A428 CAXTON TO HARDWICK IMPROVEMENT SCHEME, CAMBRIDGESHIRE

NON-INTRUSIVE ARCHAEOLOGICAL FIELD EVALUATION

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Preface

Every effort has been made in the preparation of this document to provide as complete an assessment as possible, within the terms of the specification. All statements and opinions in this document are offered in good faith. Albion Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party, or for any loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in this document.

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Albion Archaeology is grateful to Mike Dawson, CgMs Consulting and Kevin Griffin, Edmund Nuttall Capita-Symonds for commissioning the project.

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Structure of this Report

Section 1 serves as an introduction to the site, describing its location, archaeological background and the aims of the project. The methodology and results of the fieldwalking survey are discussed in section 2. Section 3 summarises the methodology and results of the geophysical survey.

The limitations of non-intrusive evaluation are described in section 4 and section 5 provides a synthesis of the results, and states their significance within the surrounding landscape. Section 6 is a bibliography.

Appendix 1 contains technical data relating to the fieldwalking survey. Appendix 2 summarises the reasoning behind the strategy for the forthcoming trial trenching evaluation. Appendix 3 contains the full geophysical survey report.

Key Terms

Throughout this document the following terms or abbreviations are used:

Client	Edmund Nuttall Capita - Symonds
Client's Consultant	Mike Dawson, CgMs Consulting Ltd
Albion	Albion Archaeology
Fieldwalking	Or Field Artefact Collection. Collection of archaeologically significant artefacts from the existing ground surface.
WYAS	Archaeological Services WYAS (geophysics sub-contractors)
SMR	Cambridgeshire's sites and monuments record
PD	Project Design
IFA	Institute of Field Archaeologists
MAP II	Management of Archaeological Projects. English Heritage 1991

Non-Technical Summary

In September and October 2004 Albion Archaeology undertook a non-intrusive archaeological field evaluation (fieldwalking and geophysical survey) on land within the footprint of the A428 Caxton to Hardwick Improvement Scheme in Cambridgeshire. The work represents the completion of the non-intrusive evaluation of the scheme. It has, in turn, allowed the design of a trial trenching strategy for the intrusive evaluation, which will be implemented at the beginning of 2005.

The scheme lies within a landscape rich in archaeological remains. Extensive previous research into its archaeological and historical background had been undertaken (Oxford Archaeology 2002). The results of previous fieldwork, including open area excavation (Wessex Archaeology 2002, 2003) and a watching brief (Kenney 2000) were also taken into account in this study of the scheme's archaeological potential.

Through a consideration of all sources of evidence, it has been possible to define six areas of archaeological significance (AAS). These include prehistoric enclosures, a putative Bronze Age round barrow, a Romano-British enclosure and a medieval / post-medieval moated site.

The AAS will be targeted during the forthcoming intrusive evaluation. A trial trenching strategy has been agreed between CgMs Consulting and Albion Archaeology. From field to field the trial trenching sample will vary from c.*3% to* 5%. *Trench locations have been determined in one of two ways:*

- *Targeted trenches, specifically located to test and further characterise the AAS.*

- *Arrayed trenches, aligned at right angles to one another, to test areas which (on* <u>current</u> *evidence) appear to be devoid of archaeological remains.*

1. INTRODUCTION

1.1 Project Background

The project background is fully described in the specification (CgMs 2004). In summary, a preferred route has been identified for the A428 Caxton to Hardwick road improvement scheme and an archaeological evaluation is required to locate and assess the significance of buried archaeological remains within the land-take of the scheme.

Following receipt of an invitation to tender from CgMs Consulting (CgMs 2004); Albion Archaeology was commissioned in September 2004 by Edmund Nuttall Capita - Symonds to undertake this archaeological evaluation. Albion's Project Design stipulated a strategy for the implementation of a programme of archaeological works within the road improvement corridor. It outlined a four-staged approach to the evaluation:

- Stage I – Fieldwalking survey (non-intrusive evaluation).
- Stage II – Geophysical survey (non-intrusive evaluation).
- Stage III – Trial trenching (intrusive evaluation)
- Stage IV - Appraisal of the results of the archaeological field evaluation.

Following negotiations between CgMs Consulting, Edmund Nuttall Capita - Symonds and Albion Archaeology the following amendments to this approach have been agreed by all parties.

- Stage I – Fieldwalking survey (non-intrusive evaluation).
- Stage II – Geophysical survey (non-intrusive evaluation).
- Stage III - Appraisal of the results of the non-intrusive archaeological field evaluation.
- Stage IV – Trial trenching (intrusive evaluation)
- Stage V - Appraisal of the results of the intrusive archaeological field evaluation.

These changes have been necessary as access for the intrusive evaluation could not be arranged by mid-November 2004. In these circumstances it was decided that the results of the non-intrusive evaluation would serve as a useful interim statement on the emerging archaeological potential of the scheme.

1.2 Site Location and Description

The A428 improvement scheme corridor is approximately 9km long; it stretches from the Caxton Gibbet roundabout in the west, to the A14/Cambridge junction in the east. Dualling as part of the Cambourn development has already taken place along a stretch of the route; the current scheme will affect land on either side of this stretch of road (Figure 1).

The present A428 follows a broadly east-west orientated clay ridge. This extends from St Neots in the west to Cambridge in the east. Most of the land is relatively flat and comprises large, open fields. The valley of Bourn lies to the south, whilst to the north the land drops away to form a series of small ridges and shallow valleys.

The geology of the corridor consists almost exclusively of a thick blanket of Boulder Clay. This overlies the clays and shales of the Kimmeridge Clays and Corallian Beds, which come to the surface in the vicinity of the road improvement scheme; particularly around Knapwell and Caxton (Oxford Archaeology 2002).

The scheme affects a total of twenty-three land parcels. For ease of reference these have been numbered from west (Field 1) to east (Field 23). The scheme is illustrated in Figures 1 – 10. Figure 1 shows the entire scheme; figures 2, 3, 4 and 5 illustrate the location of the proposed trial trenches, proposed developer compounds and the safe access and parking areas for each field.

The location of the detailed geophysical survey plots and the results of the fieldwalking evaluation are depicted in figures 6, 7, 8, 9 and 10. These figures also demonstrate how certain trial trenches will be targeted on various areas of archaeological significance (AAS).

1.3 Archaeological Background

A desk-based assessment (Oxford Archaeology 2002) deals extensively with this subject. As a result, it has already been established that find spots and monuments spanning the prehistoric to the modern period exist within the immediate vicinity of the road corridor.

Recent work in the vicinity of the road corridor at Cambourn (Knapwell Plantation) revealed the remains of settlement activity dating to the early-middle Iron Age (700BC-100BC). A relatively small quantity of settlement remains dating to the 2^{nd} – 3^{rd} centuries AD (Romano-British period); and the truncated remnants of a medieval ridge and furrow agricultural field system were also identified (Wessex Archaeology 2003).

Clearly, the archaeological remains located at the Knapwell Plantation have already been thoroughly investigated and documented. This land now lies beneath the dualled section of the A428, immediately north of Cambourn (Figure 1). Of more interest to the forthcoming road improvement scheme, are those remains which have been identified within the proposed new road corridor, and still require further investigation prior to the start of construction work. The following sites fall into this category.

1.3.1 Bronze Age barrow, Field 16 (Figure 9)

A circular cropmark, identified on an aerial photograph (NMR: OS/78132 FR.28 21 AUG 78)), has been interpreted as the ploughed out remains of a Bronze Age barrow. This cropmark has been accurately located by Albion Archaeology using GIS software, and will be tested during the forthcoming trial trench evaluation.

The remains of such monuments are considered to be of significant archaeological interest. The presence of one at this location suggests that other contemporary remains may be encountered in this part of the scheme.

1.3.2 Iron Age settlement activity, Fields 10 and 11 (Figure 4)

Wessex Archaeology also undertook trial trenching evaluation in several of the fields through which the proposed road improvement scheme will pass. The evaluation trenches in Fields 3, 4, 5, 7 and 8 revealed no significant archaeological remains.

However, Fields 10 and 11 (Figure 4) did contain significant remains: two ditches which together formed part of a sub-rectangular enclosure dating to the Romano-British period. This enclosure is also visible as a cropmark (Wessex Archaeology, 2002). A pit containing material dating to the Iron Age was also identified.

These remains are considered worthy of further investigation.

1.3.3 Romano-British remains, Field 12 (Figure 8)

A recent watching brief carried out during pipeline construction revealed the remains of Romano-British activity in Field 12 (Bourn Airfield). This consisted of several relatively shallow linear features and one, more substantial, ditch. It was suggested that the latter might be the remains of roadside ditch dating to the Roman period. The fragmented remains of an almost complete Roman greyware vessel were recovered from an associated pit (Kenney 2000).

1.3.4 Medieval/post-medieval moated site, Field 14 (Figure 9)

The SMR records the location of a possible medieval moated site (SMR 01099, SMRCB395) immediately north of the existing A428 in Field 14. This was still visible during the 19th century and is recorded on the 1891 Ordnance Survey map of the area.

A watching brief carried out by the AFU, Cambridgeshire County Council, in 1995 confirmed the existence of a substantial ditch dating to the medieval or post-medieval periods. Moated sites were generally constructed as symbols of status around the houses of wealthy farmers. The peak period of construction is thought to have been between AD1250 and AD1350, although their construction continued into the 15th century.

Medieval moated sites have been identified as valuable topics for research in the eastern region of England (Wade 1997), making these remains potentially very important. However, the morphology of this putative moated site is somewhat unusual, being very rectangular in shape; and its location immediately adjacent to the modern A428 may suggest that it is considerably later in date. It may even have been constructed in the post-medieval period. If this were the case, these remains would be of reduced archaeological significance.

1.4 Methodologies

The Project Design (Albion Archaeology 2004) stipulated three stages of works; utilising non-intrusive and intrusive evaluation techniques. These comprised fieldwalking, geophysical survey and trial trenching.

With the exception of the following fields, all suitable land within the study area has now been subject to field artefact collection and geophysical survey:

- Where land had already been subject to trial trenching evaluation, and where necessary, open area excavation by Wessex Archaeology. This included Fields 3, 4, 5, 6, 7, 8, 10 and 11 (Figure 4).
- Where land was inaccessible. This included Field 9 (Figure 4).
- Where only a very small proportion of land in a field would be affected by the improvement scheme. This included Fields 13, 22 and 23 (Figures 4 and 5).

1.5 Professional standards

Throughout the project the standards set out in the following documents were adhered to:

- Albion Archaeology's *Procedures Manual: Volume 1 Fieldwork* (2nd ed, 2001).
- IFA's *Codes of Conduct, Standards and Guidance for Archaeological Field Evaluation*.
- English Heritage's *Geophysical Survey in Archaeological Field Evaluation* (1995).
- IFA *Guidelines for Finds Work.*
- English Heritage's *The Management of Archaeological Projects* (1991)
- Bedford Museum *Preparing Archaeological Archives for Deposition with Registered Museums in Bedfordshire.*

2. FIELDWALKING

2.1 Introduction

Fieldwalking is a survey technique involving the systematic recovery of artefacts from the ground surface. The distribution of artefacts, especially the identification of concentrations, may indicate the location of past human activity. Fieldwalking within the proposed road corridor was undertaken in late 2004 as stage I of the non-intrusive evaluation.

Given suitable conditions (including soil, weathering, crop growth and light), artefacts can be seen within ploughed soil. These occur because cultivation over buried archaeological features/deposits results in the movement of artefacts into the overlying plough soil.

The purpose of the fieldwalking was to systematically collect artefacts from the surface of suitable arable land lying within the proposed road corridor. The survey sought to identify significant clusters of arefacts, indicative of past human occupation or other activity. The fieldwalking was carried out by experienced Albion Archaeology staff, and the single significant concentration of artefacts was then selected as the focus for detailed geophysical survey by WYAS.

2.2 Method statement

An area of approximately 50 hectares was evaluated using this method. This included the proposed road corridor and any associated areas of landscaping on either side of the new road. It also included a balancing pond (Field 24, Figure 3) and two proposed compounds for the road construction team (Field 2, Figure 2 and Field 16, Figure 4).

This land was walked between 28th September and 1st October 2004. At the time of walking weather conditions varied from dry and bright to light drizzle and overcast. Ground conditions were good at the time of walking as the majority of fields had been ploughed and harrowed, providing ideal conditions for this type of survey.

Collection units comprised three 20m wide strips within the route of the proposed road scheme. Additional collection units were added where appropriate in order to survey the balancing pond, compound areas and points where the road improvement scheme became wider than 60m. The fieldwalkers walked the centre line of each collection unit and retrieved archaeological material from a 1.00m wide strip on either side.

Findspots were then located on the Ordnance Survey National Grid using differential GPS survey equipment. This was undertaken in order to ensure that artefact concentrations could be accurately located in any subsequent stages of evaluation.

A summary of the results of the survey is presented below; detailed information on all the artefacts recovered is contained in Appendix 3.

2.3 Results

The field artefact collection produced a range of artefacts including flint, pottery, building materials, glass etc. The distribution of these artefacts is illustrated in Figures 6 – 10, they are discussed below according to which field number they occurred in. No artefactual material at all was recovered during fieldwalking from fields 1, 18, 20 and 21.

2.3.1 Field 2 (Figure 6)

Two sherds of modern pottery and 1 piece of modern brick were recovered from this land.

2.3.2 Field 12 (Figure 8)

A single sherd of Roman pottery was recovered from Field 12. This was located *c.*500m east of SMR 01099/SMRCB395 which also contained sherds of Roman greyware pottery (Section 1.3.3).

It would be inappropriate to attach too much significance to a single sherd of pottery found in the ploughsoil. However, the fact that this was of the same type as that recovered from SMR 01099/SMRCB395 suggests that other remains dating to this period may be encountered during the intrusive stage of evaluation in Field 12.

A single piece of undated ferrous slag and a fragment of post-medieval glass were also recovered.

2.3.3 Field 14 (Figure 9)

An undated flake of worked flint, a single sherd of Roman pottery and a single sherd of modern flower pot were recovered from this land. The nearest known site is a medieval/post-medieval moated site located immediately south of these findspots (Section 1.3.4).

2.3.4 Field 15 (Figure 9)

A single sherd of modern pottery and a piece of undated ferrous slag were recovered from this land.

2.3.5 Field 16 (Figure 9)

A single sherd of Roman pottery was recovered from this land. The nearest known site of archaeological interest is a putative Bronze Age barrow (Section 1.3.1) located *c.*200m east of this findspot.

2.3.6 Field 17 (Figure 9)

A single notched flint fragment and two pieces of modern pottery were recovered from this land.

2.3.7 Field 19 (Figure 10)

The highest quantities of artefactual material were recovered from this field. As a result it was selected for detailed geophysical survey (Section 3, Figure 10).

Three flakes of worked flint and one sherd of Roman pottery constitute the most significant of these artefacts. In addition to these a single sherd of post-medieval pottery and five sherds of modern pottery were recovered. A piece of modern glass and two pieces of ferrous slag were also recovered.

2.3.8 Field 24 (Figure 7)

One flake of worked flint, one piece of post-medieval pottery and one piece of modern brick were recovered from this land.

3. GEOPHYSICAL SURVEY

3.1 Introduction

Changes in magnetic responses below the ploughsoil can indicate variations in the subsoil/geology some of which may be associated with buried archaeological features. The means by which these variations are identified and located is known as a geophysical survey. Geophysical surveys are particularly effective in locating ditches and large pits, but cannot always locate smaller features such as postholes and small pits. This means that the absence of evidence provided by a geophysical survey cannot be taken as a categorical indication of the absence of archaeological features.

3.2 Method statement

A specialist contractor, Archaeological Services (WYAS), undertook the geophysical survey. This was carried out in two stages:

3.2.1 Stage 1

The first stage of works involved the use of magnetic susceptibility as a method for the *scanning* of the proposed road corridor. This stage of works is designed to pick up anomalies worthy of more detailed attention in the following *detailed survey* (stage 2).

The scanning survey was undertaken between the 11th and the 15th of October 2004 and covered an area of approximately 50 hectares. This corresponded to the same 50ha which had already been subject to fieldwalking. It included the proposed road corridor and all associated areas of landscaping on either side of the new road. It also included a balancing pond (Field 24, Figure 3) and two proposed compounds for the road construction team (Field 2, Figure 2 and Field 16, Figure 4).

Certain parts of the study area were selected for detailed geophysical survey (stage 2). These areas were selected partly on the basis of anomalies picked up during the scanning survey (stage 1) and partly on the results of the fieldwalking survey (Section 2). Knowledge of sites listed on the SMR (Section 1.3) was also used to guide which parts of the study area should be the focus of this detailed survey.

3.2.2 Stage 2

Consisted of a detailed geophysical survey. The detailed geophysical survey began on Monday 18th October and ceased on Thursday 22nd October. 5.5ha (11%) of the 50ha study area were subject to detailed geophysical survey. The results of this work showed a variable success rate in identifying archaeological sites.

Nine areas were chosen for this type of survey, the results from each are described briefly below. Full technical detail can be found in Appendix 3.

3.3 Results

The following represents a summary of the results from each of the areas subject to detailed geophysical survey. Where possible anomalies have been described as archaeological (ditch-type or pit-type), disturbance or geological.

3.3.1 Field 1 (Figure 6)

Three north-west to south-east aligned ditch-type anomalies were identified in this area. A series of north-north-east to south-south-west aligned ditch-type anomalies were also identified. These are probably the remains of truncated ridge and furrow earthworks dating to the medieval period.

3.3.2 Field 12 (Figure 8)

The first area of detailed geophysical survey was in the western part of the field. This revealed two very distinct ditch-type anomalies. These have been interpreted as possible roadside ditches. Given the proximity of these anomalies to the WWII Bourn Airfield, it is suggested that they may constitute a modern ancillary road or associated utilities. However, they will be targeted and tested during the forthcoming trial trench evaluation.

Several other ditch-type anomalies were also observed, it is suggested these are likely to be the remains of truncated ridge and furrow earthworks dating to the medieval period. Alternatively, they may be the result of more modern ploughing regimes.

The second area of detailed geophysical survey, located in the eastern part of the field, also revealed a distinct ditch-type anomaly. The north-west to south-east alignment of this anomaly corresponded with those already mentioned in the western area of detailed geophysical survey. It is suspected that this anomaly also represents a modern roadway, and is of low archaeological significance.

Three discrete pit-type anomalies were also identified (Appendix 3). It is suggested these may be archaeologically significant, and may relate to the Romano-British remains identified during earlier fieldwork on this land (Section 1.3.3).

A lot of disturbance was noted in this eastern survey area. Some of this may be attributed to passing cars in the northern part of the area (a phenomenon which can often cause misleading readings with this type of survey).

3.3.3 Field 14 (Figure 9)

A north-west to south-east ditch-type anomaly was recorded in the southern part of this survey area. This corresponded perfectly with cartographic data on a suspected moated site, confirming the likely existence of a significant ditch (backfilled moat) on this location. This will be targeted during trial trenching.

