

Geophysical Survey at Whirlow Hall Farm, Sheffield



View from Big Rye to the west with Bole Hill in the distance

ARS Ltd Report 2016/89

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Compiled By:

Richard Durkin

Archaeological Research Services Ltd

Angel House

Portland Square

Bakewell

DE45 1HB

Checked By:

Clive Waddington MIfA

Tel: 01629 814540

Fax: 01629 814657

admin@archaeologicalresearchservices.com

www.archaeologicalresearchservices.com



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EXECUTIVE SUMMARY

This report presents the results of a geophysical survey undertaken on land at Whirlow Hall Farm, Sheffield on behalf of The Time Travellers who were recently awarded a Heritage Lottery Grant for the project 'Discovering our Lost Iron Age and Roman Heritage' in Sheffield. The survey follows on from a previous Heritage Lottery funded programme of heritage research and archaeological investigation carried by the Whirlow Hall Farm Trust and Archaeological Research Services Ltd into the history of Whirlow Hall Farm that was completed in 2011.

The geophysical survey carried out as part of the 2016 project covers six fields which were not included in the 2011 project including a group of five adjacent fields in the west of the estate: Big Bank; Little Bank; Big Rye; Cock Hat; Bole Hill and a single field at the very south of the estate – Wigley. The survey of the six fields completes the geophysical survey of all available areas on the western side of the estate which skirt the eastern edge of the Limb Valley.

The geophysical survey of fields Big Bank, Little Bank, Big Rye, Cock Hat and Wigley was completed with the help of a number of volunteers during the weeks commencing 4th and 11th April 2016 and the survey of Bole Hill was carried out in the week commencing 20th June 2016. The results of the geophysical survey are accurate and reliable and only minimal processing of the raw data was necessary. The results have revealed further definite evidence for buried archaeological remains within the Whirlow Hall Farm estate.

The most remarkable discovery was made at the western extent of the field known as Bole Hill on a plateau that occupies a prominent position in the landscape. A square ditched enclosure of c. 30 m external dimensions with a clear entrance in the east may represent a Roman watch tower or signal station. This feature is to be investigated by field evaluation during the programme of fieldwork in June 2016. No further definite archaeologically significant features were identified in the field but a number of anomalies are of probable archaeological interest and are certainly worthy of further investigation.

The block of four fields that lie to the east of Bole Hill also appear to contain features of archaeological interest. Most notably, within the field known as Big Rye, a feature was recorded that comprises two positive linear anomalies of reasonably strong magnitude which meet at an obtuse angle. Although the two sides of the feature terminate abruptly there is a clear discontinuity in the southern part of the feature which may indicate an entrance. The anomalies almost certainly represent ditches of archaeological origin and it is probable that the feature represents part of an enclosure. However, it should be considered that the anomalies could also represent more ordinary field boundaries, albeit of some antiquity.

Also within Big Rye, and in Cock Hat immediately to the north, an unusual and enigmatic group of anomalies was recorded. The anomalies indicate that features are present which appear to be, at least partially, arranged in a zigzag formation. At this stage the anomalies have been interpreted as military communication or practice trenches probably dating from

the period during or between the first and second World Wars but this interpretation remains speculative. Within the fields known as Little Bank and Big Bank several, presumably contemporary, anomalies which do not respect the arrangement of the extant field boundaries were recorded and it is likely that these represent late prehistoric or Roman field boundaries.

At the southern extent of the estate in the field known as Wigley clear evidence of a former field boundary was recorded and it is likely that sub-surface remains of a bank and ditch survive in addition to a visible earthwork. To the south of the former field boundary evidence of a former quarry and possible track way was revealed as well as a further possible field boundary and traces of ridge and furrow cultivation. It is not clear if a group of anomalies to the south-west of the quarry are archaeologically significant or are simply further evidence of industrial activity associated with the quarry itself. In the north-east corner of the field a linear anomaly shares the same alignment as the Iron Age/ Roman enclosure that was discovered in 2011 and is located just 30m away on the opposite side of Fenney Lane. For this reason the anomaly may indicate a linear feature that is contemporary with the enclosure.

1.0 INTRODUCTION

1.1 Background

- 1.1.1 Following the award of a Heritage Lottery Grant for the project 'Discovering our Lost Iron Age and Roman Heritage' in Sheffield, local archaeology group the Time Travellers commissioned Archaeological Research Services Ltd to undertake a geophysical survey of land at Whirlow Hall Farm. This follows on from a previous Heritage Lottery funded programme of heritage research and archaeological investigation carried out by the Whirlow Hall Farm Trust and Archaeological Research Services Ltd into the history of Whirlow Hall Farm that was completed in 2011.
- 1.1.2 The 2016 project comprises a professionally-led programme of training, participation, learning activities and public engagement. The Time Travellers have invited local schools, community groups, volunteers and visitors to participate in a range of activities to help record the archaeology and discover and record the history of Whirlow Hall Farm.
- 1.1.3 The objective of the latest geophysical survey was to identify any anomalies of archaeological origin within the western and southern part of the estate in order to identify and record the presence/absence, location, nature and extent of any surviving below-ground archaeological remains.
- 1.1.4 This report presents the results of the geophysical survey.

1.2 Location, Topography and Geology

- 1.2.1 The geophysical survey covered six fields which had not been previously surveyed as shown on Fig. 1. The six fields include a group of five adjacent fields in the west of the estate: Big Bank; Little Bank; Big Rye; Cock Hat; Bole Hill and a single field at the very south of the estate – Wigley. The survey of the six fields completes the geophysical survey of all available areas on the western edge of the estate which skirts the eastern edge of the Limb Valley.
- 1.2.2 The underlying geology consists of Rough Rock Sandstone, which is coarse-grained feldspathic sandstone. There are no recorded superficial deposits (British Geological Survey 2016).

2.0 ARCHAEOLOGICAL BACKGROUND

- 2.1 A detailed discussion of the archaeological and historical background of the farm is provided in an Archaeological Desk-Based Assessment for Whirlow Hall Farm (Sheppey 2011).

3.0 METHODOLOGY

- 3.1 Magnetometry is a non-intrusive scientific prospecting technique that is the preferred geophysical technique used to determine the presence or absence of buried archaeological features when site and geological conditions are favourable. It is an efficient and effective method for locating anomalies corresponding with archaeological features. The instrument chosen for this survey was a Bartington Grad 601 dual sensor fluxgate gradiometer which can detect weak changes in the Earth's magnetic field caused by buried features.
- 3.2 All fieldwork and reporting was undertaken following Historic England and Chartered Institute for Archaeologists (CIfA) standards and guidance (Gaffney *et al.* 2008; CIfA 2013; 2014).
- 3.3 The 30m by 30m survey grids were located to cover each field in turn and aligned as shown in Figure 2. In total 133 survey grids, including partial grids, covering approximately 12 Ha. were set out and accurately positioned using a Leica Zeno 10 GNSS field controller with GS05 antenna cap which was connected to Leica Smartnet to receive corrections resulting in an accuracy of typically 0.6m or better. Each grid was then surveyed at 1m traverse intervals with the sampling at 0.25m (4 readings per metre) intervals. The survey was carried out in 'zigzag' mode with each alternate traverse walked in opposite directions. The range of the instrument was set at 100nT (0.01nT resolution).
- 3.4 The geophysical survey of fields Big Bank, Little Bank, Big Rye, Cock Hat and Wigley were completed with the help of a number of volunteers during the weeks commencing 4th and 11th April when the weather was mainly fine but with some heavy showers. The survey of Bole Hill was carried out in the week commencing 20th June 2016 when the weather very hot and dry.
- 3.5 Prior to commencing the survey in each field the gradiometer was balanced and calibrated to the local conditions and this was repeated regularly throughout each day. At the end of the day, the data was downloaded into a computer, checked and archived on the ARS Ltd server. The data was downloaded using Bartington Instruments' *Grad 601 Communication Application*.

