Welsh Government

M4 Corridor around Newport

Environmental Statement Volume 3: Appendix 8.4 Detailed Gradiometer Survey Report

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Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was commissioned by Costain Vinci Joint Venture, acting on behalf of the Welsh Government, with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features located along the route of the M4 CAN Scheme. These works are to support the planned development of the new M4 route, leaving the current M4 at Junction 29 (NGR 325233, 184050), to the north of Castleton, crossing the Gwent levels to the south of Newport before re-joining the M4 at Junction 23a in the east, just north west of Magor (NGR 342780, 187787).

The survey comprised of largely agricultural land along the proposed route of the road scheme in the vicinity of Magor, Newport and Castleton. The detailed gradiometer survey has been successful in identifying anomalies of Archaeological origin; in particular, towards the eastern end of the scheme, a circular ditch feature (**4001**) which has been interpreted as Bronze Age or Iron Age with nearby enclosures which are likely to be of a similar period (**4002**, **4003** and **4005**). Further west there are more recent land divisions and field systems in the form of linear features at **4013** and **4023** which are likely medieval or post-medieval in date.

Numerous small pits and amorphous magnetic responses have been interpreted as possible archaeology throughout the site, although those in close proximity to the archaeological features noted above may be from a similar period.

The remaining features relating to agricultural practice with ploughing trends, ceramic field drains and former field boundaries identified. These are presumed to be post-medieval and/or modern in origin.

A number of areas with high magnetic responses were also noted and it is likely that these are related to previous phases of construction along the M4 corridor. These areas of increased magnetic response may mask magnetic anomalies of potential archaeological interest.

The survey was undertaken between June and September 2015 by Wessex Archaeology's in-house geophysics team and covered a total of 52.4 ha. The geophysical survey was unable to be undertaken on certain plots of land due to access issues and the potential for damage to crop during the time allocated for the survey. Also, additional areas were added to the scheme after the surveys had been completed.

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Monmouthshire, South Wales

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Acknowledgements

The detailed gradiometer survey was commissioned by RPS for Costain Vinci Joint Venture on behalf of the Welsh Government. The assistance of Mick Rawlings, Andy Walton and Richard Spooner is gratefully acknowledged in this regard.

The fieldwork was directed by Jen Smith and Garreth Davey and undertaken by Jen Smith, Garreth Davey, Chris Hirst, Diana Chard, Stewart Wareing and Alistair Salisbury. Garreth Davey, Alistair Salisbury and Jen Smith processed and interpreted the geophysical data. Garreth Davey and Alistair Salisbury also wrote this report. The geophysical work was quality controlled by Genevieve Shaw and Dr Paul Baggaley. Illustrations were prepared by Richard Milwain. The project was managed on behalf of Wessex Archaeology by Nick Cooke.

M4 CAN,
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Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology (WA) was commissioned by RPS for Costain Vinci Joint Venture (hereafter the Client) on behalf of the Welsh Government, to carry out a geophysical survey over land along the M4 CAN Scheme, Monmouthshire, South Wales (**Figure 1**), hereafter "the Scheme" between NGR 325233, 184050 and 342780, 187787. The survey forms part of an ongoing programme of archaeological works being undertaken in advance of construction of the new M4 "Corridor around Newport" road scheme.

1.1.2 The aim of the project was to conduct a geophysical survey in an attempt to establish the presence/absence, extent, character and date of archaeological remains in view of the proposed development and its associated facilities, services and infrastructure.

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

1.2 Site Location and Topography

1.2.1 The Scheme is approximately 23 km in length and the geophysical survey areas of this phase are located near the existing motorway junctions at Magor and Castleford.

1.2.2 Geophysical surveys were undertaken at 14 areas along the proposed route of the Scheme (**Figure 1**); all of these areas are currently agricultural use and are predominantly haylage and silage.

1.2.3 Survey areas at the eastern extents of the Scheme are located around the village of Magor. The fields east of Magor occupy a relatively flat area of land used primarily for haylage. These are bordered to the north by the existing M4 motorway and Calidcote Road (B4245) to the south on a slight south-facing slope from 9 m to 20 m above Ordnance Datum (aOD).

1.2.4 The sites north of Magor comprise of agricultural land utilised for livestock. These are bounded to the south by the M4 motorway and further agricultural land and by hedgerow boundaries to the north on a west facing slope descending from 37 m to 12 m aOD.

1.2.5 Sites west of Magor comprise further haylage land, bounded to the west by the A4810 and further agricultural land to the east. These are located on a primarily south facing slope rising from 12 m to 30 m before dropping back to 22 m to the north.

1.2.6 Survey areas at the western extent of the Scheme are located northeast of Castleton and west of Coedkernew. The bulk of these are 2 km northeast of Castleton, immediately south of the A48. These fields are of mixed agricultural usage on a south-eastern facing slope from 11 m to 35 m aOD at the highest point.

1.2.7 Further geophysical survey areas within the scheme include small fields located 1.25 km northeast of Castleton, south of the M4 Motorway and north of the A48. These are undulating fields at 44 m to 50 m aOD with the westernmost parcel of fields located on the north-eastern edge of Castleton, southeast of the A48, on a southeast facing slope from 21 m – 27 m.

1.3 Soils and Geology

1.3.1 The bedrock geology at the eastern extents of the Scheme are recorded as primarily Mercia Mudstone and Black Rock Limestone formations with variable overlying River Terrace deposits and Alluvium deposits of sand and gravels. The western extents are recorded largely as St Maughans formation sandstones with overlying River Terrace and Alluvium sand and gravel deposits as well as small areas of Diamicton Till (BGS).

1.3.2 The soils underlying soils the Scheme are variable. To the western extents of the Scheme the soils are primarily recorded as of 571b (Bromyard) and stagnogleyic argillic brown earths of 572m (Salwick) whilst to the east these are recorded as primarily typical argillic brown earths of 571q (Escrick 2) and typical brown earths of 541z (East Keswick 3) (SSEW 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.

1.3.3 The deposit model report compiled by Wessex Archaeology (2016) shows extensive peat and alluvium deposits underlying much of the proposed scheme. Predominantly found centrally along the Gwent Levels but concentrated specifically west of the Caldicott Level towards the River Usk. River Terrace deposits were observed at the east and western extents of the scheme with only a thin underlying layer of alluvium. The geophysical surveys presented in this report were conducted primarily on these river terrace deposits and did not identify any broad scale geological changes.

1.4 Archaeological Background

1.4.1 A full detailed description of the archaeological background has been presented in the Archaeology and Cultural Heritage Baseline Assessment (Wessex Archaeology 2014). The findings of this report has been summarised here and are referred to where applicable within the geophysical interpretations.

Prehistoric

1.4.2 Evidence for Mesolithic occupation has been uncovered during excavations at Goldcliff, Llandevenny, Uskmouth and Magor. Preserved human footprints at Uskmouth and Magor have been dated to 6250 +/- 80 BP and 5720 +/-80 BP respectively. Alongside these, a small wooded island has been indentified as a Late Mesolithic site located at Goldcliff where a substantial collection of worked flints and faunal bones bearing cut marks were recovered.

1.4.3 Evidence of Late Bronze Age occupation have been identified with timber roundhouses recorded at Rumney Great Wharf and Chapel Tump. Bronze Age occupation is evident at Caldicot and Golden Hill with the remains of Bronze Age boats having been recorded at both.

Iron Age and Romano-British

1.4.1 Iron Age buildings, trackways and rectangular structures have been identified during excavations near Goldcliff, Magor and Caerleon. A significant Iron Age hillfort, Wilcrick Hill lies approximately 1km to the west of Magor, confirmed by geophysical surveys and subsequent evaluations.

1.4.2 The Roman period saw the construction of a fortress at Usk and forts at Monmouth and Abergavenny with a later fortress being constructed at Caerleon. Excavations in the area have recorded extensive roman drainage and field systems as well as pottery assemblages and burials of both animal and human.

Early medieval and medieval

1.4.3 Limited evidence suggests that Caerleon and Caerwent remained important areas of occupation throughout the Early Medieval period and Caerwent was a key ecclesiastic centre throughout the 6th and 7th centuries with medieval trackways recorded throughout the area on tithe maps and Monks Ditch, west of Whitson is recorded as potential canalised river. Other evidence for structures and ditches have been uncovered during excavations whilst a number of house platforms and moated sites have been identified in LiDAR data which are thought to be either Medieval or Post-Medieval in origin.

Modern

1.4.4 The development of the docks, canal, tram and rail networks in the area were all linked to the needs of the local industries, in particular the coalfields. The Alexandra Docks at Newport were developed during this period with the North Dock being opened in July 1875 and the due to rapid expansion of nearby industry, the South Dock was constructed and opened in 1893 before being expanded further in 1907 and again in 1914.

1.4.5 Newport was the target of multiple air raids throughout the Second World War (WWII) due to its location and importance. As a result, defensive structures such as anti-aircraft batteries, pillboxes and air-raid shelters are evident throughout the area with one recorded at Sycamore Farm, Llandevenny with another recorded just outside the survey area on Barecroft Common.

1.4.6 Newports industrial prosperity continued into the 20th century with important sites being constructed during this period. These include the buildings of Solutia Engineering Works, opened in 1949 and the Llanwern Steelworks (formerly Spencer Works) opened in 1962.

2 METHODOLOGY

2.1 Introduction

2.1.1 The detailed gradiometer survey was conducted using a Bartington Grad 601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (English Heritage 2008).

2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team during between June and September 2015. Field conditions at the time of the survey were generally good. A total of 52.4 ha of the proposed 60 ha scheme was surveyed; the reduction in surveyed area is due to artificial obstacles, field boundaries, areas of overgrowth etc.

2.1.3 The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies, however. Similarly, it is difficult to estimate the depth of burial of the services through gradiometer survey.

2.1.4 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 encountered than have been identified through geophysical survey. In the southern area especially few anomalies of archaeological potential have been identified, possibly due to the strong magnetic response from the superficial geology.

2.2 Method

2.2.1 The geophysical survey was conducted in general accordance with guidance from the Chartered Institute for Archaeology (CIfA) Standards and Guidance 2014 handbook for methods of best practise in the field (CIfA 2014) and to EH guidelines for geophysical survey (English Heritage 2008).

2.2.2 Individual survey grid nodes were established at 30 m x 30 m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02 m and therefore exceeds English Heritage recommendations (English Heritage 2008).

2.2.3 The gradiometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25 m intervals along transects spaced 1m apart with an effective sensitivity of 0.03 nT, in accordance with English Heritage guidelines (English Heritage 2008). Data were collected in the zigzag method.

2.2.4 Data from the survey were subject to minimal data correction processes. These comprise a zero mean traverse function (±5 nT thresholds) applied to correct for any variation between the two Bartington sensors used. A single partial grid required zero mean traverse processing on a ±10 nT threshold. A deslope function to remove grid edge discontinuities and a de-step function to account for variations in traverse position due to varying ground cover and topography. These three steps were applied to all survey areas, with no interpolation applied.

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

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

3.1.1 The gradiometer survey has been successful in identifying anomalies of archaeological interest across the Site, along with former field boundaries and agricultural features predominantly in the form of ploughing trends and ceramic field drains.

3.1.2 Results are presented as a series of greyscale and XY plots, with corresponding archaeological interpretations, at a scale of 1:1500 (**Figures 2** to **40**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image and ±25 nT at 25 nT per cm for the XY trace plots.

3.1.3 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends. Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

3.1.4 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

3.2 Gradiometer Survey Results and Interpretation: Eastern Survey Areas

3.2.1 The majority of features identified in parcel 520a (**Figure 4**) appear to be of agricultural and construction related origin. A former field boundary has been identified at **4000**. This appears on the 1882 edition Ordnance Survey (OS) map. A large amount of ferrous along its length has been detected which is likely related to its construction or to the modern trackway neighbouring the eastern survey extent. A number of trends have also been identified here. These are likely to be possible ditch-like features however given their weak magnetic responses these are difficult to accurately identify or interpret. A modern service has also been detected at **4027**.

3.2.2 The parcels 515c and 515d (**Figure 7**) present extremely noisy magnetic properties. Such responses are often attributed to made ground and it is possible that these fields have been disturbed due to their proximity to the existing M4 motorway with the ground level here raised to form embankments. Any archaeological features here will be masked by the much stronger responses from the made ground identified here, however a number of small feint trends have been identified which may be of interest.

3.2.3 Parcel 514a (**Figure 10**) has a uniform, magnetic background. Throughout the parcel of land there are plough scars orientated southwest to northeast following trends seen elsewhere in the survey. Areas of increased magnetic response identified may signify a change in soil structure or underlying geology. Numerous trends are also evident in the areas of increased magnetic responses. These may prove to be of interest however these exhibit weak magnetic responses in contrast to the increased surroundings.

3.2.4 Weak linear anomalies around **4009** are interpreted as possible ditches or cut sections. However, as the field was once divided into smaller field parcels as seen in mapping from 1882 (Ordnance Survey) these ditches may allude to these past field systems. These are defined as possible archaeology due to their weak magnetic response and no clear relationship with any other archaeology present in the fields to the north.

3.2.5 At **4010** a weakly magnetised rectilinear ditch-like anomaly has been identified as possible archaeology. The feature is approximately 22 m northeast-southwest and 10 m northwest-

southwest however this is likely to have been truncated as there is no evidence for ditch-like features to the south.

3.2.6 Parcel 515a (**Figures 13, 16** and **19**) contains several anomalies of archaeological potential. The recorded features include a circular cut feature, a number of linear anomalies possibly forming two separate enclosures and possible pit-like features throughout. These features maybe of Iron Age or Romano-British origin given the archaeological history of the area and may be associated with the undated standing stone recorded of the eastern extents of the survey area. Alongside these, clear evidence for ploughing trends have been identified with variable orientations. In addition to these there are some areas of superficial geological responses and a number of modern services have also been highlighted.

3.2.7 A weakly defined pair of parallel trends orientated northwest-southeast, adjacent to the circular anomaly **4001,** may allude to a previous field division due to similar alignments to current extant boundaries in neighbouring fields.

3.2.8 The circular anomaly has been identified as archaeology at **4001** shown by positive magnetic responses approximately 18 m in diameter, with the gully being approximately 2.5 m in width. This is likely to represent a ring gully of a former roundhouse, or a possible round barrow ring ditch due to its size and form.It is likely to be late Bronze Age or Iron Age. There are some anomalies identified as possible archaeology in the same field which may be related.

3.2.9 However, the strong dipolar magnetic anomalies at **4004** have been identified as possible archaeology but are likely to have a more modern origin, although the exact nature of this feature is unclear. Some stonework was evident on the surface at this feature during the fieldwork and it is possibly a small hollow back filled with rubble.

3.2.10 Weak +1-2 nT linear anomalies at **4002** are aligned northwest southeast before turning northeast and then southeast. These are likely to be cut ditch features and are approximately 2 m wide. The group of linear anomalies may form a small enclosure of approximately 45 m east west, though its north-south dimension is unclear. A small fragment of ditch-like anomalies is evident to the south and may form the southern boundary however, no relation is evident. While it is difficult to propose a date for ditch features like this their size and form suggest that they may be an Iron Age enclosure.

3.2.11 A fragmented linear anomaly can be seen at **4003**. The feature is likely a cut ditch, predominately aligned northeast to southwest and is approximately 130 m long and 3 m wide. This may be evidence for a boundary ditch however, given its proximity and correlation to the existing field boundary it may also be evidence for movement of field boundaries.

3.2.12 Around **4005** a number of anomalies have been interpreted as Probable Archaeology, which form a fragmented ditch-like feature. These are approximately 1.5–2 m in width and appear to form a possible causeway, orientated east – west, which opens up at the western end. This causeway is approximately 13 m wide. Where the causeway opens, linear ditch features at **4006** and **4007** approximately 2 m wide may form a further enclosure however there is no evidence remaining for the western extents. These three features may be related to the enclosure to the south at **4002**.

3.2.13 These features may be of Late Bronze Age or Iron Age and are of particular interest given their proximity to a recorded standing stone on the eastern boundary of the field, approximately 120 m from the **4001** and approximately 350 m from the enclosures.

3.2.14 At **4007** the fragmented ditch has become orientated north-south. This feature is made up of three fragments approximately 20 m in length and approximately 3 m wide. This feature is likely a cut ditch and may represent a form of land division potentially forming the northern boundary of a possible enclosure.

3.2.15 At **4008** a number of small fragmented linear anomalies can be seen. These are likely to be cut ditch features however there is no clear pattern to interpret their purpose, however these are likely related to features identified at **4005** on the other side of the existing field boundary.

3.2.16 Parcels 510a, 3bk, 511b, (**Figure 22**) present only a small amount of archaeological potential. A number of small possible pit-like features have been identified alongside very short linear anomalies which have all been interpreted at Possible Archaeology as their form and limited extents do not allow for a more definite interpretation. The remaining anomalies in the areas are likely of agricultural origin presenting further ploughing trends.

3.2.17 An isolated linear ditch-like anomaly is evident at **4011** aligned northwest southeast, which has been classified as Archaeology**.** This is approximately 1.5 m in width, however given its continuation out of the survey area to both the northeast and southwest, its full length is unknown. This is likely to be a cut ditch feature however given its isolation, its origin is unknown.

3.2.18 In Parcel 430c/495b (**Figure 25**) a possible pit has been identified at **4012.** This pit is approximately 12 m in diameter and appears to contain a large amount of ferrous material. It is unknown whether this is modern in origin or of archaeological potential, however given the proximity of further pits they have been interpreted as Possible Archaeology.

3.2.19 The parcels 490a and 410b (**Figure 25**) are largely masked by high magnetic responses likely related to the construction of the water culvert and balancing pond in the area and the presence of derelict caravans and vehicles to the east of the area.

3.2.20 Parcel 999ay (**Figure 28**) shows a complex of linear anomalies. The majority of these appear to form an area of land division with linear anomalies orientated northeast to southwest and others running northwest to southeast appearing to join them together. These features appear to correlate with features identified in the survey conducted by Wessex Archaeology (2008), see Appendix 3 (**Figures 41 and 42**), immediately to the north-east of this area where these linear features continue.

3.2.21 Defined linear anomalies at **4013** aligned northeast southwest highlight ditch-like features of approximately 2.5 m in width and at least 80 m in length. A single northeast southwest aligned linear meets the northern ditches at a perpendicular angle and extends out of the survey area to the south though, it may potentially meet the southern ditch. These linear anomalies appear to form a possible area of land division with a potential trackway running along the north. These have been interpreted as Archaeology and are likely to be evidence for a historic field system and past agricultural activity in the area but it is uncertain from what period.

3.2.22 A further linear anomaly has been identified at **4014** as Probably Archaeology. This is aligned east southeast-west northwest but extends beyond the survey extents to the east and west and is difficult to interpret given the small area of survey here however it looks to correlate with features in the previous geophysical survey, see Appendix 3 (**Figures 41 and 42**) (WA, 2008) and may form more of the field system identified at **4013.**

3.3 Gradiometer Survey Results and Interpretation: Western Survey Areas

3.3.1 Parcel 1ba (**Figure 31**) contains no significant features of archaeological potential. The detected features appear to originate from agricultural activity with ceramic field drains at **4017** and **4018,** ploughing trends around **4019, 4020** and **4021**.

3.3.2 A linear anomaly of positive magnetic response is identified at **4015** within Parcel 1ba (**Figure 34**) and is aligned northwest-southeast measuring approximately 65 m albeit fragmented. This has been interpreted as archaeology as it has strong positive magnetic responses however given its alignment and correlation with the existing field boundary, this may prove to be evidence for moving boundaries.

3.3.3 A shorter isolated linear ditch-like feature of +2-3 nT responses has been identified at **4016** aligned north-south approximately 20 m long and 1.5-2 m wide, however small fragmented responses to the south may also form part of the feature. This may be of archaeological interest and has been classified as Possible Archaeology. However potential for further discovery of archaeology may be masked by the possible modern services around **4029 – 4034.**

3.3.4 Parcel 139b (**Figure 37**) contains a linear feature **4022** which has been classified as Possible Archaeology. The feature is likely a cut ditch-like feature however given its irregular shape, it may be two or more features in close proximity. Overall this feature appears isolated however the majority of this area is covered by ferrous readings originating from the metal fences, animal shelters and modern services potentially masking any further anomalies of possible archaeological interest and making identification difficult.

3.3.5 Parcel 102c (**Figure 40**) contains further anomalies interpreted as Archaeology which are likely related to land division with further evidence for agricultural activity and ploughing identified. A complex of ditch like features is evident at **4023**, the longest of these are aligned northwest southeast with shorter anomalies adjoining these aligned northeast southwest. It is likely that these are evidence for a field system however none of the features appear to extend into the surveyed area to the west. A number of linear trends have also been identified within this area on differing alignments however the majority of these are have weak magnetic responses and form no clear pattern.

3.3.6 A further linear anomaly at **4024** aligned northwest southeast before turning east southeast is approximately 50 m in length and 2 m wide. This may form more of the field system at **4023** however as its alignment differs from the other features in the area, it may be of a different phase or origin and may be unrelated

3.3.7 Two short ditches at **4025** aligned east-west only appear in the south-eastern field. There is no evidence for either continuing into the next field. The southern-most of these is likely to represent the former field boundary as seen in OS mapping from 1883 (Ordnance Survey). It abuts the western extent to create a former triangular enclosure. Whilst the northernmost is a possible cut ditch-like feature, it is difficult to interpret further as there is no clear evidence for it extending beyond the survey area to the east and west. However it may be related to the historic field boundary.

3.3.8 A weaker northeast-southwest aligned linear anomaly at **4026** is approximately 100 m long and 1.5–2 m wide. This may be related to the field system of **4023** as it respects the alignments, however as there is no evidence for any of the features crossing into this field from the east, this is a speculative relationship.

3.4 Gradiometer Survey Results and Interpretation: Modern Services

3.4.1 A number of modern services have been identified in both the Eastern and Western survey areas. These can be seen at **4027** and **4028** in the eastern area and **4029** to **4034** in the western areas.

3.4.2 It is not clear from the geophysical data whether any of the services identified are in active use. It should also be noted that 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 CONCLUSION

4.1.1 The detailed gradiometer survey has been successful in identifying anomalies classified as Archaeology, Probable, Possible Archaeological potential in the survey areas across the scheme.

4.1.2 The most defined archaeology has been identified in Parcel 515a, where evidence for a potential roundhouse feature, **4001**, two possible enclosures at **4002** and **4003**, one with a causewayed entrance and further linear ditches have also been identified at **4005**. Given the archaeological background of the Site these are features have been interpreted as Bronze Age or Iron Age in origin, however, further investigation would be needed to confirm this.

4.1.3 Two further areas of archaeology have been identified. These are likely evidence for areas of potential land division and/or field systems around **4013** and **4023**, though exact dating for these features is also unknown. The field system at **4013** appears to correlate with linear features identified in former geophysical surveys, see Appendix 3 (**Figures 41 and 42**), within the adjoining fields (WA 2008).

4.1.4 Parcels 520a and 1ba present features of only agricultural origin such as ploughing and drainage as well as some modern services. In parcels 515c, 515d, 410b and parts of 490a high magnetic responses have been identified that will mask any other features. These responses are likely related to the construction of the M4 and associated culverts and embankments of the area.

5 REFERENCES

5.1 Bibliography

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Wessex Archaeology, 2014. *Archaeology and Cultural Heritage Baseline Assessment, M4 Corridor Around Newport, South Wales*. Unpublished Client Report.

Wessex Archaeology, 2016. *Geoarchaeological Deposit Modelling Report,* Unpublished Client Report

5.2 Cartographic and documentary sources

1882 Monmouthshire 25” (1:2500)

1886-7 Monmouthshire 6” (1:10,560)

1901 Monmouthshire 25” (1:2500)

1902 Monmouthshire 6” (1:10,560)

1921 Monmouthshire 25” (1:2500)

1922 Monmouthshire 6” (1:10,560)

Soil Survey of England and Wales, 1983.*Sheet 5, Soils of South West England*. Ordnance Survey: Southampton.

5.3 Online resources

UK Soil Observatory, http://www.ukso.org [accessed July 2015]

British Geological Survey, http://www.bgs.ac.uk [accessed July 2015]

APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey Methods and Equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m 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 0.03nT over a ±100nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system 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 English Heritage (2008) for geophysical surveys.

Scanning surveys consist of recording data at 0.25m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH, 2008).

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 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.

Post-Processing

The magnetic data collected during the detail survey are downloaded from the Bartington 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.

