HIGH SPEED RAIL
(LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

Volume 5 | Technical appendices

CFA16 | Ladbroke and Southam

July 2015

SES and AP2 ES 3.5.1.3

HIGH SPEED RAIL
(LONDON - WEST MIDLANDS)

Supplementary Environmental Statement and Additional Provision 2 Environmental Statement

Volume 5 | Technical appendices

CFA16 | Ladbroke and Southam

July 2015

SES and AP2 ES 3.5.1.3

Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

A report prepared for High Speed Two (HS2) Limited:

AECOM ARUP ATKINS CAPITA

ERM ineco Mott MacDonald PARSONS BRINCKERHOFF TEMPLE

High Speed Two (HS2) Limited,
One Canada Square,
London
E14 5AB

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.gov.uk/hs2

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full via the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.

recycle

Printed in Great Britain on paper
containing at least 75% recycled fibre.

Index

This table shows the topics covered by the technical appendices in this volume, and the reference codes for them.

CFA name and number	Topic	Code
CFA16, Ladbroke and Southam	Cultural heritage	CH-002-016
		CH-003-016
		CH-004-016

Environmental topic:	Cultural heritage	CH
Appendix name:	Gazetteer of heritage assets	002
Community forum area:	Ladbroke to Southam	CFA16

Contents

List of figures

List of tables

1 Introduction

1.1.1 This appendix provides an update to Appendix CH-002-016 Cultural heritage gazetteer of heritage assets to the main Environmental Statement (ES) as a result of design changes assessed as part of the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement (AP2ES). This update should be read in conjunction with Appendix CH-002-016 Cultural heritage gazetteer of heritage assets from the main ES.

2 Gazetteer

Table 1 - Gazetteer of heritage assets for CFA16

Unique ID	Map reference	Asset type	Name	Description	Period	Designation	Grade	Significance/value	NHL reference	HER reference
LBS113		Ancient Woodland	Lodge Spinney	A parcel of woodland with characteristics of ancient woodland, having been shown on maps dating from 1734.	Post-medieval	Ancient Woodland	None	High	n/a	n/a
LBS114		Archaeology	Geophysical anomolies near Wood Farm	Pits and ditches identified through geophysical surveys	Unknown	None	None	Low	n/a	n/a

Environmental topic:	Cultural heritage	CH
Appendix name:	Impact assessment table	003
Community forum area:	Ladbroke to Southam	CFA16

Contents

List of tables

1 Introduction

1.1.1 This appendix provides an update to Appendix CH-003-016 Cultural heritage impact assessment tothe main Environmental Statement (ES) as a result of design changes assessed as part of the Supplementary Environmental Statement (SES) and the Additional Provision 2 Environmental Statement (AP2ES). This update should be read in conjunction with Appendix CH-003-016 Cultural heritage impact assessment from the main ES.

2 Impact assessment

Table 1 - Impact assessment for CFA16

Unique identification	Name	Designation(s)	Value	Construction impact			Operation impact			New or different environmental effect from that reported in the main ES or the Additional Provision (AP1) ES
				Nature of impact including mitigation	Scale of impact	Effect	Nature of impact including mitigation	Scale of impact	Effect	
LBS114	Geophysical anomolies at Wood Farm	None	Low	The construction of the mainline, excavation of cuttings and landscaping would result in the removal of archaeological remains. This would be mitigated through a scheme of archaeological evaluation.	High adverse	Moderate adverse	The operation of the Scheme would not impact the significance of the asset	No change	Neutral	The impact of the Scheme on the archaeological site identified by geophysical surveys at the land near Wood Farm constitutes a new significant effect not previously identified in the Main or AP1 ES

Environmental topic:	Cultural heritage	CH
Appendix name:	Survey reports	004
Community forum area:	Ladbroke and Southam	016

Contents

List of figures

1 Introduction

1.1.1 This appendix provides an update to Appendix CH-004-016 Cultural heritage survey reports from the main Environmental Statement (ES) as a result of design changes assessed as part of the Additional Provision 2 Environmental Statement (AP2 ES). This update should be read in conjunction with Appendix CH-004-016 Cultural heritage survey reports from the main ES.

2 Geophysical surveys

2.1 CN005 land off Welsh Road

Project Background

2.1.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN005 off Welsh Road, near Ufton, Warwickshire (Figure 1), hereafter "the Site" (centred on NGR 438483, 263409). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

2.1.2 This geophysical survey undertaken here has been preceded by a Desk-Based Assessment (HS2 Environmental Statement 2013) and a remote sensing survey comprising LiDAR and hyperspectral survey and analysis (Wessex Archaeology 2013). Geophysical survey areas have been identified based on the archaeological potential and conclusions identified in these reports.

2.1.3 This Site, CN005, was selected for geophysical survey as it is considered to be an area at medium risk with known cropmarks and it will be an area of major construction works.

Site Details

2.1.4 The Site comprises three arable fields located approximately 1.2km north-east of Ufton, Warwickshire. The Site is bounded to the north by the Grand Union canal, to the north-east by Welsh road, to the east and west by hedgerows and to the south by hedgerows and the farm buildings of Wood Farm (see Figure 1). The gradiometer survey covered an area of approximately 12.5ha.

2.1.5 The Site lies on a north facing slope at a height of around 84m aOD (above Ordnance Datum) and falling to a height to 66m aOD.

2.1.6 The solid geology is mapped as primarily the Mercia Mudstone Formation (Early Triassic) with superficial deposits of alluvium and a small area of head (clay and silt) also recorded.

2.1.7 The soils underlying the majority of the Site are likely to be pelo-alluvial soils of the 813b (Fladbury) association to the north and the non-calcareous pelosols of the 431 (Worcester) association to the south (SSEW SE Sheet 3-2 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.

Archaeological Background

2.1.8 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant DBA should be consulted (HS2, Environmental Statement, 2013). A summary of relevant sites within 1km of the survey area are summarised below and have been included to provide context and inform the geophysical interpretation. Sites referred to can be found either within the gazetteer for CFA16 in the Environmental Statement (LBS numbers), in the English Heritage PastScape database (PastScape numbers), in the supplementary survey works (WA numbers) or in the Warwickshire SMR (MWA numbers).

2.1.9 The current landscape is recorded as large, irregular fields but difficult to ascertain if they were piecemeal or planned enclosures.

2.1.10 Within the survey area the LiDAR data identified two large circular hollows interpreted as possibly the remains of former quarries or ponds (WA16.62)and also traces of ridge and furrow with at least three different plough regimes apparent (WA16.63) (Wessex Archaeology 2013).

2.1.11 Features and sites in the area are predominantly of medieval, post medieval and 20th century date. These relate to agricultural activity, local industrial activity and the Second World War defensive locations on the Grand Union Canal.

2.1.12 Within the wider landscape, the Site lies between two medieval settlements of Ufton and Long Itchington. Findspots have been recorded at the villages of Neolithic, Bronze Age, Roman, and Anglo-Saxon/early medieval date.

2.1.13 Ufton, to the south of the Site was a medieval settlement with remnant ridge and furrow and building remains recorded 500m south of the church. There is also a possible deserted medieval settlement recorded 200m southwest of the church at Ufton. This indicates the potential for medieval activity to cover a larger area than the current extents of the modern settlement (LBS079).

2.1.14 Adjacent to the south-east of the Site and approximately 200m north of Ufton Wood are recorded two possible enclosures detected on aerial photography. These are of unknown date and are both visible only as cropmarks (LBS084).

2.1.15 Approximately 600m south-east of the Site is an area of woodland which is the location of the parish boundary between Ufton and Long Itchington. An ancient charter documents a wood at this location with a possible earthen bank dating to the early medieval period (LBS082 and LBS083).

2.1.16 West of the site are two features, recorded as possible medieval or post-medieval spoil heaps or mounds. One is visible only as a cropmark (PastScape ID 1528220) in aerial photography whilst the other comprises a sub-circular mound of 37m in diameter (PastScape ID 1528249).

2.1.17 Approximately 650m to the east is an area of partly dispersed, partly continuous medieval or post-medieval ridge and furrow as can be seen in historic aerial photography. However the majority of this has since been levelled (PastScape ID 1528168). Similar features have been recorded 500m south of the site (PastScape ID 1531887).

2.1.18 To the south of the site between Ufton Wood and the outskirts of Ufton are three locations of mid-18th to early 20th century industrial activity. Documentary evidence suggests that 400m NW of Ufton Church is a brick kiln (MWA827), a lime kiln with associated quarrying is recorded 800m N of the church (MWA828) and Brickyard Cottage, a former brick works is marked on the Ordnance Survey map of 1887, and is located 300m northwest of the church at Ufton (MWA7090).

2.1.19 The Grand Union Canal runs immediately north of the site along the boundary. There are multiple records associated with the canal, including a former WWII pillbox on the south bank near Bascote and associated bridge modifications at Longhole Bridge, a second world war anti-tank road block, a double lock at Bascote Locks and a toll house (LBS092).

Survey Objectives

2.1.20 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2014). The stated aims include the following:

- To conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- To clarify the presence/absence and extent of any buried archaeological remains within the site;
- To determine the general nature of the remains present.
- To combine the results of the geophysical surveys with data from other archaeological assessments carried out as part of the project in order to analyse the archaeological potential of the survey locations

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

Methods

Survey Dates

2.1.22 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team between the 28th January and 3rd February 2015.

Grid Location

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

2.1.24 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

2.1.25 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 (English Heritage 2008).

2.1.26 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

2.1.27 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) 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 data, with no interpolation applied.

2.1.28 Further details of the geophysical and survey equipment, methods and processing are described in Annex 1.

Data Presentation

2.1.29 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

2.1.30 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1500.

Results

2.1.31 The gradiometer survey has been successful in identifying anomalies of possible archaeological interest, along with numerous trends. The results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1500 (Figures 2 to 7).

2.1.32 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 4 and Figure 7). Full definitions of the interpretation terms used in this report are provided in Annex 2.

2.1.33 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.

Interpretation: Archaeology

2.1.34 A few oval and sub-oval anomalies identified at 4000 and 4001 comprise pit type responses. Though they are dispersed without any particular pattern or distribution they are interpreted as possible archaeology (see Figure 4 and Figure 7).

2.1.35 Large areas of this field contain interconnecting linear bipolar anomalies which are typical responses for ceramic field drains. These can be seen around 4002 and 4003 and between 4004 and 4006. They make up a large complex of drains contained within the current field boundaries and are presumed to be of modern date.

2.1.36 Ploughing trends are visible predominantly at 4005 and 4006 as weak, regularly spaced, repeating linear positive anomalies oriented primarily in a northeast-southwest direction. They are presumed to of modern origin.

2.1.37 An irregular shaped area of increased magnetic response containing several pit-type positive anomalies with a magnetic strength of between +1 and +3nT has been identified at 4008 (see Figure 7). The largest and strongest positive anomaly has been classed as archaeology whereas the remaining pit-type anomalies, due to their weaker response and irregular shape, have all been classed as possible archaeology. As the pit type anomalies and area of increased magnetic response is discrete and defined and is not thought to be natural in origin, particularly as no other anomalies of this type occur elsewhere on the Site.

2.1.38 Across this field are several widely spaced, positive linear and curvilinear anomalies that are possibly the remains of ridge and furrow. They can be seen in three different orientations at 4009 to 4012 and follow the natural contours of the hill. The highest point of this field is approximately at the location of the ferrous area at 4013.

2.1.39 A larger circular area containing numerous ferrous anomalies at 4013 correlates with a crater within the field that is visible in available satellite imagery prior to 2006 and still visible in the LiDAR data (Wessex Archaeology 2013). The ferrous signals could be the result of back filling the depression with debris containing ferrous and ceramic material. Though the backfilling of the area appears to have occurred after 2006 the original depression itself may relate to earlier quarrying or agricultural activity such as a pond.

2.1.40 An intermittent linear series of ferrous anomalies and a trend of uncertain origins visible at 4010 oriented north-east to south-west and a second area of ferrous anomalies at 4009 on a similar orientation may represent a former field subdivision.

2.1.41 There are several weak linear and curvilinear trends across the Site do not appear to form any regular patterns or distributions in relation to themselves or other anomalies and as such they cannot be characterised further and have been classed as of uncertain origin.

Interpretation: Modern Services

2.1.42 Two modern services have been identified in the survey area at 4007 /4014 and 4015. They extend across the Site and continue outside of the survey area.

2.1.43 Gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

2.1.44 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest within the Site, along with a larger area of ridge and furrow, numerous ploughing trends and a complex of field drains. The anomalies of possible archaeological interest comprise an area of increased magnetic response containing several possible pit-type features and some further dispersed pits elsewhere.

Discussion

2.1.45 The main anomalies of interest are the possible pit-type anomalies around 4000 and 4001 and the area of increased magnetic response containing several pit-type anomalies at 4008. The possible feature at 4008 is in an area that does not have any identified ridge and furrow remains; rather it is surrounded by such anomalies. Whether the feature pre or post-dates the ridge and furrow anomalies cannot be ascertained from the gradiometer data alone, as the disappearance of the ridge and furrow response could also be due to a change in the superficial geology. The area of increased magnetic response is irregular in shape but still defined and although some of the weaker contrasting pit-type anomalies could also be in response to natural features such as superficial geology or tree-throws. However, the latter interpretation is thought to be unlikely as no other such anomalies have been identified elsewhere across the Site.

2.1.46 The possible internal field boundary at 4009 and 4010 is not visible on present or historic OS mapping which could indicate a 19th century or earlier date, however a temporary fence or subdivision may not be depicted (Ordnance Survey 1887, 1905, 1960-1972).

2.1.47 Few anomalies of archaeological interest apart from some possible pits have been identified in the northern part of the Site.

2.1.48 The modern services at 4007, 4014 and 4015 truncate the ceramic field drain complex and areas of ridge and furrow.

2.1.49 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

English Heritage, 2008. Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition

HS2 Environmental Statement, 2013. London-West Midlands Environmental Statement, Volume 5: Technical Appendices: CFA16: Ladbroke and Southam Baseline Report: Cultural Heritage. Report Reference: CH-001-016

Ordnance Survey, 1887. OS County Series: Warwickshire 1:2500

Ordnance Survey, 1905. OS County Series: Warwickshire 1:2500

Ordnance Survey 1957. Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington

Ordnance Survey, 1960-1972. OS Plan: Warwickshire 1:2500

Ordnance Survey, 1977. Quaternary Map of the United Kingdom: South. Ordnance Survey. Southampton

Soil Survey of England and Wales, 1983. Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Wessex Archaeology, 2013. HS2 Community Forum Area 16 (Ladbroke and Southam): Hyperspectral and LiDAR Analysis Report Reference 86252.01

Wessex Archaeology, 2014. HS2: Geophysical Survey Written Scheme of Investigation: Warwickshire. Report Reference: 86257.01.