4.0 GEOPHYSICAL SURVEY RESULTS

4.1 Introduction

- 4.1.1 The data was minimally processed using Geoplot software. The data was "clipped" (clipping parameters selected on the mean and standard deviation data values), "de-staggered" and the striping that can often appear in gradiometer data was removed by utilising the "zero mean traverse" function with thresholds applied. Finally the

data was interpolated. To enhance the visibility of subtle features the data was viewed under a number of different clip plotting parameters.

- 4.1.2 Occasionally processing the data to compensate for directional sensitivity or to remove iron spikes caused by miscellaneous ferrous objects can also inadvertently disguise anomalies that may be of archaeological origin, particularly long linear features in the direction of the traverses. A good example of this is around feature F1 where the eastern and western ditches aligned perfectly with the survey traverses. Any attempt to process the data to compensate for directional sensitivity results in a loss of definition of the ditches. To take account of this the data has been analysed in a number of different formats and at each stage of processing and in the case of F1 presented with the area within and immediately around the enclosure not processed for directional sensitivity.
- 4.1.3 Not all anomalies have been included in the results and discussion. Positive discrete anomalies that can, in certain circumstances, indicate the presence of archaeologically significant features such as pits were recorded in many areas of the site. Without supporting evidence, an obvious pattern to their distribution or a clear relationship with other archaeological features this type of anomaly has not been analysed in detail at this stage but the anomalies have been highlighted in the figures. Where the anomalies do have potential to be archaeologically significant they have been included in the results.
- 4.1.4 Dipolar anomalies with no clustering or pattern to their distribution are common on most sites and almost certainly relate to natural variations in the pedology and geology, agricultural disturbance and miscellaneous ferrous litter on the surface of the field. These anomalies have also not been analysed further.
- 4.1.4 The data analysis is presented graphically in Figures 3 to 10. A greyscale shade plot of the processed gradiometer data is presented in Figure 3 and an interpretative plan in Figure 4. Trace plots of the survey areas are presented in Figures 5 to 10. A plan showing the combined geophysical survey results from 2011 and 2016 is presented in Figure 11.

4.2 Anomalies (Fields as shown on Fig. 4)

4.2.1 Bole Hill

- 4.2.1.1 Bole Hill is a narrow field located at the western extent of the Whirlow estate and comprises approximately 1.9 Ha. The field rises steeply from a low point of c. 287m AOD in the east to a plateau in the west which has a high point of c.311m AOD. The field is bounded by the eastern edge of the Limb Valley to the south and west and by further agricultural land to the north and east. At the time of the survey the field was under grass which was being used as grazing for cattle.

4.2.1.2 In the west of the field, on the plateau which occupies a prominent position in the landscape, the geophysical survey results revealed a significant archaeological feature (F1). The feature comprises a square, double-ditched/construction socket defined enclosure with external dimensions of c. 30m. A probable entrance is evident in both the inner and outer ditches in the east. Although the southern outer ditch was not recorded, the monument is probably intact with the missing ditch lying within an area omitted from the survey due to the presence of metal fencing in the field boundary which would have contaminated the data.

4.2.1.3 An arcing positive linear anomaly of c. 100m in length (BH1) was recorded overlying, or underlying, and to the east of F1. The geophysical response suggests an archaeological cut feature, possibly a boundary or track, although the alignment of the anomaly suggests it may not be contemporary with the enclosure. A weaker positive linear anomaly (BH2), again partially over or under laying the enclosure but this time on a north-west/ south-east alignment, may also represent a cut feature that may not be contemporary with the enclosure. To the north-west of F1 three positive linear anomalies (BH3 to BH5) on a north-east/ south-west alignment, which again does not respect the alignment of the enclosure, are suggestive of ditches or perhaps deep plough furrows.

4.2.1.4 To the east of anomaly BH1 and along the steepest part of the field the data is less clear. There is evidence of further possible anthropogenic activity provided by a number of positive linear anomalies (BH6 to BH10) on varying alignments although generally following the topography of the field, but these are likely to coincide with agricultural activity both ancient and modern. It is not clear, therefore, if the anomalies are evidence of significant features or more ordinary agricultural remnants.

4.2.1.5 A number of notable positive discrete anomalies were recorded in the field (BH 11 to BH 14) and these may represent archaeological cut features, possibly pits. However, there is no evidence in the location or arrangement of the anomalies to support this so it is also possible that the anomalies are of natural origin.

4.2.2 Little Bank

4.2.2.1 Little Bank shares its western boundary with Bole Hill and comprises a triangular field of approximately 1.1 ha. The field falls to the south, and more gently to the east, from a high point of 290m AOD in the north-west to a low point of 278m AOD in the south-east. The field is bounded to the south by the Limb Valley; to the west by Bole Hill; to the east by Big Bank and to the north by Big Rye. At the time of the survey the field was under short grass being grazed by sheep.

4.2.2.2 Two notable discontinuous positive linear anomalies were recorded towards the south and east of the field (LB1 and LB2). Anomaly LB2 is curvilinear and more sinuous than anomaly LB1 which is more regular and contains a corner and short

return side in the west. The anomalies almost certainly represent archaeological cut features which may represent late prehistoric or Roman field boundaries. Although the form of the two anomalies is dissimilar, the anomalies appear to share a common alignment suggesting they may be contemporary.

4.2.2.3 A reasonable number of small positive discrete anomalies were recorded in the field. The anomalies appear to be generally randomly distributed and are therefore equally likely to be natural as they are archaeological, although an archaeological origin in the form of cut features such as pits should certainly be considered at this stage. However, one small group of discrete anomalies (LB3) appear to be arranged in a circular formation and these may be worthy of further investigation although this may simply be a fortuitous grouping.

4.2.3 Big Bank

4.2.3.1 Big Bank is located to the east of Little Bank only separated in the west by a hedgerow boundary. The field is trapezoidal in shape and comprises just over 2.0ha. The field slopes from north to south from a high point of 286m AOD to a low point of 270m AOD. The field is bounded to the west by Little Bank; to the north by Big Rye; to the north-east by a small copse flanking Coit Lane; to the south-west by the Limb Valley and to the south-east by the field known as Barley (not included in the geophysical survey but surveyed as part of the 2011 project – Taylor 2011). At the time of the survey the field was under short grass being grazed by sheep.