As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

Typical data and image processing steps may include:

- Destripe – Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;
- Destagger – Shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Despike – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- 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.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- 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:

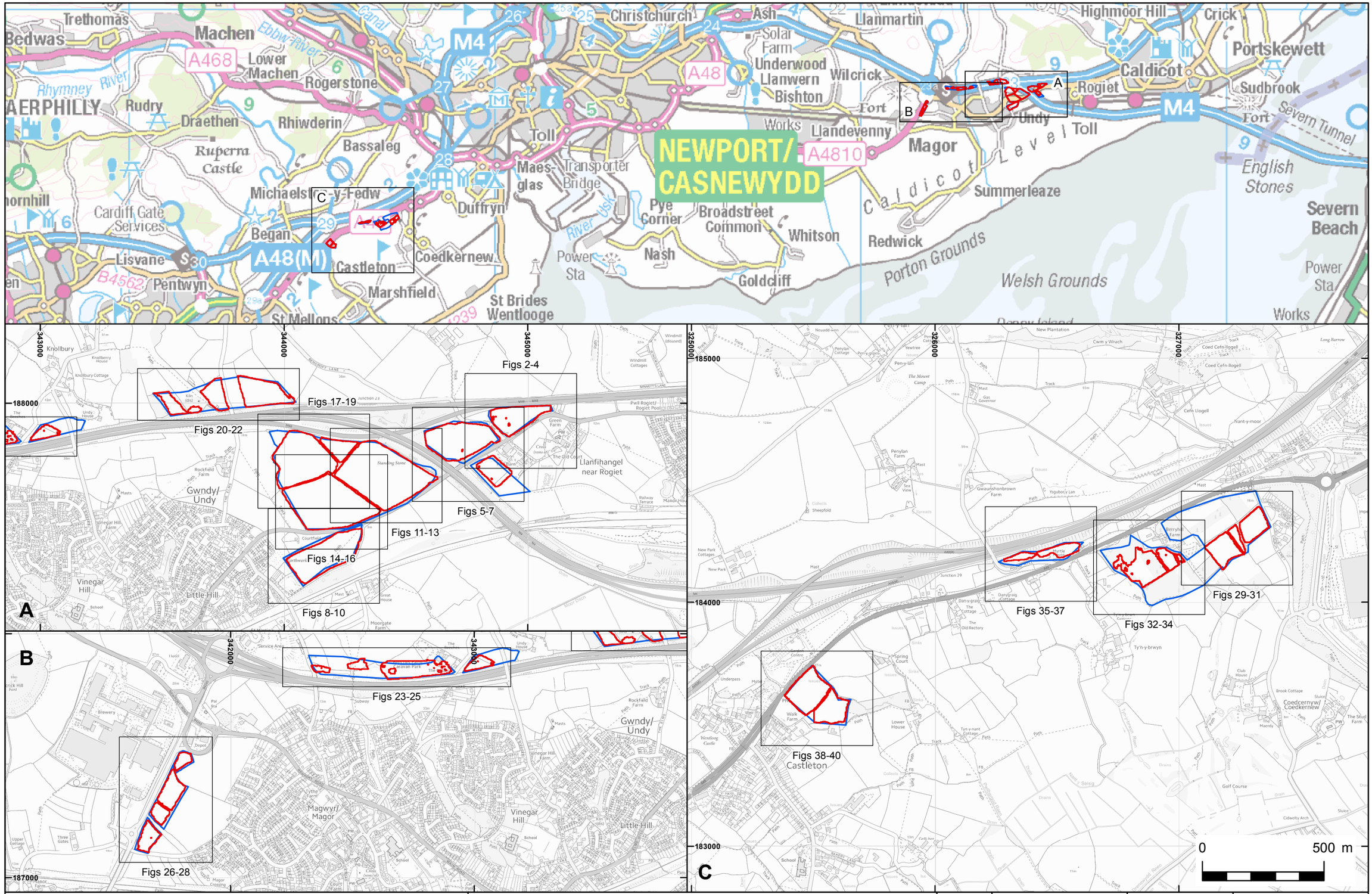
- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Agricultural – used for ditch sections that are aligned parallel to existing boundaries and former field boundaries that are not considered to be of archaeological significance.
- 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.

APPENDIX 3: PREVIOUS 2008 GEOPHYSICAL SURVEY

Presented as Figures 41 – 44.



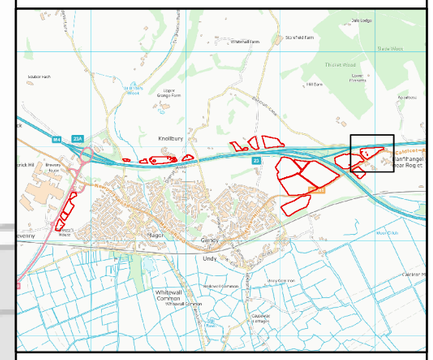
Detailed Survey Extents

Site

Date:	08/10/2015	Revision Number:	0
Scale:	1:100000 and 1:15000 at A3	Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS\FigsMXD\Geophys\2015_10_08\102831_Fig01.mxd		

Site location and detailed survey extents

Figure 1



Detailed Survey Extents

Site

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Revision Number:	0
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Illustrator:	RAM
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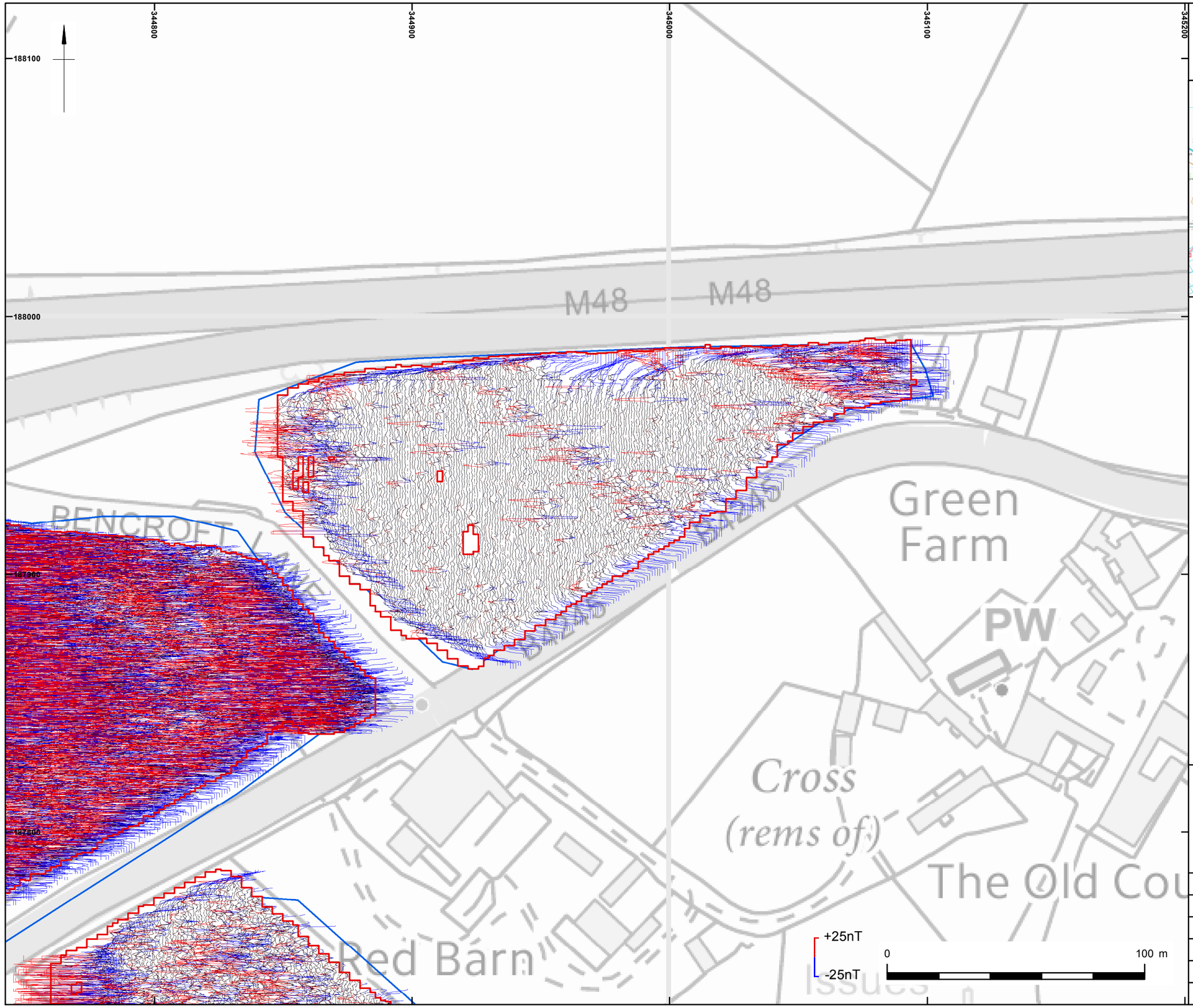
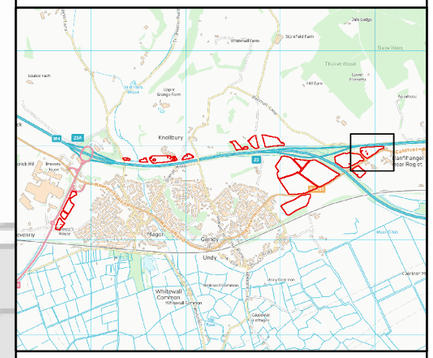
FigsMXD\Geophys\2015_10_08\102831_Fig02.mxd	

Greyscale plot: Area 520a

Figure 2





Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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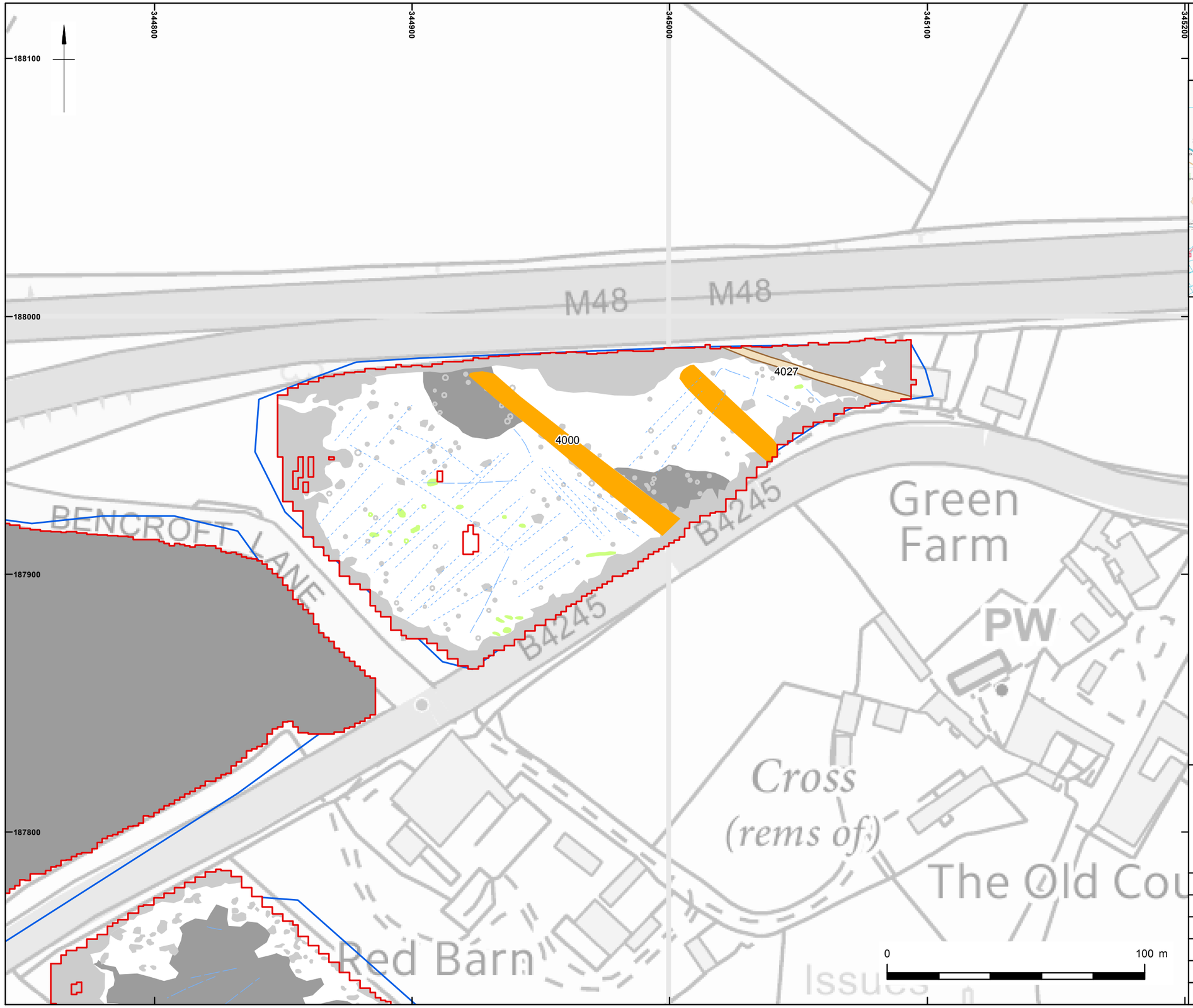
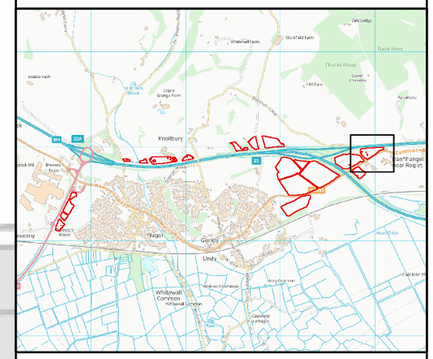
FigsMXD\Geophys\2015_10_08\102831_Fig03.mxd	

XY trace plot: Area 520a

Figure 3





- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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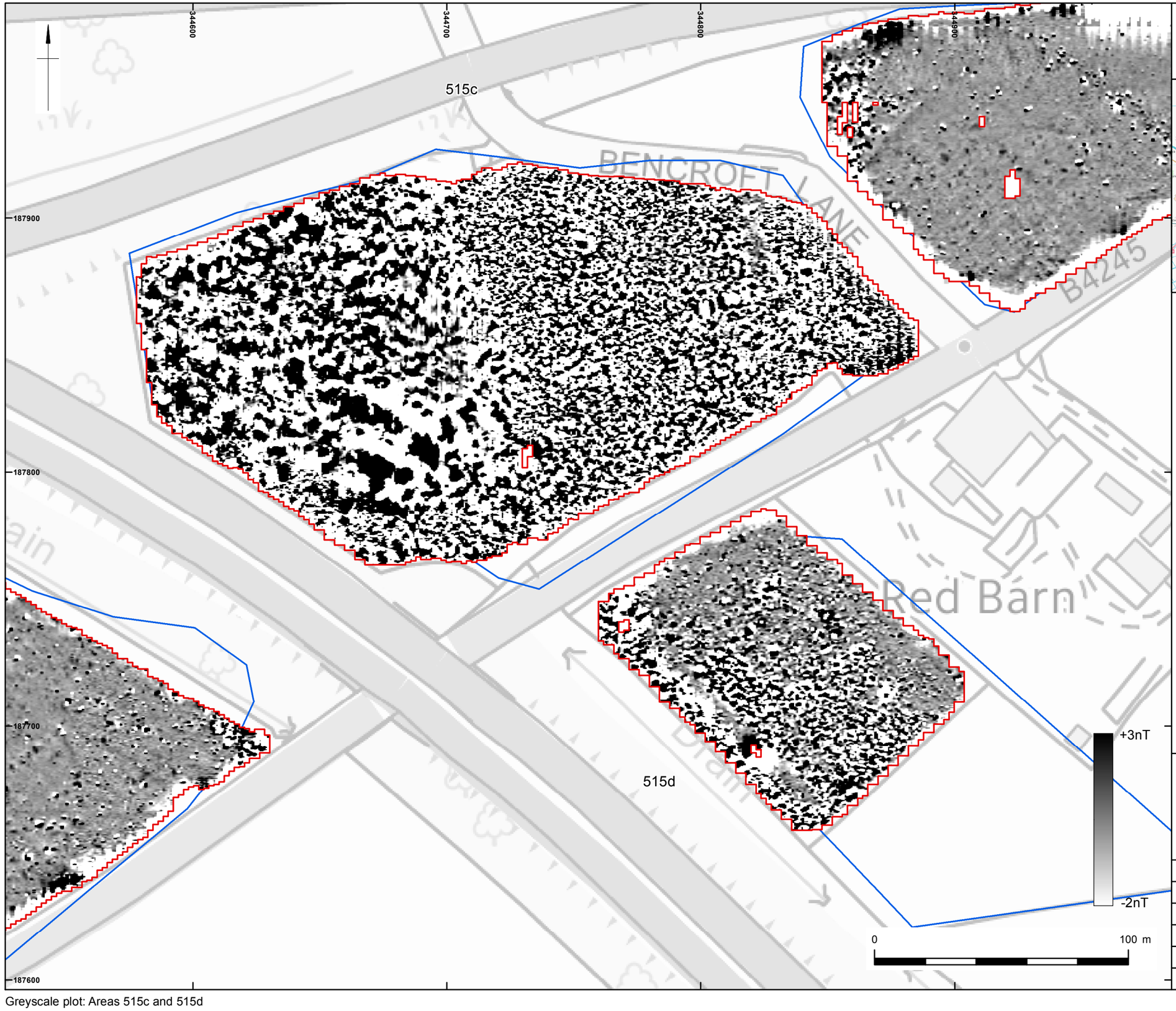
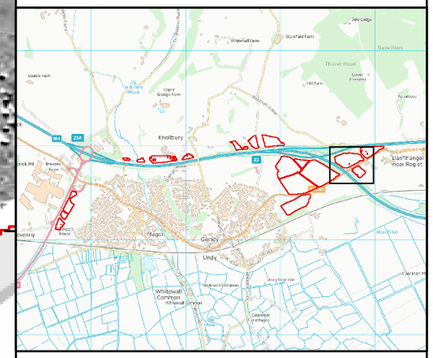
FigsMXD\Geophys\2015_10_08\102831_Fig04.mxd	

Interpretation: Area 520a

Figure 4





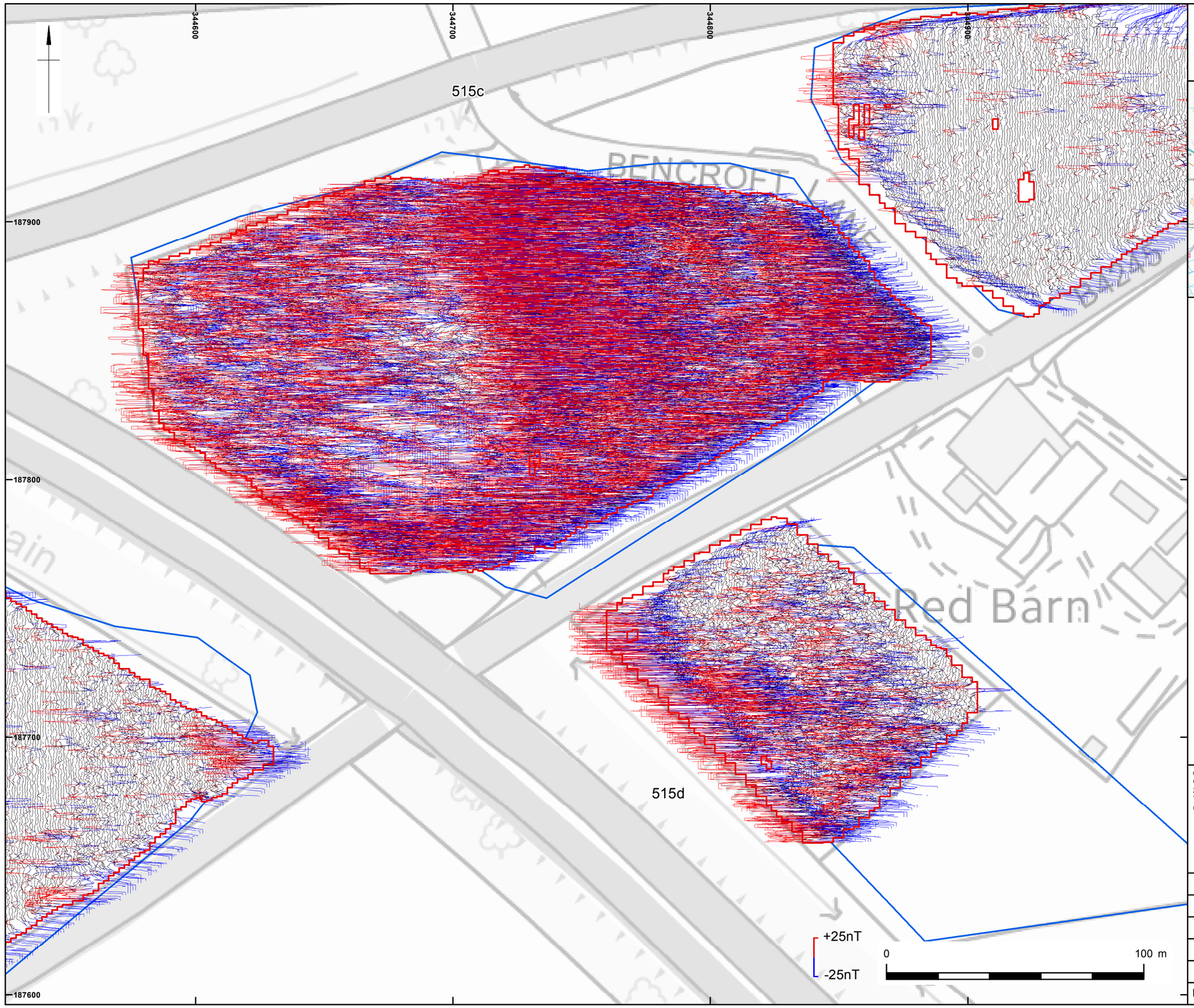
Detailed Survey Extents

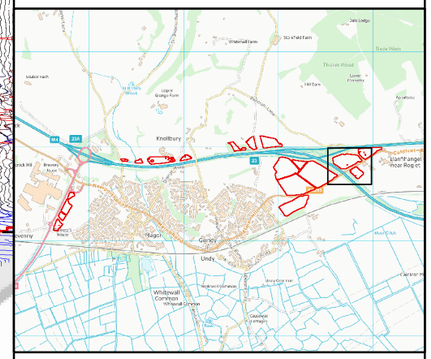
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
	FigsMXD\Geophys\2015_10_08\102831_Fig05.mxd

Greyscale plot: Areas 515c and 515d

Figure 5





Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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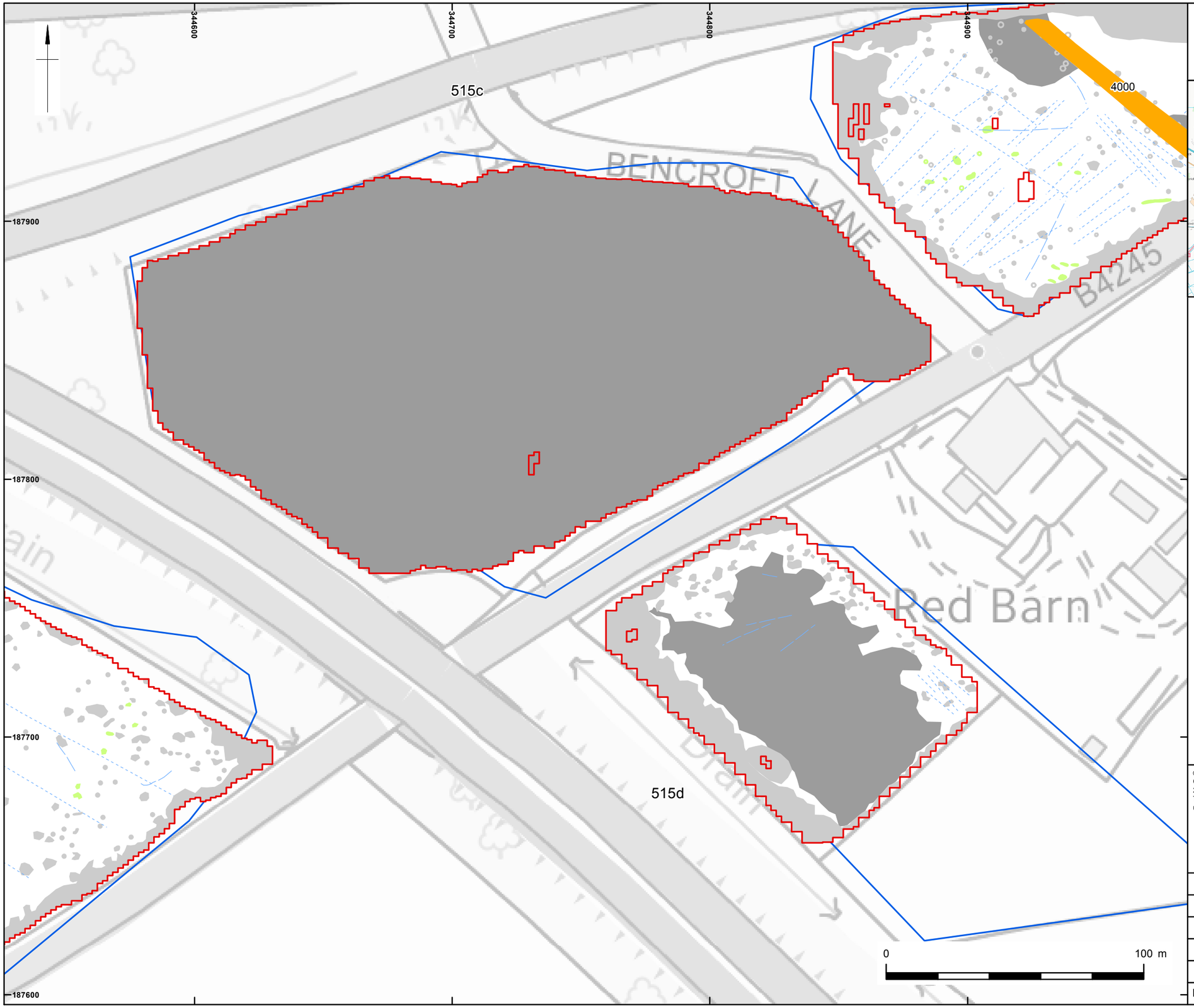
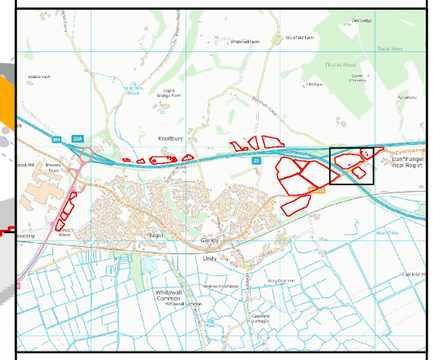
XY trace plot: Areas 515c and 515d

