E145

High Speed Two Phase 2a (West Midlands - Crewe)

Background Information and Data

CA4: Whitmore Heath to Madeley
Cultural heritage survey reports (BID-CH-004-004)

July 2017

BID

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Department for Transport

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1 Introduction

1.1.1 This document presents the results of the cultural heritage surveys carried out in the Whitmore Heath to Madeley community area (CA4) relevant to High Speed Rail (West Midlands - Crewe). Geophysical surveys and remote sensing studies have been undertaken.

1.1.2 The cultural heritage assessment is detailed in the High Speed Rail (West Midlands - Crewe) Environmental Statement (ES)[1]. Volumes 2, 3 and 4 discuss cultural heritage effects and Volume 5, Appendices sets out the following:

- a cultural heritage baseline report for each community area;
- a gazetteer of heritage assets for each community area;
- a cultural heritage impact assessment table for each community area;
- a route-wide historic landscape character report; and
- a route-wide geoarchaeology desk study report.

[1] HS2 Ltd (2017), High Speed Rail (West Midlands-Crewe) Environmental Statement, www.gov.uk/hs2

2 Geophysical survey

2.1 Introduction

2.1.1 This document presents the results of the geophysical survey carried out along the Whitmore Heath to Madeley area. The surveyed areas are shown in Figure 1.

2.1.2 The works undertaken conform with current best practice and guidance for geophysical surveys as outlined in the Chartered Institute for Archaeologists' Standards and Guidance for archaeological geophysical survey[2] and Historic England's (HE; formerly English Heritage) Guidelines Geophysical Survey in Archaeological Field Evaluation[3]. For more information see the Technical Note on geophysical survey in the Environmental Impact Assessment Scope and Methodology Report (SMR) Addendum (ES Volume 5: Appendix CT-001-002).

2.1.3 Geophysical surveys of multiple areas between Lichfield and Crewe were undertaken in association with environmental assessments being completed for the Scheme. This report provides the results of non-intrusive geophysical surveys on the Whitmore Heath to Madeley area of the route of the Proposed Scheme between August 2016 and January 2017. The Whitmore Heath to Madeley area is approximately 10km from the south-east of Acton and to south-east of Wrinehill.

2.1.4 The geophysical surveys undertaken here were preceded by desk-based research and a remote sensing survey (described in Section 3 of this report) comprising light detection and ranging (LiDAR) survey, as well as Aerial Photographic transcription and analysis. This work was used to generate an archaeological risk model which informed the locations selected for geophysical survey. The final survey areas were in part dictated by accessibility, as well as by potential and the risk model.

2.1.5 Archaeological background for each area of survey presents a brief summary of the known archaeological assets within and surrounding the individual survey areas.

2.2 Survey objectives

Aims of the fieldwork

2.2.1 The aim of this survey is to establish the presence/absence, extent and character of detectable archaeological remains within the survey area, including both the testing of previously recorded sites and the identification of additional locations of archaeological potential not previously recorded.

Objectives of the fieldwork

2.2.2 The results of the surveys will be combined with data from other archaeological assessments carried out as part of the project, such as desk-top studies and LiDAR

[2] Chartered Institute for Archaeologists (2014), *Standard and Guidance for archaeological geophysical survey*
[3] English Heritage (2008), *Geophysical Survey in Archaeological Field Evaluation*, Research and Professional Service Guideline No. 1, 2nd Edition

data, in order to analyse the archaeological potential of the survey locations with a view to contributing to the preparation of the ES for the Proposed Scheme; and the development of a programme of archaeological investigation.

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

2.3 Methods

Introduction

2.3.1 All surveys covered within this report adhere to the same methodology, as set out below, and conform with HE guidelines and recommendations[4] and the HS2 technical note.

Grid location

2.3.2 The individual survey grid nodes were established at 30m by 30m intervals using a Leica Viva Real Time Kinetic (RTK) Global Navigation Satellite System (GNSS) instrument, which is precise to approximately 0.02m and therefore exceeds HE recommendations[5].

2.3.3 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, which may result in misalignment. 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

2.3.4 The magnetic survey was conducted using Bartington Grad-01-1000L fluxgate gradiometers, which has a vertical separation of 1m between sensors. These are positioned with horizontal separations of 1m on either a hand-held Bartington Grad-601-2 instrument carrying two gradiometers, or a Bartington cart system carrying four gradiometers. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03 nT[6], in accordance with HE guidelines[7].

2.3.5 For the hand-held system, data were collected in the zigzag method with grids orientated north to south (Grid North). The first direction walked for each grid was on a northward heading. The cart system also collected data in a zigzag method north to south, but the position of readings is recorded by GPS rather than a grid system.

2.3.6 Further details of the geophysical and survey equipment and methods are provided in Annex A.

Data processing

2.3.7 Data from the survey were subject to minimal data correction processes. For hand-held data, these comprise a zero mean traverse (ZMT) function (±5 nT thresholds)

[4] English Heritage (2008)
[5] English Heritage (2008)
[6] nT = unit of magnetic flux density
[7] English Heritage (2008)

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. For the cart system, a smooth is applied to the data achieving a similar effect as the ZMT in the hand-held data.

2.3.8 Further details of the geophysical data processing are provided in Annex A.

Data presentation

2.3.9 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. The data images and interpretation shapefiles were then used to produce the final figures in a Geographic Information system (GIS (ESRI ArcMap 10)).

2.3.10 The gradiometer data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image and ±25 nT at 25 nT per cm for the XY trace plots for all hand-held collected data. Due to technical limitations XY trace plots cannot be produced for data collected by the cart systems.

Assumptions and limitations

2.3.11 Gradiometer survey will detect numerous ferrous anomalies. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation. In areas with a large amount of ferrous responses, such as those covered by 'green waste', it is possible that archaeological anomalies will be masked. As such, accurate interpretation in affected areas is likely to be limited or impossible.

2.3.12 It should be noted that, in all areas, 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 present than have been identified through geophysical survey.

2.3.13 Best efforts are made to provide accurate analysis of the geophysical data. This includes using all available resources to inform interpretations and drawing on experience from previous surveys. However, the true date and character of anomalies can only be accurately defined by a programme of ground truthing (such as trenching or trial pitting). Further details of the interpretation of geophysical survey results are provided in Annex B.

Sources

2.3.14 Reference numbers used within the archaeological background sections below are from the relevant county Historic Environment Records (HER) or other stated source.

Records are prefixed as follows:

- national heritage list for England = NHLE (designated assets);

- SHER = Staffordshire HER;
- CHER = Cheshire HER;
- AP= Aerial Photograph; and
- LiDAR = Light Detection and Ranging.