HER Records Consulted

HWA8816 – Historic Landscape Characterisation: Large Irregular Fields

LBS 079 – Ufton Historic Settlement

LBS 082 – Ufton and Long Itchington Woods

LBS 083 – Ufton/Long Itchington Parish boundary

LBS 084 – Wood Farm cropmark enclosures

LBS 092 – The Grand Union Canal including Bascote Locks, Bascote Toll House, anti-tank road block and WWII bridge modifications

MWA 827 - Site of Brick Kiln 400m NW of Ufton Church

MWA 828 - Site of Lime Kiln 800m N of Church

MWA 7090 - Brickworks at Brickyard Cottage

Pastscape 1528168, Warwickshire

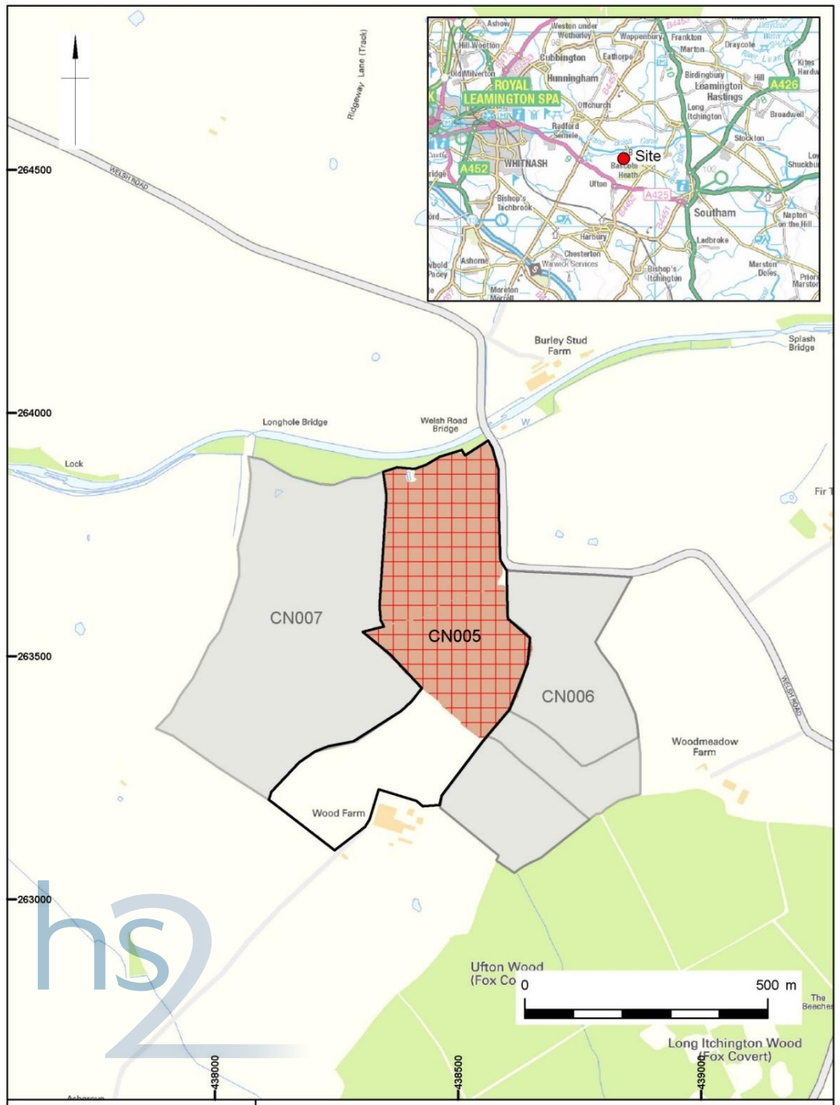
Pastscape 1528220, Warwickshire

Pastscape 1528249, Warwickshire

Pastscape 1531887, Warwickshire

2.2 Figures

Figure 1: CN005 Site location



Site location Figure 1

Figure 2: CN005 Greyscale plot (north)

Greyscale plot (north)

Figure 2

Figure 3: CN005 XY trace (north)

XY trace (north)

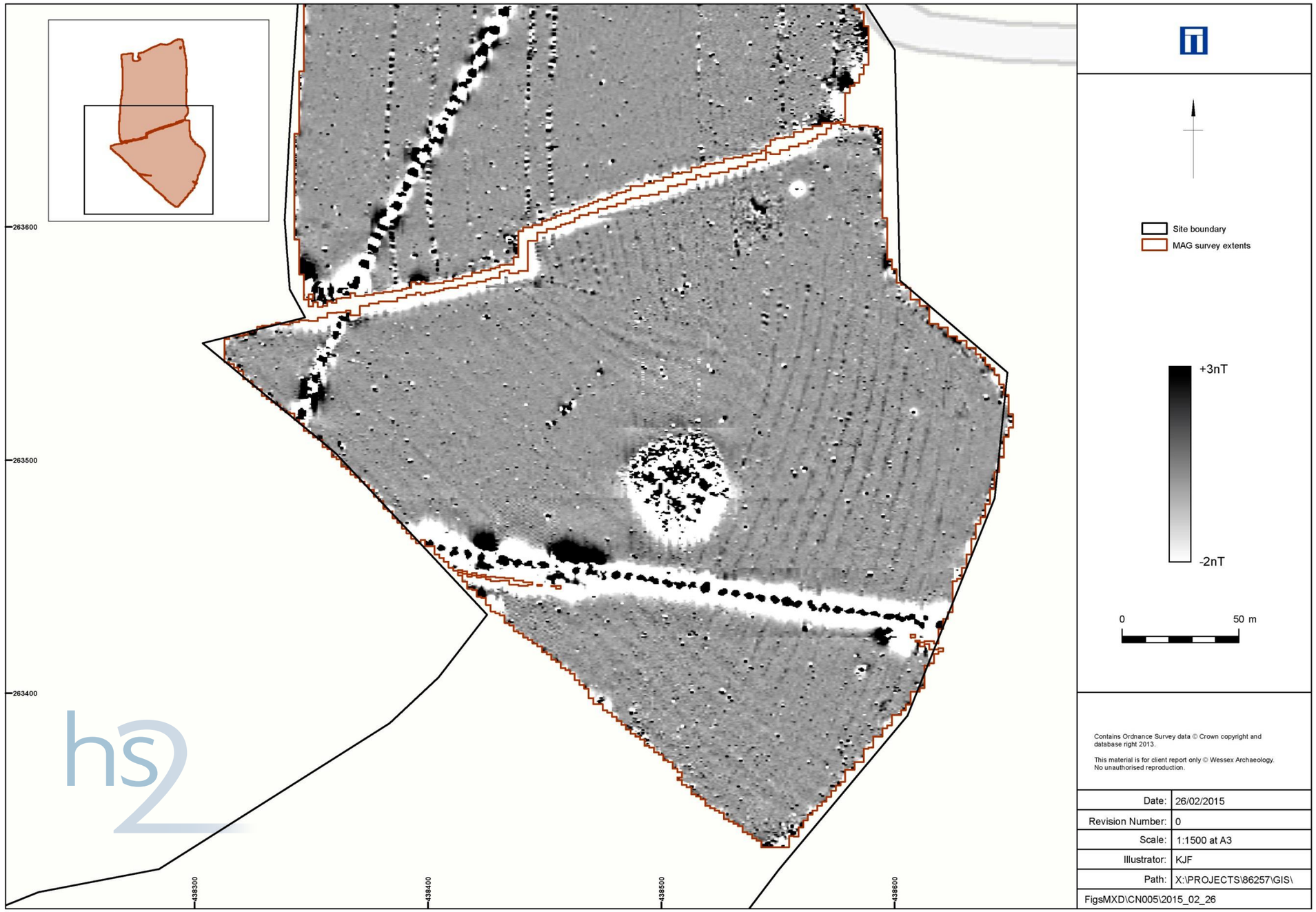
Figure 3

Figure 4: CN005 Interpretation (north)

Interpretation (north)

Figure 4

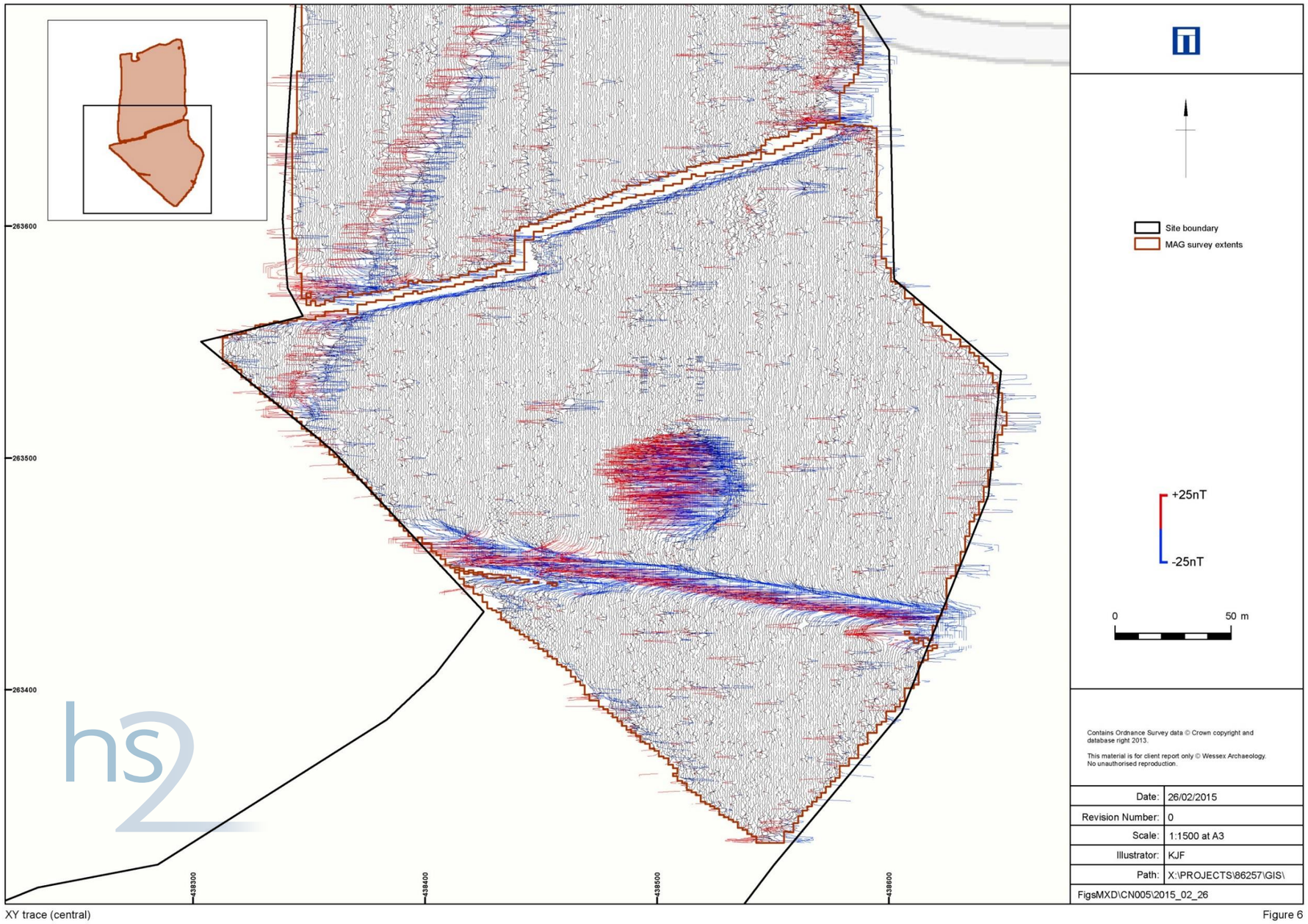
Figure 5: CN005 Greyscale plot (central)



Greyscale plot (central)

Figure 5

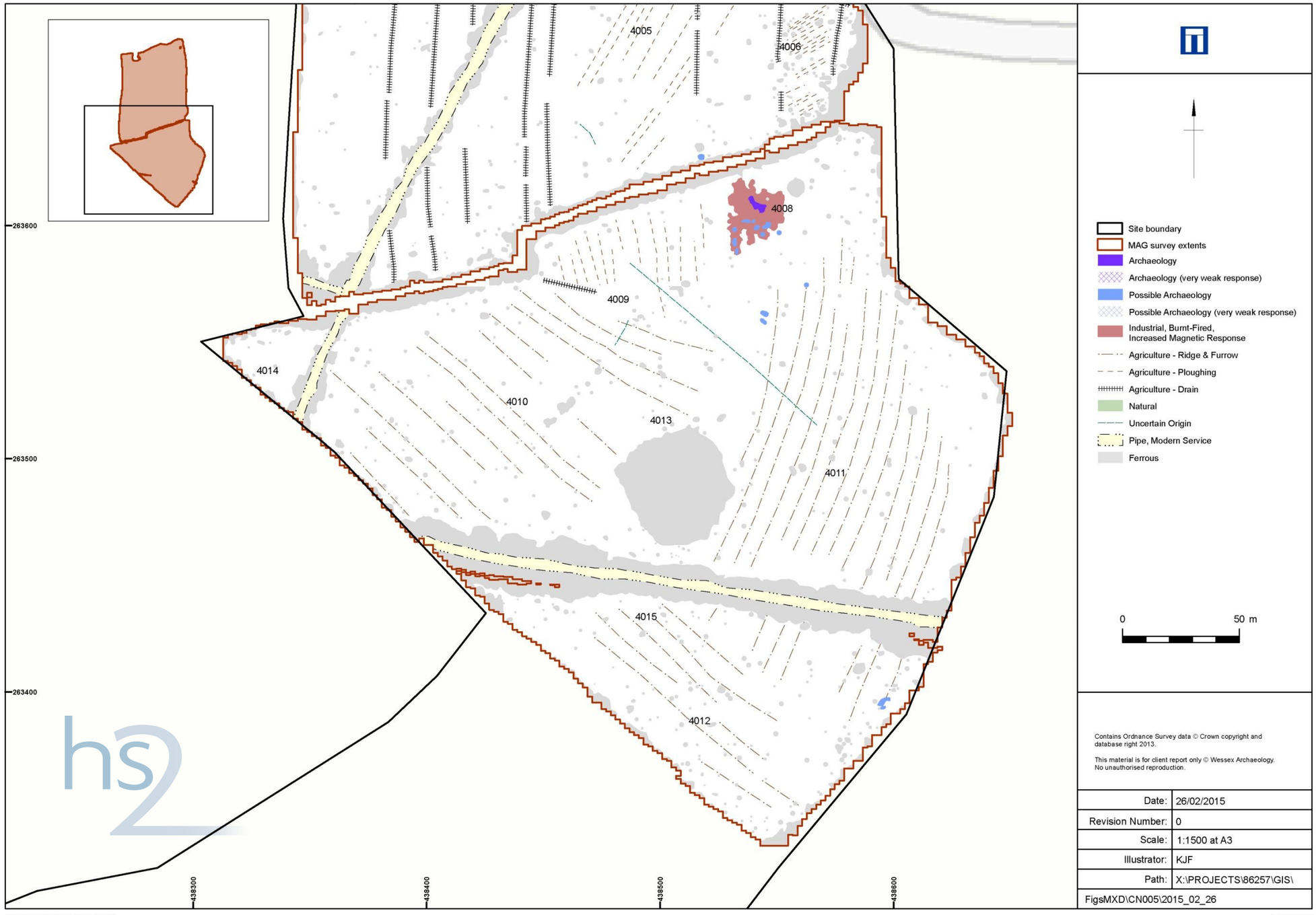
Figure 6: CN005 XY trace (central)



XY trace (central)

Figure 6

Figure 7: CN005 Interpretation (central)



Interpretation (central)

Figure 7

2.3 CN006, land north of Ufton Wood

Project Background

2.3.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2 Limited, to carry out a geophysical survey of area CN006 off Welsh Road, near Ufton, Warwickshire (Figure 8), hereafter "the Site" (NGR 438727 263274). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

2.3.2 The geophysical survey undertaken here has been preceded by a Desk-Based Assessment (HS2 Environmental Statement 2013) and a remote sensing survey comprising LiDAR and hyperspectral survey and analysis (Wessex Archaeology 2013). Geophysical survey areas have been identified based on the archaeological potential and conclusions identified in these reports.

