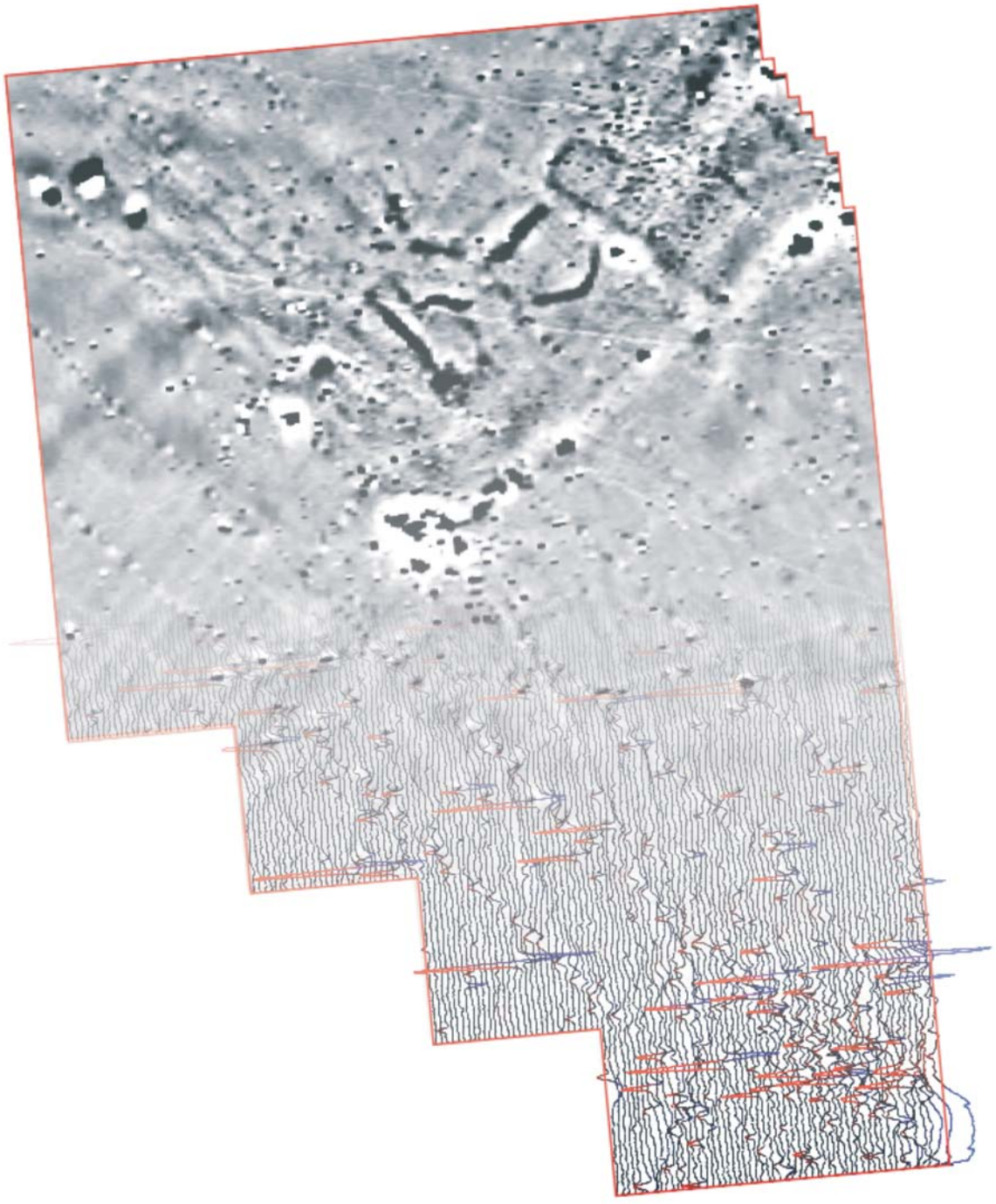
Wessex Archaeology

Land adjacent to Steart Village, Steart Point, Somerset

Detailed Gradiometer Survey Report



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Land adjacent to Steart Village, Steart Point, Somerset, TA5 2PX

Detailed Gradiometer Survey Report

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Report Covers:
Front *Merged Greyscale Plot and XY Trace Plot for Area A*
Rear *Looking east along a fieldwalking run in Plot 26.*

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Summary

Wessex Archaeology were commissioned by May Gurney Ltd to carry out an archaeological fieldwalking survey of land proposed for a habitat creation scheme at Steart Point peninsula, near Bridgwater, Somerset (centred on OS NGR 327000 145000). The archaeological works were being carried out as part of a package of measures in order to mitigate anticipated off-site impacts associated with construction work at Bristol Port, and specifically loss of floodplain/ wildlife habitat. At Steart Point, the works comprises the construction of an artificial floodplain creek and saline lagoon/ balancing pond system, extending over a footprint measuring approximately 45ha.

On the basis of the results of a fieldwalking survey across approximately 10% of the scheme footprint (Wessex Archaeology 2011), which identified a number of artefact concentrations throughout the scheme area, this phase of mitigation comprised a detailed gradiometer survey covering approximately 5.5 ha (as six separate areas labelled Areas A-F).

Area A was by far the largest survey area and contained the greatest concentration of archaeological features including one probable settlement enclosure and a second possible settlement enclosure. Agricultural features and divisions from multiple phases were observed in this area; the archaeology has been shown to extend in nearly every direction beyond the limits of this survey block. Archaeological features were also observed in Areas C and D where drainage ditches were present in Area C and a possible settlement structure was present in the centre of Area D. Areas B, E and F appeared devoid of significant remains, with only probable agricultural features visible in the data.

Along with the archaeological anomalies outlined above are a number of geological features that show in the data. These are thought to be remnant features that relate to the former wetland landscape. A number of the isolated anomalies interpreted as possible archaeology could be natural features such as hollows or tree throws.

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Acknowledgements

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The fieldwork was directed by Hannah Brown and assisted by Ross Lefort. The geophysical data was processed by Ross Lefort and interpreted by Hannah Brown. This report was written by Ross Lefort and Hannah Brown. The geophysical work was quality controlled by Dr. Paul Baggaley, and illustrations prepared by Linda Coleman. The project was managed on behalf of Wessex Archaeology by Andy Crockett.

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1 INTRODUCTION

1.1 Project Background

1.1.1 Wessex Archaeology (the **Contractor**) were commissioned by May Gurney Ltd (the **Client**) to carry out geophysical survey of land proposed for a habitat creation scheme at Steart Point peninsula, near Bridgwater, Somerset (the **Site** - centred on OS NGR 327000 145000; **Figure 1**). The current fieldwork was undertaken on 21st and 22nd December 2011, and comprised the detailed gradiometer survey of six separate areas of the scheme (Areas A-F), defined primarily on the basis of previous fieldwalking results (Wessex Archaeology 2011).

1.1.2 The archaeological works were carried out as part of a package of measures in order to mitigate anticipated off-site impacts associated with construction work at Bristol Port, and specifically loss of floodplain/ wildlife habitat. At Steart Point, the mitigation measures will comprise construction of an artificial floodplain creek and saline lagoon/ balancing pond system, extending over a footprint measuring approximately 45ha.

1.1.3 An earlier desk-based assessment (Wessex Archaeology 2008) of the Site and extended heritage assessment of the wider area (Wessex Archaeology 2009) have set out the historical background to the Steart Peninsular, the summary of which is detailed below. A further evaluation was undertaken of two proposed pond areas (Wessex Archaeology 2010), one of which comprises most of the southern pond (Pond 2) of the two originally proposed ponds in the south-western part of the current scheme.

1.1.4 Most recently, a fieldwalking survey of approximately 10% of the scheme impact footprint (Wessex Archaeology 2011). Aside from a finds assemblage comprised predominantly of post-medieval and modern material (mostly ceramic building material but also clay pipe), the fieldwalking identified apparent concentrations of artefacts at various points throughout the scheme, including:

- *two undiagnostic prehistoric (9500 – 700 BC) worked flint pieces recorded from the south-west of the Site;*
- *three sherds of Romano-British (AD 43 – 410) pottery (in two locations c. 46m apart) from the middle of the Site;*
- *a relative concentration of unabraded 11th - 13th century medieval pottery from the east of the Site (Plot 3), probably associated with a 'moated' site identified from LiDAR data in this area; and*
- *similarly dated pottery scattered throughout the remainder Site.*

1.2 The Site, Location and Geology

1.2.1 The Site lies approximately 8km north-northwest of Bridgwater, Somerset. It is located on the northern coast of the county and comprises the southern portion of the Steart Peninsular which lies at the mouth of the River Parrett on the Severn Estuary.