2.4 CA4-2427 Shelton under Harley, Stableford

Site details

2.4.1 A geophysical survey was carried out over area CA4-2427 Shelton under Harley, Stableford (centred on National Grid Reference (NGR) 381276, 339992 (Figure 2)).

2.4.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of post-medieval activity in the surrounding area.

2.4.3 The survey area comprises an irregular parcel of land covering areas within two fields to the east of Bent Lane, 1.2km south of Whitmore, approximately 8.6km south-west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries and predefined survey extents within the fields. The gradiometer survey covered 3.7ha of the 6.7ha survey area.

2.4.4 The survey area lies on a south-west facing slope. The north-eastern area of the survey area peaks at approximately 134m above Ordnance Datum (AOD) and falls to 110m AOD at the south-western extents.

2.4.5 There are no overhead cables or water courses present over the survey area. The internal field boundaries are formed of hedgerows and fence lines.

2.4.6 The underlying geology is recorded as the Wildmoor Sandstone Formation. No superficial deposits are recorded although an area of river terrace deposits is mapped adjacent to the eastern edge of the area[8]. The soils underlying the survey area are likely to comprise the typical brown sands of the Bridgnorth (551a) association[9]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.4.7 There is little known activity within or immediately adjacent to the survey area. Land immediately to the south and west of the area between Bent Lane and Meece Brook has been identified as containing post-medieval or modern drainage or water management features.

[8] British Geological Survey (2015), http://www.bgs.ac.uk
[9] Soil Survey of England and Wales (1983), *Sheet 3, Soils of Midland and Western England*, Ordnance Survey: Southampton

2.4.8 Linear features identified in the LiDAR data within and to the north of the survey area are likely to be former field boundaries (LiDAR 3013 and 3016). Traces of ridge and furrow in the area around Church Farm may indicate medieval cultivation.

Results

2.4.9 The gradiometer survey carried out on the 15 September 2016 using hand-held systems has identified anomalies relating to modern agricultural activity and ferrous responses.

2.4.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –3 - 5). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trend (Figure 5).

Interpretation: agricultural

2.4.11 The dataset is dominated by large areas of dipolar responses. These are likely related to the spreading of green waste across the fields. This has the potential to mask weaker archaeological anomalies; however, the majority of the dipolar responses are relatively sparsely spread and should allow for the detection of archaeological features.

Conclusions

2.4.12 The survey has not identified any anomalies of archaeological origin. The area is dominated by green waste; however, it is not thought that this has limited the effectiveness of the survey to the point that archaeological features would not be detected.

2.5 CA4-2482 Whitmore

Site details

2.5.1 A geophysical survey was carried out over area CA4-2482 Whitmore (centred on NGR 380704, 340296 (Figure 6)).

2.5.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post medieval activity in the surrounding area.

2.5.3 The survey area comprises a long irregular parcel of land covering areas within eight fields to the west of Bent Lane, Whitmore, approximately 8.6km south-west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 17.4ha of the 42.6ha survey area.

2.5.4 The survey area lies on a south-east facing slope. The northern area of the survey area peaks at approximately 139m AOD and falls to 110m AOD at the southern extents.

2.5.5 There are no overhead cables present over the survey area. Meece Brook, a small water courses traverses the centre of the survey area almost north-south before turning south-east and continuing through the southern fields. Internal field boundaries are formed of hedgerows, fence lines and the course of the brook.

2.5.6 The underlying geology is mapped as the Wildmoor Sandstone Formation with a band of superficial deposits of alluvium recorded through the eastern part of the survey area. Either side of this, river terrace deposits (terrace 1) are mapped in the southern part of the area along with a small area of peat[10]. The soils underlying the majority of the survey area are likely to comprise the typical brown sands of the Bridgnorth (551a) association, with an area of typical earthy eu-fibrous peat soils of the Altcar 1 (1022a) formation in the south[11]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.5.7 Whitmore is recorded in the Domesday survey of 1086 as having three villagers and two smallholders with one plough. The church dates from the 12th century (NHLE1280181). A 16th century map seems to suggest that the settlement was once more extensive to the west of Whitmore Hall and the main road than it is today (SHERMST2590). The place name suggests the possible location of a site or settlement of possible Saxon origin.

2.5.8 The land to the north-east of the area forms the landscape park and gardens around Whitmore Hall, possibly originally established in the 16th century, but re-landscaped completely in the 18th to 19th centuries (SHERMST6013).

2.5.9 Church Farm, situated to the north-west of the survey area, dates from at least 19th century (SHERMST21789). A series of linear features identified from the LiDAR data both within and adjacent to the area are thought to relate to former post-medieval field boundaries (LiDAR3011, 3013, 3014, 3016, 3021 and 3023). Three blocks of possible ridge and furrow have also been identified, which could indicate medieval or post-medieval cultivation. To the east of Meece Brook, which traverses the eastern part of the survey area, a possible area of drainage features or water meadow has been identified.

2.5.10 The road at the north-east edge of the survey area is the original route of the 'Seabridge-Butterton' stretch of the Newcastle to Drayton Road, which is first documented in the 15th century (SHERMST13794).

[10] British Geological Survey (2015)
[11] Soil Survey of England and Wales (1983)

Results

2.5.11 The gradiometer survey carried out between 19 – 23 September and 12 – 14 October 2016 using a combination of hand-held and cart based systems has identified anomalies of possible archaeological interest and agricultural features, along with numerous trends and ferrous responses.

2.5.12 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 7 - 18). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figures 9, 12, 15 and 18).

Interpretation: archaeology

2.5.13 A short linear feature has been identified at 4-2482-001. This is approximately 8m by 1.5m, aligned north-east to south-west with a magnetic response of 3 – 11 nT. This has been interpreted as a small ditch-like feature and is of possible archaeological origin, however given its isolation from any other potential features; it may prove to be natural in provenance.

Interpretation: agricultural

2.5.14 Several linear features are evident across the survey area such as those at 4-2482-002. These are closely spaced and aligned predominantly north to south. These have been interpreted as evidence for agricultural activity.

2.5.15 A number of linear dipolar anomalies have been identified in the southern (4-2482-003), and centre-east (4-2482-004) fields. These exhibit responses consistent with ceramic materials and given their uniform alignment and distribution, these are likely to be related to land drainage systems.

2.5.16 Large areas throughout the dataset have exhibited increased magnetic responses, such as those at 4-2482-005 to 4-2482-006. The northern fields are dominated by these responses. Given the large quantity and coverage, it is likely that this disturbance has been caused by materials spread over the fields, such as green waste.