2.3.3 The Site CN006 was selected for geophysical survey as it is considered to be an area at medium risk with known cropmarks and it will be an area of major construction works.

Site details

2.3.4 The Site is comprised of three fields located approximately 1.5km north-east of Ufton, Warwickshire. The site is bounded to the north by Welsh Road, to the west and east by hedgerow field boundaries, and to the south by Long Itchington Wood and Ufton Wood. The gradiometer survey covered 9.4ha of the 14.8ha site; some areas were not accessible at the time of the survey which accounts for the reduced coverage.

2.3.5 The Site lies on an area of gently sloping land that falls away towards the north-west. The south-east region of the survey area lies at a height of 83m aOD (above Ordnance Datum) and falls from this height to less than 74m aOD to the north-east of the Site. The highest ground in the area at approximately 110m aOD is adjacent to the south-east of the Site at Long Itchington Wood.

2.3.6 The solid geology is recorded as an area containing Arden Sandstone and Mercia Mudstone Formation (Triassic) to the north-west with interbedded argillaceous rock and limestone of the Penarth Group Formation to the south-west (Ordnance Survey 1957). There are no superficial deposits recorded on Site but close by are head deposits of clay, silt, sand and gravel and Dunsmore Gravel sands and gravels at Ufton (Ordnance Survey 1977).

2.3.7 To the north-west the soils underlying the Site are likely to be pelo-stagnogley soils of the 712b (Denchworth) association with deposits of typical argillic pelosols of the 431 (Worcester) association and to the south-east typical calcareous pelosols of the 411a (Evesham 1) association (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.

Archaeological background

2.3.8 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant Desk-Based Assessment should be consulted (HS2 Environmental Statement 2013). A summary of relevant sites within 1km of the survey area are summarised below and have been included to provide context and inform the geophysical interpretation. Sites referred to can be found either within the gazetteer for CFA 18 in the Environmental Statement (STN numbers) in the supplementary survey works (WA numbers) or in the Warwickshire SMR (MWA numbers). Sites referred to can be found either within the gazetteer for CFA 16 in the Environmental Statement (LBS numbers) in the supplementary survey works (WA numbers) or in the Warwickshire SMR (MWA numbers). A small number can also be found on the English Heritage Pastscape database (http://www.pastscape.org.uk/)

2.3.9 The current landscape is characterised as large rectilinear fields with straight and curvilinear boundaries, possibly planned enclosure, and the area may once have formed woodland (LBS101).

2.3.10 Remote sensing revealed several features within the vicinity primarily areas of ridge and furrow (Wessex Archaeology 2013: Feature WA1.59) showing different ploughing regimes. In Long Itchington and Ufton Woods were identified a series of substantial boundaries comprising banks with ditches on either side (WA1.57) and less substantial linear features likely to represent former boundaries or drainage features (WA1.58).

2.3.11 Within the Site boundary are recorded two possible enclosures of unknown date, which are visible as cropmarks on aerial photographs (LBS084). They are located 100m north-east of Wood Farm, Ufton and 200m north of Ufton Wood and the area of the cropmarks covers the west and south-west of the Site.

2.3.12 Bordering the southern boundary of the Site is an area of woodland within which is located the site of the parish boundary between Ufton and Long Itchington dating to the early medieval period. An ancient charter boundary relating to Long Itchington records it at this location (LBS083) with the possibility of an earthen bank delimiting the parish boundary.

2.3.13 To the west of the Site are two features, both recorded as probably medieval or post-medieval mounds or spoil heaps. One is visible as a cropmark on aerial photographs taken in 1945 and 1996, though it appears to be reduced in size on aerial photographs taken in 2006. The site comprises a circular mound (PastScape ID 1528220). The second site comprises a sub-circular mound which measures 37m in diameter. The site superficially resembles a ploughed out round barrow, but it appears to be on the top of ridge and furrow (PastScape ID 1528249).

2.3.14 The village of Ufton to the south-west of the Site was a medieval settlement (LBS079) with a possible deserted medieval settlement 200m south-west of the church at Ufton and remains of buildings and ridge and furrow recorded 500m south of the church at Ufton (LBS079). This potentially indicates that the medieval settlement was covering a larger area than the current modern settlement.

2.3.15 The Site lies between two medieval settlements at Ufton to the south-west and Long Itchington to the north-east and several of the records in and around the Site relate to medieval activity, particularly agricultural activity as demonstrated by the presence of ridge and furrow. The concentration of medieval records with some dating to early medieval and with the possibility of Saxon sites in the area as well suggests that the origins of the medieval settlements could be even earlier.

2.3.16 Approximately 500m to the east is a partly dispersed, partly contiguous area of medieval or post-medieval ridge and furrow is visible as earthworks on photographs taken in the 1940s, though about two thirds of it has been levelled on aerial photographs taken in the 1990s (PastScape ID 1528168). There is a second record of a partly dispersed, partly contiguous area of medieval or post-medieval ridge and furrow approximately 750m to the south-west of the Site bordering on Ufton Wood (PastScape ID 1531887).

2.3.17 To the south-west of the Site between Ufton Wood and the outskirts of Ufton are three industrial sites all dating to the mid-18th century to early 20th century. Approximately 400m NW of Ufton Church documentary evidence suggests that this is the site of a brick kiln used for making bricks during the Imperial period (MWA827). A lime kiln 800N of Ufton Church, with documentary evidence suggesting that this is the site of a lime kiln dating to the Imperial period and there is extensive evidence of quarrying within the field between here and the church at Ufton (MWA828). Thirdly brickworks at Brickyard Cottage where bricks were made during the Imperial period. They are marked on the Ordnance Survey map of 1885, and were located 300m northwest of the church at Ufton (MWA7090).

2.3.18 The Grand Union Canal runs approximately 300m to the north of the Site and there are various records associated with it such as a double lock at Bascote Locks, a toll house (LBS092), and a second world war anti-tank road block (MWA8097) and pillbox located on the bank of the south side of the Grand Union Canal near Bascote, adjacent to Longhole Bridge (PastScape ID 1417804).

Survey Objectives

2.3.19 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2014). The stated aims include the following:

- To conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- To clarify the presence/absence and extent of any buried archaeological remains within the site;
- To determine the general nature of the remains present.
- To combine the results of the geophysical surveys with data from other archaeological assessments carried out as part of the project in order to analyse the archaeological potential of the survey locations

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

Methods

Survey Dates

2.3.21 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team between the 19th and the 21st November 2014.

Grid Location

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

2.3.23 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

2.3.24 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 (English Heritage 2008).

2.3.25 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

2.3.26 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) 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 data, with no interpolation applied.

2.3.27 Further details of the geophysical and survey equipment, methods and processing are described in Annex 1.

Data Presentation

2.3.28 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

2.3.29 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1500.

Results

2.3.30 The gradiometer survey has been successful in identifying anomalies of likely and possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1500 (Figures 9 to 14).

2.3.31 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figures 11 and 14). Full definitions of the interpretation terms used in this report are provided in Annex 2.

2.3.32 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.

Interpretation: Archaeology

2.3.33 Few anomalies of archaeological interest have been identified across the survey area with a concentration of possible features along the southern and western survey boundaries. The main area of interest is at 4011 where a weakly positive U-shaped curvilinear anomaly has

been identified and interpreted as archaeology, providing a very weak geophysical response. It is possibly an enclosure ditch with the enclosed area measuring approximately 22 x 25m. To the north-east at 4012 are two weakly positive linear features that are possibly further sections of ditch. Stronger ploughing trends cross the enclosure ditch anomaly at 4011 and two areas of broad and weakly positive magnetic values adjacent to 4011 are identified as natural in origin.

2.3.34 At 4002 a weakly positive linear anomaly approximately 15m in length represents a cut feature such as a ditch with a further linear at a perpendicular angle at 4003, they are possibly related and part of the same feature. The linear anomalies do not run parallel to any known current field boundaries and (if related) could be another enclosure in this area of the Site.

2.3.35 At 4004 a weakly positive L-shaped linear and a further linear at 4005 could possibly represent cut features and are possibly part of an enclosure. As well as the ditch-like linear anomalies there are a few small oval shaped positive anomalies that could represent pits however they do not form any significant concentration or distribution either by themselves or within and around the possible enclosures at 4011 or 4002-4005.

2.3.36 Elsewhere one pit-like feature is visible at 4000 and to the north-west of 4000 are several oval and sub-oval weakly positive anomalies and one linear section of weakly positive magnetic anomaly. They are interpreted as possible archaeology (weak response) and could represent cut features such as pits, with the linear anomaly possibly a surviving section of ditch. They do not form a regular pattern or distribution and they lie within an overall larger region of increased magnetic response.

2.3.37 A short L-shaped section of weakly positive magnetic anomaly at 4001 lies approximately 15-20m south of the anomaly at 4000 interpreted as possible archaeology. It is possibly archaeological in origin and a cut feature but due to its weak magnetic values along its length it is a tentative interpretation.

2.3.38 Further to the intermittent linear anomaly at 4003 (described above in association with 4002) are three separate roughly linear/curvilinear weak positive anomalies to the east of 4003. They are similar in response to the anomalies at 4001 and at 4003 and have been interpreted as possible archaeology (very weak response). They could represent cut features such as a ditch but their association with each other is unknown. The anomalies do not form a regular pattern such as forming an enclosure which could relate them to each other. Surrounding the linear/curvilinear anomalies are numerous linear and curvilinear trends of uncertain origin. They criss-cross each other and do not form a regular distribution or pattern.

2.3.39 There are few anomalies of interest at 4006 aside from a few small oval shaped anomalies of possible archaeological interest (very weak response) that could be cut features such as pits or postholes, a number of these are present across the Site such as at 4013 and are interpreted in the same manner. They are irregular in their distribution and they do not show a particular concentration to aid further characterisation.

2.3.40 There are numerous linear trends visible across the Site such as at 4007 which are interpreted as ploughing trends and are considered to be relatively modern in date. In the larger field to the west the trends are orientated north-west to south-east and in the field to the east the trends are orientated north-east to south-west. The trends are especially visible at 4009 and 4016. There are a series of field drain responses at 4017 oriented north-east to south-west and another ceramic field drain is present at 4008 represented by a linear series of bipolar anomalies.

2.3.41 Around 4010 are at least four elongated, weakly positive, broad responses; these have been interpreted as natural or geological in origin and possibly represent deposits of weakly magnetic sediment. Similar anomalies can also be seen near 4011 and 4012.

2.3.42 Across the Site around 4015, 4001, 4007 and 4019, is a large, linear, broad but well-defined area interpreted as an area of increased magnetic response. It is characterised by numerous distinct ferrous dipolar anomalies in much larger concentrations than over the rest of the Site. While they have been interpreted as ferrous and modern debris there is the possibility that they could be geological in origin, there are head deposits recorded in the adjacent field to the north-east of the Site and this area of response could be a continuation of those deposits.

2.3.43 Two modern services are visible at 4018, 4019. These anomalies are discussed below.

Interpretation: Modern Services

2.3.44 There are two modern services identified in the data at 4018 and 4019, both services run parallel to each other in an approximate north-west to south-east orientation.

2.3.45 It is not clear from the geophysical data whether the services identified are in active use or not. Also gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

2.3.46 The detailed gradiometer survey has been successful in detecting anomalies of likely and possible archaeological interest within the Site, in addition to regions of increased magnetic response, ceramic field drains, numerous trends of uncertain and origin and ploughing trends.

Discussion

2.3.47 Potential ditches, possibly former enclosure ditches, have been identified primarily in the southern and eastern areas of the Site at 4002 to 4006 and 4011 to 4012 near the present field boundary with Ufton and Long Itchington Woods. Elsewhere are visible a few pit-like features, as at 4000 and 4013, but they are random in distribution and do not form particular clusters or patterns of significance.

2.3.48 The Site was targeted because of two possible enclosures recorded 100m north-east of Wood Farm, the possible ditched enclosures identified in this report from the gradiometer data lie just outside the polygonised area recorded on the HER database (MWA6788). Either the same enclosures are being identified but there is discrepancy in their location when being transcribed from aerial photographs or there are more enclosures than previously seen. From the gradiometer data there are four possible areas containing ditch-like anomalies interpreted either as archaeology or as possible archaeology at 4011, 4012, 4002-4003 and 4004-4005.

2.3.49 The other significant feature of the Site is the presence of ridge and furrow across the south-westernmost field around 4016. The weakly positive linear anomalies are regularly spaced approximately 7m apart and oriented north-west to south-east, running parallel to the current field boundaries. This possibly dates these boundaries to a similar period as a charter boundary recorded in the woods adjacent (MWA8889). The ridge and furrow anomalies within this field are not visible in the LiDAR data but there are two ridge and furrow areas adjacent to the Site. When the ridge and furrow in the gradiometer data is compared to the ridge and

furrow visible in the LiDAR data it can be seen that they are of comparable spacing but that all three areas of ridge and furrow are oriented in different directions. Ridge and furrow crosses the possible U-shaped enclosure ditch at 4011.

2.3.50 Lastly of note is the very large expanse of dipolar anomalies around 4014-4015, 4001 and 4018-4019 and orientated SW-NE across three fields. It is interpreted as a broad band of increased magnetic response containing numerous anomalies of ferrous response and could represent a spread of debris. However due to its size and orientation and the fact that it is well defined as to its extents it could also represent a natural feature such as a band of sands and gravels which would also exhibit similar dipolar responses. Incidentally part of this large anomaly is in the area where the cropmarks were identified.

2.3.51 Ceramic field drains are present in the north-east field which is also around the location of the two modern services identified. The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies. It is difficult to estimate the depth of burial of the services through

2.3.52 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

English Heritage, 2008. Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition

HS2 Environmental Statement, 2013. London-West Midlands Environmental Statement, Volume 5: Technical Appendices: CFA16: Ladbroke and Southam Baseline Report: Cultural Heritage. Report Reference: CH-001-016

Ordnance Survey, 1957. Sheet 2, Geological Map of Great Britain. England and Wales: Ordnance Survey: Chessington

Ordnance Survey, 1977. Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton

Soil Survey of England and Wales, 1983. Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Wessex Archaeology, 2013. LiDAR and Hyperspectral Analysis Report Reference 86252.01

Wessex Archaeology, 2014. HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86257.01.

HER Records Consulted

HWA8820 - Historic Landscape Characterisation: Large rectilinear fields with straight and curvilinear boundaries, possibly planned enclosure. This area may once have formed woodland.

MWA6788 - Possible enclosures 100m NE of Wood Farm, Ufton

MWA8889 - Ancient charter boundary relating to Long Itchington, the site of the parish boundary between Ufton and Long Itchington Wood

MWA827 - Site of Brick Kiln 400m NW of Ufton Church

MWA828 - Site of Lime Kiln 800N of Church and there is extensive evidence of quarrying within the field which is located 100m north of the church at Ufton.