Figure 6



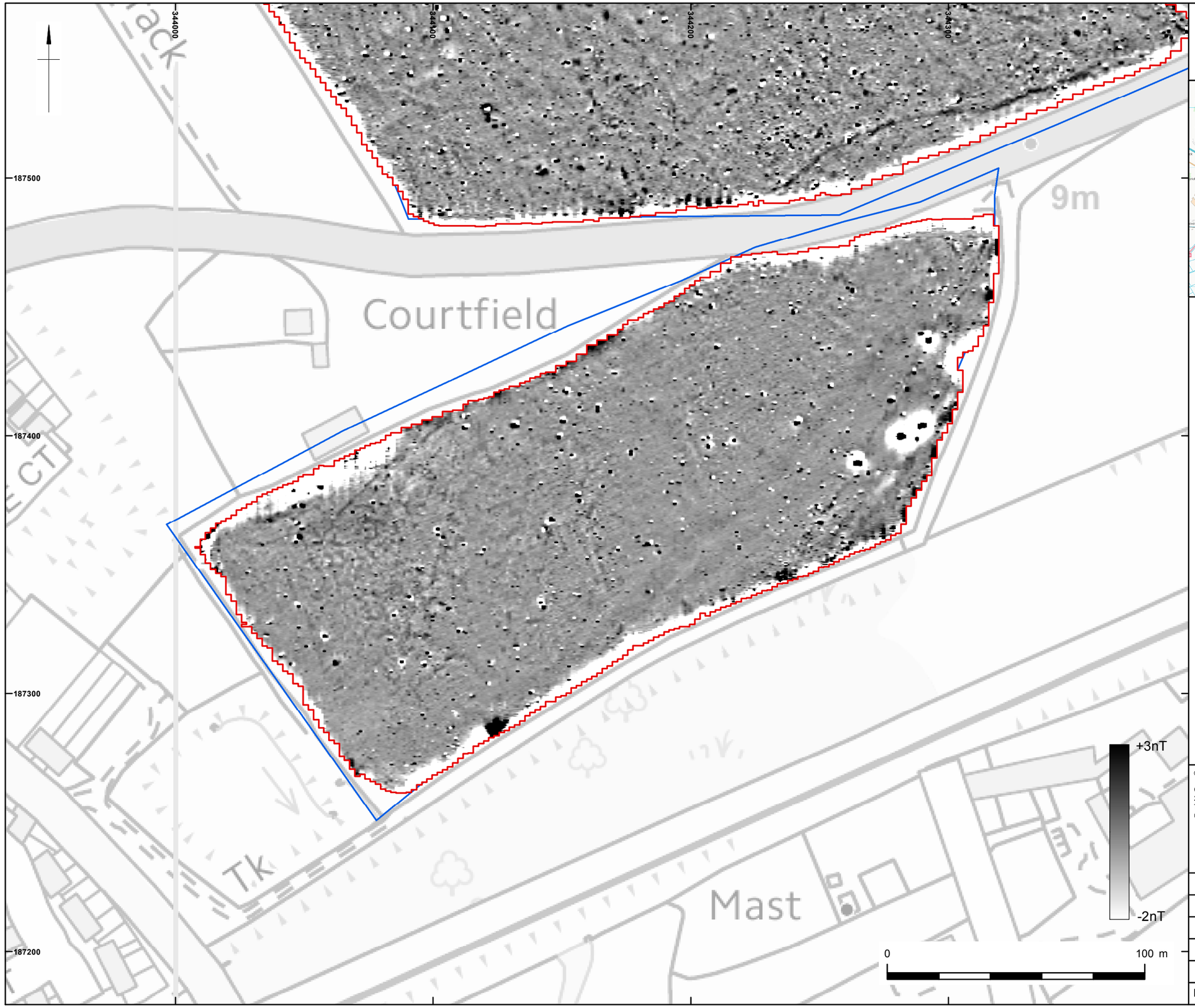


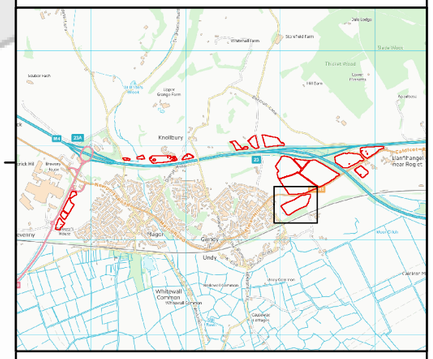
Detailed Survey Extents
Site
Archaeology
Probable Archaeology
Possible Archaeology
Modern Service
Agricultural
Former Field Boundary
Ferrous
Increased Magnetic Response
Superficial Geology
Drainage
Ploughing
Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig07.mxd	

Interpretation: Areas 515c and 515d

Figure 7





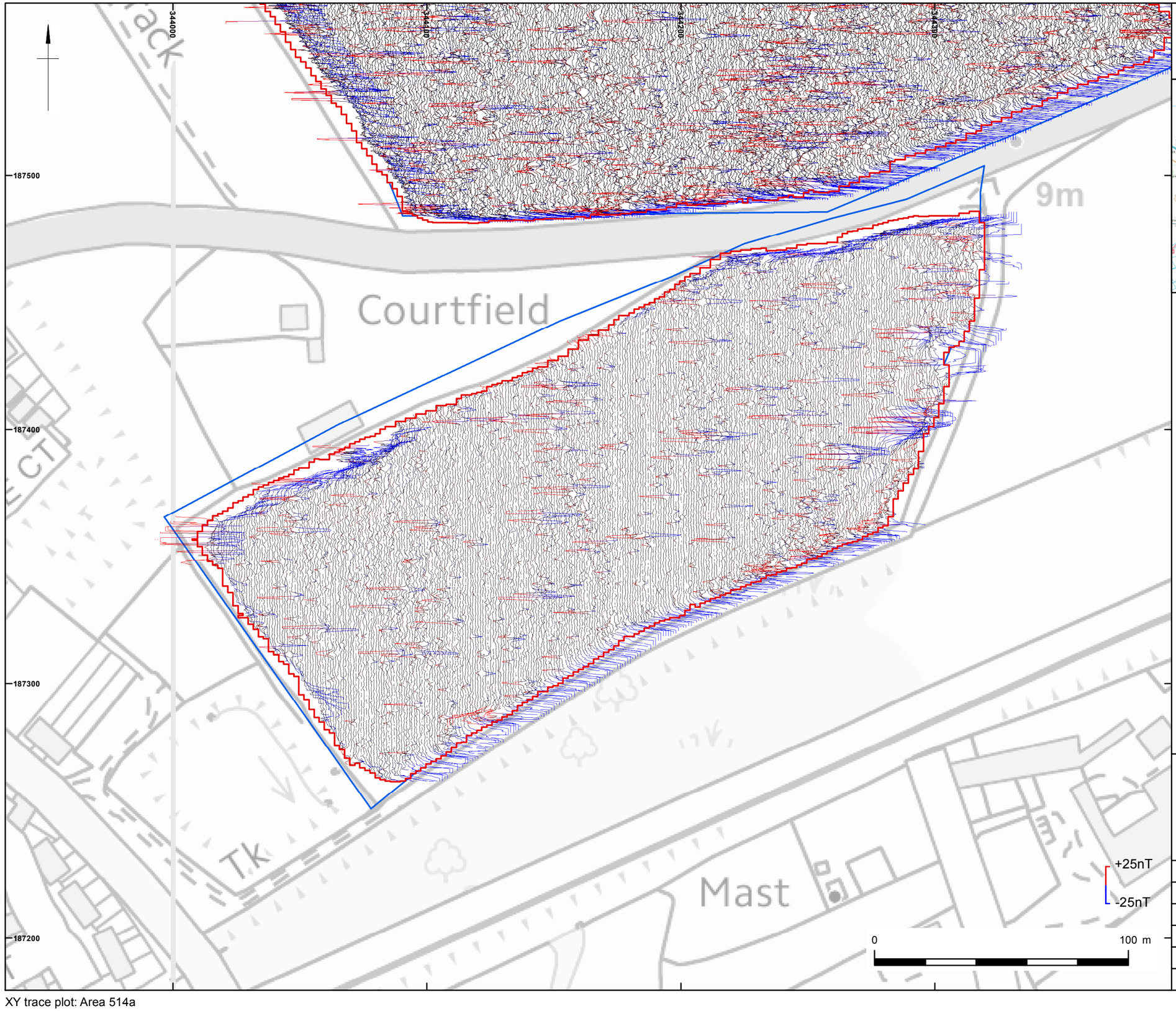
Detailed Survey Extents

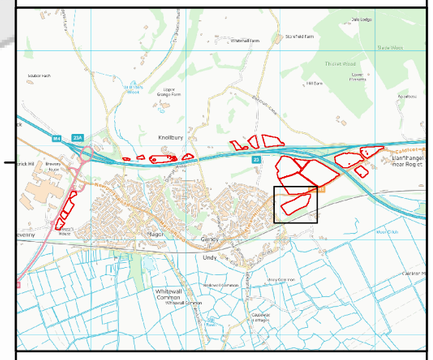
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig08.mxd	

Greyscale plot: Area 514a

Figure 8





Detailed Survey Extents

Site

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Revision Number:	0
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Illustrator:	RAM
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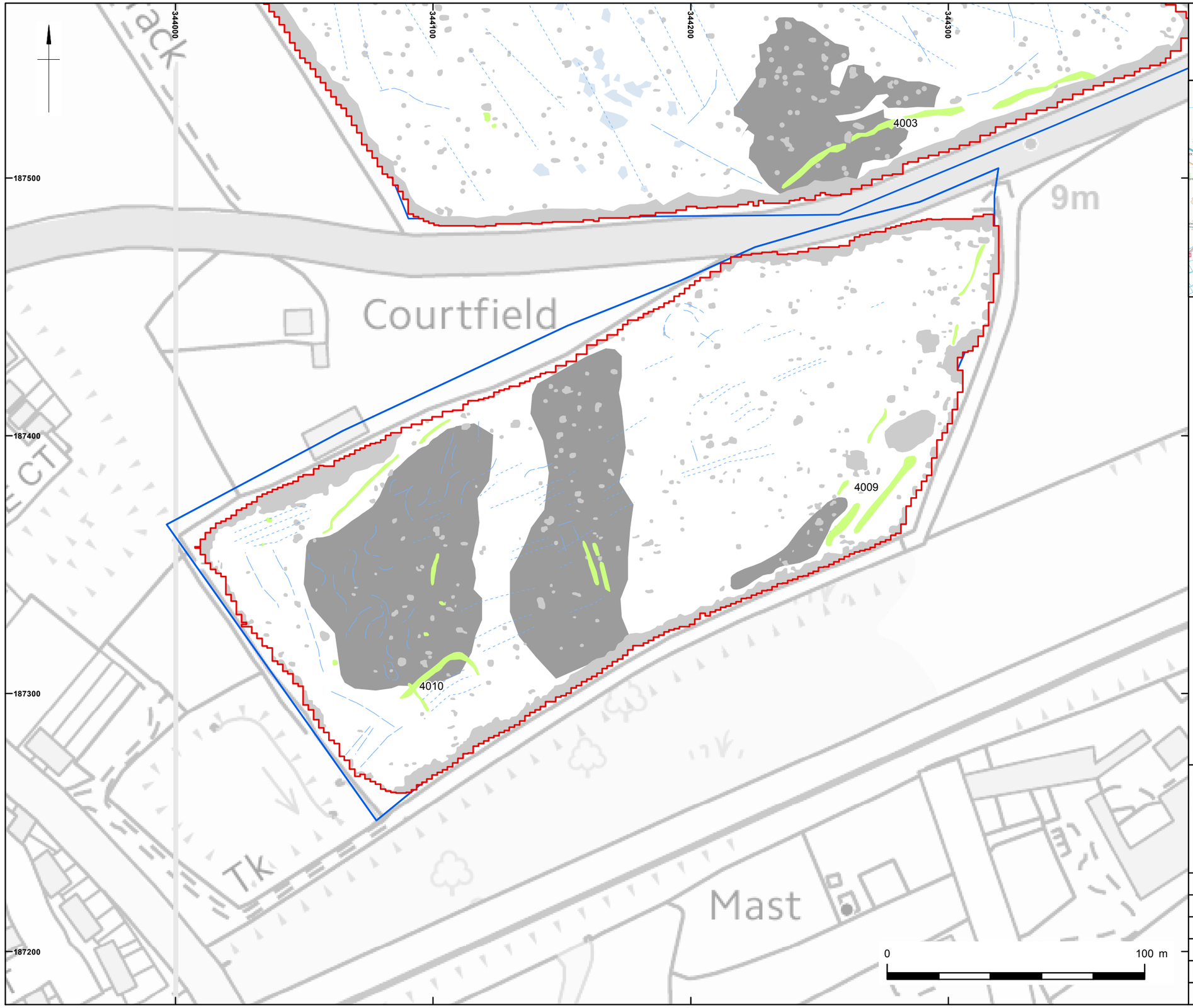
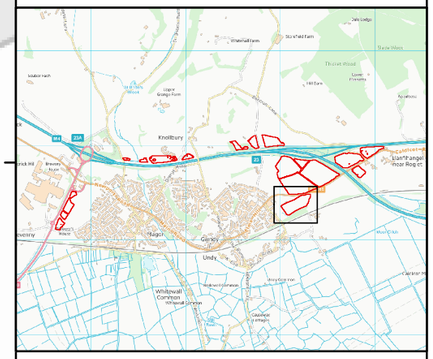
XY trace plot: Area 514a

Figure 9





- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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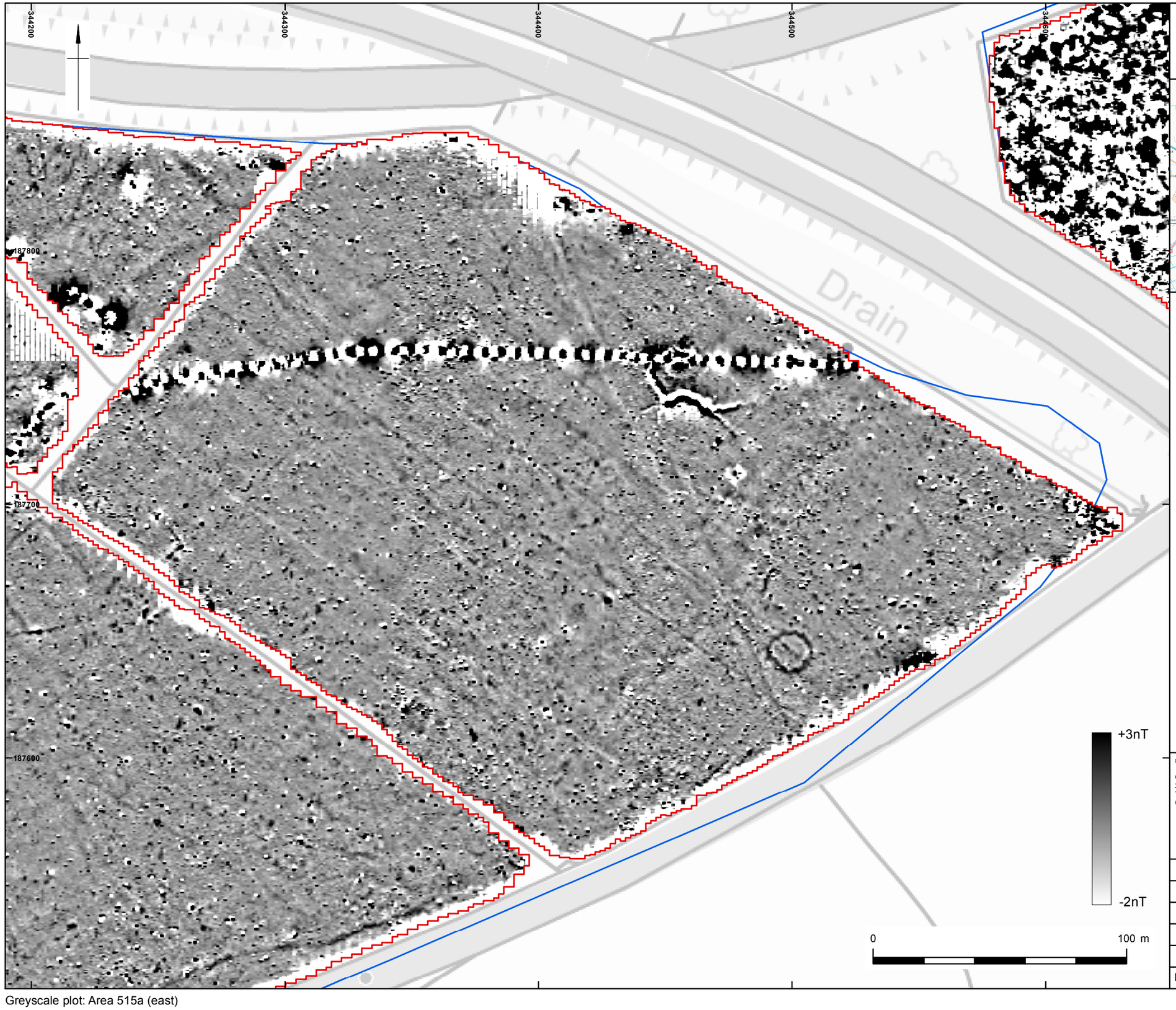
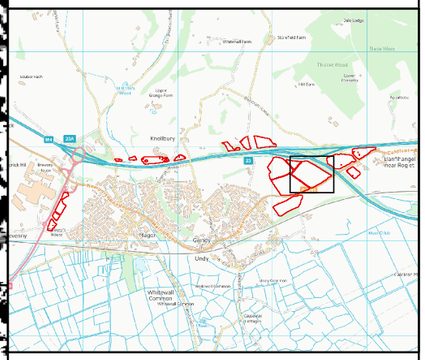
FigsMXD\Geophys\2015_10_08\102831_Fig10.mxd	

Interpretation: Area 514a

Figure 10





Detailed Survey Extents

Site

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Illustrator:	RAM
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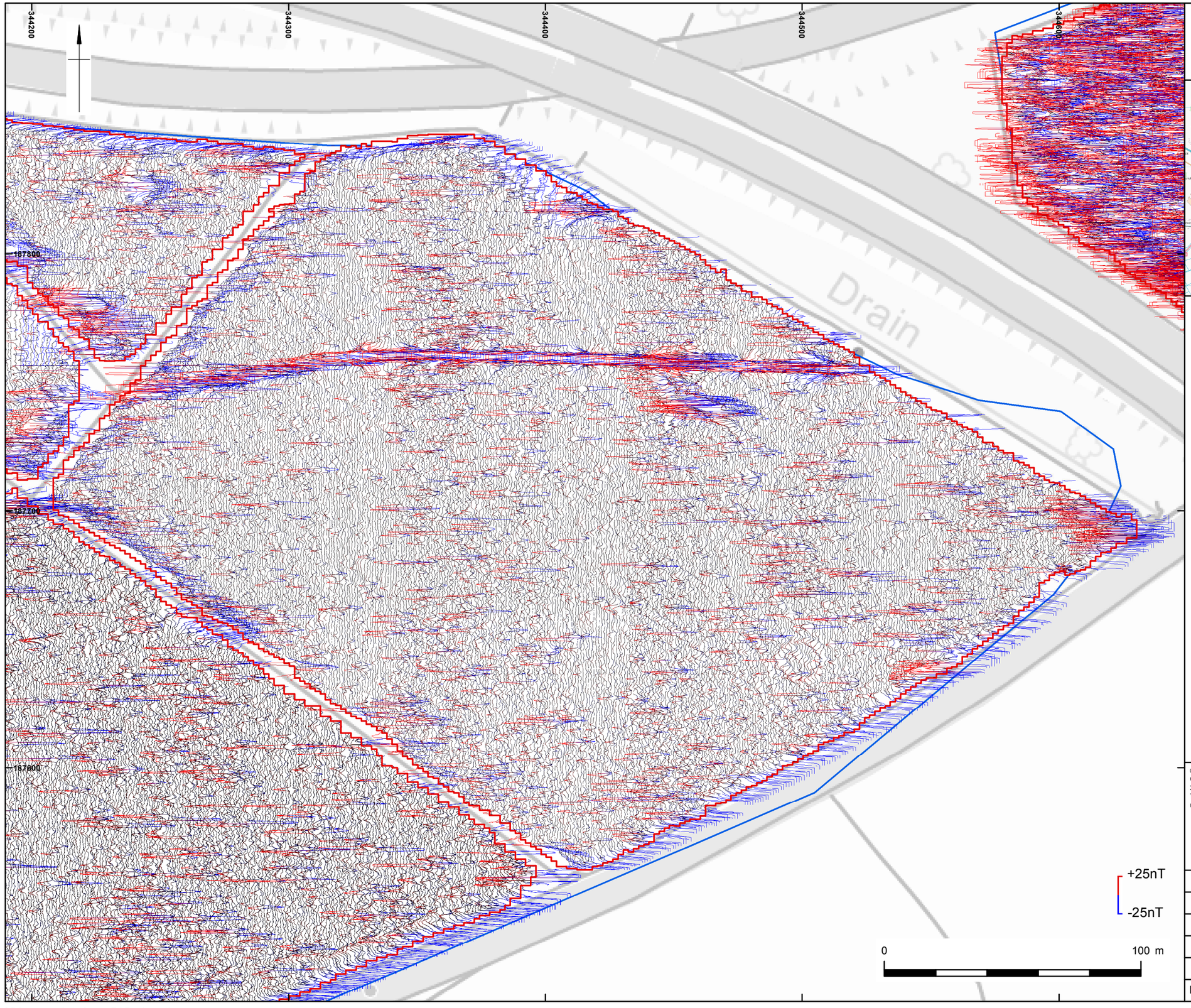
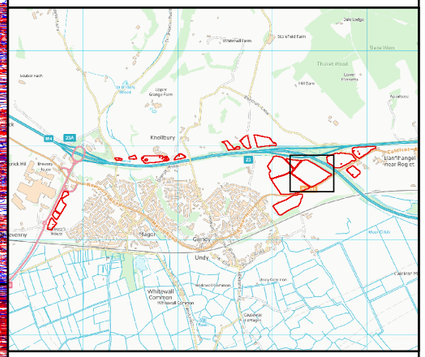
Greyscale plot: Area 515a (east)

Figure 11





Detailed Survey Extents

Site

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Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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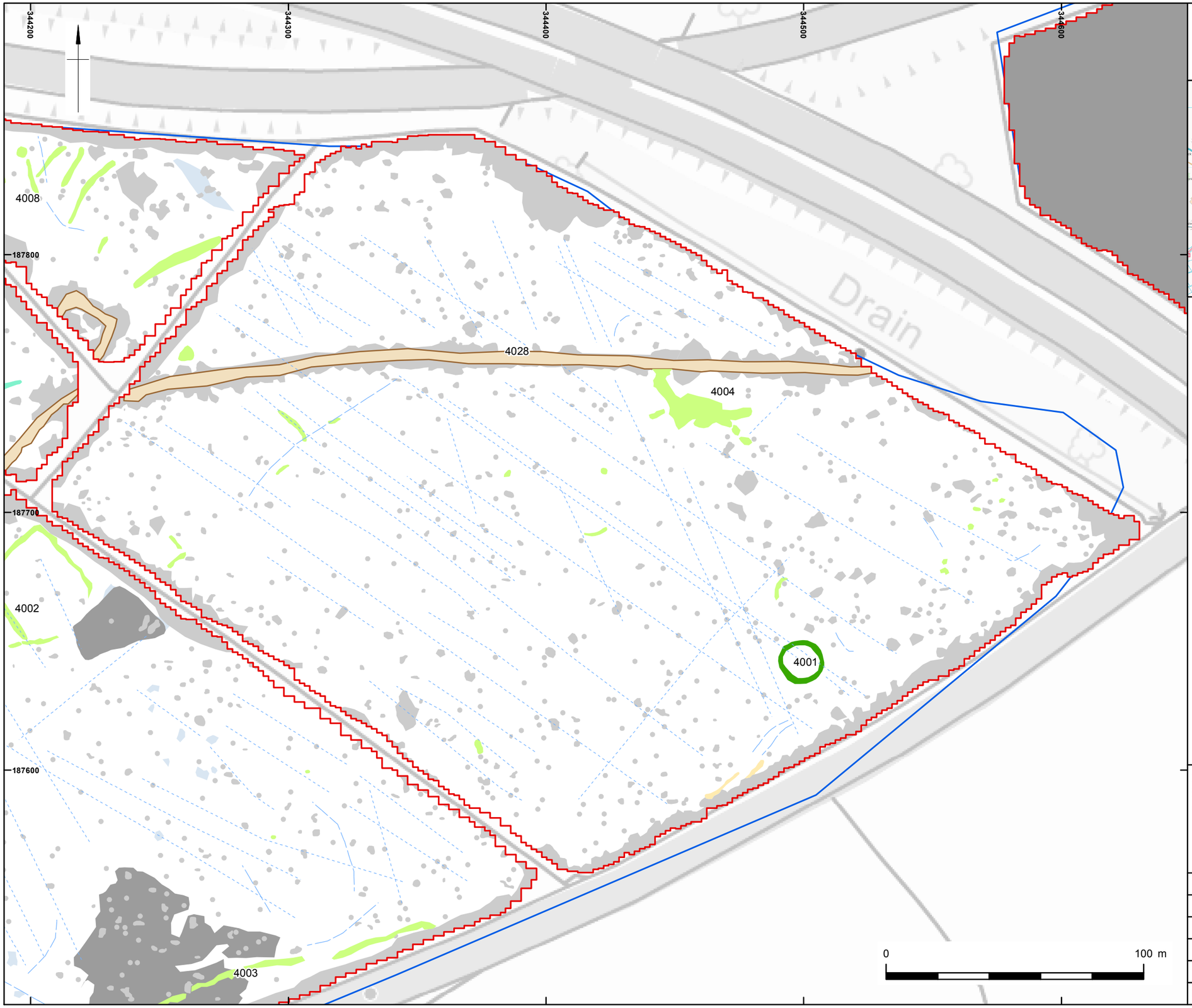
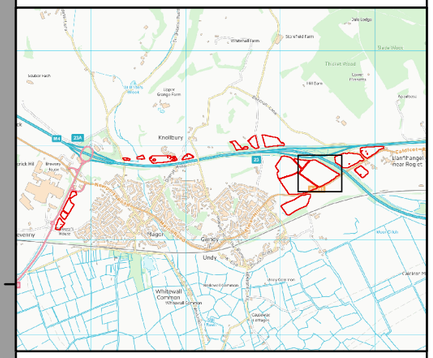
FigsMXD\Geophys\2015_10_08\102831_Fig12.mxd	