4.2.3.2 Two of the anomalies which were recorded in Little Bank (LB1 and LB2) were also recorded in Big Bank (BB1 and BB2); presumably passing below the extant field boundaries. The perpendicular alignment of a further anomaly BB3 suggests it is likely to be contemporary. Extremely weak positive linear anomalies BB4, BB5 and BB6 may be archaeological but on arable land are equally likely to be agricultural remnants of unknown age.

4.2.3.3 Negative linear anomalies BB7 to BB10 all appear to originate at the corners of the field and meet towards the centre at the location of anomaly BB11. This group of anomalies may provide evidence of envelope pattern ploughing which is a result of plough headlands overlapping when the field is ploughed “on the square” working round and round inwards from the edge (Wilson 1982, 155-158).

4.2.3.4 A notable group of anomalies recorded along the south-western boundary towards the south of the field (BB12) are of unknown origin. The anomalies comprise an erratic collection of strong geophysical responses of both positive and negative polarity which are most likely to indicate modern disturbance or be geological or natural; possibly a deposit as ordinary as colluvium at the bottom of the field. However, the anomalies could also represent industrial activity, although this is less likely.

4.2.4 Big Rye

4.2.4.1 Big Rye is located to the north of Little Bank and Big Bank and comprises a roughly rectangular field of approximately 2.6 ha. The field slopes gently from west to east and north to south from a high point of 292m AOD in the north-west to a low point of 281m AOD in the south-east. The field is bounded to the south by Little Bank and Big Bank; to the west by an arable field which lies outside the estate boundary; to the north-west by a small copse containing a mobile phone mast; to the north by Cock Hat; to the east by Coit Lane with the playing fields of Silverdale School beyond and to the south-east by a further small copse and mobile phone masts. At the time of the survey the field was under short grass.

4.2.4.2 The geophysical survey results revealed a notable feature towards the west. The feature F2 comprises two positive linear anomalies of reasonably strong magnitude which meet at an obtuse angle. Although the two sides of the feature terminate abruptly there is a clear discontinuity in the southern part of the feature which may indicate an entrance. The anomalies almost certainly represent ditches of probable archaeological origin and it is certainly feasible that the feature represents part of an enclosure. However it is also possible the anomalies represent more ordinary, though ancient, field boundaries.

4.2.4.3 Two weak positive linear anomalies (BR1 and BR2) on an east-west alignment that respects the alignment of the extant field boundaries are either field boundary remains, crop boundaries, possible ridge and furrow or plough scarring. A number of further anomalies/striations on the same alignment almost certainly indicate relatively modern plough scarring. It is not thought that these anomalies are archaeologically significant.

4.2.4.4 An enigmatic group of weak positive anomalies (group BR3 to BR6) which continue into, and are more obvious in, the field to north, Cock Hat (see 4.2.5.2), may represent military communication slit or practice trenches which may date from anytime between the first and second World Wars. However, this interpretation will remain speculative in the absence of any invasive investigation. It is not clear if anomaly BR7 is also part of the same group or indicates the presence of a separate cut feature. A jumbled group of dipolar and truncated linear anomalies in the north-east corner of the field (BR8) are likely to represent modern disturbance in the entrance to the field and are unlikely to be archaeologically significant.

4.2.5 Cock Hat

4.2.5.1 Cock Hat is located at the northern part of the estate, lying to the west of Coit Lane and being the most northerly field surveyed as part of this project. The field is roughly triangular with the apex in the north and encompasses approximately 1.5 ha.

The field slopes from west to east and more gently from south to north from a high point of 292m AOD in the south-west to a low point of 281m AOD along most of the north-eastern boundary. The field is bounded to the south by Big Rye; to the north-west by arable fields that lie outside the Whirlow estate and to the north-east by Coit Lane with the playing fields of Silverdale School beyond. At the time of the survey the field was under short grass.

4.2.5.2 In the south east a number of positive linear anomalies which appear to be arranged in a zigzag formation (CH1 to CH3 and possibly CH4) and are undoubtedly contemporary with anomalies BR3 to BR6 in Big Rye have, at this stage, also been interpreted as military trenches (see 4.2.4.4). Towards the apex of the field a pair of positive linear anomalies CH4 and CH5 entirely respect the alignment of the extant field boundary and are therefore probably modern and agricultural.

4.2.6 Wigley

4.2.6.1 Wigley is located at the southern tip of the estate and comprises 2.7 ha. The irregular field falls steeply from north to south from a high point 245m AOD to a low point of 219m AOD. The field is bounded to the south and west by the Limb Valley; to the east by Fenney lane and a housing estate beyond and to the north by the field known as Barley (not included in the geophysical survey but surveyed as part of the 2011 project – Taylor 2011). At the time of the survey the field was under short grass.

4.2.6.2 An earthwork, which appears to bisect the field on a south-west/north-east alignment, was noted during the fieldwork and this corresponds to anomaly W1 which was recorded clearly in the geophysical survey results. The anomaly comprises a linear feature with both a positive and negative component and this will relate to the probable ditch and bank of the former boundary. The boundary appears on the Ordnance Survey (OS) map of 1898 but had partially disappeared by 1905 and entirely disappeared by 1922. To the south of W1 there is a subtle hint of possible ridge and furrow cultivation. A large spike in the data on the alignment of W1 is likely to represent modern disturbance – a borrow pit or removal of a boundary feature such as a tree.

4.2.6.3 The geophysical survey results are busier to the south of anomaly W1. At the very south-eastern extent of the surveyed area a large area of disturbance (W2), indicated by strong responses of both polarities with no discernable form, was recorded and this corresponds with the location of a quarry which appeared on the OS maps from about 1893, but had disappeared by 1922. The extent of the anomaly is larger than the mapped area of the quarry but it is likely that the quarry was surrounded by areas of associated disturbance and industrial activity and associated general disturbance and this accounts for the geophysical response.

4.2.6.4 To the south-west of the area of clear disturbance a further group of anomalies (W3) is less conclusive. Although it is most likely that the anomalies are the result of activity associated with the quarry there is sufficient evidence to suggest, albeit tentatively, a more significant archaeological origin, possibly indicating the presence of a boundary ditch surrounding a group of pits. W3 again comprises positive and negative anomalies although this time the general arrangement of the group is more regular.

4.2.6.5 To the north of W2 and W3 further linear anomalies were recorded: W4 a positive linear anomaly which is weaker in magnitude than W1 and on a contrasting alignment and W5 an erratic negative linear anomaly on a more north-south alignment. Anomaly W5 is surrounded at the southern end by positive discrete anomalies which form a linear arrangement (group W6) and it may be that W5 and group W6 indicate the presence of a poorly preserved linear ditched feature which may be a boundary or more likely a track way leading to the quarry.

4.2.6.6 In the north-east corner of the field a fairly weak linear anomaly (W8) might be overlooked other than it shares an alignment with, and appears to be aligned with the western entrance of, the Iron Age/Roman enclosure in Hall field (Taylor 2011). Although the enclosure is on the opposite side of Fenney Lane it is only 30m away. Positive discrete anomalies W9, W10 and W11 are possibly of archaeological interest and are worthy of further investigation.