MWA7090 - Brickworks at Brickyard Cottage300m northwest of the church at Ufton.

MWA9538 - medieval settlement of Ufton

MWA7542 - remains of buildings and ridge and furrow, medieval in date, 500m south of church at Ufton

MWA 6224 - possible deserted medieval settlement 200m south-west of church at Ufton

MWA4304 - Bascote Locks, double lock

MWA4319 - toll house over Grand Union Canal

MWA8097 - WWII anti-tank road block

PastScape ID 1528220 - a probably Medieval or Post Medieval mound or spoil heap visible as a cropmark

PastScape ID 1528249 - a probably Medieval or Post Medieval mound or spoil heap is visible as a cropmark on aerial photographs. The site comprises a sub-circular mound which measure 37m in diameter. The site superficially resembles a ploughed out round barrow, but it appears to be on the top of ridge and furrow.

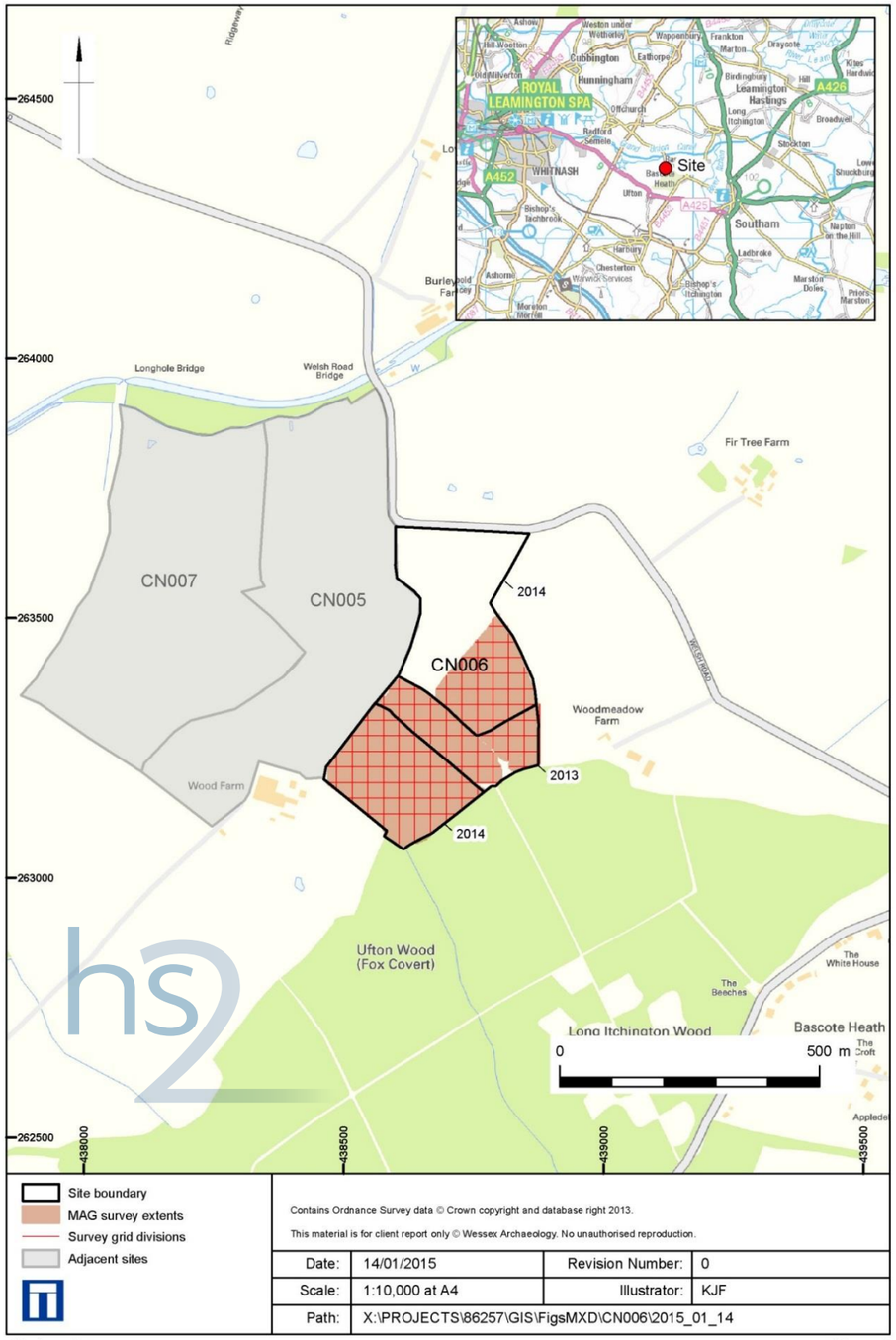
PastScape ID 1528168 - A partly dispersed, partly contiguous area of Medieval or Post Medieval ridge and furrow

PastScape ID 1417804 - Second World War Pillbox 1940-1941

PastScape ID 1531887, A partly dispersed, partly contiguous area of Medieval or Post Medieval ridge and furrow

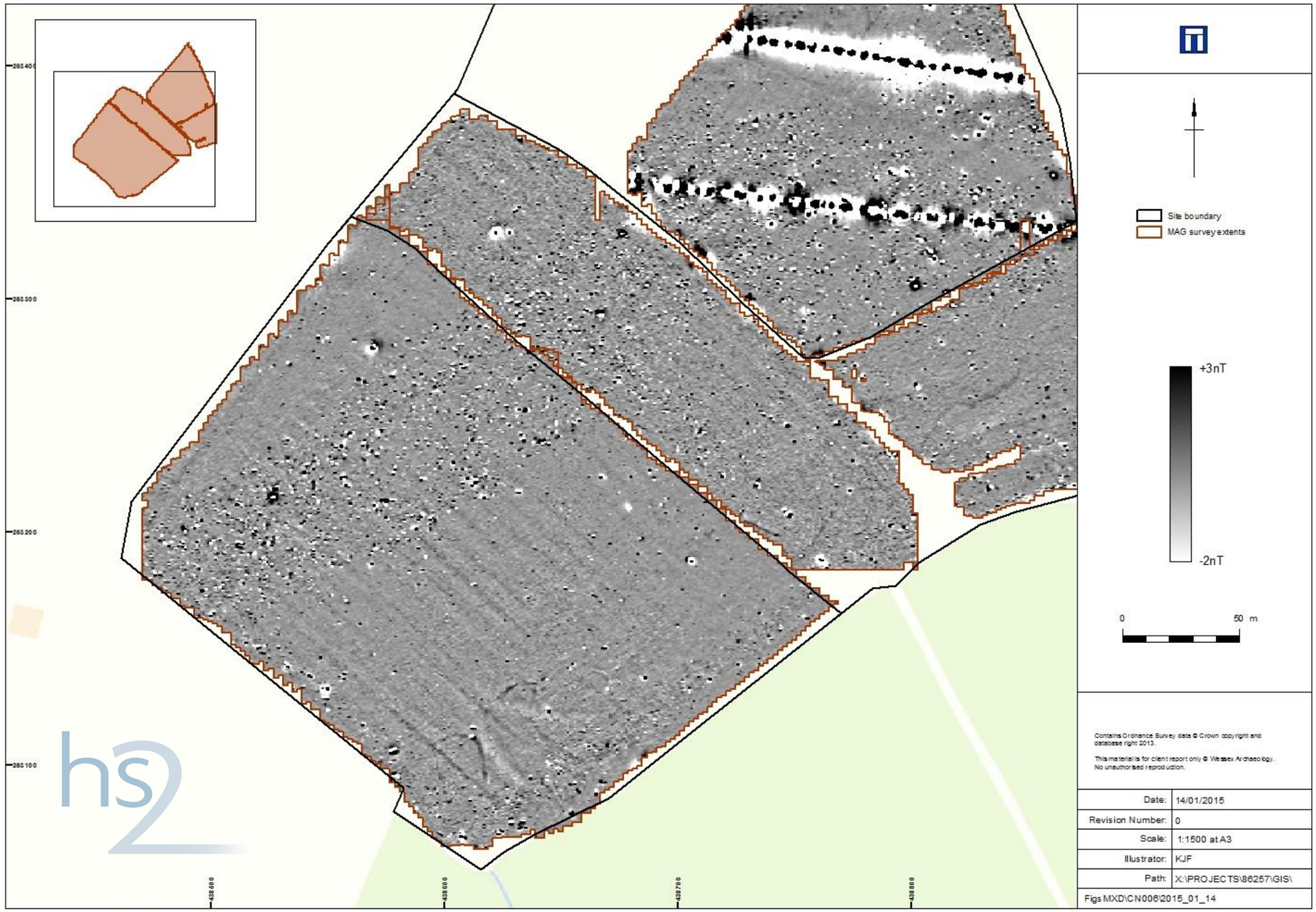
Figures

Figure 8: CN006 Site location



Site location Figure 8

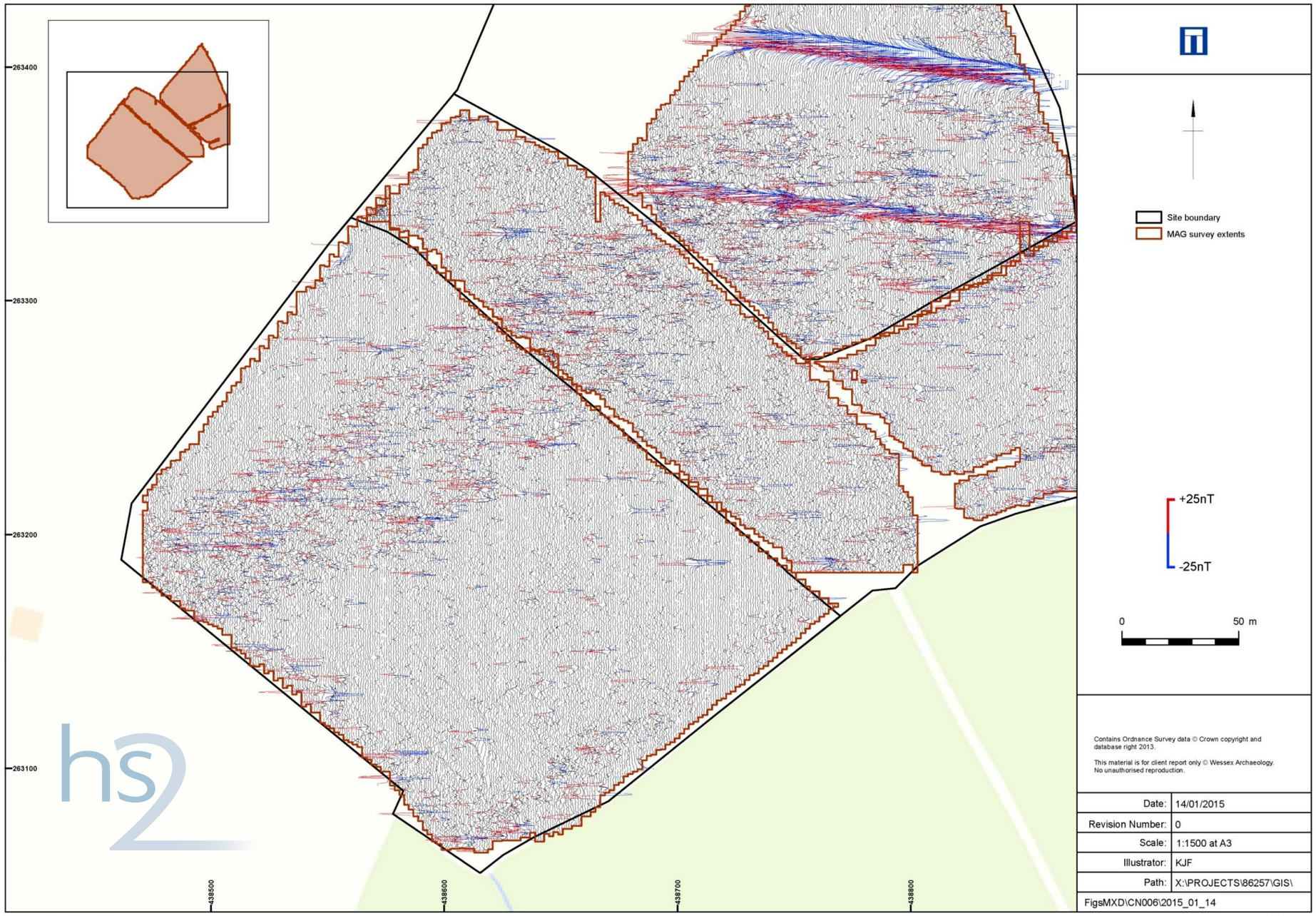
Figure 9: CN006 Greyscale plot: South-west



Greyscale plot (south-west)

Figure 9

Figure 10: CN006 XY trace: South-west



XY trace (south-west)

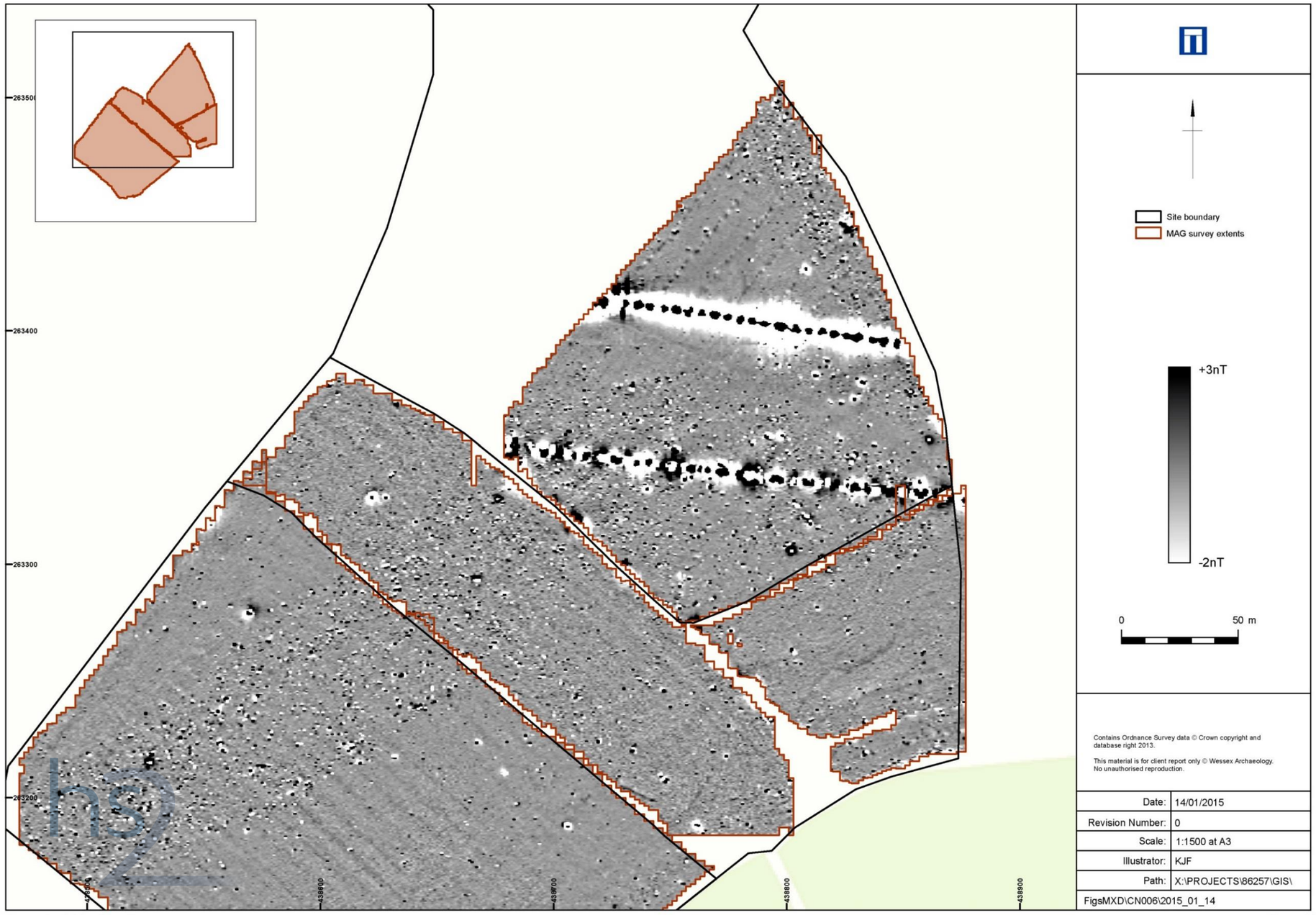
Figure 10

Figure 11: CN006 Interpretation: South-west

Interpretation (south-west)