XY trace plot: Area 515a (east)

Figure 12



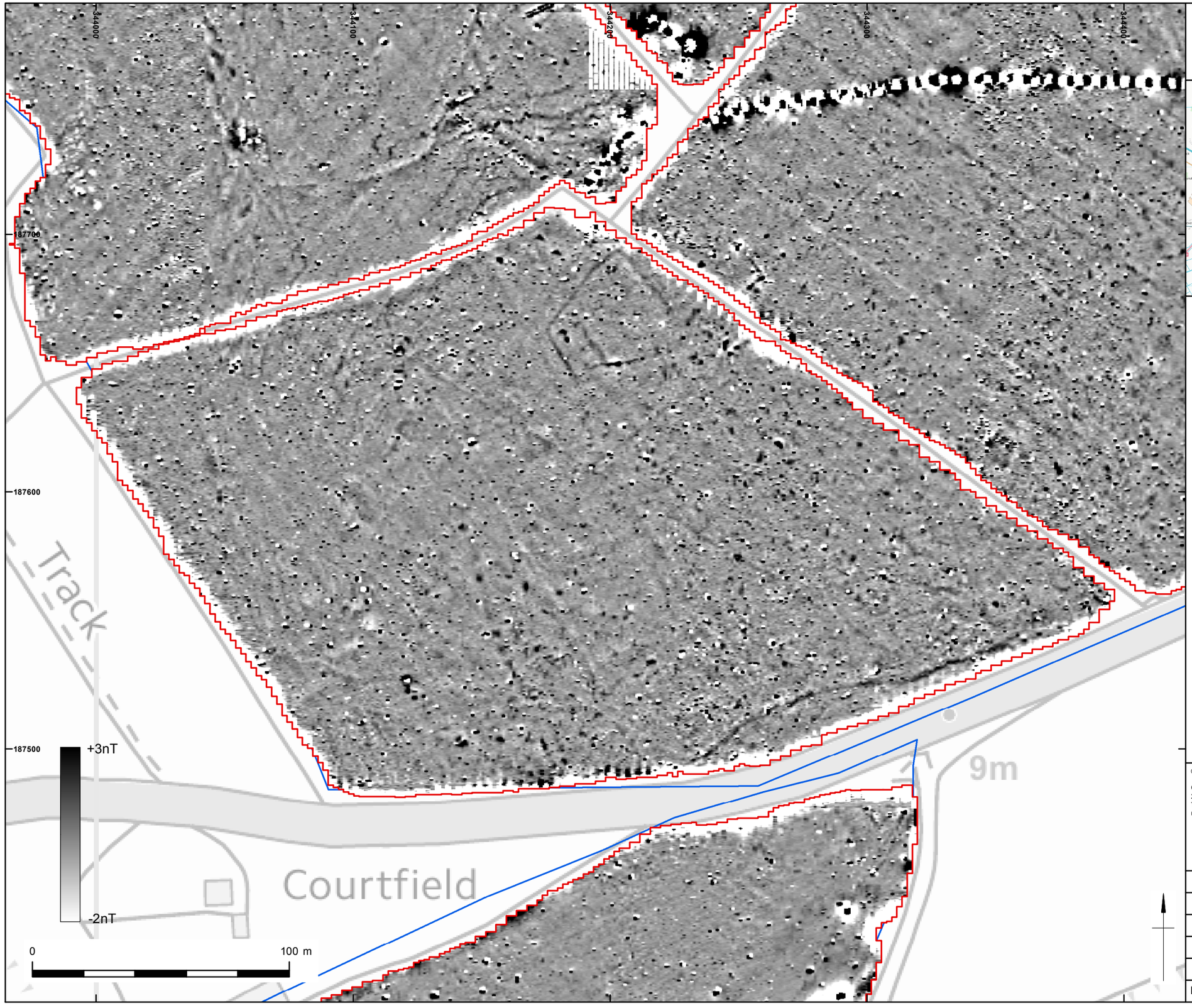


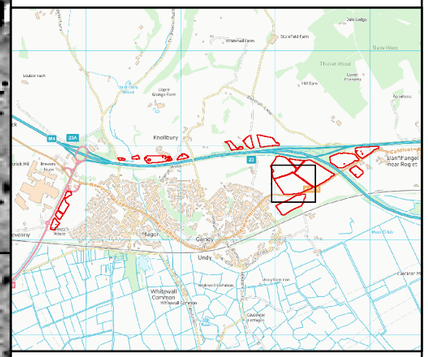
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig13.mxd	

Interpretation: Area 515a (east)

Figure 13





Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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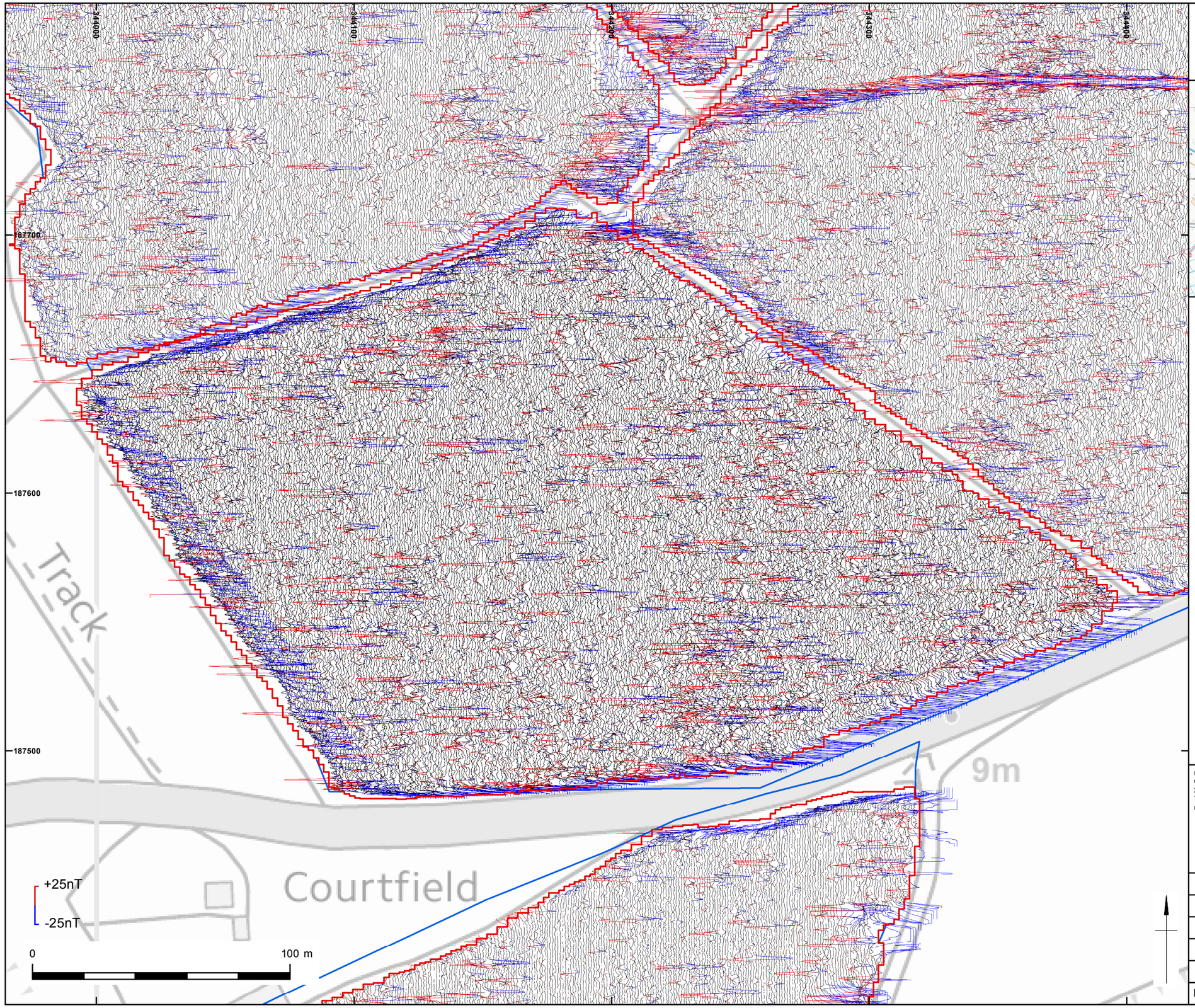
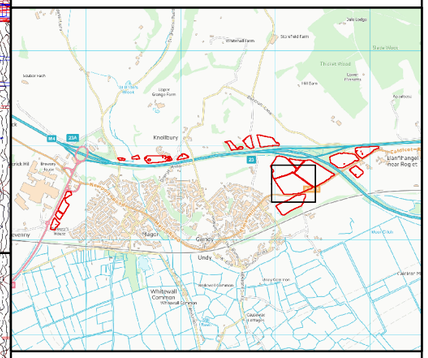
FigsMXD\Geophys\2015_10_08\102831_Fig14.mxd	

Greyscale plot: Area 515a (south)

Figure 14





Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
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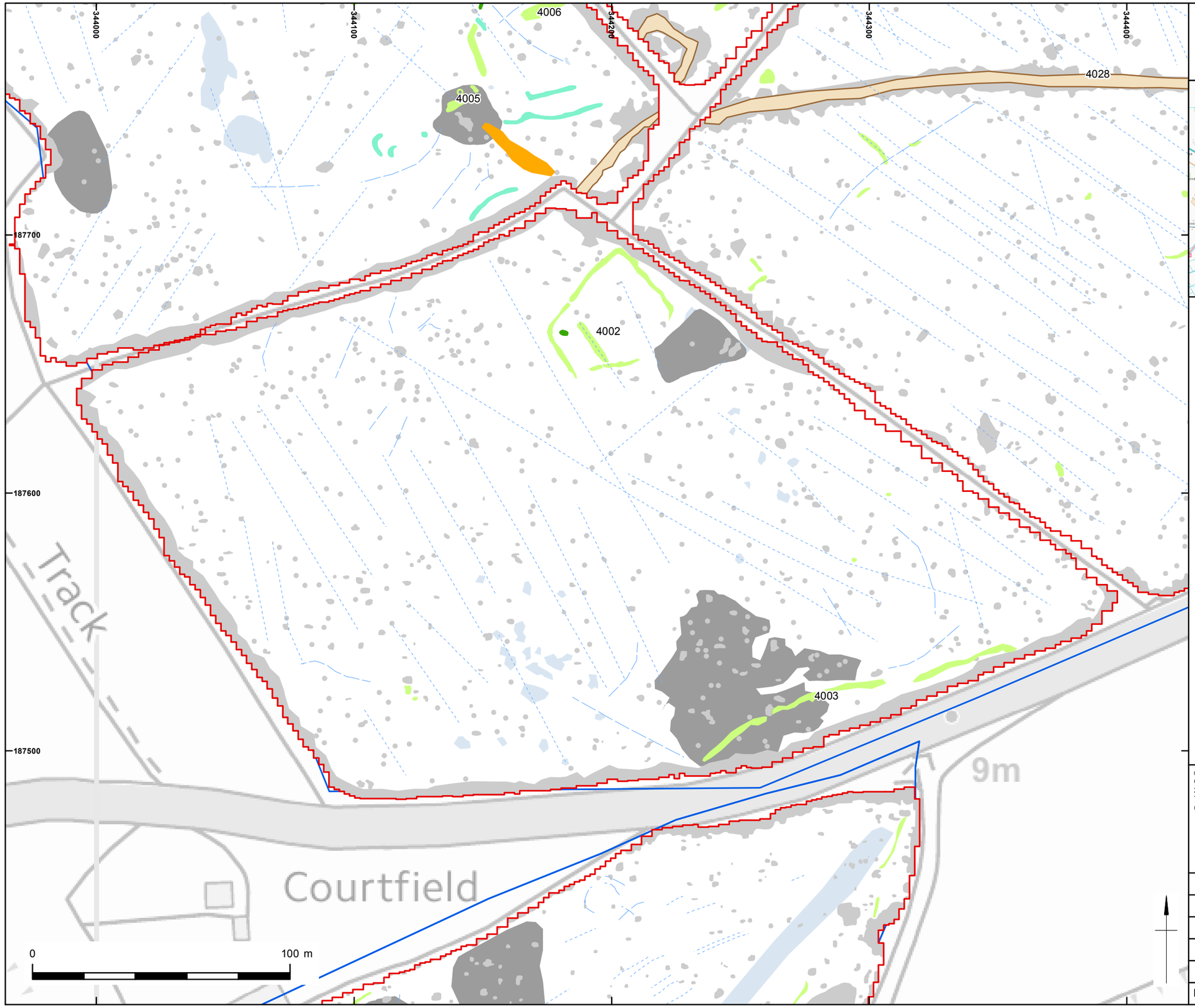
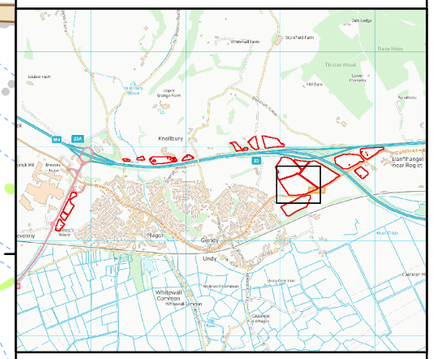
FigsMXD\Geophys\2015_10_08\102831_Fig15.mxd	

XY trace plot: Area 515a (south)

Figure 15



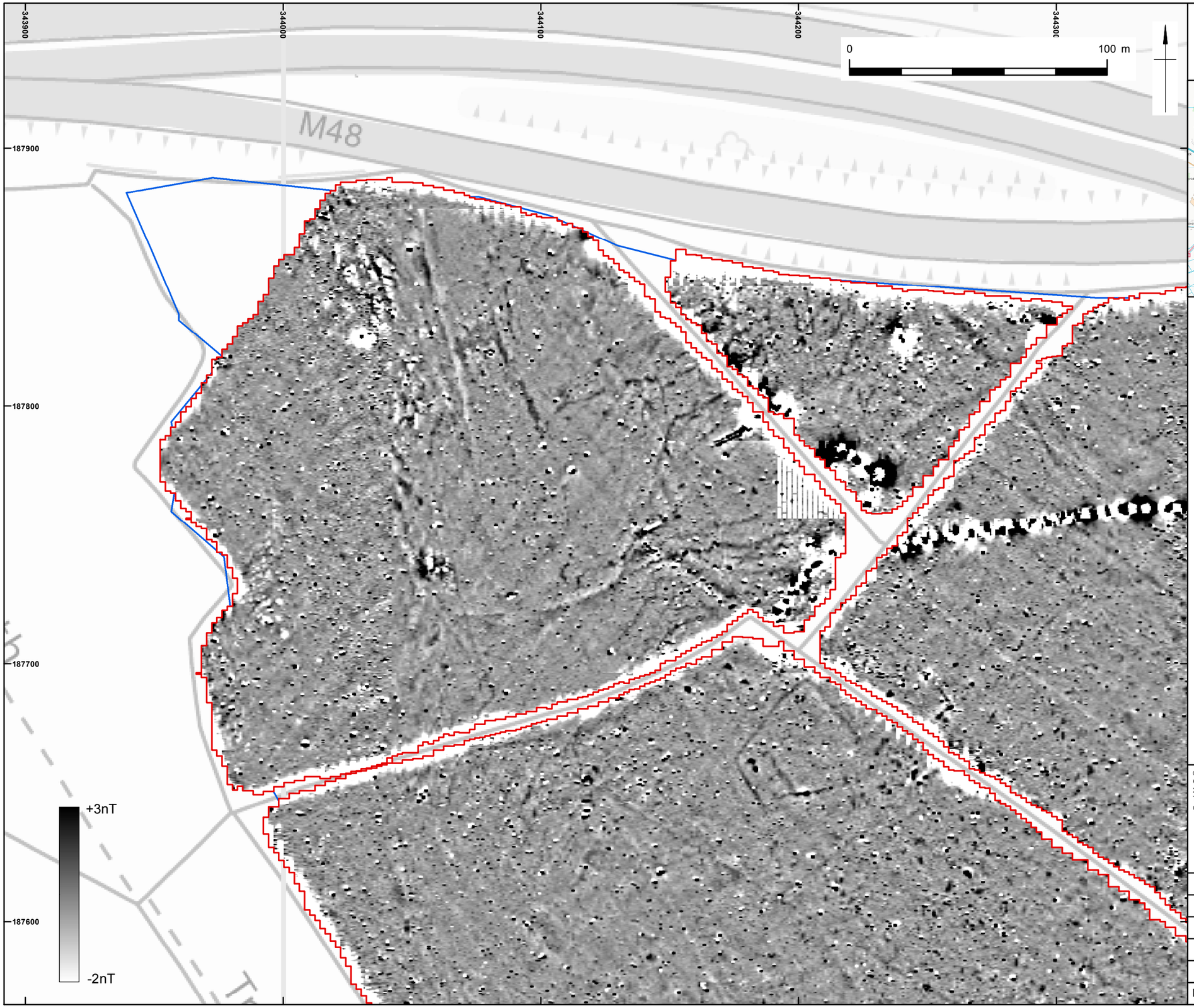


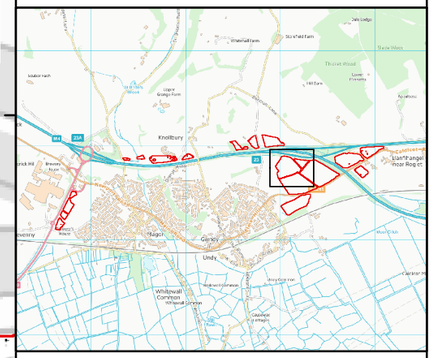
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS FigsMXD\Geophys\2015_10_08\102831_Fig16.mxd

Interpretation: Area 515a (south)

Figure 16





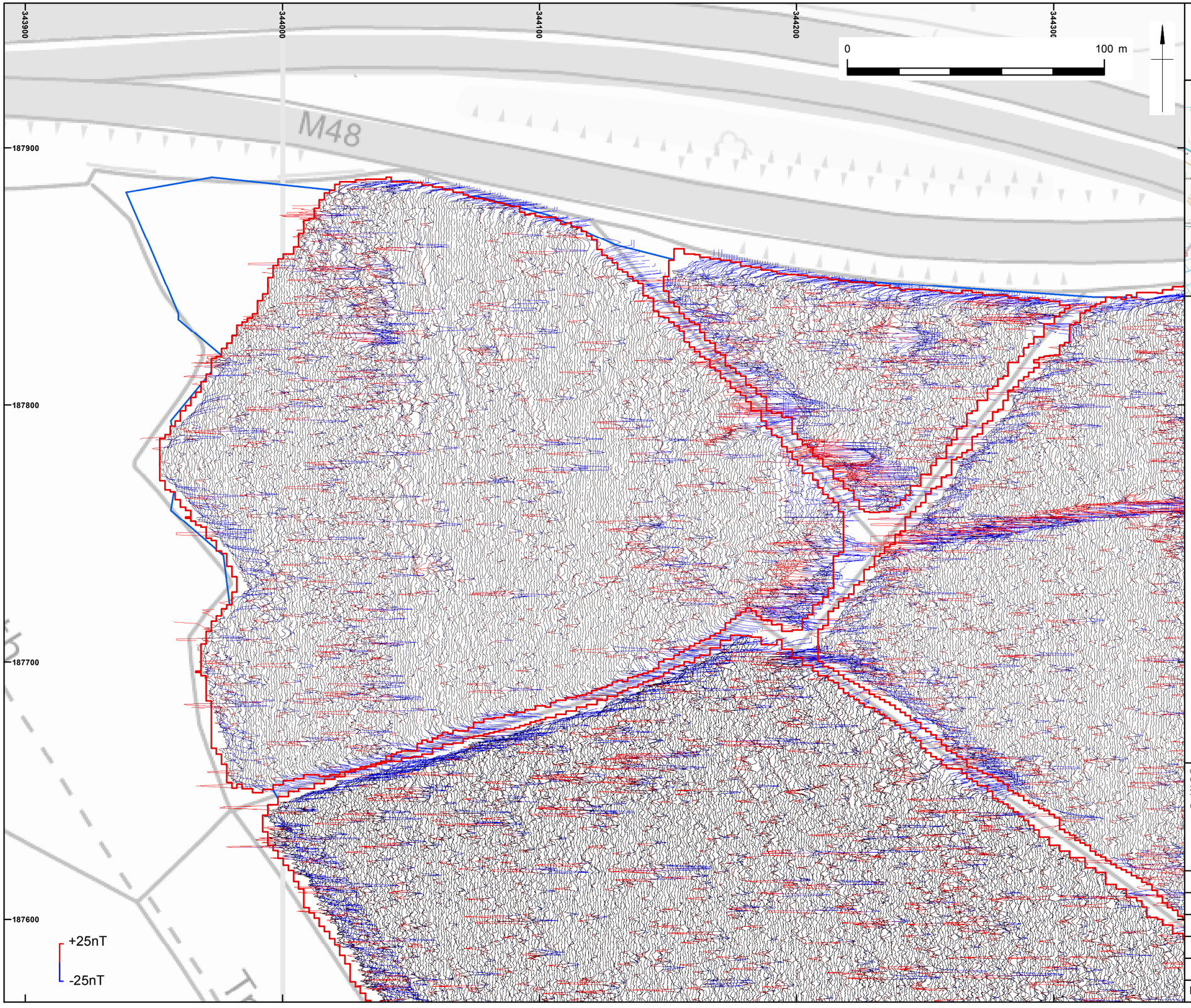
Detailed Survey Extents

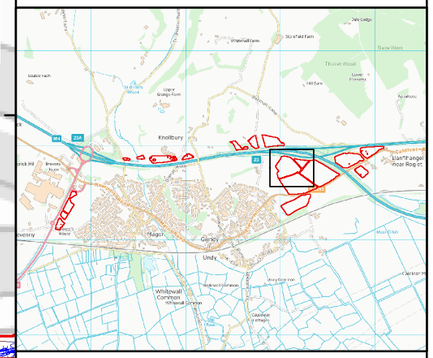
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig17.mxd	

Greyscale plot: Area 515a (north)

Figure 17





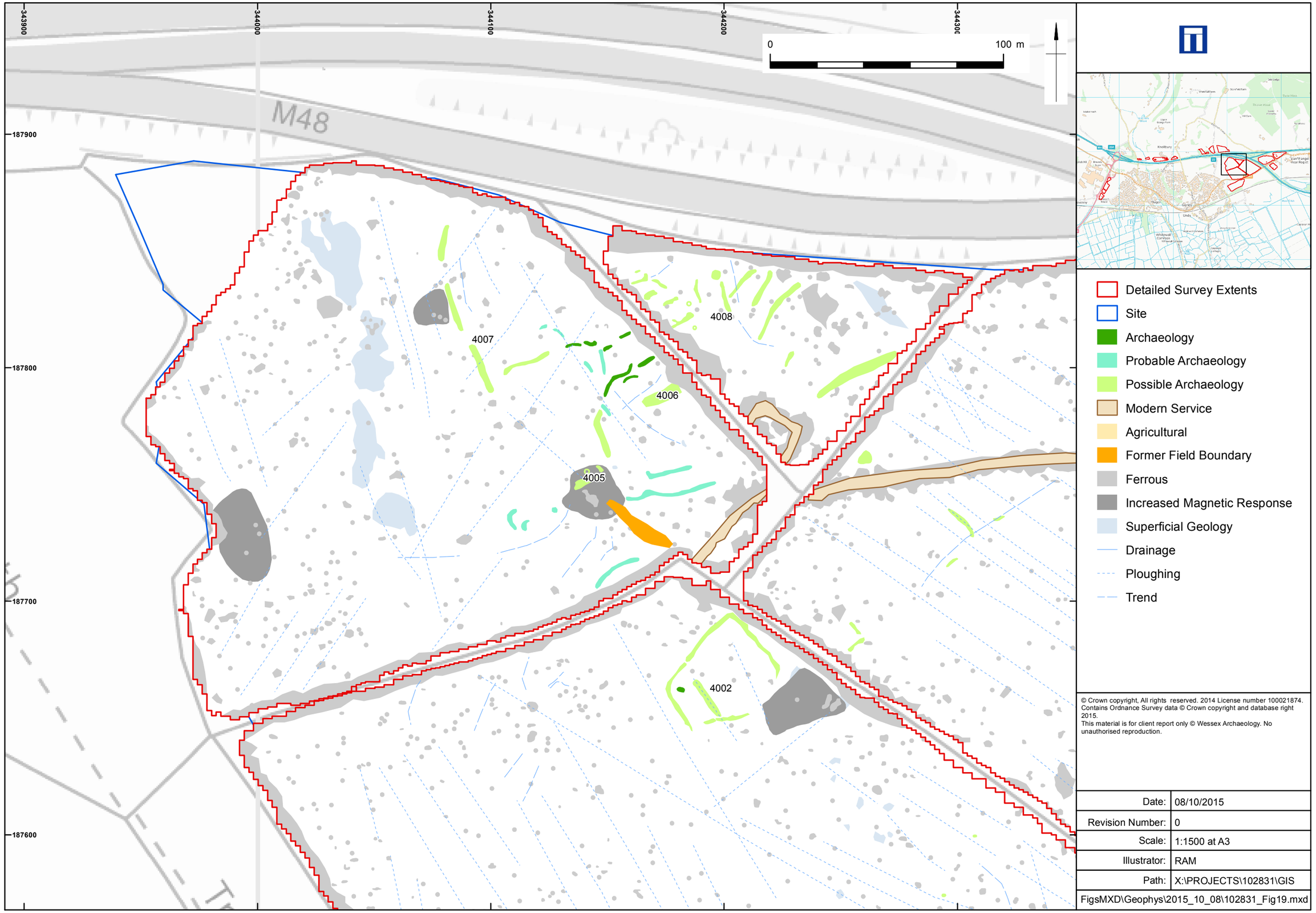
Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig18.mxd	