1.2.2 The Site is situated within the Central Somerset Levels, in an area of low lying (*c*. 4.50 – 8m above Ordnance Datum (aOD)) flat, artificially drained land. Aside from the northern coastal area containing Steart and Wall Common and an area in the mid-south river margins (lying at 6-8m aOD) most of the peninsula lies at 5.40 – 5.80m (aOD) – (Wessex Archaeology 2009, figure 2).

1.2.3 The Site is made up of medium-sized fields separated by hedgerows and/or water-filled drainage ditches. Most of these fields are used as pasture, although towards the eastern side of the Site a number are arable; at the time of survey these were under stubble or young crop. The importance of Steart Flats to wildlife, particularly wintering wildfowl, is recognised and the Site is surrounded to the north and east by the Severn Estuary Special Protection and RAMSAR Sites, and the Bridgwater Bay National Nature Reserve and Site of Special Scientific Interest.

1.2.4 The underlying geology of the Site is Triassic mudstones with Rhaetic and Dolomitic conglomerates, which are overlain by alluvial deposits and, along the northwestern edge of the peninsula, by deposits of blown sand (British Geological Survey 1977). The coast of the peninsular is made up of shingle storm beaches, dune sands and salt marsh. The soils of the majority of the Site are Pelo-Calcareous Alluvial Gleys, with the possibility of Typical Sand-Pararendzinas along the northwestern extents (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, as demonstrated by a geophysical pilot survey conducted by Wessex Archaeology on land to the west of Steart Drove (2011).

1.3 Archaeological and Historical Background

1.3.1 The geomorphological evolution of the Severn Estuary, at the mouth of which Steart Peninsula is located has, over many millennia, provided a dynamic environment within which humans have lived.

1.3.2 The Severn Levels, within which the Steart Peninsula is situated, are a man-made landscape and the result of sustained drainage and sea defence that began in some areas as early as the Romano-British period (AD 43 – 410). In order to understand the archaeological potential of the Site it is necessary to understand the development of the landscape.

1.3.3 During the Pleistocene epoch for the 500,000 years prior to the beginning of the Holocene epoch (12,000 BP) the climate cycled through relatively frequent glacial (cold) and inter-glacial (warm) periods. The variance in climatic temperature was accompanied by fluctuating sea levels as water was periodically taken up and then released by the ice sheets. Evidence from hydrographic, geophysical and borehole surveys from Gloucester to the central Bristol Channel indicates that within the Severn Levels the Lower and Middle Palaeolithic landscape would have been dominated by a main river valley cut into bedrock geology with a network of subsidiary valleys feeding into it from the English and Welsh sides in the location of the present estuary (Brunning 2008, 44).

1.3.4 This very early landscape is now buried beneath deep Holocene marine sediments which make up the Severn Levels. The start of the Holocene is marked by the onset of a warm

interglacial period starting at around 12,500BP. This warming phase was accompanied initially by rapidly rising sea-levels. The remains of a submerged Mesolithic forest just off the coast at Hinkley illustrate the huge change in the environment from the wooded landscape which dominated the landscape 10,000 years ago.

1.3.5 Within the intertidal zone the importance of the sea as a resource is evident with the remains of fish weirs and small vessels of medieval and later date giving clues as to how the people who lived on this coastline used the sea. On the peninsula itself surviving field boundaries, banks, ditches, lanes and settlements are the product of hundreds of years of reclamation and land improvement. Couple this with physical ground conditions which favour the survival of organic and environmental remains, and the significance of the heritage resource at a location such as the Steart Peninsula is clear.

1.3.6 The wider setting of the Steart Peninsula, particularly Bridgwater Bay and the River Parrett, has been the subject of a number of heritage research projects, from which a great deal has been learnt about the nature and extent of the heritage resource both in the intertidal and terrestrial environments. The peninsula itself has also been the focus of some detailed desk-based research projects as part of the Environment Agency's work to assess the suitability of the peninsula for habitat creation use.

1.3.7 Overall - the modern landscape in which the Site is situated is largely a landscape of the medieval and post-medieval periods, with its origins in post-Roman flooding episodes. Any Roman or prehistoric remains are likely to survive buried beneath alluvial deposits formed at the time of this flooding. Because of this, it is not possible to assess the likelihood of sub-surface prehistoric or Roman remains surviving across the Site, with the exception of the higher ground, where there is no depth of stratigraphy and areas of the intertidal zone, where such deposits may be exposed by tidal action. In the light of this, the possibility of encountering significant archaeological deposits of prehistoric or Roman date, particularly during intrusive groundworks cannot be discounted.

1.3.8 The results of this recent work (Wessex Archaeology 2008, 2009) have served to define the known heritage resource, but also to highlight the potential that exists for the presence and survival of further buried archaeological and palaeoenvironmental remains. The more salient information is reiterated below.

Former field boundaries

1.3.9 Analysis of the digital elevation data model, slope maps and hillshade plots has allowed the digitisation of numerous linear features likely to be the remains of former field boundaries (Wessex Archaeology 2009). Comparison with the historic mapping confirmed that a number of the Site field boundaries do occur on 18th and 19th century maps. It is clear from that much of the farmland was originally considerably more subdivided than is the case today.

1.3.10 To the east of Steart Drove, there are occasional parcels of smaller fields, but for the most part the fields appear to comprise fairly regular rectangular co-axial fields, aligned roughly north west to south east, perpendicular to the road. This pattern only changes near the point itself, where a number of the fields take their alignment off a second road.

1.3.11 In his work on the Severn Estuary Levels, Rippon suggested that differences in the sub-division of the landscape may well reflect the development of the landscape (Rippon, 1996, 50 - 52). He suggested that areas of small irregular fields with sinuous boundaries may represent early enclosures of the landscape, with more regular fields representing later enclosure. The enclosure of the back fen is likely to have been a later phase of enclosure.

'Moated' sites, earthworks and trackways

1.3.12 In addition to the numerous field boundaries there are a series of roughly rectangular platforms or 'moated' sites set within the enclosed fields. These are generally defined by slightly deeper ditches than the drainage ditches of the surrounding fields. In addition to this there is evidence for a number of other earthworks in the landscape, comprising both upstanding earthworks and negative features. There are a number of irregular negative features likely to be ponds created for watering livestock. Many of the 'moated' sites and earthworks are linked by trackways or now defunct tracks.

1.3.13 In total some 14 'moated' platforms were identified from the LiDAR data (Wessex Archaeology 2009, **Appendix 1**). Most of these sites comprise roughly rectangular platforms either wholly or partially surrounded by ditches or 'moats'. Most are situated on low lying ground within the levels, although (**2028**) comprises two possible platforms on the higher ground to the east of Chalcott Farm. Others appear to be closely linked to areas of existing settlement, whilst the remainder are more likely to represent abandoned cottages, houses or farms. Their distribution (**Figure 1**) suggests that the levels within the area were once divided into a network of smaller farms linked by trackways and droveways, and that many of these later became incorporated into the current farm-holdings.

1.3.14 There are four 'moated' sites to the east of Steart Drove, within the Site. All four of the 'moated' sites lie just to the south-east of Steart Drove, to which they are linked by short trackways. The only previously known earthwork shown in this figure is a windmill mound (**1027**) within **2035**. Excavations on the site revealed medieval pottery, whilst a windmill is recorded on the site as late as 1614. It is not clear how this windmill is likely to relate to the nearby 'moated' sites, but it seems to have been one of two mills serving the manor of Stockland Bristol. It was recorded as being flooded by the sea in 1655.

1.3.15 An evaluation of two proposed pond areas was undertaken by Wessex Archaeology in 2010 (Wessex Archaeology 2010), one of which comprised part of the present Pond 2 area. No archaeological features of significance were identified. Aside from clearly modern finds the only find of note was from the ploughsoil outside the current area (Area D of the scheme); a single sherd of central Gaulish Roman samian ware dating to the second half of the 2nd century AD.