Conclusions

2.5.17 The survey has identified a single ditch-like feature as the only possible archaeological feature within the survey area. This is small and isolated, making accurate interpretation very difficult. Although on further investigation this may be found to be natural in origin; an archaeological potential cannot be ruled out with the currently available information. There is no firm evidence for medieval or post-medieval activity, such as ridge and furrow, which is recorded in the surrounding area. However, the presence of strong ferrous responses, related to the spreading of green waste, does have the potential to mask weaker archaeological anomalies. Modern agricultural activity has also been identified in the form of ploughing.

2.6 CA4-2496 The Hill, Baldwin's Gate

Site details

2.6.1 A geophysical survey was carried out over area CA4-2496 at The Hill, Baldwin's Gate (centred on NGR 380092, 340834 (Figure 19)).

2.6.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity in the surrounding area.

2.6.3 The survey area comprises a long irregular parcel of land covering two fields to the north of the A53, approximately 0.6km west of Whitmore and approximately 9km south-west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 7.6ha of the 8.0ha survey area, with the remaining area unsuitable for survey as a result of overgrown hedgerows.

2.6.4 The survey area lies on a south-east facing slope. The north-west area of the survey area peaks at approximately 141m AOD and falls to 127m AOD at the south-eastern extent.

2.6.5 There are no overhead cables or water courses present over the survey area.

2.6.6 The underlying geology is mapped as the Wildmoor Sandstone Formation with no superficial deposits recorded within the survey area[12]. The soils underlying the area are likely to comprise the typical brown sands of the Bridgnorth (551a) association[13]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.6.7 Immediately to the north of the survey area narrow ridge and furrow has been identified from aerial photographs, indicative of post medieval agricultural use. Further areas of ridge and furrow have been identified to the north-east of the area, near The Old School (LiDAR3019) and to the south-east, south of Church Farm (LiDAR3013).

2.6.8 Within the survey area a linear feature observed within the LiDAR data can be seen to correspond with a former field boundary depicted on the 1st edition Ordnance Survey map (LiDAR3021).

[12] British Geological Survey (2015)
[13] Soil Survey of England and Wales (1983)

Results

2.6.9 The gradiometer survey carried out between 11 – 12 January 2017 using hand-held systems has identified areas of ridge and furrow, as well as more modern agricultural features, numerous natural trends and ferrous responses.

2.6.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –20 - 22). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figure 22).

Interpretation: archaeology

2.6.11 Broadly spaced, low magnitude, parallel linear trend anomalies have been identified across the eastern portion of the survey area (4-2496-001 and 4-2496-002). The anomalies are aligned north-east to south-west and are typical of ridge and furrow cultivation.

Interpretation: agricultural

2.6.12 Two fractured linear anomalies can be seen aligned north-west to south-east (4-2496-003) and north-east to south-west (4-2496-004). The anomalies correspond to former field boundaries present on historic mapping with 4-2496-003 visible on the 1st edition 1880 Ordnance Survey map and 4-2496-004 first visible on the 1960 edition Ordnance Survey map.

2.6.13 Closely spaced parallel linear trend anomalies have been identified in the central portion of the survey area (4-2496-005). These low magnitude anomalies are interpreted to be evidence of agricultural activity in the survey area, such as ploughing.

2.6.14 In the south-west of the survey area, a network of linear dipolar anomalies has been identified (4-2496-006). These features appear to intersect and are a broadly north-west to south-east and north-east to south-west alignments. They have been interpreted as land drains.

Interpretation: natural

2.6.15 The dataset is dominated by sinuous positive anomalies. These anomalies are particularly prevalent in the north-east (4-2496-007) and in the central portions of the survey (4-2496-008). These anomalies have been interpreted as natural in origin and are likely caused by the build-up of magnetically susceptible deposits in depressions in the underlying geology.

Interpretation: modern

2.6.16 A small area of increased magnetic background has been identified in the south-east of the survey area (4-2496-009). This anomaly does not correspond to anything on historic mapping, and is therefore most likely to represent an area of spreading or burning, although a possible infilled pond or area of made ground is also plausible.

2.6.17 Several areas of increased ferrous activity have been identified primarily around the periphery of the survey area. These anomalies are the result of disturbance from fences and ferrous objects surrounding the survey area.

Conclusions

2.6.18 Anomalies of potential archaeological origin have been identified by the survey. Ridge and furrow cultivation seen in the area may date to as early as the early medieval period. There is no evidence for any further medieval or post-medieval activity within the data. The remaining data identifies more modern agricultural activity and natural trends throughout.

2.7 CA4-2501 Whitmore

Site details

2.7.1 A geophysical survey was carried out over area CA4-2501 at Whitmore (centred on NGR 380093, 340976 (Figure 23)).

2.7.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity in the surrounding area.

2.7.3 The survey area comprises an irregular parcel of land covering three fields to the north of the A53, approximately 0.6km west of Whitmore and approximately 9km south-west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 9.6ha of the 13.4ha survey area.

2.7.4 The survey area lies on a south-east facing slope. The north-west area of the survey area peaks at approximately 141m AOD and falls to 127m AOD at the south-eastern extent.

2.7.5 There are no overhead cables or water courses present over the survey area. A substantial trackway is located across the central portion of the survey area.

2.7.6 The underlying geology across the southernmost edge is mapped as the Wildmoor Sandstone Formation; to the north of this is a narrow band of the interbedded sandstone and conglomerate of the Kidderminster Formation and then a wide band of the conglomerate of the Kidderminster Formation. Within the northern part of the survey area there is another band of the interbedded sandstone and conglomerate of the Kidderminster Formation with the mudstone, sandstone and conglomerate of the Salop Formation to the north of this. No superficial deposits are recorded[14]. The soils underlying the survey area are likely to comprise the typical humo-ferric podzols of the Goldstone (631e) association[15]. Soils in such geological settings have been

[14] British Geological Survey (2015)
[15] Soil Survey of England and Wales (1983)

demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.7.7 A possible barrow was identified just to the north-west of the area (SHERMST1995), although partial excavation in 1935 did not reveal any supporting archaeological evidence. Given the known quarrying activity in the area this feature could also be related to gravel extraction.

2.7.8 To the west of the survey area is the landscaped park around Whitmore Hall, this may have been originally established in the 16th century along with the house (NHLE1206579), but was re-landscaped completely in the 18th to 19th centuries (SHERMST6013). The area adjacent to the survey area is thought to have been an area of walled gardens, although only one still survives (SHERMST12389).