XY trace plot: Area 515a (north)

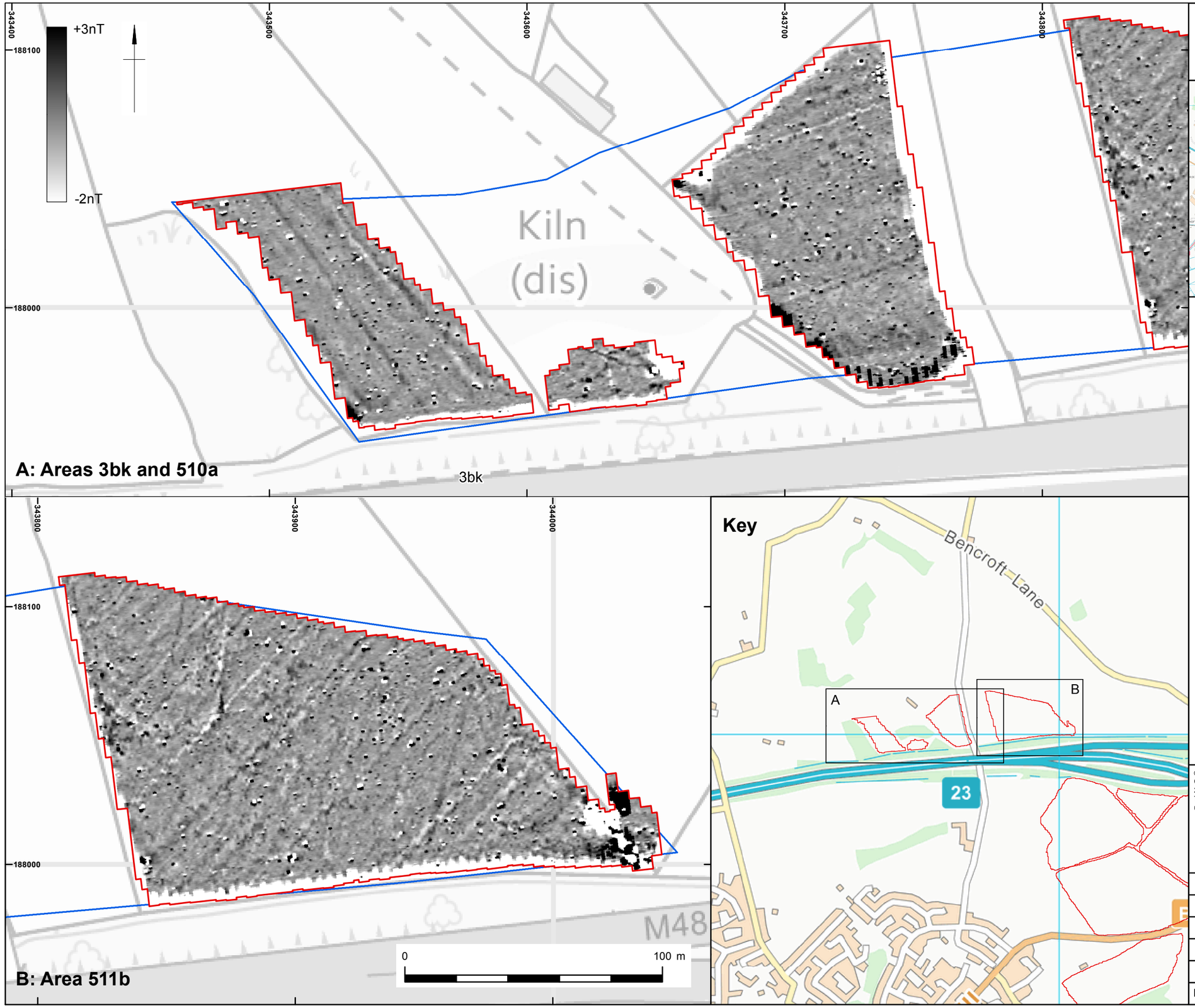
Figure 18

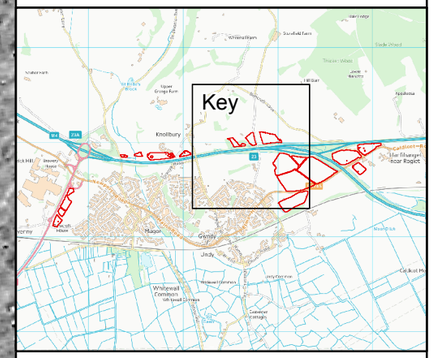


Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig19.mxd	

Interpretation: Area 515a (north)

Figure 19





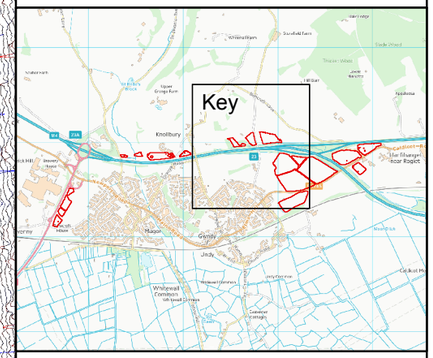
Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 and 1:10000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig20.mxd	

Greyscale plot: Areas 3bk, 510a and 511b

Figure 20



Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
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Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig21.mxd	

XY trace plot: Areas 3bk, 510a and 511b

Figure 21

343400 343500 343600 343700 343800

188100

188000

Kiln
(dis)

4011

3bk

A: Areas 3bk and 510a

343800 343900 344000

188100

188000

M48

0 100 m

B: Area 511b

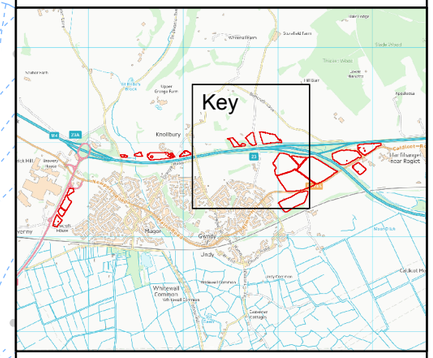
Key

Bencroft Lane

A

B

23



- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 and 1:10000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS FigsMXD\Geophys\2015_10_08\102831_Fig22.mxd

Interpretation: Areas 3bk, 510a and 511b

Figure 22

342300 342400 342500 342600

187900

11m

Drain

A: Area 410b

342600 342700 342800 342900

187900

187800

B: Area 490a

343000 343100

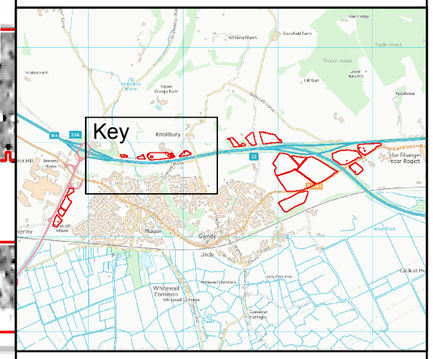
187900

+3nT

-2nT

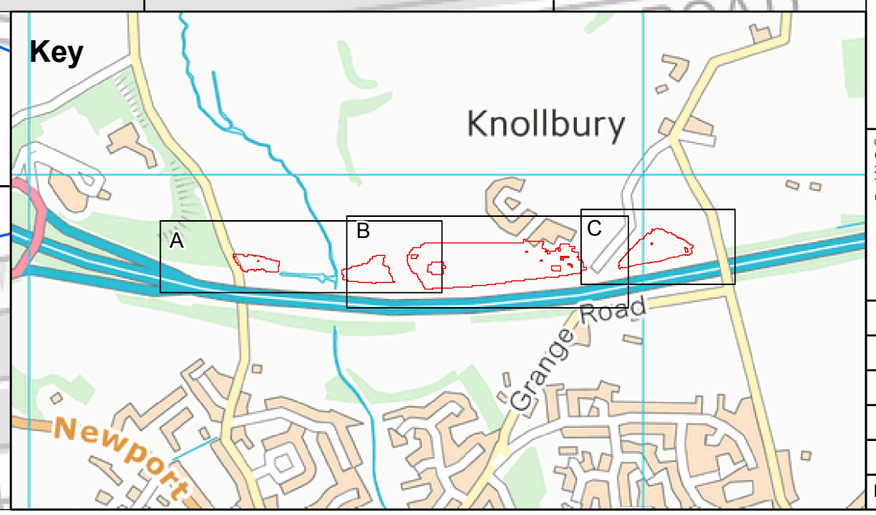
0 100 m

C: Area 430c/495b



Detailed Survey Extents

Site



Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 and 1:10000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig23.mxd	

Greyscale plot: Areas 410b, 490a and 430c/495b

Figure 23

342300
342400
342500
342600
187900
11m
Drain
A: Area 410b
342600
342700
342800
342900
187900
187800
B: Area 490a
C: Area 430c/495b
343000
343100
187900
+25nT
-25nT
0
100 m
Key
Knollbury
A
B
C
Newport
Grange Road
Key
Detailed Survey Extents
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 and 1:10000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS FigsMXD\Geophys\2015_10_08\102831_Fig24.mxd

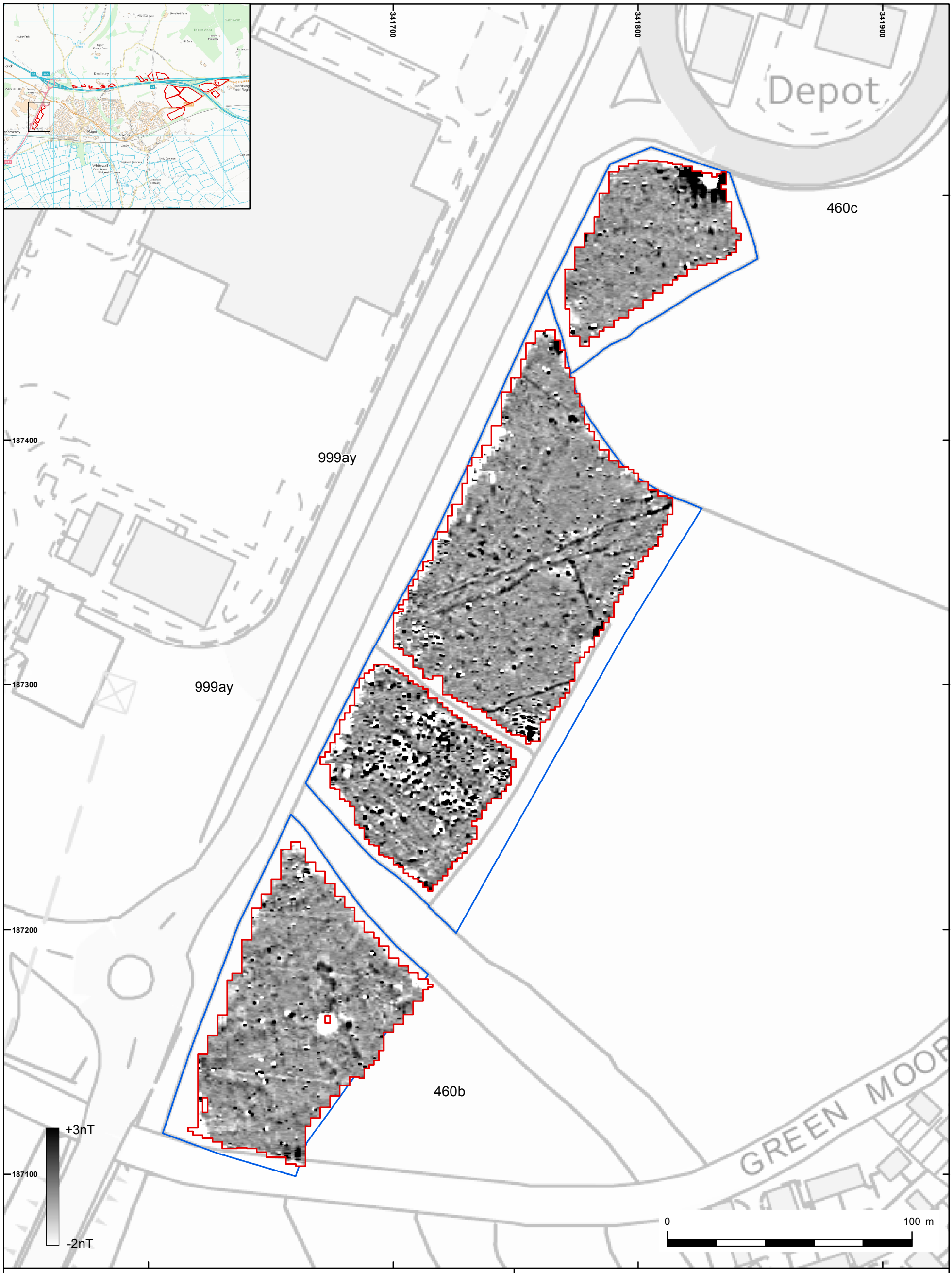
XY trace plot: Areas 410b, 490a and 430c/495b

Figure 24

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 and 1:10000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig25.mxd	

Interpretation: Areas 410b, 490a and 430c/495b

Figure 25



Date:	08/10/2015	Revision Number:	0
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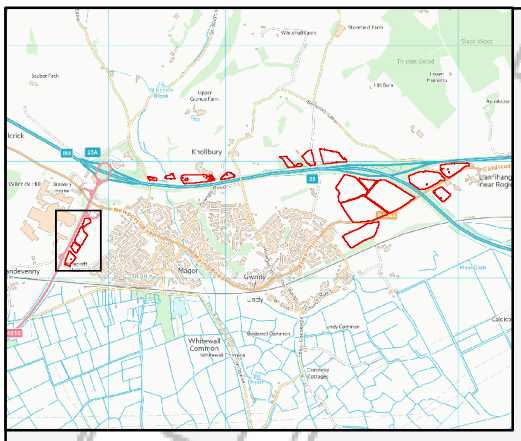
Path:	X:\PROJECTS\102831\GIS\FigsMXD\Geophys\2015_10_08\102831_Fig26.mxd		

Greyscale plot: Areas 460b, 999ay and 460c

Figure 26



341700

341800

341900

Depot

460c

187400

999ay

187300

999ay

187200

460b

187100

+25nT

-25nT

0

100 m

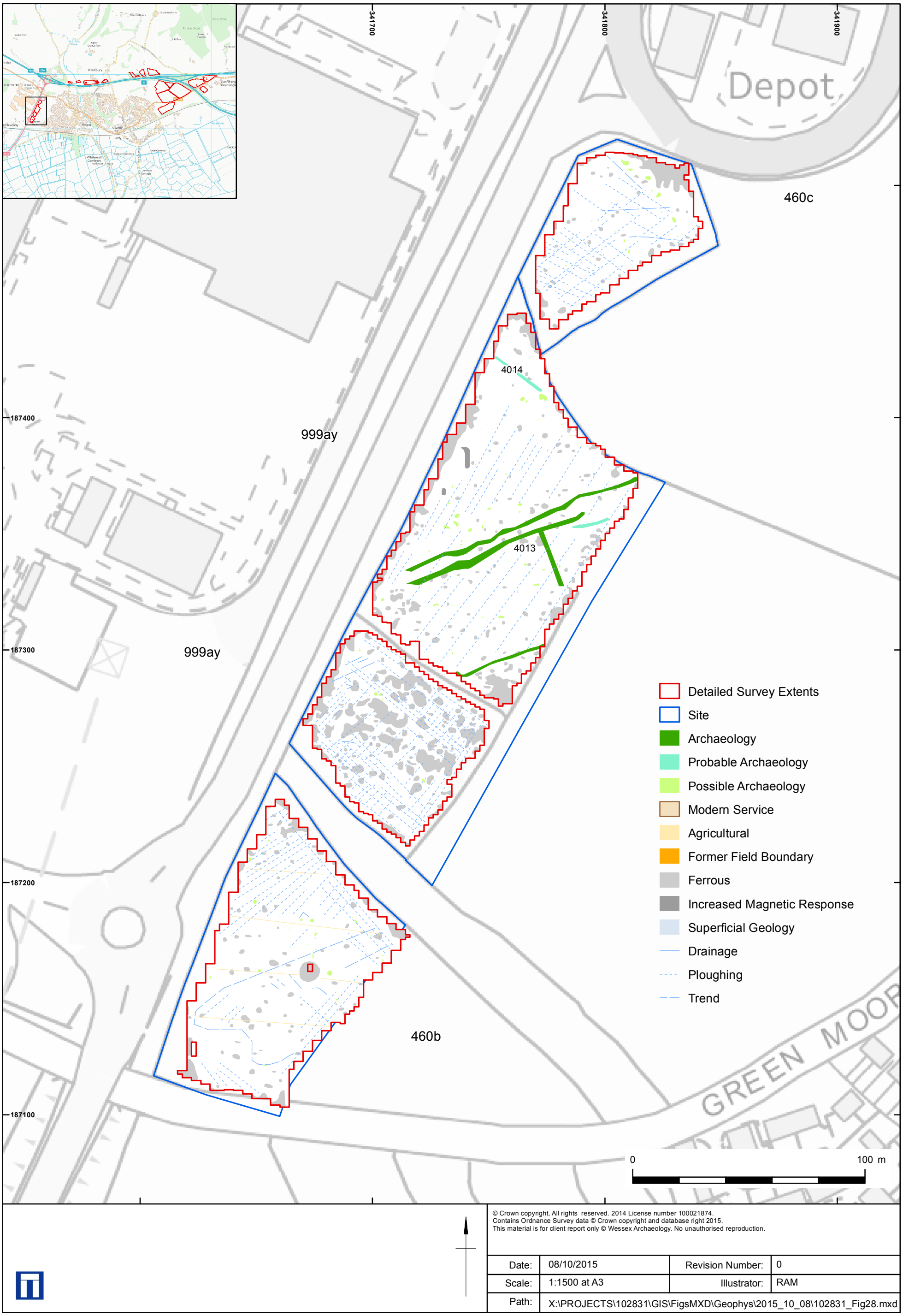
Detailed Survey Extents

Site

Date:	08/10/2015	Revision Number:	0
Scale:	1:1500 at A3	Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS\FigsMXD\Geophys\2015_10_08\102831_Fig27.mxd		

XY trace plot: Areas 460b, 999ay and 460c

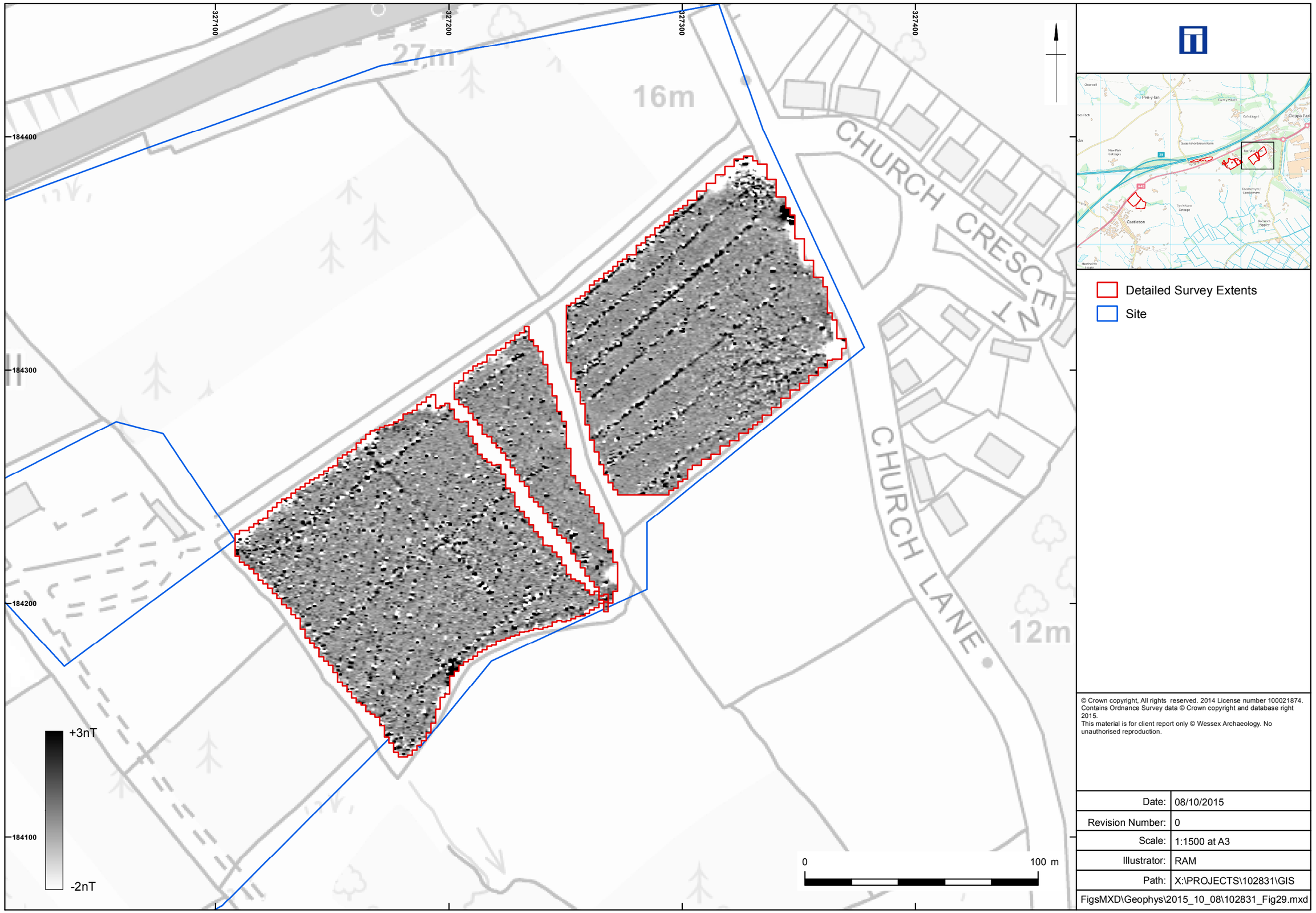
Figure 27



Date:	08/10/2015	Revision Number:	0
Scale:	1:1500 at A3	Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS\FigsMXD\Geophys\2015_10_08\102831_Fig28.mxd		

Interpretation: Areas 460b, 999ay and 460c

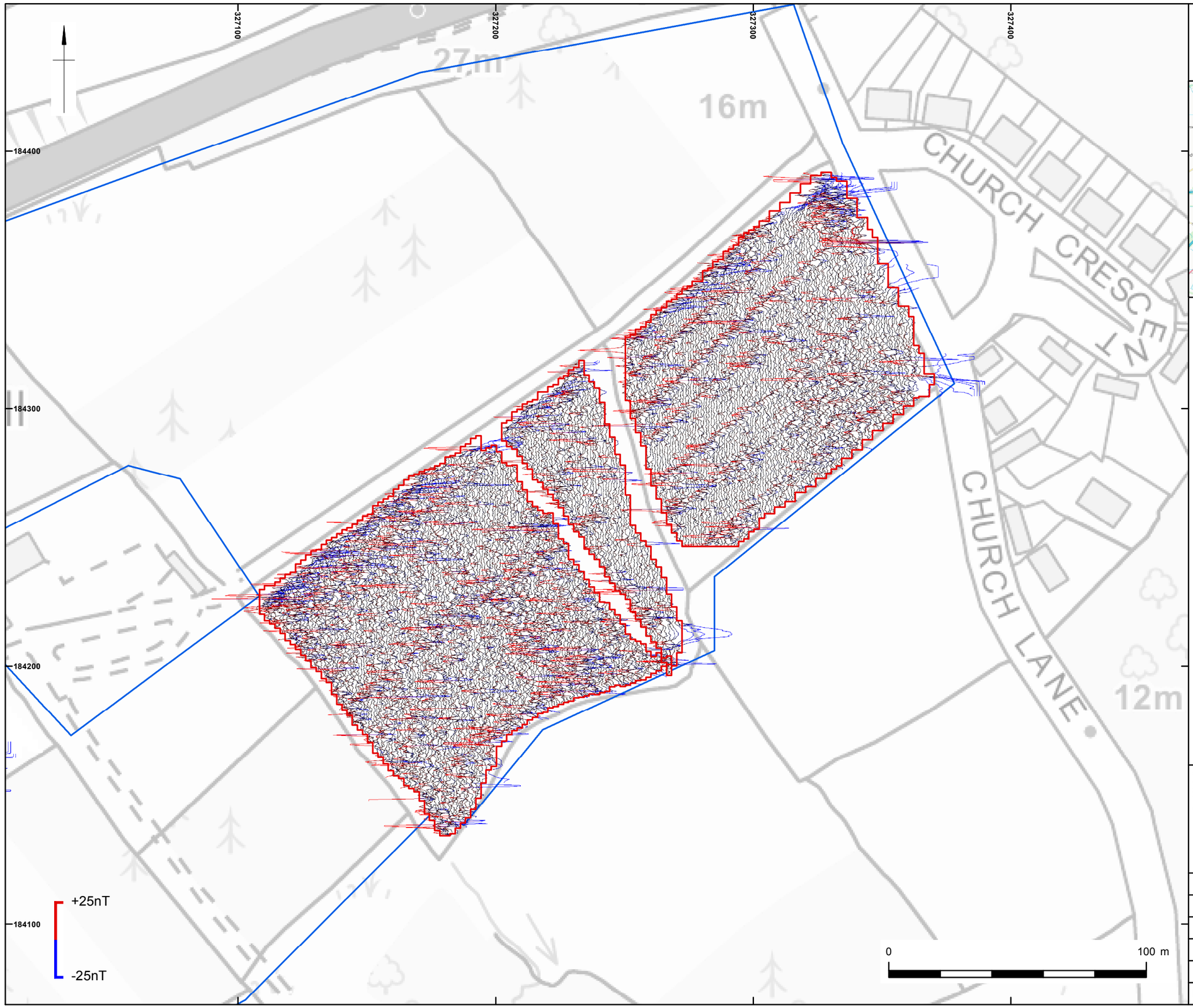
Figure 28

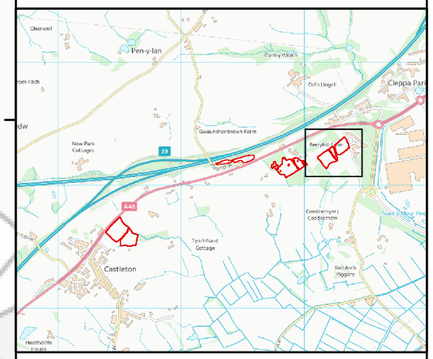


Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig29.mxd	

Greyscale plot: Area 1ba (east)