1.3.16 A further evaluation by Wessex Archaeology (2011b) comprised the investigation of a complex of earthworks to the immediate west of the Site, recorded on the Somerset Historic Environment Record as a *Deserted Farm, North-East of Woolstone Farm* (HER no 34653) and centred on Ordnance Survey National Grid Reference (NGR) 324539 144852. The trenches were positioned to investigate anomalies identified by an earlier geophysical survey (Wessex Archaeology 2011a) and a number of bank and ditch earthworks visible as extant features on the ground and also in LiDAR imagery of the site. These features were thought likely to represent the remains of a deserted farmstead positioned within a ditched enclosure.

1.3.17 The excavated evidence appears to suggest two phases of building within the main interior platform within a roughly square *c*. 55m ditched enclosure. Evidence for buildings in the form of walling and a section of robbed out wall were recorded from the internal platform. Pottery associated with the earliest investigated phase of the building dates its use to the 13th century with pottery evidence associated with the later building phase dating it to the 17th -18th centuries

2 SCOPE OF WORKS

2.1.1 Survey was conducted over a total of approximately 5.5ha split into 6 areas. The fields within the Site were assigned numerical labels during the fieldwalking survey (WA 2011) and these are referenced below, however, the geophysical survey areas are referred to here as Areas A to F for reasons of clarity (**Figure 1**).

3 METHODOLOGY

3.1 Introduction

3.1.1 A geophysical specification was prepared by Wessex Archaeology to investigate the Site. The methodology consisted of detailed magnetometer survey conducted using a Bartington Grad601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (2008).

3.1.2 The geophysical survey was conducted by Wessex Archaeology's in-house geophysics team on 21st – 23rd December 2011. Field conditions were variable, with heavy rain in the preceding days resulting in saturated and slippery ground, particularly in the arable fields which retained only sparse stubble. Survey was also hampered by long strips of bare, recently ploughed ground which cut through the majority of survey areas at various points as a result of the fieldwalking survey methodology (WA 2011).

3.2 Method

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

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

3.2.3 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse function (±5nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey areas, with no interpolation applied.

3.2.4 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 2**.

4 RESULTS

4.1 Introduction

4.1.1 The gradiometer survey has been successful in identifying anomalies of archaeological interest as well as others of probable and of possible archaeological interest. Results are presented as a series of greyscale (**Figure 2** and **5**) and XY plots (**Figure 3** and **6**), and archaeological interpretations (**Figure 4** and **7**), all at a scale of 1:1250. The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots.

4.1.2 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**.

4.1.3 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.

4.2 Gradiometer Survey Results and Interpretation

Area A

4.2.1 Area A is the largest of the six survey areas measuring 2.58ha and was targeted over an area identified from aerial photography that produced a dense concentration of medieval and post-medieval finds during recent fieldwalking. It is suspected that there is at least one unrecorded moated site in this area.

4.2.2 A number of anomalies of archaeological interest have been observed in this area. Aside from the ferrous responses, the most noticeable anomalies in the data are a group of linear and curvilinear positive features (4000). They have values around 5nT with small regions with readings over 10nT. This kind of response is usually interpreted as the remains of a ditch that has been filled with magnetically enhanced domestic or industrial refuse. This group of anomalies is notable as they do not appear to join to form a single enclosure or structure but are instead bounded by a far less distinct set of joined linear anomalies.

4.2.3 These weaker anomalies (4001) are slightly negative with values varying in magnitude from less than -0.5nT to -2.0nT. Similar anomalies are present running right through this area at 4005, 4006 and 4009. This complex of anomalies is oriented north east to south west. The anomalies in this area appear to define a double enclosure comprising two conjoined rectangular enclosures measuring 55m x 45m (4000) and 50m x 45m (4002). The formation processes that produced these enclosure responses are clearly different from those that formed the anomalies discussed above (4000). These anomalies may represent channels that were cut to help drain the land around this settlement. As their function was primarily to keep the land dry they would not have been allowed to fill while the area was settled. As a result they contain less magnetically enhanced material and appear fainter and negative in the data.

4.2.4 4002 marks the second of the two conjoined enclosures. It contains an area of increased magnetic response and a denser concentration of ferrous anomalies than other regions of this survey area. This area is separated from the anomalies around 4000 by one of the weakly negative ditches discussed above. Within this enclosure are a small partial rectangular enclosure (25m x 7.5m) and two similarly aligned linear anomalies, all with positive values between 1.5nT and 3nT. A number of linear trends runs through the area with two defined by parallel rows of discrete anomalies of possible archaeological interest. This enclosure looks a likely area of occupation given the concentration of burnt/ferrous/ceramic material in this enclosure along with the coherent linear and rectilinear anomalies that may represent building remains.

4.2.5 The connected enclosure at 4000 appears to be relatively clear of debris and may be an enclosure with a number of dividing ditches that is used to keep animals and undertake agricultural and/or industrial activity. There is an anomaly interpreted as an area of increased magnetic response at 4004; it is located in the western corner of 4000 and appears to be an area of burning with values around 10nT. On the nearby southern corner

is a large mass of ferrous responses, these may be modern objects but an archaeological interpretation should not be ruled out.

4.2.6 There are a number of faint linear anomalies to the north west of 4000 at 4003. They may be related to this double enclosure and have values around 0.5nT to 1.5nT. There are a number of other linear trends running throughout the rest of this area. Some are positive with values between 0.5nT and 1.0nT and are interpreted as ploughing trends while others are defined by dipolar anomalies (-2nT to 2nT) and are interpreted as ceramic field drains oriented north west to south east.

4.2.7 4005 marks a group of drainage ditches similar to those at 4001; it is likely that they connect to one another and are part of the same complex. 4005 defines a rectangular enclosure measuring approximately 45m x 15m, this would appear to have an agricultural function given that there are no obvious anomalies visible within to suggest any specialised function. This enclosure joins onto another possible enclosure at 4006 that has a concentration of ferrous anomalies along with a spread of increased magnetic response. There are also linear positive anomalies that range in magnitude from 0.5nT to 3nT plus; these suggest that some form of settlement or activity took place within this enclosure.

4.2.8 To the north of this enclosure around 4007 are more trends, some are related to ploughing and a number of them are the same ceramic field drains mentioned earlier. The grid pattern of ploughing trends concentrated around 4008 relates to a post-medieval system of drainage ditches that were visible in places on the surface.

4.2.9 More of the earlier field system is visible around 4009 in addition to a number of other interesting anomalies. Just south of 4009 are three strongly magnetised anomalies that are similar in form to 4004 with values ranging from -50nT to 40nT. They are thought to be the product of high temperature activity and may have been created by industrial processes. High temperatures can increase the magnetic properties of a substance because the magnetic minerals within these substances lose their randomised magnetic alignments when they are heated above their Curie point (between 575°C and 675°C). When a heated material cools these minerals are together re-aligned with the Earth's magnetic field. As they now have a common alignment, the magnetic fields of these minerals no longer cancel each other out and instead combine to register high magnetic readings (Aspinall et al. 2008: 21-28).

4.2.10 North of 4009 is a curvilinear anomaly with very diffuse edges and values between 0.5nT and 1.5nT. There are numerous examples of such anomalies throughout the data and they are interpreted as natural geological features (palaeochannels and boggy areas) from a time when the area was still wetland. They are most likely magnetised to the point that we can detect them thanks to the action of magnetotactic bacteria. These bacteria live in a range of environments and grow a crystal of magnetite in their bodies during the course of their lives. Over many years these crystals from dead bacteria build up, increasing the magnetisation of the sediment in the process (Aspinall et al. 2008: 21-28).

4.2.11 In addition to all the other trends are three distinctive negative trends that run roughly WNW to ESE through the data with two passing through 4000 and 4001 and the other passing just to the north of 4002. They have values around -1nT and are much better defined than other trends in the area; they are possibly agricultural features.