5.0 DISCUSSION AND CONCLUSIONS

5.1 The results of the geophysical survey are accurate and reliable and only minimal processing of the raw data was necessary. The results have revealed further evidence for significant buried archaeological remains within the Whirlow Hall Farm estate.

5.2 The most remarkable discovery was made at the western end of the field known as Bole Hill on a plateau that occupies a prominent position in the landscape commanding wide vistas. A square double-ditched/construction socket enclosure of c. 30 m external dimensions with a clear entrance in the east may represent a Roman watch tower or signal station. At the time of writing this feature is earmarked for field evaluation as part of the programme of excavations being carried out by this project. No further definite archaeologically significant features were identified in the field but a number of anomalies are of probable archaeological interest and are certainly worthy of further investigation including what appears to be an arcing boundary ditch.

5.3 The block of four fields that lie to the east of Bole Hill also appear to contain features of archaeological interest. Most notably, within the field known as Big Rye, a feature comprising two positive linear anomalies of reasonably strong magnitude which

meet at an obtuse angle was recorded. Although the two sides of the feature terminate abruptly there is a clear discontinuity in the southern part of the feature which may indicate an entrance. The anomalies almost certainly represent ditches of archaeological origin and it is feasible that the feature represents part of an enclosure. However, it is also possible that the anomalies represent more ordinary field boundaries.

- 5.4 Also within Big Rye, and in Cock Hat immediately to the north, an unusual and enigmatic group of anomalies was recorded. The anomalies indicate that features are present which appear to be, at least partially, arranged in a zigzag formation. At this stage the anomalies have been interpreted as military communication or practice trenches probably dating from the period during or between the first and second World Wars but this interpretation remains speculative. Within the fields known as Little Bank and Big Bank several presumably contemporary anomalies which do not respect the arrangement of the extant field boundaries were recorded and it is likely that these represent late prehistoric or Roman field boundaries.
- 5.5 At the southern end of the estate in the field known as Wigley clear evidence of a former field boundary was recorded and it is likely sub-surface remains of a bank and ditch survive. To the south of the former field boundary evidence of a former quarry and possible track way was revealed as well as a further possible field boundary and traces of ridge and furrow cultivation. It is not clear if a group of anomalies to the south-west of the quarry are archaeologically significant or are simply further evidence of industrial activity associated with the quarry itself. In the north-east corner of the field a linear anomaly shares the same alignment as the Iron Age/Roman enclosure that was discovered in 2011 and is located just 30m away on the opposite side of Fenney Lane. For this reason the anomaly may indicate a linear feature that is contemporary with the enclosure.

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- 7.1 All statements and opinions contained within this report arising from the works undertaken are offered in good faith and compiled according to professional standards. No responsibility can be accepted by the author/s of the report for any errors of fact or opinion resulting from data supplied by any third party, or for loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in any such report(s), howsoever such facts and opinions may have been derived.

8.0 ACKNOWLEDGEMENTS

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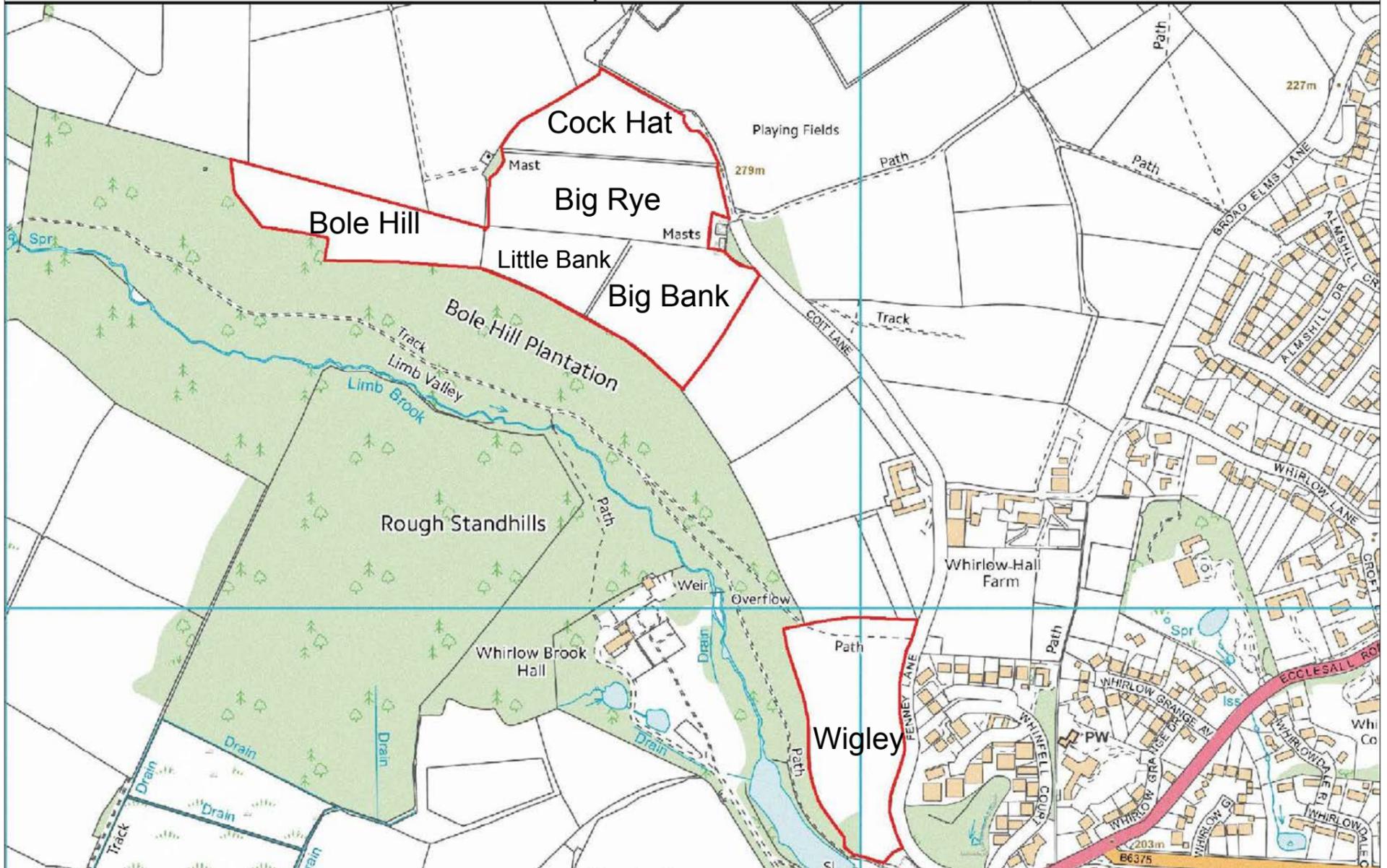
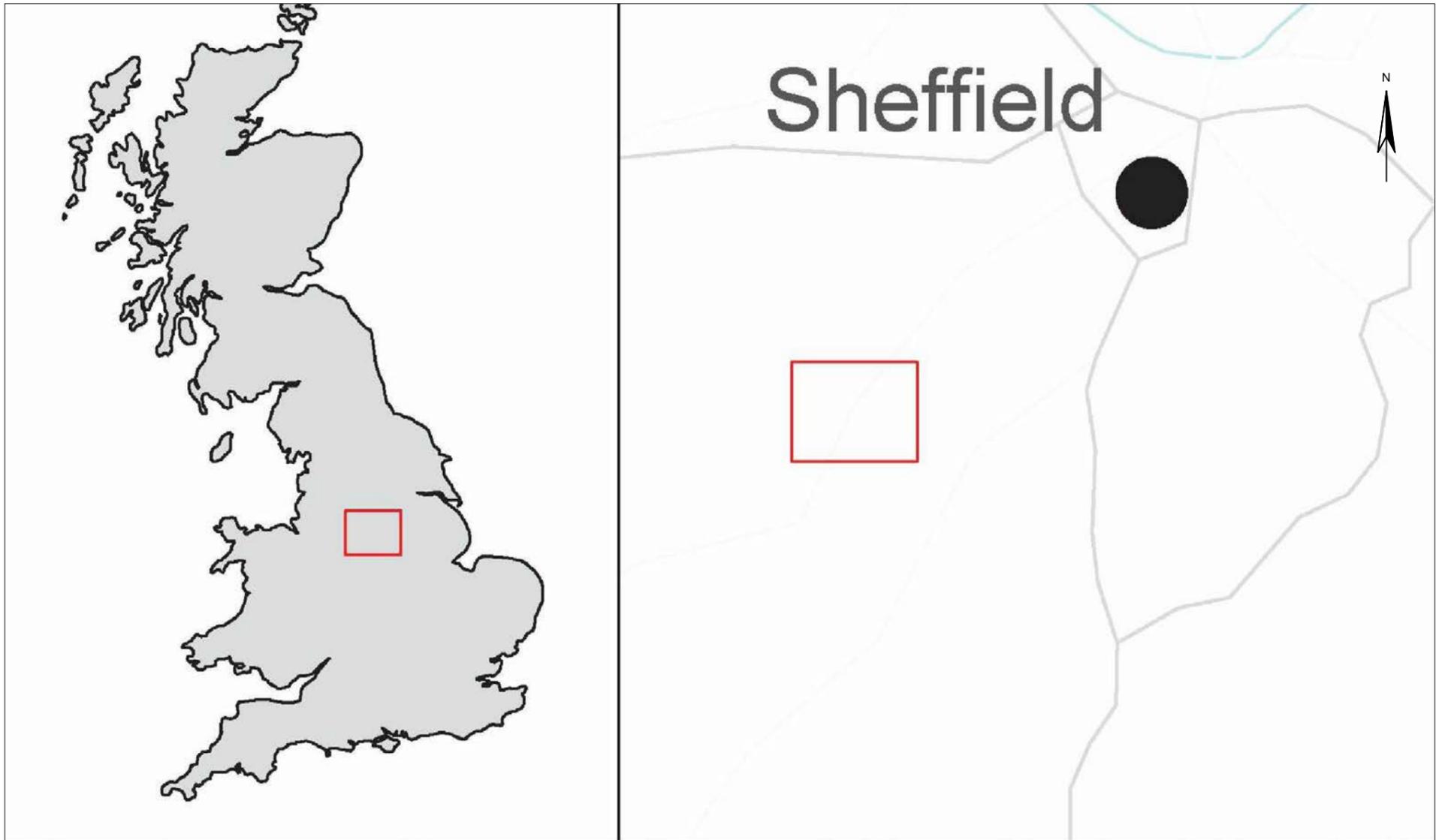
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Appendix 1: Figures