Other north-south aligned ditch-type anomalies were also recorded. These are interpreted as being the remains of medieval ridge and furrow agricultural earthworks.

3.3.4 Field 16 (Figure 9)

Three survey areas were selected in this field, one in the western part, one in the central part and one in the eastern part. The intention was to test two cropmarks, one of a suspected barrow in the east, and one of a two-armed right angled ditch in the west.

Evidence of ridge and furrow agricultural field systems was revealed. In addition to this several other ditch-type anomalies were also revealed. Neither cropmark could be clearly identified within this series of ditches. However, the entire area will be tested by trial trenching.

The possible barrow was considered to be of such significance that a copy of the original aerial photograph was later obtained from the National Monuments Record, and the cropmark was re-plotted using GIS software. As a result, it became apparent that the location of the barrow shown in the desk-based assessment (presumably itself based on an SMR plot) was not accurate (Oxford Archaeology 2002) and that therefore, the detailed geophysical survey had not covered the site of the monument.

Again, this area will be extensively sampled using trial trenches designed to test the character of this cropmark (Figure 9).

3.3.5 Field 18 (Figure 10)

The survey area in Field 18 produced relatively dramatic results. Two previously unknown oval ditch-type anomalies were identified. These have the appearance of prehistoric enclosures and are therefore considered to be of considerable archaeological significance.

Six discrete pit-type anomalies were identified in and around these enclosures (Appendix 3). These may represent the remains of backfilled pits or areas of burning.

Such enclosures often contain remains associated with human settlement or livestock husbandry and are therefore very informative regarding the settlement patterns and economy of prehistoric people.

3.3.6 Field 19 (Figure 10)

Despite this survey area being located over the most significant artefact cluster identified by fieldwalking, no archaeologically significant anomalies were recorded in this field.

4. LIMITATIONS OF NON-INTRUSIVE EVALUATION

4.1 Introduction

Although each piece of non-intrusive fieldwork has provided valuable information on the location and extent of archaeological remains within the scheme boundaries, it is important to consider the limitations of this type of evidence. The potential limitations of fieldwalking and geophysical survey are discussed below.

4.2 Fieldwalking

Artefact concentrations often indicate the location of past human activity, for example the struck flint in Field 19 or Roman pottery in Field 12. However, the reliability of this evidence is often dependent on the conditions at the time of fieldwalking. In this case the ploughed and harrowed condition of the topsoil permitted good visibility of artefacts.

Fieldwalking can sometimes produce results that do not reflect the presence of buried archaeological features. Factors including the durability of the artefact (pottery fabrics dominated by grog and shell inclusions may not survive), depth and regularity of ploughing, soil type, nature of rubbish disposal in antiquity and presence of alluvial deposits overlying archaeological remains can all play a part. Therefore, where there is an absence of concentrations within a study area, this cannot be used to categorically state that there are no buried archaeological features.

The correlation of artefact concentrations with evidence from other data-sets often produces the most reliable evidence, for example when combined with geophysical anomalies or known cropmarks. However, this does not appear to be the case with the present study. Field 19 contained by far the most artefactual material and yet the geophysical survey undertaken in the same area did not reveal significant evidence of sub-surface archaeological remains.

This does not necessarily mean buried archaeological features are not present within Field 19, or anywhere else in which fieldwalking did not reveal significant remains. The absence of archaeological features can only be conclusively demonstrated by trial excavation, as has been shown elsewhere in the region. For example, the results from Maxey East (Pryor 1985) led to the conclusion that a site cannot be characterised by non-intrusive field survey (i.e. fieldwalking) alone.

4.3 Geophysical survey

The geophysical survey undertaken within the scheme boundaries was of the magnetic susceptibility type. This detects variations in the magnetic susceptibility between topsoil, subsoil and any underlying geological layers; in theory making it possible to detect ditches, pits and other silted up features (Clark 1990).

Again, the correlation of geophysical anomalies with evidence from other data-sets often produces the most reliable evidence, for example when combined with fieldwalking artefact clusters or cropmark data. This appears to be the case, for example, with Field 14, in which the cartographic and SMR data correspond with a ditch-type anomaly picked up during detailed geophysical survey (Section 3.3.3).

Overall the geophysical survey picked up relatively few anomalies which are thought to have a definite archaeological origin. Only one clear case of the identification of a previously unknown archaeological site resulted from the nine geophysical survey areas. This was in Field 18 in which two large oval ditch-type features were identified. These are almost certainly prehistoric enclosures, possibly the focus of human settlement or livestock management.

There are several reasons why geophysical survey produced so few anomalies in the remainder of the study area. Firstly, it is possible there are no archaeological features present. Secondly, geophysical survey is often successful in locating large ditches and pits, such as the enclosure ditches in Field 18. However, it rarely identifies smaller pits and postholes. Thirdly, it is always possible that some features were infilled with material that has a low magnetic susceptibility. This would result in there being no detectable magnetic contrast between the infill of a feature and the surrounding topsoil and/or undisturbed geological layer.

5. SYNTHESIS

Two extensive pieces of non-intrusive fieldwork, fieldwalking and geophysical survey, have been completed by Albion Archaeology. In addition to this, extensive research has been undertaken into the archaeological and historical background of the study area (Oxford Archaeology 2002). These phases of work complete the non-intrusive evaluation of the site.

The results of previous fieldwork including open area excavation, trial trenching (Wessex Archaeology 2002, 2003) and a watching brief (Kenney 2000) have also been taken into account in considering the archaeological potential of the scheme.

On the basis of these sources it has been possible to identify the following six *areas of archaeological significance.*

Fields 10 and **11** (Figure 4) were subject to a recent trial trenching evaluation (Wessex Archaeology 2003, 2003). As a result an enclosure dating to the Romano-British period and a pit dating to the Iron Age were identified. The potential for additional remains dating to these periods is extremely high in this area.

The northern part of **Field 12** (Figure 8) was the subject of an archaeological watching brief (Kenney 2000). This also identified archaeological remains dating to the Romano-British period. Albion's subsequent fieldwalking evaluation recovered a single sherd of pottery of the same date, suggesting that this land retains a relatively high potential for remains dating to this period.

The south-eastern part of **Field 14** (Figure 9) was also subject to a watching brief (SMR) which recorded the presence of a ditch feature dating to the medieval or post-medieval period. In addition to this, cartographic sources record the presence of a significant rectangular moat on this location confirmed by geophysics. This area retains an extremely high potential for remains dating to either the medieval or post-medieval periods.

Field 16 (Figure 9) contains two archaeologically significant cropmarks, one of which may be the remains of a Bronze Age barrow. This field retains a relatively high potential for producing archaeological remains dating to the Bronze Age, and possibly other prehistoric periods.

Detailed geophysical survey in **Field 18** (Figure 10) recorded the presence of two, possibly prehistoric, enclosures. Therefore a relatively high archaeological potential for significant prehistoric remains must be assigned to this land.

Field 19 (Figure 10) produced the highest density of artefactual material for the entire evaluation area. The majority of this material dated to the modern period. Only two flakes of worked flint and one sherd of Roman pottery were recovered. As a result this area retains only a moderate potential for containing significant archaeological remains.

5.1 Confidence Rating for the Current Study

The present study has established that the scheme contains significant archaeological remains. The potential for archaeological remains dating specifically to the prehistoric, Roman, medieval and post-medieval periods is considered high.

However, it must be stressed that that much remains unknown. A non-intrusive survey clearly has only limited value as a predictive tool for the precise location and characterisation of sub-surface archaeological deposits. Therefore, hitherto undiscovered archaeological remains may be present within the footprint of the scheme. These will only be detectable through intrusive archaeological evaluation.

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7. APPENDICES

7.1 Appendix 1 – Fieldwalking Summary Table

Field Number	Find type	Bag No.	Number of sherds/ or fragments	Weight (g)
	Worked flint			
14	Flake	1400	1	18
17	?notched flake	1702	1	7
19	Flake	1907	1	8
19	Flake	1912	1	5
19	?unfinished arrowhead	1913	1	2
24	Flake	2400	1	3
	Pottery			
12	Roman: Greyware	1200	2	26
14	Roman: Micaceous ware	1402	1	2
16	Roman: Greyware	1600	1	9
19	Roman: Greyware	1911	1	7
19	Post-medieval: Tin-glazed ware (C17-18)	1902	1	24
24	Post-medieval: Glazed earthenware (C17-18)	2401	1	6
2	Modern: Teapot lid	200	1	11
2	Modern: Mocha ware (C18-19)	201	1	6
14	Modern: Flower pot	1403	1	2
15	Modern: Black basalt	1501	1	13
17	Modern: Brown stoneware (C18-19)	1701	2	103
17	Modern: Creamware (C18-19)	1703	1	8
19	Modern: Transfer-printed ware (C19)	1900	1	1
19	Modern: Brown stoneware (C18-19)	1903	1	13
19	Modern: Transfer-printed ware (C19)	1904	2	3
19	Modern: Earthenware	1909	1	4
19	Modern: Transfer-printed ware (C19)	1910	1	3
19	Undiagnostic pottery (Roman or medieval)	1914	1	7
	Ceramic building material			
2	Modern brick	202	1	55
24	Modern brick	2402	1	28
	Glass			
12	Post-medieval vessel glass	1201	1	36
19	Modern bottle glass	1905	1	13
	Metalworking residues			
12	Ferrous slag	1202	1	19
14	Ferrous slag	1404	1	4
15	Ferrous slag	1500	1	3
19	Ferrous slag	1901	1	28
19	Ferrous slag	1906	1	9

Table 1 Summary of the artefact assemblages identified during fieldwalking

7.2 Appendix 2 – Proposed Albion Archaeology Trial Trenching Strategy

7.2.1 Introduction

Meetings were held between Albion Archaeology, CgMs Consulting and WYAS following the completion of fieldwalking, geophysical scanning and detailed geophysical survey. The intention at each stage was to maximise the potential for targeting the forthcoming trial trenching evaluation on the most potentially significant parts of the road scheme.

Data from the SMR, aerial photographs, cartographic sources and utility plans were also consulted in order to ensure that all known or suspected archaeological sites could be subjected to trial trench evaluation in a safe, effective way.

As a result of these meetings, and additional research carried out by Albion, it was agreed on 3rd November 2004 that Figures 2, 3, 4 and 5 would constitute the proposed trial trenching strategy for the road improvement scheme.

7.2.2 Results

From field to field the trial trenching sample will vary from *c*.3% to 5%. Trenches have been located in one of the two following ways:

- Targeted trenches, specifically located to test and further characterise the AAS.
- Arrayed trenches, aligned at right angles to one another, to test areas which (on current evidence) appear to be devoid of archaeological remains.

In general the aim of the intrusive survey will be to gather information on the following:

- The location, extent, nature and date of any archaeological features or deposits that may be present.
- The integrity and state of preservation of any archaeological features or deposits that may be present.

More specifically it is intended that trial trenching will:

- Clarify whether or not the non-intrusive evaluation techniques were accurate in locating all archaeological remains within the evaluation area.

7.3 Appendix 3 – Full Geophysical Survey Report

A428 Caxton to Hardwick Improvements
Cambridgeshire

Geophysical Survey

November 2004

Report No. 1316

Albion Archaeology.

A428 Caxton to Hardwick Improvements

Cambridgeshire

Geophysical Survey

Contents

Summary

A geophysical evaluation comprising magnetic scanning followed by selected detailed survey was undertaken at locations along the route of the proposed upgrade of the A428 between Caxton and Hardwick in Cambridgeshire. Approximately 40 hectares was scanned with the subsequent detailed survey covering 6 hectares in nine separate blocks. Discrete anomalies and areas of magnetic enhancement as well as linear anomalies were identified during the scanning and the benefits of such a programme have again been demonstrated by the location of two, previously unknown, enclosures during the subsequent detailed survey. Most of the remaining anomalies were interpreted as having an agricultural origin being caused by ploughing, field drains or recently removed field boundaries. An archaeological origin for some of the discrete areas of enhancement, particularly adjacent to the existing road, cannot be ruled out.

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Archaeological Services WYAS
PO Box 30, Nepshaw Lane South, Morley, Leeds LS27 0UG

1. Introduction and Archaeological Background

1.1 Archaeological Services WYAS was commissioned to carry out a geophysical (fluxgate gradiometer) evaluation along the proposed route of the A428 road improvements between Caxton and Hardwick in Cambridgeshire at selected locations (see Fig. 1), by Joe Abrams of Albion Archaeology.

1.2 This section of the upgrade scheme extends from NGR TL 297 606 in the west (the intersection with the A1198 - Ermine Street), to TL 374 597 in the east (see Figs 2 and 3) and covers approximately 40 hectares of agricultural land, parts of the route having previously been evaluated by Wessex Archaeology. The proposed improvements extend both north and south of the current carriageway except towards the eastern end of the section where a completely new carriageway is to be built north of the current road alignment. All of the fields along the route were suitable for survey being either under stubble or having been harrowed and re-seeded. Consequently no problems were encountered during the fieldwork that was carried out between October 11th and October 21st 2004.

1.3 Topographically the site is generally flat gently undulating between 60m to 70m AOD. On the Soil Survey of England and Wales map sheet for Eastern England, the soils are recorded as being of the Hanslope soil association comprising slowly permeable calcareous and non-calcareous clayey soils over chalky till.

1.4 The existing route of the A428, and of the proposed upgrade, crosses a landscape of considerable archaeological potential with evidence of occupation from the Bronze Age onwards. It is thought that the current road follows the route of an ancient ridgeway and there is some (circumstantial) evidence that it was also possibly the route of a Roman road. Archaeological excavations in advance of the recent Cambourne new town development have uncovered Iron Age farmsteads as well as occupation from Roman, Saxon and Medieval periods. At nearby Papworth Everard an evaluation revealed evidence of Bronze Age or Early Iron Age settlement. At Childerley lie the remains of a moated site thought not to be of manorial origin and an Iron Age gold coin was found in 1854 at Childerley Gate. When Bourn Airfield was under construction in 1942 a stone Roman coffin and other burials were found.

1.5 More recently an archaeological watching brief carried out by Cambridgeshire County Council Archaeological Field Unit (Kenney 2000) during the construction of the Bourn to Caldecote Highfields water pipeline revealed a small road-side site that produced a considerable quantity of Roman pottery from linear features, including a possible roadside ditch, as well as smaller discrete features. One small pit contained the squashed remains of a nearly complete Roman sandy greyware vessel dated to the 3rd or 4th century AD.

2. Methodology and Presentation

2.1 The general objectives of the geophysical evaluation were:

- to identify any areas of possible archaeological interest

- to establish the extent and character of any archaeological features within the defined survey areas.

2.2 As the area that will be impacted by the proposed upgrade was relatively large (40 hectares) it was proposed that the primary objective could be achieved by undertaking a programme of magnetic scanning (using Geoscan FM36 fluxgate gradiometers) across all the areas likely to be affected by the groundworks. As well as the actual land take-out due to the dualling proposals areas of landscaping and infrastructure such as roundabouts and also the location of a balancing pond and site compounds were included within the survey area.

2.3 The second objective was to be achieved by selected detailed survey of potential areas of archaeological interest highlighted by the scanning. It was proposed that detailed survey would be carried out to cover a maximum of 20% of the total survey area (8 hectares), depending on the results of the scanning. The actual amount of detailed survey (6 hectares) was determined at a post-scanning meeting. Areas of potential identified during the scanning were to be targeted as well as areas of archaeological significance identified on the Cambridgeshire Sites and Monument Record (hereafter CSMR) and 'hotspots' identified as a result of a programme of fieldwalking undertaken by Albion Archaeology immediately prior to the commencement of the geophysical evaluation. No sample detailed block was less than 0.36 hectares, an area equivalent to a block measuring 60m by 60m.

2.4 The survey methodology and report format comply with the recommendations outlined in the English Heritage Guidelines (David 1995) as a minimum standard. All figures reproduced from Ordnance Survey mapping are done so with the permission of the controller of Her Majesty's Stationery Office. © Crown copyright.

2.5 A general site location plan, incorporating the 1:50000 Ordnance Survey mapping, is shown in Figure 1. Figures 2 and 3 are more detailed location plans, showing the processed greyscale gradiometer data, superimposed onto an Ordnance Survey digital base map supplied by the client, at a scale of 1:10000. The processed data is displayed in greyscale format, at a scale of 1:1000, in Figures 4, 7, 10, 13, 16, 19, and 22 with the accompanying interpretations shown at the same scale in Figures 5, 8, 11, 14, 17, 20 and 23. The remaining figures show the unprocessed ('raw') data in XY trace plot format, also at a scale of 1:1000.

2.6 Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the archive.

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

3. Results

3.1 Magnetometer Scanning

3.1.1 During scanning it was observed that the magnetic background noise was relatively quiet, fluctuating on average between +/- 0.5 nT. This is probably due to the low magnetic susceptibility of the clay-based soils. An exception was the area within Bourn Airfield where the magnetic background varied between +/-2 nT probably as a consequence of the introduction of slag and brick material into the topsoil.

3.1.2 A wide area of magnetic enhancement, between +3 and +6nT, and two linear anomalies were located in the most westerly field. Block 1 was positioned to investigate these responses. Between Fields 1 and 2 a ferrous pipe was also located.

3.1.3 As described before (Section 3.1.1) the soils within Bourn Airfield had an elevated magnetic background. Consequently Block 2 was sited towards the western end of this field to sample this variable background and an area of magnetic enhancement and Block 3 to evaluate a large cluster of 'iron spike' anomalies (see Appendix 1) noted south of Two Pots House Farm (see Fig. 3).

3.1.4 Another area of magnetic enhancement, approximately +4nT in strength, was identified to the east of Childerley Lodge. Also a linear anomaly of +3nT was noted and a bamboo cane left so that Block 6 could investigate these anomalies.

3.1.5 Close to the eastern end of the corridor an area of magnetic enhancement and linear anomalies were detected. Block 8 was positioned to target these responses.

3.1.6 No other areas of archaeological potential were identified during scanning. Blocks 4, 5, and 7 were located over areas of potential archaeological interest and Block 9 was located centred over a fieldwalking find-spot.

3.1.7 A metal pipe was located in Field 19 and its alignment marked out with canes.

3.2 Detailed Magnetometer Survey

Block 1 – Field 1 (Figs 4, 5 and 6)

3.2.1 Block 1was positioned to evaluate an area of magnetic enhancement and investigate the nature of two linear anomalies. The detailed gradiometer plot shows that there are many dipolar 'iron spike' anomalies and a series of parallel linear trend anomalies aligned from south-west to north-east that are probably caused by modern field drains. Other weaker linear trend oblique to those previously described aligned from south-south-west to north-north-east are interpreted as being caused by ploughing.