Figure 29





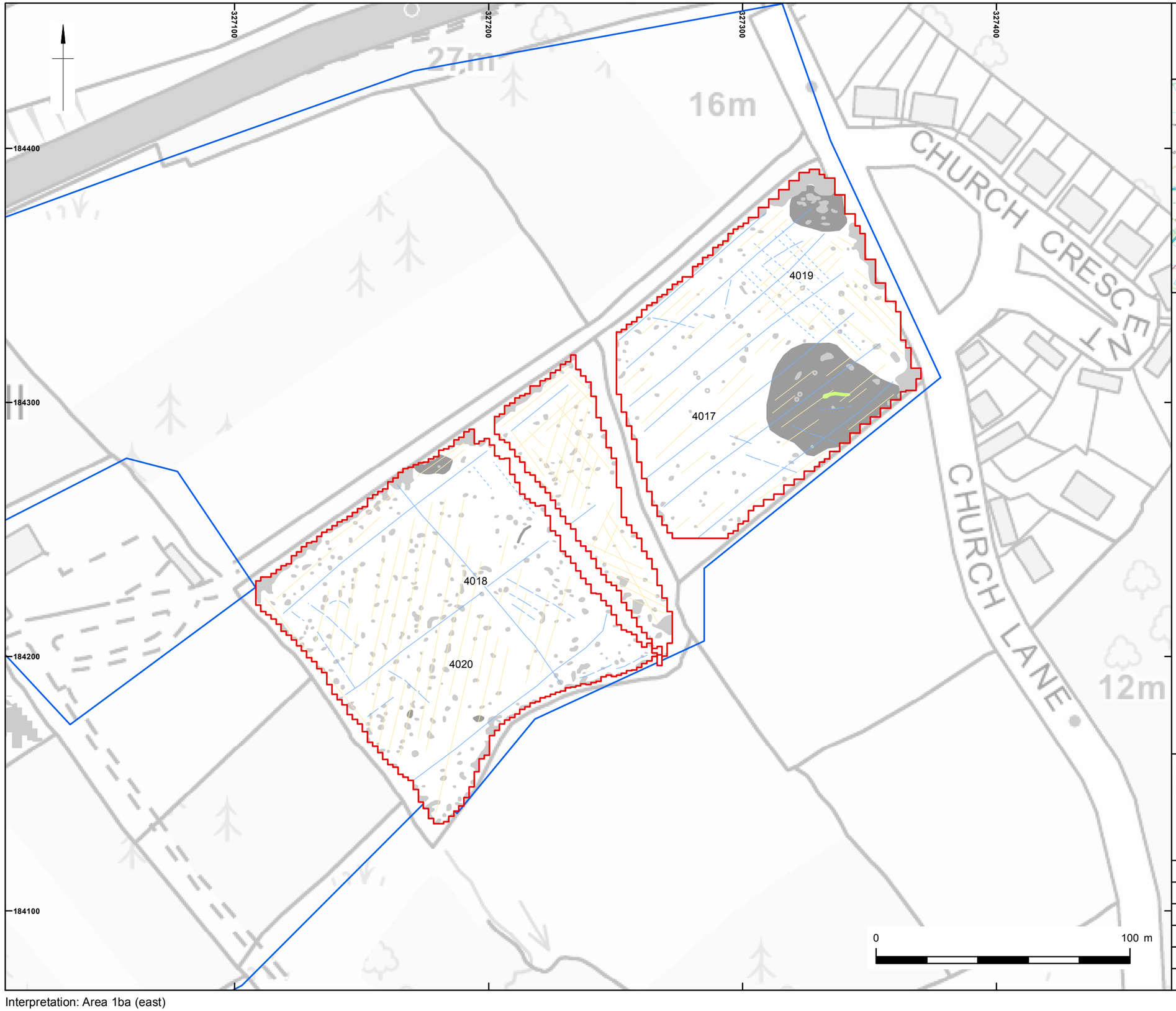
Detailed Survey Extents

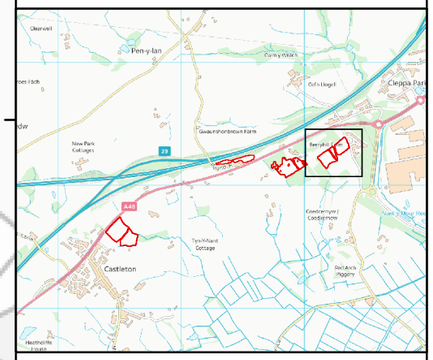
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig30.mxd	

XY trace plot: Area 1ba (east)

Figure 30



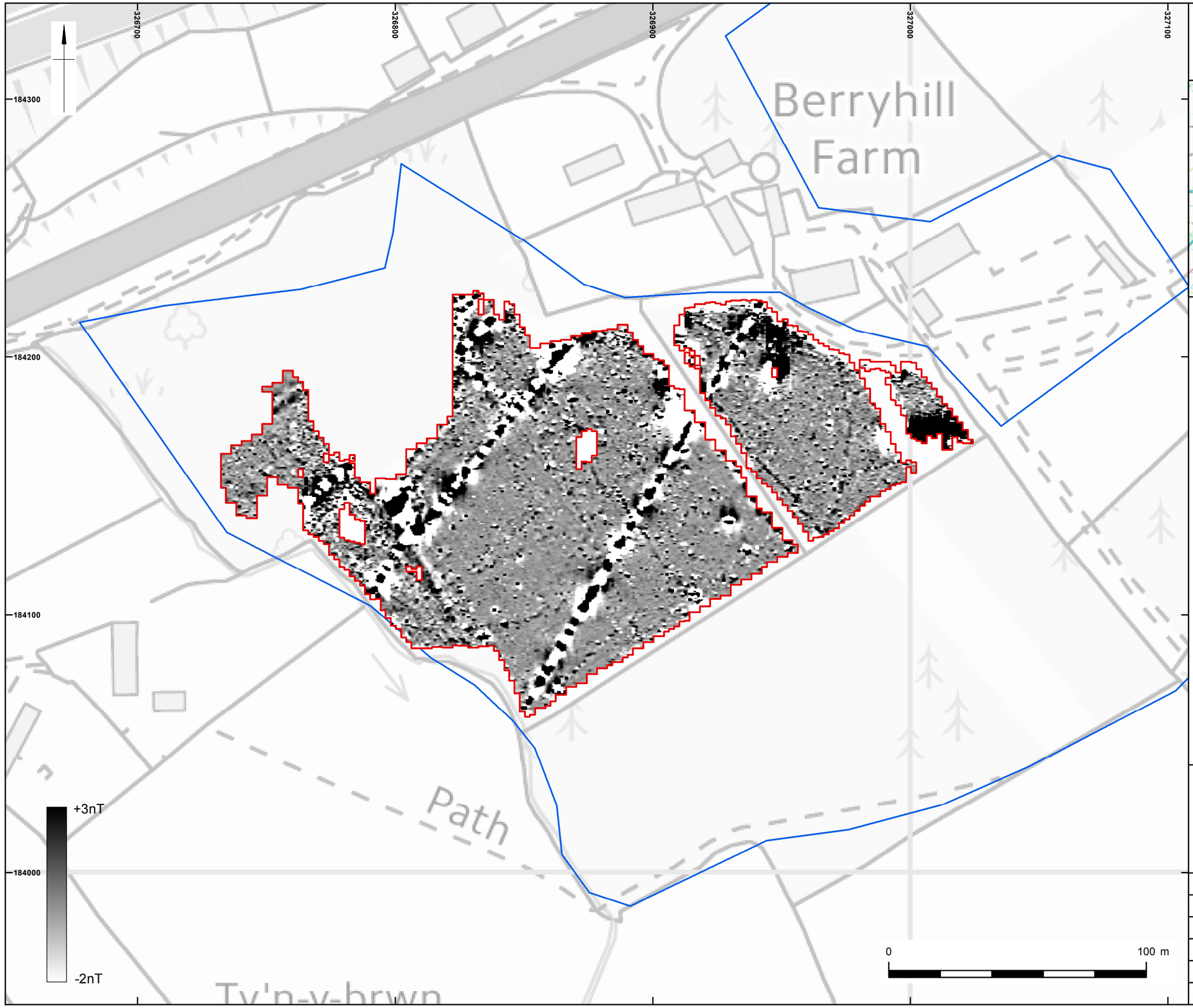


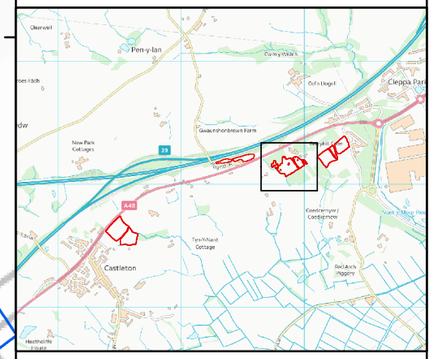
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig31.mxd	

Interpretation: Area 1ba (east)

Figure 31





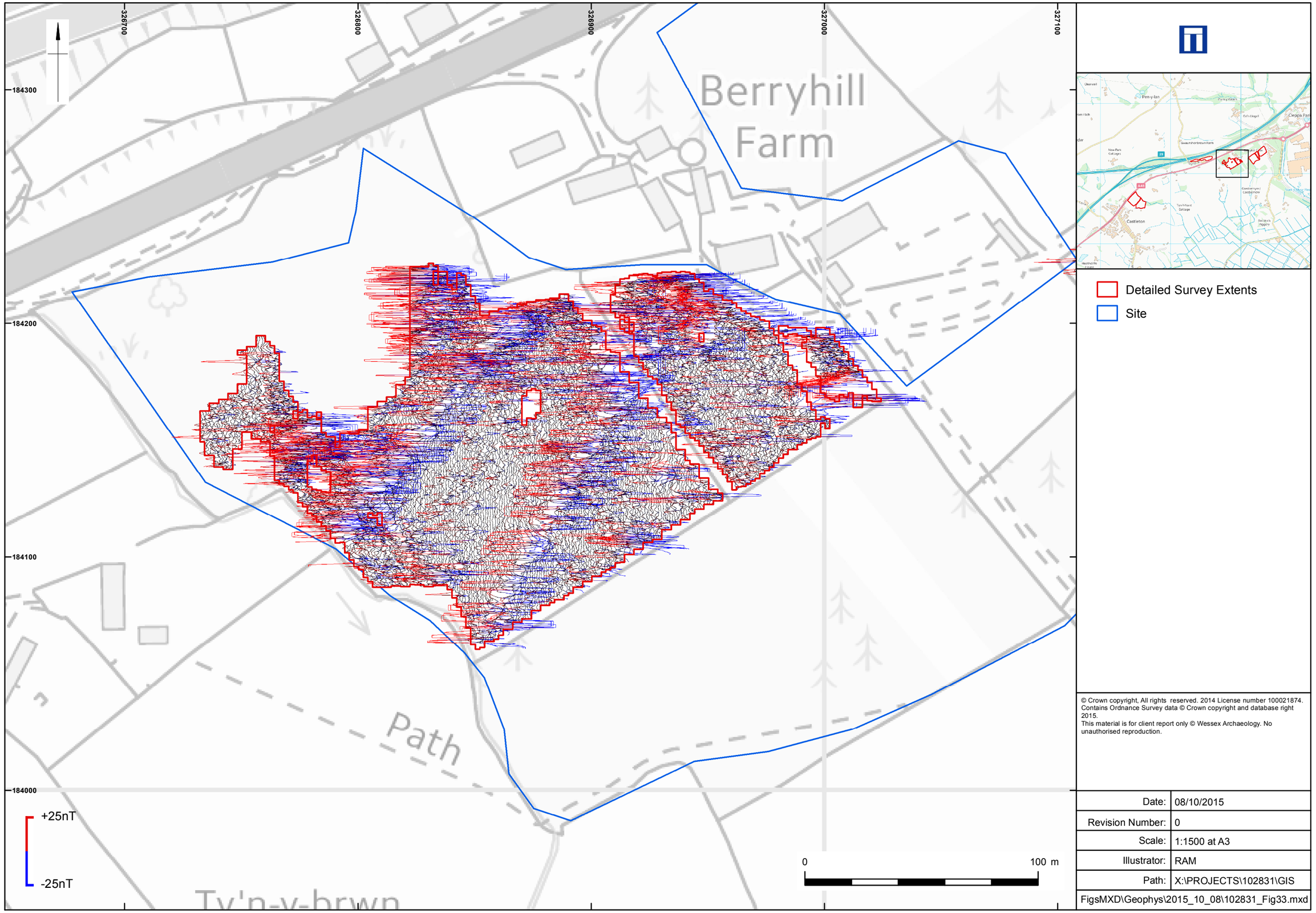
Detailed Survey Extents

Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig32.mxd	

Greyscale plot: Area 1ba (west)

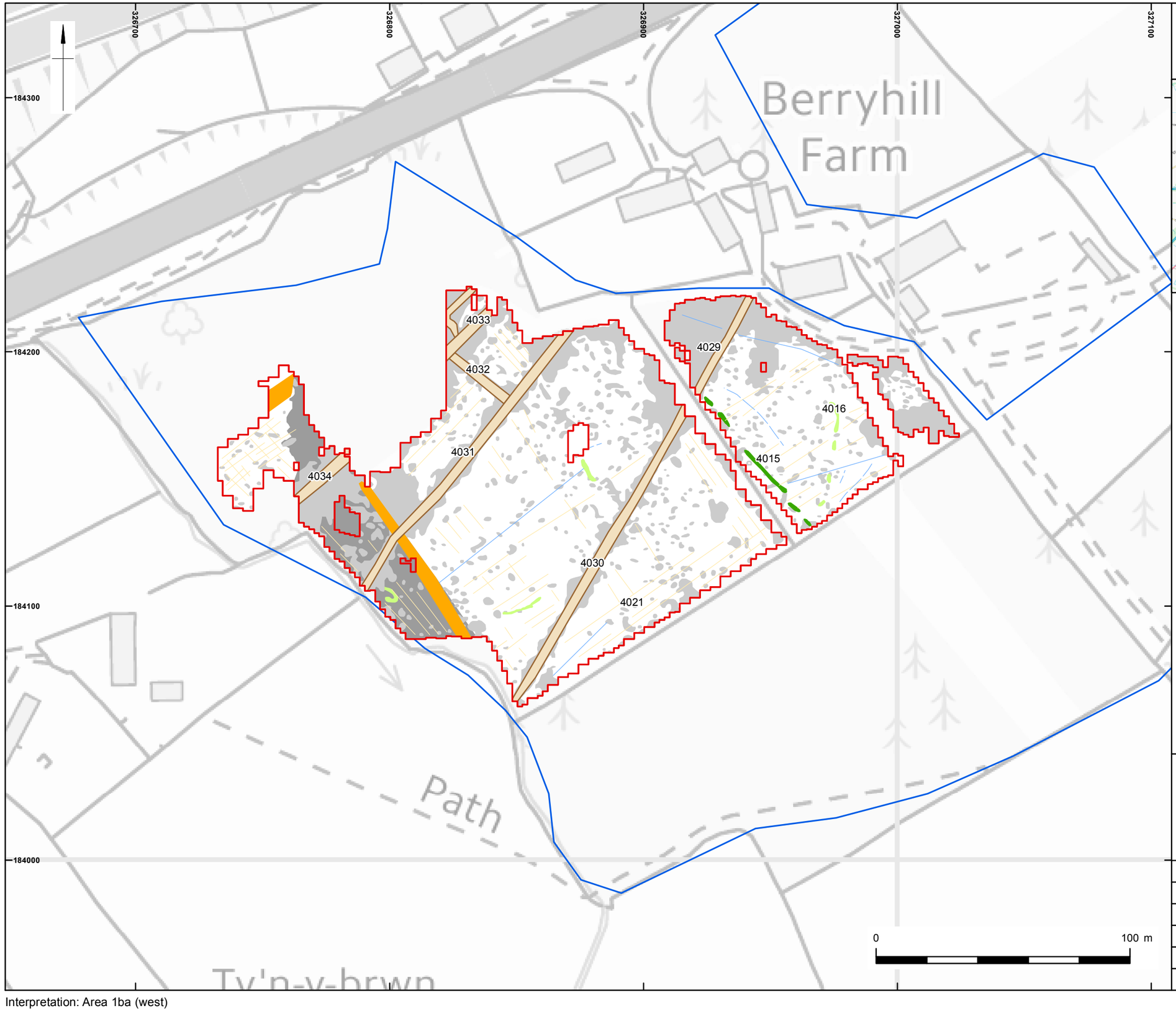
Figure 32

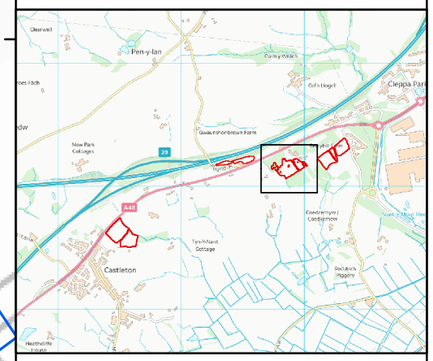


Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig33.mxd	

XY trace plot: Area 1ba (west)

Figure 33



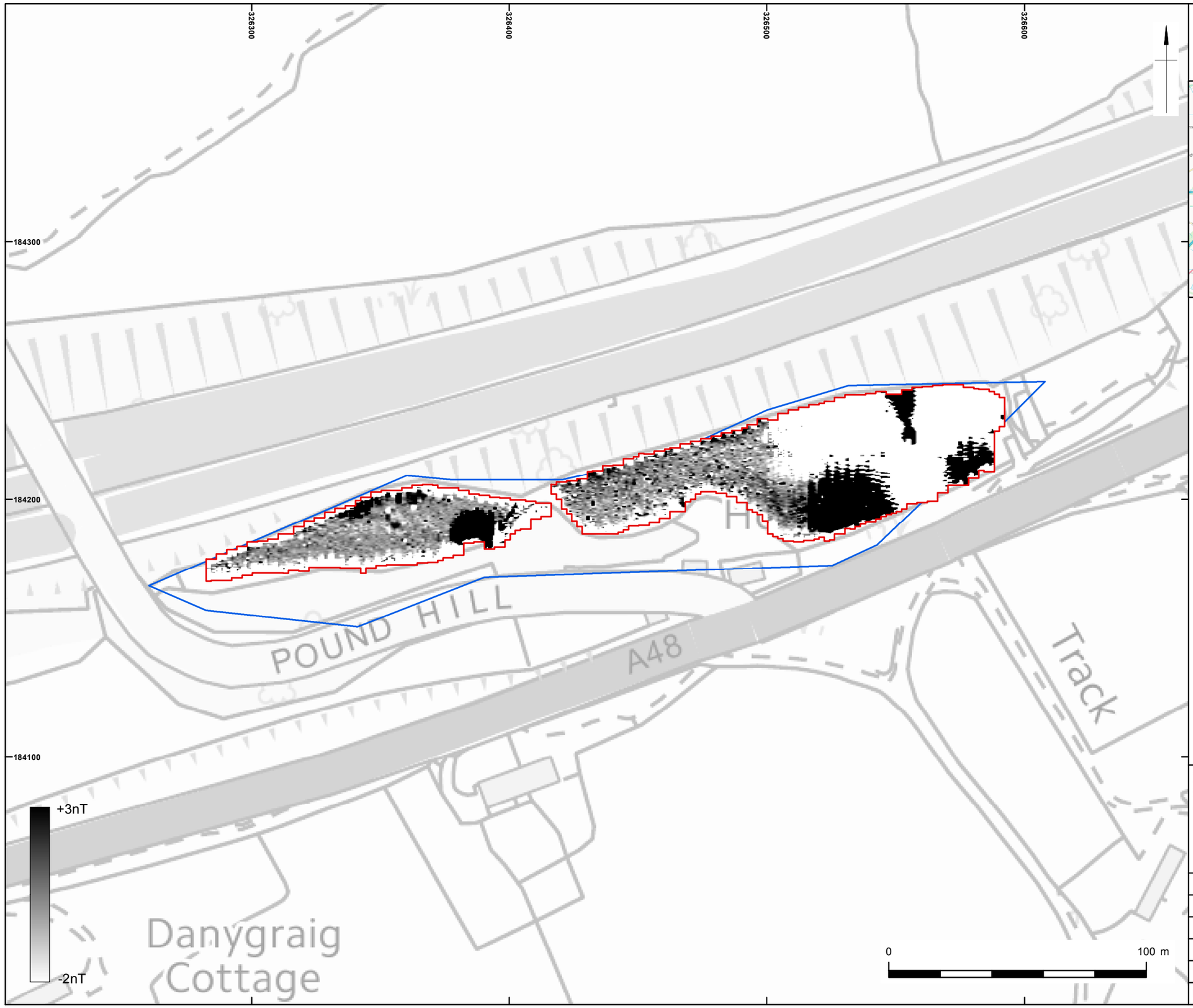


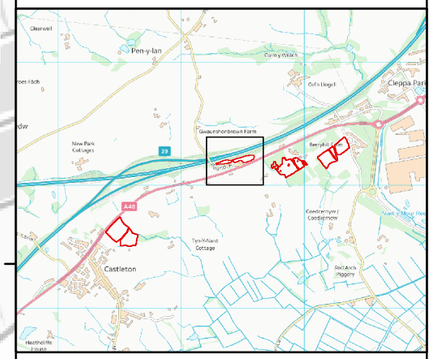
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig34.mxd	

Interpretation: Area 1ba (west)