Area B

4.2.12 Area B contains no definite archaeological anomalies with only a single L-shaped linear of possible archaeological interest present at 4010. A linear alignment of ferrous anomalies,

south of 4011, running perpendicular from the ditch is also present. This may relate to a former field division or a drainage structure. A number of linear trends are visible that are most likely related to ploughing. The only other anomalies present in this area are more diffuse edged anomalies that are tagged as superficial geology, like those discussed above.

Area C

4.2.13 Area C is divided into two smaller sub-sections by a roughly north east to south west aligned drainage ditch. There are some interesting linear anomalies at 4012 aligned roughly north west to south east associated with a spread of increased magnetic response. This appears to be a ditch with three branches that run out perpendicular from the main linear ditch for a short distance. The main ditch runs into the modern ditch at its southern end and does not appear in the data on the south side of this ditch. It continues north beyond the limits of this survey. It seems likely that this ditch is related to drainage given its layout. A few trends are aligned parallel to this ditch while other trends are aligned exactly north-west to south-east at a slightly different angle. All these trends are likely to be agricultural in origin. There are more geological anomalies, like those discussed above in this data at 4013.

4.2.14 There is one anomaly (4014) on the south side of the drainage ditch that may prove to be archaeological although it has diffuse edges. There are at least five ceramic field drains (4015) running through this area in addition to a number of trends that are on a similar alignment to those located on the north side of the drainage ditch. There are more geological anomalies in this area.

Area D

4.2.15 Area D is divided by two ditches and a pool and has a tight cluster of curvilinear anomalies located towards the centre of the survey area around 4016; these anomalies have values between 2nT and 6nT. This feature looks very convincing as an archaeological feature (possible structure) and has been classed as probable archaeology. A wide linear anomaly of possible archaeological interest is located directly north of this group of features with values around 5nT. There are more linear trends that are likely to be agricultural but apart from some ferrous anomalies the rest of the survey area is dominated by geological anomalies. These anomalies are diffuse in form like the examples discussed above but are a lot stronger than others observed. They are dipolar with readings ranging from -6nT to 6nT; some of the positive areas have been classed as possible archaeology but it seems likely that they are natural.

Area E

4.2.16 Area E is divided into two areas by an L-shaped section of drainage ditch. The larger northern section contains one anomaly of possible interest east of 4018. This may relate to a former field boundary. There is an area of increased magnetic response at 4019 that is defined by a concentration of ferrous anomalies but this does not look significant. A ceramic field drain runs north east to south west through this area. The only other archaeological anomalies present are a group of trends that are mostly aligned north to south; these are thought to be agricultural anomalies. Some diffuse geological anomalies are present across this survey area.

4.2.17 The southern part of this survey area is almost clear of archaeological anomalies with the exception of some trends at 4020. The area is dominated by small ferrous anomalies and broad, diffuse edged geological anomalies.

Area F

4.2.18 Area F is divided into three areas by drainage ditches and is clear of significant archaeological anomalies. Apart from small ferrous anomalies the only archaeological anomalies present are ceramic field drains aligned north west to south east and a number of faint linear and curvilinear trends at a variety of alignments. The survey area is dominated by geological features with higher magnetic values similar to those observed in Area D.

5 CONCLUSIONS

5.1.1 The detailed gradiometer survey has been successful in detecting anomalies of definite, probable and possible archaeological potential within the study area and can therefore be considered to have successfully fulfilled the aim of the survey.

5.1.2 This geophysical survey has clearly demonstrated the presence of archaeological features throughout the survey area. Many of these extend beyond the limits of the survey areas, which were delimited by the size of the areas requested by the client.

5.1.3 Area A contains the most interesting complex of archaeological features with at least one settlement enclosure identified along with a possible second. The division of the land into different areas of activity can be seen along with the changes in land management in this area throughout time. Area D contains another interesting feature that appears to relate to some form of settlement structure. A common theme across all survey areas is the constant battle to keep this area dry and a number of technological approaches from the digging of deep ditches to the setting of ceramic field drains can be seen in this data from all six of the survey areas covered.

5.1.4 Numerous discrete anomalies appear throughout the dataset and it is likely that some of these will be archaeological in origin. In similar geological settings, evaluation of geophysical survey data has demonstrated that tree throws and natural hollows may exhibit similar responses; whilst a more definite interpretation of such anomalies cannot be given, it seems probable that stronger, better defined responses are more likely to be archaeological.

5.1.5 Weak linear trends across the survey area may be archaeological in origin, although little more can be said about many of them. Some appear to be related to ploughing.

5.1.6 It should be noted that not all archaeological features will have been detected through geophysical survey, particularly in the case of small discrete features such as pits and post holes. Where dense concentrations of pit-like responses have been identified, it is possible that clusters of features may result in a single extended anomaly. It is also possible that the fill of archaeological features may not exhibit sufficient magnetic contrast from the surrounding natural layers to be resolved as an anomaly.

5.1.7 In the case of Area A the presence of buildings is inferred from the concentrations of ferrous/burnt/ceramic anomalies. A previous geophysical survey and follow up evaluation nearby uncovered a similar complex of features (Wessex Archaeology 2011b and 2011c). These features were identified as belonging to a medieval deserted farm with buildings constructed from stone surrounded by a mass of CBM, ceramic and burnt material (Wessex Archaeology 2011b: 5-10) It is not possible to easily identify stone buildings constructed from white lias, red sandstone, pebbles and slate (local materials used in construction) as they do not contrast magnetically with the background geology. Instead we must attempt to identify the tell-tale refuse that is indicative of occupation. Other

geophysical techniques such as earth resistance or ground penetrating radar will better define stone structures.

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Wessex Archaeology, 2011a, *Land adjacent to Steart Village, Steart Point, Somerset, TA5 2PX: Fieldwalking Survey and Evaluation Report*, Salisbury: Wessex Archaeology

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7 APPENDICES

7.1 Appendix 1: Survey Equipment and Data Processing

Survey Methods and Equipment

7.1.1 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.

7.1.2 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.

7.1.3 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.

7.1.4 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.

7.1.5 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 (English Heritage, 2008).

7.1.6 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. In this case, data were collected at 0.125m intervals along traverses spaced 0.25m apart, resulting in 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.

Post-Processing

7.1.7 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.

7.1.8 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.

7.1.9 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)*

7.1.10 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.*

7.2 Appendix 2: Geophysical Interpretation

7.2.1 The interpretation methodology used by Wessex Archaeology separates the anomalies into two main categories: archaeological and unidentified responses.

7.2.2 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:

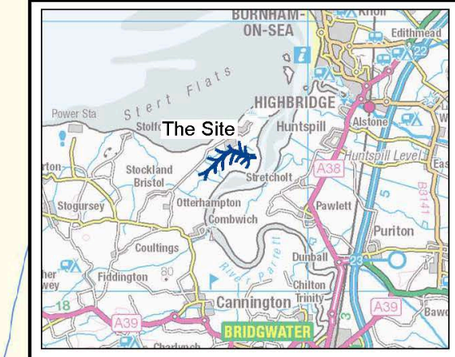
- *Archaeology – used when there is a clear geophysical response and anthropogenic pattern.*
- *Probable archaeology – used for features which give a clear response but which form incomplete patterns.*
- *Possible archaeology – used for features which give a response but which form no discernable pattern or trend.*

7.2.3 The unidentified 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.*
- *Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.*