Block 2 – Field 12 (Figs 7, 8 and 9)

3.2.2 This block was positioned towards the western end of Bourn Airfield to sample the variable magnetic background and areas of magnetic enhancement. Weak linear trends have been identified running on a roughly east-west alignment. These responses are typically agricultural in origin and are possibly caused by field drains or by recent ploughing. Parallel with these anomalies are two stronger dipolar linear responses, one of which curves to the south. These anomalies may be indicative of modern services possibly associated with the airfield. To the north-west of the block another weak linear trend aligned from north-west to south-east may link to the previously described linear dipolar anomalies. A modern origin is considered likely.

Block 3 – Field 12 (Figs 10, 11 and 12)

3.2.3 Block 3 was located around an area of magnetic disturbance and a cluster of dipolar responses that are clearly visible in the middle of the survey area centred on a particularly strong dipolar anomaly. The degree of ferrous contamination and the clustering is indicative of a specific activity or episode of dumping rather than the random spread of ferrous responses that are often identified when surveying on arable fields. Again activity associated with the airfield is considered the most likely cause of the observed anomalies. A single dipolar anomaly similar to those present in Block 2 has also been identified in the south-western corner of the survey block.

3.2.4 In the western half of the block three small, positive discrete anomalies have been highlighted. Given the close proximity of the late Roman features identified during the AFU watching brief to the east an archaeological origin for these anomalies is considered possible.

Block 4 – Field 14 (Figs 13, 14 and 15)

3.2.5 This block was positioned to try and locate a medieval structure and a moated site described on the CSMR database. Parallel, linear trend anomalies approximately 6m to 8m apart and aligned from north to south are indicative of the former practice of ridge and furrow ploughing. Even when there are no visible traces of the earthworks the magnetic contrast between the infilled furrows and the former ridges can result in the observed vestigial striped magnetic effect.

3.2.6 Another slightly stronger linear trend anomaly towards the southern edge of the block could locate a former field boundary ditch. Apart from these agricultural anomalies only ‘iron spike’ anomalies were recorded.

Block 5 – Field 16 (Figs 16, 17 and 18)

3.2.7 Block 5 was positioned to sample the site of a proposed site compound being also located close to the recorded spot were an Iron Age coin was found. Relatively weak parallel, linear trend anomalies aligned from north-east to south-west are interpreted as being caused by either field drains or recent agricultural activity. Another isolated linear anomaly can be seen crossing these anomalies on a north-north-west to south-south-east alignment. This too is interpreted as having a modern agricultural origin.

Block 6 – Field 16 (Figs 16, 17 and 18)

3.2.8 Block 6 was sited over a linear anomaly and an area of magnetic enhancement. The detailed survey has indeed identified several linear anomalies that are all fairly weak in nature. The anomalies either run north-east to south-west or north-west to south-east and all are aligned slightly obliquely to those anomalies identified in the previous block. Although again probably agricultural in nature the lack of a definite regular pattern to the anomalies could perhaps indicate an archaeological origin.

Block 7 – Field 16 (Figs 16, 17 and 18)

3.2.9 The location of a ploughed out round barrow recorded on Cambridgeshire SMR determined the position of Block 7. However, no traces of the former monument can be seen in the magnetic data and only linear trend anomalies with an agricultural origin have been identified.

Block 8 – Field 18 (Figs 19, 20 and 21)

3.2.10 Block 8 was positioned to evaluate anomalies identified during the magnetic scanning and the source of these responses is immediately apparent in the detailed survey results. Strong positive anomalies caused by the infilled ditches of two adjacent enclosures are present immediately east of the drain that marks the boundary between Fields 17 and 18. The larger enclosure is approximately oval in shape with a long axis from south-west to north-east. There is an apparent entrance on the south side and several positive discrete anomalies within the enclosure are indicative of other features such as pits or areas of burning. To the north-east the other enclosure is more D-shaped; a probable entrance on the north-east side can be seen. Beyond this second enclosure very weak linear trends have been highlighted. These anomalies appear to respect the edge of the enclosure and are possibly also archaeological in origin. Other broad areas of magnetic enhancement between the enclosure and the drain are also noted. It is not clear whether these anomalies are archaeological in nature or not and they could equally be caused by recent topsoil disturbance perhaps associated with the installation of the drain.

Block 9 – Field 19 (Figs 22, 23 and 24)

3.2.11 This block was centred on a very small assemblage of pot sherds located during field walking. No anomalies were identified during the magnetic scanning and this has been verified by the results of the detailed survey. Although a few discrete anomalies have been identified the absence of any associated ditched features would tend to suggest a modern non-archaeological origin.

4. Discussion and Conclusions

4.1 The benefits of prefacing detailed magnetic survey with a programme of rapid magnetic scanning have again been demonstrated during this evaluation. Although the majority of the anomalies highlighted during the scanning have proved to be caused by drainage systems, ploughing regimes or by other recent activity two previously unknown small enclosures have been located and their extent defined. Neither of these features manifest as a cropmark and neither did the fieldwalking locate any finds nearby to suggest archaeological activity in the vicinity.

4.2 Other small discrete anomalies have been identified, particularly close to the current road edge in Block 3. These anomalies may also be due to underlying archaeological features but there is insufficient information to be confident of such an interpretation. The amount of ferrous debris and modern activity in this field, possibly associated with the airfield, may have further masked the magnetic response from small-scale, possibly truncated archaeological features. However, the identification of roadside activity nearby during the AFU watching brief suggests that this area has an elevated archaeological potential.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains.

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Acknowledgements

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Figures

Appendices

Appendix 1

Magnetic Survey: Technical Information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes that intrude into the topsoil may give a negative magnetic response relative to the background level.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed ***'positive'***. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as ***'negative'*** anomalies that, conversely, means that the response is negative relative to the mean magnetic background. Such negative anomalies are often very faint and are commonly caused by modern, non-ferrous, features such as plastic water pipes. Infilled natural features may also appear as negative anomalies on some geological substrates.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies that are interpreted as modern in origin may be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories which are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. An agricultural origin, either ploughing or land drains is a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an X–Y trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Magnetic Susceptibility Survey

There are two methods of measuring the magnetic susceptibility of a soil sample. The first involves the measurement of a given volume of soil, which will include any air and moisture that lies within the sample, and is termed volume specific susceptibility. This method results in a bulk value that it not necessarily fully representative of the constituent components of the sample. The second technique overcomes this potential problem by taking into account both the volume and mass of a sample and is termed mass specific susceptibility. However, mass specific readings cannot be taken in the field where the bulk properties of a soil are usually unknown and so volume specific readings must be taken. Whilst these values are not fully representative they do allow general comparisons across a site and give a broad indication of susceptibility changes. This is usually enough to assess the susceptibility of a site and evaluate whether enhancement has occurred.

Methodology: Gradiometer Survey

There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as ***magnetic scanning*** and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey.

The disadvantages of magnetic scanning are that features that produce weak anomalies (less than 2nT) are unlikely to stand out from the magnetic background and so will be difficult to detect. The coarse sampling interval means that discrete features or linear features that are parallel or broadly oblique to the direction of traverse may not be detected. If linear features are suspected in a site then the traverse direction should be perpendicular (or as close as is possible within the physical constraints of the site) to the orientation of the suspected features. The possible drawbacks mentioned above mean that negative results from magnetic scanning should **always** be checked with at least a sample detailed magnetic survey (see below).

The second method is referred to as ***detailed survey*** and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.5m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation. Detailed survey allows the visualisation of weaker anomalies that may not have been detected by magnetic scanning.

During this survey a Bartington Grad601 magnetic field gradiometer and a Geoscan FM36 fluxgate gradiometer were used. Readings were taken, on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in greyscale and XY trace plot format having been selectively processed and interpolated using Geoplot (Geoscan Research) software. Due to the variation in background magnetic noise the greyscale plots are displayed at various ranges as shown on the figures, using a linear incremental scale.

X-Y trace plot format allows the full range of data to be viewed, dependent on the clip, allowing the ‘shape’ of individual anomalies to be discerned and potentially archaeological anomalies differentiated from ferrous 'iron spike' responses.

Appendix 2

Survey Location Information

A Trimble Geodimeter 600s total station theodolite was used to lay-out and tie-in the various survey grids. Temporary reference points (survey marker stakes) were left in place for accurate geo-referencing and the grids tied-in relative to these markers and to field boundaries. The survey grids were then superimposed onto an Ordnance Survey map base supplied by the client as a best fit to produce the grid locations and the co-ordinates listed below. Overall there was a good correlation between the local survey and the digital map base and it is estimated that the average 'best fit' error is better than ±1.5m. However, it should be noted that Ordnance Survey 1:2500 Superplan mapping has an error of ±1.9m at 95% confidence. These potential errors must be considered if distances are measured off, or if the tie in survey is used in GPS systems, for relocation purposes.

The locations of the temporary reference points are shown on Figures 2 and 3 and the Ordnance Survey grid co-ordinates tabulated below.

Station	Easting	Northing
A	533911.30	259705.56
B	533716.69	259815.49
C	533967.60	259839.40
D	535581.95	259810.84
E	535549.96	259704.90
F	535617.30	259695.34
G	535444.43	259783.17
H	535395.10	259731.37
I	535312.96	259745.89
J	536771.54	259791.77
K	536839.56	259767.93
L	536492.40	259885.88
M	536563.81	259796.15
N	536757.71	259886.50
O	529867.09	260674.63
P	529732.55	260672.42

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party or for the removal of any of the survey reference points.

Appendix 3

Geophysical Archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Word 2000), and graphics files (CorelDraw6 and AutoCAD 2000) files.
- a full copy of the report

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the relevant Sites and Monument Record Office).

