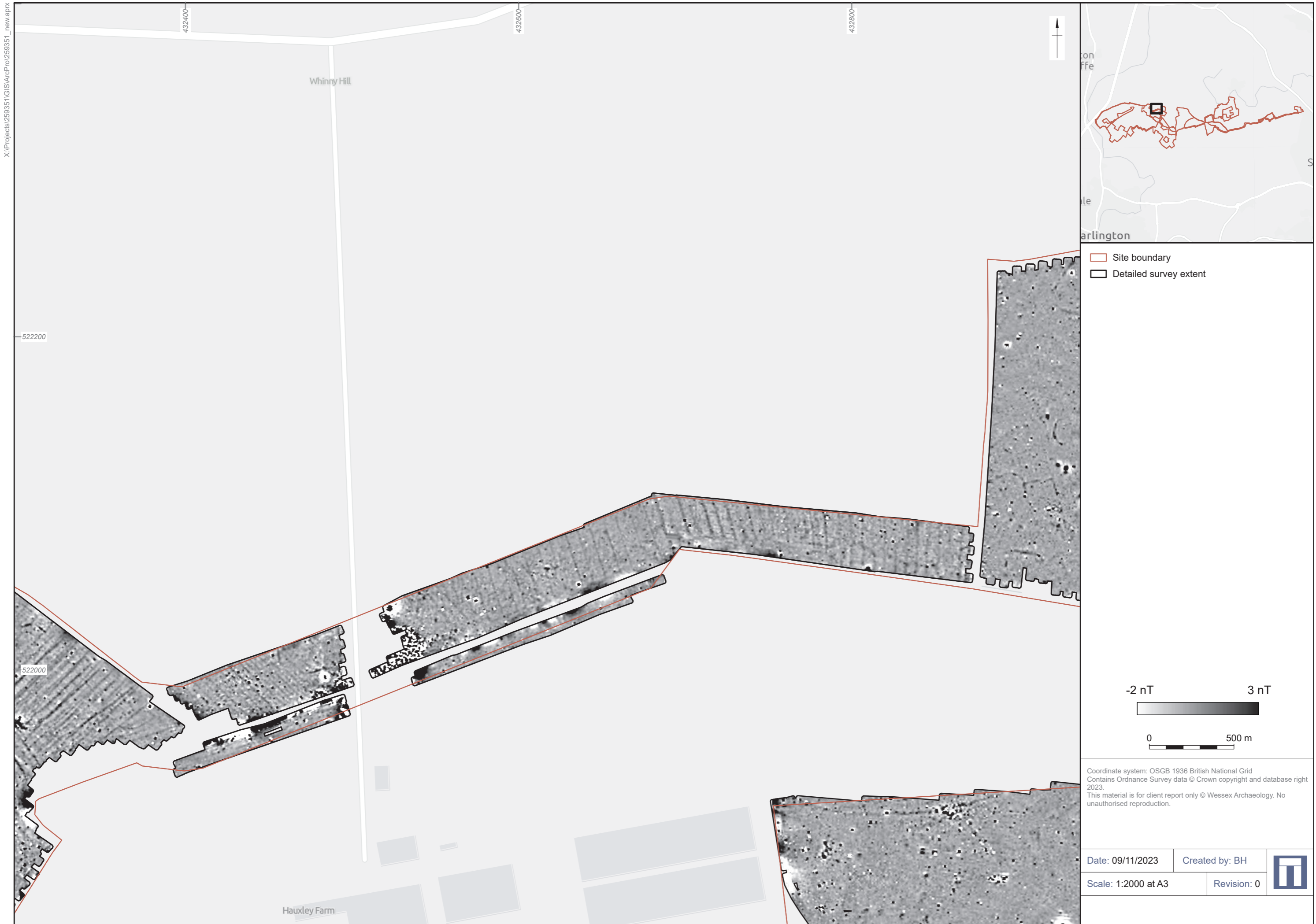


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Area 2 detailed gradiometer survey results: interpretation





Area 2 detailed gradiometer survey results: greyscale plot



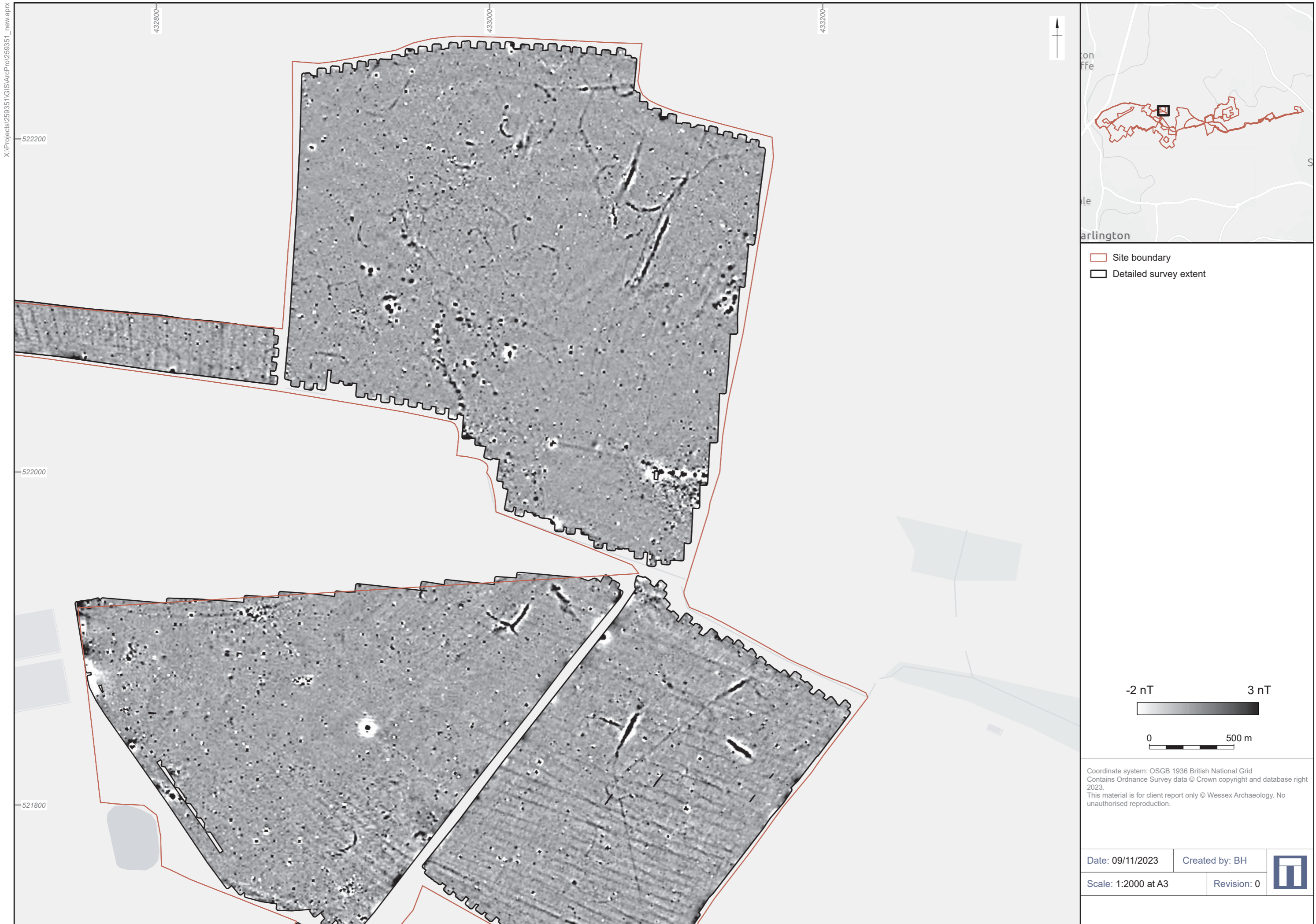
- Site boundary
- Detailed survey extent
- Archaeology
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Agricultural feature
- Trend
- Ferrous

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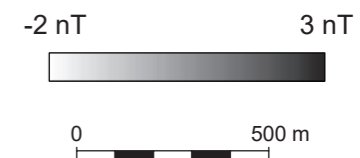
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Area 2 detailed gradiometer survey results: interpretation





- Site boundary
- Detailed survey extent



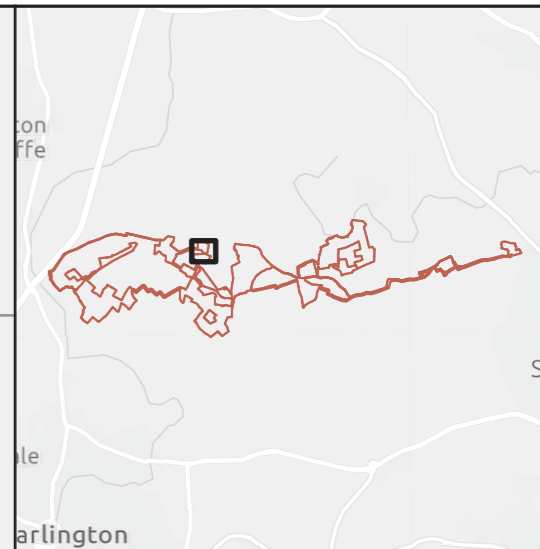
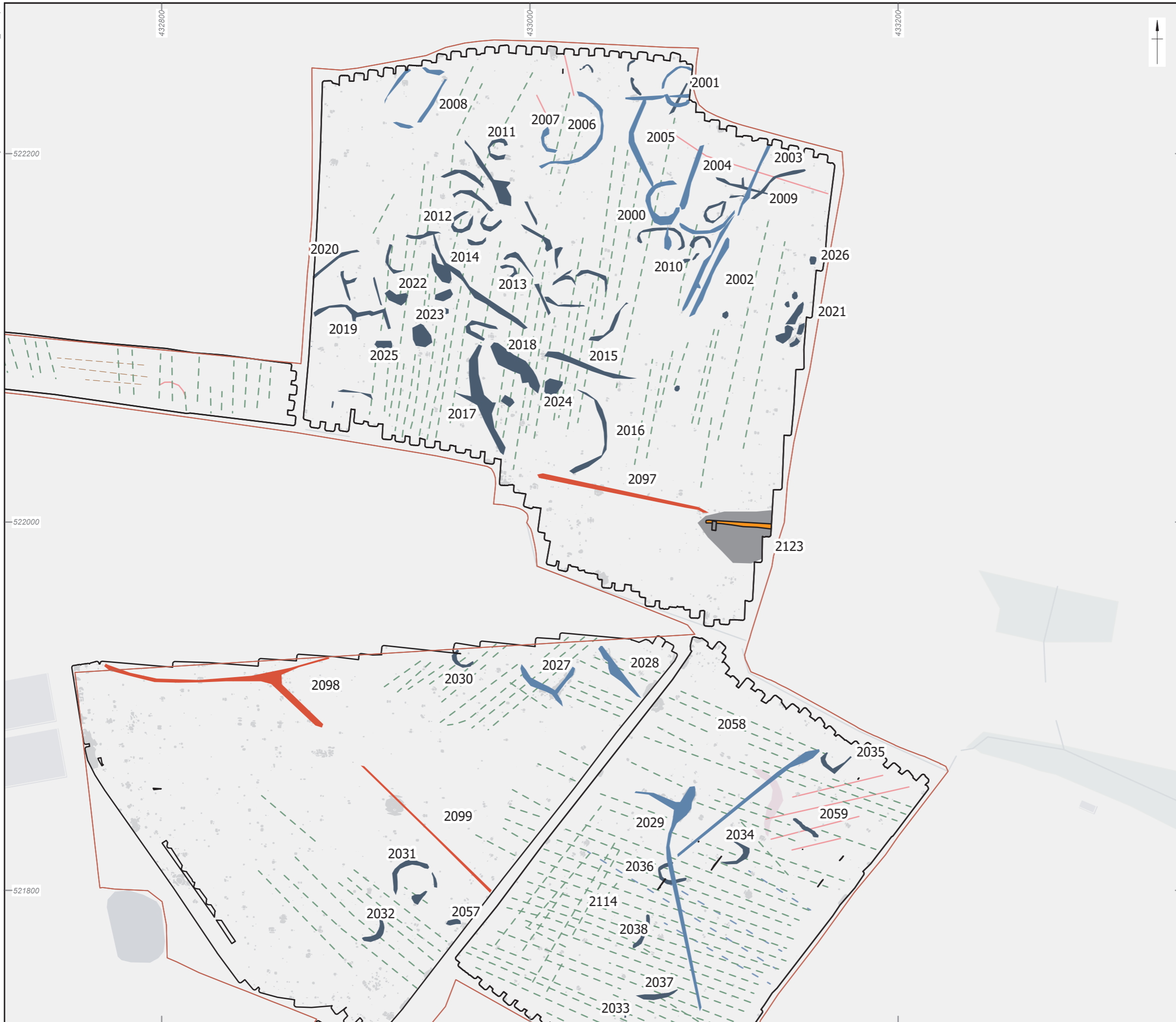
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Area 2 detailed gradiometer survey results: greyscale plot




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- ▭ Site boundary
- Detailed survey extent
- ▭ Archaeology
- ▭ Possible archaeology
- ▭ Former field boundary
- ▭ Historic cultivation
- Increased response
- Geology
- Agricultural feature
- Drain
- Trend
- Modern service
- Ferrous

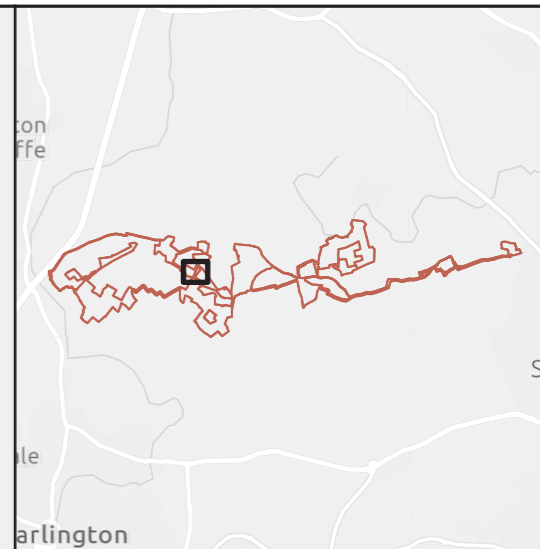


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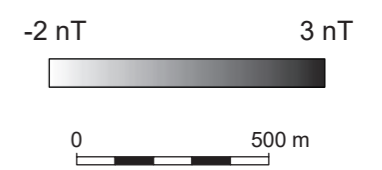
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Area 2 detailed gradiometer survey results: interpretation

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- Site boundary
- Detailed survey extent



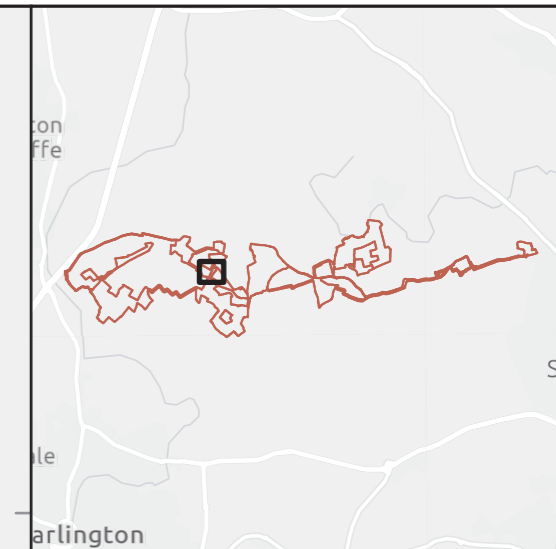
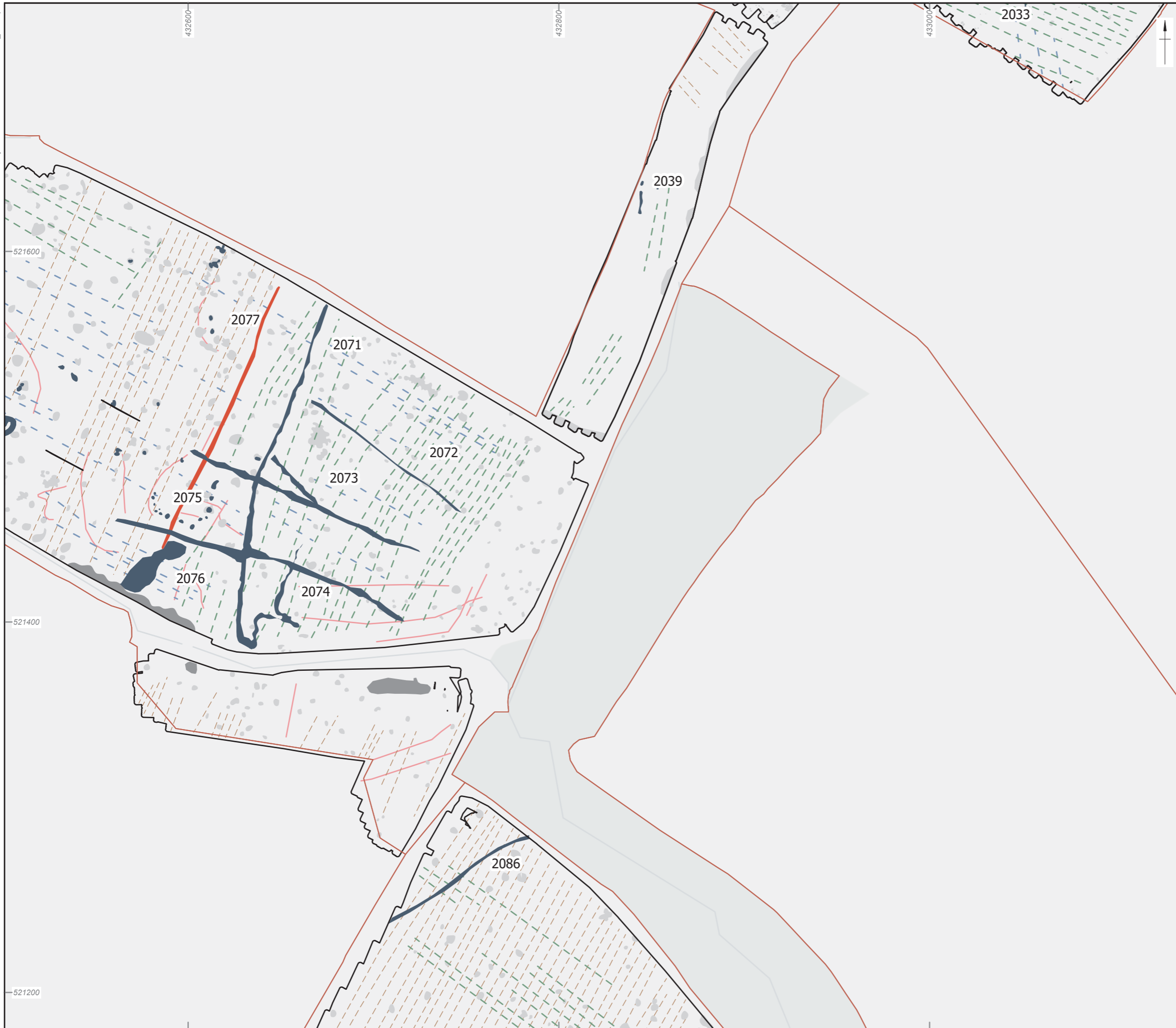
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Area 2 detailed gradiometer survey results: greyscale plot




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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Agricultural feature
- Drain
- Trend
- Ferrous



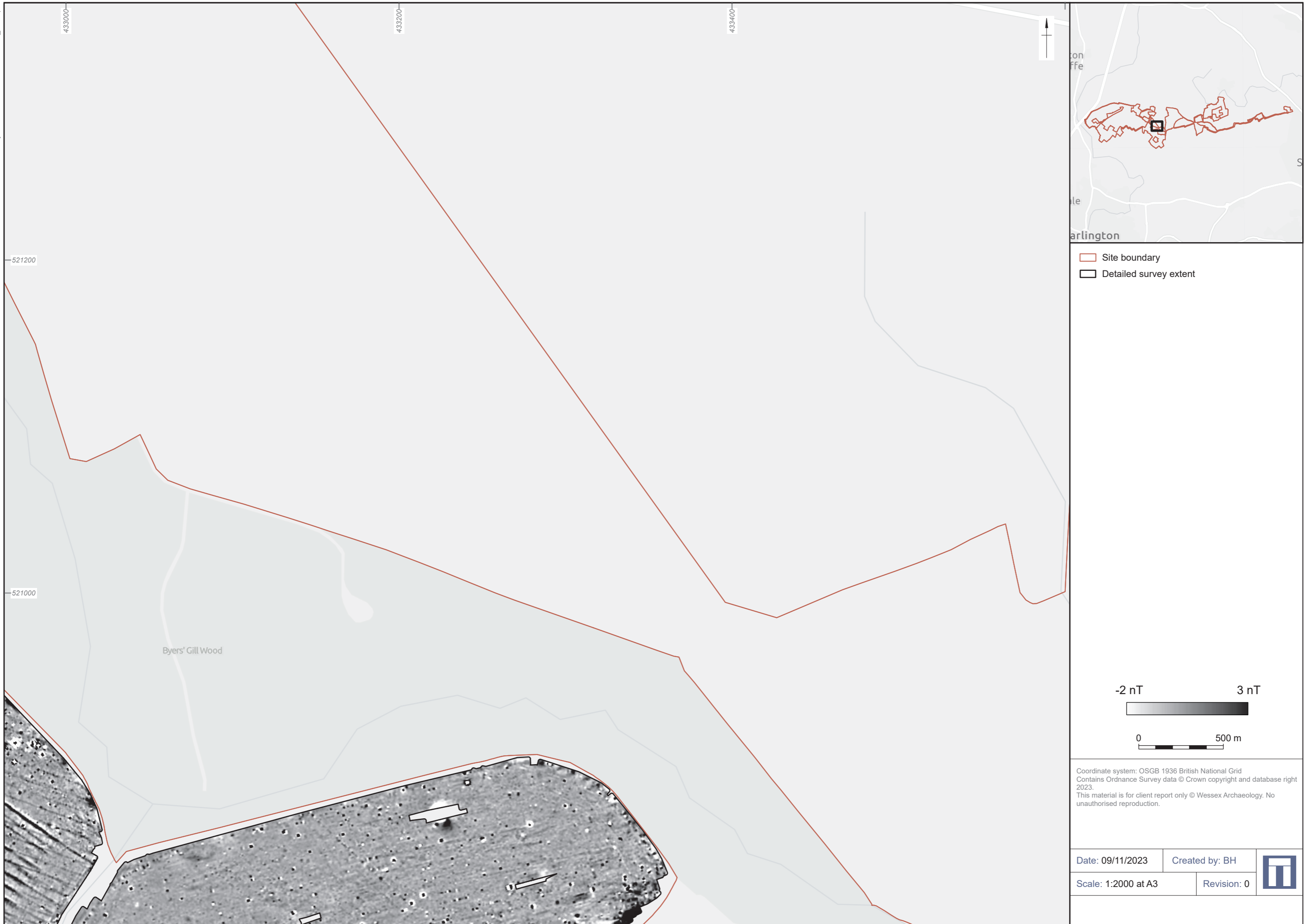
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Area 2 detailed gradiometer survey results: interpretation