Archaeological Research Services Ltd
 Angel House
 Portland Square
 Bakewell
 Derbyshire
 DE45 1HB

Site Code: WHF
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 Date June 2016
 Drawn: RD
 Scale: As shown

Figure 1
 Site Location

Key:  Geophysical survey areas



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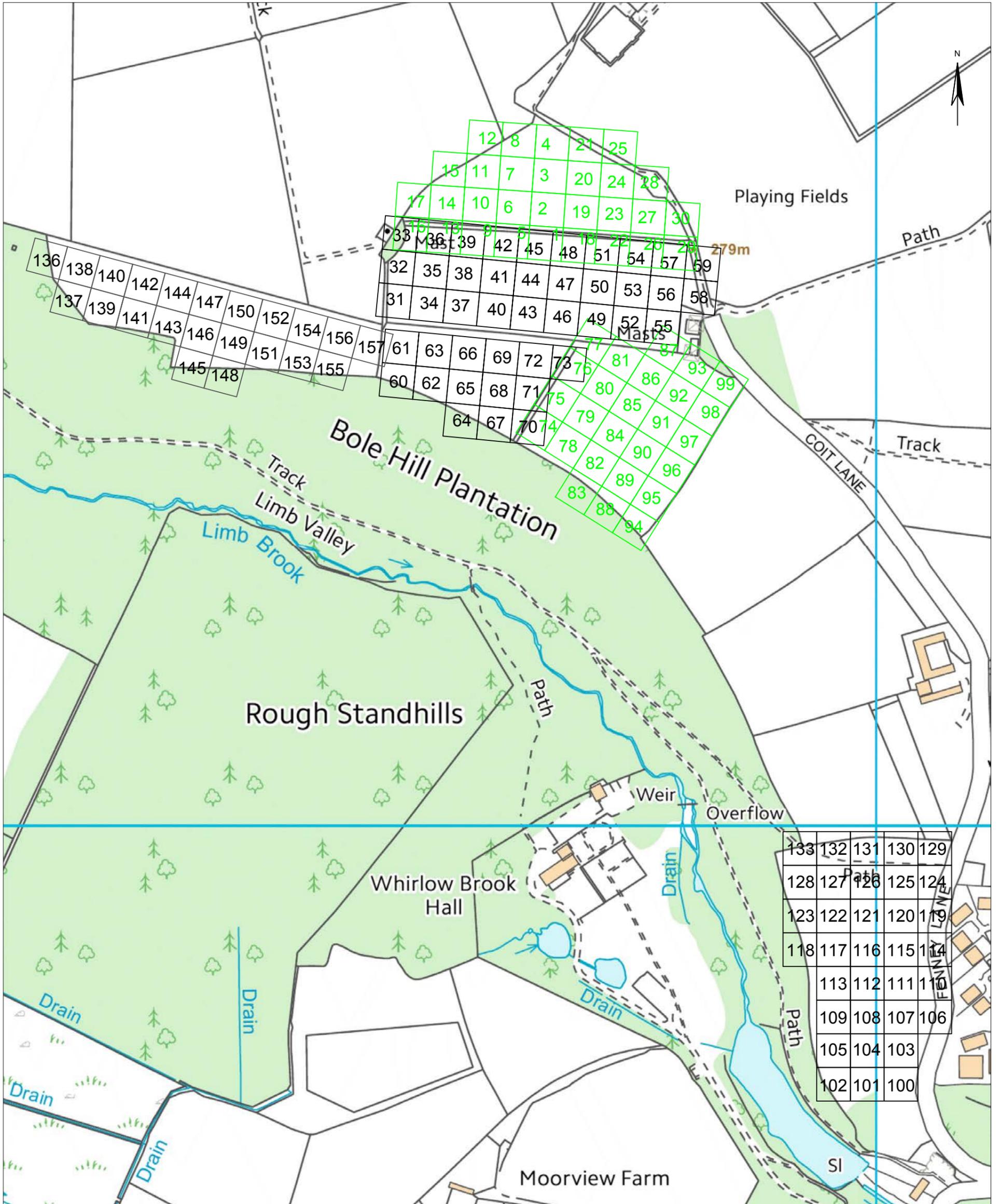