Figure 11

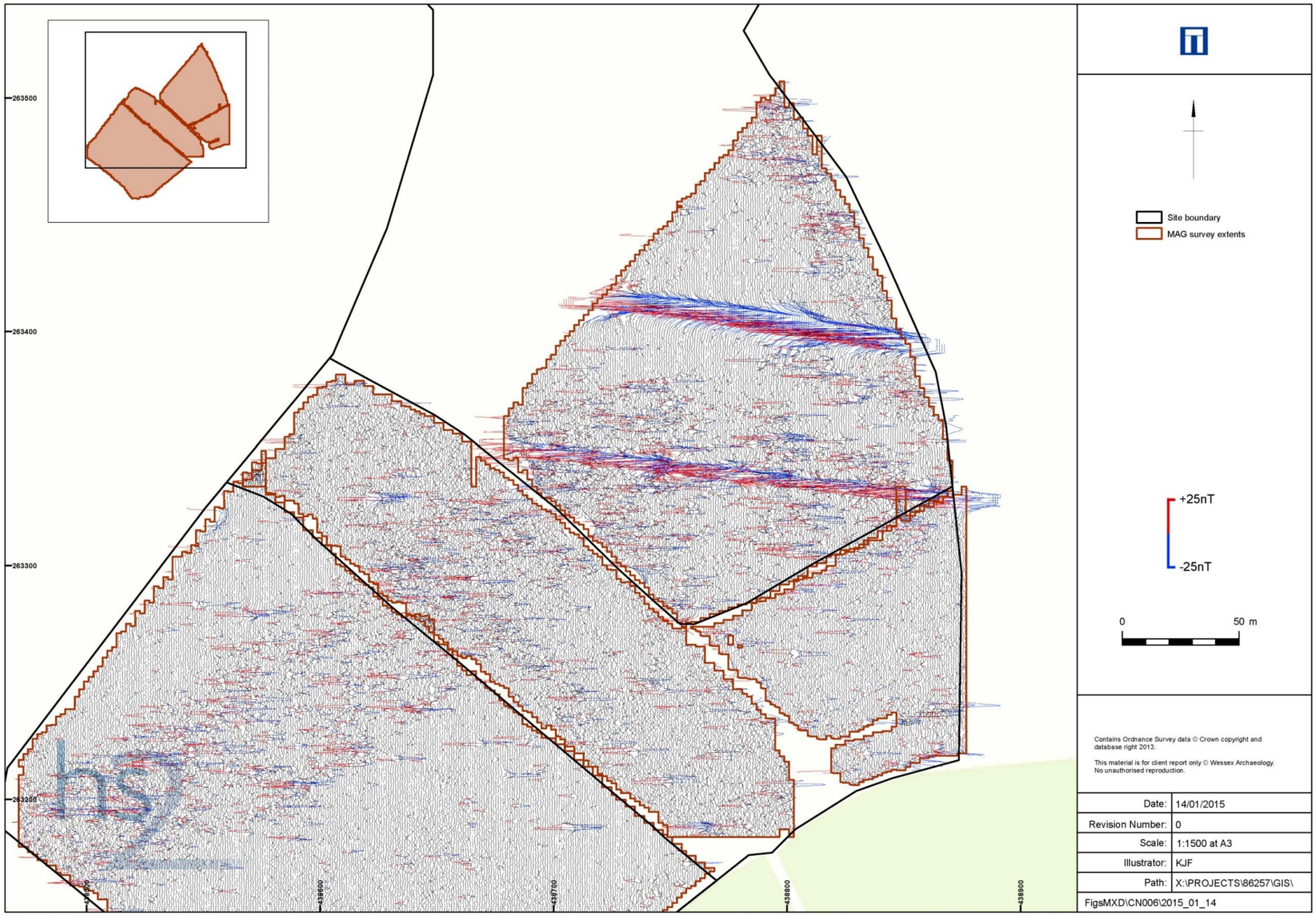
Figure 12: CN006 Greyscale plot: North-east



Greyscale plot (north-east)

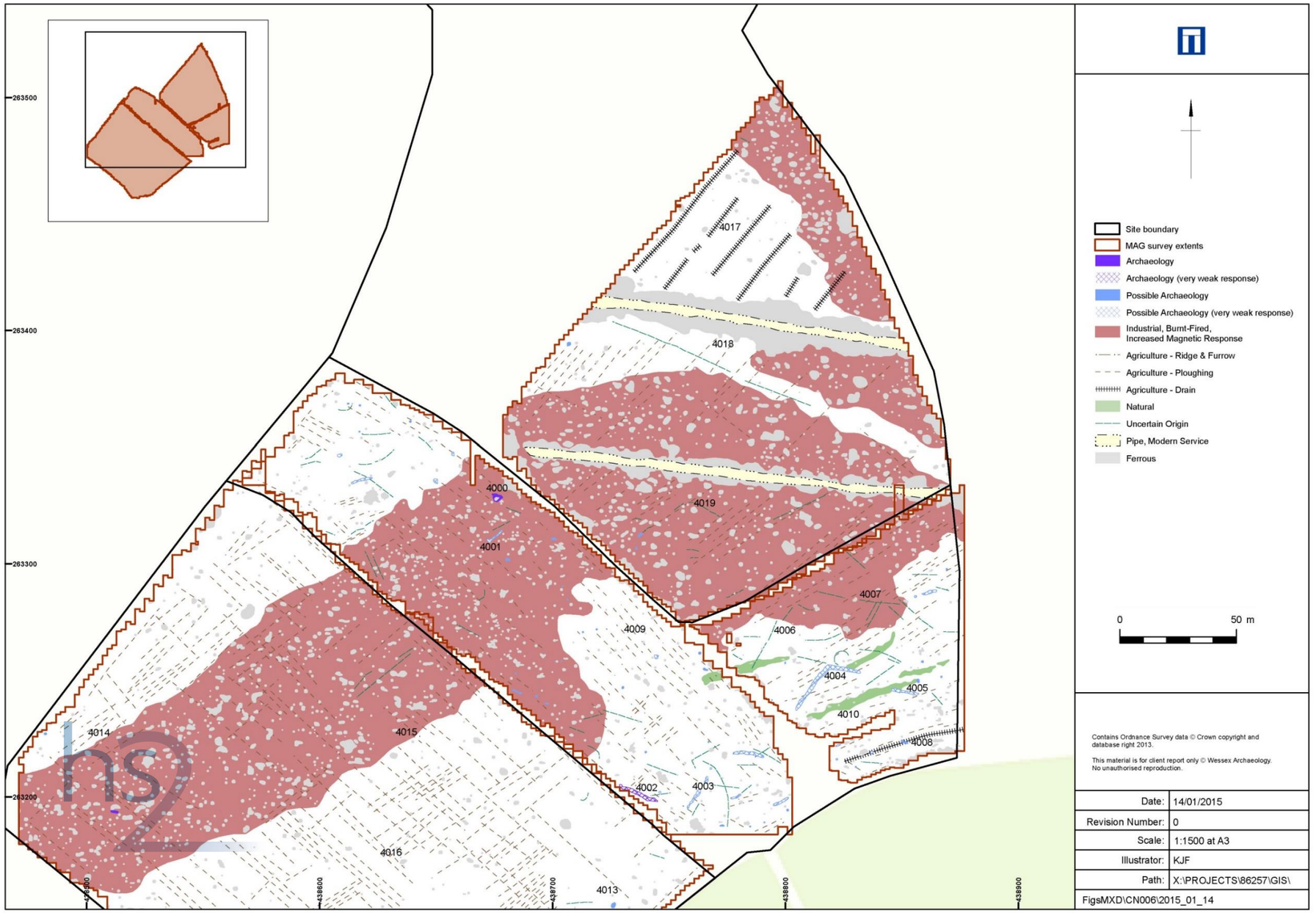
Figure 12

Figure 13: CN006 XY trace: North-east



XY trace (north-east) Figure 13

Figure 14: CN006 Interpretation: North-east



Interpretation (north-east)

Figure 14

2.4 CN007, land north of Wood Farm

Project background

2.4.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN007 off Welsh Road, near Ufton, Warwickshire (Figure 15), hereafter "the Site" (centred on NGR 438182, 263521). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

2.4.2 The geophysical survey undertaken here has been preceded by a Desk-Based Assessment (HS2 Environmental Statement 2013) and a remote sensing survey comprising LiDAR and hyperspectral survey and analysis (Wessex Archaeology 2013). Geophysical survey areas have been identified based on the archaeological potential and conclusions identified in these reports.

2.4.3 This Site, CN007, was selected for geophysical survey as it is considered to be an area at medium risk with known cropmarks and it will be an area of major construction works.

Site Details

2.4.4 The site comprised two arable fields located approximately 1.3km north of Ufton, Warwickshire. The site is bounded to the north by a small wooded area and the Grand Union canal, to the east and south by hedgerows and to the west by hedgerows and a farm track. The gradiometer survey covered 20.1ha out of a proposed 20.9 ha with only a very small area lost due to the obstruction of a pond.

2.4.5 The Site lies on a north-west facing slope at a height of 81m aOD (above Ordnance Datum) and falls from this height to 64m aOD.

2.4.6 The solid geology is recorded as primarily Mercia Mudstone Formation (Early Triassic). Superficial deposits are primarily alluvium with a small area of head clay and silt formation recorded on the Site.

2.4.7 The soils underlying the majority of the Site are likely to be pelo-alluvial soils of the 813b (Fladbury) association to the north and to the south non-calcareous pelosols of the 431 (Worcester) association (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.

Archaeological Background

2.4.8 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant DBA should be consulted (Wessex Archaeology 2013). A summary of relevant sites within 1km of the survey area are summarised below and have been included to provide context and inform the geophysical interpretation. Sites referred to can be found either within the gazetteer for CFA 16 in the Environmental Statement (LBS numbers), in the English Heritage PastScape database (PastScape numbers), in the supplementary survey works (WA numbers) or in the Warwickshire SMR (MWA/HWA numbers).

2.4.9 The Site is characterised as post-war large and very large irregular fields.

2.4.10 Features and sites in the area are predominantly of medieval, post medieval and 20th century date. These relate to agricultural activity, local industrial activity and the Second World War defensive locations on the Grand Union Canal. Within the wider landscape, the Site lies between two medieval settlements of Ufton and Long Itchington. Findspots have been recorded at the villages of Neolithic, Bronze Age, Roman, and Anglo-Saxon/early medieval date.

2.4.11 To the southeast of the Site are recorded two possible enclosures detected on aerial photography 200m north of Ufton Wood. These are of unknown date and are both visible only as cropmarks (LBS084).

2.4.12 Ufton, to the south of the Site was a medieval settlement with remnant ridge and furrow and building remains recorded 500m south of the church at Ufton and a possible deserted medieval settlement recorded 200m southwest of the church (LBS079). This indicates the potential for medieval activity to cover a larger area than the current extents of the modern settlement.

2.4.13 An area of woodland approximately 700m south-east of the site is the parish boundary between Ufton and Long Itchington. An ancient charter documents a wood at this location with a possible earthen bank dating to the early medieval period (LBS082; LBS083).

2.4.14 West of the site are two features, recorded as possible medieval or post-medieval spoil heaps or mounds. One is visible only as a cropmark (PastScape ID 1528220) in aerial photography whilst the other comprises a sub-circular mound, 37m in diameter (PastScape ID 1528249).

2.4.15 Approximately 1km to the east is an area of partly dispersed, partly continuous medieval or post-medieval ridge and furrow as can be seen in historic aerial photography however the majority of this has since been levelled (PastScape ID 1528168). Similar features have been recorded 500m south of the site (PastScape ID 1531887).

2.4.16 To the south of the site between Ufton Wood and the outskirts of Ufton are three locations of imperial mid-18th to early 20th century industrial activity. Documentary evidence suggests that 400m NW of Ufton Church is a brick kiln (MWA827). A lime kiln with associated quarrying is recorded 800m N of the church (MWA828). Thirdly Brickyard Cottage, a former brick works is marked on the Ordnance Survey map of 1885, and is located 300m northwest of the church at Ufton (MWA7090).

2.4.17 The Grand Union Canal runs immediately north of the site along the boundary (LBS092). There are multiple records associated with the canal such as a former WWII pillbox on the south bank near Bascote and associated bridge modifications at Longhole Bridge, a WWII anti-tank road block, a double lock at Bascote Locks and a toll house.

Survey Objectives

2.4.18 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2014). The stated aims include the following:

- To conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- To clarify the presence/absence and extent of any buried archaeological remains within the site;
- To determine the general nature of the remains present.

- To combine the results of the geophysical surveys with data from other archaeological assessments carried out as part of the project in order to analyse the archaeological potential of the survey locations

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

Methods

Survey Dates

2.4.20 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team between the 20th and 2nd February January 2015.

Grid Location

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

2.4.22 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

2.4.23 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 (English Heritage 2008).

2.4.24 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

2.4.25 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) 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 data, with no interpolation applied.

2.4.26 Further details of the geophysical and survey equipment, methods and processing are described in Annex 1.

Data Presentation

2.4.27 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

2.4.28 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1500.

Results

2.4.29 The gradiometer survey has been successful in identifying anomalies of possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1500 (Figures 16 to 21).

2.4.30 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 18 and Figure 21). Full definitions of the interpretation terms used in this report are provided in Annex 2.

2.4.31 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.

Interpretation: Archaeology

2.4.32 Only a few and isolated pit type anomalies have been identified, such as at 4000, and these take the form of sub-oval positive anomalies. They do not form any regular pattern or distribution and have been interpreted as possibly archaeology. They could represent pits or could be natural in origin such as changes in the superficial geology or tree throws.

2.4.33 There are numerous repeating, regularly spaced, linear bipolar anomalies that are typical of the response from ceramic field drains. They are present as interconnecting linear anomalies in the top half of the field.