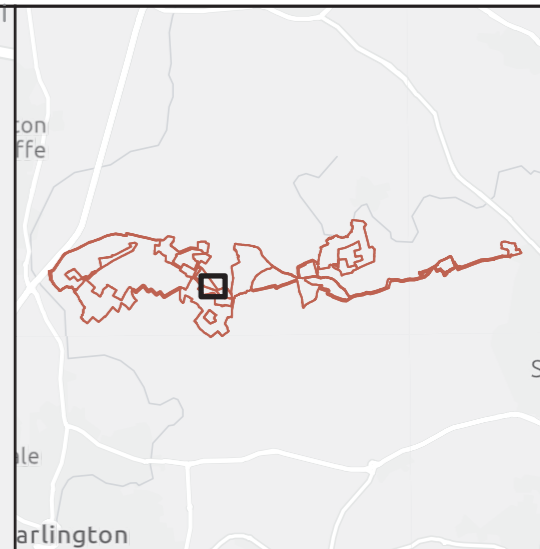
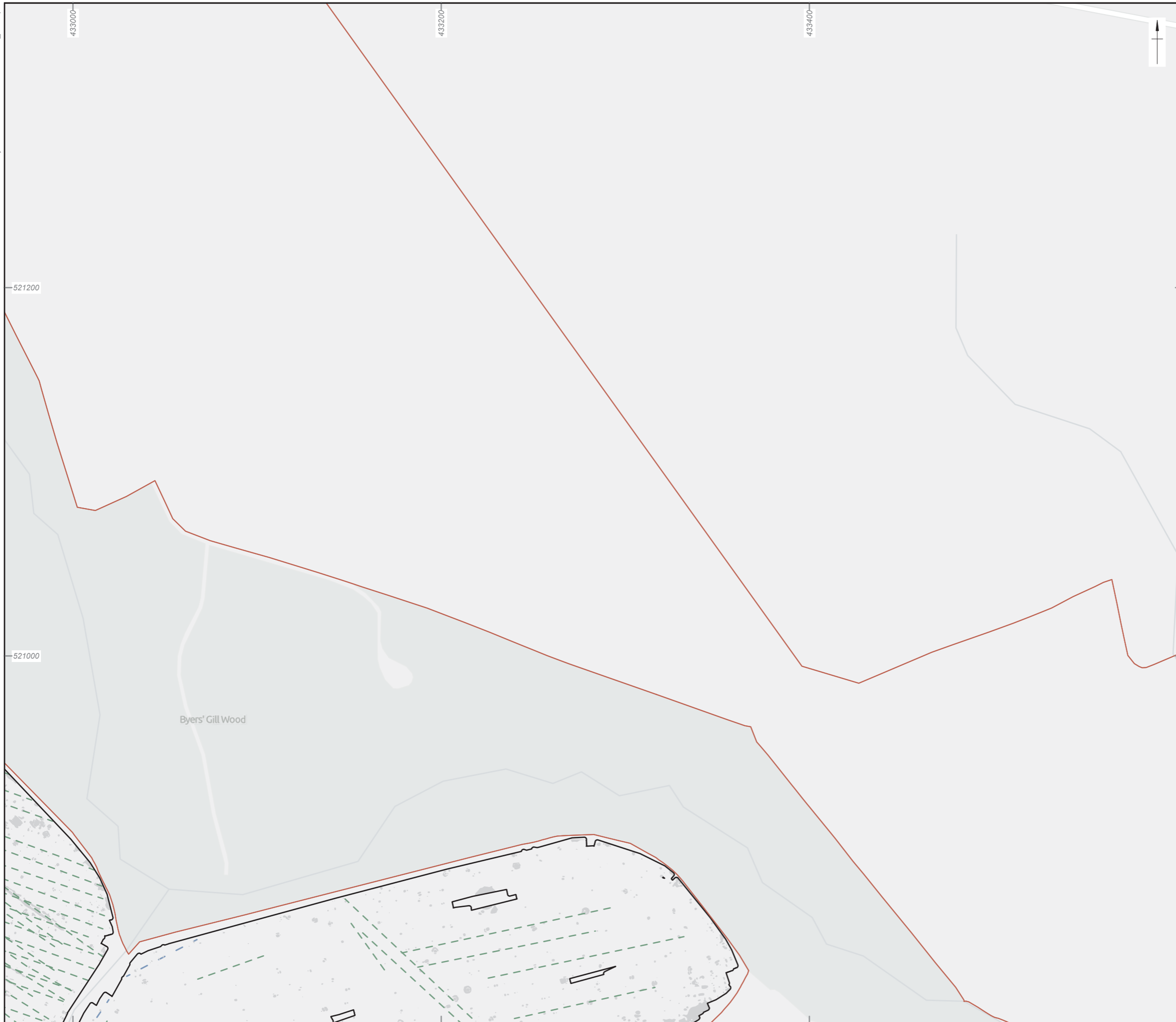


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Area 2 detailed gradiometer survey results: greyscale plot


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- Site boundary
- Detailed survey extent
- Historic cultivation
- Drain
- Ferrous

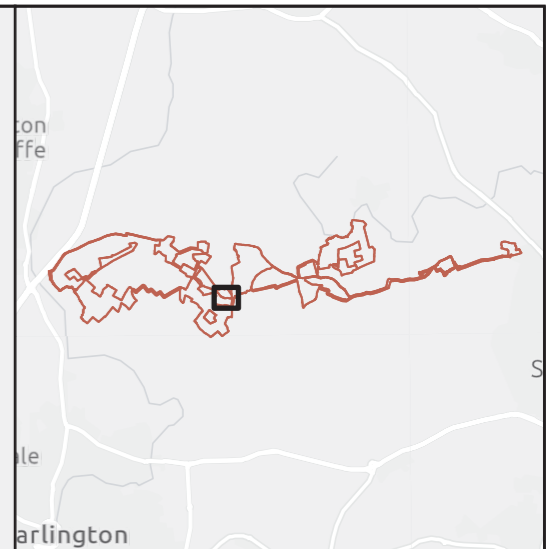
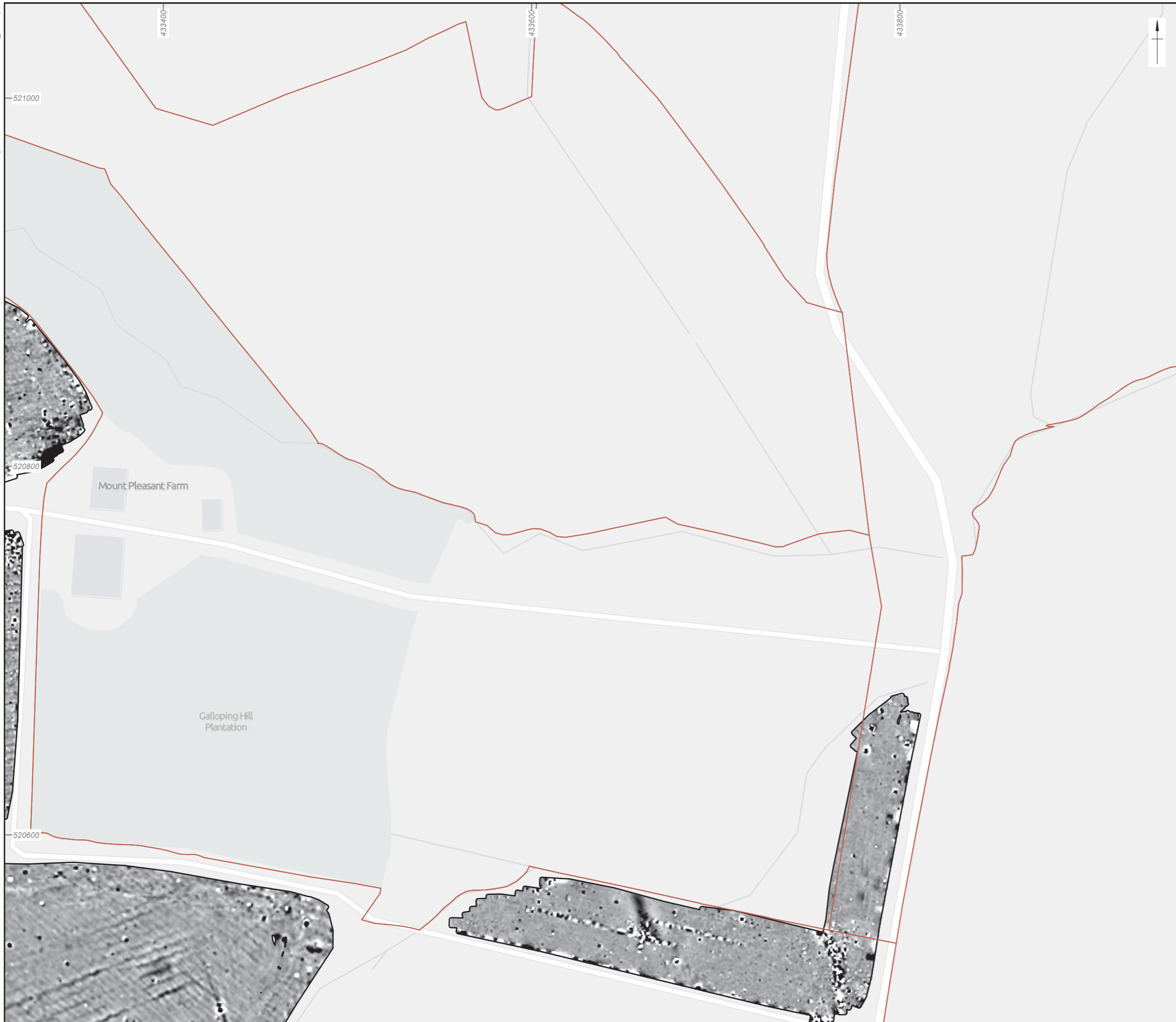


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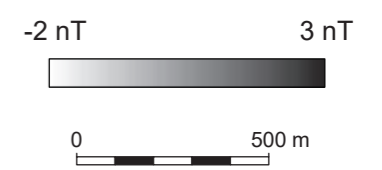
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Area 2 detailed gradiometer survey results: interpretation

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- Site boundary
- Detailed survey extent

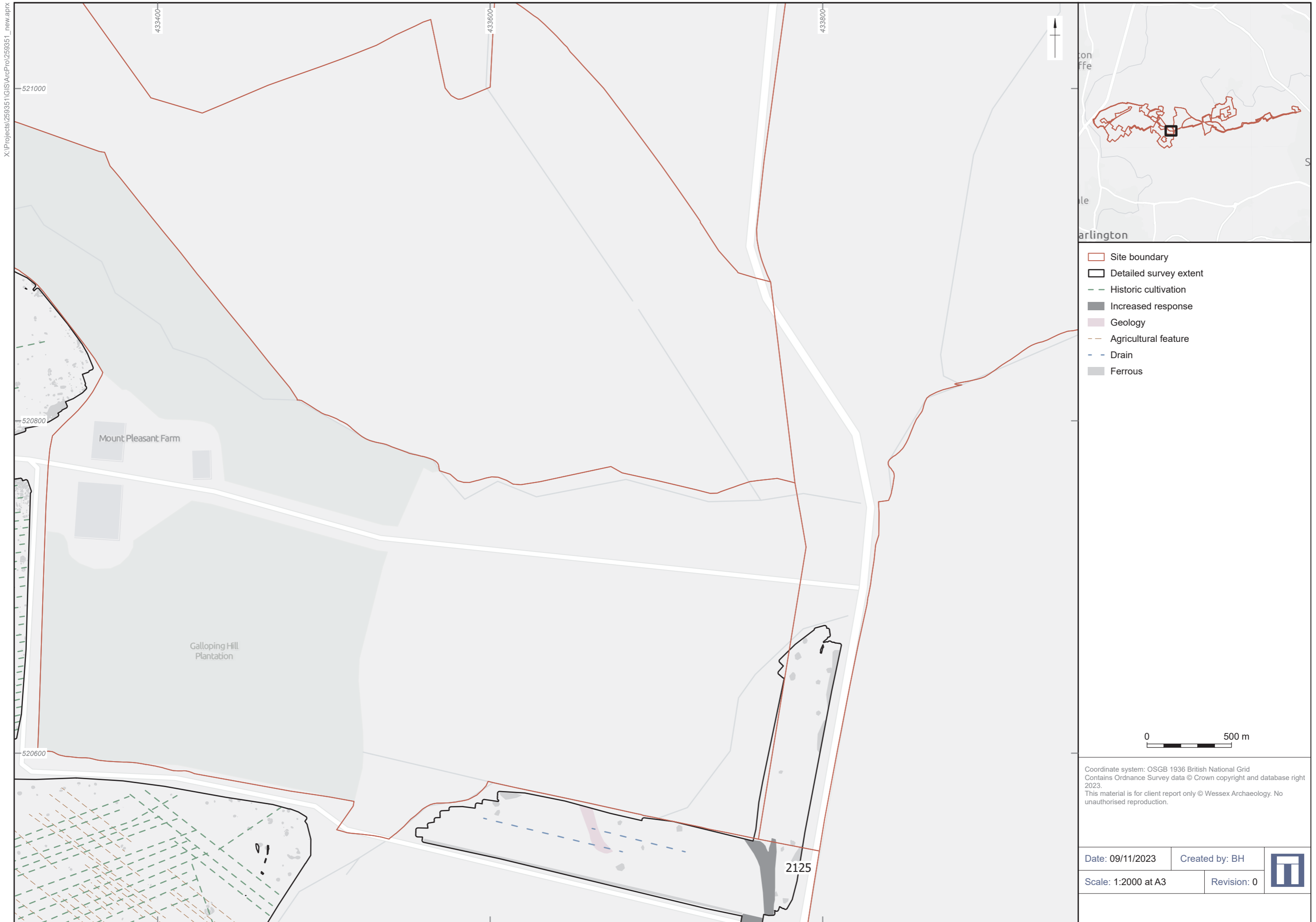


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Area 2 detailed gradiometer survey results: greyscale plot





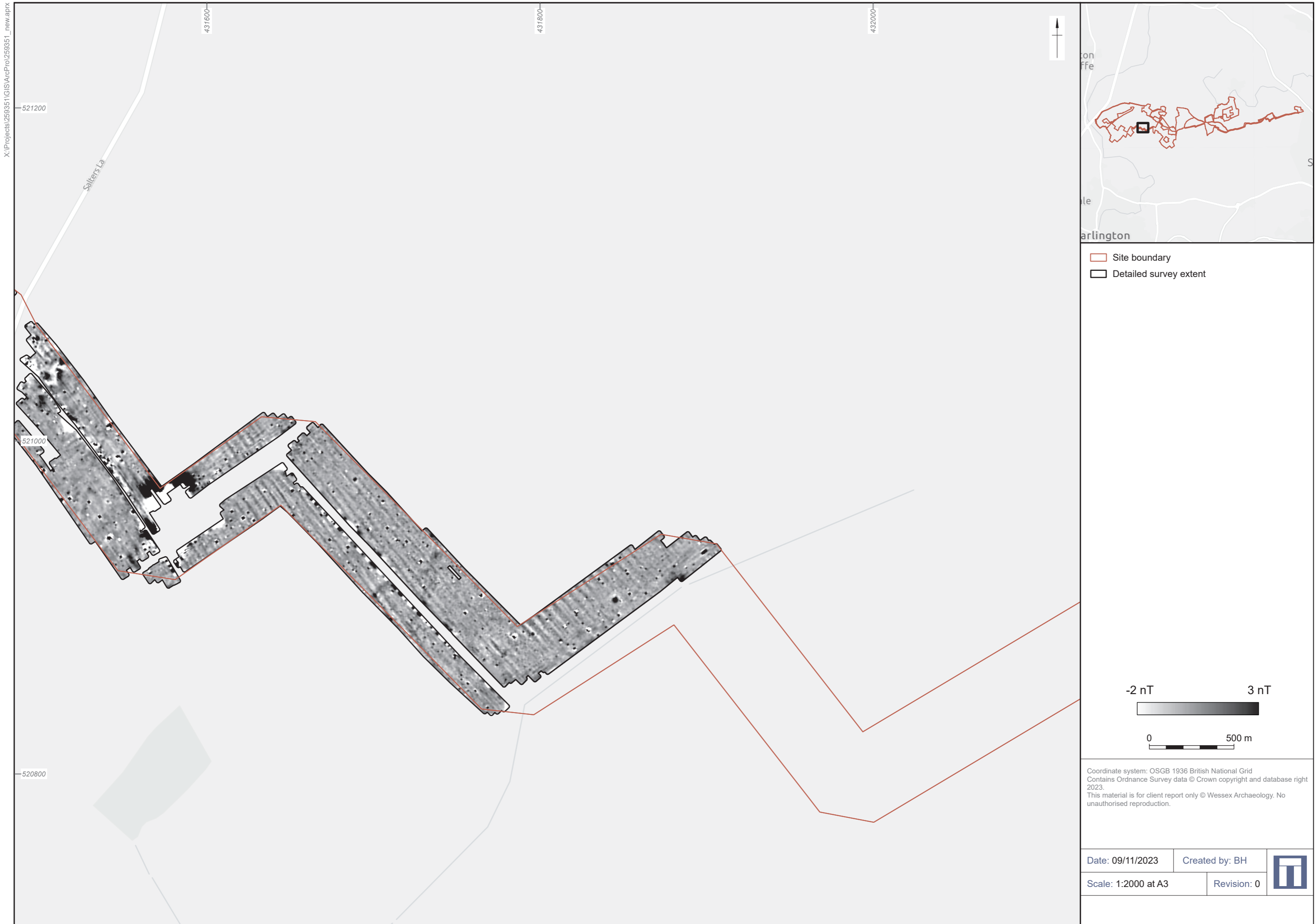
Area 2 detailed gradiometer survey results: interpretation

Figure 41

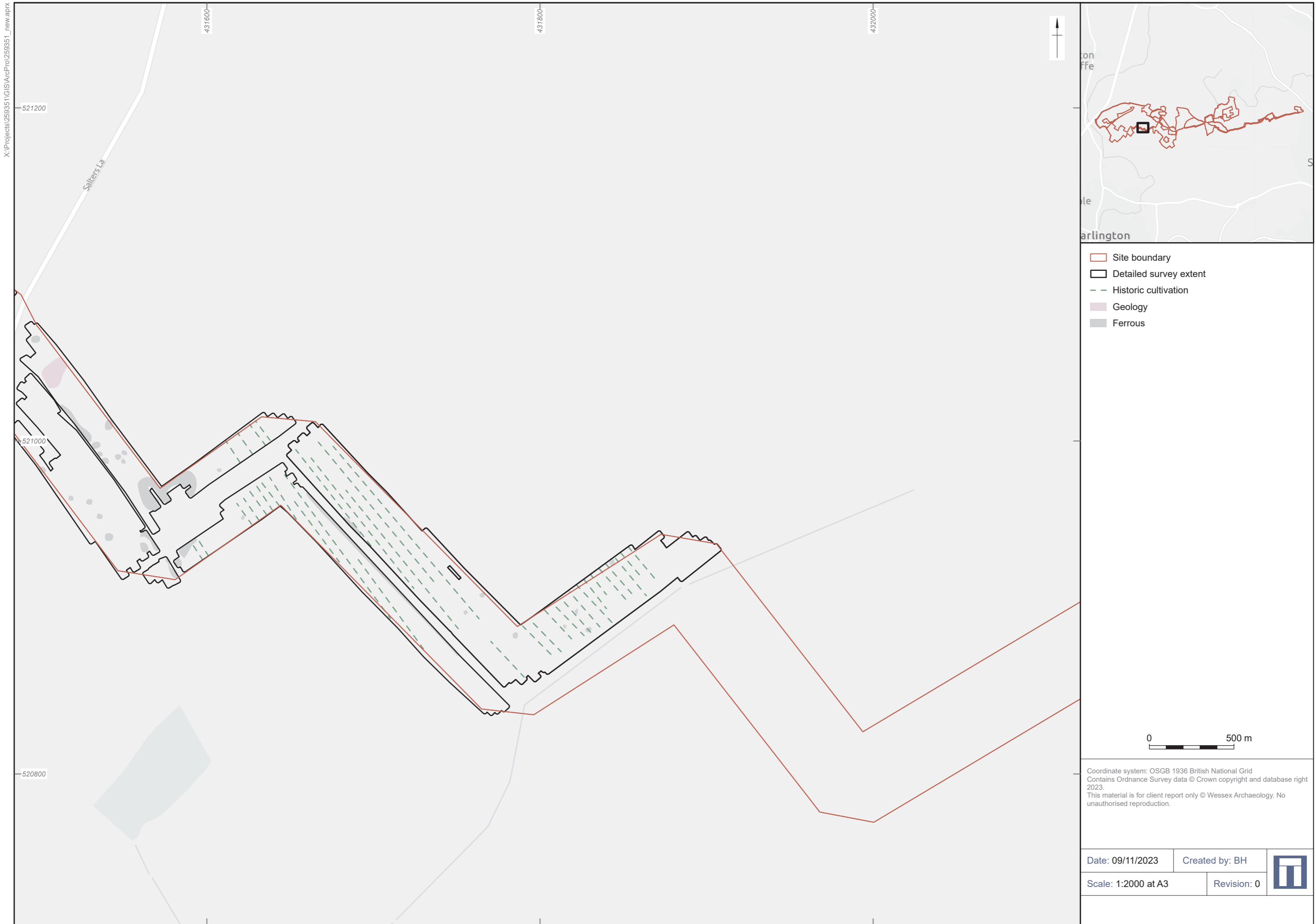
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Area 2 detailed gradiometer survey results: greyscale plot

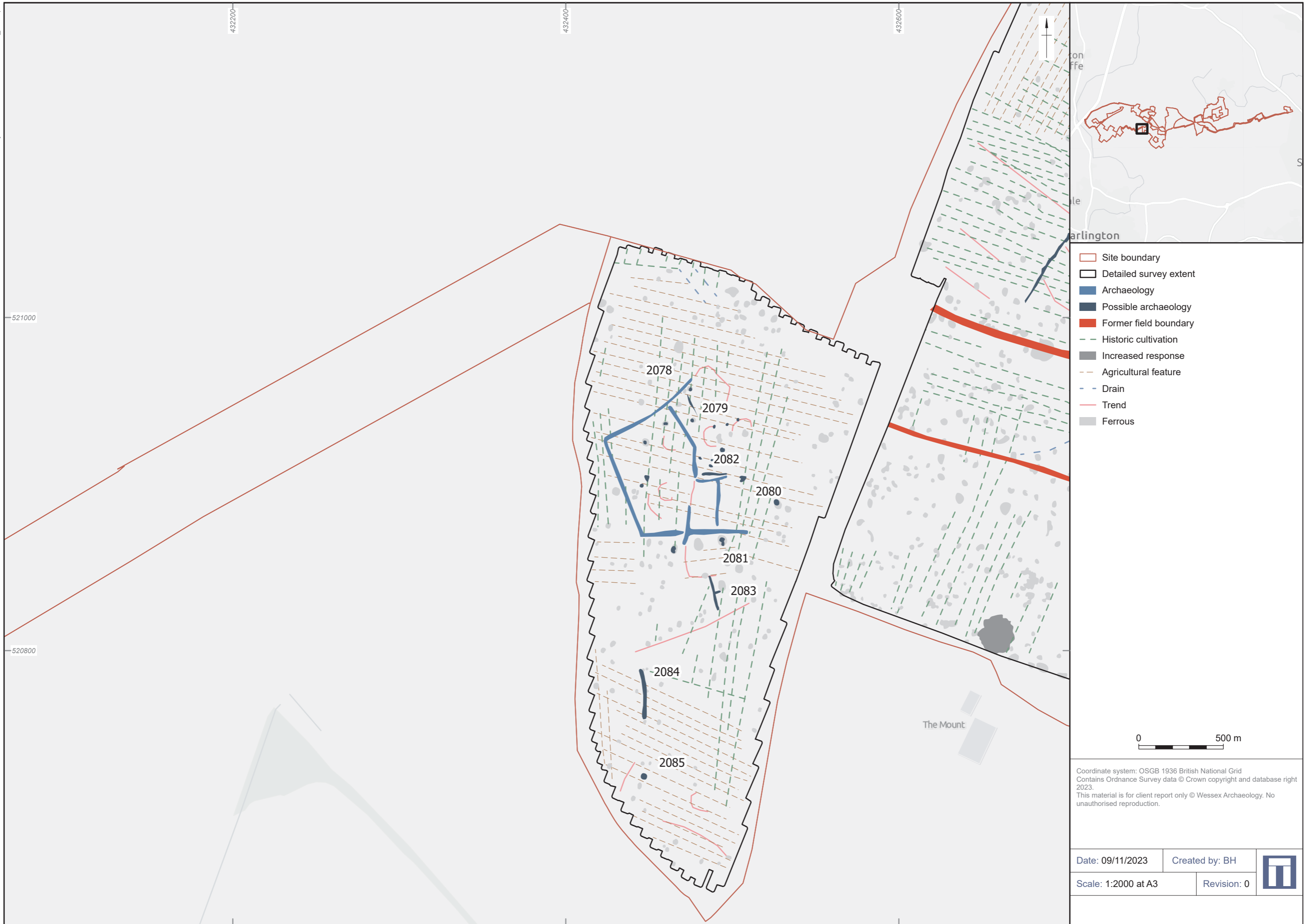


Area 2 detailed gradiometer survey results: interpretation



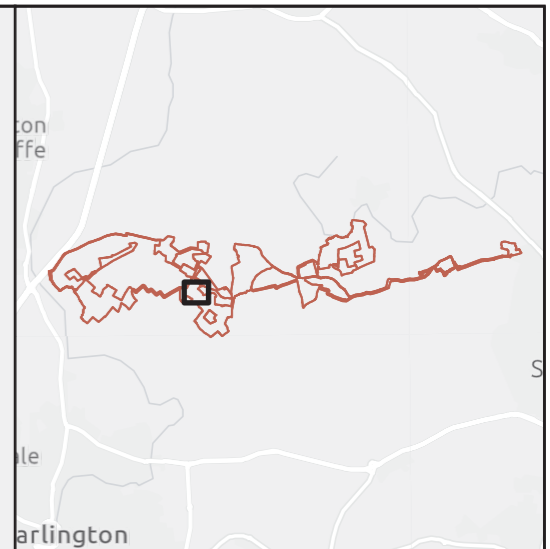
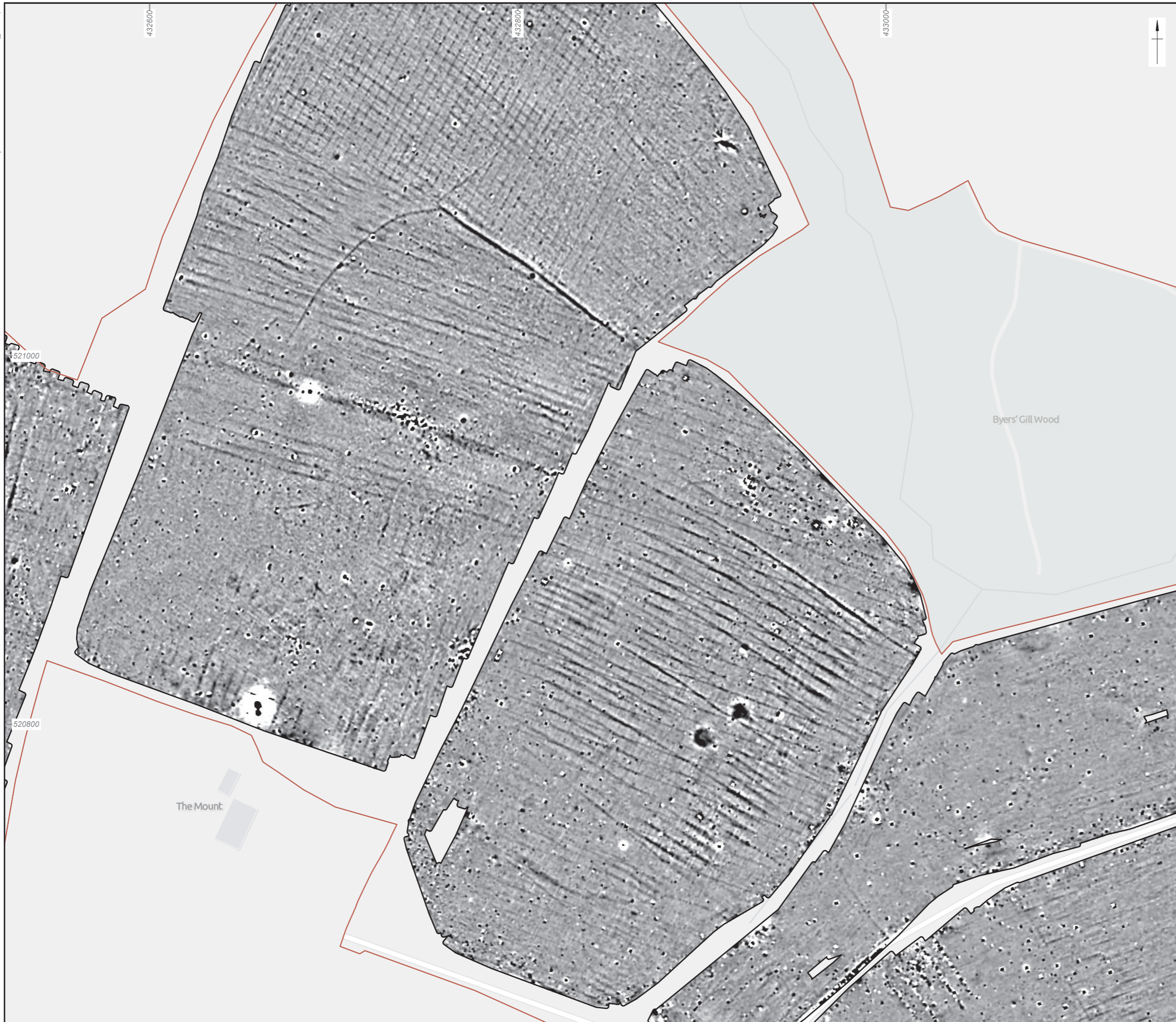