2.7.9 Within the survey area a large area of post medieval ridge and furrow has been identified through aerial photography assessment (AP155). Another area of possible ridge and furrow has been observed to the south-east near The Old School (LiDAR3019).

2.7.10 A north-east to south-west aligned linear feature immediately to the south of the survey area can be seen to correspond to field boundaries shown on the 1st edition Ordnance Survey map (LiDAR3021). Other ditches are noted from the aerial photography assessment but their date is unknown.

2.7.11 To the north-west of the survey area former gravel pits indicate extraction activity in the wider area (LiDAR3024).

Results

2.7.12 The gradiometer survey carried out between 10 – 12 January 2017 using hand-held systems has identified areas of ridge and furrow, as well as more modern agricultural features, numerous trends, and ferrous responses.

2.7.13 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 24 - 29). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figure 26 and 29).

Interpretation: archaeology

2.7.14 To the east of the survey area, broadly spaced parallel linear trend anomalies have been identified on a north-west to south-east alignment (4-2501-001 and 4-2501-002). These anomalies have been interpreted as evidence of ridge and furrow cultivation.

Interpretation: agricultural

2.7.15 Throughout the dataset several closely spaced parallel linear anomalies have been identified at a variety of alignments, but these are generally north-west to south-east

or south-west to north-east (4-2501-003 to 4-2501-010). These anomalies are indicative of agricultural activity within the survey area, such as ploughing.

2.7.16 In the north-east of the survey area a high magnitude linear anomaly has been identified aligned west-south-west to east-north-east (4-2501-011). This anomaly corresponds to a former field boundary visible on historic mapping (1st edition Ordnance Survey 1880).

2.7.17 In the south of the survey area, a small collection of interlinked, dipolar linear anomalies has been identified (4-2501-012). This type of anomaly is generally indicative of material that has been subject to burning or firing, such as ceramics or bricks. Due to the alignment of this anomaly, it has been interpreted as a small area of land drains.

Interpretation: geological or natural

2.7.18 Large areas of sinuous positive anomalies have been identified by the survey (4-2501-013 to 4-2501-017). These range in size and magnitude throughout the dataset. These anomalies are likely the result of the build-up of magnetically susceptible deposits in depressions and natural pits in the underlying geology.

Conclusions

2.7.19 Anomalies indicative of historic cultivation have been identified by the detailed magnetometer survey. Ridge and furrow that could date to the medieval period has been identified as the only archaeological feature in the survey data. The remaining dataset has details geological and modern agricultural anomalies.

2.8 CA4-2591 Baldwin's Gate, Whitmore

Site details

2.8.1 A geophysical survey was carried out over area CA4-2591 Baldwin's Gate, Whitmore (centred on NGR 379651, 341378 (Figure 30)).

2.8.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity in the surrounding area.

2.8.3 The survey area comprises a parcel of land covering two small fields to the south of Snape Hall Road, 1.2km north-west of Baldwin's Gate, approximately 9.2km south-west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries. The gradiometer survey covered 3.3ha of the 3.88ha survey area, with a reduction due to a wooded area.

2.8.4 This survey area lies on a north-west facing slope. The southern boundary of the survey area lies at approximately 165m AOD and falls to 135m AOD at the north-western extents.

2.8.5 There are no overhead cables or watercourses present over the survey area. There is a break in the centre of the survey area due to a wooded area which also forms the southern boundary. No other internal boundaries are present.

2.8.6 The underlying geology of the survey area is mapped as the Kidderminster Formation of sandstone and conglomerate within the bands of the Salop Formation of mudstone, sandstone and conglomerate. No superficial deposits are recorded[16]. The soils underlying the survey area are likely to comprise the typical humo-ferric podzols of the Goldstone (631e) association[17]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.8.7 Evidence from LiDAR data indicates the presence of a block of medieval to post-medieval ridge and furrow (LiDAR3030), one of six similar areas present to the north, north-west and north-east of the survey area. The LiDAR data also records the presence of an oval mound (LiDAR3029) which overlies the ridge and furrow, thought to represent the spoil heap from extraction operations, and a bank from a former field boundary to the west of the ridge and furrow (LiDAR3026).

2.8.8 The area surrounding the survey area contains several further field boundaries visible on LiDAR data (LiDAR3026) and several cut features likely to represent areas of extraction (LiDAR3024, 3028). Evidence from aerial photographs indicates the location of a field system to the south-east of the area which contains evidence of narrow ridge and furrow.

2.8.9 The historic environment record (HER) records the extent of Madeley Great Park (SHERMST1220), first mentioned in documentary evidence in 1272 and disparked in approximately 1808 with some of its former boundaries still remaining as substantial earthworks. Within the area of the park noted by the Staffordshire HER is the Grade II listed Snape Hall Farmhouse (NHLE 1206528) which was constructed in the mid 17th century and formed part of a farmstead laid out in U-plan courtyard (SHERMST14176).

Results

2.8.10 The gradiometer survey carried out on the 13 September 2016 using hand-held systems has identified anomalies of possible archaeological interest and agricultural features along with numerous trends and ferrous responses.

2.8.11 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –31 - 33). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 33).

[16] British Geological Survey (2015)
[17] Soil Survey of England and Wales (1983)

Interpretation: archaeology

2.8.12 Two positive anomalies are located in the north-east extreme of the survey area (4-2591-001 and 4-2591-002). The anomalies measure approximately 3m by 2m and are approximately 36m apart. They have been tentatively ascribed a possible archaeological interpretation due to their response being consistent with archaeological features such as pits.

2.8.13 To the south-west (4-2591-004) and further to the north-east (4-2591-005) broader spaced, parallel, linear anomalies have been identified. These are indicative of possible ridge and furrow cultivation and could date to the medieval period.

Interpretation: agricultural

2.8.14 In the south-west part of the survey, low magnitude, parallel linear trend anomalies have been identified, aligned north to south (4-2591-003). These are indicative of modern agricultural ploughing activity.

2.8.15 Higher magnitude, linear, trend anomalies, orientated north-north-west to south-south-east, have been identified in the centre of the survey area (4-2591-006). The increased magnitude is indicative of burned or fired material, such as ceramics. Due to their alignment and magnitude, these anomalies have been interpreted as land drains.

2.8.16 Two areas of dipolar responses have been identified within the survey area. 4-2591-007 and 4-2591-008. These have been interpreted as the result of the spreading of green waste as part of fertilisation.

Interpretation: modern utilities

2.8.17 Aligned east to west across the eastern portion of the survey, a high magnitude (+/-100 nT) trend, has been identified (4-2591-009). This is indicative of a modern underground utility pipe.