7.2.4 Finally, services such as water pipes are marked where they have been identified.

Wessex Archaeology



Creek
Pond
Moated site
Geophysical survey extent

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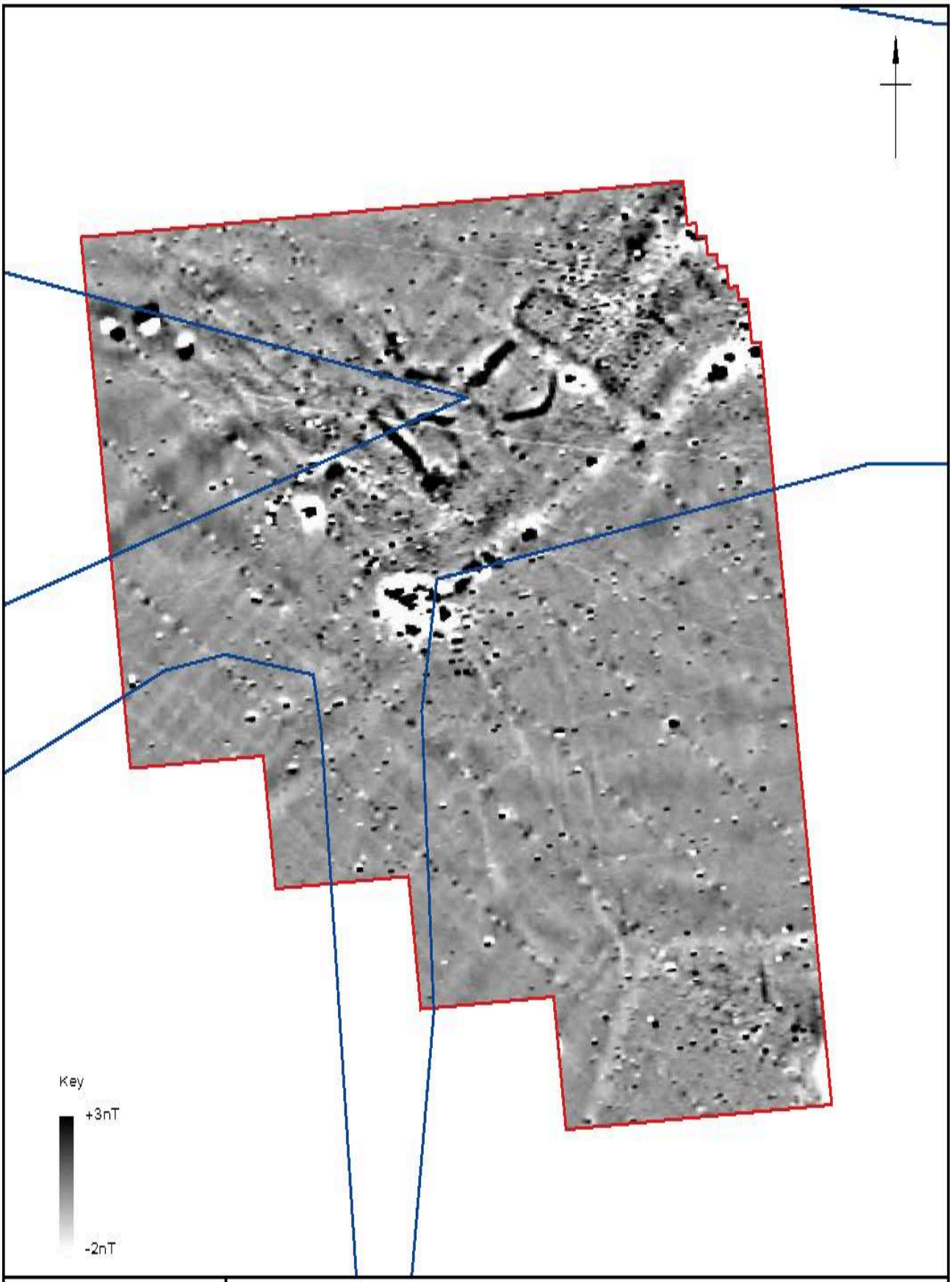
Site location and survey extents

Figure 1



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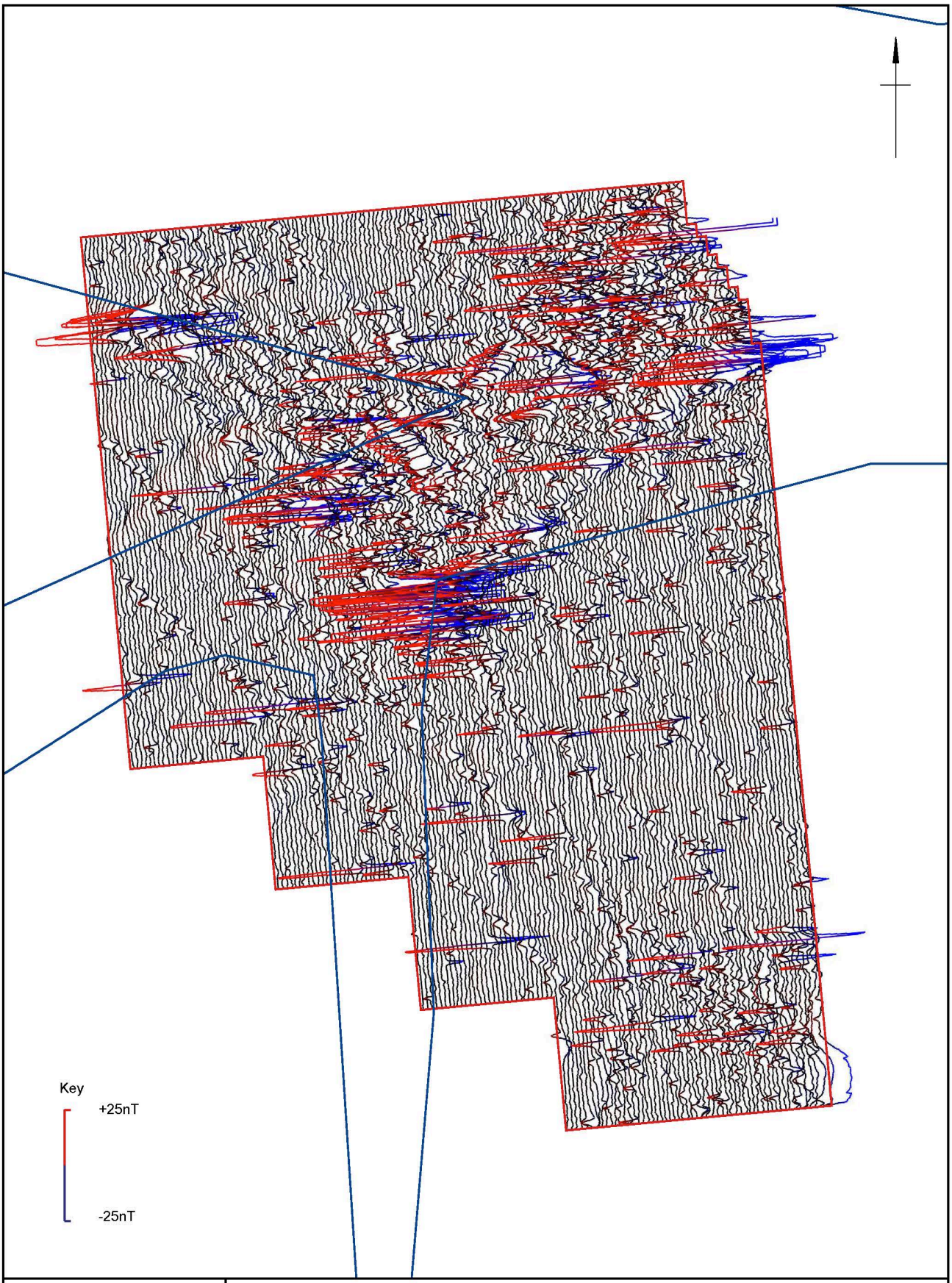
Wessex Archaeology