Area 2 detailed gradiometer survey results: greyscale plot

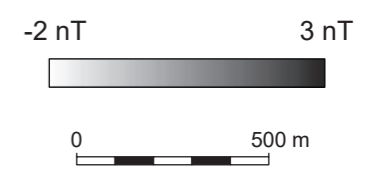


Area 2 detailed gradiometer survey results: interpretation





- Site boundary
- Detailed survey extent

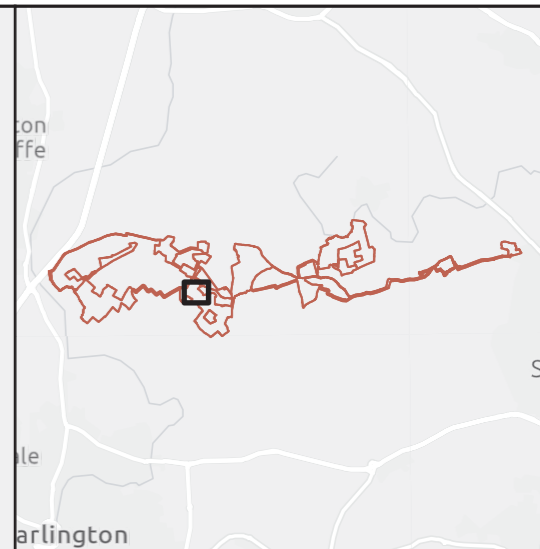
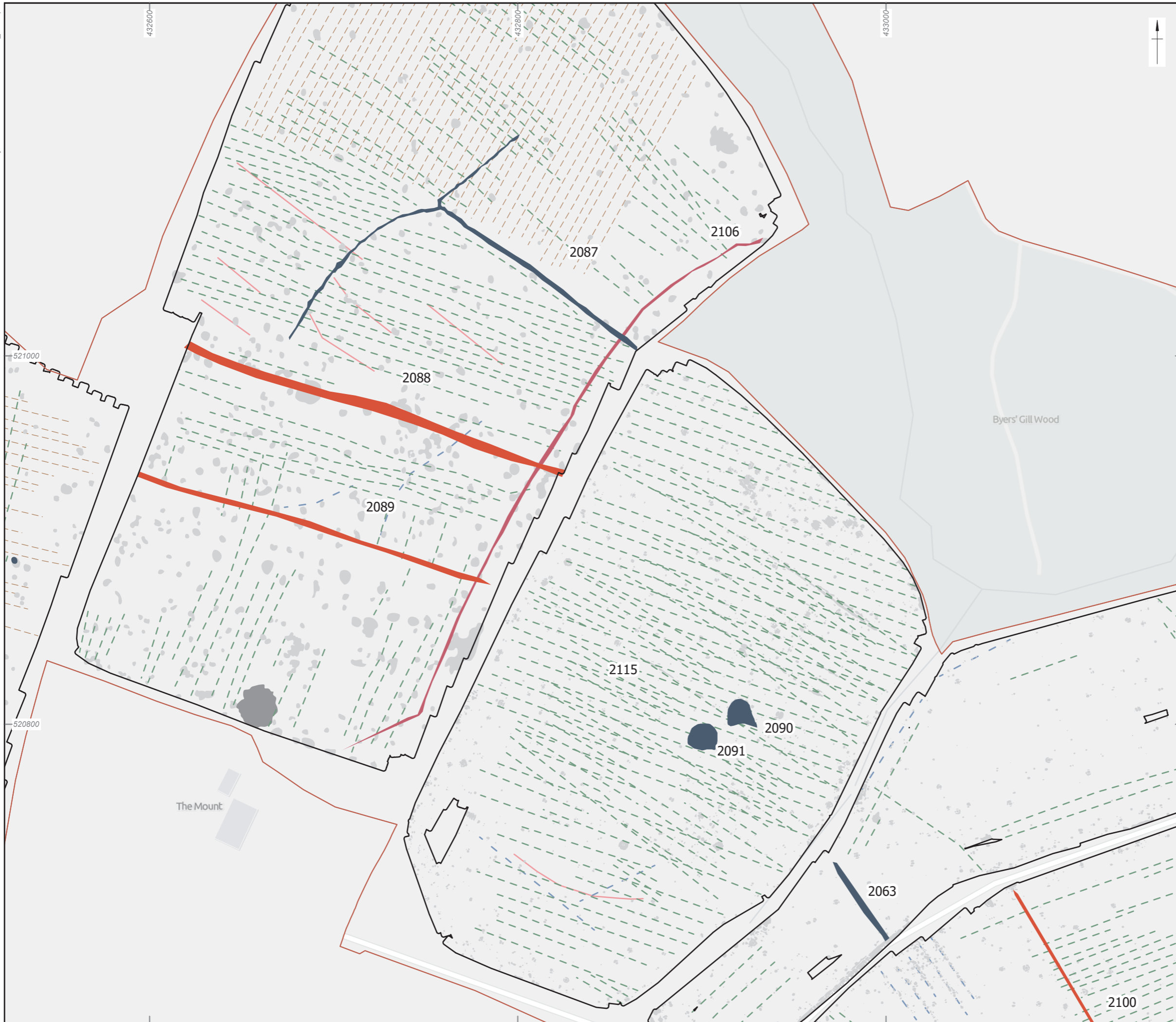


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Area 2 detailed gradiometer survey results: greyscale plot






- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Increased response
- Agricultural feature
- Drain
- Trend
- Ferrous



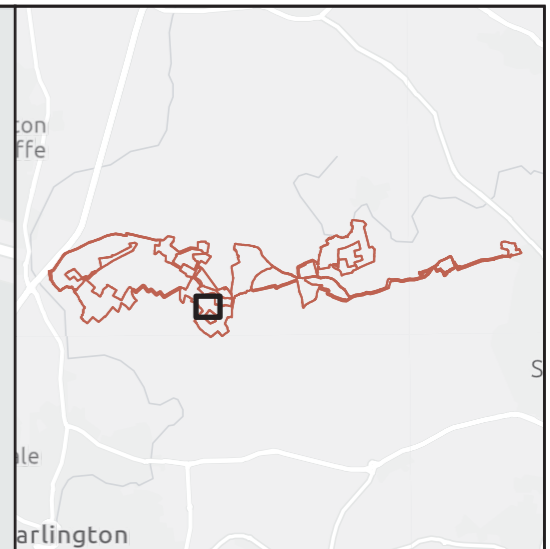
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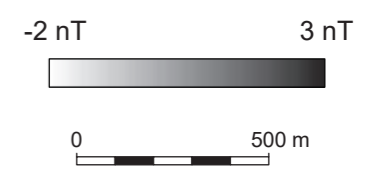
Area 2 detailed gradiometer survey results: interpretation



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- ▭ Site boundary
- Detailed survey extent

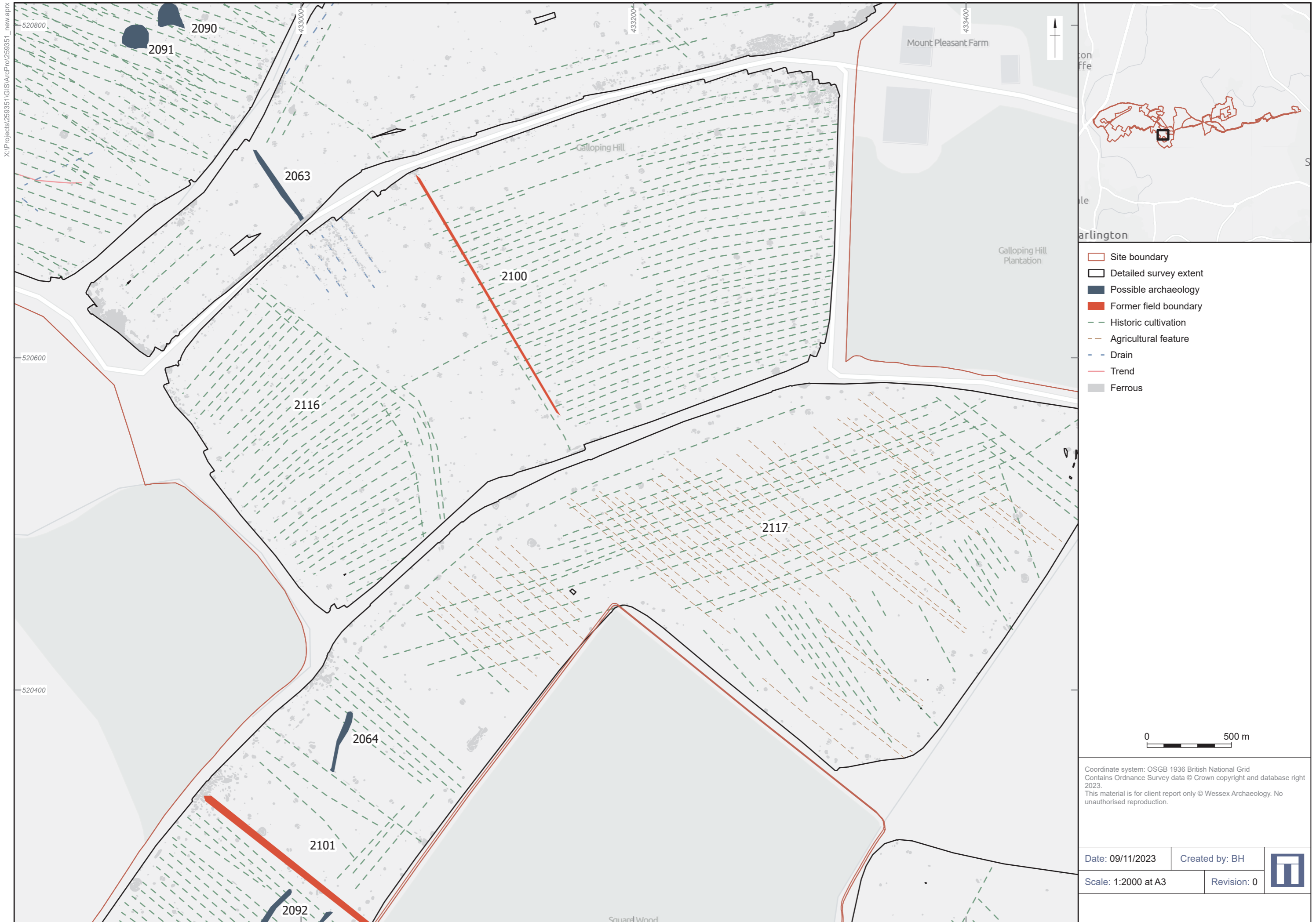


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Area 2 detailed gradiometer survey results: greyscale plot

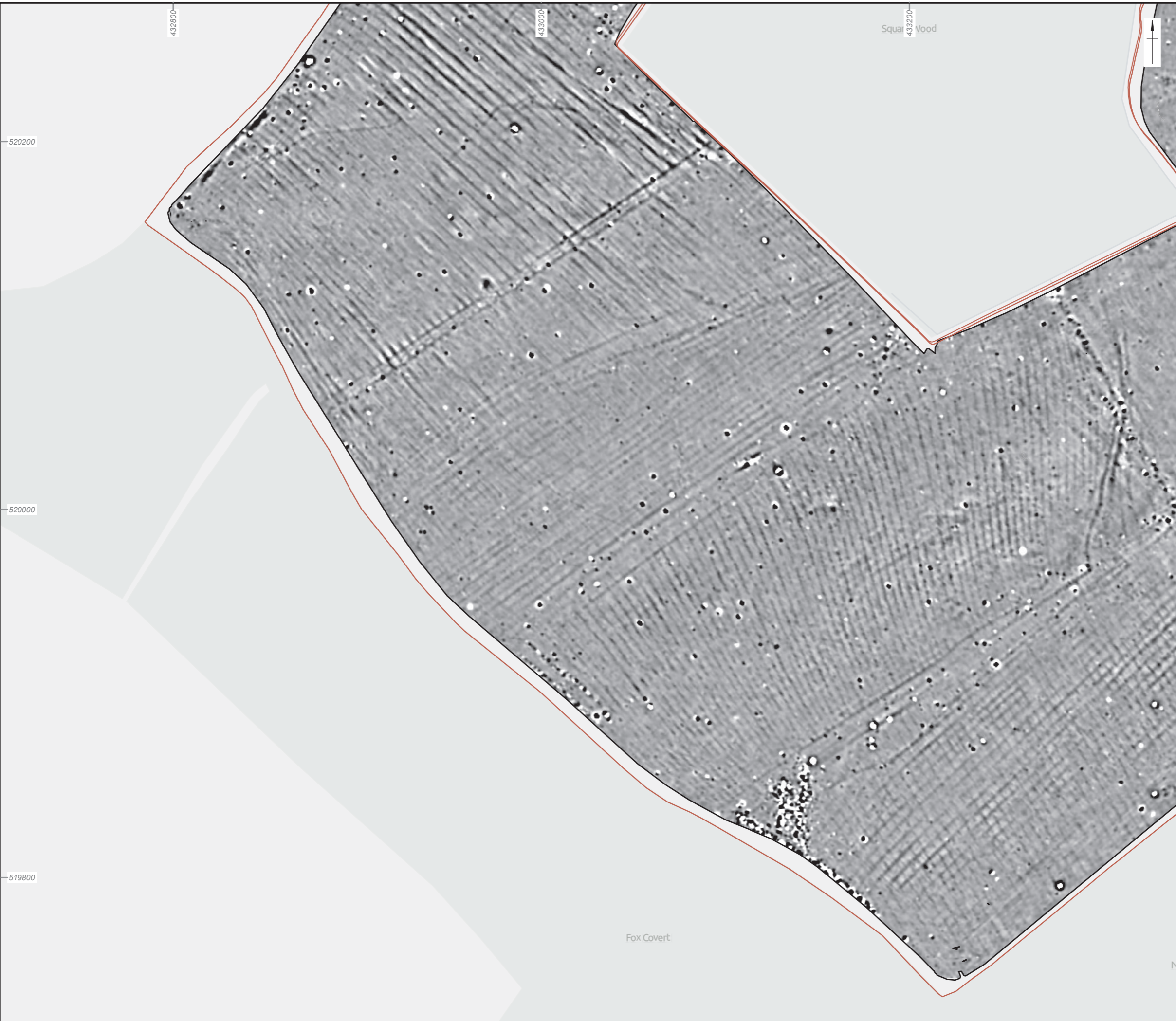




Area 2 detailed gradiometer survey results: interpretation



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520200

520000

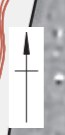
519800

432800

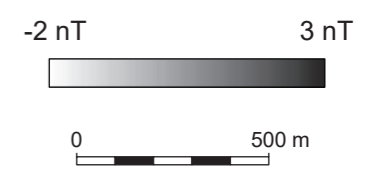
433000

Square Wood  
433200

Fox Covert



- Site boundary
- Detailed survey extent



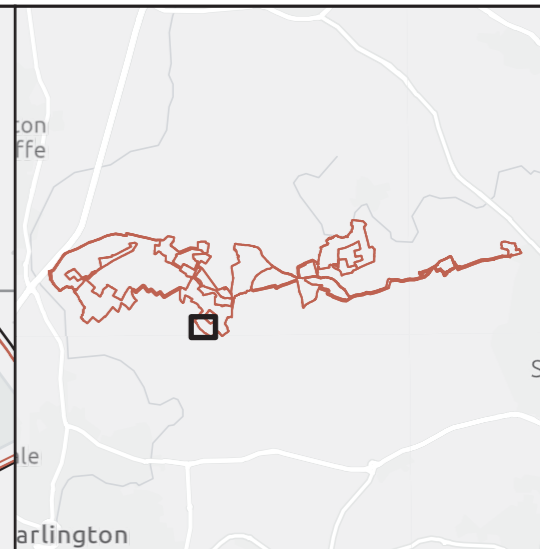
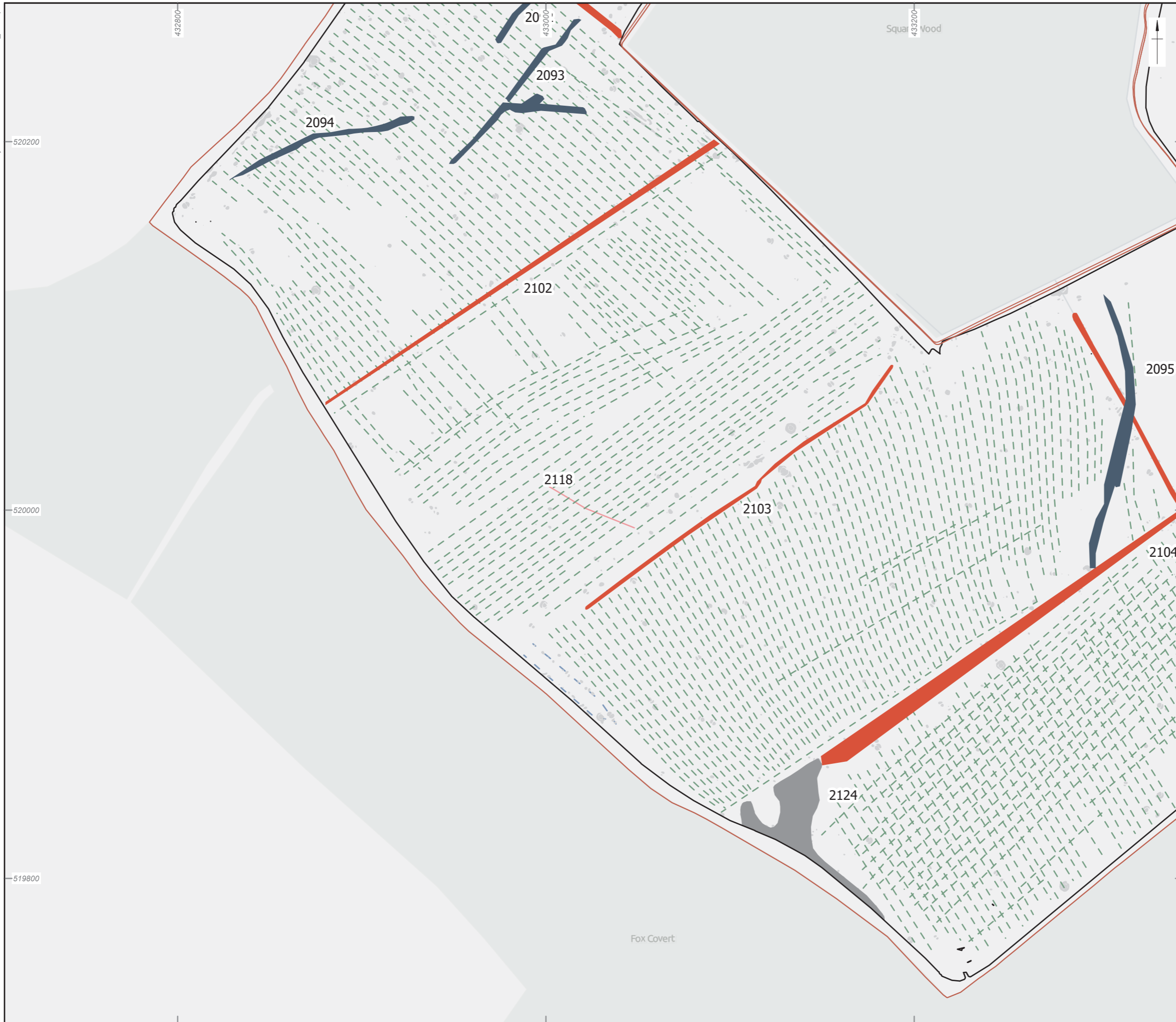
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Area 2 detailed gradiometer survey results: greyscale plot




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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Drain
- Trend
- Ferrous

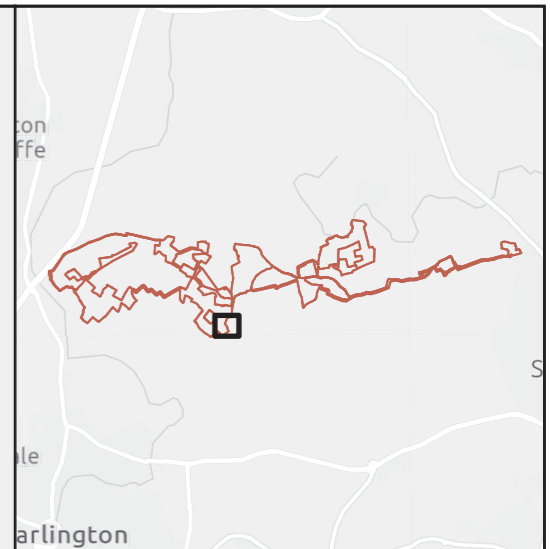


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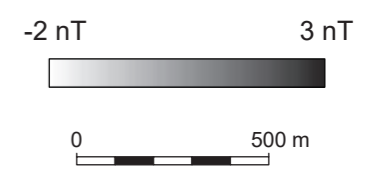
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Area 2 detailed gradiometer survey results: interpretation


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- Site boundary
- Detailed survey extent