Conclusions

2.8.18 The survey has identified areas of possible archaeology. Several anomalies have tentatively been interpreted as possible pits based on their magnetic response. Further evidence of modern and historical agricultural practice has been identified by the survey, including modern ploughing, possible ridge and furrow cultivation, and the spreading of green waste for fertilisation.

2.8.19 Ferrous anomalies have been identified across the survey, most notably an underground utility at the eastern extreme of the survey area.

2.9 CA4-2607 Whitmore Heath

Site details

2.9.1 A geophysical survey was carried out over area CA4-2607 Whitmore Heath (centred on NGR 3796, 341480 (Figure 34)).

2.9.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity in the surrounding area.

2.9.3 This survey area comprises a single arable field to the north of Snape Hall road, 1.2km north-west of Baldwin's Gate, approximately 9.2km south-west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries. The gradiometer survey covered 2.1ha of the 2.6ha survey area with the reduction to coverage caused by overgrowth and trees.

2.9.4 This survey area lies on a west facing slope. The eastern boundary of the survey area lies at approximately 160m AOD and falls to 135m AOD at the western extent.

2.9.5 There are no overhead cables or internal field boundaries present over the survey area. The northern boundary follows a small water course with large trees.

2.9.6 The underlying geology of the survey area is mapped as the Salop Formation of mudstone, sandstone and conglomerate with a band of the Salop Formation of sandstone within the eastern section of the area. No superficial deposits are recorded[18]. The soils underlying the survey area are likely to comprise the typical humo-ferric podzols of the Goldstone (631e) association[19]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.9.7 Analysis of LiDAR data has indicated the presence of a block of medieval to post-medieval ridge and furrow (LiDAR3030), four post-medieval former field boundaries (LiDAR3026) and an area of former extraction (LiDAR3028) within the survey area.

2.9.8 Outside of the survey area, LiDAR data indicates the presence of further areas of medieval to post medieval ridge and furrow and former field boundaries lying immediately adjacent to its eastern and western boundaries, as well as within the field across the road to the south.

2.9.9 To the west of the survey area the HER records the extent of Madeley Great Park (SHERMST1220), first mentioned in documentary evidence in 1272 and disparked in approximately 1808 with some of its former boundaries still remaining as substantial earthworks. Within the area of the park noted by the HER is the Grade II listed Snape Hall Farmhouse (NHLE1206528), which was constructed in the mid 17th century and formed part of a farmstead laid out in U-plan courtyard (SHERMST14176).

[18] British Geological Survey (2015)
[19] Soil Survey of England and Wales (1983)

Results

2.9.10 The gradiometer survey carried out on the 12 September 2016 using hand-held systems has identified anomalies of possible archaeological interest and agricultural features along with numerous trends and ferrous responses.

2.9.11 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –35 - 37). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 37).

Interpretation: archaeology

2.9.12 To the eastern side of the survey area, a small cluster of anomalies has been interpreted primarily as geological responses however there are two potential archaeological features in the vicinity at 4-2607-001. These anomalies are pit-like in appearance and present as positive (+2 - +4 nT).

Interpretation: agricultural

2.9.13 To the south of the survey area, broadly spaced parallel linear trend anomalies have been identified. These are indicative of modern agricultural activity, such as ploughing.

Interpretation: geological or natural

2.9.14 Broad anomalies, measuring 3-5m wide and spanning the length of the survey area, have been identified (4-2607-002). These have been interpreted as natural anomalies, likely the caused by the build-up of magnetically susceptible sands and gravels in varying depths in the underlying geology.

Interpretation: modern

2.9.15 Aligned west-south-west to east-north-east across the northern part of the survey, two high magnitude (+/- 100 nT), linear trend anomalies can be seen parallel to each other and appear to join to become one at the north-eastern end (4-4607-003 and 4-2607-004). This type of anomaly is indicative of a modern underground utility pipe, consisting of highly ferrous material.

Conclusions

2.9.16 The survey has identified pit-like features as the only anomalies that may be of archaeological origin. There is no evidence for any medieval or post-medieval activity within the dataset, although this is recorded in the surrounding area. The remaining dataset shows clear geological and agricultural activity across the survey with more modern high magnitude anomalies consistent with utility pipes identified across the north of the area.

2.10 CA4-2659 Whitmore Wood, Whitmore

Site details

2.10.1 A geophysical survey was carried out over area CA4-2659 Whitmore Heath (centred on NGR 378971, 341963 (Figure 38)).

2.10.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential. This is as a result of the presence of medieval and post-medieval agricultural activity within the survey area which includes traces of ridge and furrow and former field boundaries.

2.10.3 This survey area comprises several arable and pasture fields to the north of Snape Hall Road, 1.8km north of Baldwin's Gate, approximately 10km west-south-west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries. The gradiometer survey covered 41.1ha of the 59.2ha survey area with the reduction to coverage caused by overgrowth and trees.

2.10.4 This survey area lies on a steep west facing slope. The extreme east of the survey area lies at approximately 175m AOD and falls down to the western boundary at approximately 115m AOD.

2.10.5 There are no overhead cables or water courses present over the survey area. Internal field boundaries consist of hedgerows and small fence lines. Several trackways traverse the survey area.

2.10.6 The underlying geology of the survey area is mapped as the Salop Formation with bands of sandstone and mudstone, sandstone and conglomerate alternating across the survey area. No superficial deposits are recorded across the majority of the survey area, although a small area of till is mapped along the western edge[20]. The soils likely consist of stagnogleyic argillic brown earths of the Whimple 3 (572f) formation in the east, whilst the west is likely covered by earthy eu-fibrous peat soils of the Altcar 1 (1022a) formation[21]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.10.7 The area lies at the northern edge of Madeley Great Park (SHERMST1220). The boundary of the park runs through the western part of the survey area. The park is first documented in the 13th century and was not disparked until around the turn of the 19th century.

2.10.8 Two possible areas of extraction or possible quarrying are recorded to the north of the survey area (LiDAR3048). A number of small hollows and ponds visible on the 1st

[20] British Geological Survey (2015)
[21] Soil Survey of England and Wales (1983)

edition Ordnance Survey map on the edges of the woodland to the north-east are also likely to be the remains of earlier quarrying.

2.10.9 Possible drainage or water meadows have been identified from aerial photographs within an area of land immediately to the south-west of the survey area (AP152). A number of parallel linear features were identified within the LiDAR data to the south near to the railway line (LiDAR3043) which are also probable post-medieval drainage.