Greyscale Plot, Area A

Figure 2



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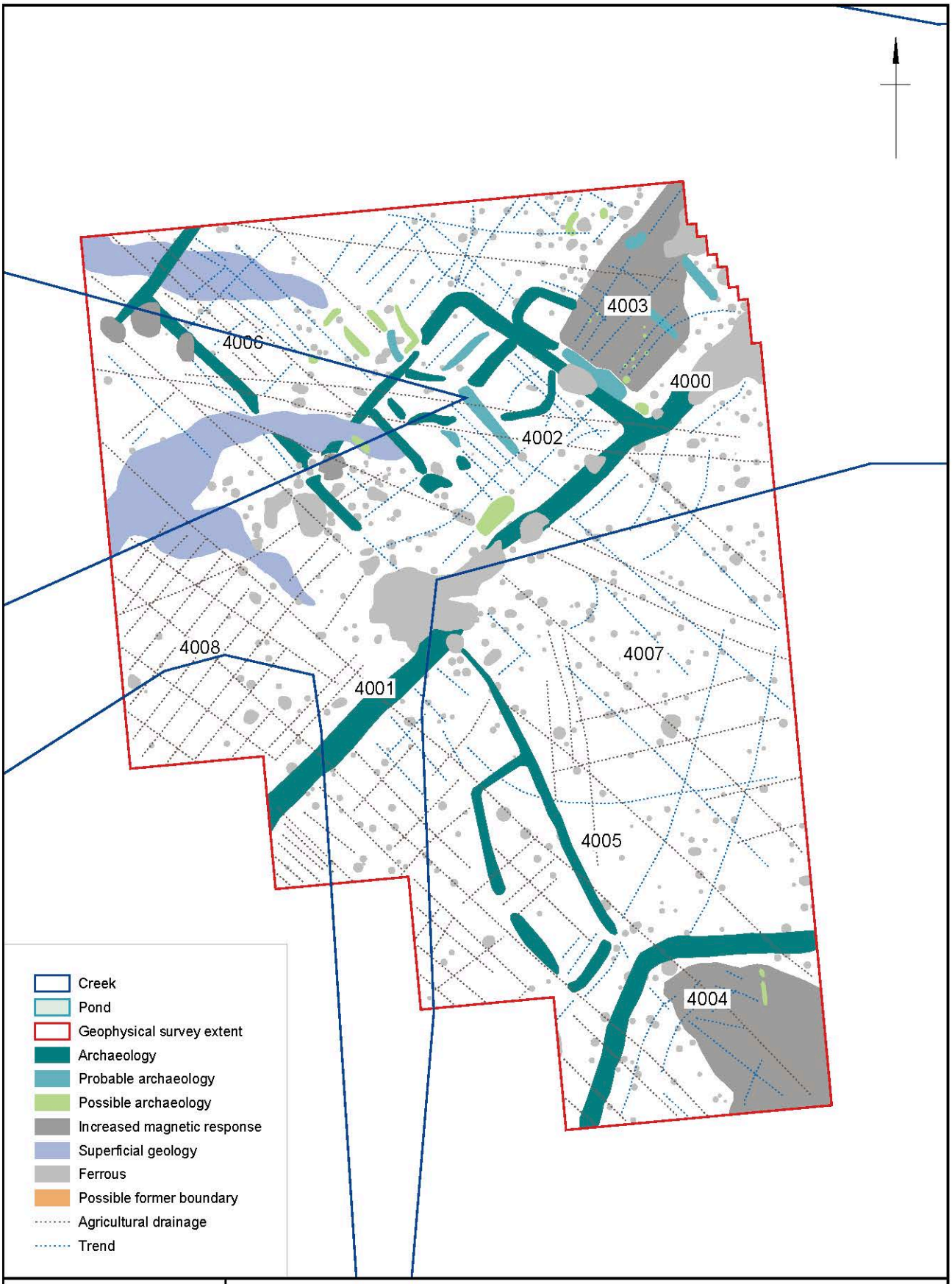
Wessex Archaeology

XY Trace Plot, Area A

Figure 3



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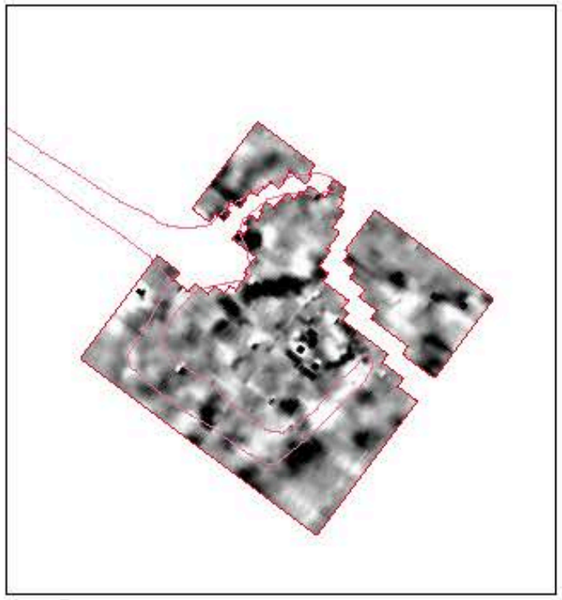
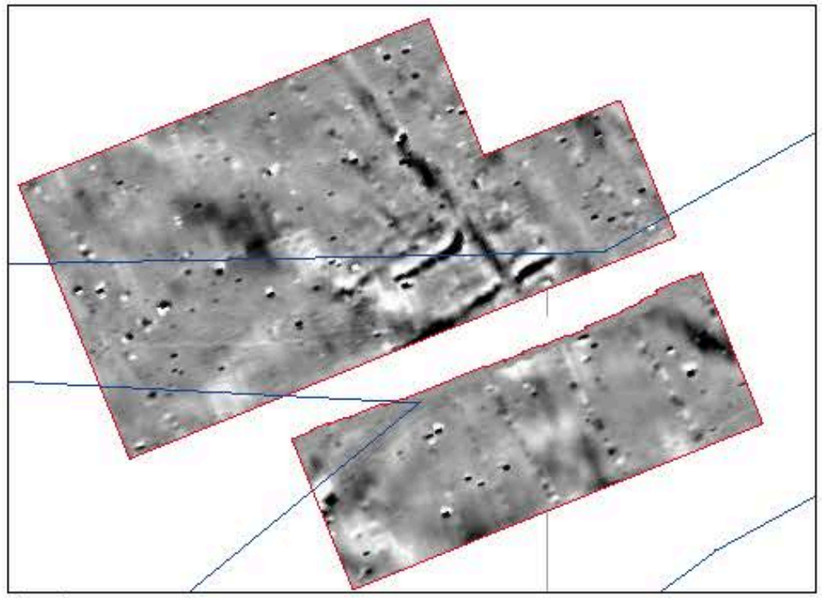
Wessex Archaeology