Figure 34





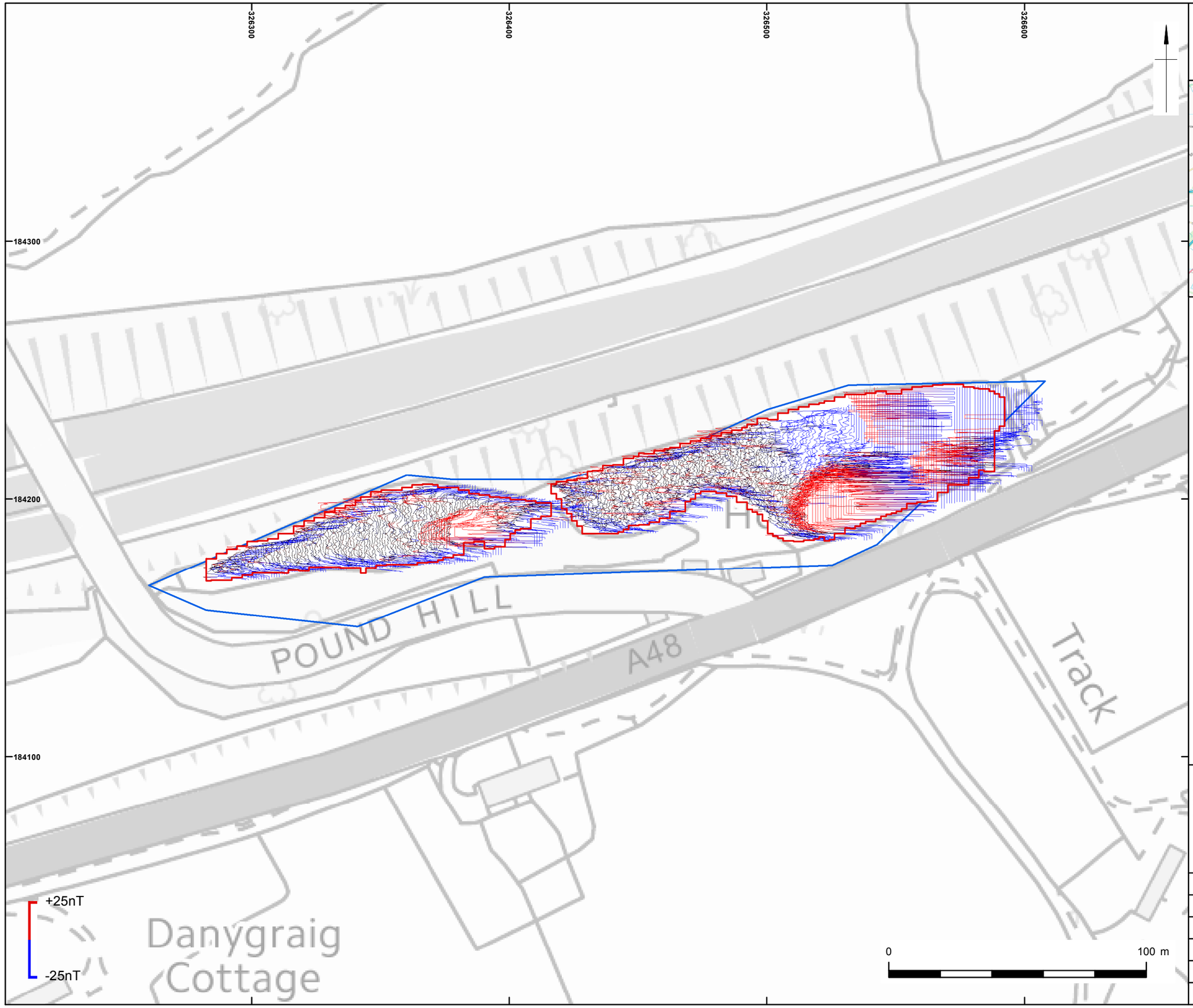
Detailed Survey Extents

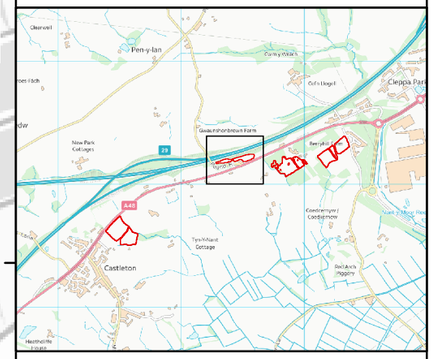
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig35.mxd	

Greyscale plot: Area 139b

Figure 35





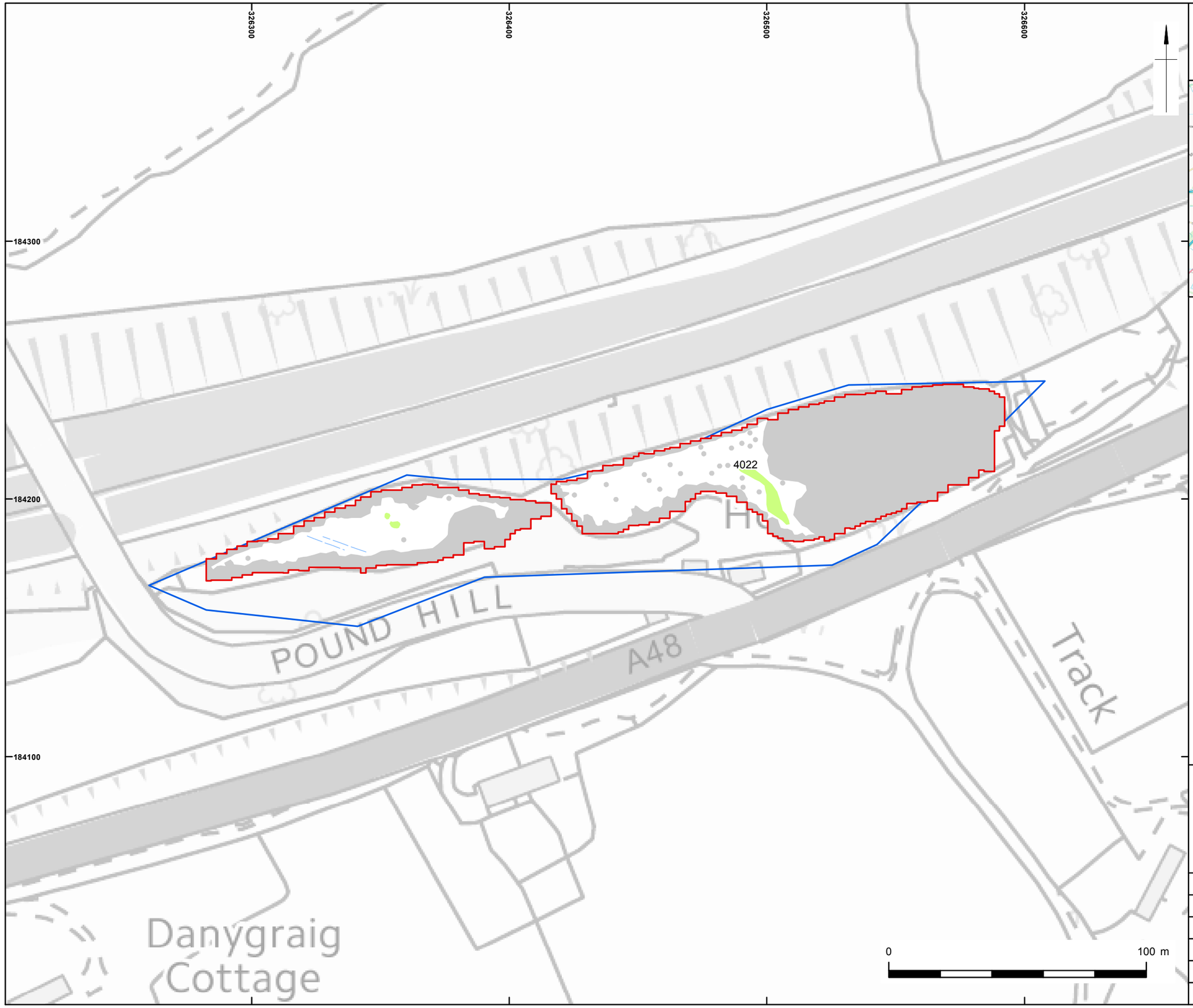
Detailed Survey Extents

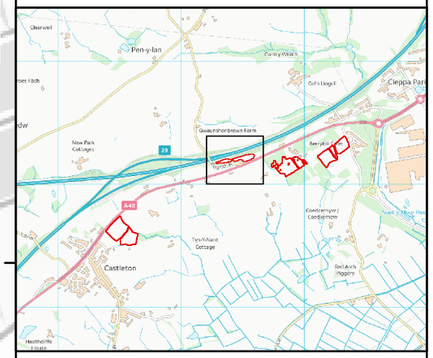
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig36.mxd	

XY trace plot: Area 139b

Figure 36



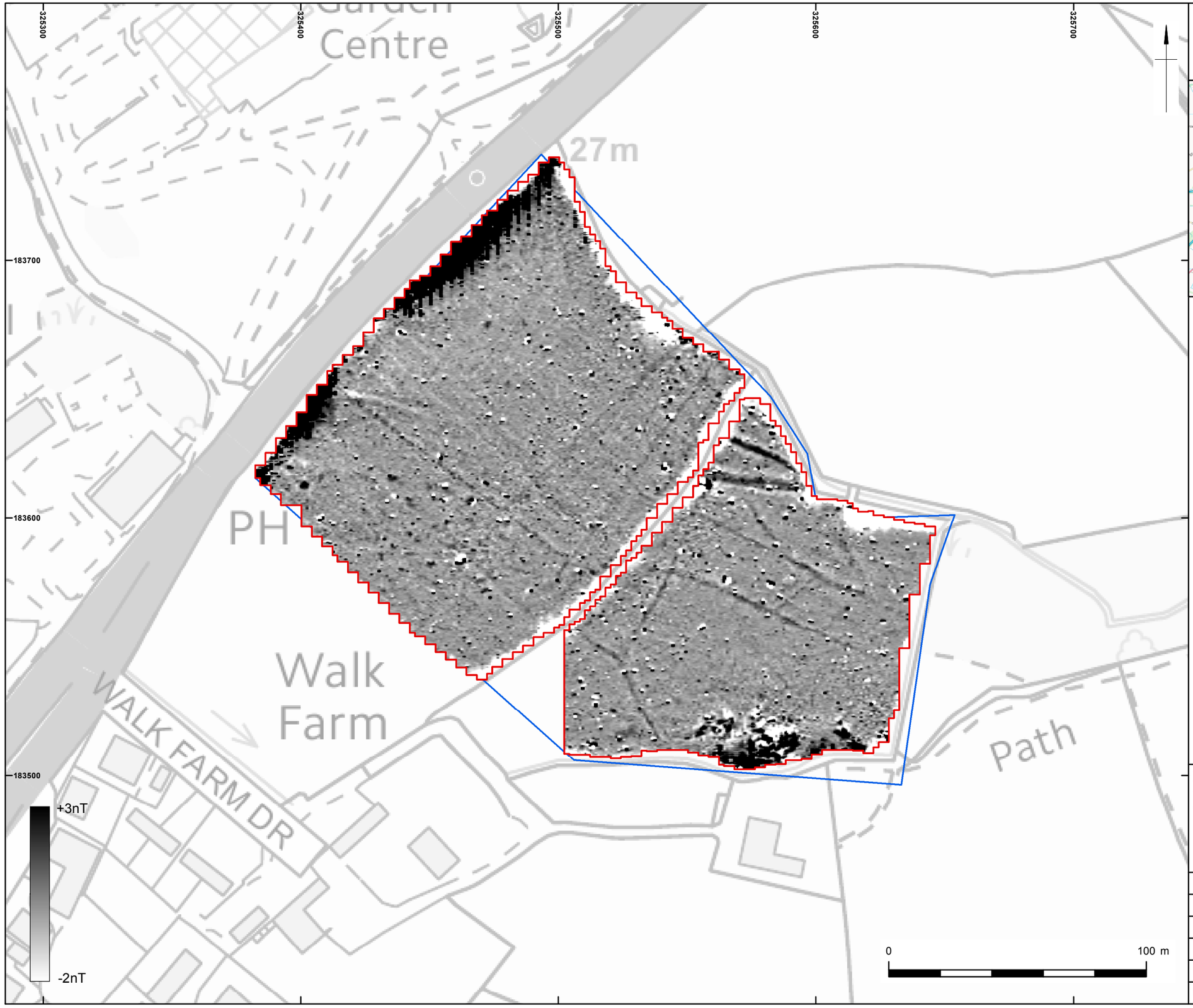


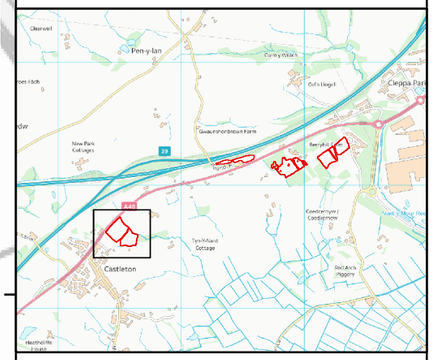
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig37.mxd	

Interpretation: Area 139b

Figure 37





Detailed Survey Extents

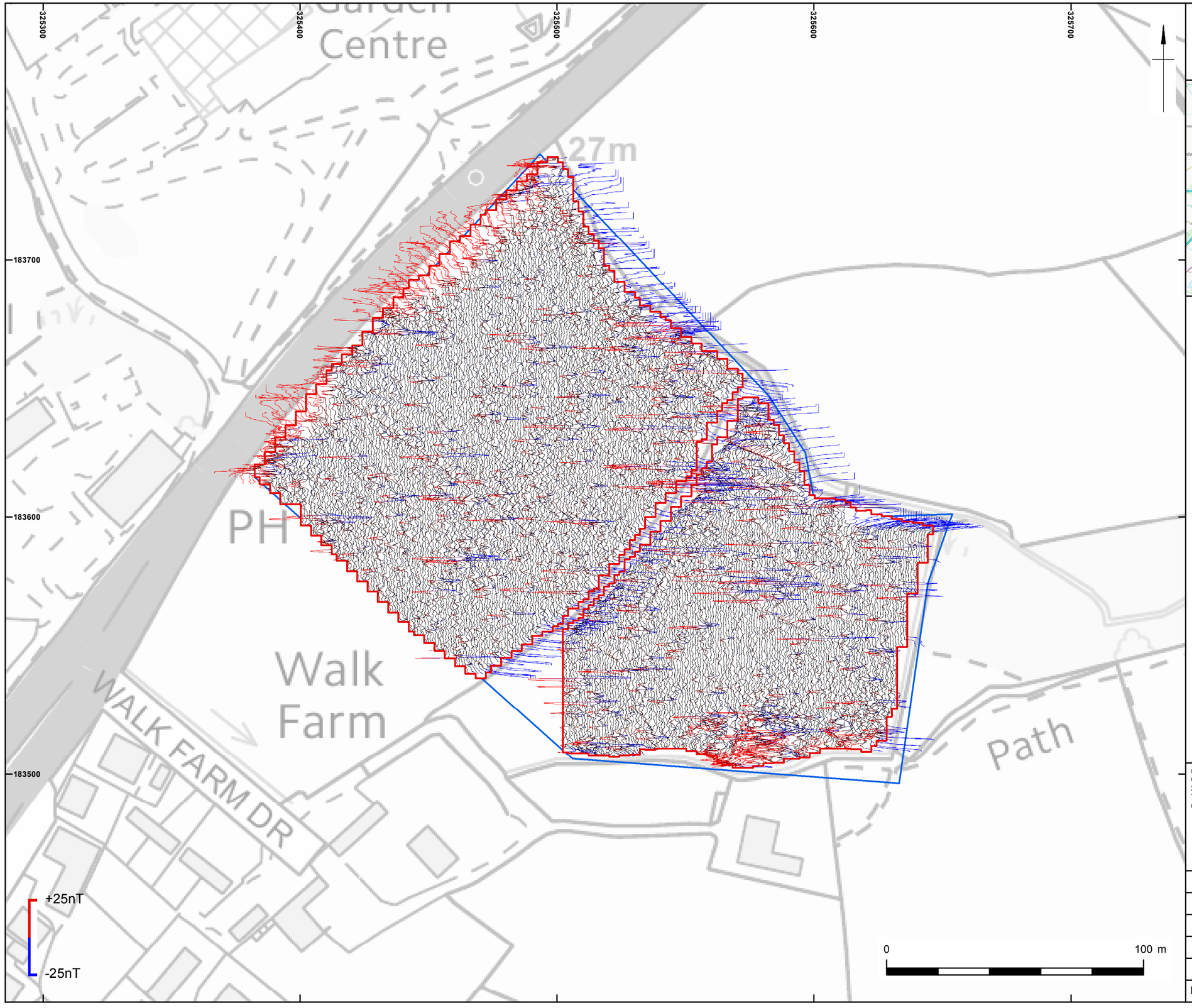
Site

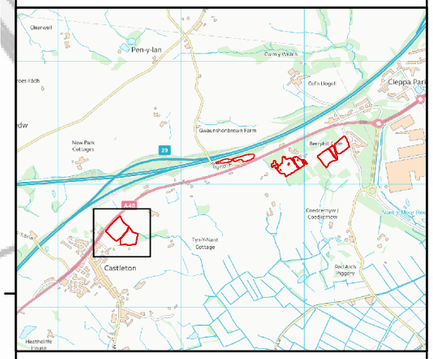
Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS

FigsMXD\Geophys\2015_10_08\102831_Fig38.mxd

Greyscale plot: Area 102c

Figure 38





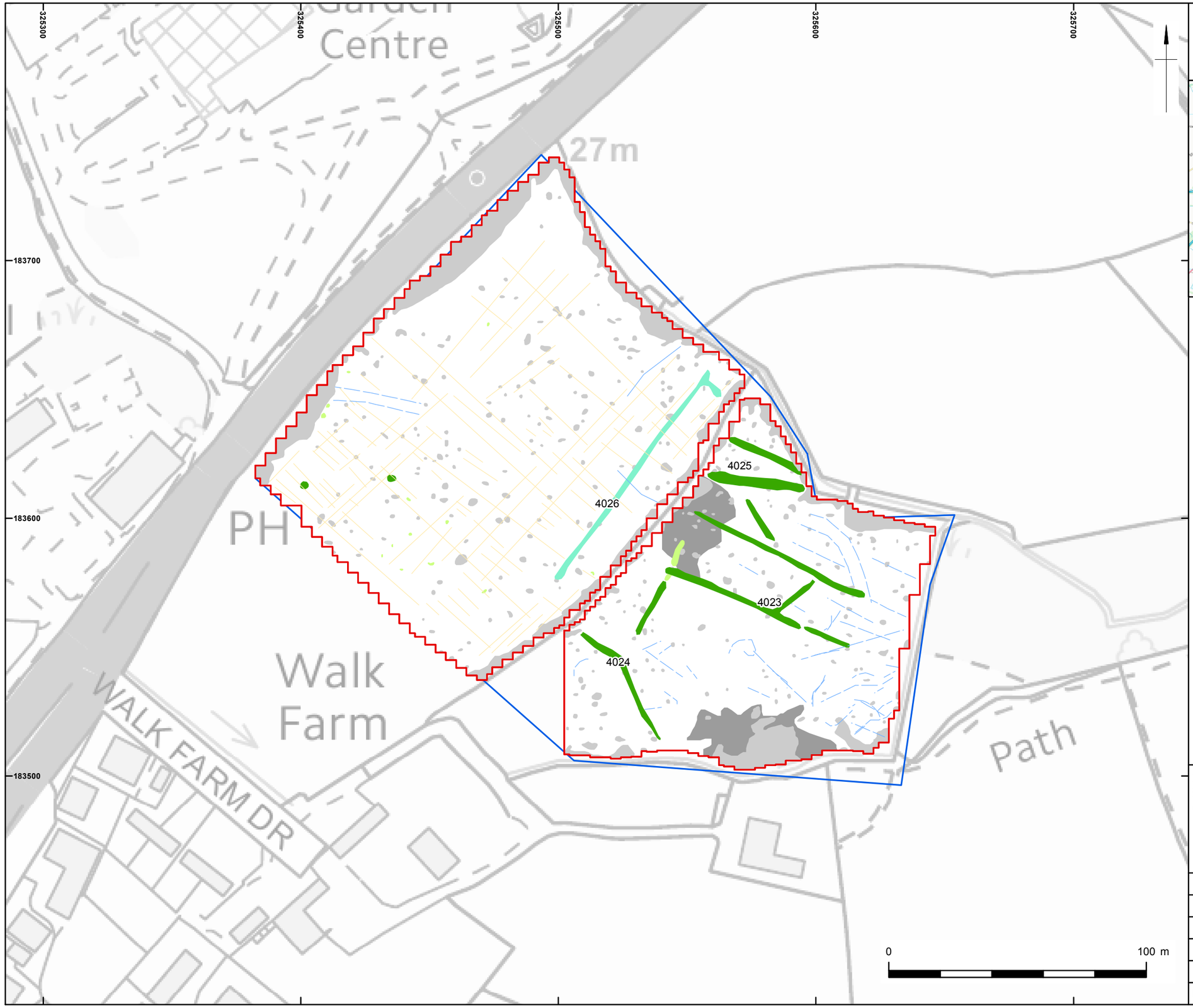
Detailed Survey Extents

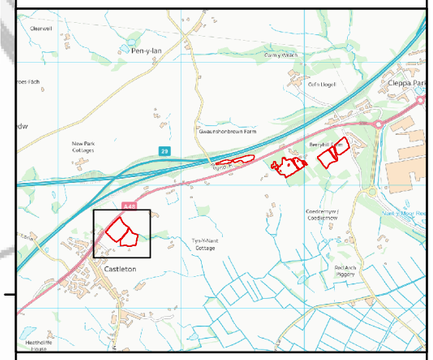
Site

Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig39.mxd	

XY trace plot: Area 102c

Figure 39



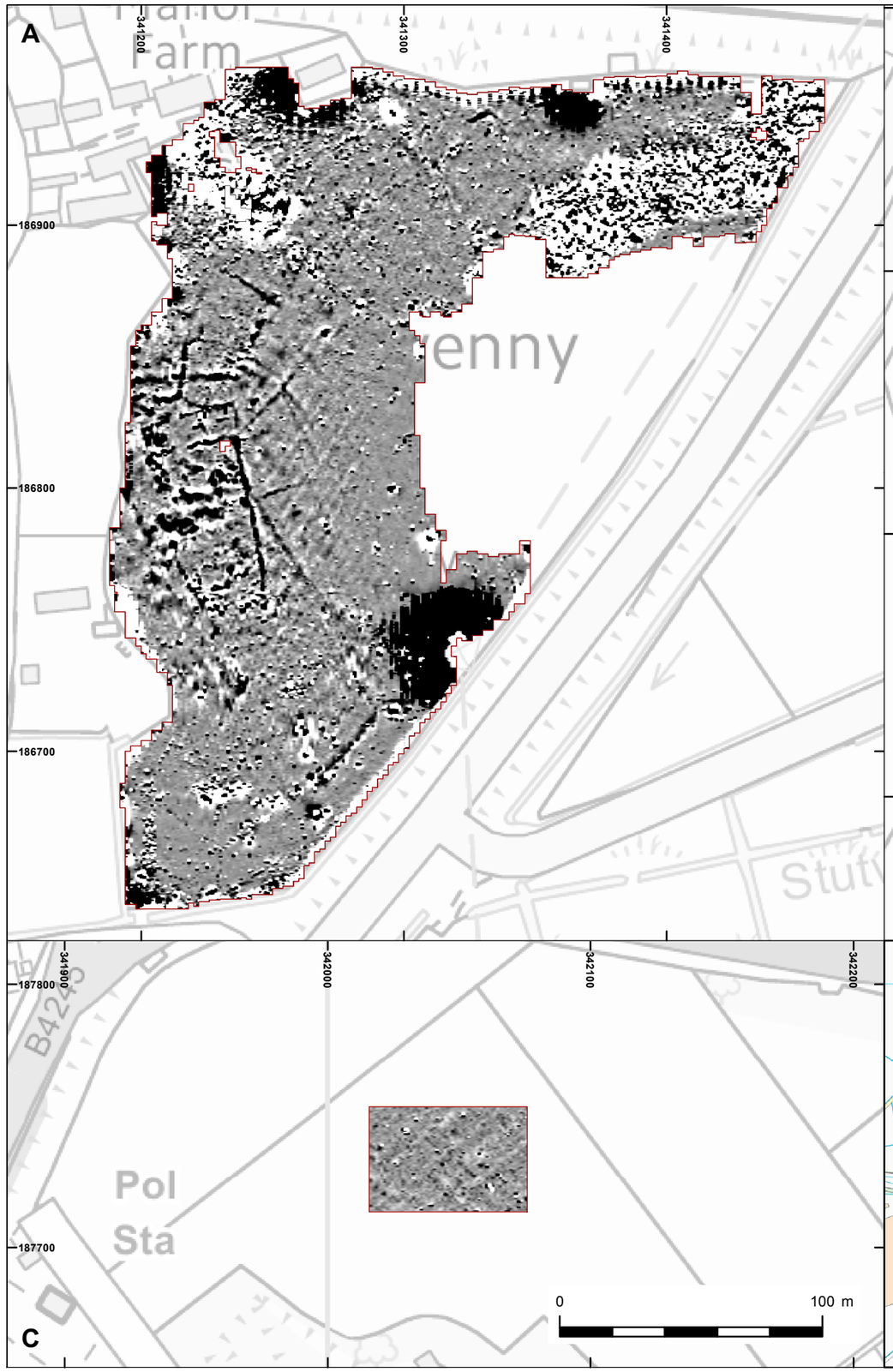


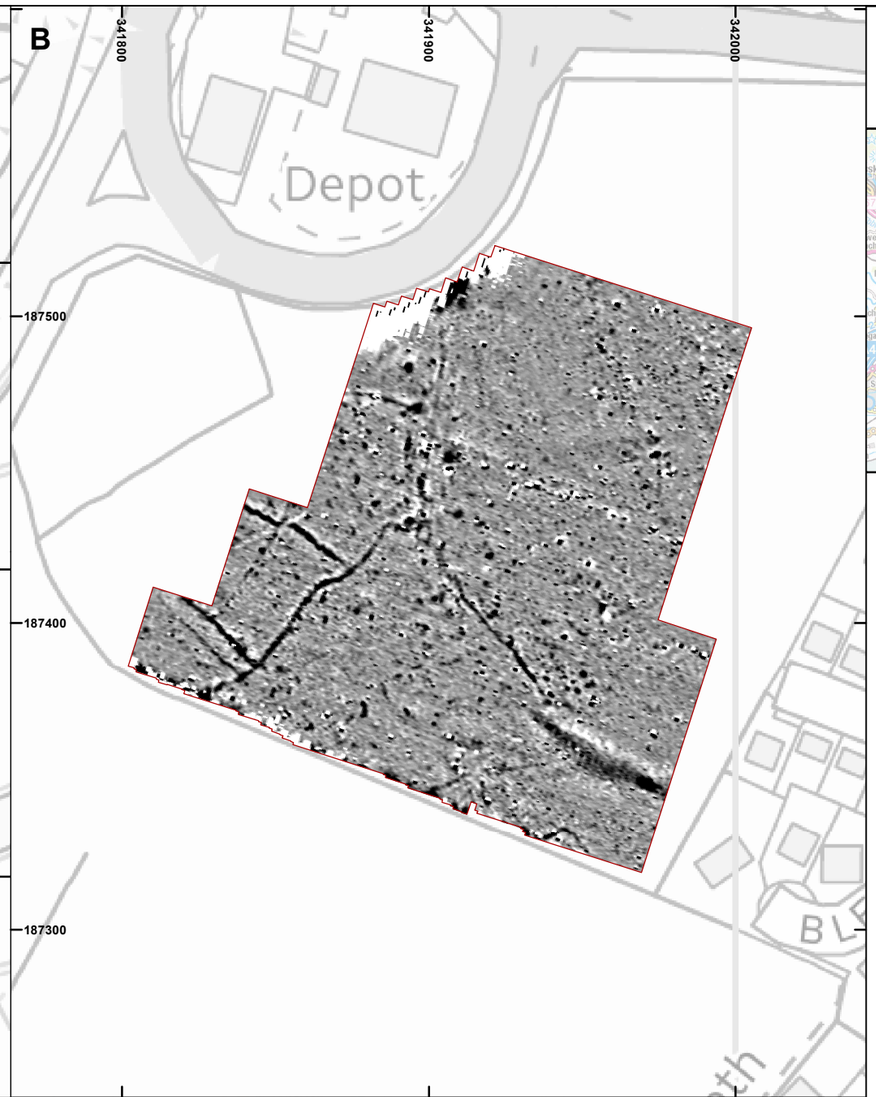
- Detailed Survey Extents
- Site
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Modern Service
- Agricultural
- Former Field Boundary
- Ferrous
- Increased Magnetic Response
- Superficial Geology
- Drainage
- Ploughing
- Trend