2.4.34 A strong, positive linear anomaly at 4002 extends across the field in an approximately northwest to southeast orientation bisecting the field and is interpreted as a ditch. The anomaly has a magnetic strength in excess of +5nT which suggest that it is filled in with magnetically enhanced material and it is possibly a former field boundary.

2.4.35 A small area at 4003 contains a few weakly contrasting linear positive trends in a northwest to southeast direction and is interpreted as an area of ridge and furrow.

2.4.36 An oval shaped area at 4004 contains several bipolar anomalies and some dipolar ferrous anomalies. It has been interpreted as an area of burnt or fired material or increased magnetic response and could be a spread of debris containing ferrous and ceramic material. The remaining anomalies in this field are numerous dipolar anomalies which are interpreted as ferrous and are presumed to be modern in origin.

2.4.37 In the southern area of the field at 4005 and 4006 are two distinct rectilinear areas measuring approximately 50 x 40m and containing numerous bipolar and dipolar anomalies. They seem to form a discrete area within the general background noise and have been identified as areas of increased magnetic response. A further, approximately circular area, although less well-defined, is identified at 4007 and is possibly related. The numerous bipolar and dipolar anomalies could represent an area containing ferrous and ceramic debris and the shape and layout of the overall anomaly suggests it is possibly a building or structure, potentially foundations or rubble.

2.4.38 There are only a couple of possible archaeological pit-type features in this field and like the pits described above they could equally represent natural features.

2.4.39 There are numerous parallel, regularly spaced linear positive trends across the field all oriented in a northwest to southeast direction and while they are likely to be agricultural in origin it is not readily identifiable if they are ridge and furrow or ceramic field drains and ploughing trends. Around 4008 and 4010 the linear trends a weakly positive and would suggest ridge and furrow due to their line spacing. However at 4009 the linear anomalies consist of repeating bipolar anomalies and connect with each other to suggest a network of features such as are seen in the northern field around 4001. The presence of numerous positive and dipolar single anomalies around 4009 also suggests that in some areas the ceramic field drains have possibly been ploughed out and the debris dispersed.

2.4.40 Weak positive and negative linear trends have been identified across the entire site, such as around 4011, however they appear to have no correlation with one another and given their strength it is not possible to accurately identify their origin.

Interpretation: Modern Services

2.4.41 Two modern services have been identified in the southern field of the survey area. A strong linear series of bipolar anomalies surrounded by a ferrous halo at 4012 shows a northwest to southeast oriented service. A second linear series of repeating dipolar anomalies at 4013 and oriented in a north northeast to south southwest orientation is also a modern service and they appear to cross paths in the eastern area of the field.

2.4.42 Gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

1.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest within the Site, along with ploughing trends, areas of increased magnetic response and superficial geology. The anomalies of possible archaeological interest are primarily pit-like features.

Discussion

2.4.43 The anomalies of possible archaeological origin are centred around 4000 with some pit type responses identified and at 4005 to 4007 with the larger rectilinear areas possibly indicating the remains of a former structure and containing ferrous and ceramic debris. There are no buildings or other types of larger structures visible on available OS mapping (Ordnance Survey 1887, 1905, 1971)

2.4.44 The linear trends, such as are visible around 4008 to 4010 are aligned northwest to southeast similar to the orientation of the current field boundaries. These linear positive trends have been interpreted as ridge and furrow whereas the linear series of bipolar anomalies around 4009 are a more typical response from ceramic field drains. The drains may have deliberately been located within the furrows at a time when they were still extant.

2.4.45 The ditch anomaly between 4000 and 4002 represents a former field boundary visible on available OS mapping (Ordnance Survey 1971).

2.4.46 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

English Heritage, 2008. Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition

HS2 Environmental Statement, 2013. London-West Midlands Environmental Statement, Volume 5: Technical Appendices: CFA16: Ladbroke and Southam Baseline Report: Cultural Heritage. Report Reference: CH-001-016

Soil Survey of England and Wales, 1983. Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Ordnance Survey, 1887. OS County Series: Warwickshire 1:2500

Ordnance Survey, 1905. OS County Series: Warwickshire 1:2500

Ordnance Survey 1957. Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington

Ordnance Survey, 1971. OS Plan 1:2,500

Ordnance Survey, 1977. Quaternary Map of the United Kingdom: South. Ordnance Survey. Southampton

Wessex Archaeology 2013. HS2 Community Forum Area 16 (Ladbroke and Southam): Hyperspectral and LiDAR Analysis Report Reference: 86252.01

Wessex Archaeology, 2014. HS2: Geophysical Survey Written Scheme of Investigation: Warwickshire. Report Reference: 86257.01.

HER Records Consulted

LBS 079 – Ufton Historic Settlement

LBS 082 – Ufton and Long Itchington Woods

LBS 083 – Ufton/Long Itchington Parish boundary

LBS 084 – Wood Farm Cropmark Enclosures

LBS 092 – The Grand Union Canal including double lock at Bascote Locks; Bascote Toll House; Anti-tank road block; WWII Bridge modification

MWA 827 - Site of Brick Kiln 400m NW of Ufton Church

MWA 828 - Site of Lime Kiln 800m N of Church

MWA 7090 - Brickworks at Brickyard Cottage

Pastscape 1528168, Warwickshire

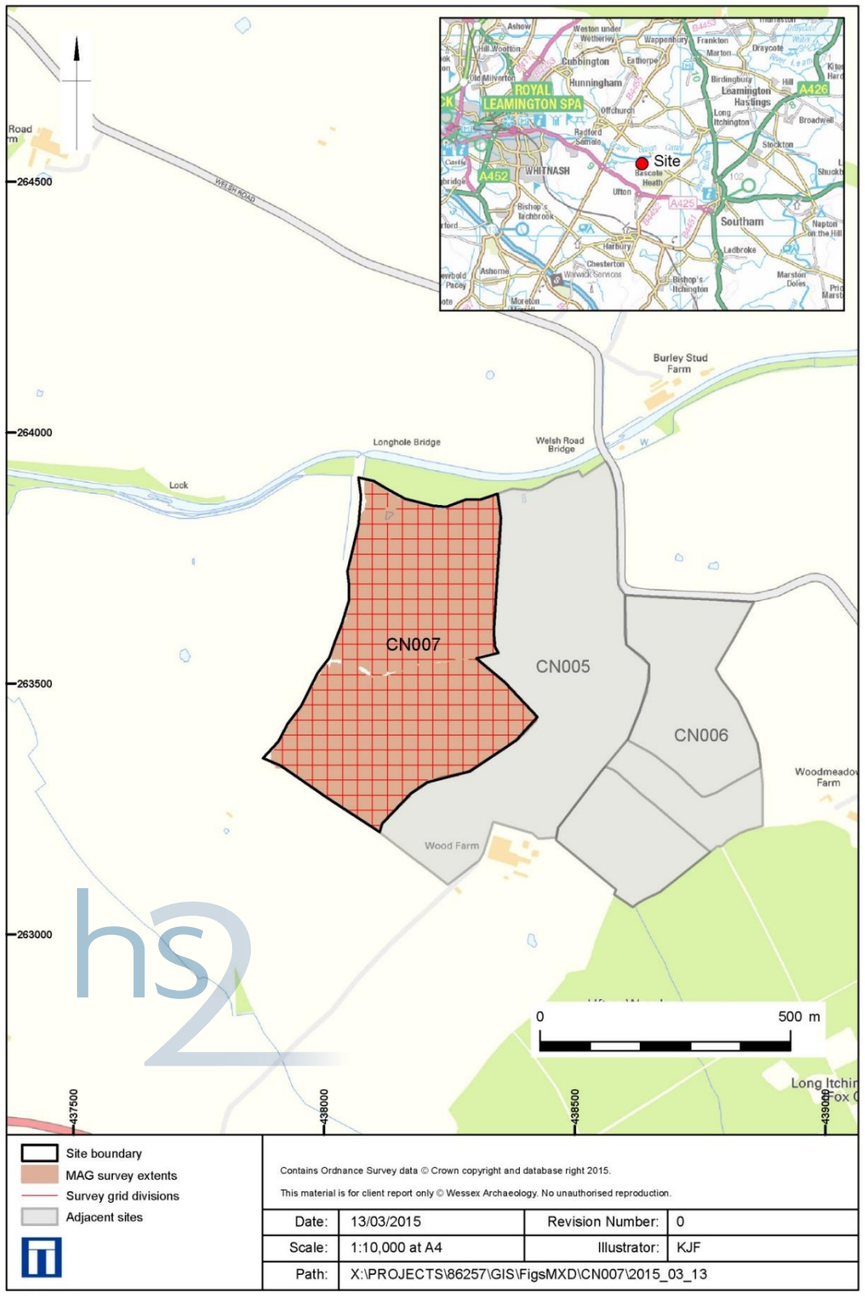
Pastscape 1528220, Warwickshire

Pastscape 1528249, Warwickshire

Pastscape 1531887, Warwickshire

Figures

Figure 15: CN007 Site location



Site location Figure 15

Figure 16: CN007 Greyscale plot: North

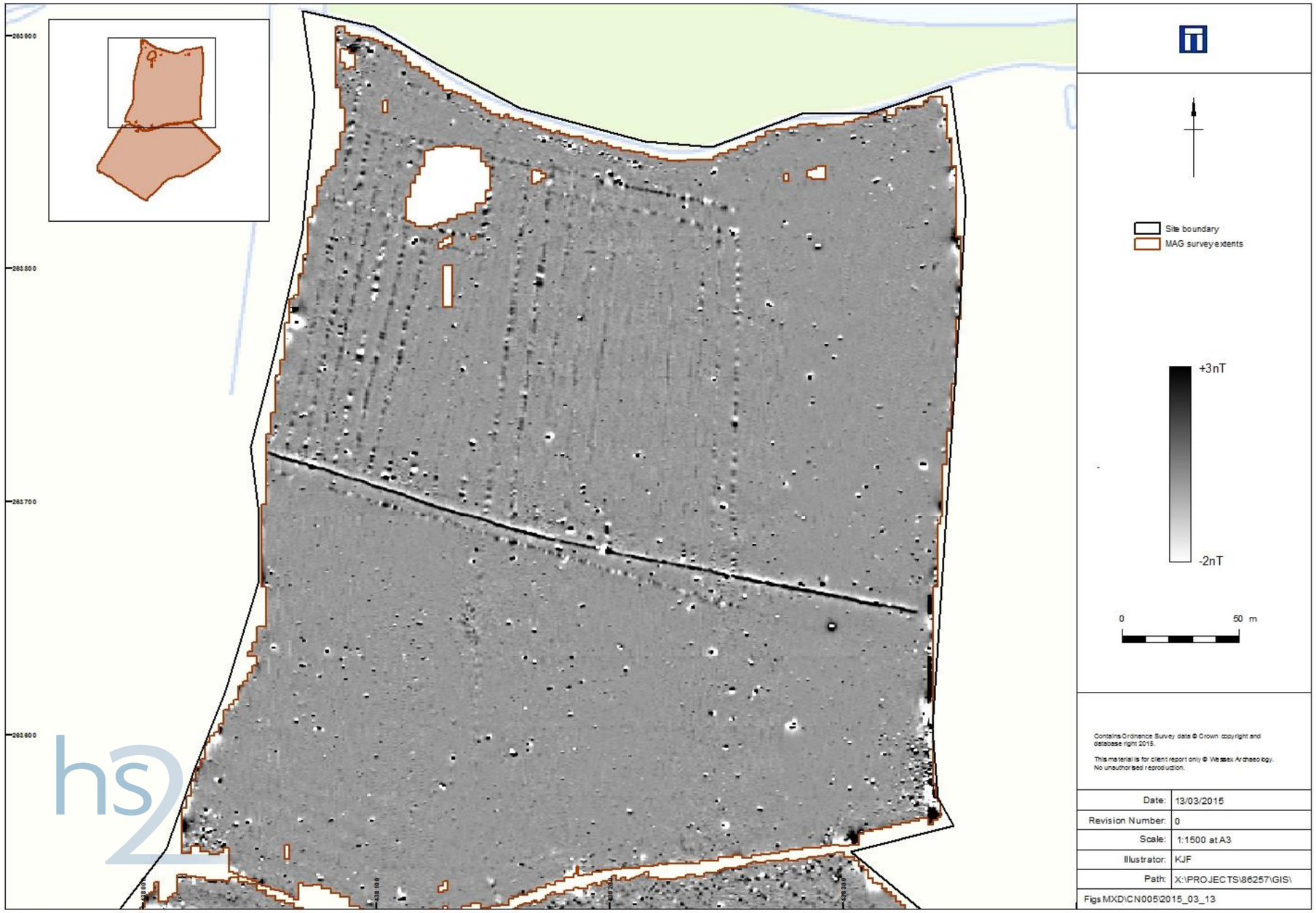
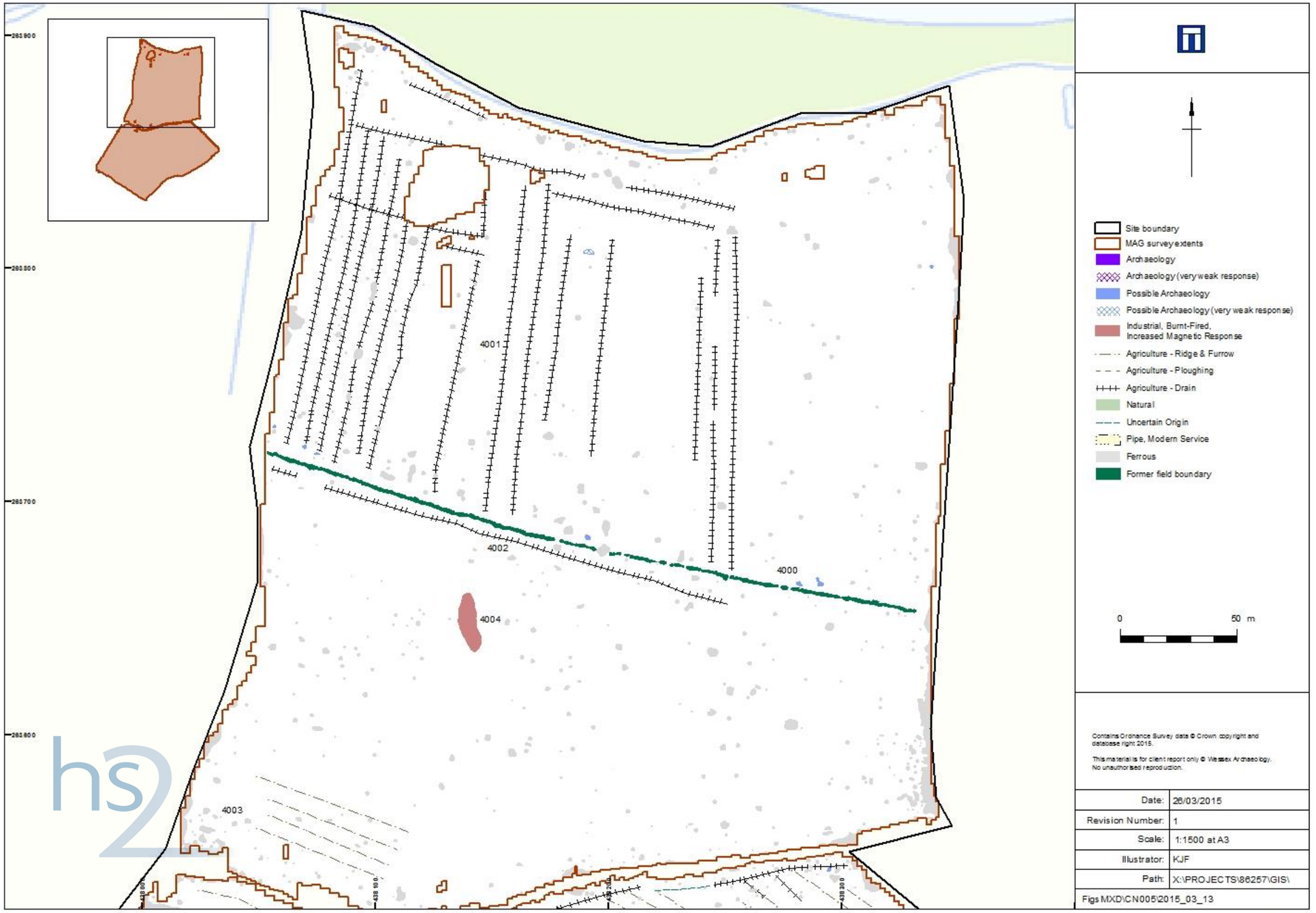