Interpretation, Area A

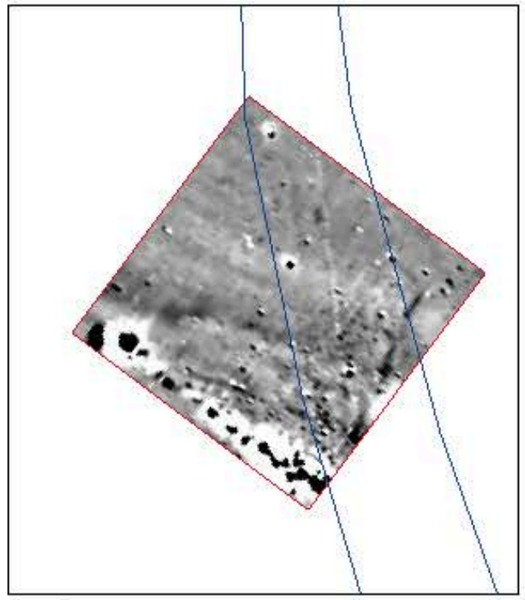
Figure 4



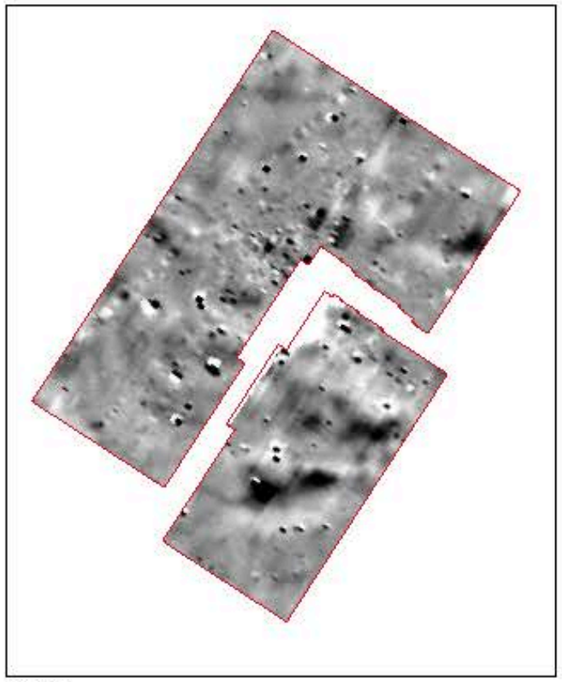
Area D



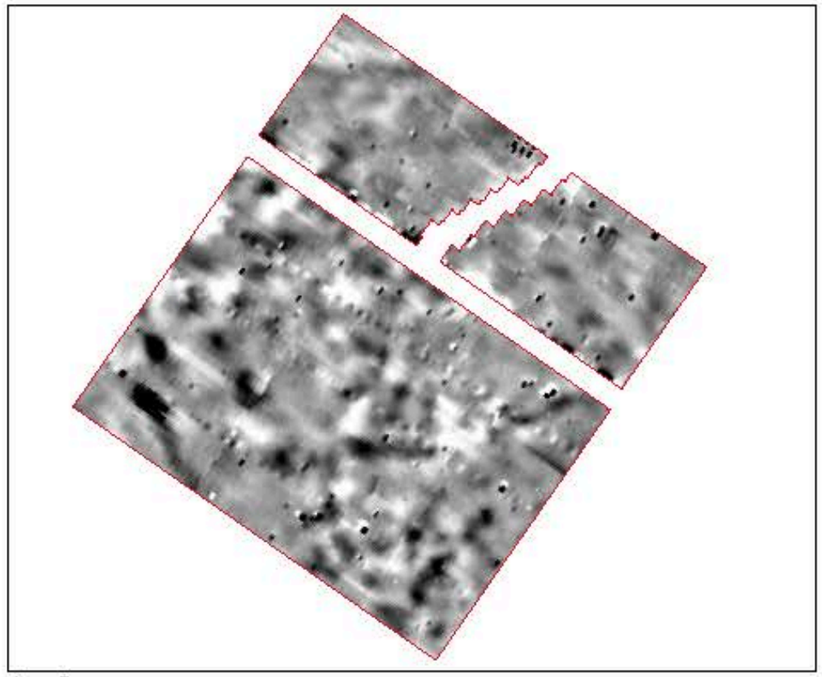
Area C



Area B



Area E



Area F

Key

+3nT

-2nT

Wessex Archaeology

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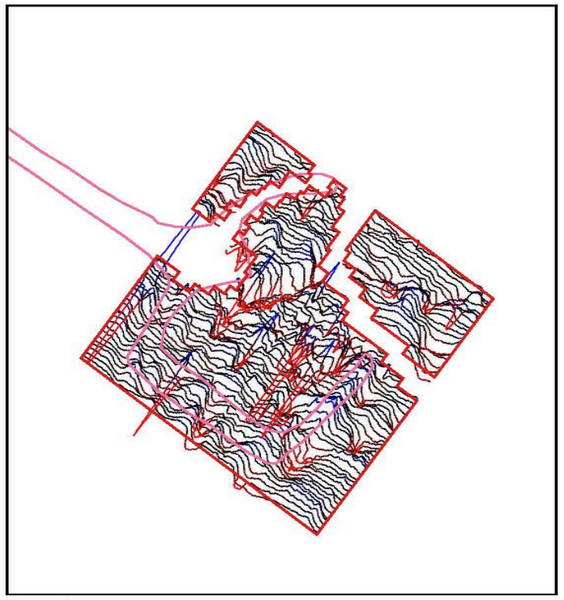
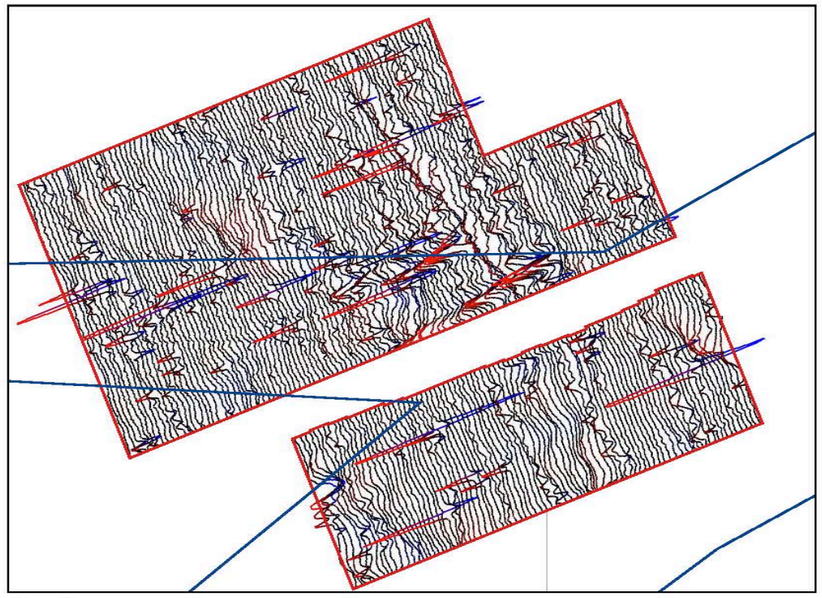
Greyscale Plot, Areas B-F

Figure 5



Area D



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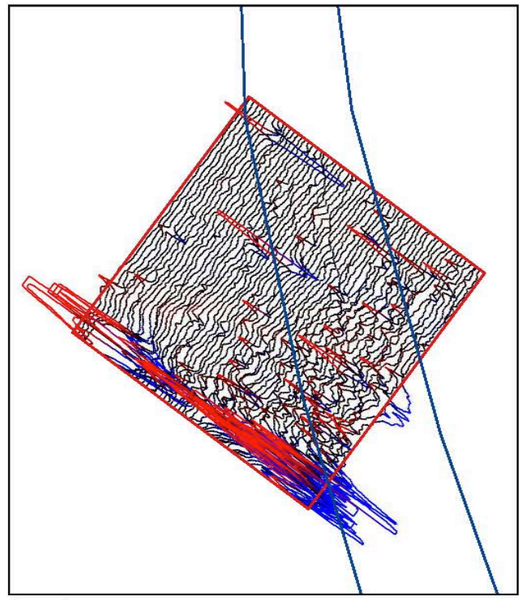
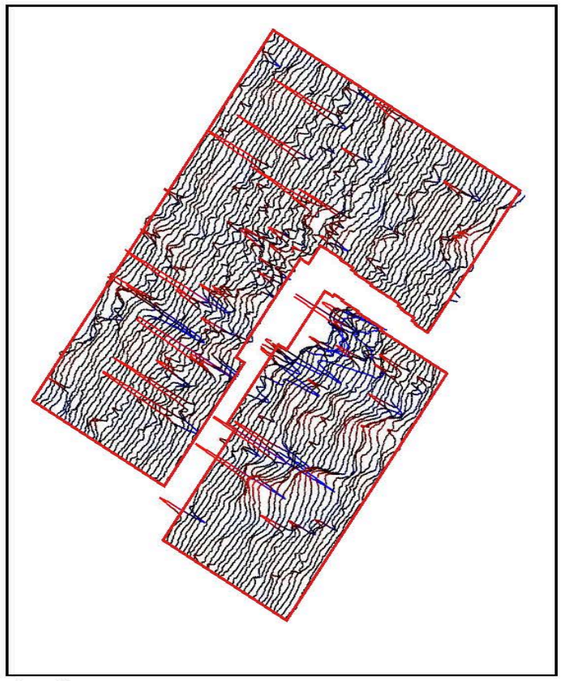


Area B



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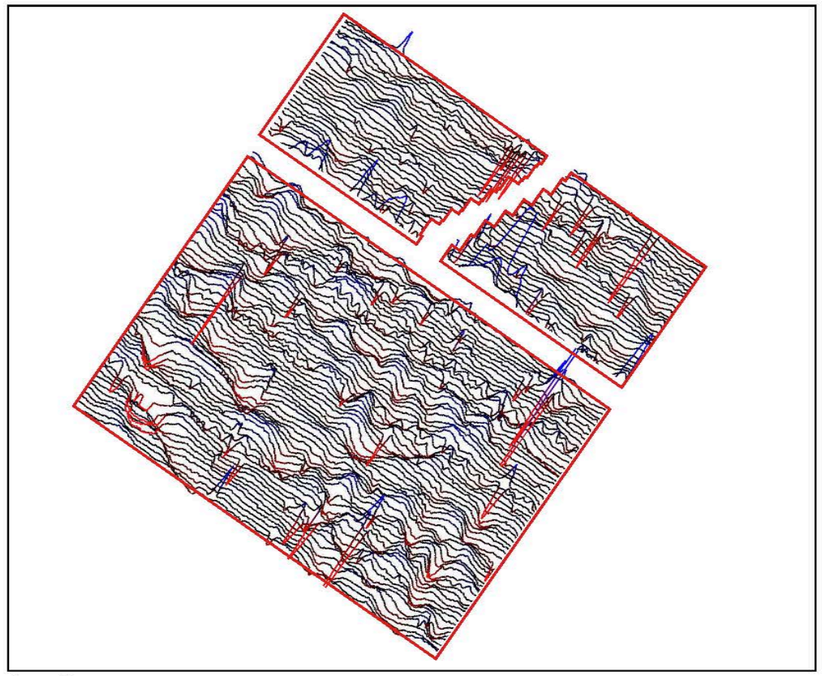