2.10.10 Three blocks of possible vestigial ridge and furrow have been identified in the LiDAR data to the north of Whitmore Wood (LiDAR3038, 3046). Possible ridge and furrow has also been mapped in the wood itself, although this may be related to modern woodland management (LiDAR3042). Further parcels of former ridge and furrow have been identified on the southern part of the survey area, along with several linear features which are probable former field boundaries (LiDAR3030, 3033, 3035).

2.10.11 The Grade II Listed Snape Hall Farmhouse lies in the southern part of the survey area (NHLE 1206528). This mid 17th century building is believed to have earlier origins from documentary evidence (SHERMST14176, MST7104).

Results

2.10.12 The gradiometer survey carried out between 5 – 16 December 2016 using a combination of hand-held and cart based systems has identified areas of ridge and furrow, as well as several anomalies of possible archaeological interest and agricultural features, along with numerous trends and ferrous responses.

2.10.13 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –39 - 47). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 40, 43, 45 and 47).

Interpretation: archaeology

2.10.14 Broadly spaced, parallel linear anomalies have been identified in several areas across the dataset (4-2659-001 and 4-2659-002). These are aligned south-west to north-east at 4-2659-001 and north-west to south-east at 4-2659-002. Due to their spacing and alignment these anomalies have been interpreted as evidence of ridge and furrow cultivation. The straight nature of these trends is thought more indicative of the post-medieval period than the medieval period which is characterised by more curved plough lines.

2.10.15 Two small curvilinear anomalies have been identified in the centre of the survey area (4-2659-003). The isolated nature of these features makes interpretation of these anomalies difficult and may suggest a natural origin. However, the possibility that they relate to the fragmented remains of small enclosures or ring ditches cannot be discounted.

2.10.16 A small cluster of positive anomalies, including a curvilinear anomaly similar to those seen at 4-2659-003 have been identified in the south-west of the survey area (4-2659-004). Specifically, the curvilinear anomaly is considered to be of a possible archaeological origin. This may be evidence of a small enclosure or ring ditch with associated pit-like features. However, they could equally relate to natural variation in soils or be modern in origin.

2.10.17 A strong positive, undefined anomaly has been identified to the south-east of the survey area (4-2659-005). This potential feature presents as a very strong anomaly and has tentatively been interpreted as possible archaeology as a result. However, it could equally relate to the laying of nearby underground utilities (4-2659-029 and 4-2659-030) or other modern activity in the area.

Interpretation: agricultural

2.10.18 A low magnitude negative rectilinear anomaly has been identified in the north of the survey area (4-2659-006). This anomaly appears in the west, aligns north-west to south-east and proceeds to turn at an oblique angle to a south-west to north-east alignment. This potential feature and a similar feature to the west (4-2659-007) appear to correspond to former field boundaries present in 1st edition Ordnance Survey mapping (1880).

2.10.19 A further positive, linear anomaly (4-2659-008) has been identified in the southern portion of the survey area. This anomaly is interpreted as an unrecorded former field boundary.

2.10.20 Several networks of dipolar, linear anomalies have been identified throughout the dataset. These anomalies have been identified at 4-2659-009 – 4-2659-018. The anomalies are indicative of materials that have been burnt or fired, such as ceramics, and as such have been interpreted as networks of land drains spread across much of the survey area.

2.10.21 More pronounced, closely spaced parallel linear anomalies have also been identified throughout the dataset. These are interpreted as evidence of modern agricultural activity.

Interpretation: geological or natural

2.10.22 There is significant natural variation identified across the dataset. This is largely considered to be a result of thinner top soils and variable (although unrecorded) superficial deposits in the elevated areas of the survey. Areas of variable magnetic background resulting in a sinuous appearance to the anomalies correspond to higher areas of elevation. These anomalies are mostly prevalent at 4-2659-019 in the north, 4-2659-020 in the centre of the survey, 4-2659-021 in the south, and 4-2659-022 in the east of the survey. The strong positive linear anomalies present in the dataset are likely the result of the accumulation of magnetically susceptible deposits in depressions in the underlying bedrock geology.

2.10.23 Other, more isolated, areas of increased magnetic background have also been identified by the survey (4-2659-023 – 4-2659-025). These anomalies have been interpreted as localised areas of natural variation in the underlying superficial deposits, which are likely to be unrecorded, and are the result of variations in the magnetic susceptibility of the deposits.

Interpretation: modern utility

2.10.24 To the south of 4-2659-026, a high magnitude (+/- 100 nT) linear anomaly has been identified aligned west-south-west to east-north-east (4-2659-028). The strength of this anomaly is indicative of a modern utility, such a cable.

2.10.25 Further strong dipolar linear anomalies have been identified aligned north to south (4-2659-029), east to west (4-2659-030), and north-east to south-west (4-2659-031) in the southern portion of the survey area, as well as one running west to east before turning south-east in the west of the area (4-2659-032). These high magnitude anomalies are indicative of modern utilities, such as pipes.

Interpretation: modern

2.10.26 A broad, dipolar, linear anomaly aligned east to west across the southern portion of the survey area has been identified as a modern trackway (4-2659-026). A further trackway (4-2659-027) is evident in the north of the area.

Conclusions

2.10.27 The survey has identified areas of possible post medieval ridge and furrow as the only anomalies that can be confidently classified as being of an archaeological origin. Several areas of possible archaeological features, such as pits and enclosures, have also been detected. The interpretation for these anomalies is tentative due to their isolated nature. The majority of these anomalies could be natural or modern origin on further investigation.

2.10.28 Clear geological variations and agricultural activity is evident across the survey area. Modern, high magnitude anomalies consistent with utility pipes have been identified across significant proportions to the south of the survey area where possible archaeological features have been identified. It is possible that the magnetic disturbance caused by these modern features may be masking weaker archaeological anomalies.

2.11 CA4-2695 south of Hey House, Whitmore

Site details

2.11.1 A geophysical survey was carried out over area CA4-2695 south of Hey House, Whitmore, Staffordshire (centred on NGR 377635, 342828 (Figure 48)).

2.11.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity identified in the LiDAR data and on aerial photography.

2.11.3 The survey area comprised three fields to the south of Hey House, approximately 1.8km south of Madeley and 10.5km to the west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries along the north and east, with open boundaries to the south and west. The gradiometer survey covered 13.9ha of the 19.8ha survey area.

2.11.4 This survey area lies on an east facing slope. The most westerly point of the survey area lies at approximately 134m AOD and drops to 111m AOD at the eastern extent.

2.11.5 There are no overhead cables above the survey area. Internal field boundaries are formed of hedgerows and fence lines, as well as farm tracks.