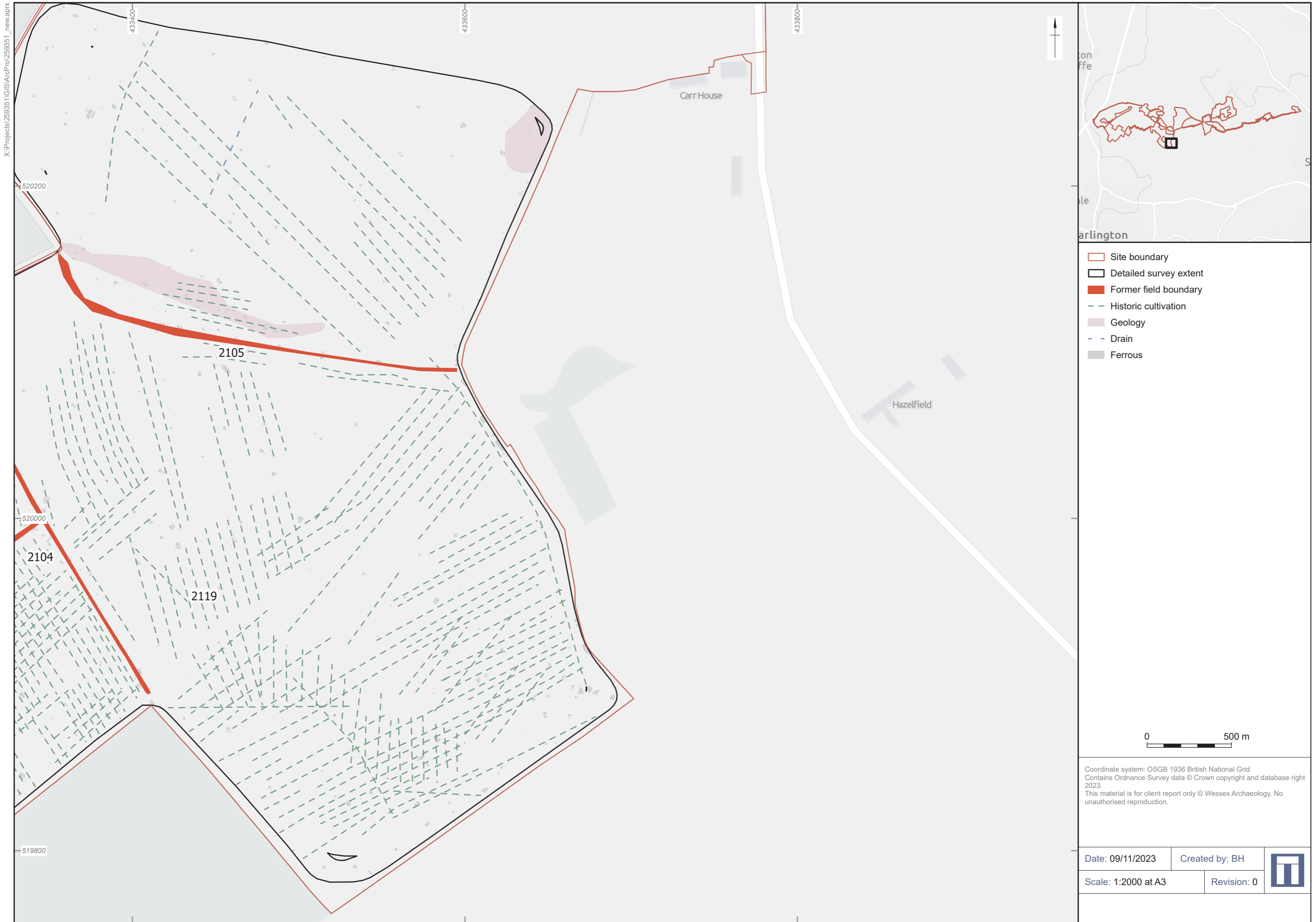


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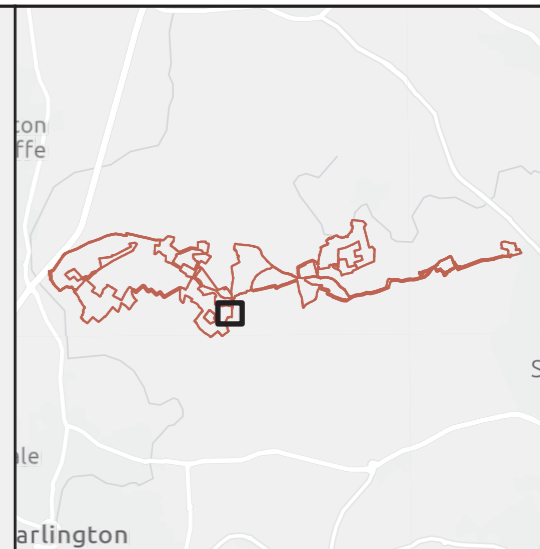
Area 2 detailed gradiometer survey results: greyscale plot



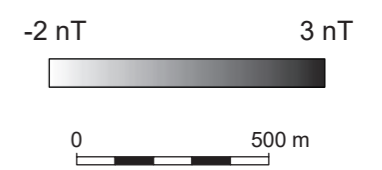


Area 2 detailed gradiometer survey results: interpretation


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- Site boundary
- Detailed survey extent



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Area 2 detailed gradiometer survey results: greyscale plot



Area 2 detailed gradiometer survey results: interpretation

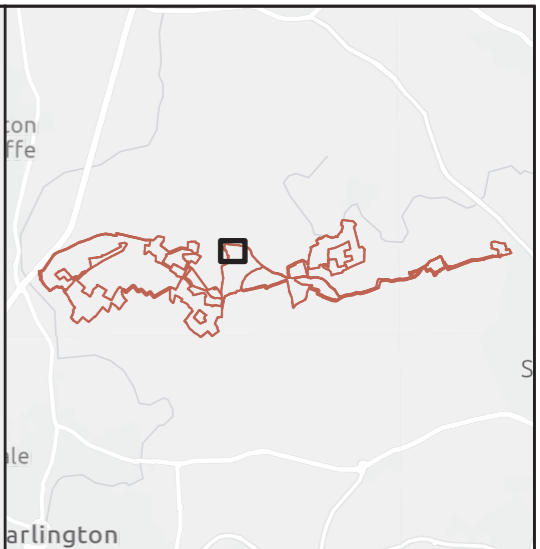
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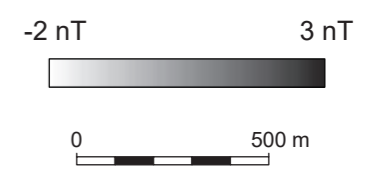




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- ▭ Site boundary
- Detailed survey extent

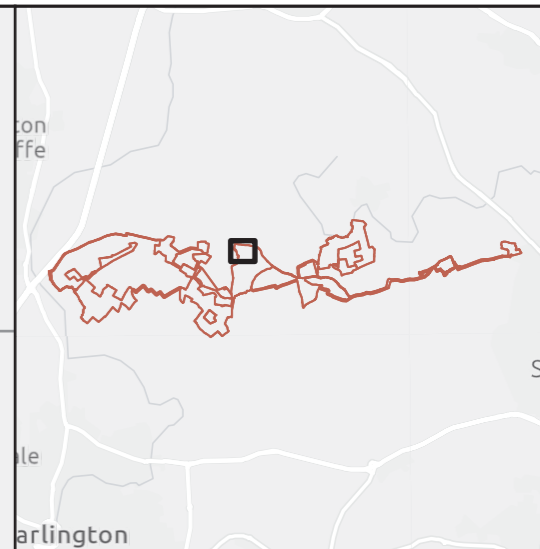
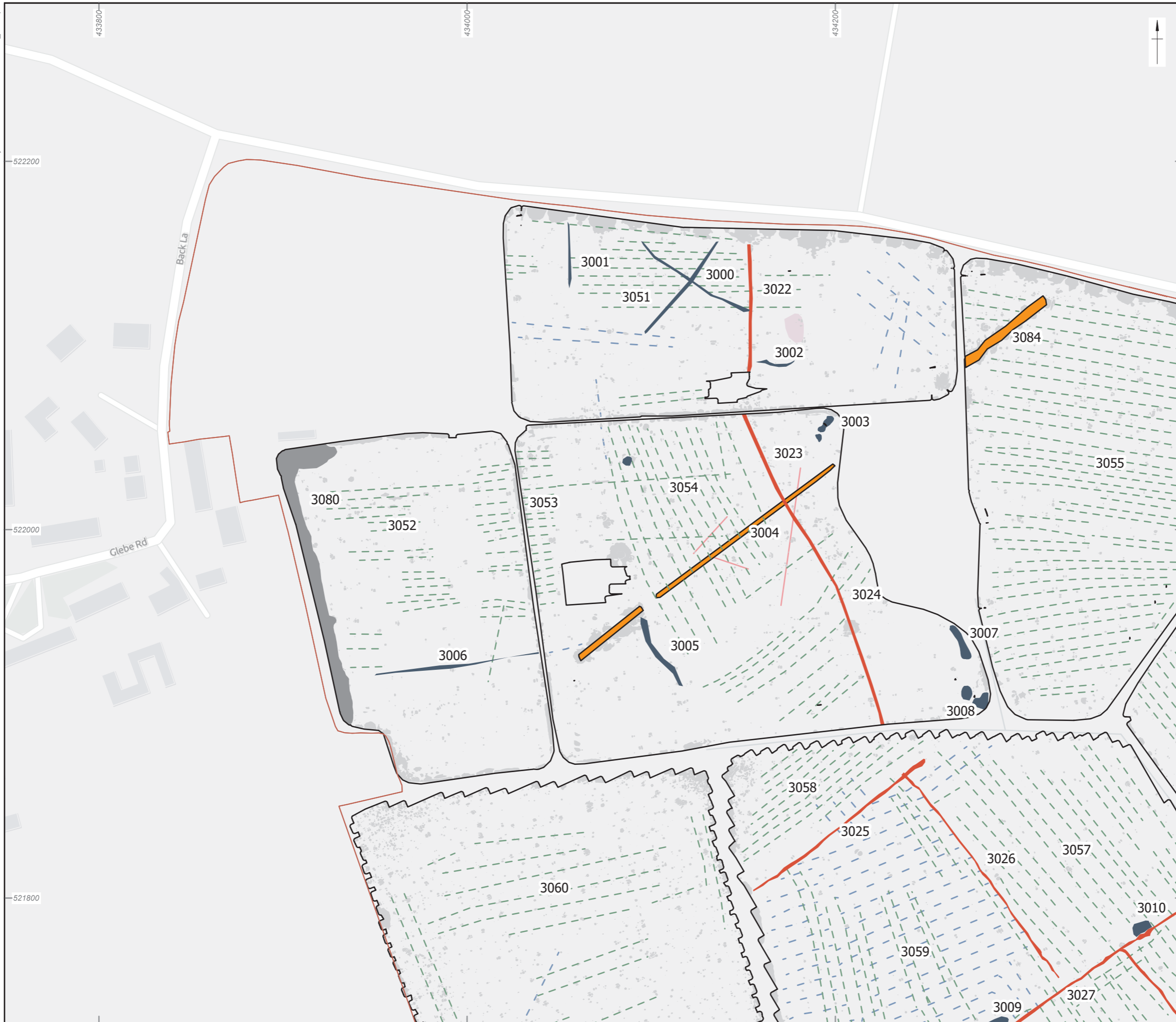


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Area 3 detailed gradiometer survey results: greyscale plot






- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Geology
- Drain
- Trend
- Modern service
- Ferrous



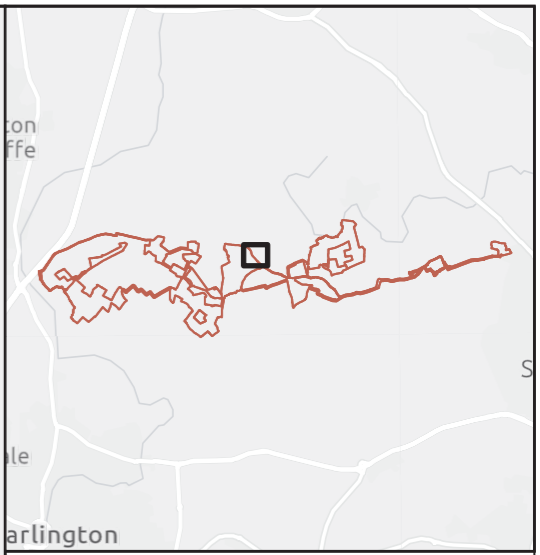
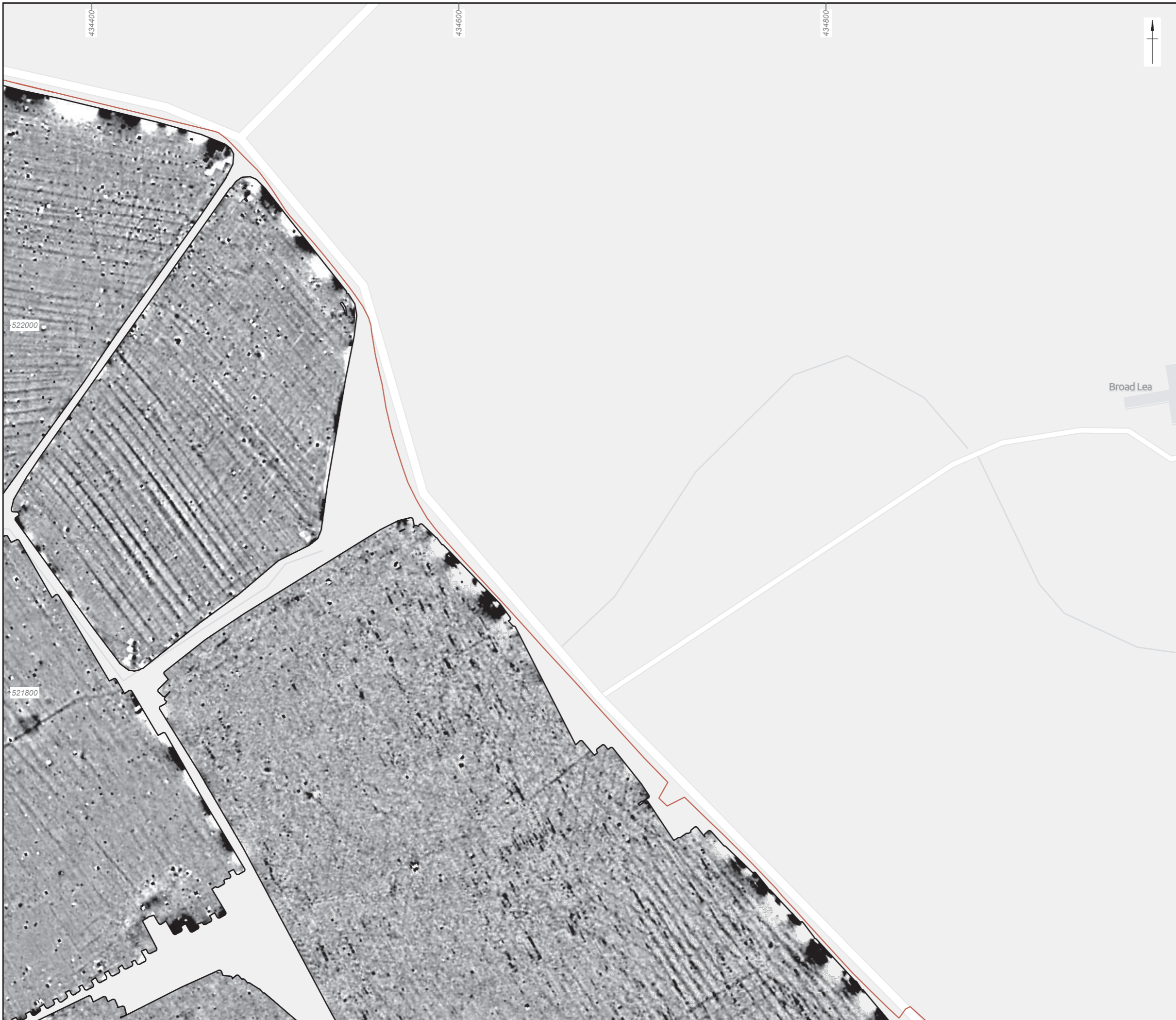
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Area 3 detailed gradiometer survey results: interpretation

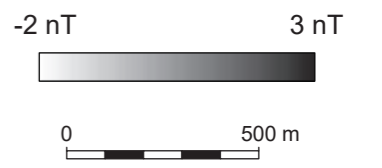


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- ▭ Site boundary
- Detailed survey extent

Broad Lea



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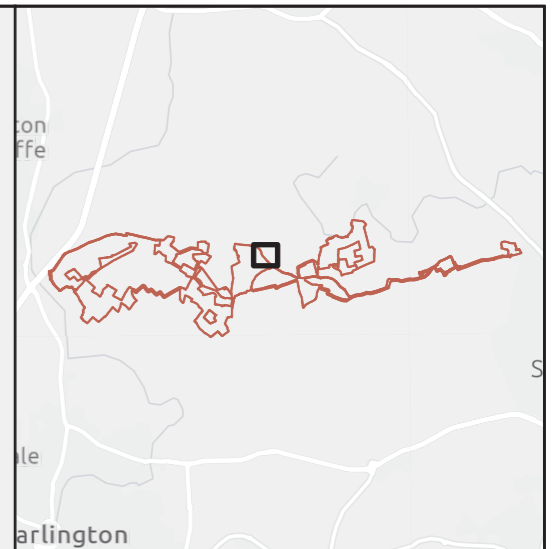
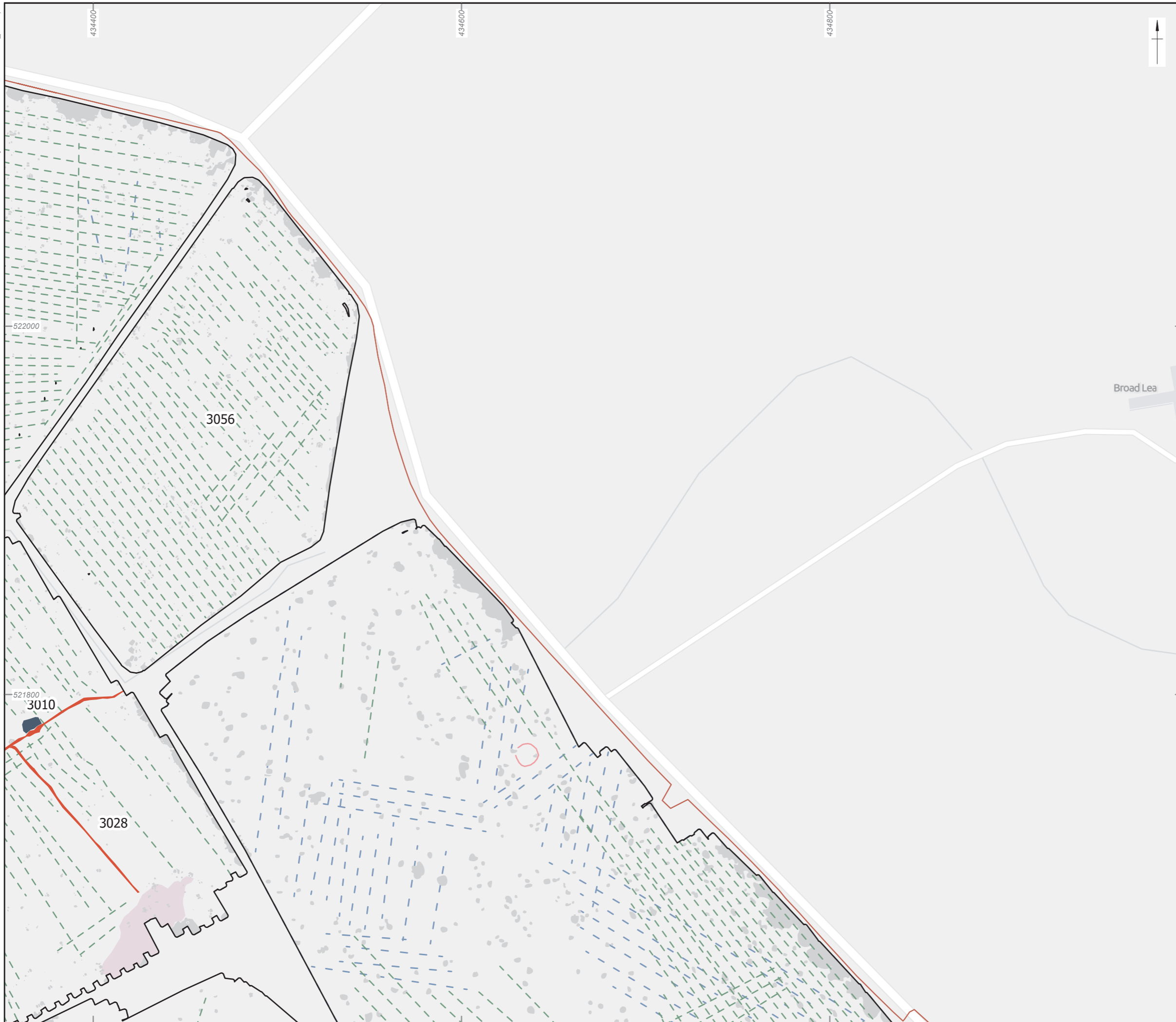
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Area 3 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Geology
- Drain
- Trend
- Ferrous

Broad Lea

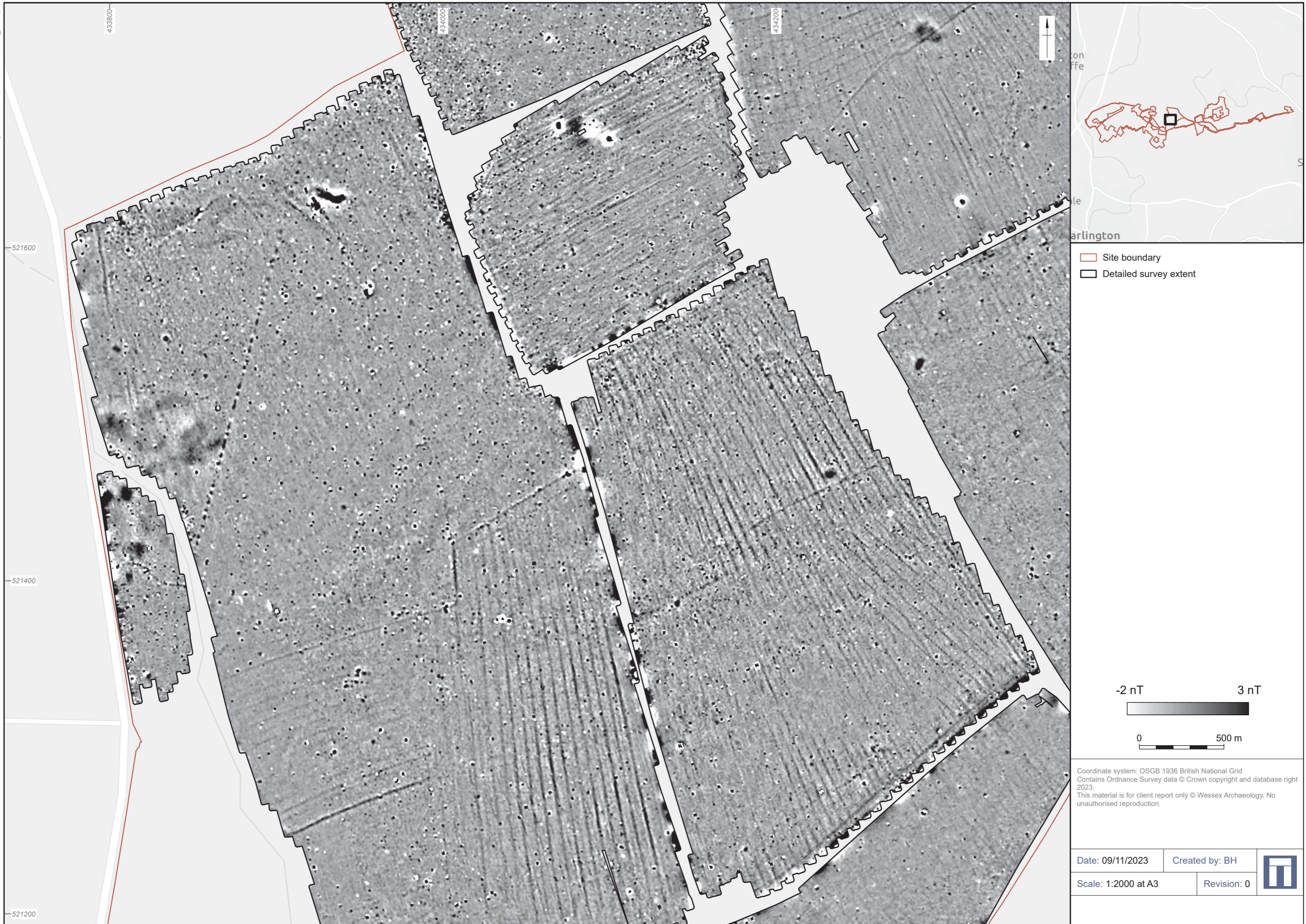


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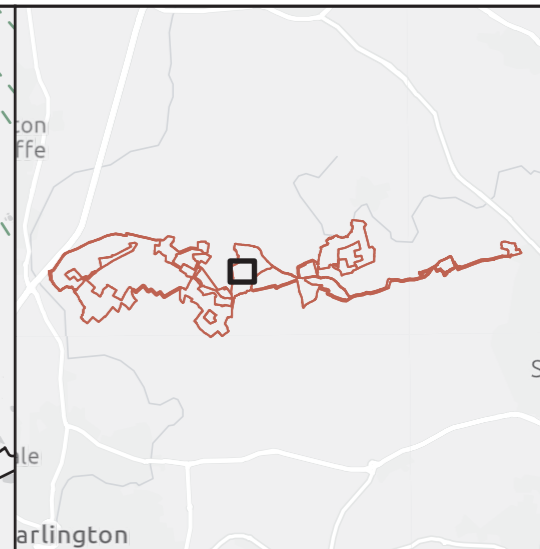
Area 3 detailed gradiometer survey results: interpretation





Area 3 detailed gradiometer survey results: greyscale plot





- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Geology
- Agricultural feature
- Drain
- Trend
- Ferrous