Area F

Key

+25nT

-25nT

Wessex Archaeology

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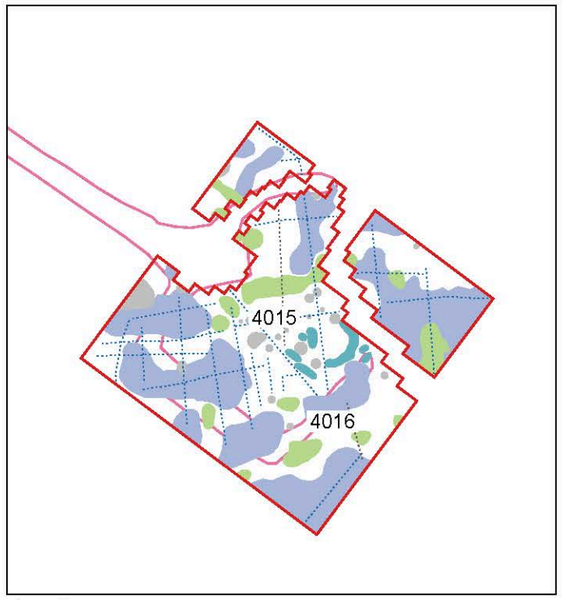
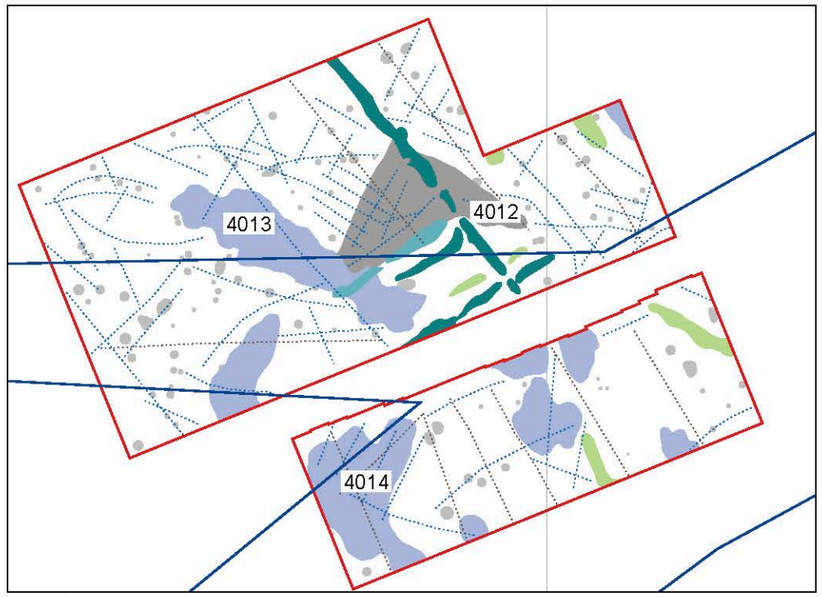
XY Trace Plot, Areas B-F

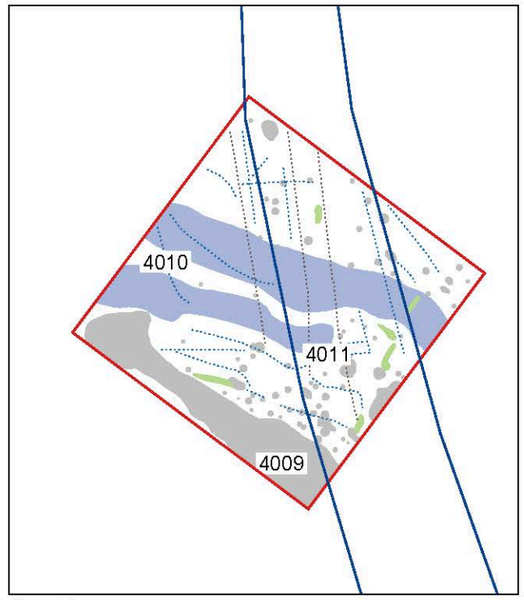
Figure 6



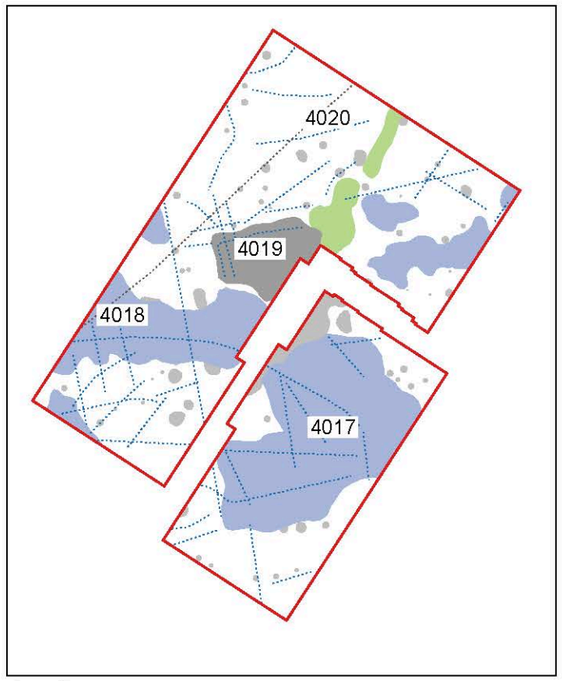
Area D



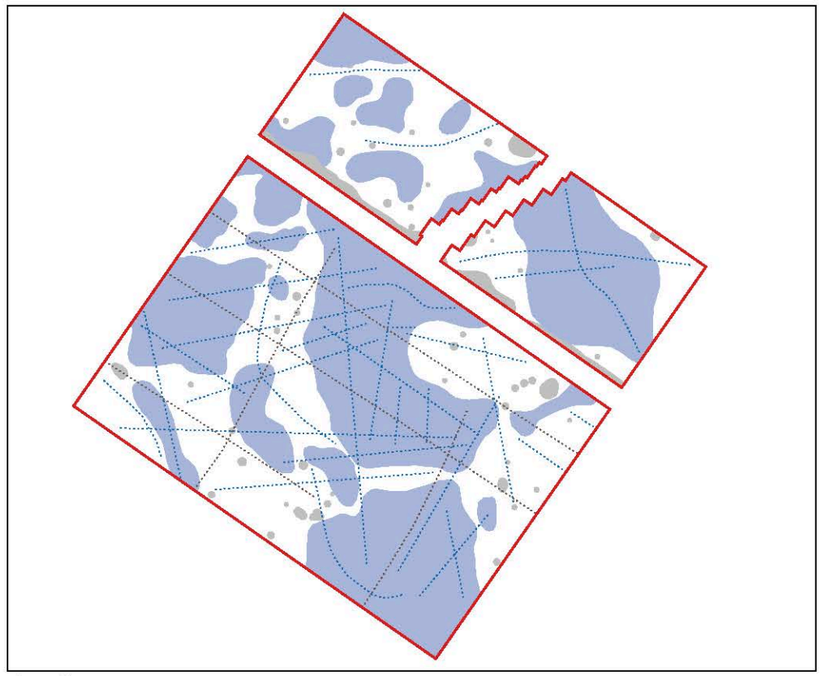
Area C



Area B



Area E



Area F

Creek
Pond
Geophysical survey extent
Archaeology
Probable archaeology
Possible archaeology
Increased magnetic response
Superficial geology
Ferrous
Possible former boundary
Agricultural drainage
Trend

Wessex Archaeology

Date:	13/01/12	Revision Number:	0
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Interpretation, Areas B-F

Figure 7

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