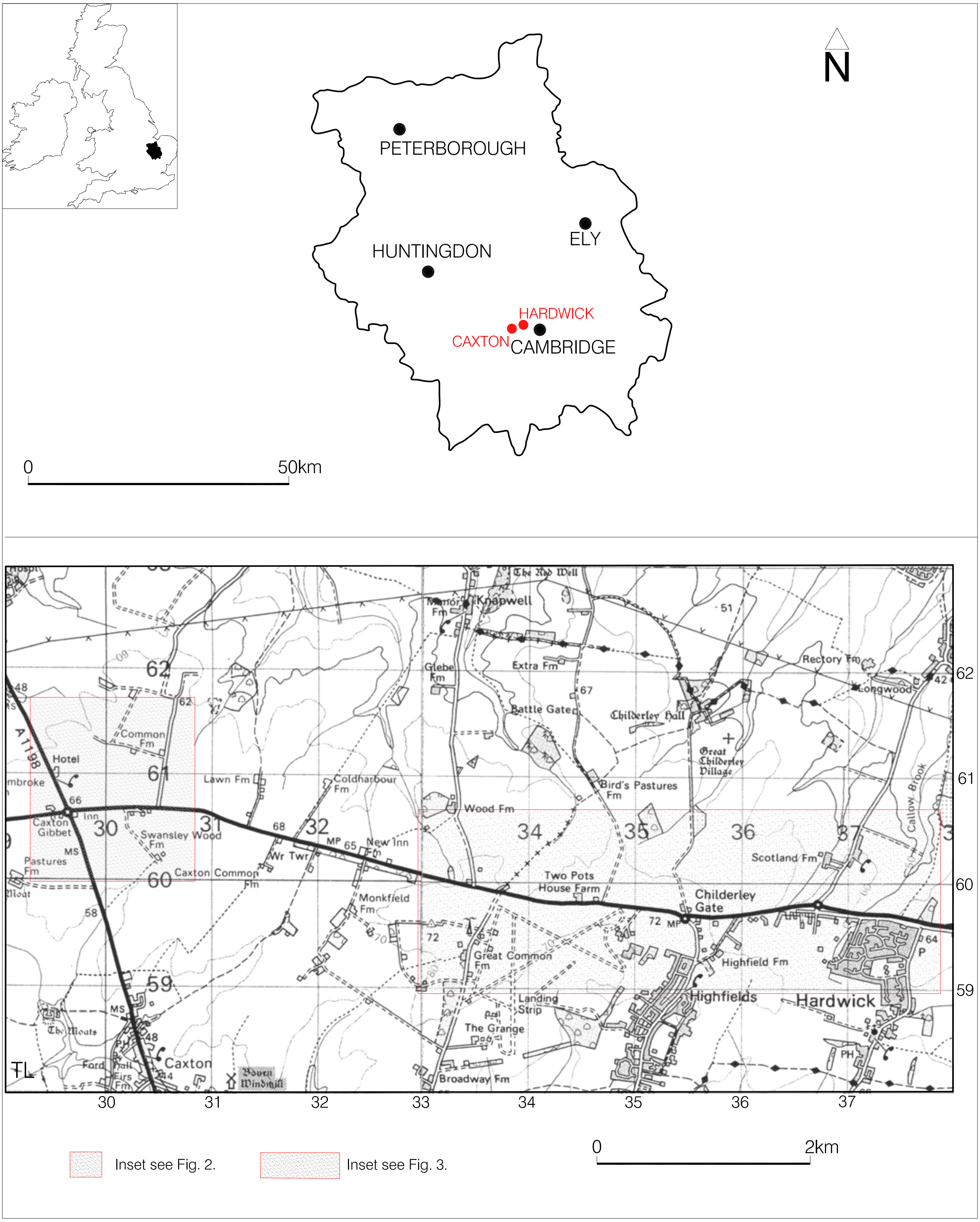


Fig. 1. Site location

Fig. 2. Site location showing greyscale gradiometer data

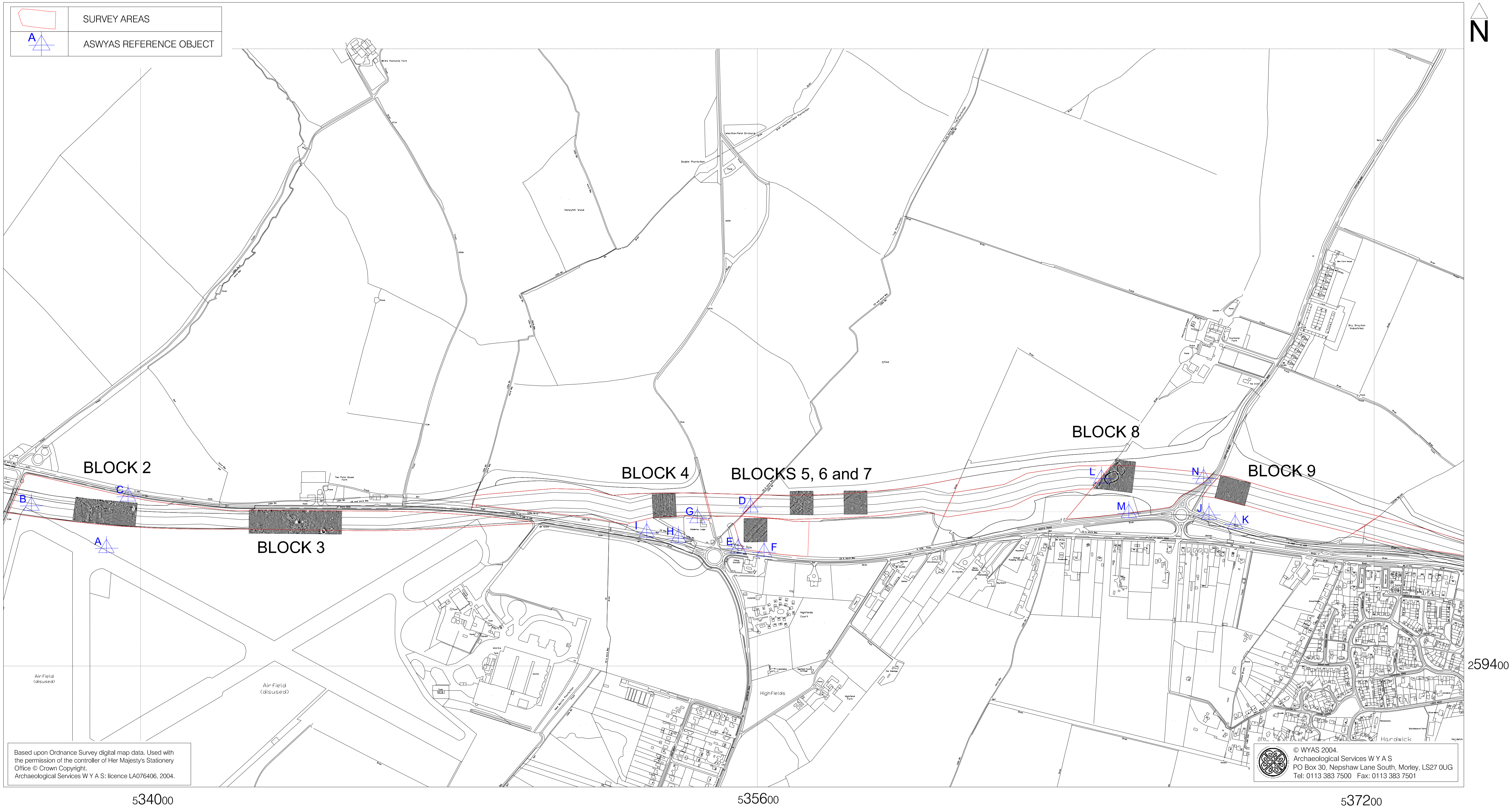


Fig. 3. Site location showing greyscale gradiometer data

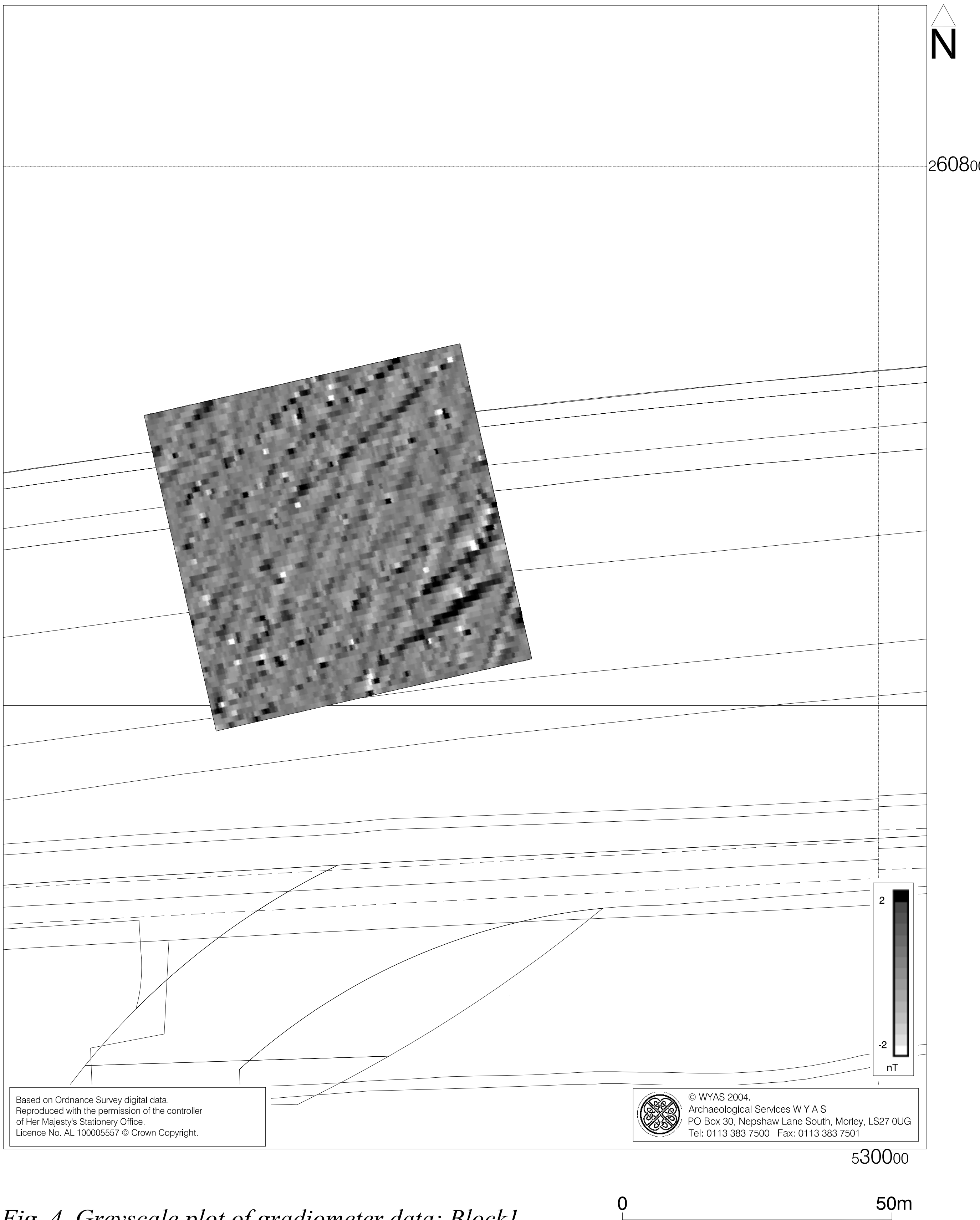


Fig. 4. Greyscale plot of gradiometer data; Block1

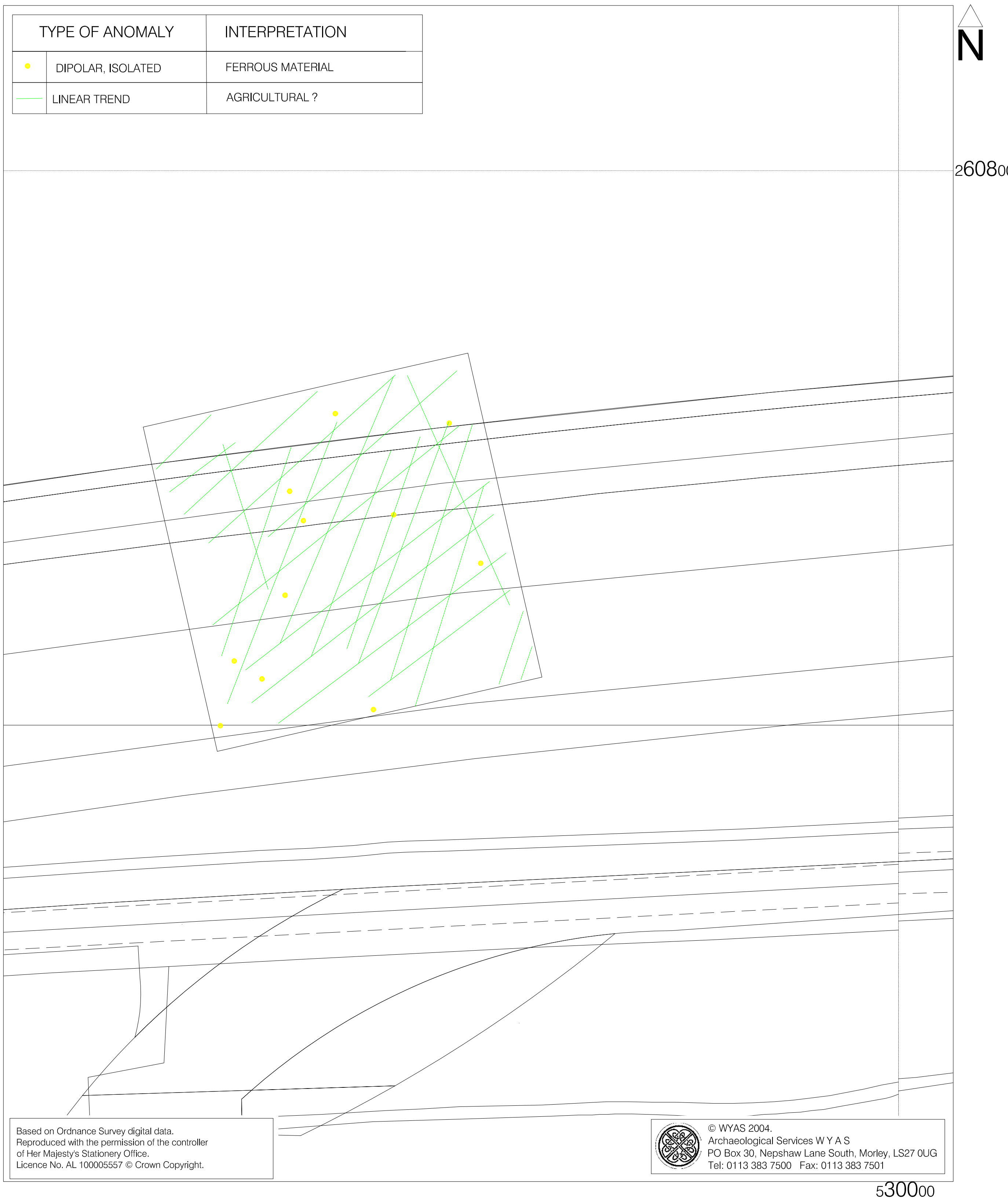


Fig. 5. Interpretation plot of gradiometer data; Block1

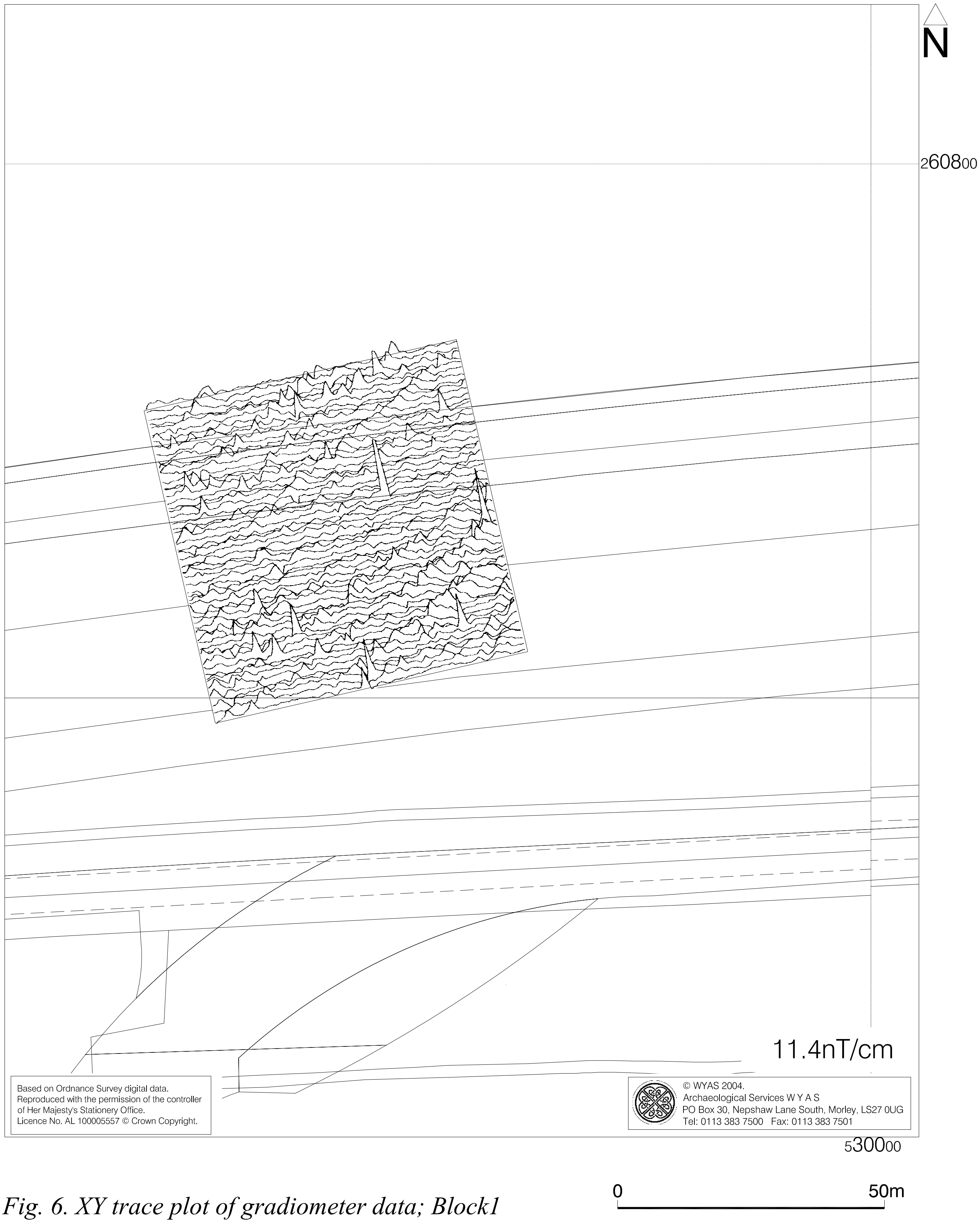


Fig. 6. XY trace plot of gradiometer data; Block1

Fig. 7. Greyscale plot of gradiometer data; Block 2

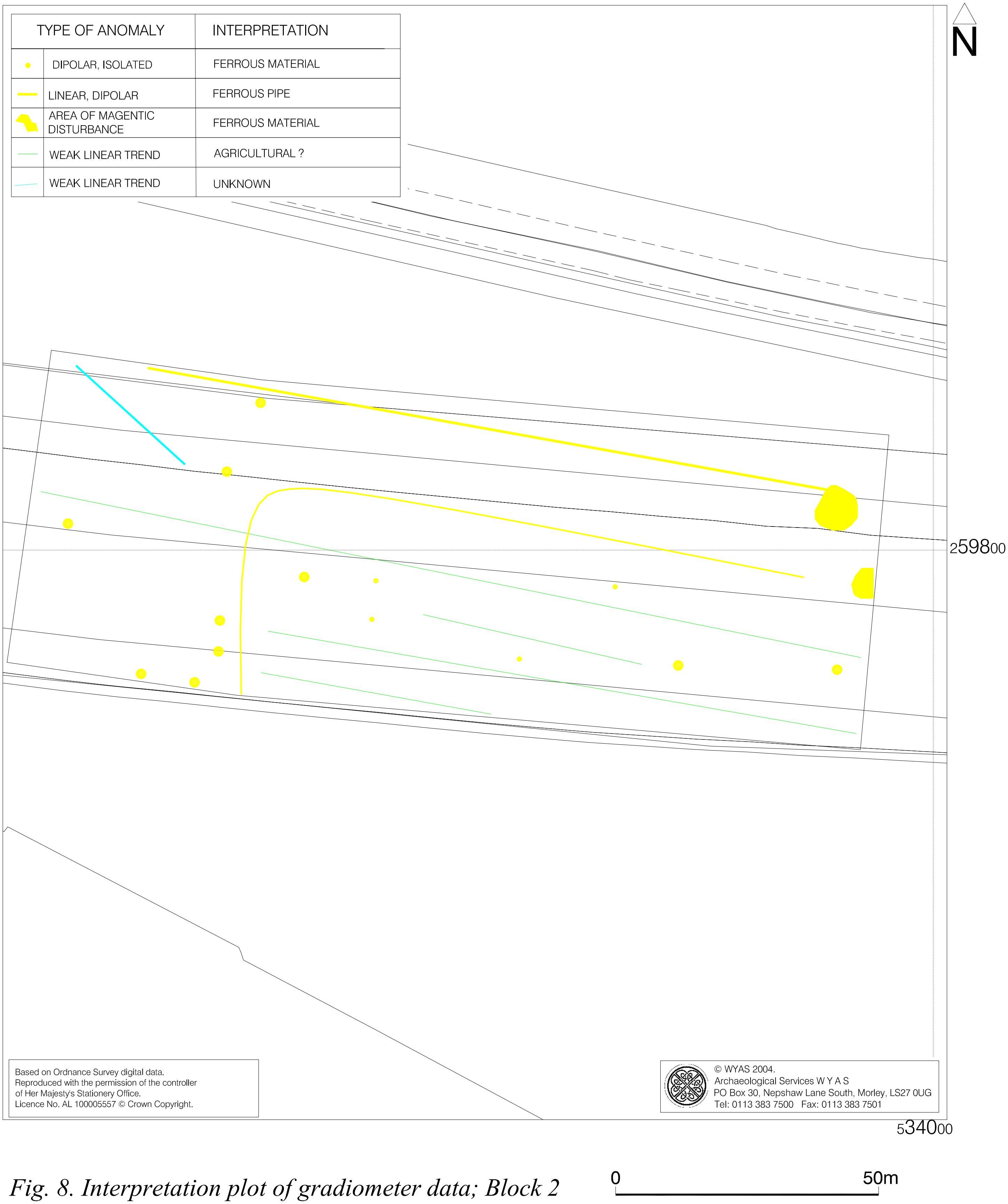


Fig. 8. Interpretation plot of gradiometer data; Block 2