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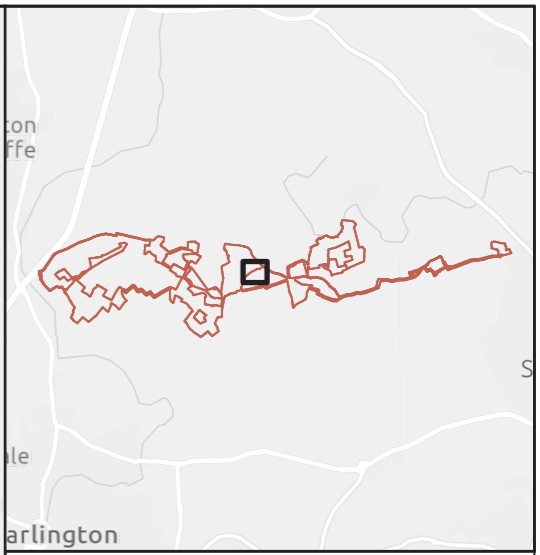
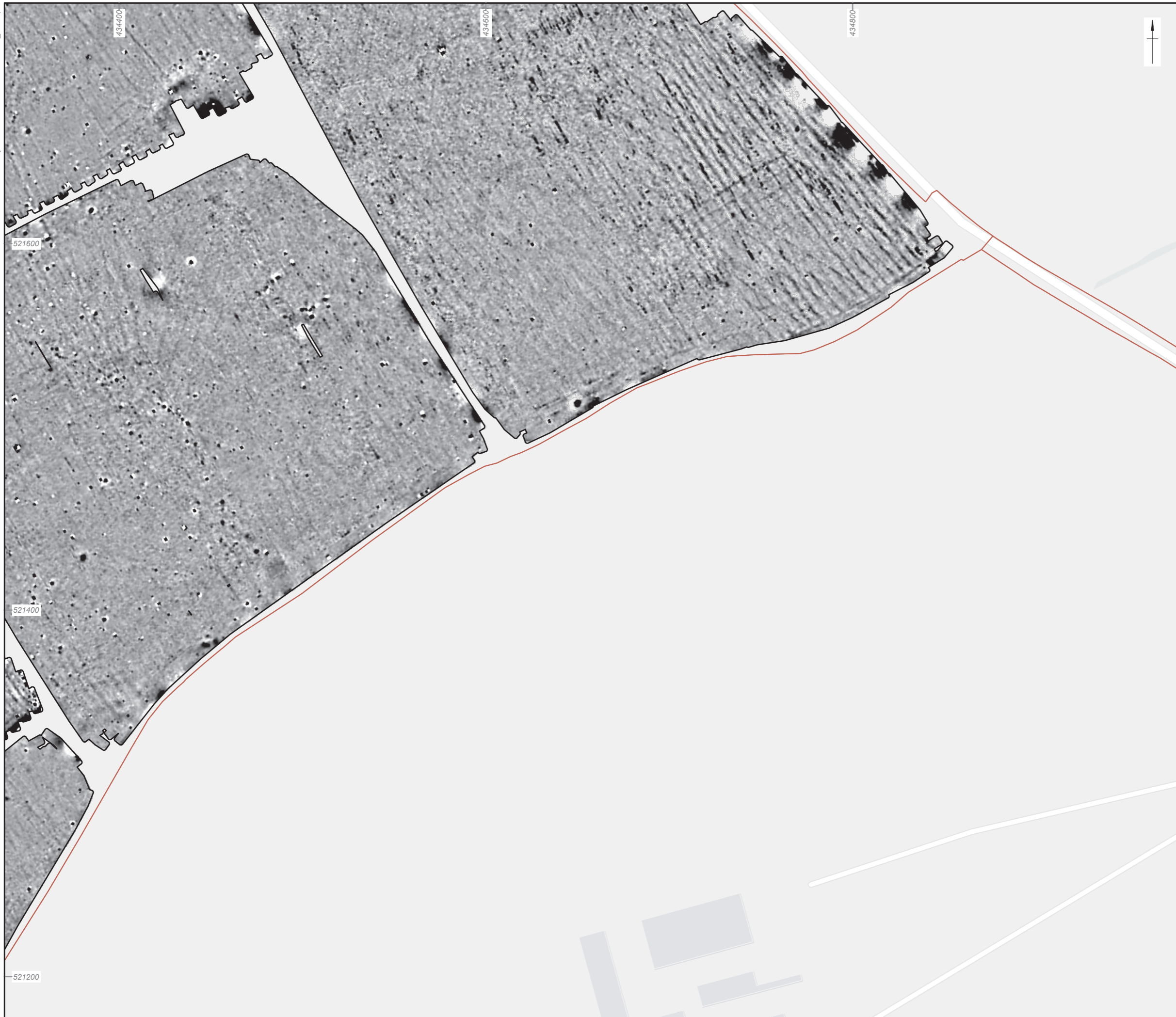
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Area 3 detailed gradiometer survey results: interpretation

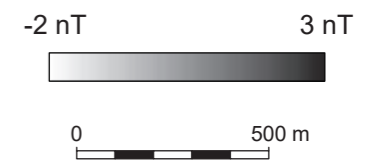
Figure 61



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- Site boundary
- Detailed survey extent

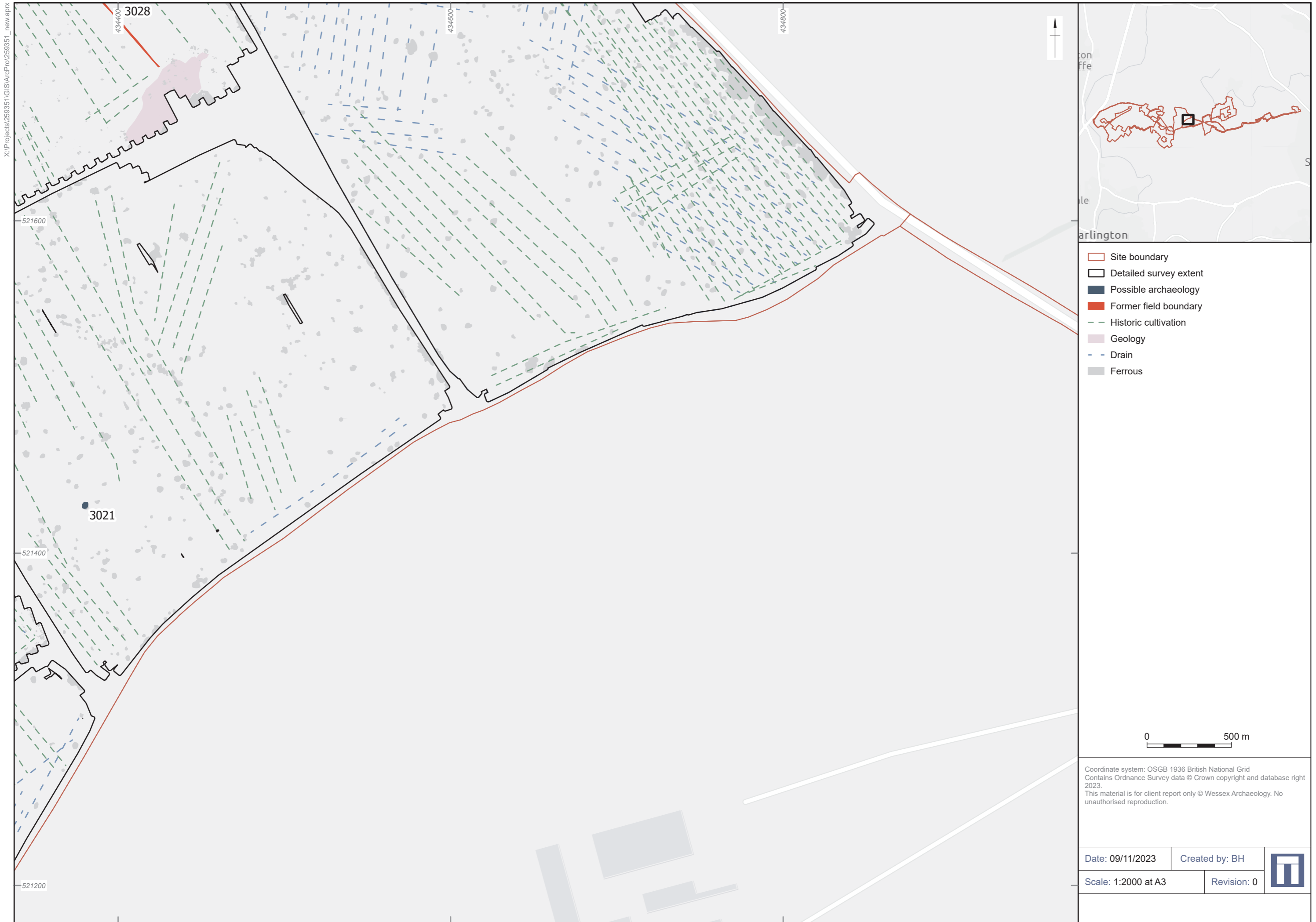


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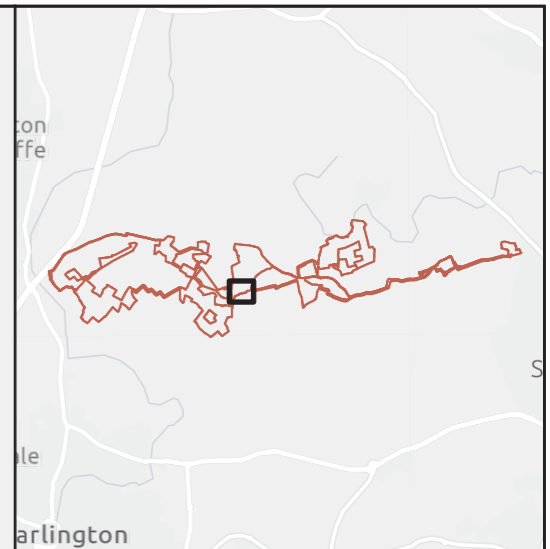
Area 3 detailed gradiometer survey results: greyscale plot



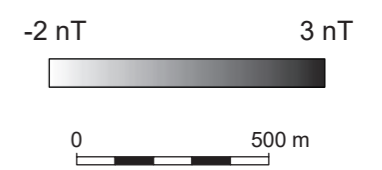


Area 3 detailed gradiometer survey results: interpretation


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- Site boundary
- Detailed survey extent



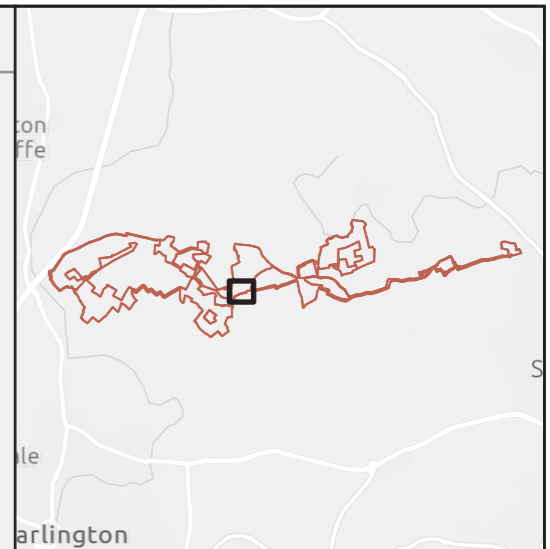
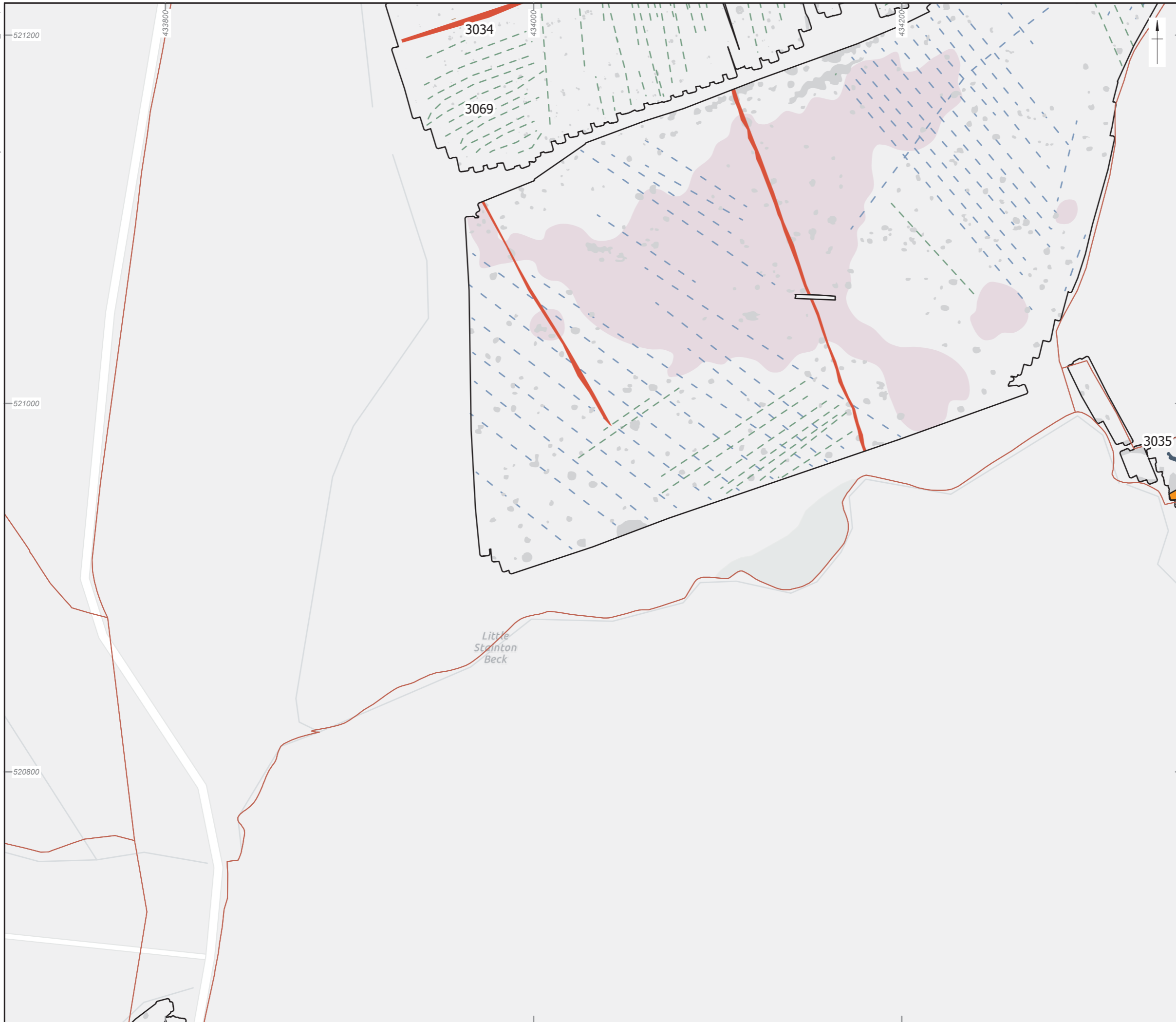
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Area 3 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Geology
- Agricultural feature
- Drain
- Modern service
- Ferrous



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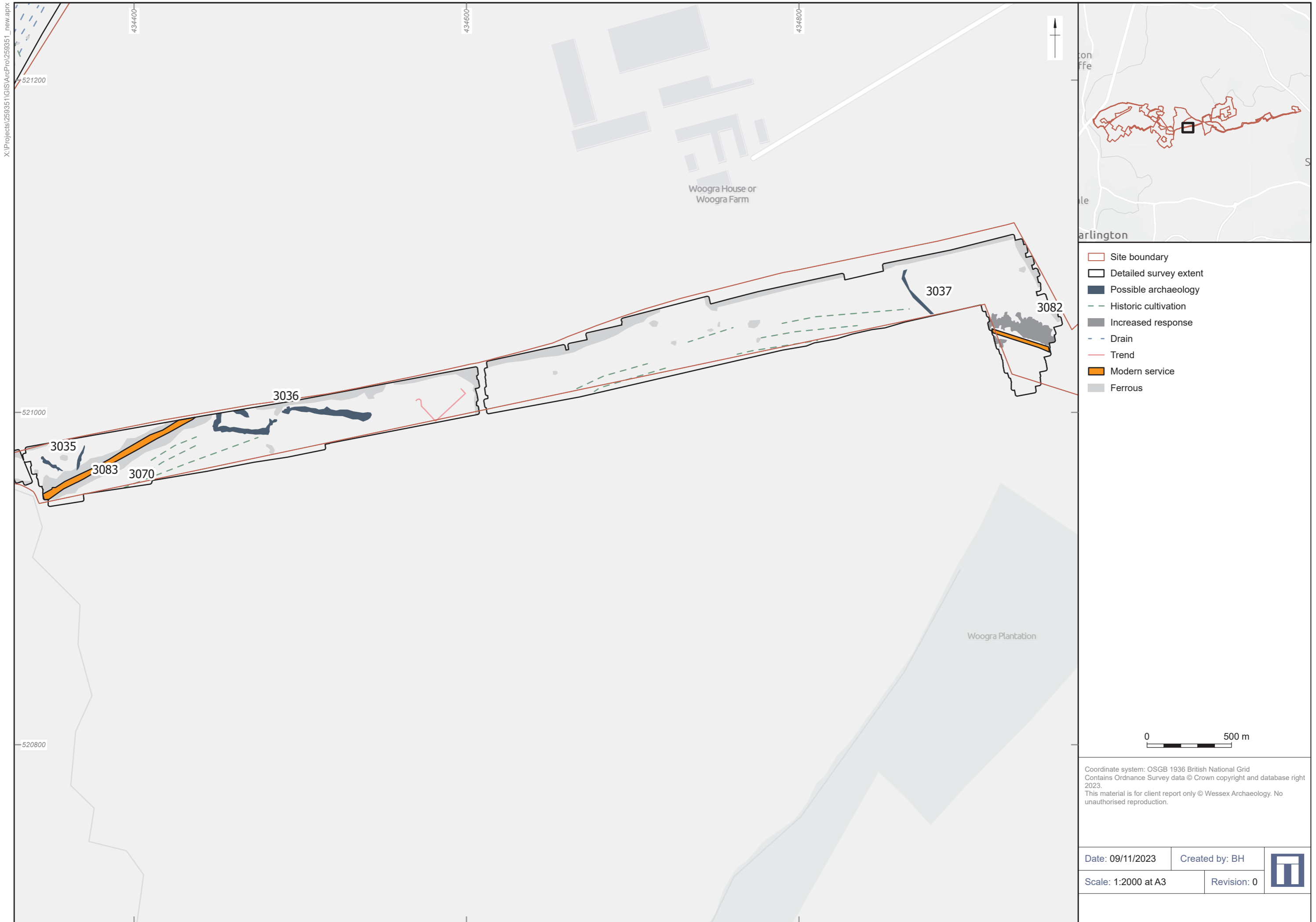
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Area 3 detailed gradiometer survey results: interpretation



Area 3 detailed gradiometer survey results: greyscale plot





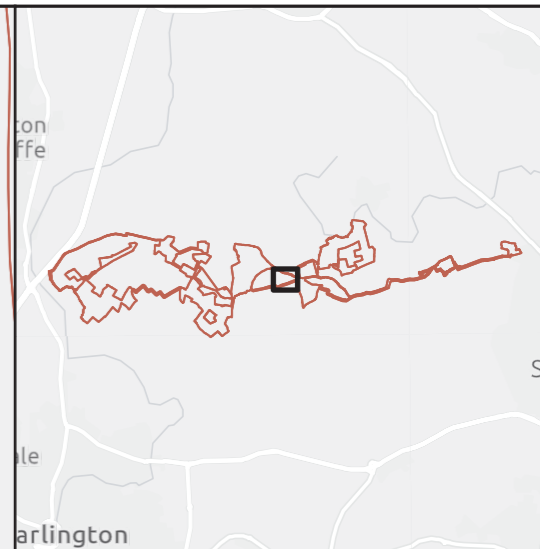
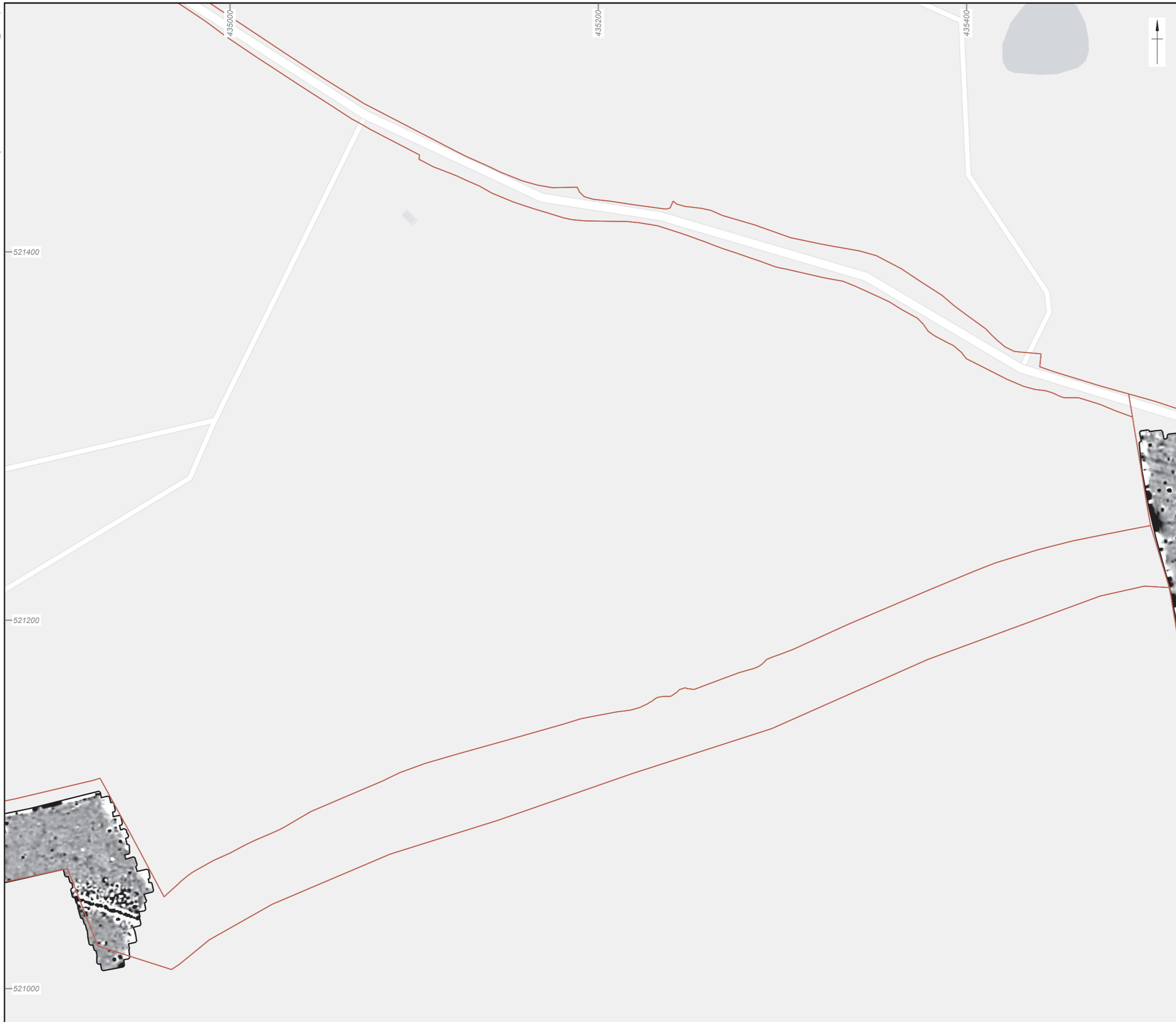
Area 3 detailed gradiometer survey results: interpretation

Figure 67

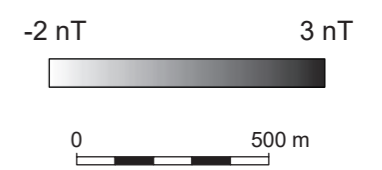
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- Site boundary
- Detailed survey extent

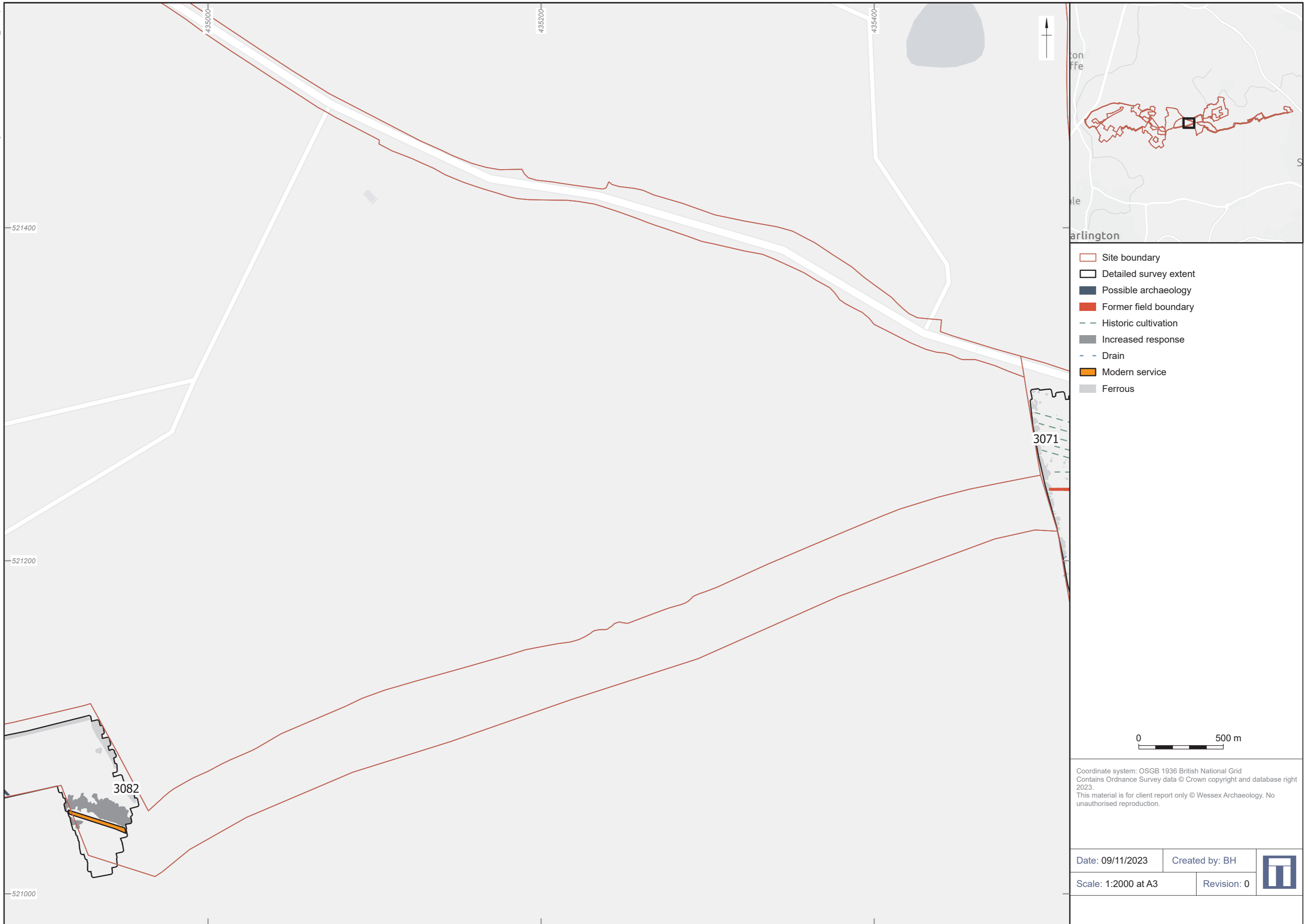


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Area 3 detailed gradiometer survey results: greyscale plot