Figure 2
Location of Survey Grids

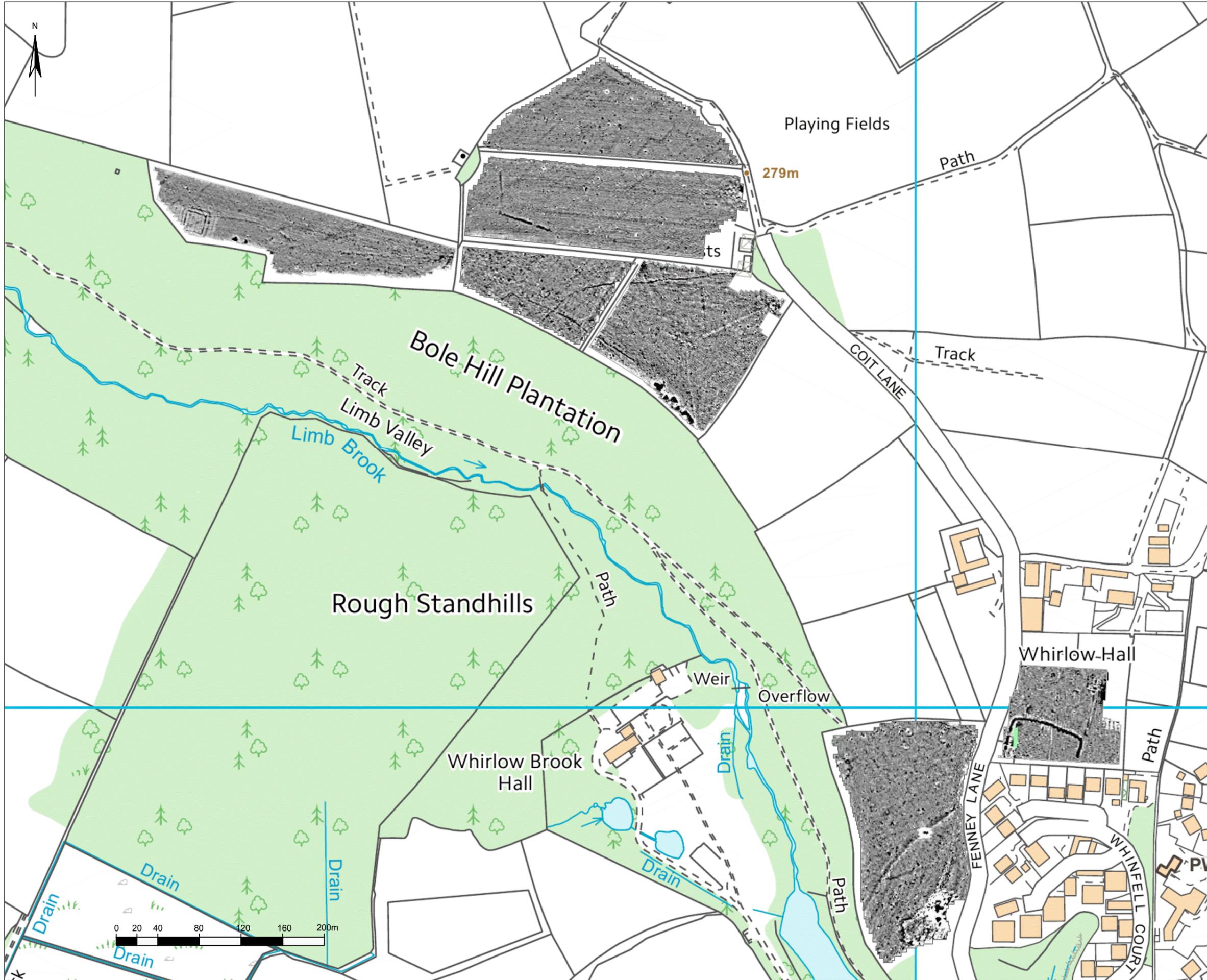
- Key:**
- 1 30m x 30m Survey Grid Cock Hat and Big Bank
 - 31 30m x 30m Survey Grid remaining fields

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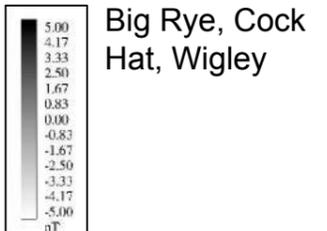
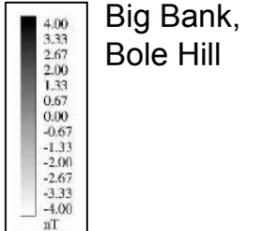
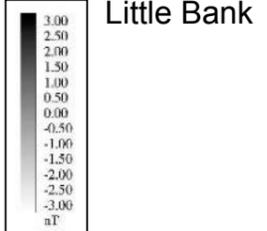


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Site Code: WHF
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 Scale: As Shown