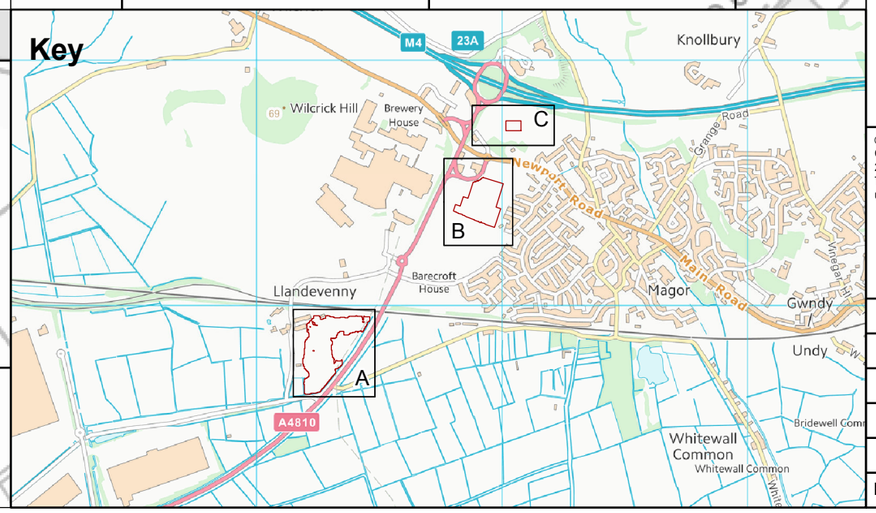
Date:	08/10/2015
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_10_08\102831_Fig40.mxd	

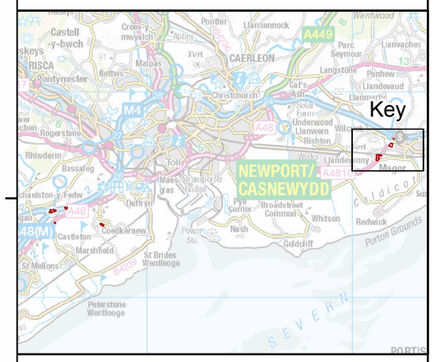
Interpretation: Area 102c

Figure 40









Detailed Survey Extents (2008)

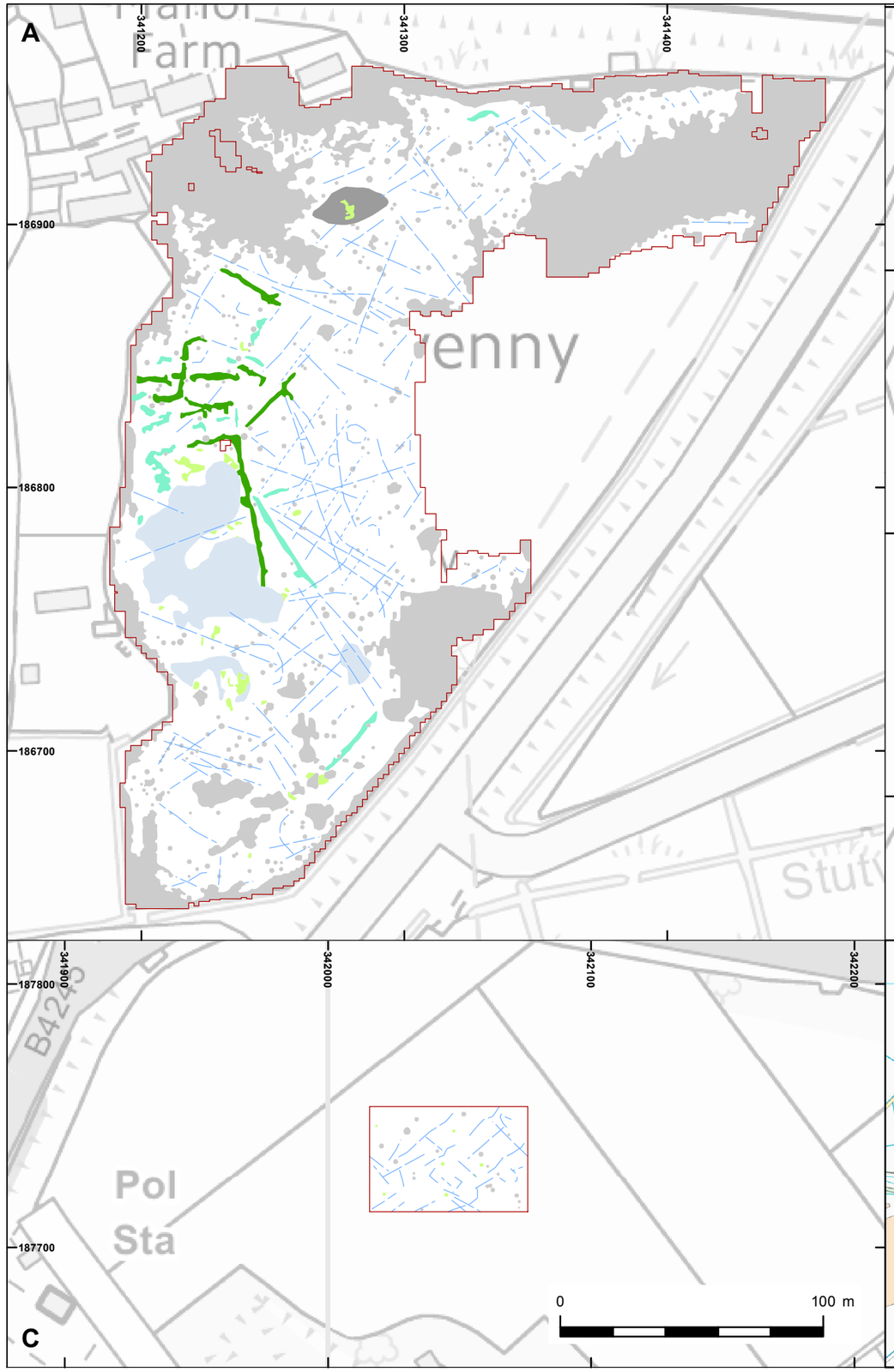
+3nT

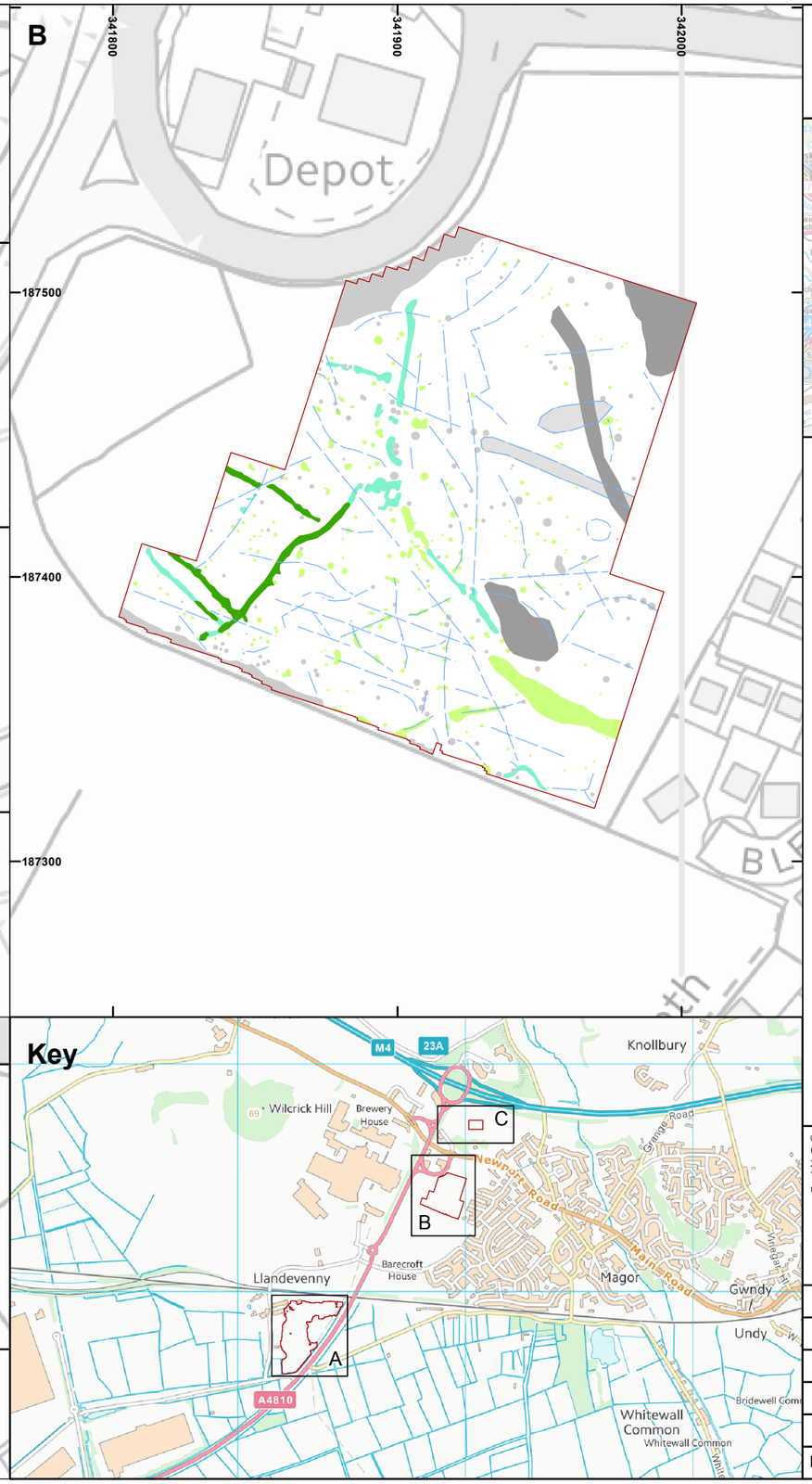
-2nT

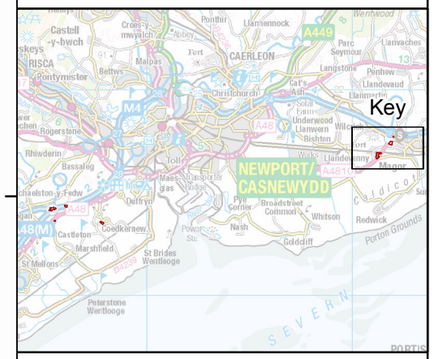
Date:	04/02/2016
Revision Number:	0
Scale:	1:2000 and 1:25000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS FigsMXD\Geophys\2015_02_04\102831_Fig41.mxd

Greyscale plot: Detailed Survey Extents (East), 2008

Figure 41





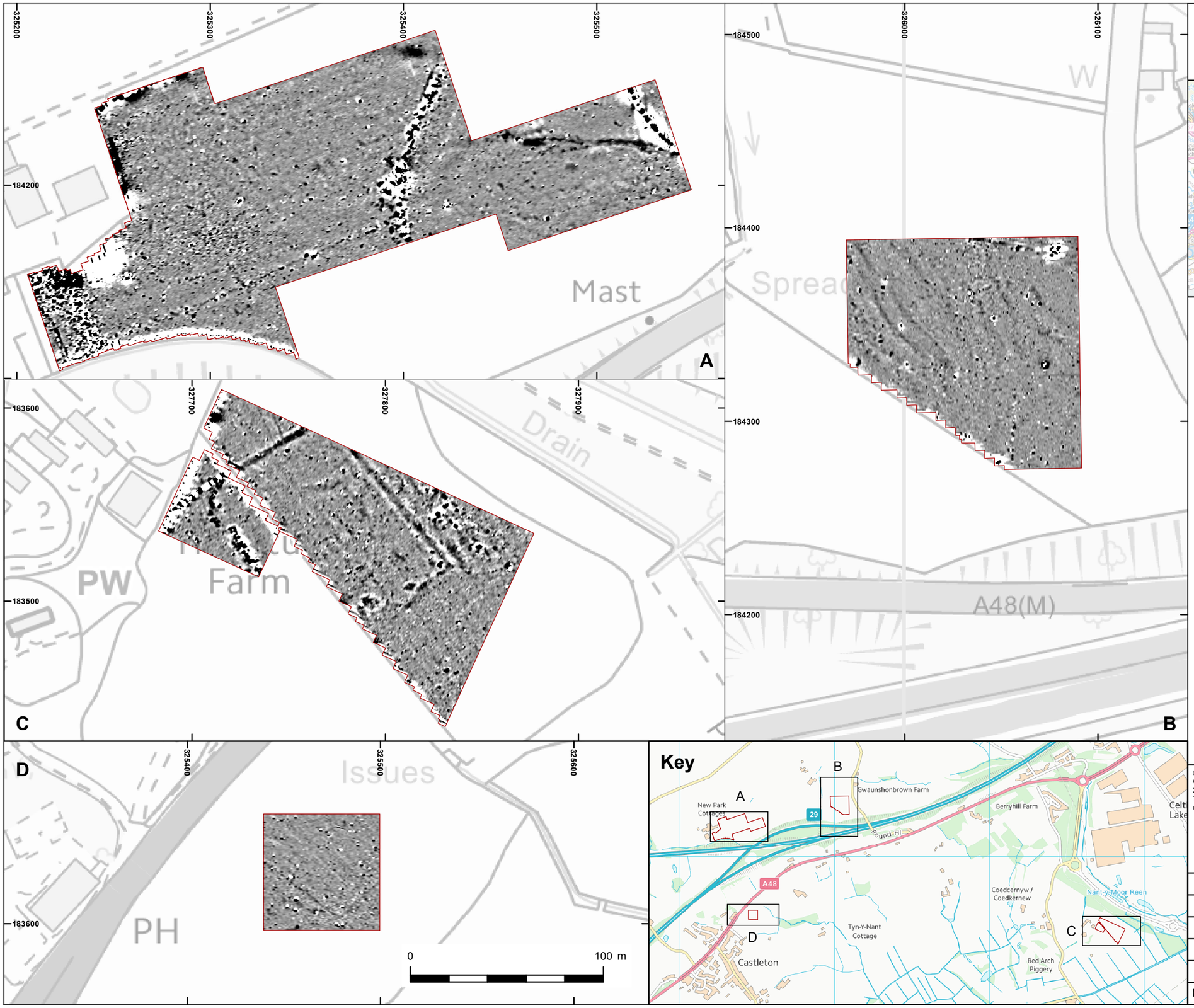


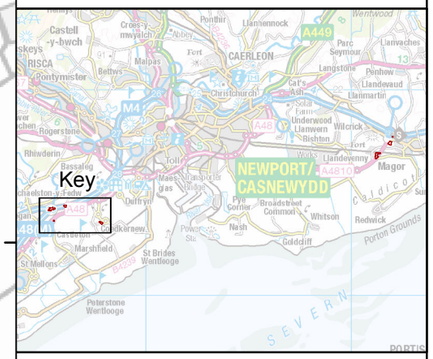
- Detailed Survey Extents (2008)
- Ploughing
- Trend
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Pipe
- Trend
- Increased Magnetic Response
- Ferrous
- Superficial Geology

Date:	04/02/2016
Revision Number:	0
Scale:	1:2000 and 1:25000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS FigsMXD\Geophys\2015_02_04\102831_Fig42.mxd

Interpretation: Detailed Survey Extents (East), 2008

Figure 42





Detailed Survey Extents (2008)

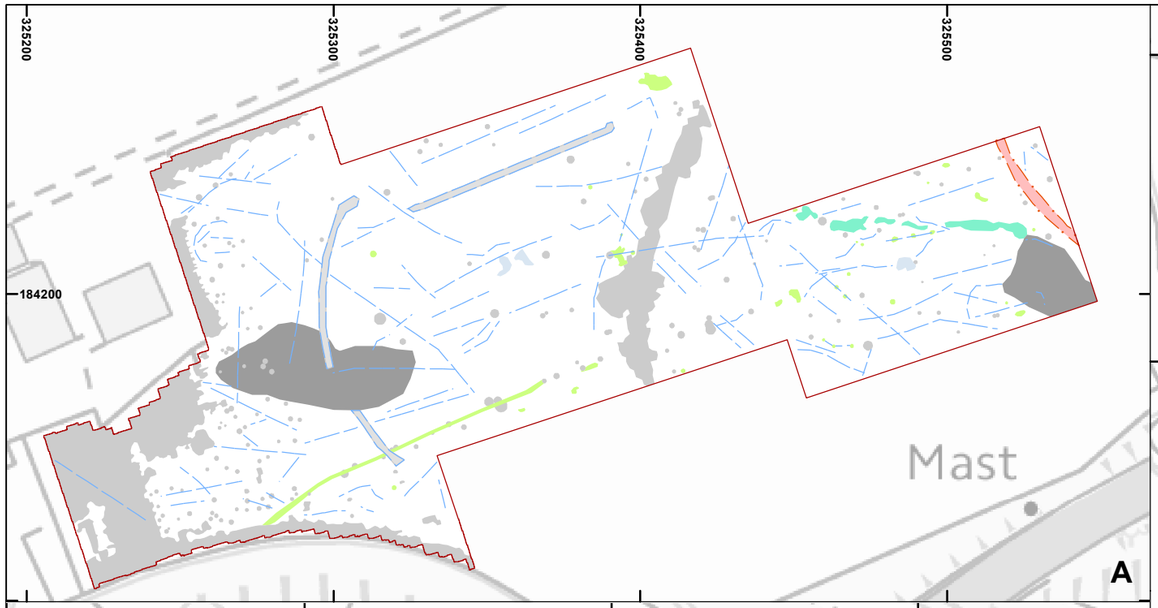
+3nT

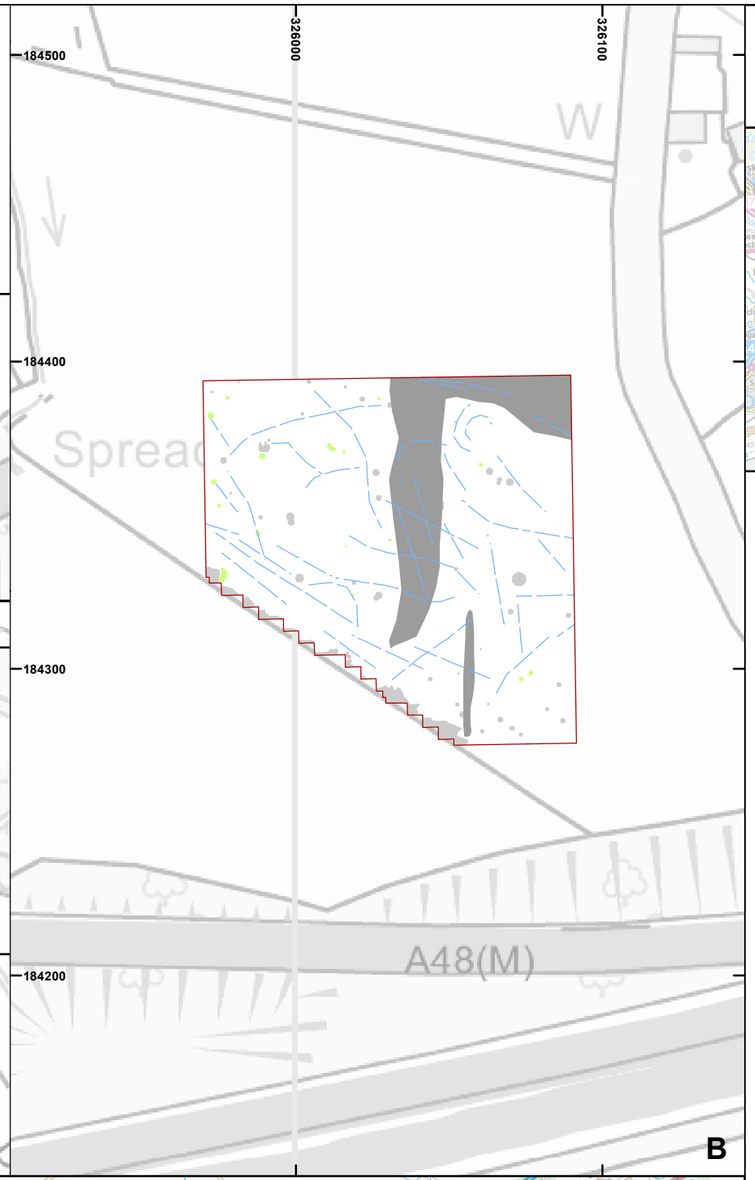
-2nT

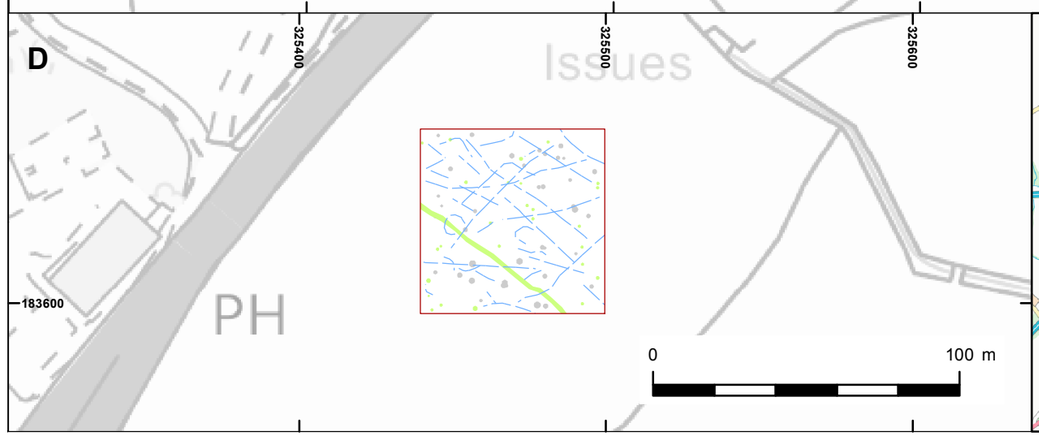
Date:	04/02/2016
Revision Number:	0
Scale:	1:2000 and 1:25000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_02_04\102831_Fig43.mxd	

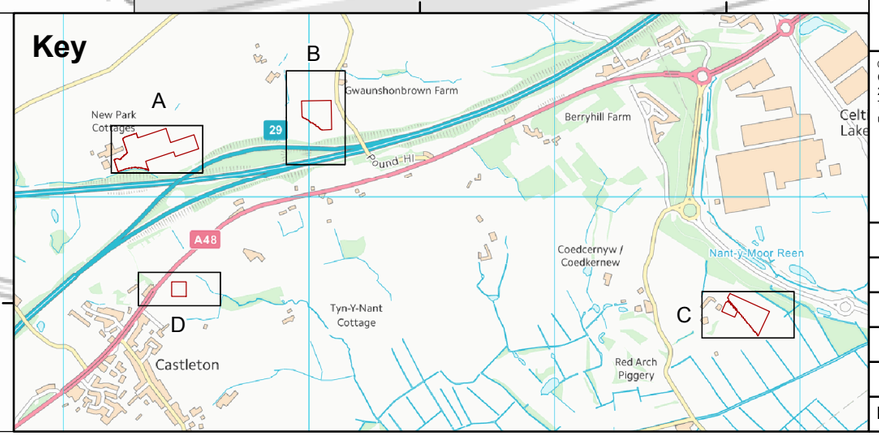
Greyscale plot: Detailed Survey Extents (West), 2008

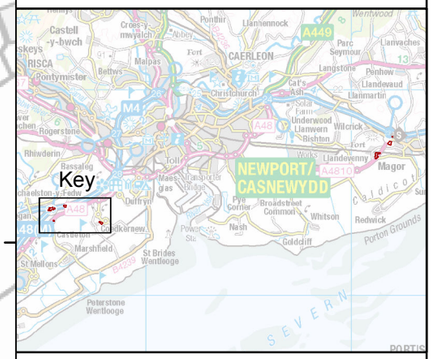
Figure 43











- Detailed Survey Extents (2008)
- Ploughing
- Trend
- Archaeology
- Probable Archaeology
- Possible Archaeology
- Pipe
- Trend
- Increased Magnetic Response
- Ferrous
- Superficial Geology

Date:	04/02/2016
Revision Number:	0
Scale:	1:2000 and 1:25000 (Key) at A3
Illustrator:	RAM
Path:	X:\PROJECTS\102831\GIS
FigsMXD\Geophys\2015_02_04\102831_Fig44.mxd	

Interpretation: Detailed Survey Extents (West), 2008

Figure 44

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