Figure 17: CN007 XY trace: North

XY trace (north)

Figure 17

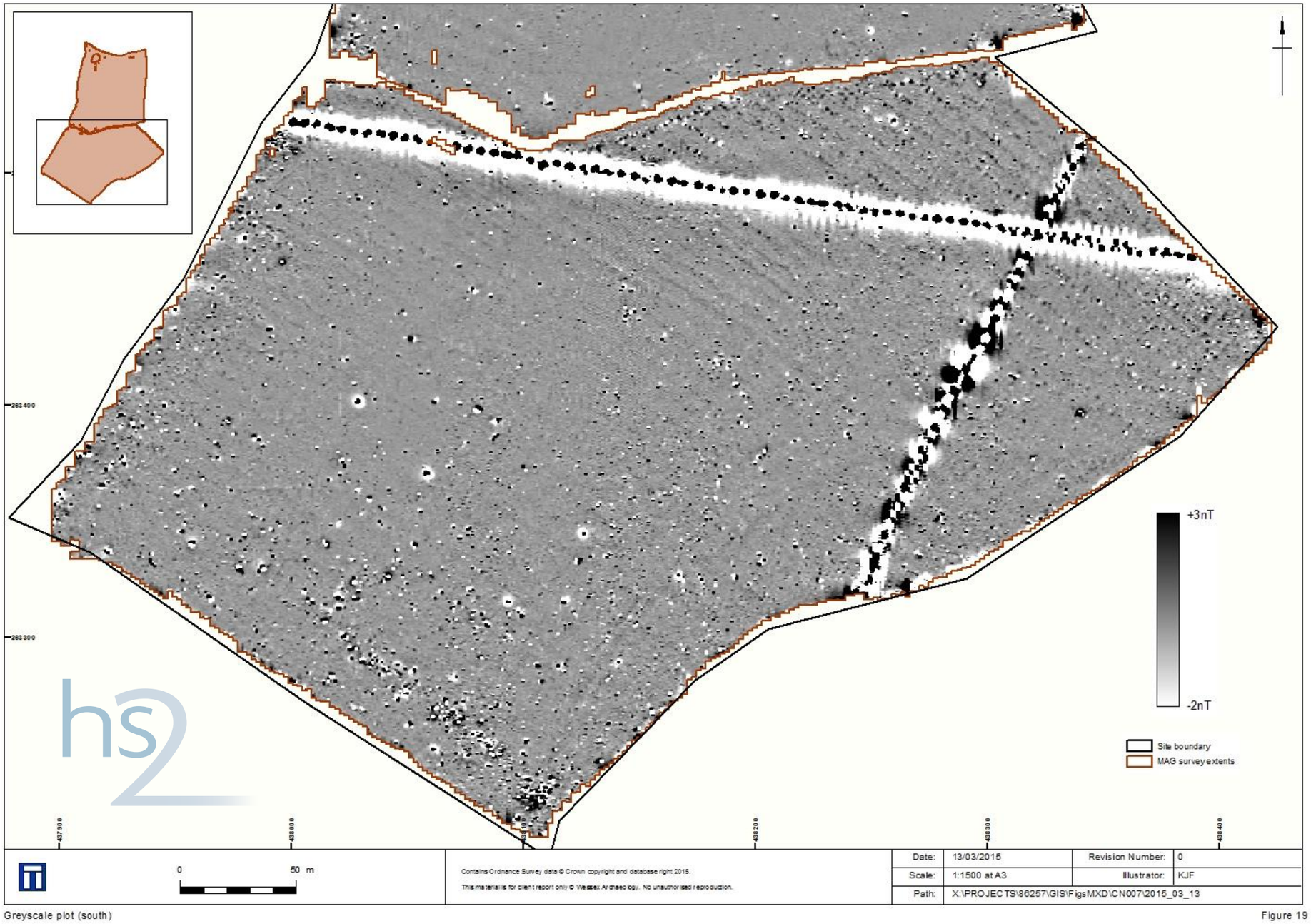
Figure 18: CN007 Interpretation: North



Interpretation (north)

Figure 18

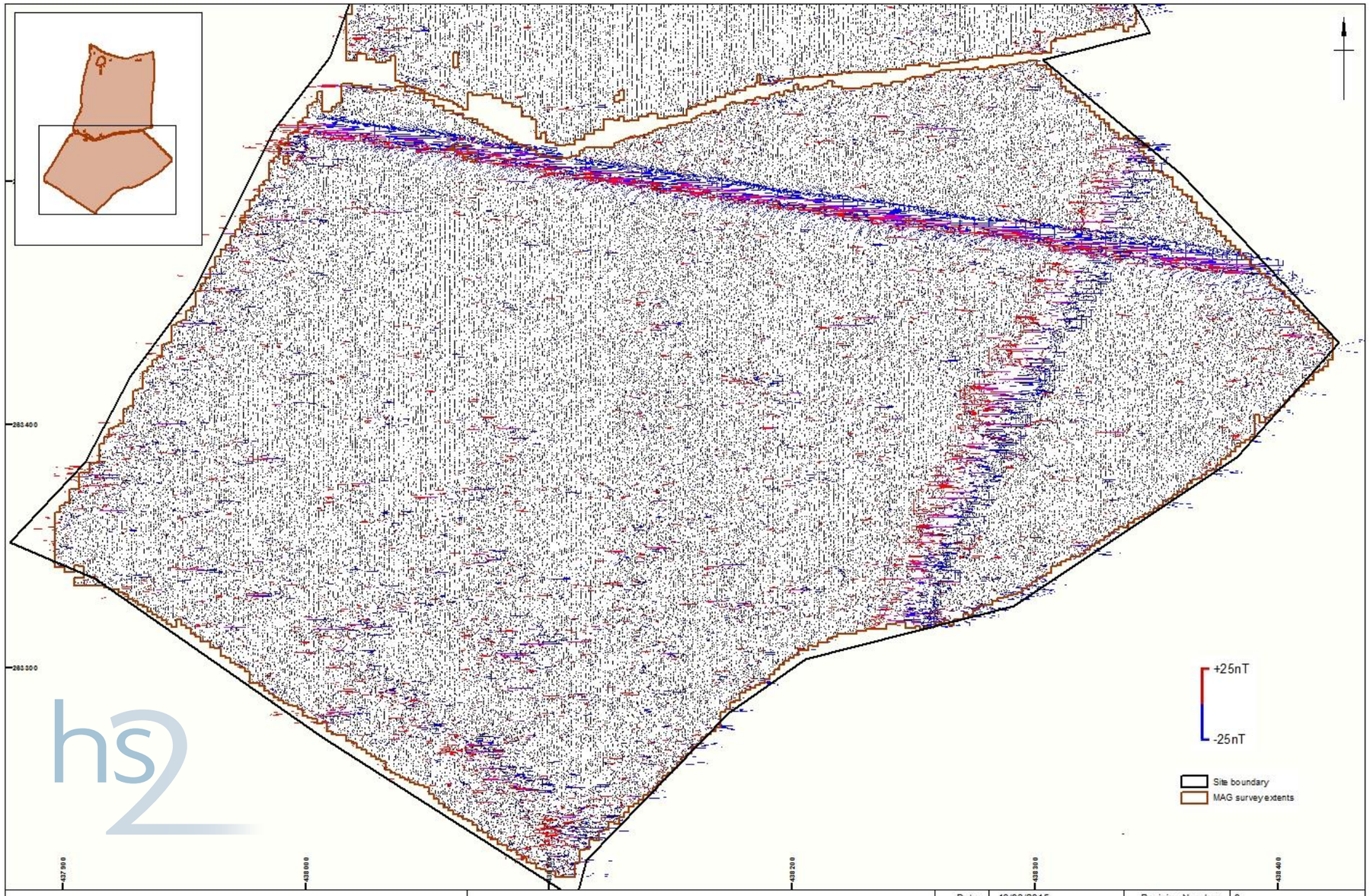
Figure 19: CN007 Greyscale plot: South



Greyscale plot (south)

Figure 19

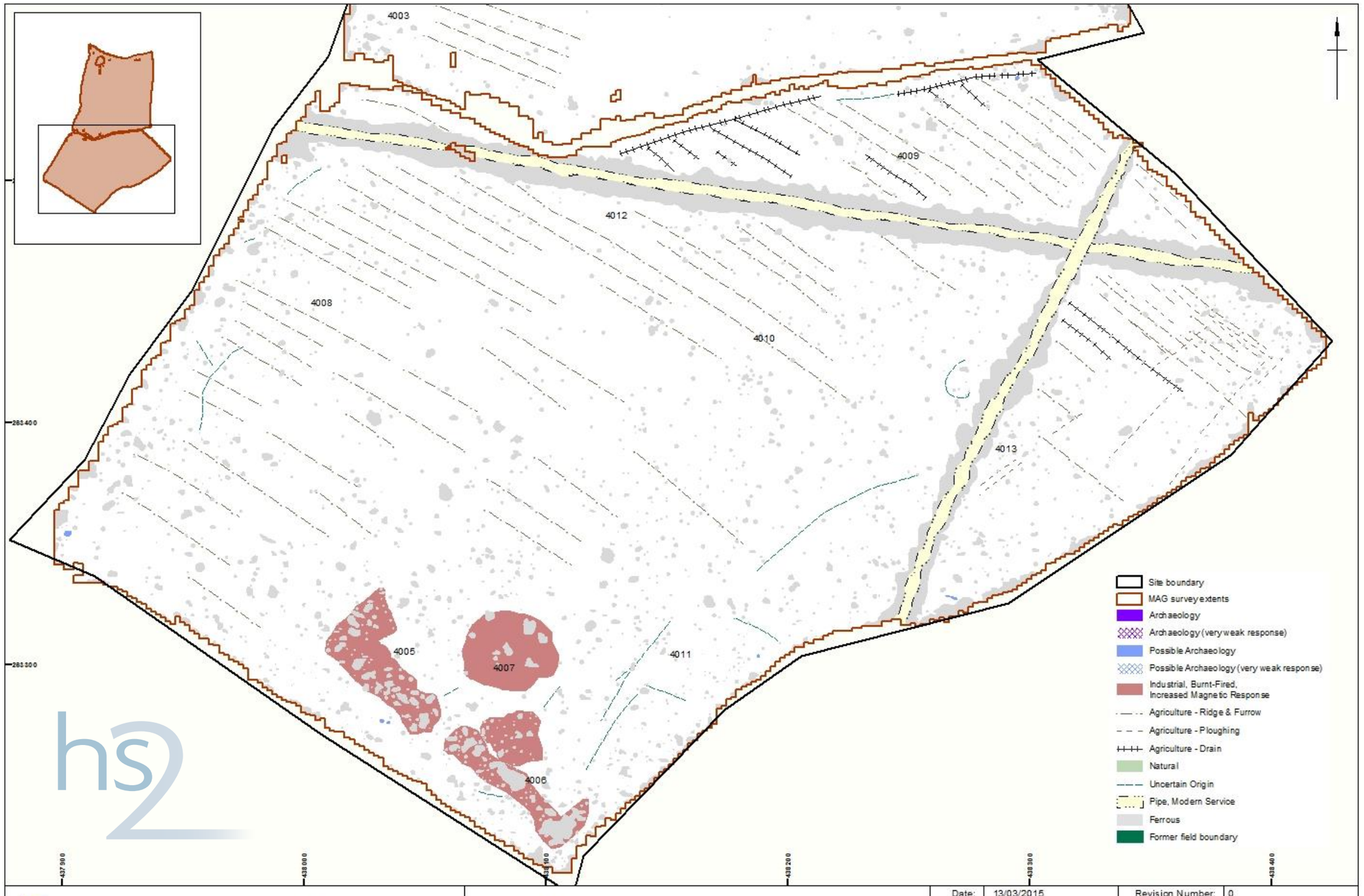
Figure 20: CN007 XY trace: South



XY trace (south)

Figure 20

Figure 21: CN007 Interpretation: South



Interpretation (south)

Figure 21

2.5 Annex 1: Survey Equipment and Data Processing

Survey Methods and Equipment

2.5.1 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.

2.5.2 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.

2.5.3 Wessex Archaeology conducts detailed gradiometer surveys using 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.

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

2.5.5 Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.

Post-Processing

2.5.6 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.

2.5.7 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.

2.5.8 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);
- Deslope - This function is used to remove a linear trend within a data set. It is most commonly used to remove grid edge discontinuities that can result from applying zero mean traverse to a data set.
- Multiply - The multiply function multiplies the data by a negative or positive constant value. It has a variety of functions but its typical use is to normalise data that has been collected with sensors at different heights from the ground.

2.5.9 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.

2.6 Annex 2: Geophysical Interpretation

Interpretation Categories

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

2.6.2 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.
- Possible archaeology - used for features which give a response but which form no discernible pattern or trend.

1.1.2 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:

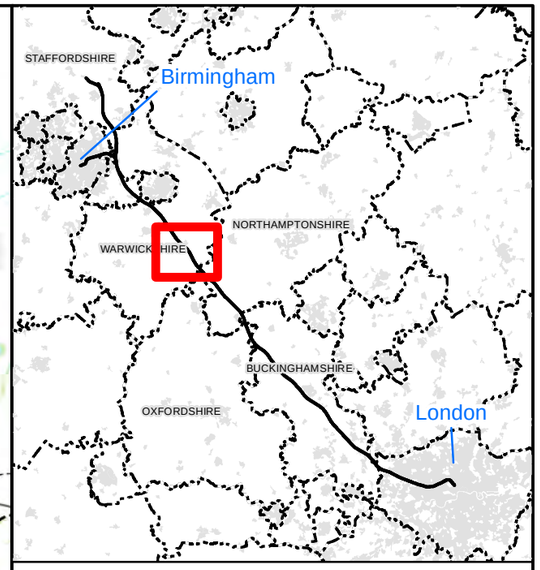
- Industrial, Burnt-Fired, Increased magnetic response - used for areas dominated by bipolar and dipolar anomalies which may have some archaeological potential.
- Uncertain Origin - used for low amplitude or indistinct linear anomalies.
- Ferrous - used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Agricultural - used for linear trends that can be shown to relate to agricultural activity

including ridge and furrow, drainage and ploughing scars.