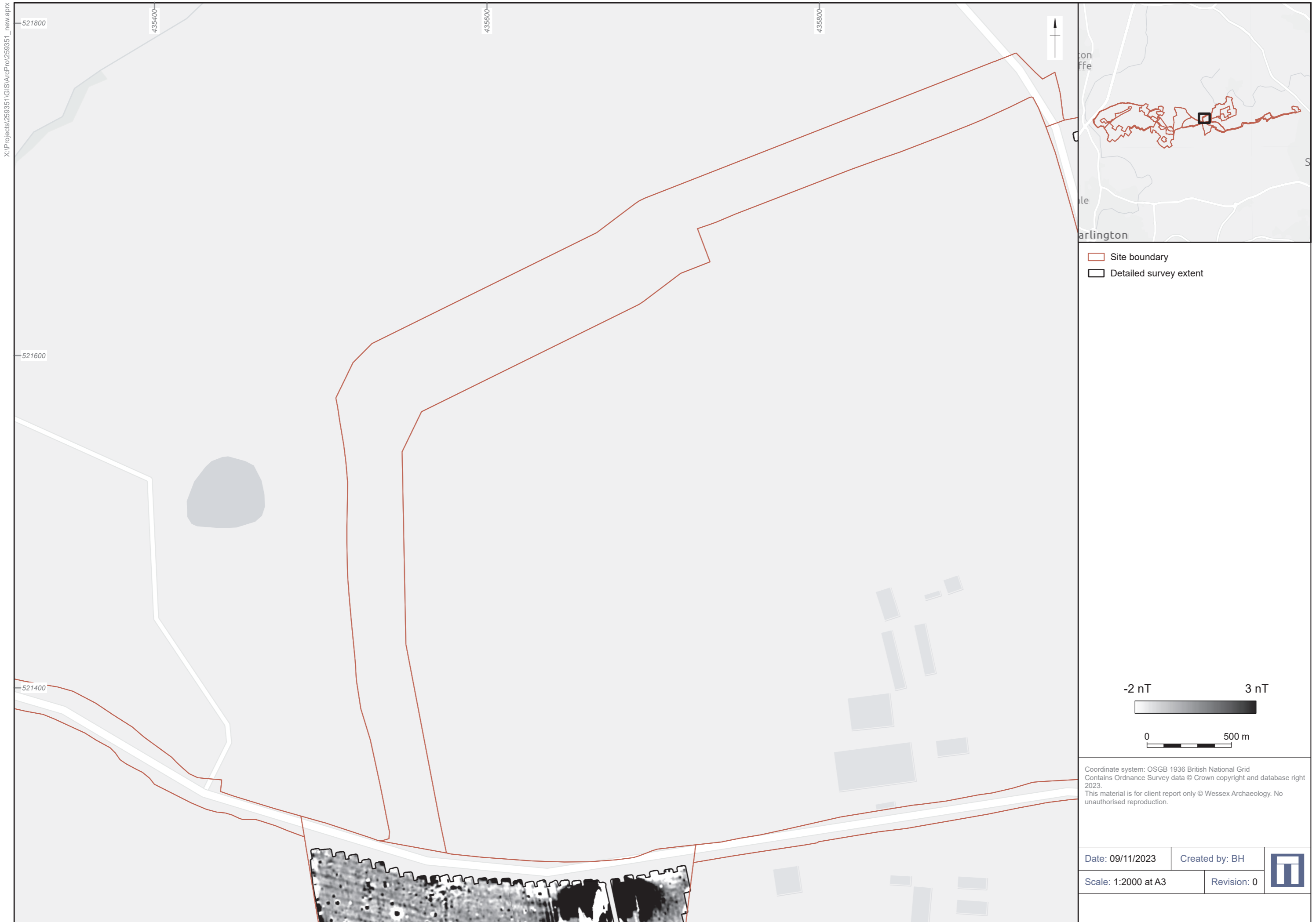


- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Drain
- Modern service
- Ferrous

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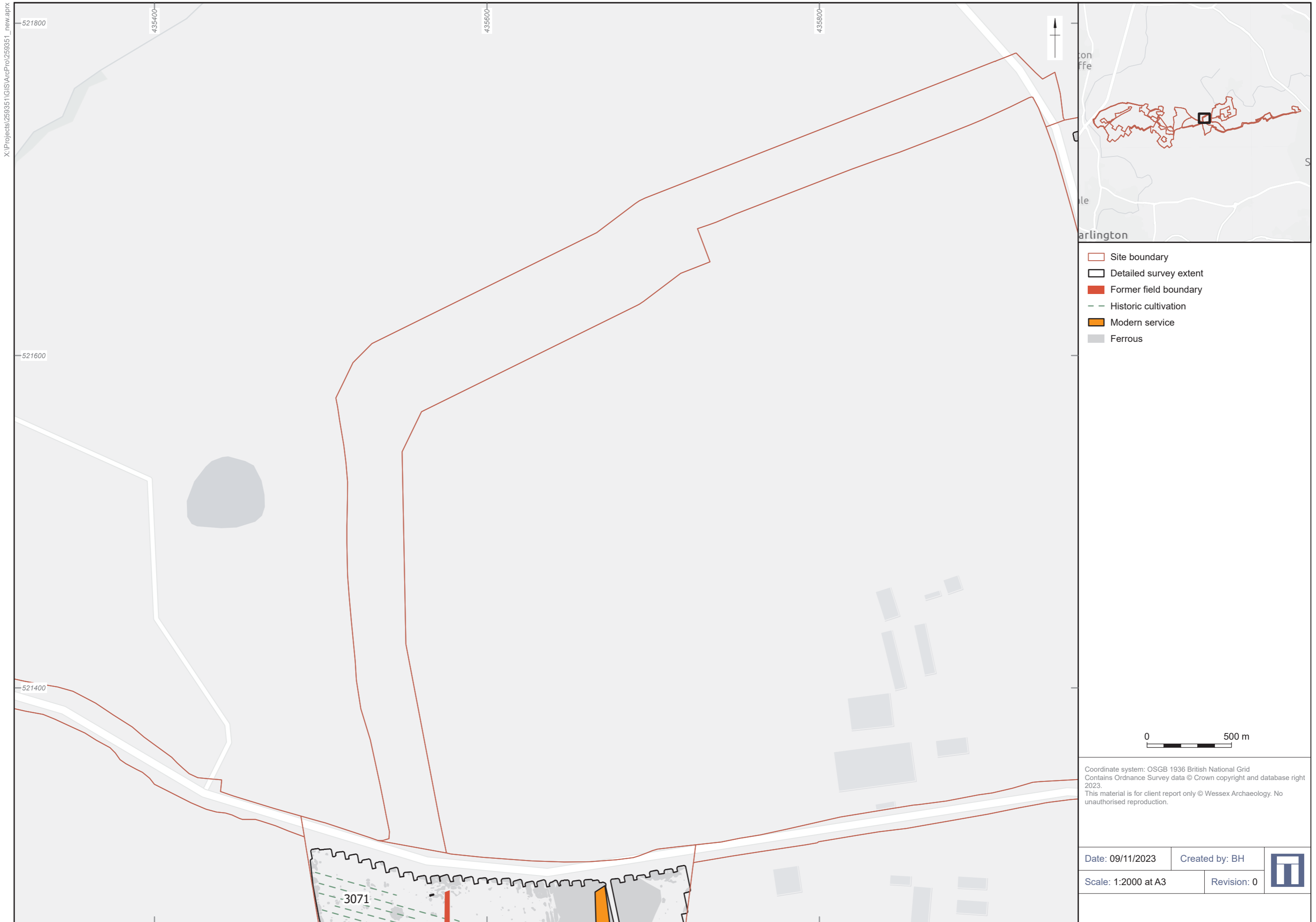
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Area 3 detailed gradiometer survey results: interpretation



Area 3 detailed gradiometer survey results: greyscale plot






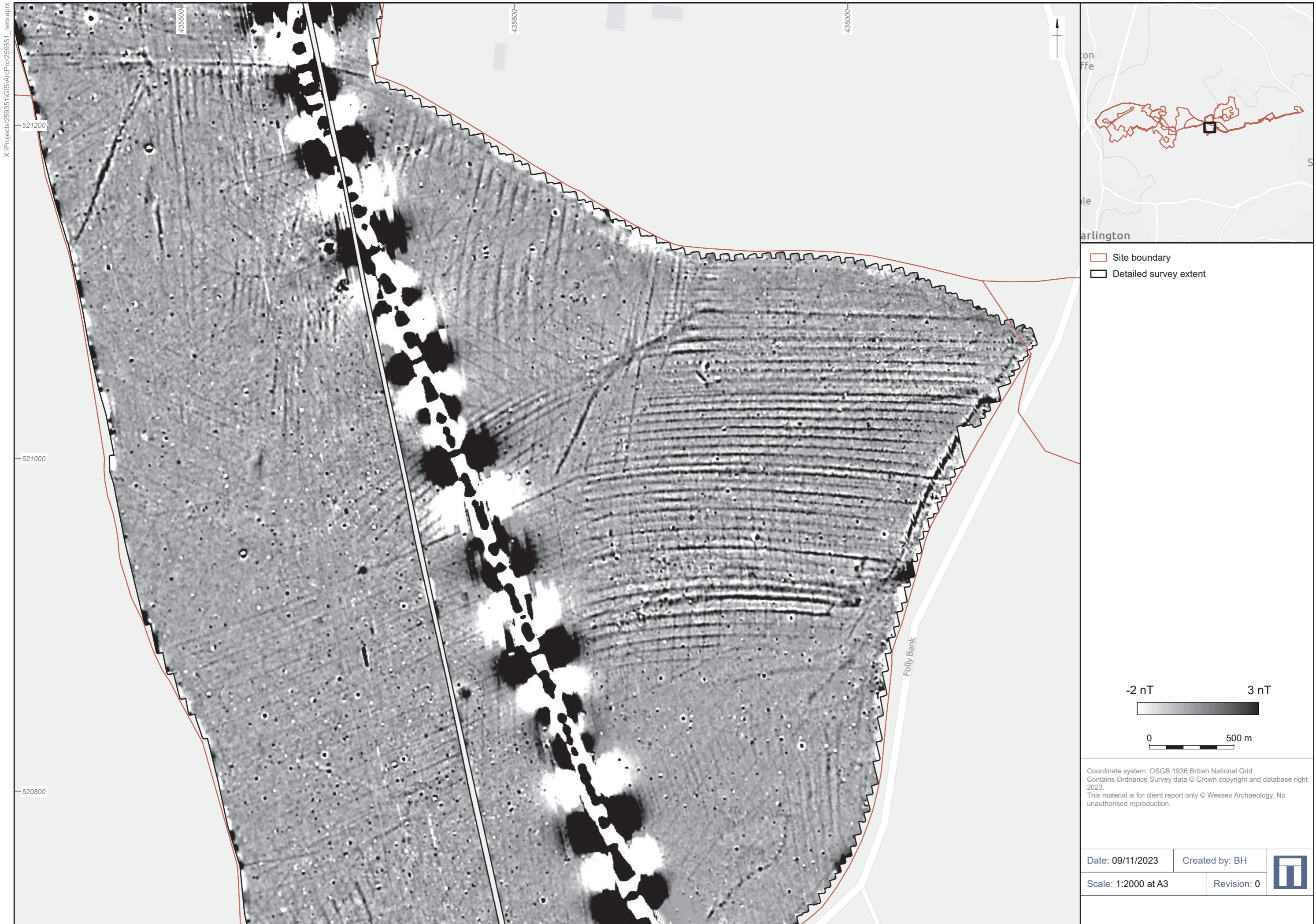
Area 3 detailed gradiometer survey results: interpretation

Figure 71

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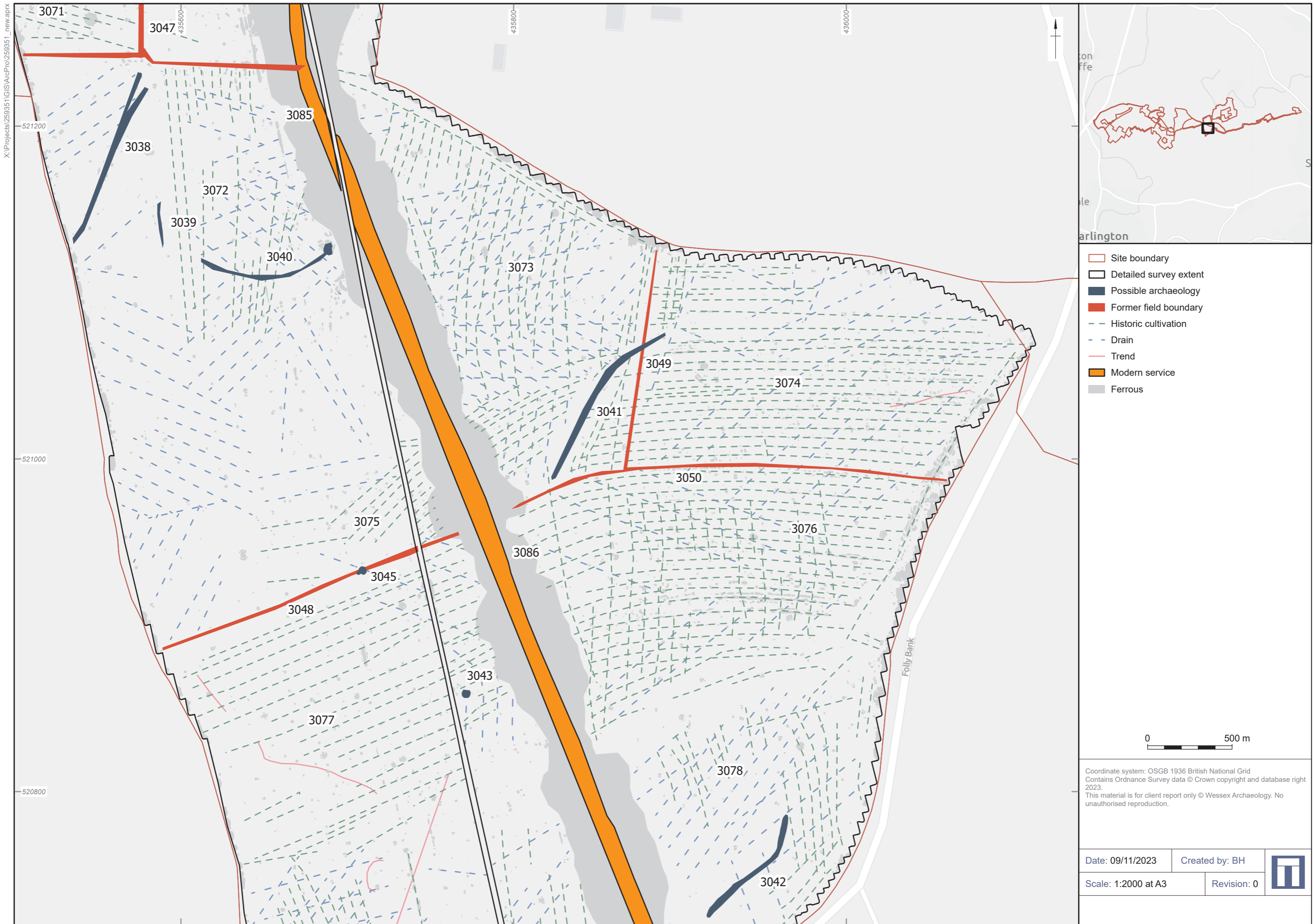
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Area 3 detailed gradiometer survey results: greyscale plot

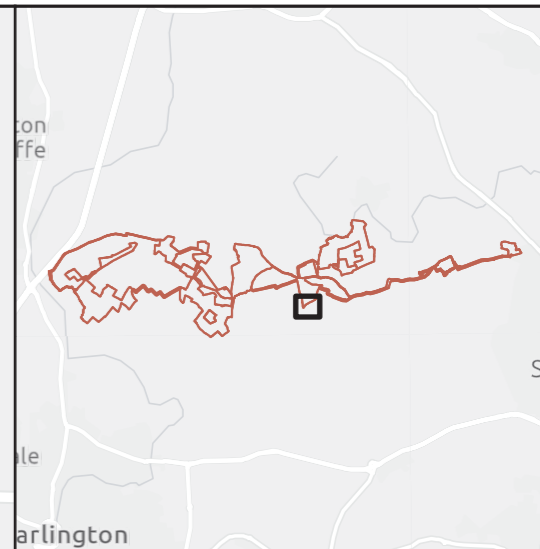




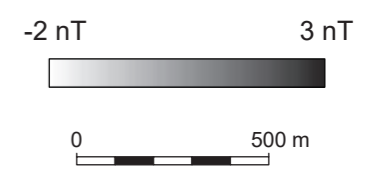
Area 3 detailed gradiometer survey results: interpretation

Figure 73


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- Site boundary
- Detailed survey extent



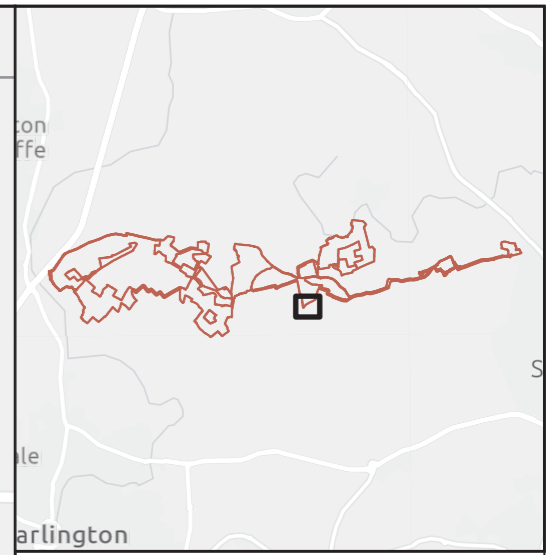
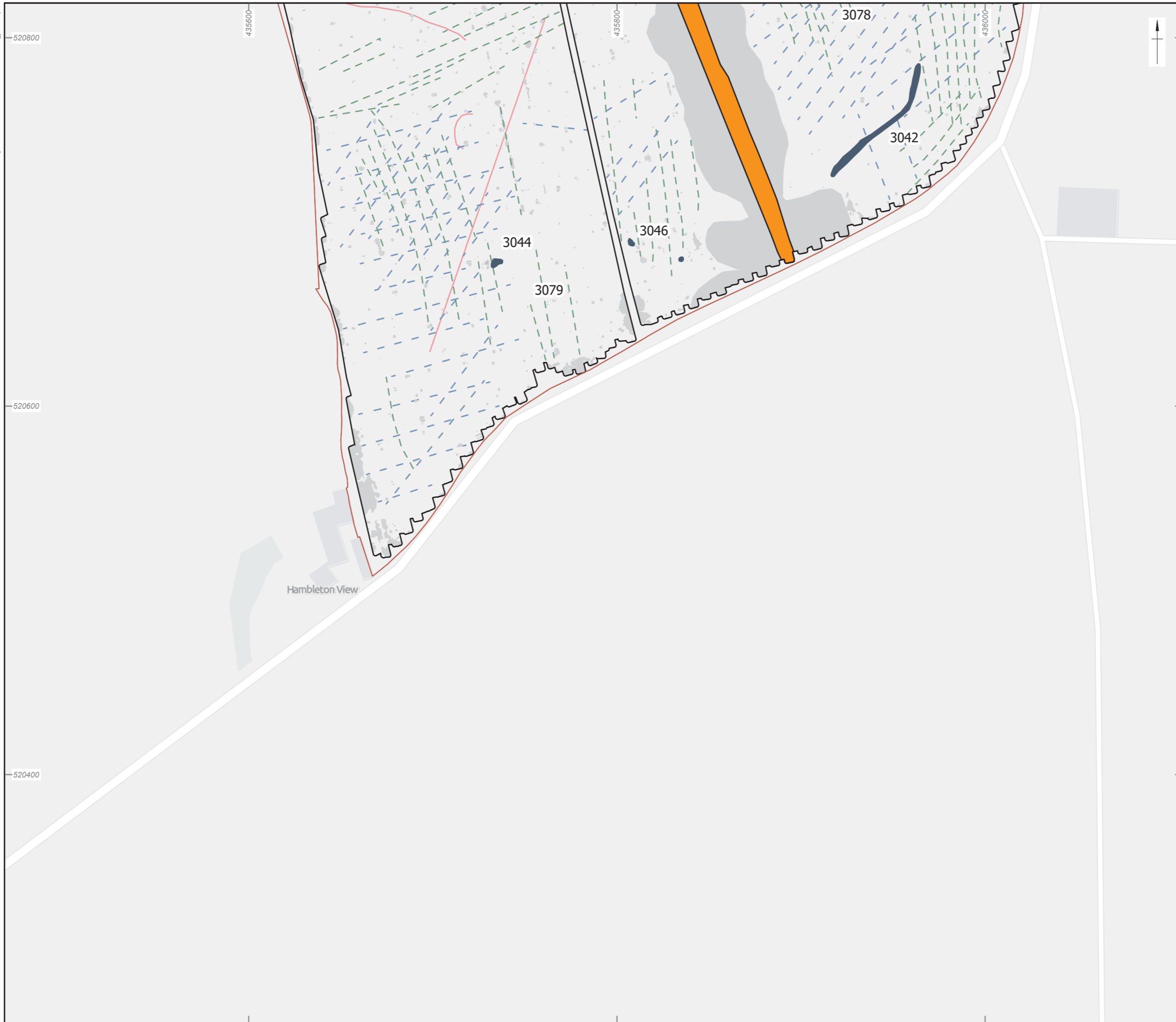
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Area 3 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Historic cultivation
- Drain
- Trend
- Modern service
- Ferrous

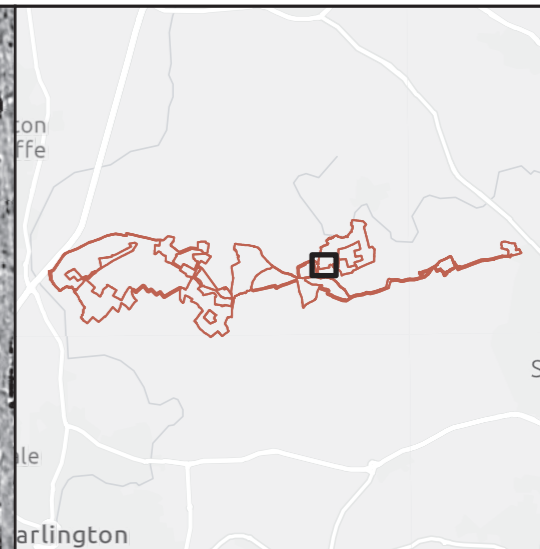
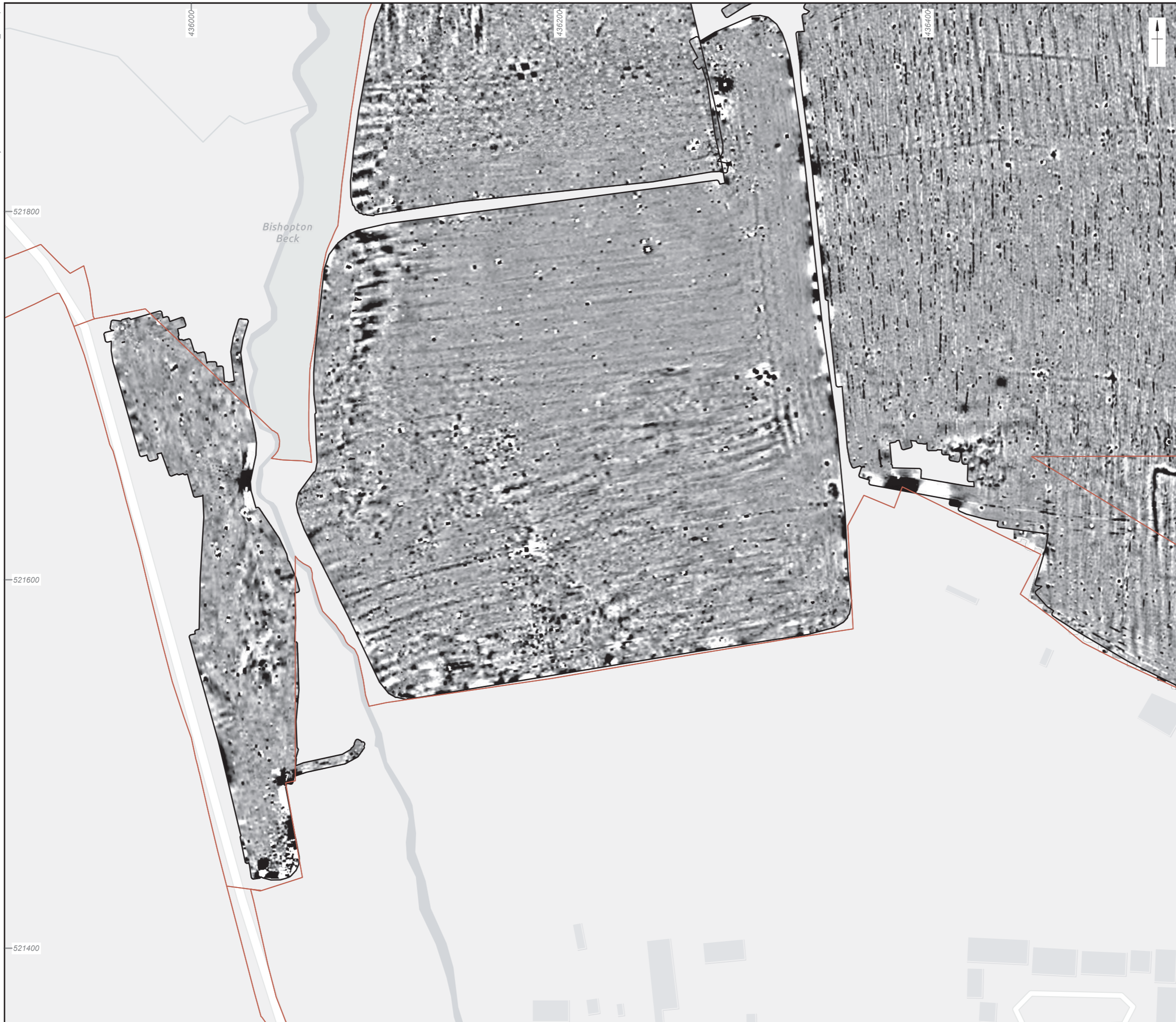