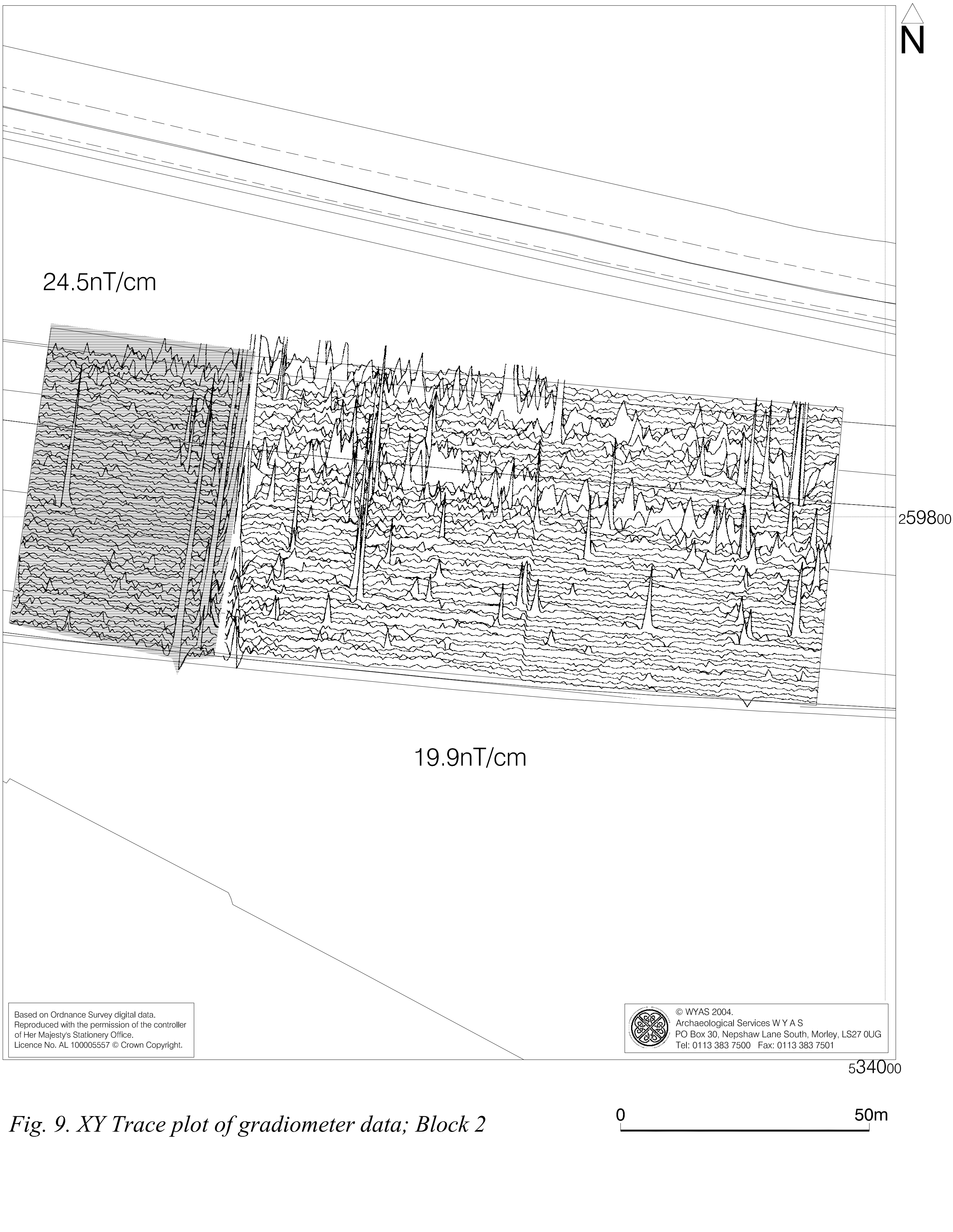


Fig. 9. XY Trace plot of gradiometer data; Block 2

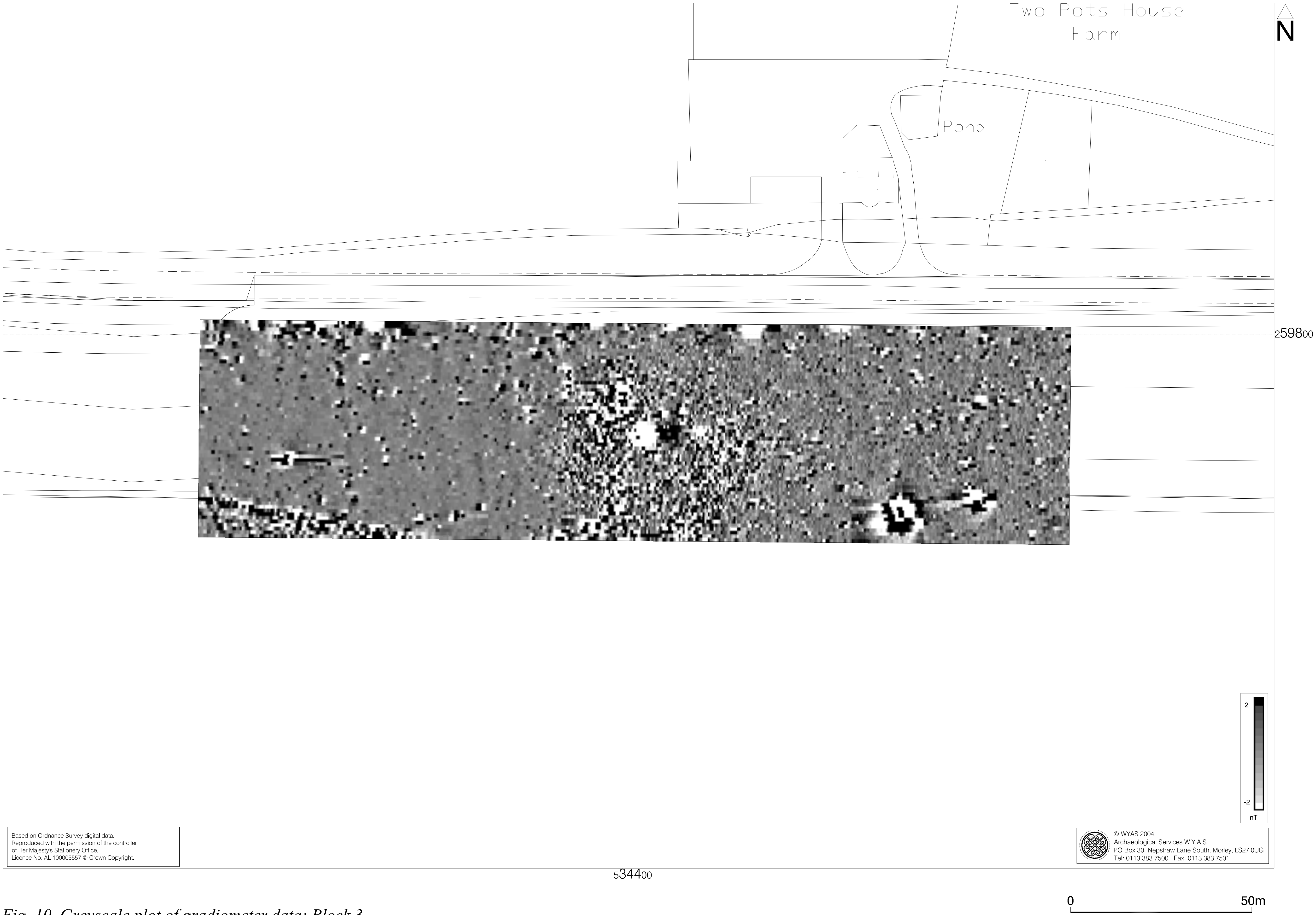


Fig. 10. Greyscale plot of gradiometer data; Block 3

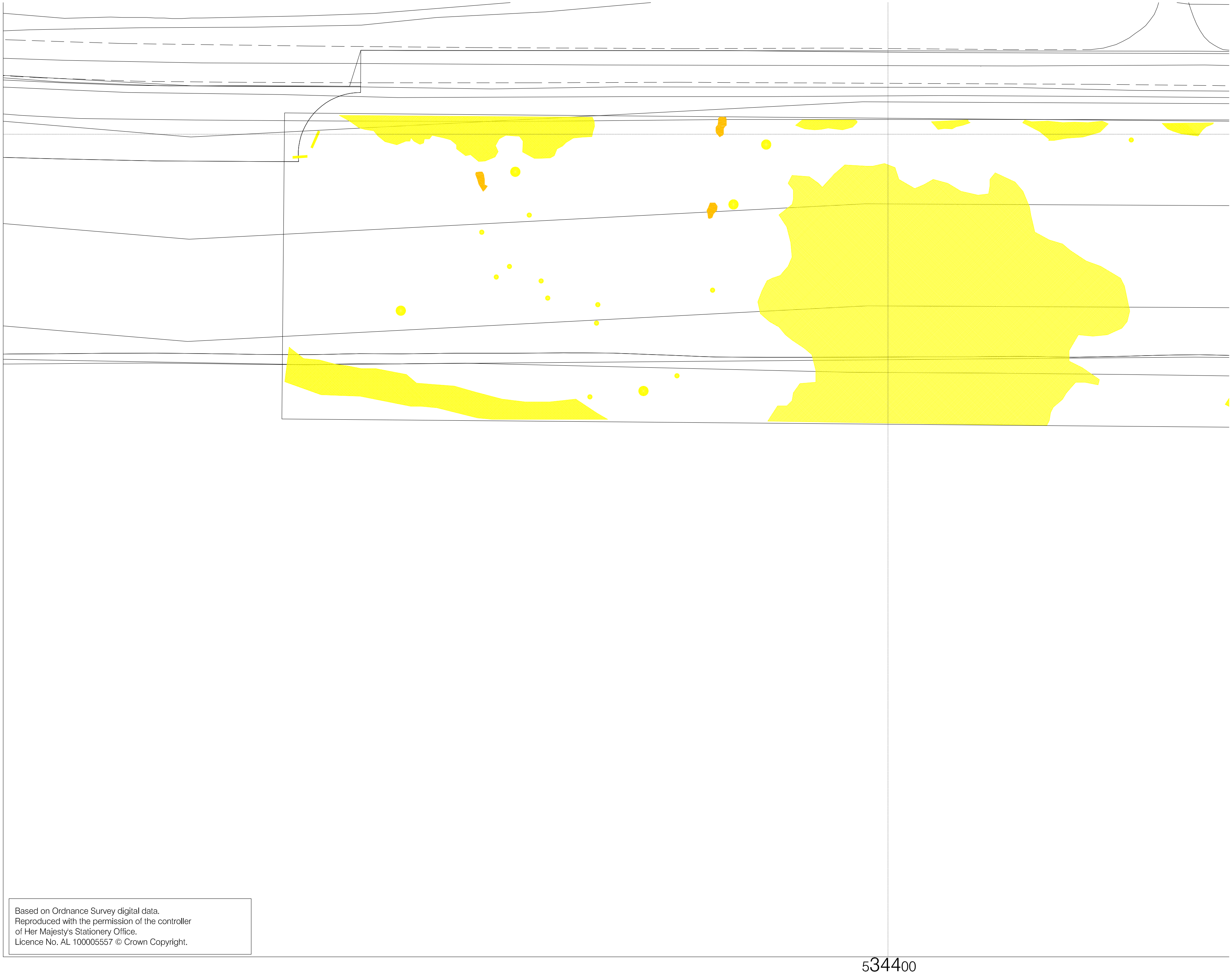


Fig. 11. Interpretation plot of gradiometer data; Block 3

Fig. 12. XY trace plot of gradiometer data; Block 3

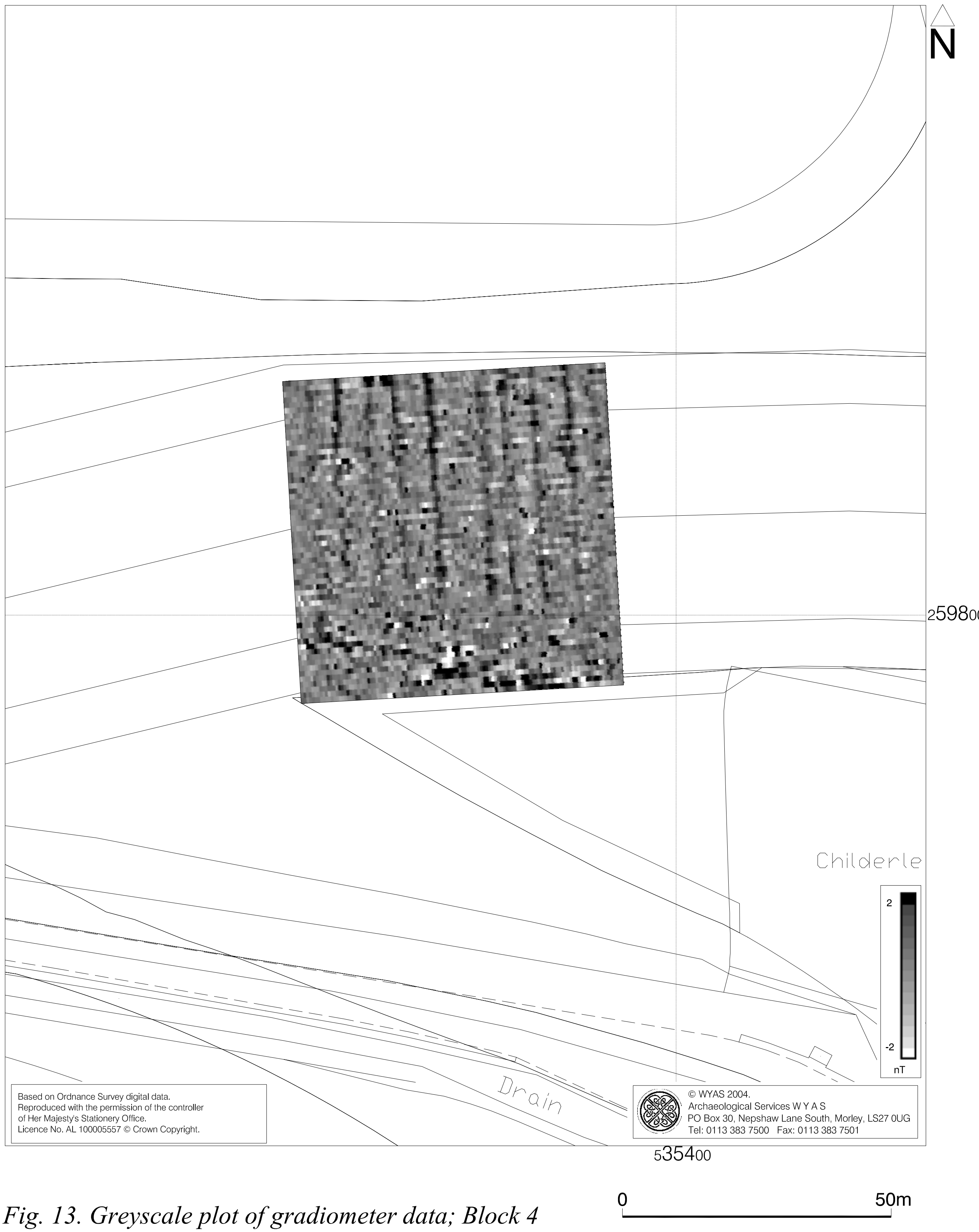


Fig. 13. Greyscale plot of gradiometer data; Block 4

Fig. 14. Interpretation plot of gradiometer data; Block 4

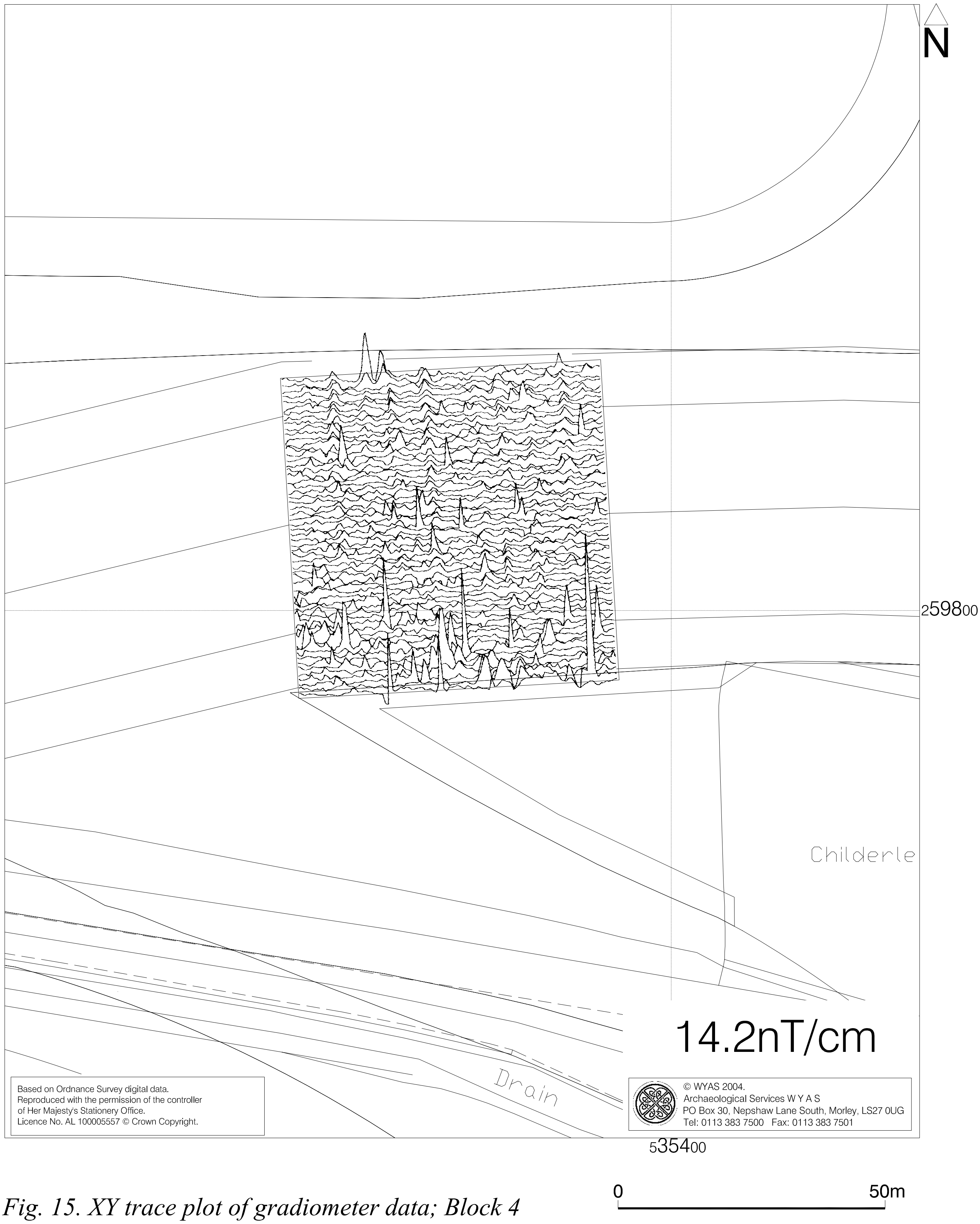


Fig. 15. XY trace plot of gradiometer data; Block 4

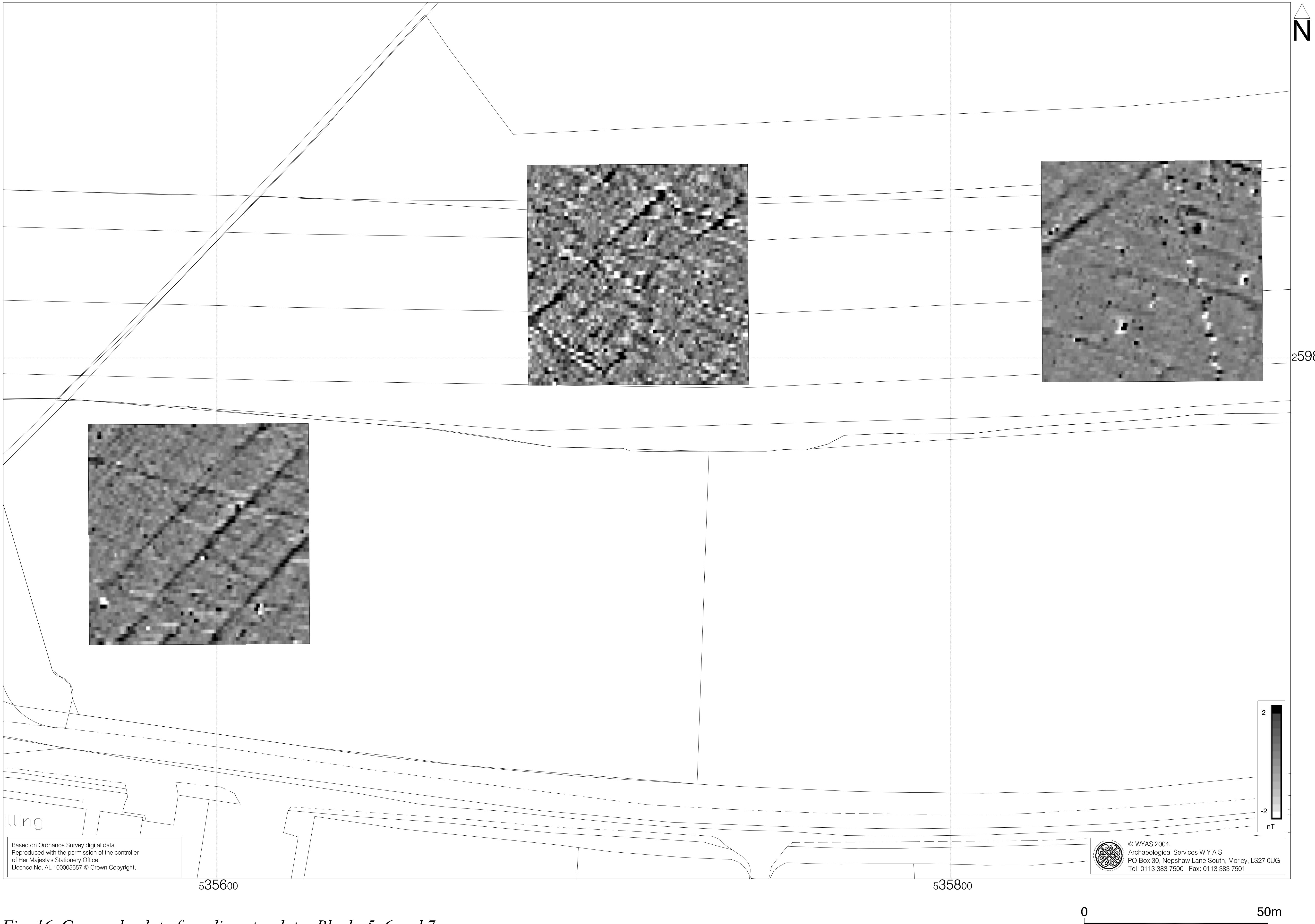


Fig. 16. Greyscale plot of gradiometer data; Blocks 5, 6 and 7