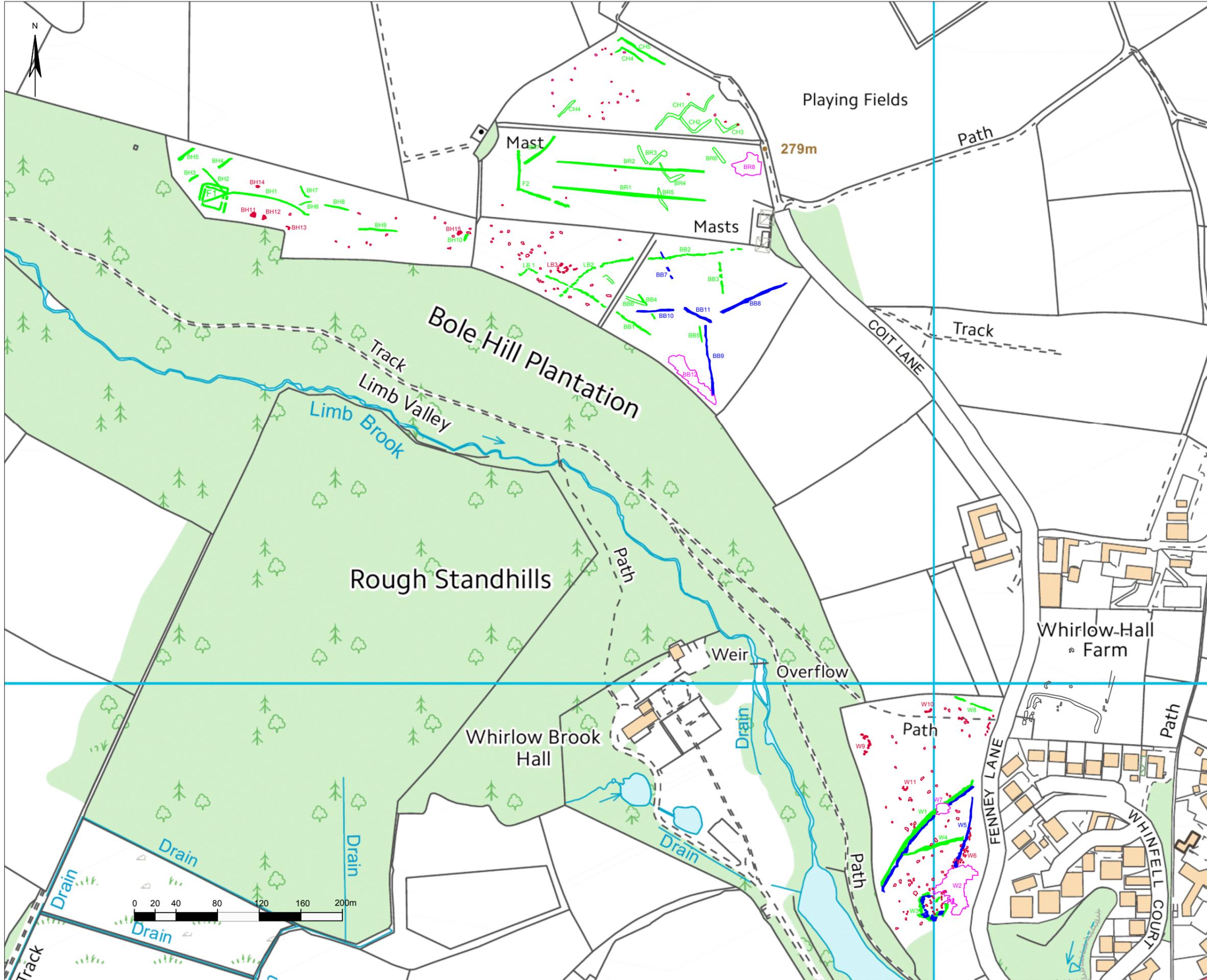
Figure 3
 Greyscale Shade Plot of
 Processed Gradiometer
 Data

Key: Plotting parameters



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 Date: June 2016
 Drawn: RD
 Scale: As Shown

Figure 4
 Interpretative Plan

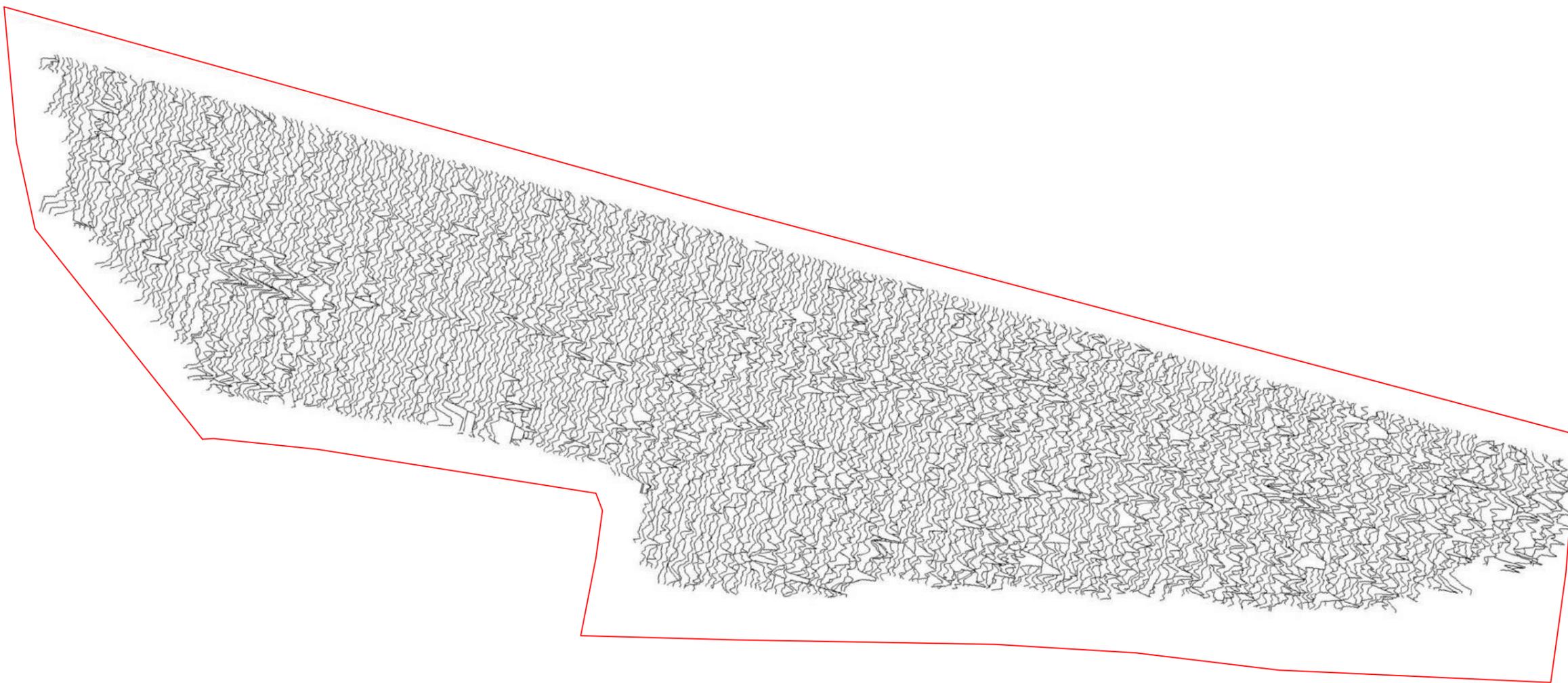
- Key:
- Positive linear anomaly
 - Negative linear anomaly
 - Weak positive linear anomaly (possible military feature)
 - Positive discrete anomaly included in results
 - Positive discrete anomaly not included in results
 - Positive and negative anomaly
 - Features identified in 2011

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Figure 5
Trace Plot Bole Hill

Key:

 Bole Hill Field Boundary

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Figure 6
Trace Plot Little Bank