- Natural - used for spreads of anomalies that are considered to be geological or more discrete anomalies considered to be natural.

2.6.3 Finally, services such as water pipes are marked where they have been identified along with ceramic field drains.

ROYAL LEAMINGTON SPA
Newbold Comyn Park
OFFCHURCH AND CUBBINGTON
Radford Semele
WARWICK DISTRICT
A425
Longhole Viaduct
CH-07-204a
Long Itchington
RUGBY BOROUGH
Stockton
A426
River Itchen Viaduct
LADBROKE AND SOUTHAM
Flecknoe
Long Itchington Wood Tunnel
Ufton
Southam
Long Itchington Wood Green Tunnel
Napton on the Hill
Harbury
DAVENTRY DISTRICT
WARWICKSHIRE
Ladbroke
STRATFORD-ON-AVON DISTRICT
Bishop's Itchington
Lower Radbourne South Viaduct
Priors Marston
Hellidon
Lower Radbourne North Viaduct
A423
Oxford Canal Viaduct
Priors Hardwick
Lighthorne Heath
Knightcote
Wormleighton
SOUTH NORTHAMPTONSHIRE DISTRICT
Lower Boddington
Gaydon
M40
NORTHAMPTONSHIRE
Byfield
A361
Lower Boddington Maintenance Loop
Northend
Fenny Compton
Upper Boddington
GREATWORTH TO LOWER BODDINGTON
Temple Herdewyke
OXFORDSHIRE
Aston le Walls
Highfurlong Brook Viaduct
Kineton



Map Series Information:

This map series shows archaeological geophysical survey locations within the land required for the construction of the Proposed Scheme

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community forum with amendment
- Map sheets not included in this community forum

Map Number: CH-07-INDEX-CFA16

Map Name: Index Map of: Archaeological Geophysical Survey - Location SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:65,000

0 650 1,300 1,950 2,600 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001850-AP02-P01

Date: 17/06/15

LADBROKE & SOUTHAM

OFFCHURCH & CUBBINGTON

STRATFORD-ON-AVON DISTRICT

WARWICK DISTRICT

Bascote Lodge Farm
Grand Union Canal
Snowford Lodge Farm
SNOWFORD HILL
RIDGEWAY LANE
STONEBRIDGE LANE
Print Wood
Print Farm
Fir Tree Farm
Fox Farm
Nun's Bushes
Bascote Heath
Thorpe Rough
The White House
Heath Farm
WELSH ROAD
Lower Print Farm
Burnt Heath Farm
Woodmeadow Farm
Long Itchington Wood
FEATHERBED LANE
Appledell
War Memorial
WSI-CFA17-001
WSI-CFA16-005
WSI-CFA16-006
WSI-CFA16-007
For Continuation Refer to Map Number CH-07-205
Longhole Bridge
131+000
130+000
129+000
128+000
Springhill Cottages
Welsh Road Farm
Welsh Road Underbridge
Longhole Viaduct
Long Itchington Wood Tunnel
Wood Farm Cottage
Ufton Wood
Bunkers Hill Farm
FOSSEWAY
Centenary Way
Grand Union Canal
A425
B4452
B4455
Ufton Fields Nature Reserve

Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Land potentially required during construction
- Community forum boundary
- County boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland

Area identified for survey 2014
- Geophysical and Fieldwalking surveys
- Geophysical surveys

Areas surveyed in 2013
- Fieldwalking surveys completed
- Geophysical surveys completed

Map Number: CH-07-204a

Map Name: Archaeological Geophysical Survey - Location SES and AP2 ES

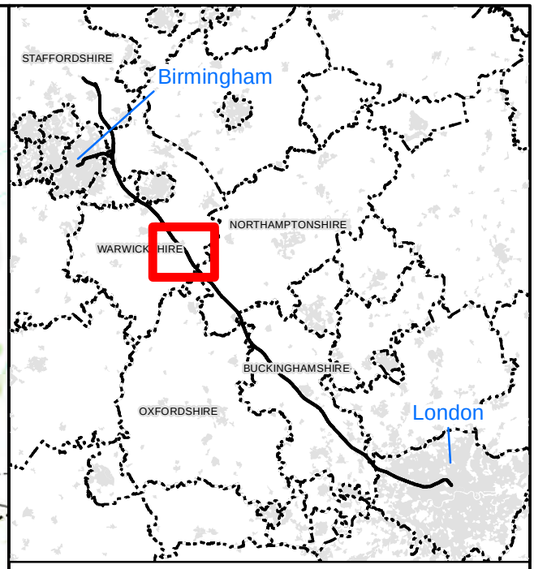
Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: C253-ATK-EV-MAP-030-001790-AP02-P01

Date: 17/06/15



Map Series Information:

This map series shows magnetometer survey results within the land required for the construction of the Proposed Scheme

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community forum with amendment
- Map sheets not included in this community forum

Map Number: CH-09-INDEX-CFA16

Map Name: Index Map of: Archaeological Geophysical Survey - Magnetometer Data Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:65,000

0 650 1,300 1,950 2,600 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001857-AP02-P01

Date: 10/06/15

LADBROKE AND SOUTHAM

OFFCHURCH AND CUBBINGTON

WARWICK DISTRICT

STRATFORD-ON-AVON DISTRICT

WELSH ROAD

Lower Print Farm

Woodmeadow Farm

Fox Farm

FEATHERBED LANE

Grand Union Canal

Longhole Viaduct

Long Itchington Wood Tunnel

129+000

128+000

Wood Farm

Lower Fox Farm

For Continuation Refer to Map Number CH-09-208-L1

Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Land potentially required during construction
- Community forum boundary
- District/Borough boundary
- Edge of geophysical survey

Map Number: CH-09-208

Map Name: Archaeological Geophysical Survey - Magnetometer Data Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001808-AP02-P01

Date: 08/06/15

Grand Union Canal

Wood Farm

For Continuation Refer to Map Number CH-09-208

Lower Fox Farm

STRATFORD-ON-AVON DISTRICT

Ashgrove Farm

UFTON HILL

A425

WHITE HART LANE

SOUTHAM ROAD

REEDS PARK

ST MICHAELS CLOSE

UFTON FIELDS

Ufton

Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Land potentially required during construction
- Community forum boundary
- District/Borough boundary
- Edge of geophysical survey

Map Number: CH-09-208-L1

Map Name: Archaeological Geophysical Survey - Magnetometer Data Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:5,000

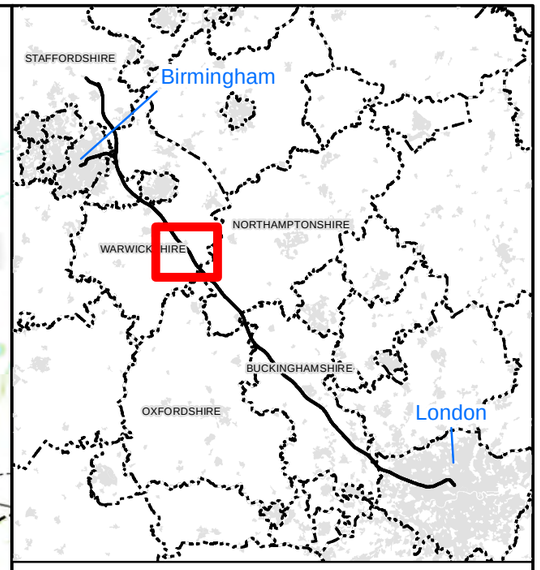
0 50 100 150 200 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001809-AP02-P01

Date: 08/06/15

ROYAL LEAMINGTON SPA
Newbold Comyn Park
OFFCHURCH AND CUBBINGTON
Radford Semele
WARWICK DISTRICT
Longhole Viaduct
CH-10-208
CH-10-208-L1
Long Itchington Wood Tunnel
Ufton
Long Itchington
Stockton
River Itchen Viaduct
RUGBY BOROUGH
Flecknoe
LADBROKE AND SOUTHAM
Southam
Napton on the Hill
Long Itchington Wood Green Tunnel
Harbury
DAVENTRY DISTRICT
WARWICKSHIRE
Ladbroke
STRATFORD-ON-AVON DISTRICT
Bishop's Itchington
Hellidon
Lower Radbourne South Viaduct
Priors Marston
Lower Radbourne North Viaduct
Oxford Canal Viaduct
Lighthorne Heath
Priors Hardwick
SOUTH NORTHAMPTONSHIRE DISTRICT
Knightcote
Wormleighton
Lower Boddington
Gaydon
NORTHAMPTONSHIRE
Byfield
Lower Boddington Maintenance Loop
Upper Boddington
Northend
Fenny Compton
GREATWORTH TO LOWER BODDINGTON
Temple Herdewyke
OXFORDSHIRE
Highfurlong Brook Viaduct
Aston le Walls
Kineton



Map Series Information:

This map series shows interpretation of magnetometer survey results within the land required for the construction of the Proposed Scheme

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community forum with amendment
- Map sheets not included in this community forum

Map Number: CH-10-INDEX-CFA16

Map Name: Index Map of: Archaeological Geophysical Survey - Interpretation Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Note: Not all data layers in the legend are represented on every map.

Scale at A3: 1:65,000

0 650 1,300 1,950 2,600 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001864-AP02-P01

Date: 10/06/15

LADBROKE AND SOUTHAM

OFFCHURCH AND CUBBINGTON

WARWICK DISTRICT

STRATFORD-ON-AVON DISTRICT

WELSH ROAD

Lower Print Farm

Woodmeadow Farm

Fox Farm

FEATHERBED LANE

Grand Union Canal

Longhole Viaduct

Long Itchington Wood Tunnel

129+000

128+000

Wood Farm

Lower Fox Farm

For Continuation Refer to Map Number CH-10-208-L1

Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Land potentially required during construction
- Community forum boundary
- District/Borough boundary
- Edge of geophysical survey

Geophysical survey results

- Possible archaeology (VWR)
- Drain
- Pipe
- Plough
- Ridge and furrow
- Trend

- Uncertain origin
- Archaeology (discrete)
- Archaeology (zone)
- Archaeology (VWR)
- Possible archaeology (VWR)
- Possible archaeology
- Ferrous

- Old field boundary
- Increased magnetic response
- Industrial burnt fired
- Modern service
- Natural
- Pipe, modern service
- Plough

- Ridge and furrow
- Uncertain

Map Number: CH-10-208

Map Name: Archaeological Geophysical Survey - Interpretation Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

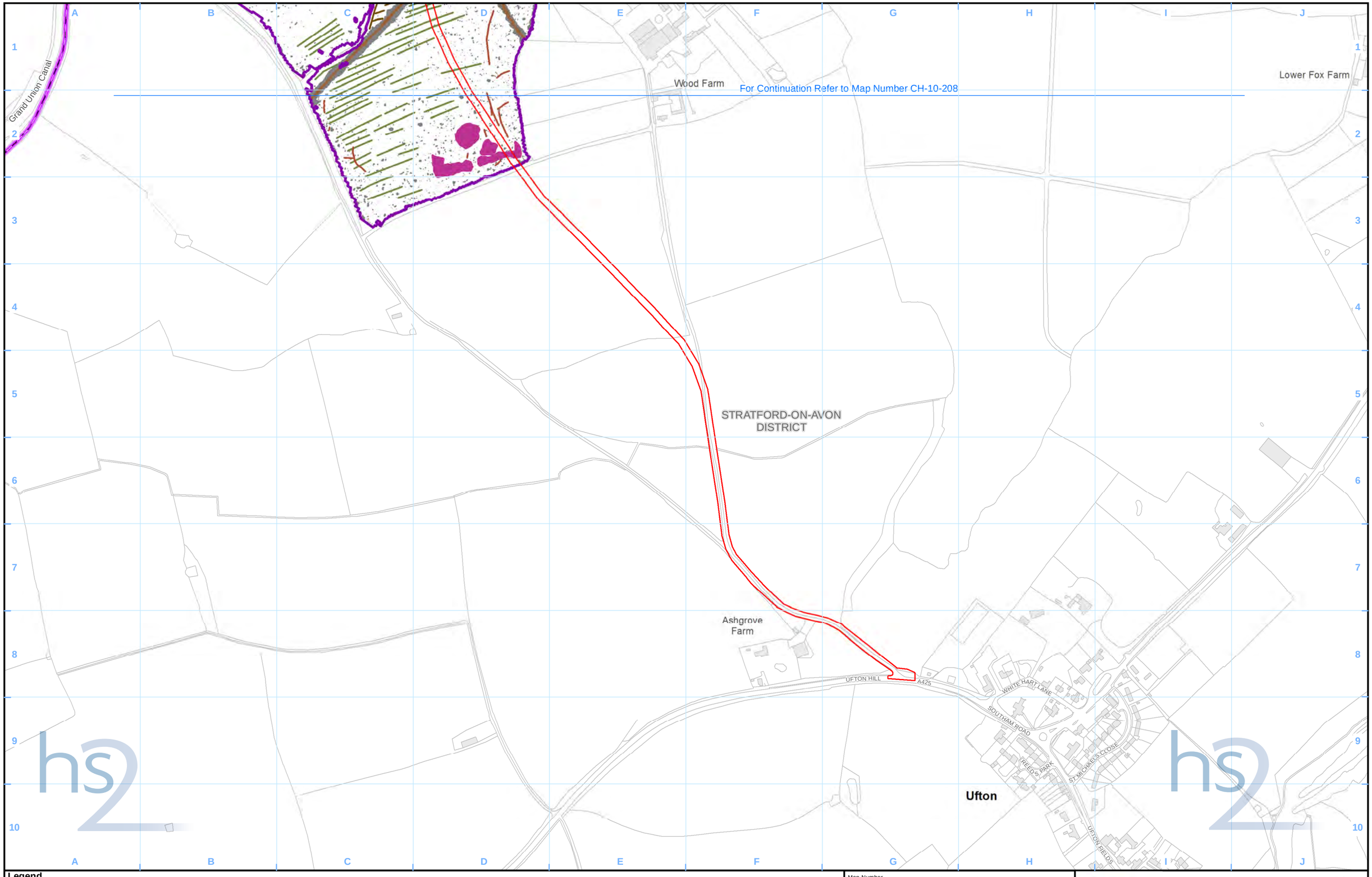
Scale at A3: 1:5,000

0 50 100 150 200 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001829-AP02-P01

Date: 08/06/15



Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Land potentially required during construction
- Community forum boundary
- District/Borough boundary
- Edge of geophysical survey

Geophysical survey results

- Possible archaeology (VWR)
- Drain
- Pipe
- Plough
- Ridge and furrow
- Trend

- Uncertain origin
- Archaeology (discrete)
- Archaeology (zone)
- Archaeology (VWR)
- Possible archaeology (VWR)
- Possible archaeology
- Ferrous

- Old field boundary
- Increased magnetic response
- Industrial burnt fired
- Modern service
- Natural
- Pipe, modern service
- Plough

- Ridge and furrow
- Uncertain

Map Number: CH-10-208-L1

Map Name: Archaeological Geophysical Survey - Interpretation Plot SES and AP2 ES

Community Forum Area CFA16: Ladbroke and Southam

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C253-ATK-EV-MAP-030-001830-AP02-P01

Date: 08/06/15

High Speed Two (HS2) Limited
One Canada Square
London E14 5AB

T 020 7944 4908
E hs2enquiries@hs2.org.uk