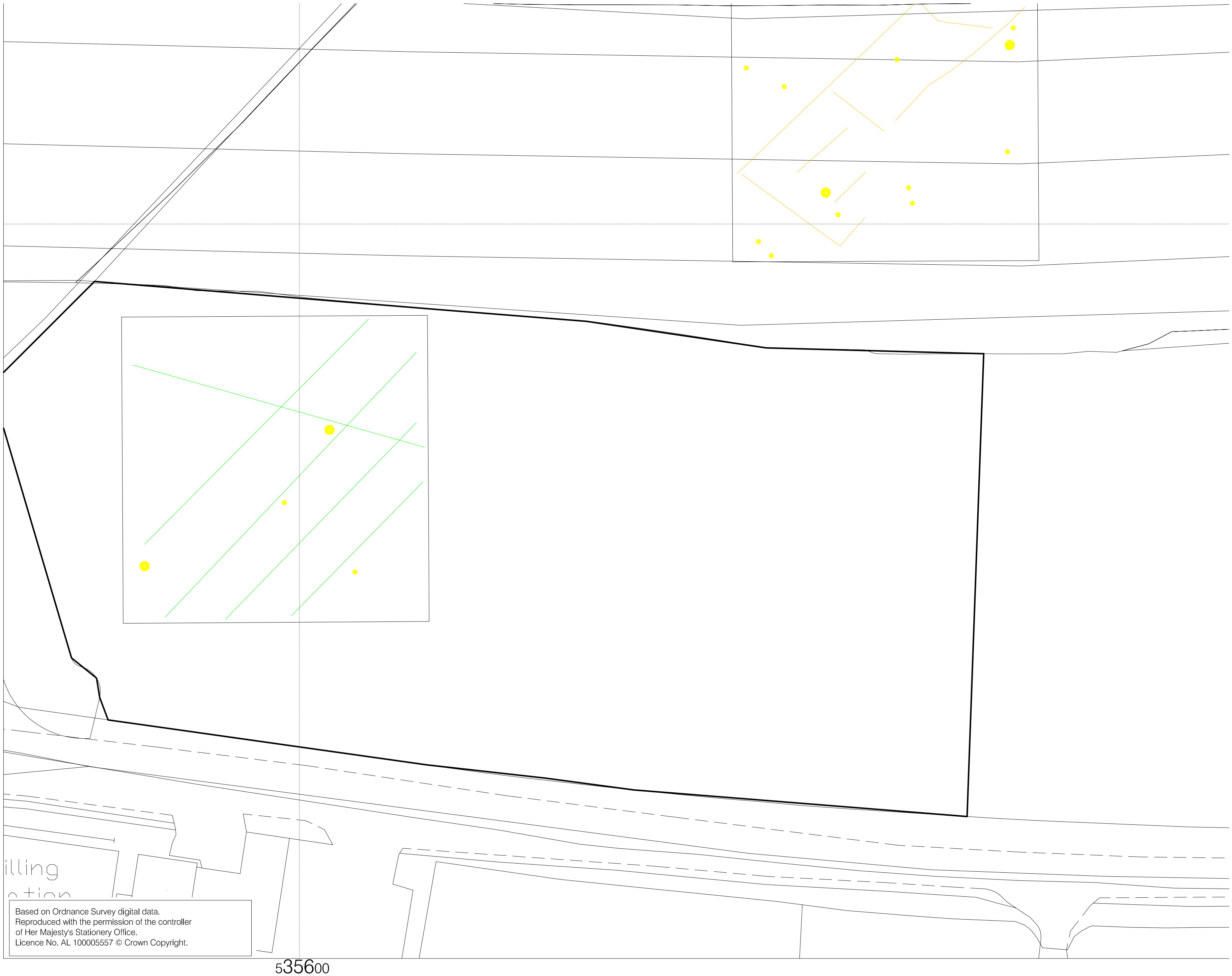


Fig. 17. Interpretation plot of gradiometer data; Blocks 5, 6 and 7

Fig. 18. XY trace plot of gradiometer data; Blocks 5, 6 and 7

Fig. 19. Greyscale plot of gradiometer data; Block 8

0 50m

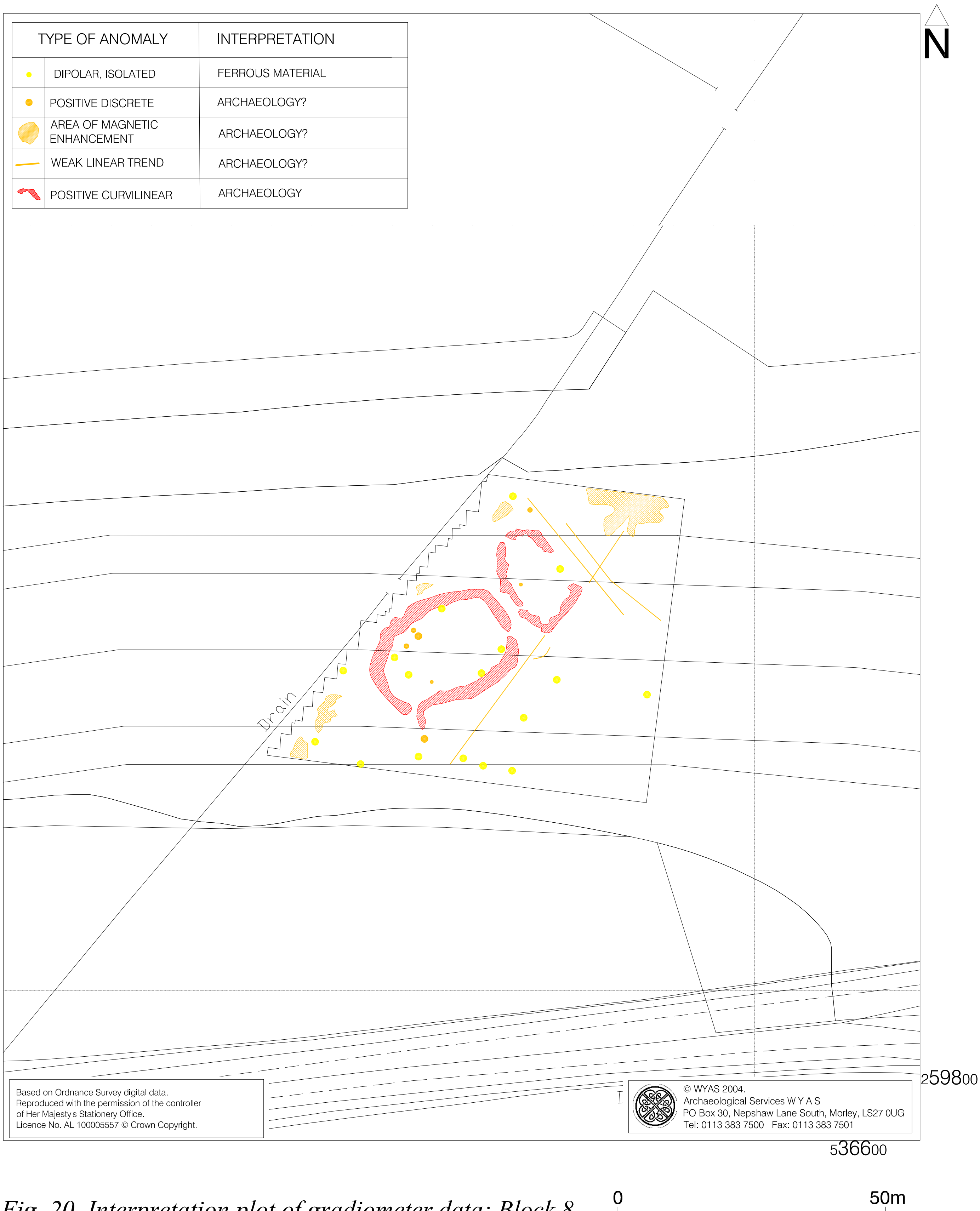


Fig. 20. Interpretation plot of gradiometer data; Block 8

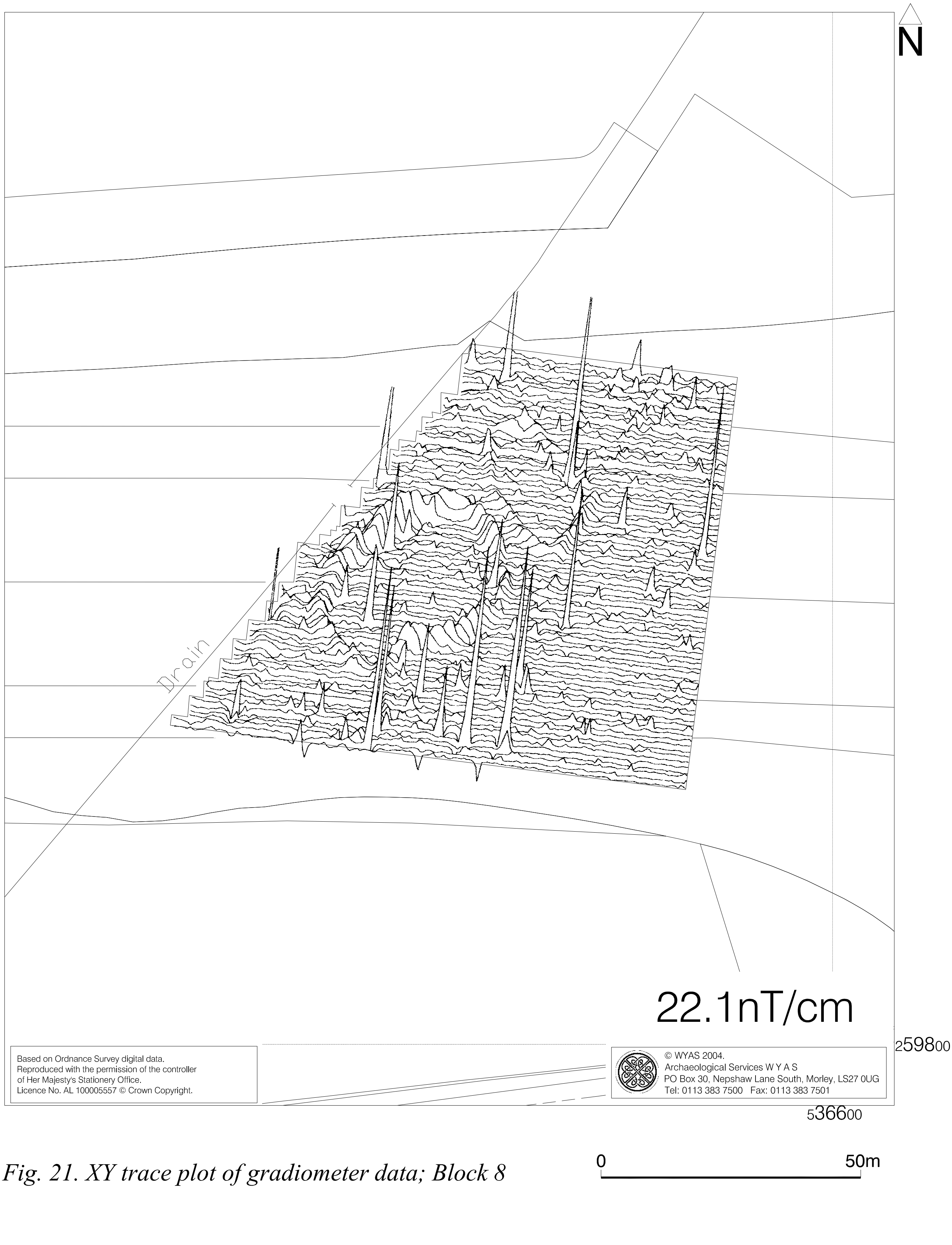
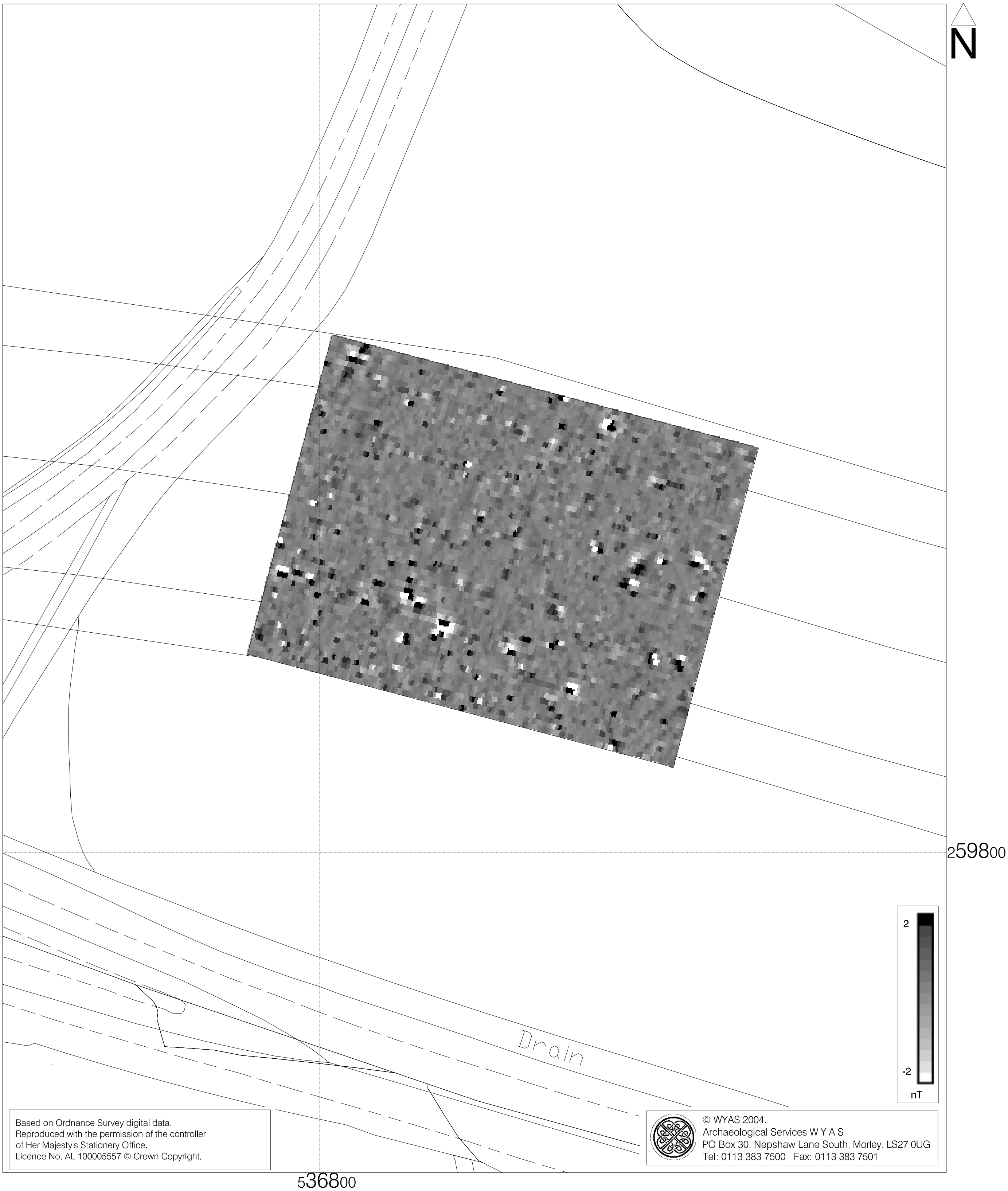


Fig. 21. XY trace plot of gradiometer data; Block 8



0 50m

Fig. 22. Greyscale plot of gradiometer data; Block 9

Fig. 23. Interpretation plot of gradiometer data; Block 9

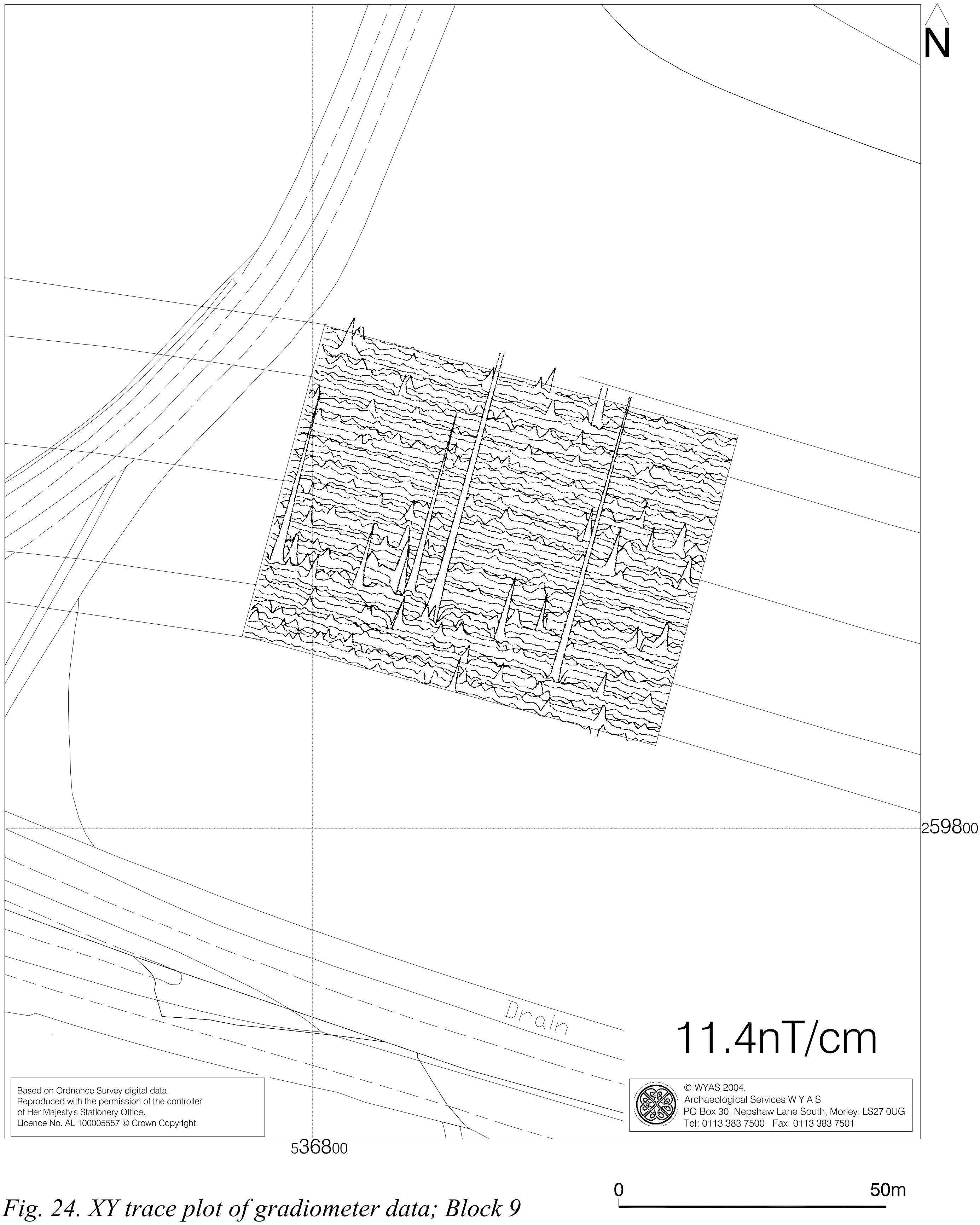
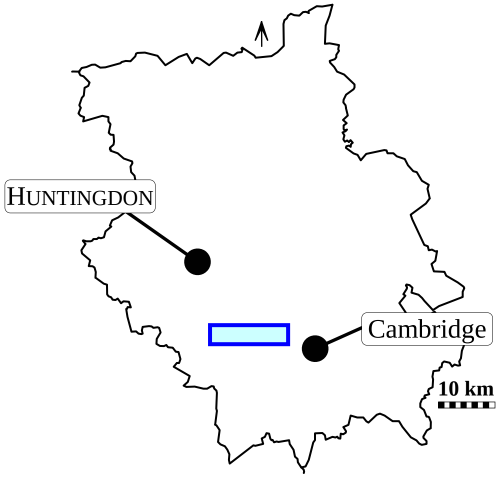