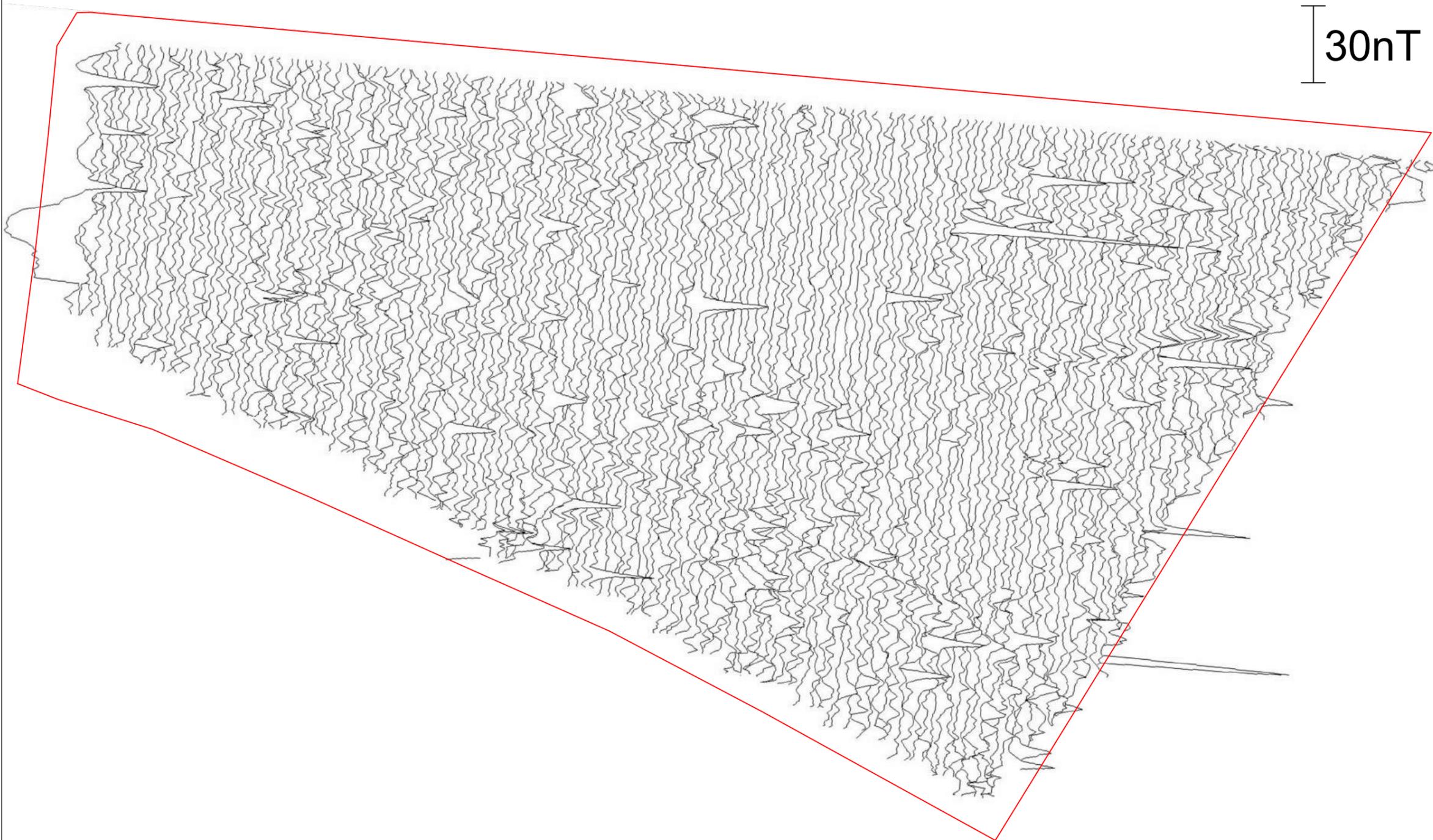
Key:

 Little Bank Field Boundary

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Figure 7
Trace Plot Big Bank

Key:

 Big Bank Field Boundary

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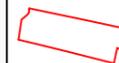


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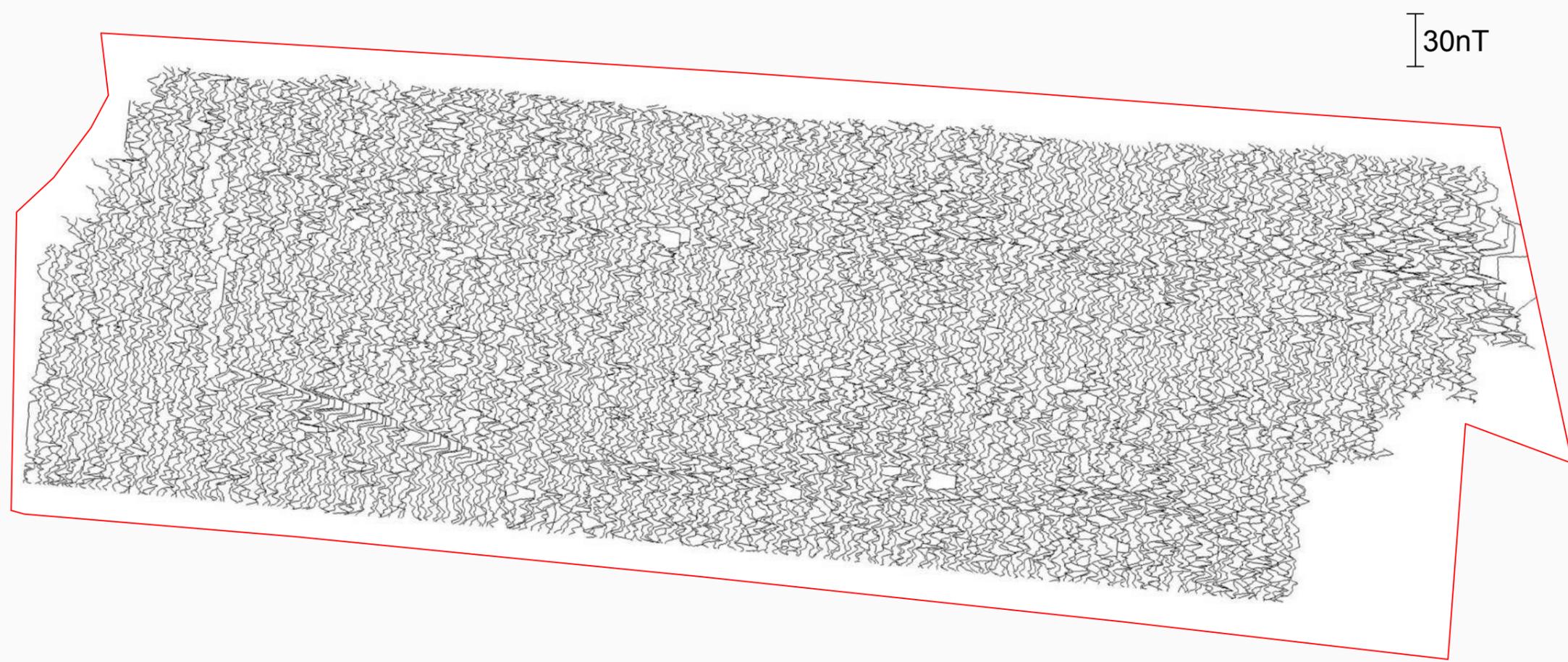
Figure 8
Trace Plot Big Rye

Key:

 Big Rye Field Boundary

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Figure 9
Trace Plot Cock Hat

Key:

 Cock Hat Field Boundary

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Figure 10
Trace Plot Wigley

Key:  Wigley field boundary

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Figure 11
 Greyscale Shade Plot of
 Processed Gradiometer
 Data from 2011 and
 2016

Key:

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