2.11.6 The underlying geology is mapped as the Halesowen Formation - Mudstone, Siltstone and Sandstone with a band of Butterton Sandstone Bed running from north-west to south-east across the centre of the survey area. No superficial deposits are recorded[22]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Hodnet (572c) association[23]. Soils derived from these parent geological materials are considered suitable for magnetometry.

Archaeological background

2.11.7 Across the survey area are a series of linear features to the south of Hey House (LiDAR 3050). Some of the features may represent the remains of former field boundaries, although none of the features are present on historic mapping. As a group, the features follow the same sinuous north-south alignment as the modern field boundary to the east. The longest of the features, measuring 800m north-south, extends southwards into a drainage ditch, suggesting that some of these features may also be related to drainage.

2.11.8 Partially within the western part of the survey area are two blocks of ridge and furrow to the east of Manor Cottages, divided by a track, identified in the LiDAR data (LiDAR3055). These are aligned east-west with the southern block being more curvilinear, which may reflect an earlier date.

2.11.9 Approximately 20m to the west of the survey area is an earthwork mound which is recorded within the HER as a possible Bronze Age round barrow (SHERMST1414). The mound is 37m in diameter and approximately 3m in height.

[22] British Geological Survey (2015)
[23] Soil Survey of England and Wales (1983)

Results

2.11.10 The gradiometer survey carried out between 8 – 12 November 2016 using a cart based system has identified areas of probable archaeological significance, as well as ridge and furrow, modern agricultural features, and modern features, along with numerous trends and ferrous responses.

2.11.11 Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (Figures 49 – 52). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figure 50 and 52).

Interpretation: archaeology

2.11.12 One key area of archaeology has been identified by the survey. A meandering, irregular linear feature has been detected, orientated roughly north-east to south-west across the southern portion of the survey area (4-2695-001). This complex of anomalies has been interpreted as a possible First World War practice trench based on its shape and alignment in comparison to previous survey results which identified these types of features on other archaeological sites. This feature appears to continue to the north-east in CA4-2700. This interpretation should be considered tentative until further investigation has taken place.

2.11.13 There are also less distinct pit-like features (4-2695-002 – 4-2695-003) along the route of the possible practice trench. These vary in size from 1.0 – 3.5m in diameter. Whilst it is possible that these are related to the trench activity (4-2695-001), they may represent natural features.

2.11.14 Several areas of parallel anomalies (4-2695-004 – 4-2695-008), spaced at 4 – 8m, have been identified across the survey area. These are indicative of ridge and furrow ploughing. Given the relatively straight and narrow nature of the trends, it is possible that the ridge and furrow activity dates to the post-medieval period.

Interpretation: agricultural

2.11.15 A fragmented positive linear anomaly (4-2695-009) runs across the south of the survey area. This runs approximately 143m west to east before turning approximately 77m south-south-east. This is thought to relate to a former field boundary, as evidence of ridge and furrow cultivation (4-2695-006 – 4-2695-008) appears to respect the feature. However, this feature is not visible on any available mapping of the area.

2.11.16 A sub-rectangular area of strong dipolar responses (4-2695-010) is present in the east of the dataset. This is likely related to the modern agricultural practice of spreading green waste fertiliser. These responses do have the potential to mask weaker archaeological anomalies.

Interpretation: geological or natural

2.11.17 A positive, sinuous anomaly (4-2695-011) runs *c.*150 m north-west to south-east through the centre of the area. The weakly magnetic response (0.5 – 1 nT) and broadness (5 – 8.5m) of this feature suggests it is likely related to geological variation, possibly related to a band of sandstone recorded across the area.

Interpretation: modern

2.11.18 A linear band of dipolar responses (4-2695-012 – 4-2695-013) runs *c.*295m along the north-eastern boundary of the survey area. This is a modern magnetic disturbance related to a trackway visible on aerial photography of the area.

2.11.19 Three areas of magnetically strong (+/- 100 nT) dipolar responses (4-2695-014 – 4-2695-016) are seen across the centre of the area. These vary in diameter from 16 – 30m. Responses such as these are indicative of modern made ground and may relate to back filled ponds.

Conclusions

2.11.20 The detailed gradiometer survey has detected a possible First World War practice trench and areas of ridge and furrow within the survey area. It is possible that further activity is present around the possible First World War feature.

2.11.21 The majority of the anomalies detected are interpreted as modern or natural in origin. The modern features relate to agricultural practices, trackways, and areas of made ground.

2.12 CA4-2700 land to south-east of Hey House, Whitmore

Site details

2.12.1 A geophysical survey was carried out over area CA4-2700 south-east of Hey House, Whitmore, Staffordshire (centred on NGR 377699, 342064 (Figure 53)).

2.12.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post-medieval activity seen in the LiDAR data and on aerial photography.

2.12.3 This survey area comprises six pasture fields to the east of Manor Road, approximately 1.6km south of Madeley and 10.5km to the west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries along the north, south, and west, with the West Coast Main Line railway to the east. The gradiometer survey covered 8.7ha of the 9.3ha survey area, with an area in the north-east not able to be surveyed as a result of waterlogged ground. This survey area is therefore considered to be completed. The survey area lies on flat ground, lying at approximately 111m AOD. Overhead cables traverse north to south across the north of the survey area.

2.12.4 The solid geology across the survey area is recorded as mudstone, siltstone, and sandstone of the Halesowen formation. Superficial deposits of glaciofluvial sand and gravel are present across the survey area[24]. The soils underlying the majority of this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Hodnet (572c) association. An area of brown earth, of the Wick 1 (541r) association, is recorded across the south-east[25]. Soils derived from these parent geological materials are considered to be suitable for magnetometry.

Archaeological background

2.12.5 There is very little archaeological evidence within the vicinity of the survey area. The LiDAR data shows a large, shallow pit feature, sub-circular in form and measuring 60m in diameter on the very northern edge of the survey area (LiDAR 3051). This is probably as a result of post medieval mineral extraction.

2.12.6 The early 18th century Grade II Listed Hey House lies just to the north of the survey area (NHLE 1206142, SHER MST7042, MST14433).

2.12.7 To the west of the survey area are a series of linear features to the south of Hey House (LiDAR 3050). Some of the features may represent the remains of former field boundaries, although none of the features are present on historic mapping. As a group, the features follow the same sinuous north to south alignment as the modern field boundary to the east. The longest of the features, measuring 800m, extends southwards into a drainage ditch, suggesting that some of these features may also be related to drainage.

2.12.8 Further to the west are two blocks of ridge and furrow, divided by a track, identified in the LiDAR data (LiDAR 3055). As well as an earthwork mound, which is recorded within the HER as a possible Bronze Age round barrow (SHER MST1414).