Fig. 24. XY trace plot of gradiometer data; Block 9

Figures



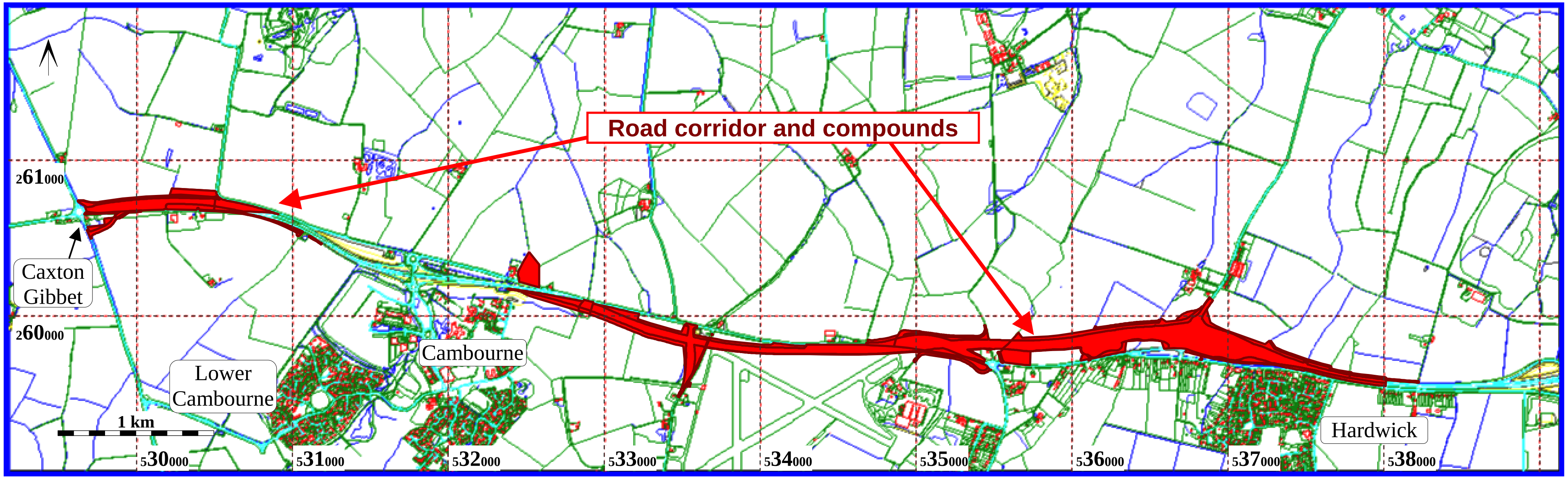


Figure 1: Site location

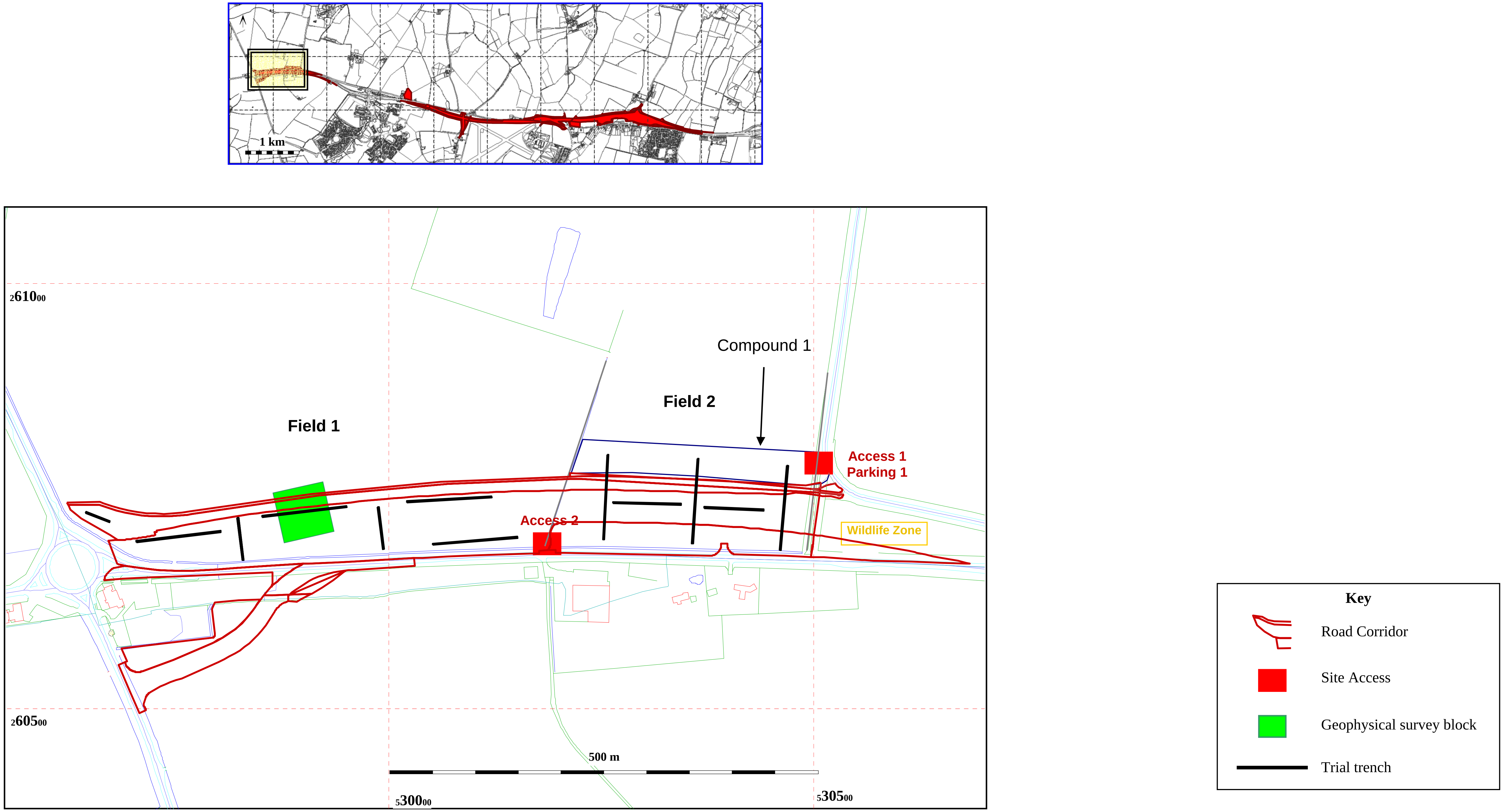


Figure 2: Fields 1 and 2: Trial trench locations
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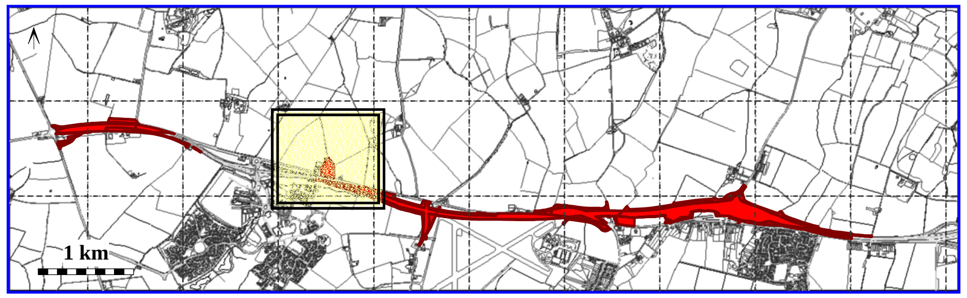

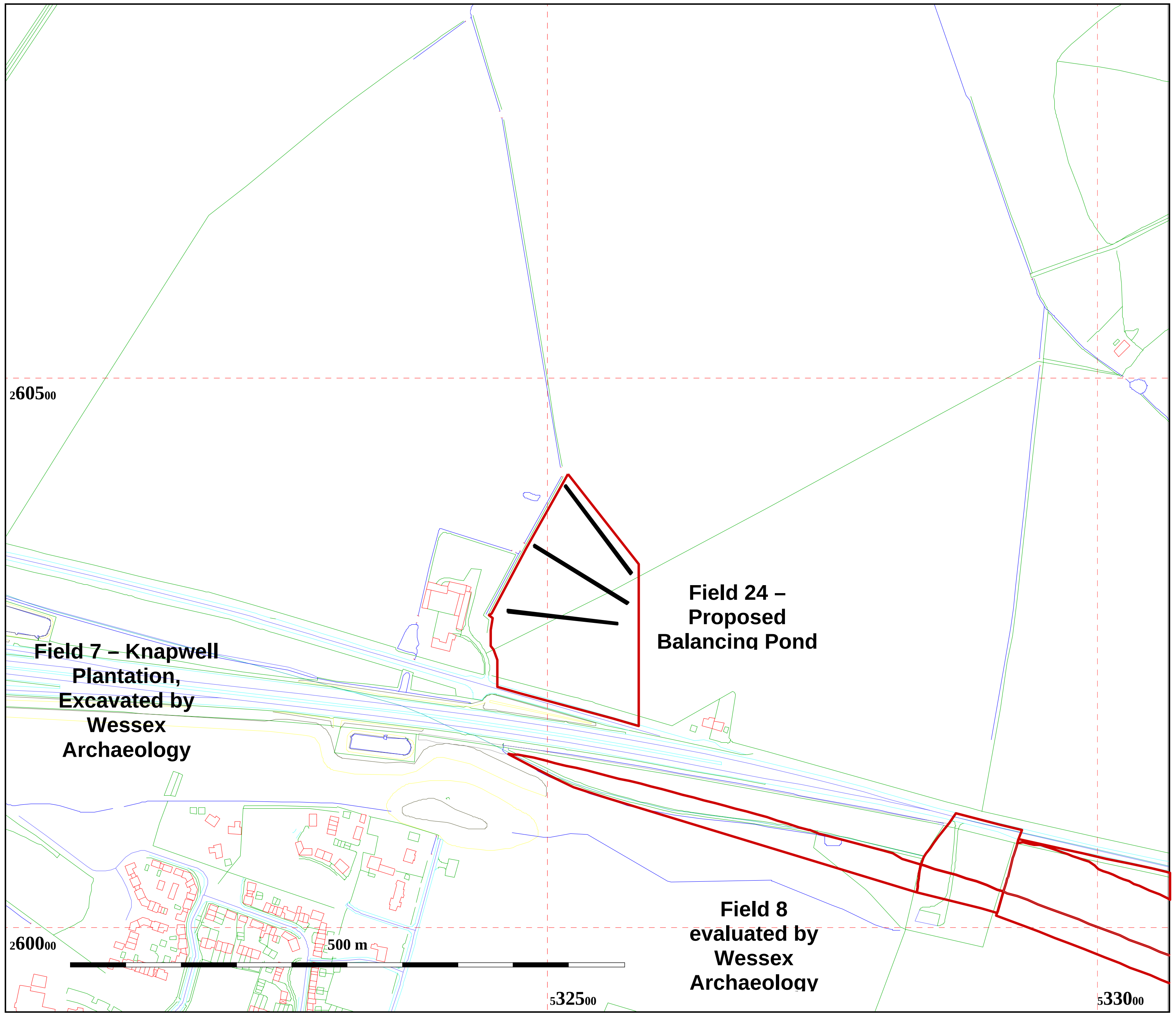

Key

- Road Corridor
- Site Access
- Geophysical survey block
- Trial trench

Figure 3: Field 24: Trial trench locations

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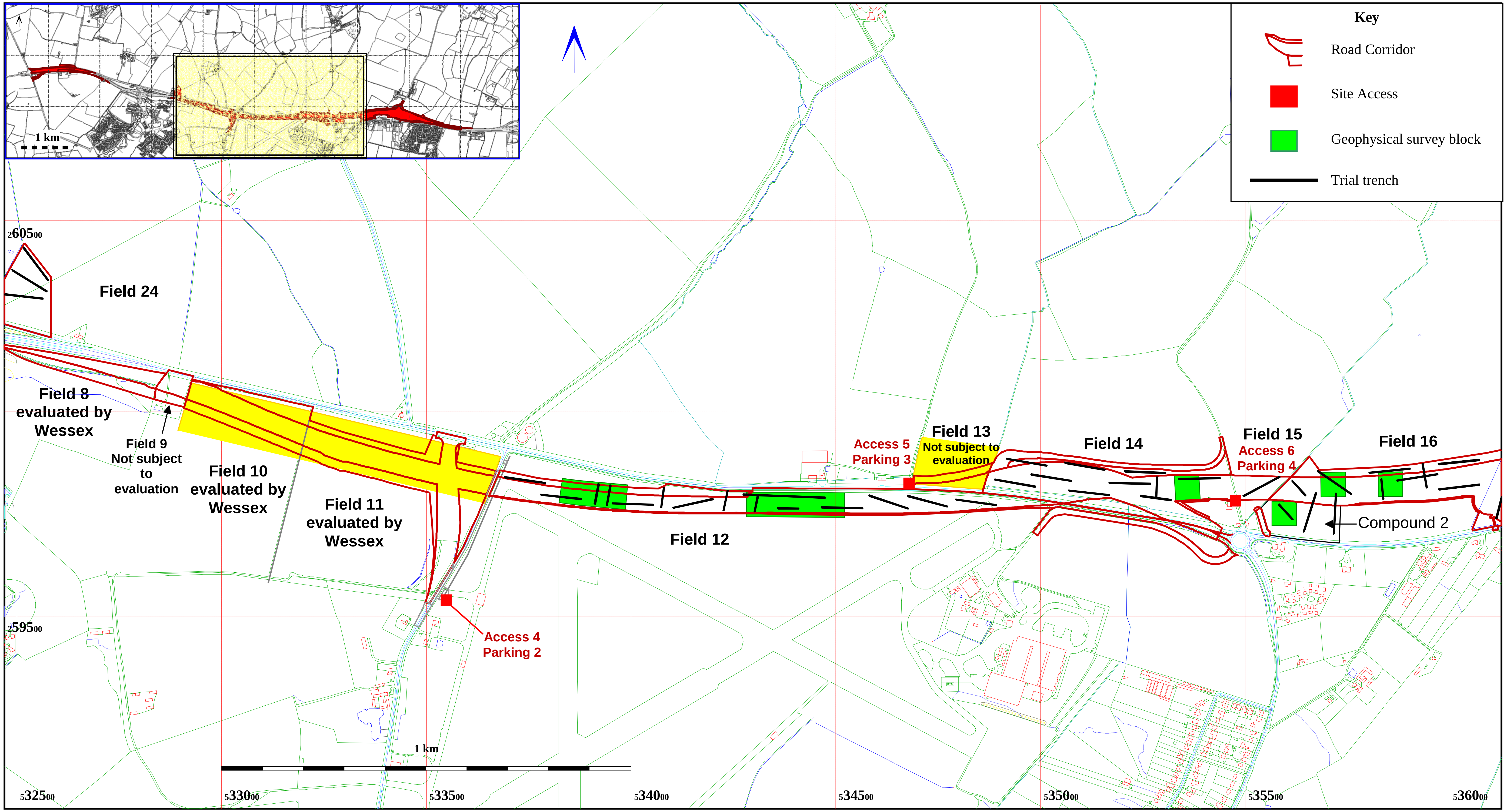

Figure 4: Fields 12 to 16: Trial trench locations

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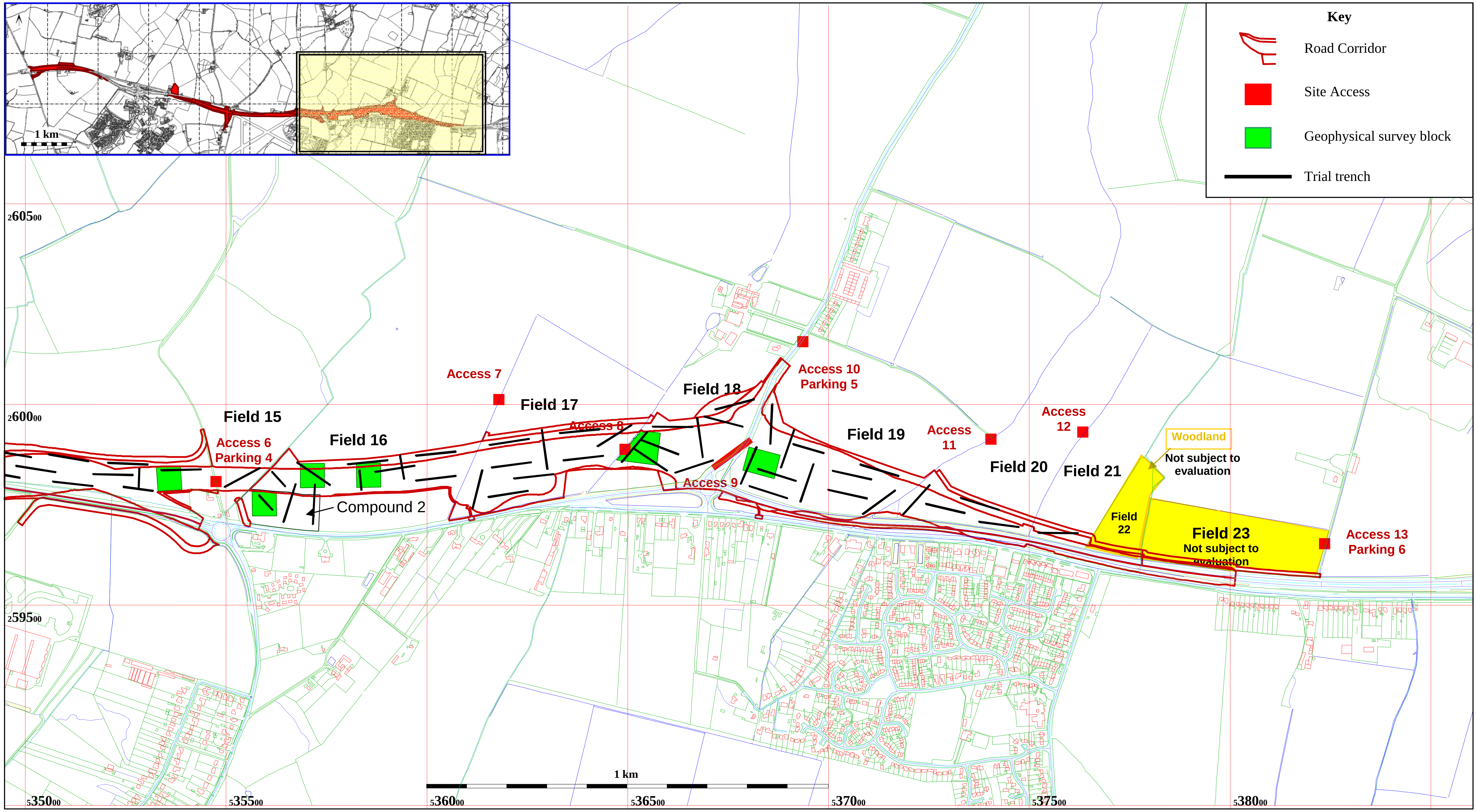