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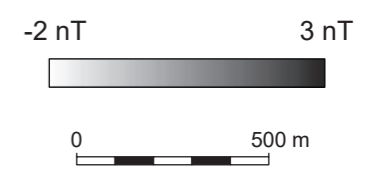
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Area 3 detailed gradiometer survey results: interpretation






- ▭ Site boundary
- Detailed survey extent

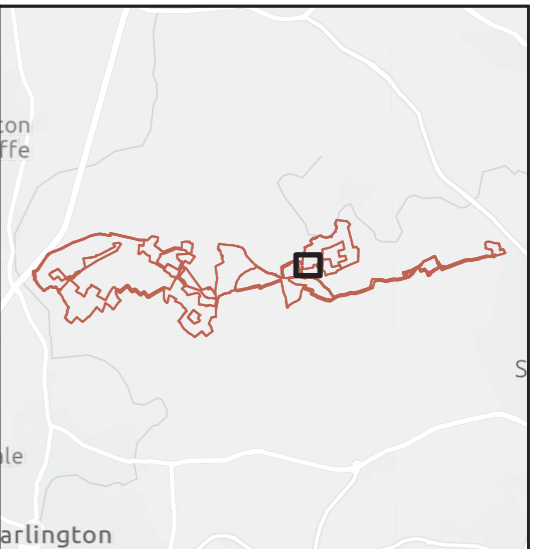
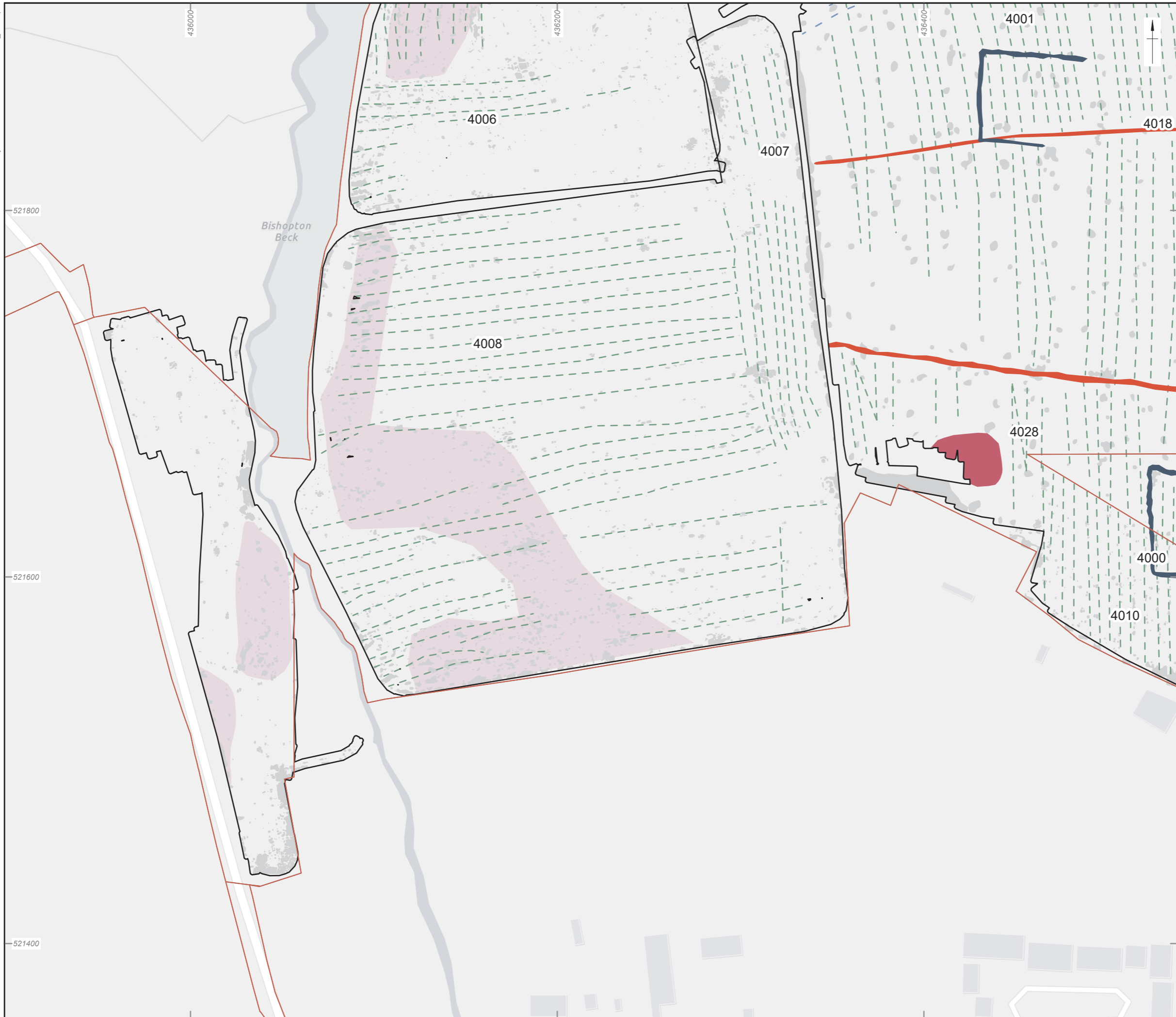


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Area 5 detailed gradiometer survey results: greyscale plot





- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic landscape feature
- Historic cultivation
- Geology
- Drain
- Ferrous

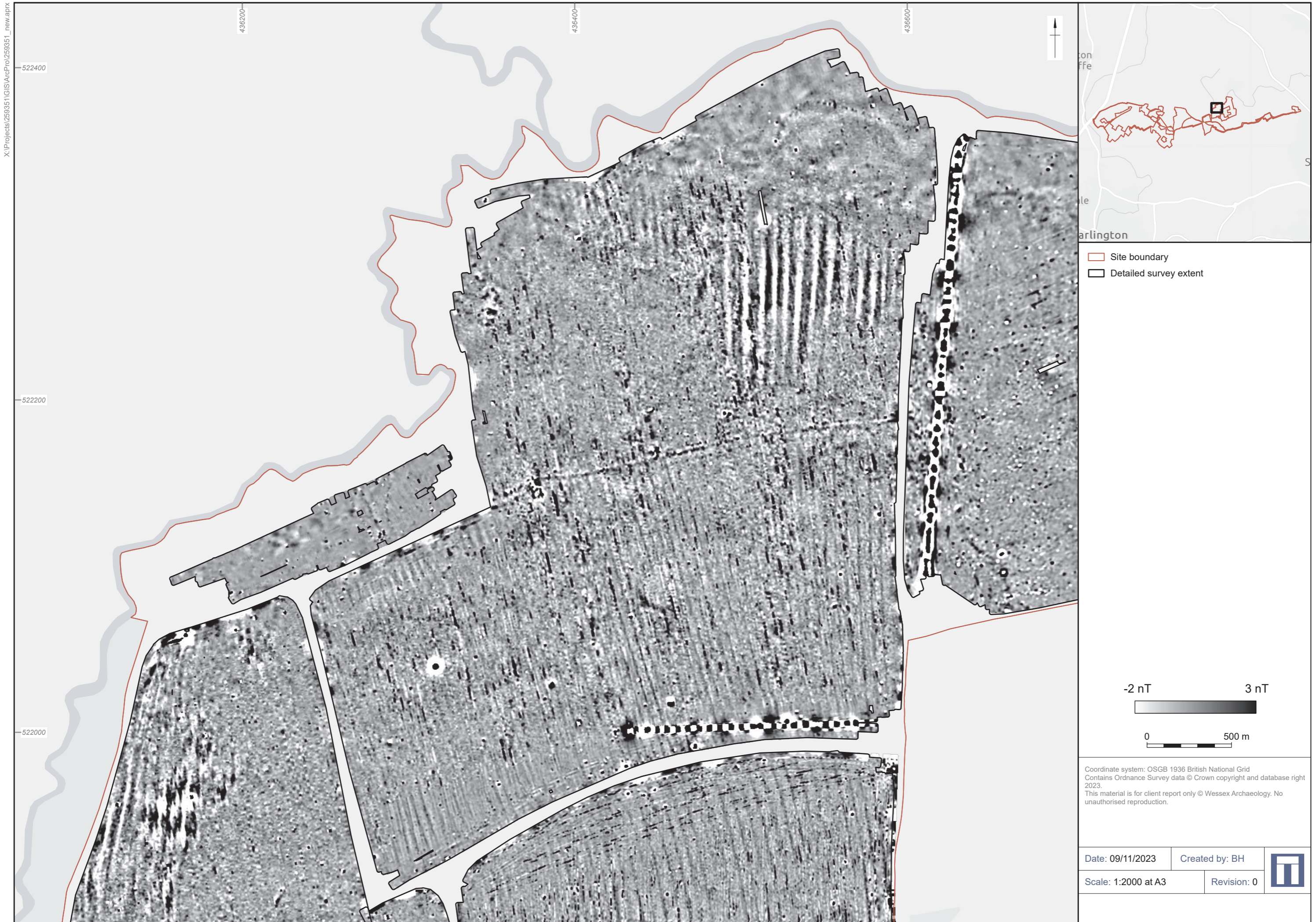


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Area 5 detailed gradiometer survey results: interpretation

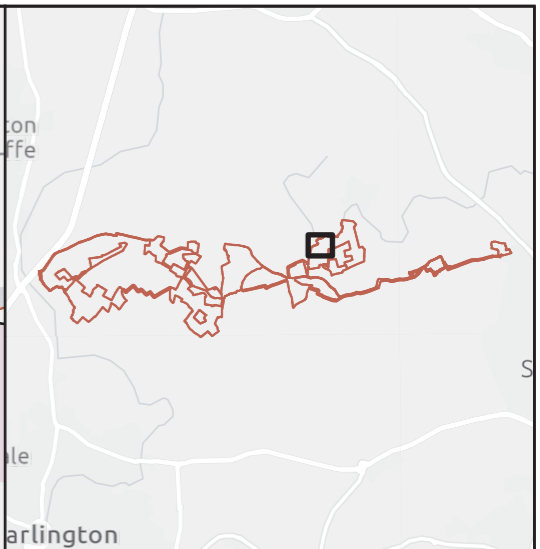
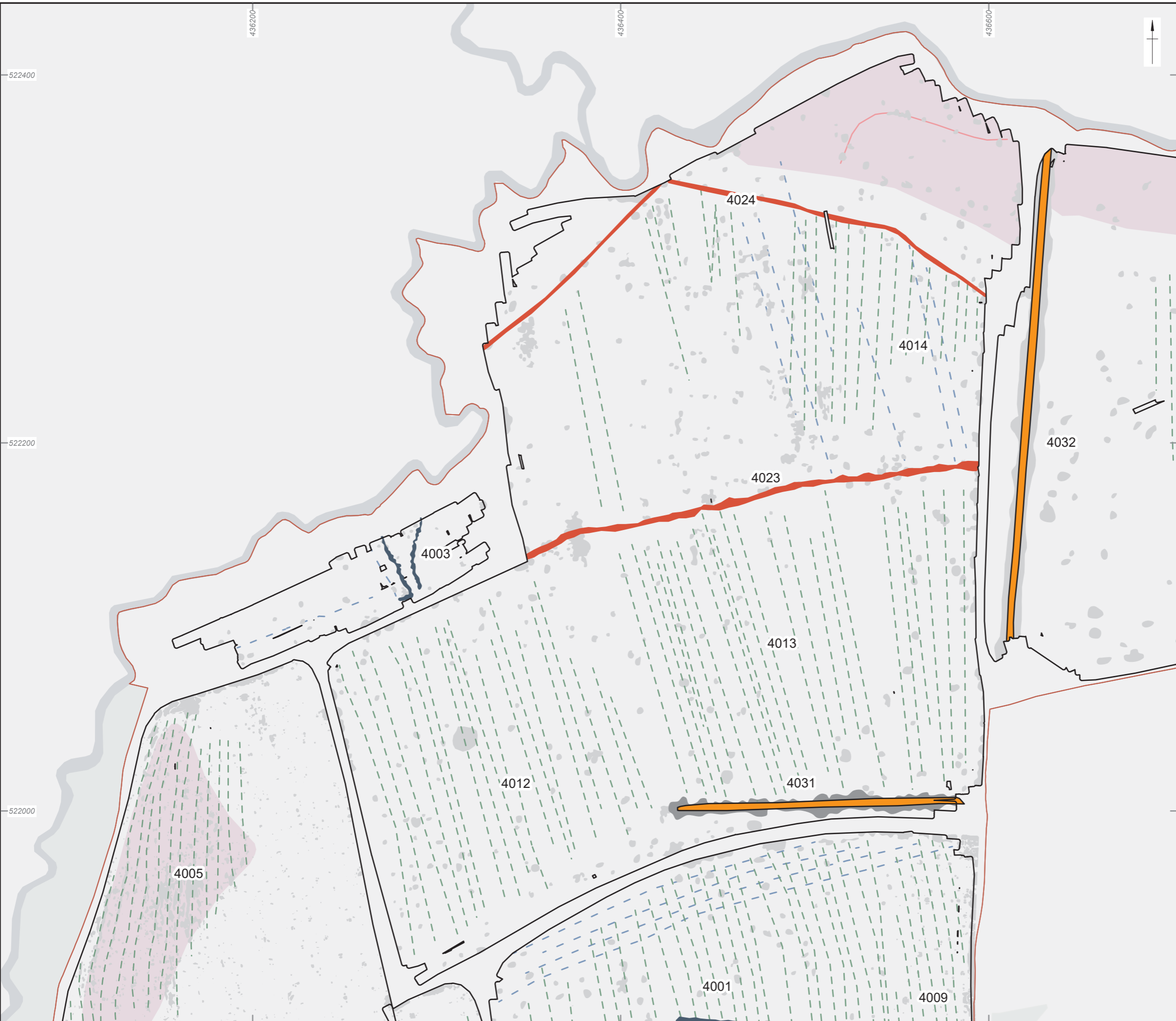




Area 5 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Geology
- Drain
- Trend
- Modern service
- Ferrous



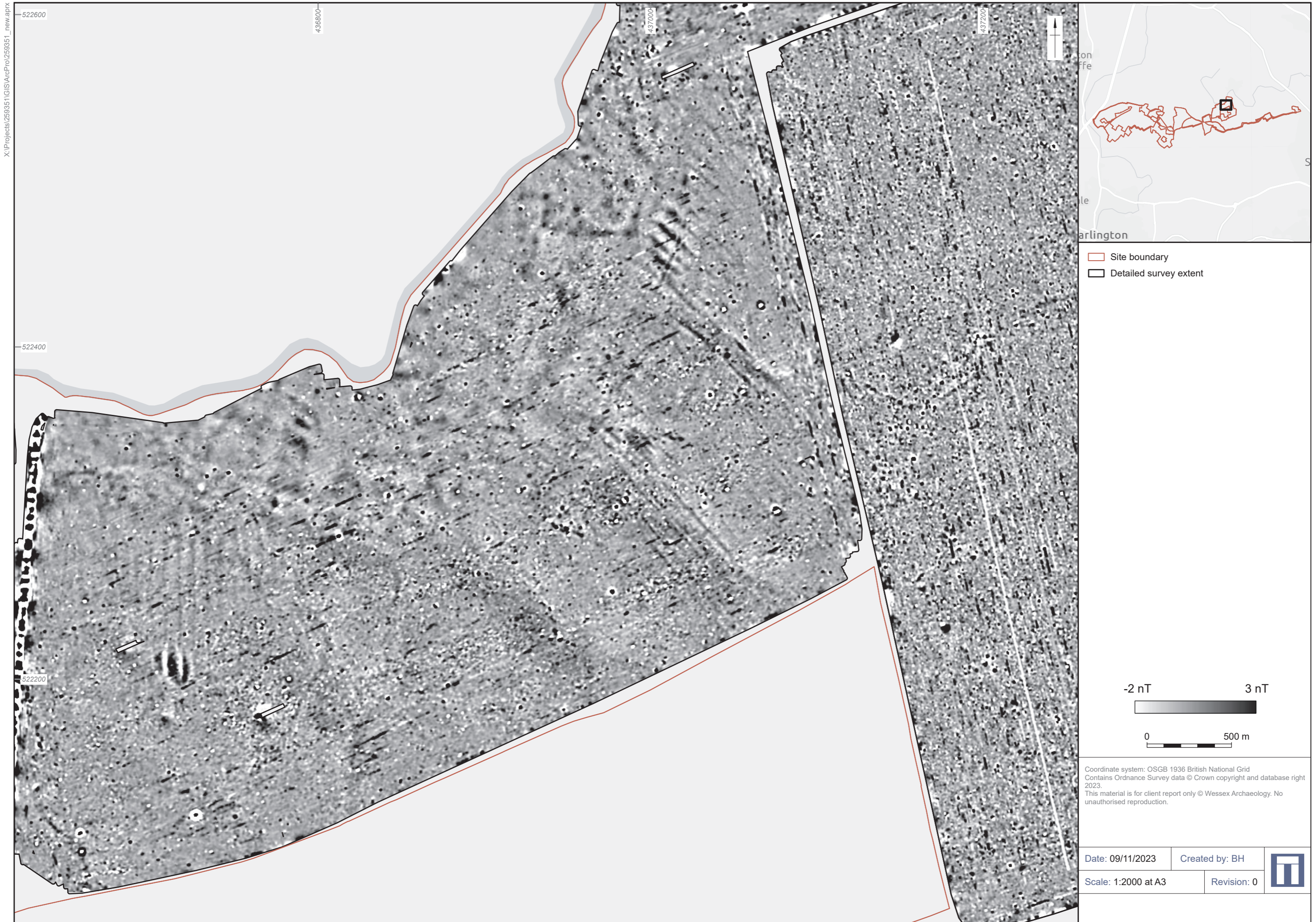
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Area 5 detailed gradiometer survey results: interpretation

Figure 79

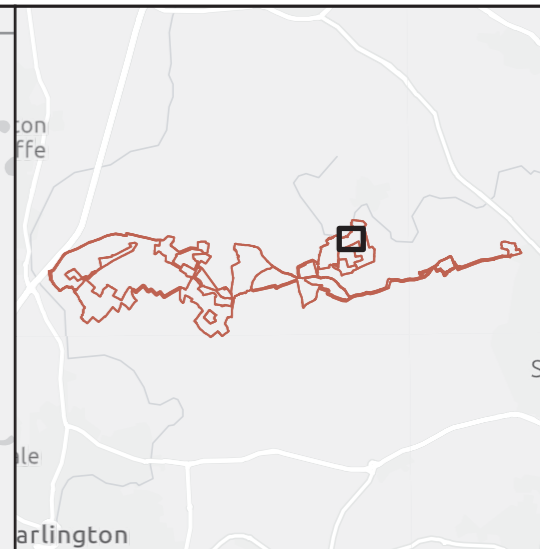
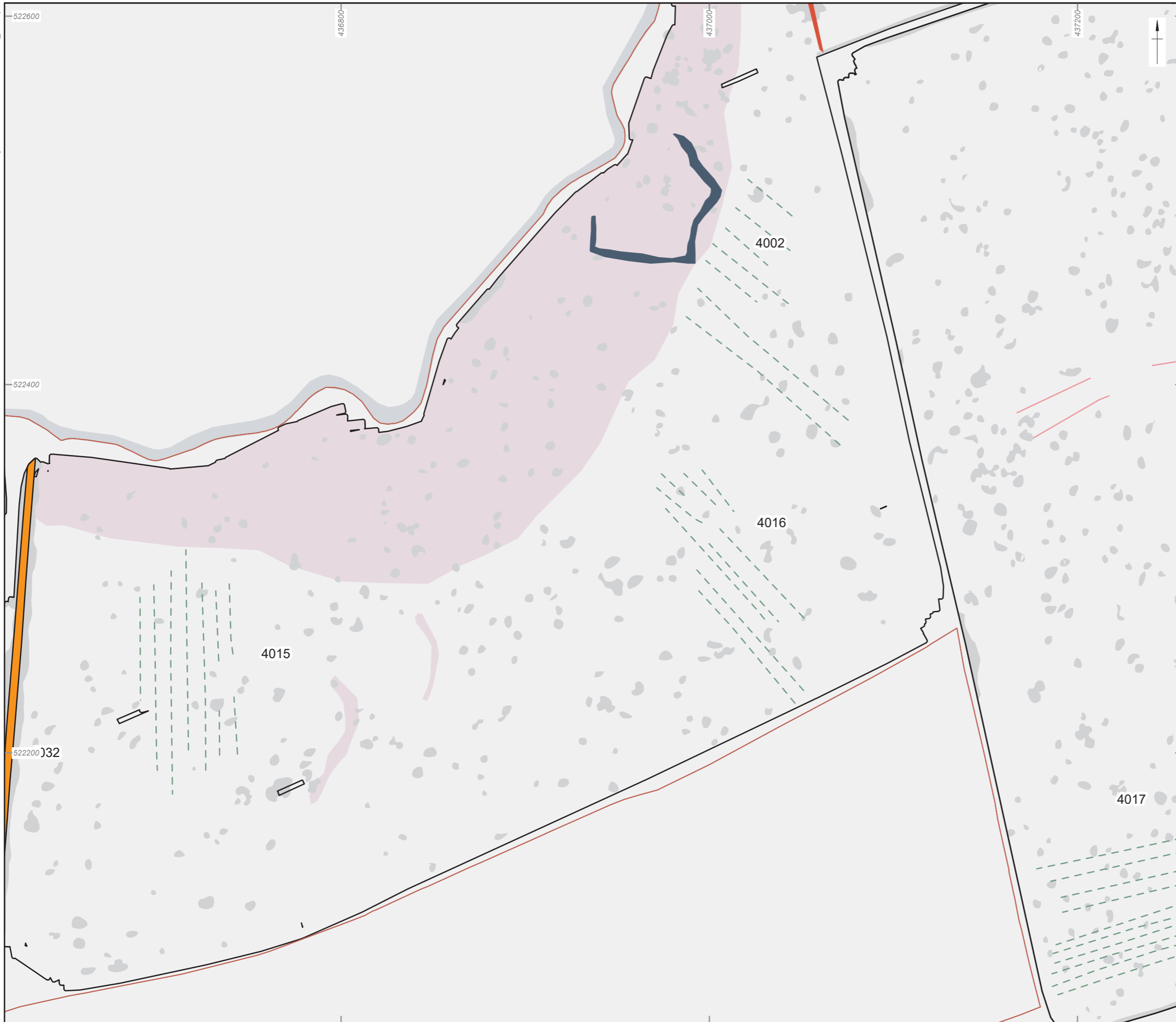




Area 5 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Geology
- Trend
- Modern service
- Ferrous