Figure 5: Fields 15 to 21: Trial trench locations

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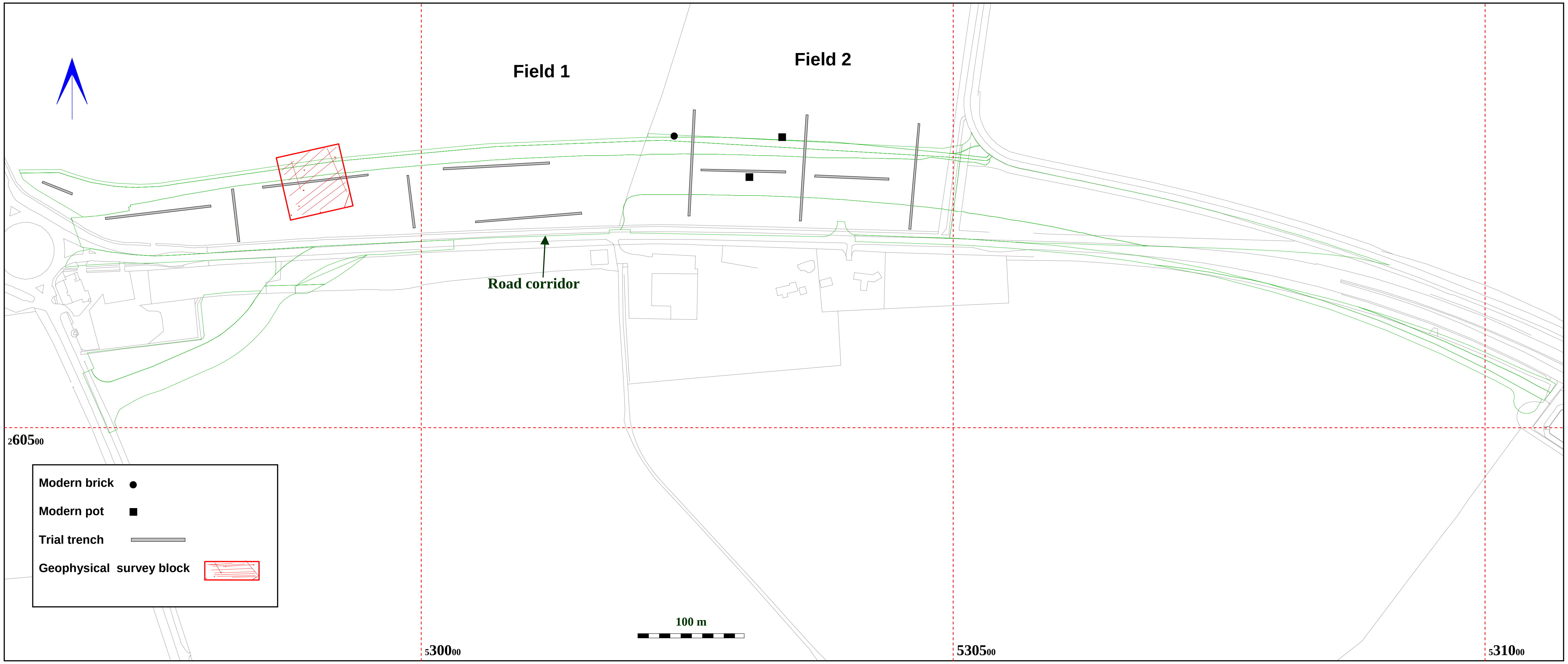

Figure 6: Fields 1 and 2: Results of detailed geophysical survey and fieldwalking (with proposed trial trench locations)

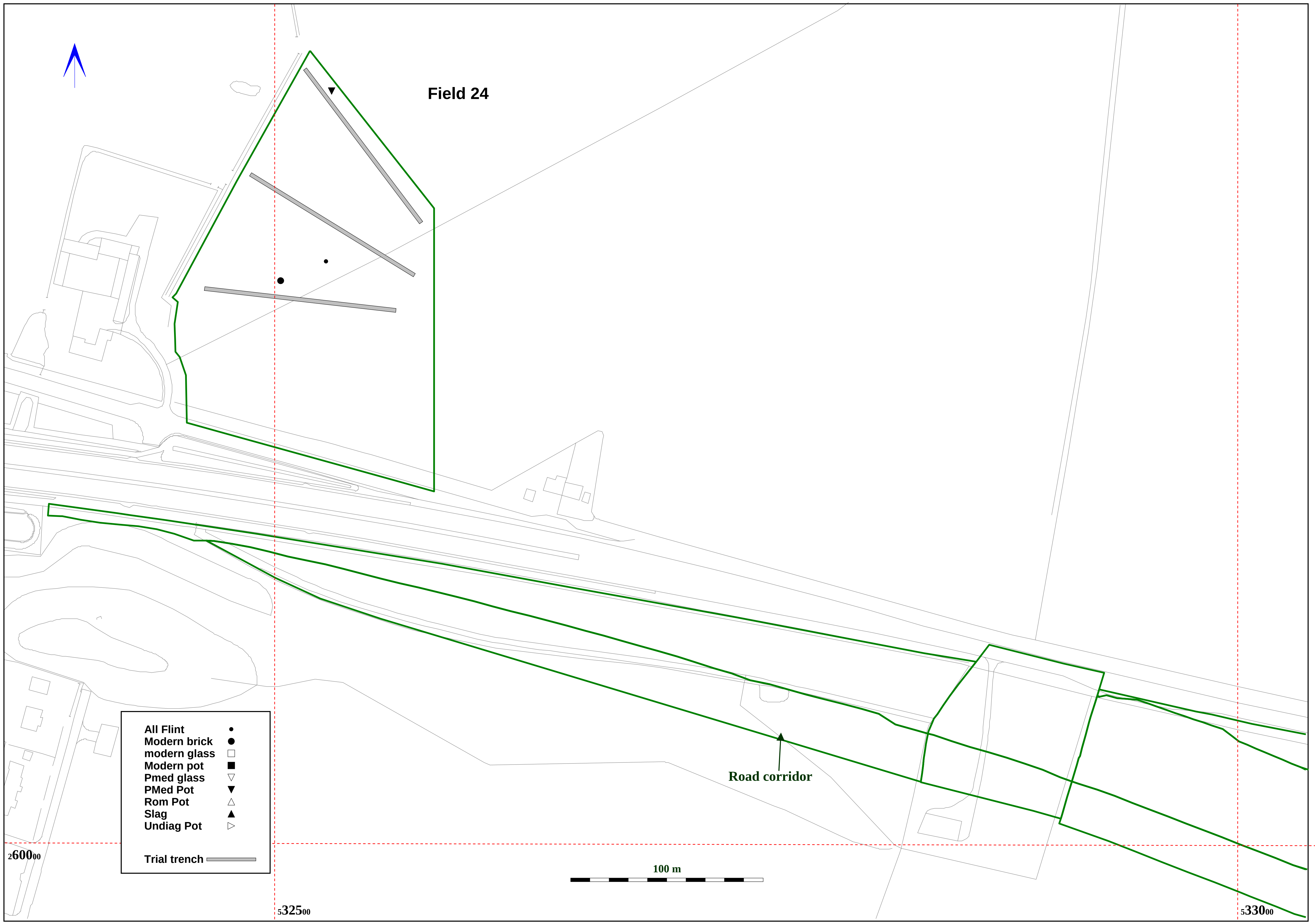

Figure 7: Field 24: fieldwalking results (with proposed trial trench locations)

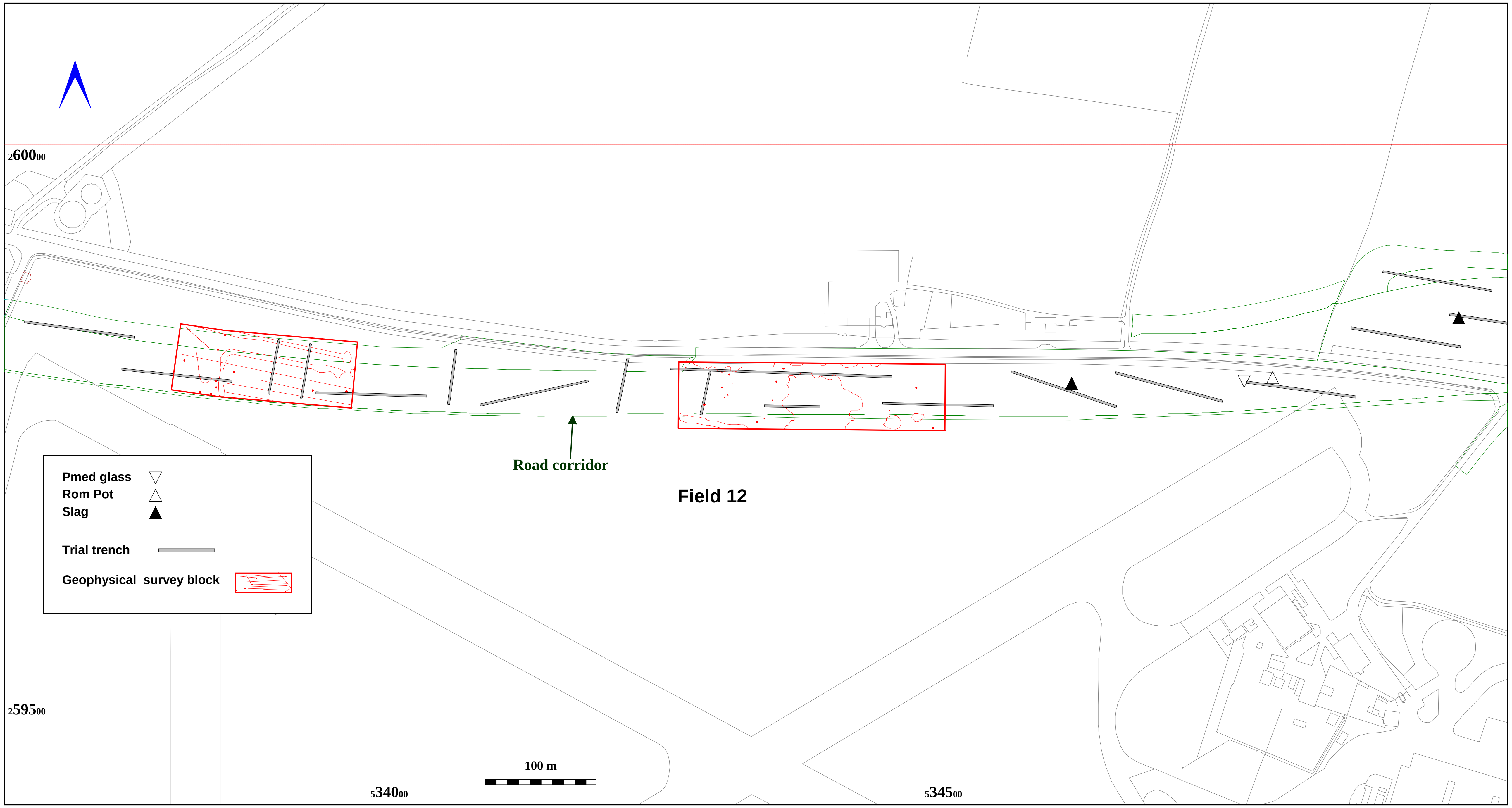

Figure 8: Field 12: Results of detailed geophysical survey and fieldwalking (with proposed trial trench locations)

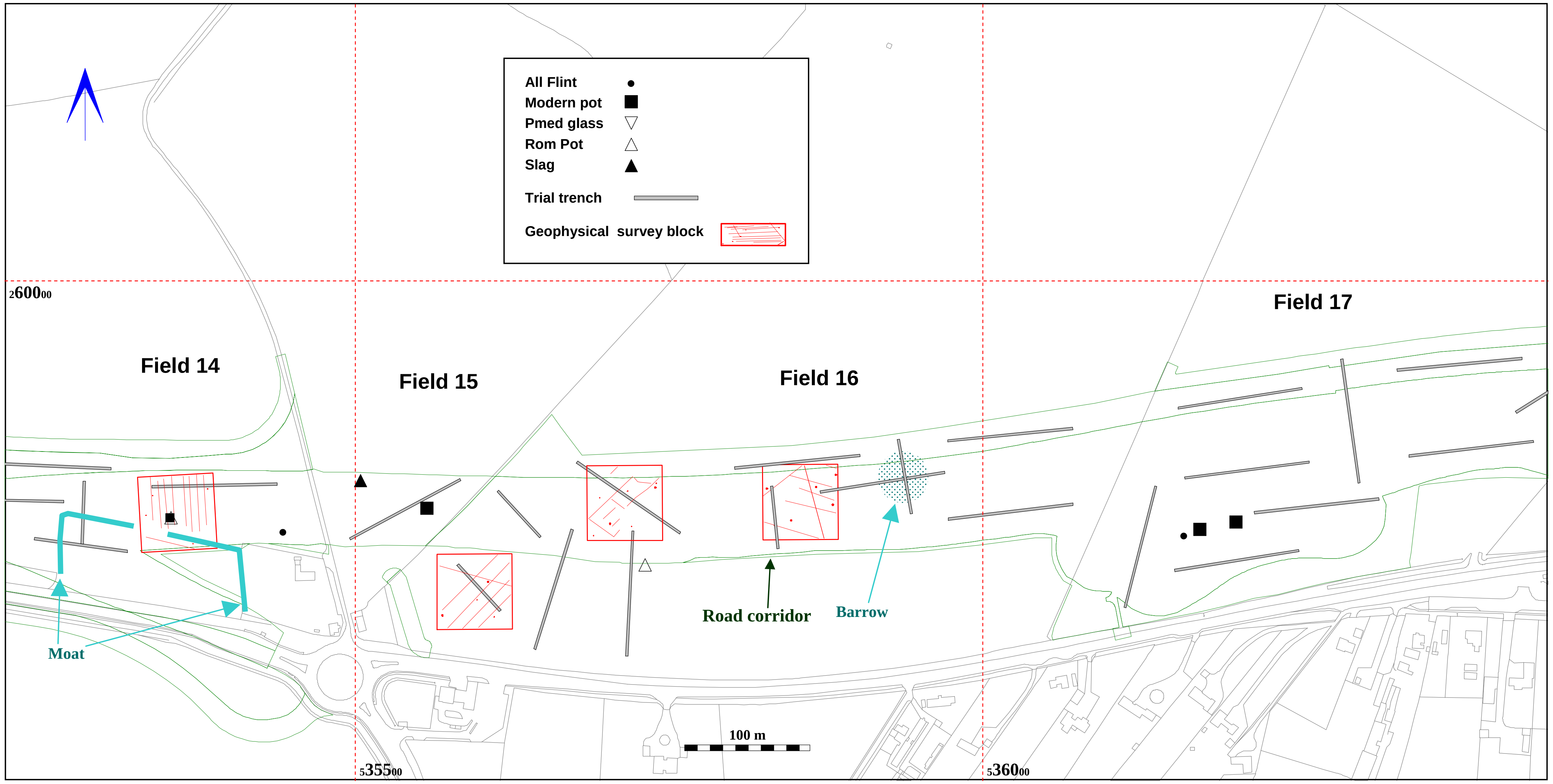

Figure 9: Fields 14 to 17: Results of detailed geophysical survey and fieldwalking (with proposed trial trench locations)

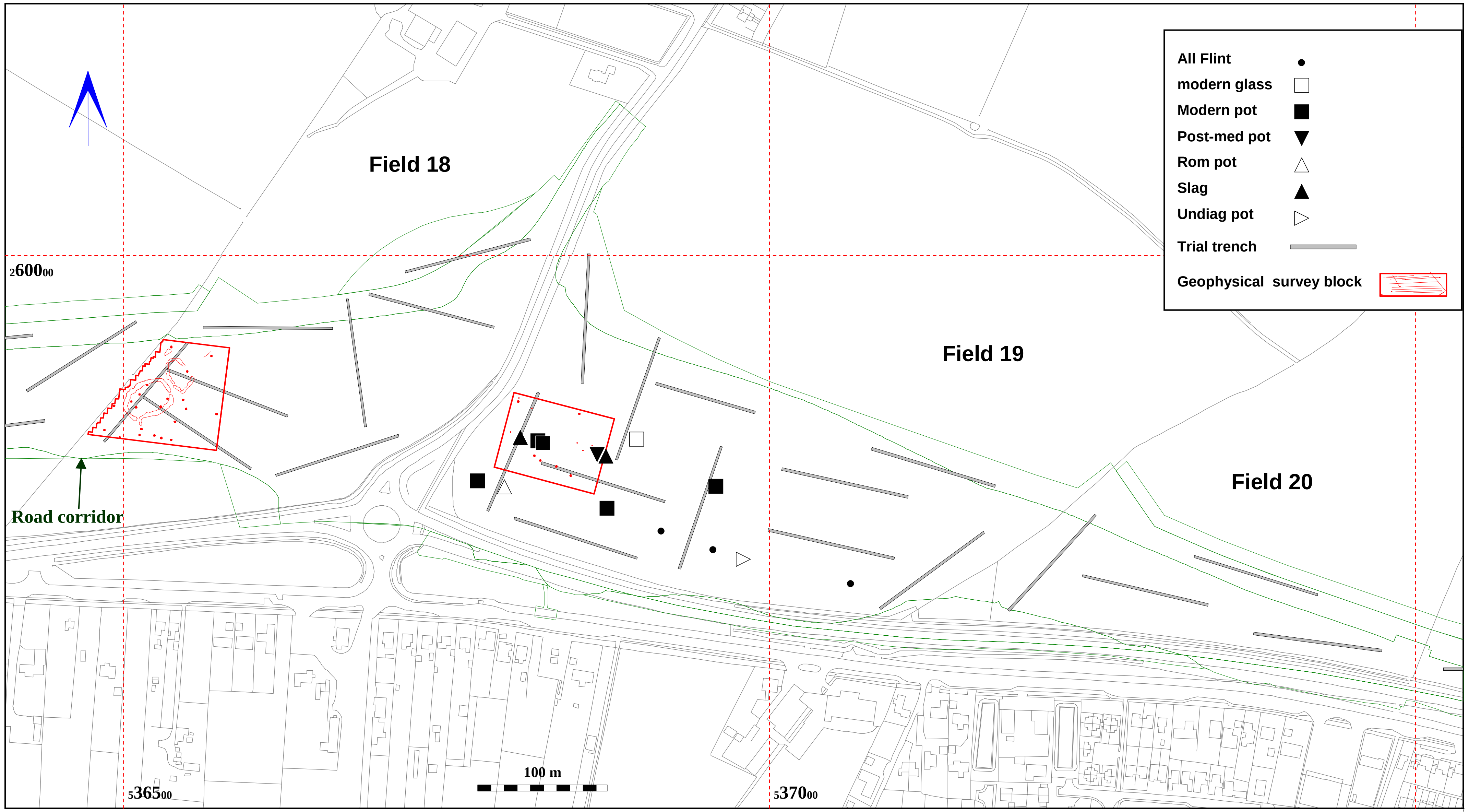

Figure 10: Fields 18-20: Location of trial trenches, showing geophysical survey blocks and field walking results