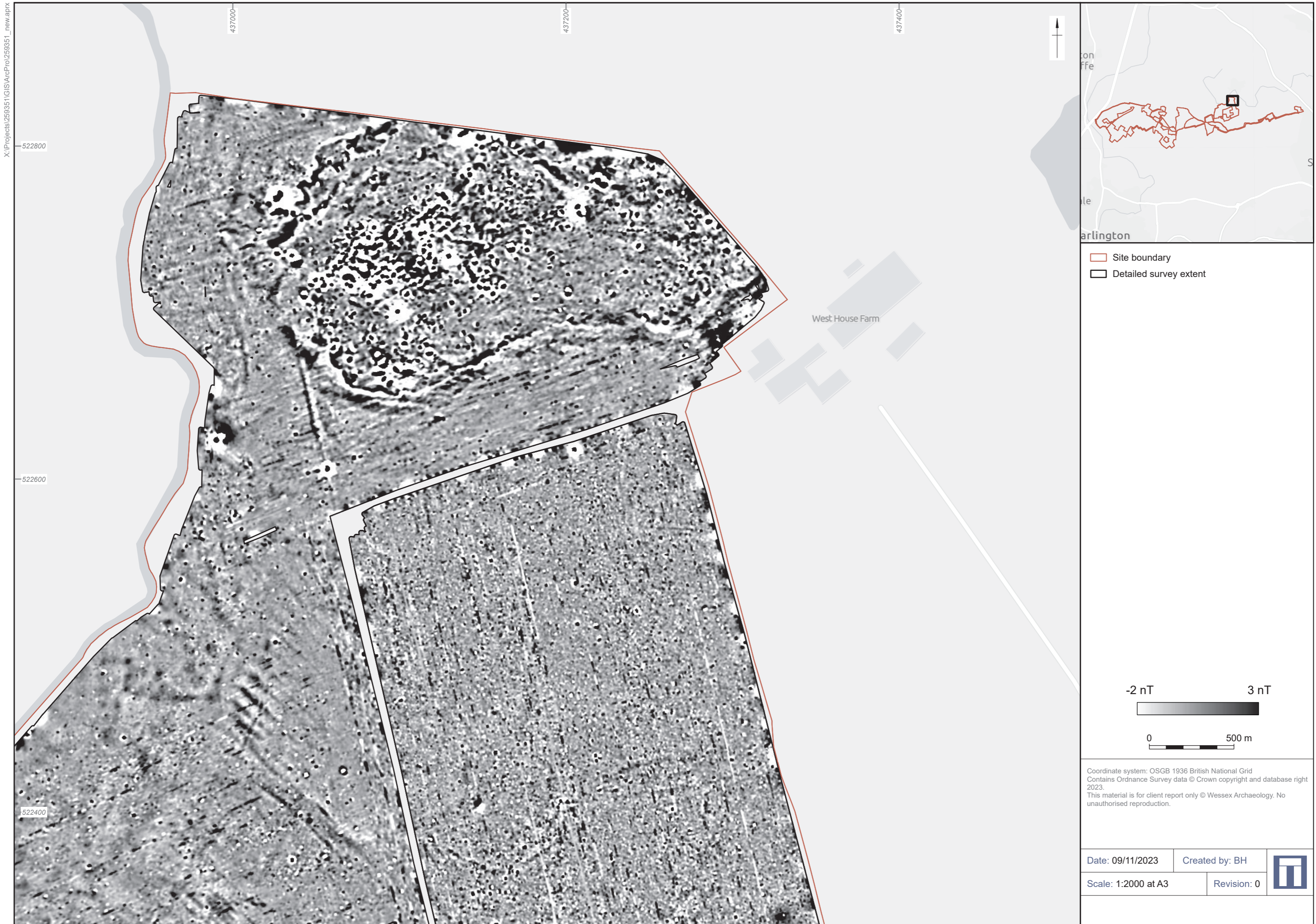


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Area 5 detailed gradiometer survey results: interpretation





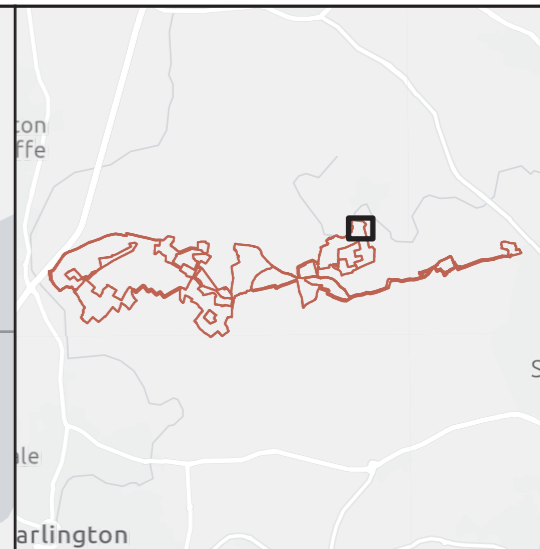
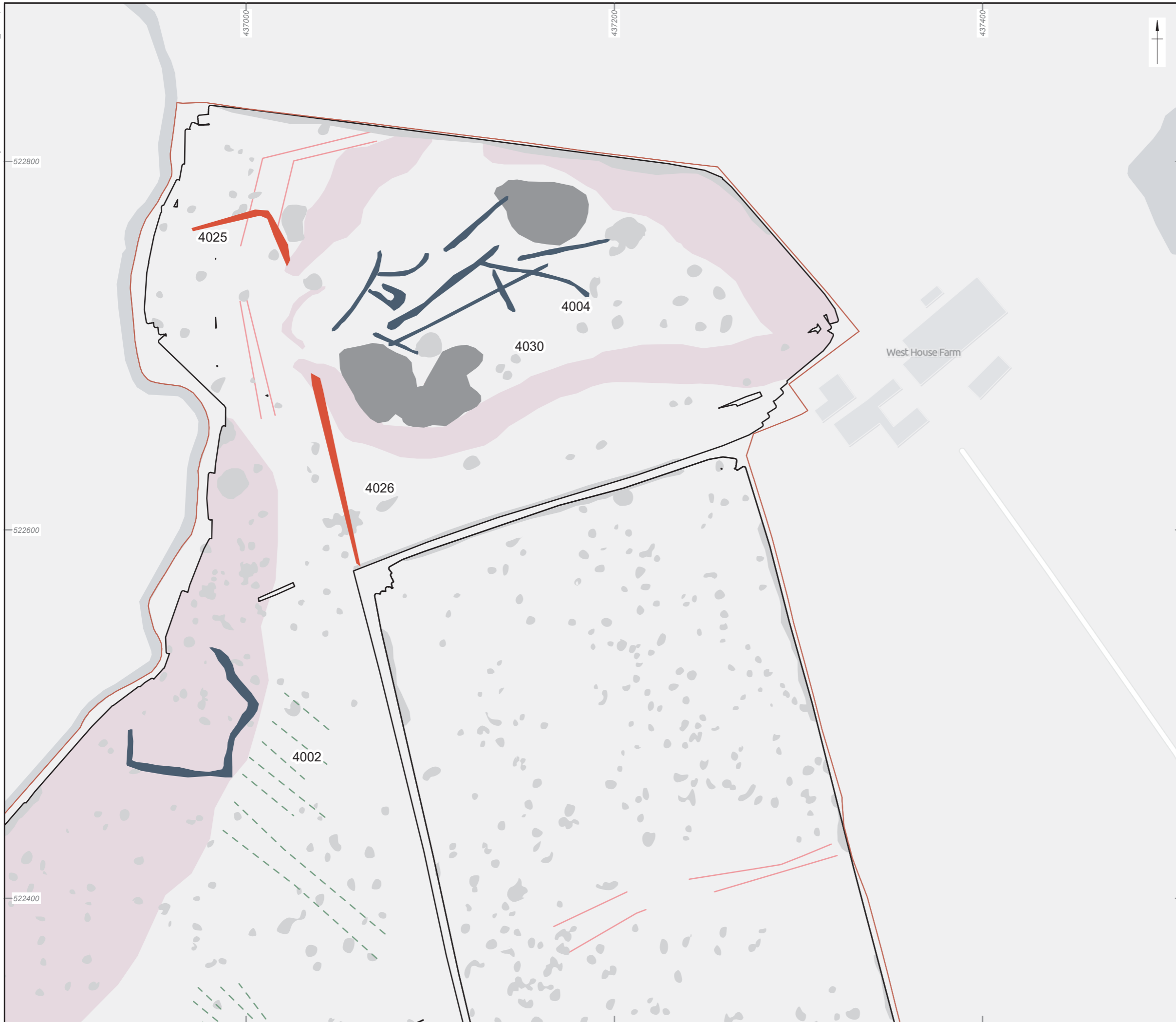
Area 5 detailed gradiometer survey results: greyscale plot

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- Site boundary
- Detailed survey extent
- Possible archaeology
- Former field boundary
- Historic cultivation
- Increased response
- Geology
- Trend
- Ferrous

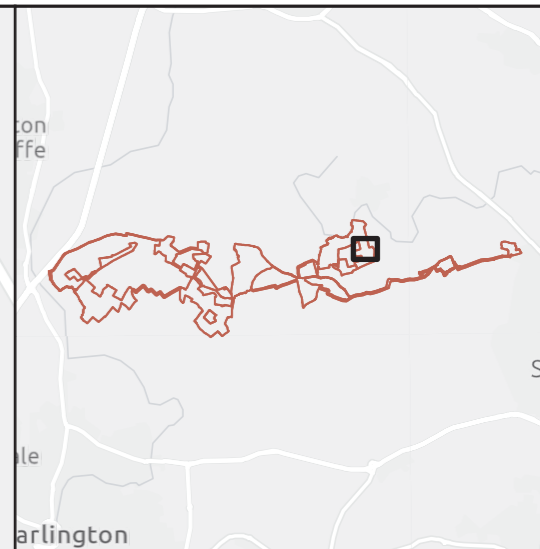


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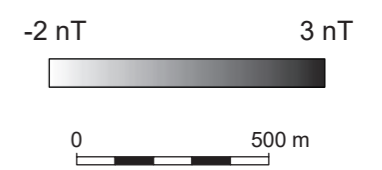
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Area 5 detailed gradiometer survey results: interpretation


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- Site boundary
- Detailed survey extent

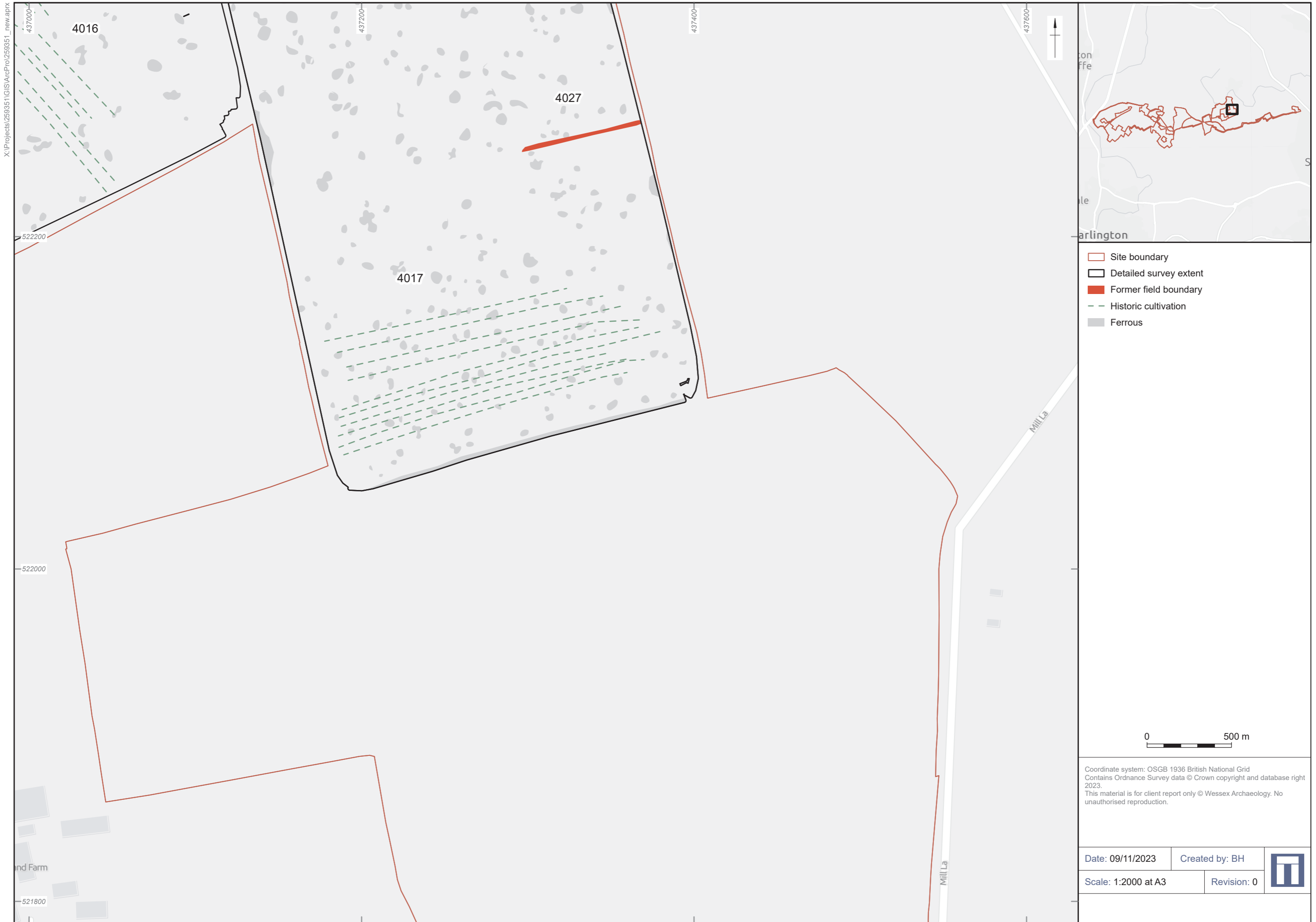


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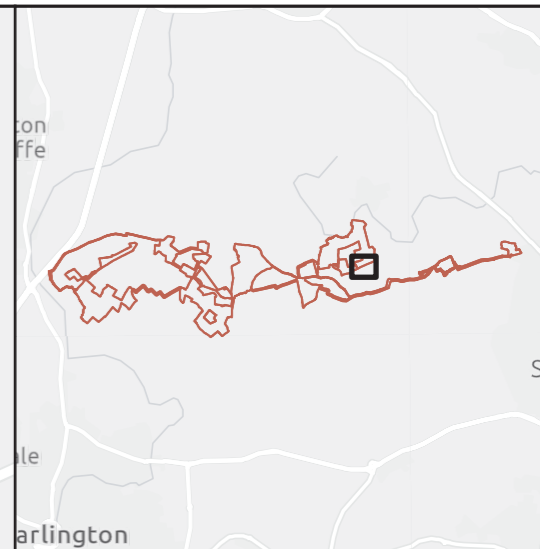
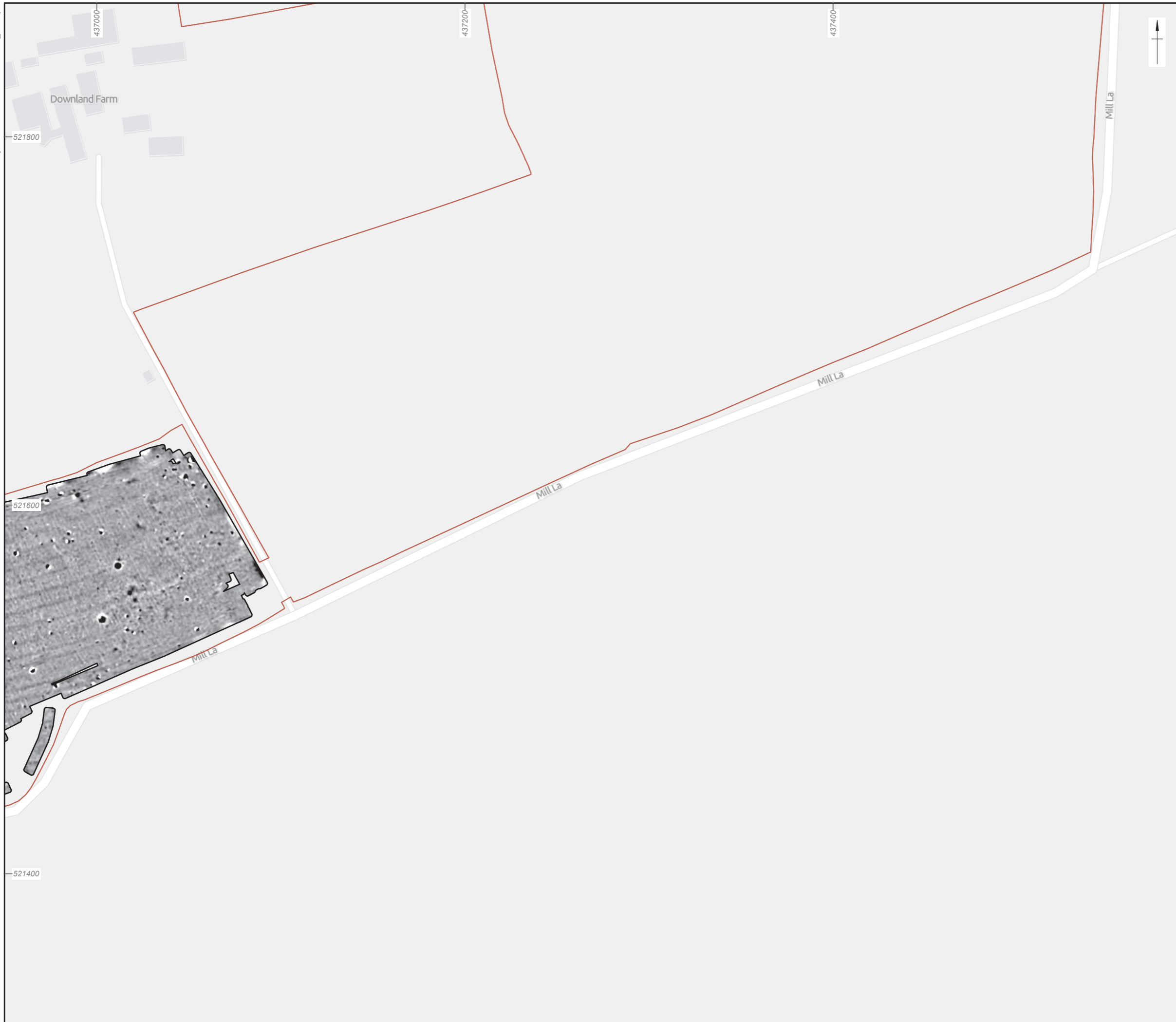
Area 5 detailed gradiometer survey results: greyscale plot



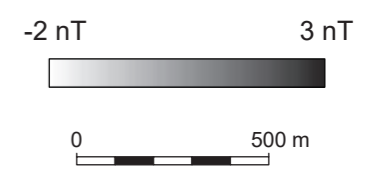


Area 5 detailed gradiometer survey results: interpretation


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- Site boundary
- Detailed survey extent



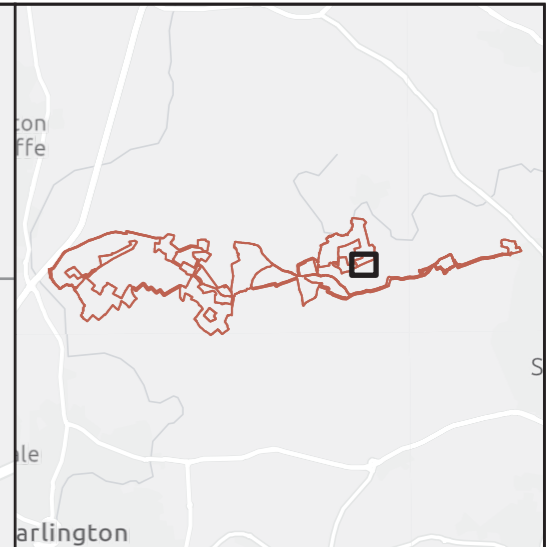
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Area 5 detailed gradiometer survey results: greyscale plot



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- Site boundary
- Detailed survey extent
- Historic cultivation
- Ferrous

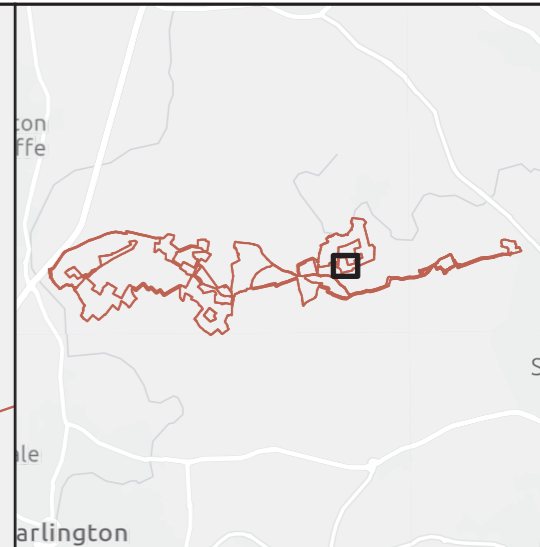


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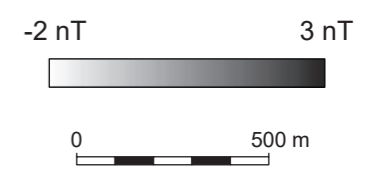
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Area 5 detailed gradiometer survey results: interpretation






- Site boundary
- Detailed survey extent

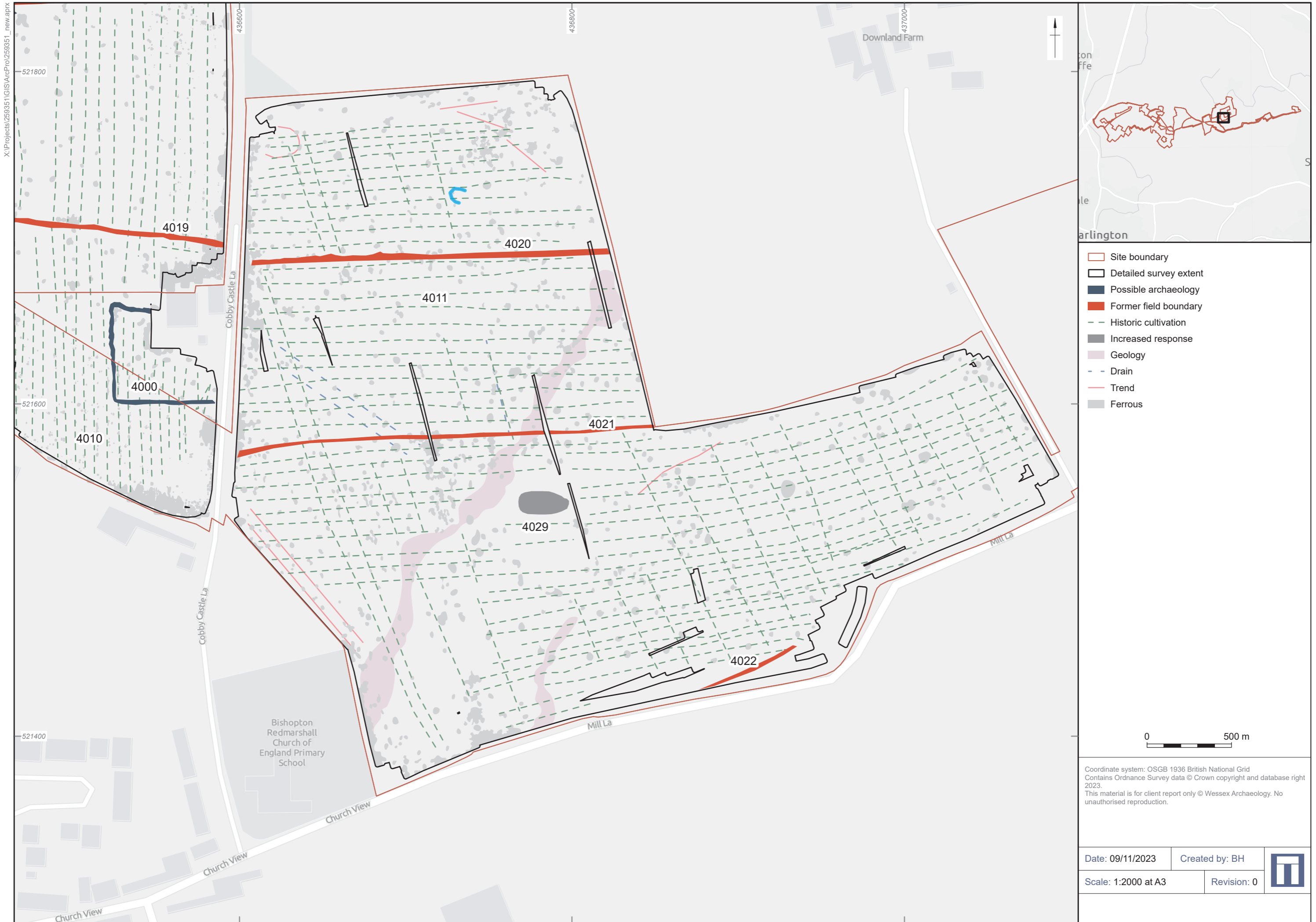


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Area 5 detailed gradiometer survey results: greyscale plot





Area 5 detailed gradiometer survey results: interpretation



## APPENDICES

### Appendix 1 Gradiometer Survey Equipment and Data Processing (Sensys)

The magnetic data for this project were acquired using a non-magnetic cart fitted with four SenSys FGM650/3 magnetic gradiometers, either hand-pushed or towed across the site by a suitable all-terrain vehicle (ATV). The instrument has four sensors fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 0.6 m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of  $\pm 8 \mu\text{T}$  over  $\pm 1000 \text{ nT}$  range. All the data are relayed to a CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 probes at a rate of 100 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Captivate system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.01 m intervals along traverses spaced up to 0.25m apart.

### Post-processing

The magnetic data collected during the survey is downloaded from the system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

Typical data and image processing steps may include:

- GPS DeStripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect within the defined window. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.
- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.
- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).





Typical displays of the data used during processing and analysis:

- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.



## Appendix 2 Geophysical interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural, and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.





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