Results

2.12.9 The gradiometer survey carried out between 7 – 9 November 2016 using hand-held systems has identified a small number of anomalies of archaeological and possible archaeological interest, as well as evidence of agricultural activity, and modern features, along with numerous trends and ferrous responses.

2.12.10 The results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 54 - 59). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 56 and 59).

Interpretation: archaeology

2.12.11 A sinuous linear anomaly (4-2700-001) runs north to south along the south-western boundary survey area. The anomaly covers approximately 205m with a width of

[24] British Geological Survey (2015)
[25] Soil Survey of England and Wales (1983)

approximately 5m. This anomaly has been interpreted as a possible First World War practice trench based on its shape and alignment in comparison to previous survey results which identified these types of features on other archaeological sites. This is likely a continuation of a feature identified in CA4-2695 (4-2695-001).

2.12.12 A fragmented positive linear anomaly (4-2700-002) runs along the southern boundary of the survey area. This anomaly is indicative of a ditch feature, with a width of 0.5 – 1.5m and running for approximately 90m. The western end of the anomaly appears to terminate at an area of dipolar responses (4-2700-003). This may be evidence of a back filled pond, suggesting that the probable ditch (4-2700-002) may be a drainage feature. However, the origin of these is not clear and it is not possible to rule out an archaeological origin, potentially relating to the possible First World War practice trenches identified to the north-west (4-2700-001).

Interpretation: agricultural

2.12.13 Large areas of dipolar responses have been detected across much of the dataset. These are evidence of the modern agricultural practice of spreading green waste as fertiliser. Whilst this does have the potential to mask weak archaeological features, the sparse coverage of the dipolar responses may allow for archaeological features to be visible.

2.12.14 An area of linear dipolar anomalies (4-2700-004) has been identified in the south of the dataset. These responses are indicative of clay pipes, given their herring bone pattern they are interpreted as land drains.

Interpretation: modern utilities

2.12.15 A magnetically strong linear anomaly (4-2700-005) runs north to south through the north of the survey area. This anomaly is indicative of a modern utility.

Interpretation: modern

2.12.16 A moderately strong (+/-15 nT) linear anomaly (4-2700-006) runs *c.*50 m east-north-east to west-south-west across the north of the survey area. The exact cause of this feature is not clear; however, the strength of the anomaly and its magnetic profile, positive with associated negative response, suggests that it is a modern feature and possibly ferrous.

2.12.17 An area of dipolar responses (4-2700-007) has been detected in the centre of the survey area. The anomaly is approximately 11m in diameter. This is indicative of an area of modern made ground, possibly related to a back filled pond.

Conclusions

2.12.18 The detailed gradiometer survey has detected a First World War practice trench, which likely forms part of a wider complex seen in CA4-2695. A further ditch-like feature may be an extension. There is no evidence of medieval or post medieval activity within the dataset, although this is recorded in the surrounding area.

2.12.19 Whilst ferrous responses from the spreading of green waste are evident in the area it is thought unlikely that these are masking archaeological features. This is due to the relatively weak and sparsely spread nature of the ferrous responses. Other modern agricultural activity is evident across the area, with land drains identified to the south. Several modern features have been identified, including a modern utility and probable ferrous features.

2.13 CA4-2774 west of Hey House, Whitmore

Site details

2.13.1 A geophysical survey was carried out over area CA4-2774 west of Hey House, Whitmore, Staffordshire (centred on NGR 377155, 343409 (Figure 60)).

2.13.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post medieval activity seen in the LiDAR data and on aerial photography.

2.13.3 The survey area comprises three pasture fields to the west of Manor Road, approximately 1.3km south of Madeley and 11km to the west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries along the north and east, with open boundaries to the south and west. The gradiometer survey covered 8.4ha of the 18.5ha survey area.

2.13.4 The survey area lies on an east facing slope. The most westerly point of the survey area lies at approximately 143m AOD and drops to 108m AOD at the eastern extent.

2.13.5 Overhead cables traverse the eastern boundary of the area, as well as running north-east to south-west across the south of the survey area. Internal field boundaries are formed of hedgerows and fence lines.

2.13.6 The solid geology is recorded as mudstone, siltstone, and sandstone of the Halesowen formation across the majority of this survey area, with a band of Butterton Sandstone Bed running from north-west to south-east across the centre. Superficial deposits of till are recorded in the central of the survey area and glaciofluvial sand and gravel in the north-eastern part[26]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Hodnet (572c) association[27]. Although the presence of overlying deposits of till may reduce the effectiveness of magnetometer survey, potentially providing random false positive readings in the geophysical survey, soils derived from these parent geological materials are considered suitable for magnetometry.

[26] British Geological Survey (2015)
[27] Soil Survey of England and Wales (1983)

Archaeological background

2.13.7 There are several blocks of ridge and furrow and former field boundaries that have been located to the west of Hey House Lodge and Manor Cottages in the LiDAR data (LiDAR3061). Six distinct blocks of ridge and furrow are present in the data, ranging in size from 1.8 to 0.2ha. Some of these lie within the southern part survey area. A linear feature also identified corresponds with a former field boundary between these parcels.

2.13.8 A post-medieval field system has been mapped from aerial photography as partially lying within the south-west of the survey area. Further field systems are recorded to the east (LiDAR3053). Former field boundaries have been identified within the LiDAR data in the north of the survey area (LiDAR3067).

Results

2.13.9 The gradiometer survey carried out between 10 – 11 November 2016 using hand-held systems has identified areas of ridge and furrow, agricultural features, and modern features, along with numerous trends and ferrous responses.

2.13.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –61 - 66). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figures 63 and 66).

Interpretation: archaeology

2.13.11 Areas of spaced parallel linear anomalies (4-2774-001 – 4-2774-002) spaced at 5 – 8m have been detected across the centre and south of the survey area. These are indicative of ridge and furrow cultivation. Given their relatively straight nature it is possible that these are post medieval in origin.

Interpretation: agricultural

2.13.12 Large areas of dipolar responses (4-2774-003 – 4-2774-005) have been identified in the north-east and south of the survey area. These are most likely related to the modern agricultural practice of spreading green waste fertiliser over the fields. This does have the potential to mask weaker archaeological anomalies; however more substantial remains would still be visible.

2.13.13 Four weak dipolar linear anomalies (4-2774-006 – 4-2774-009) are seen across the east and south of the area. These vary in length from 29 – 79m and are indicative of land drains.

2.13.14 A small number of unidentified trends have also been highlighted in the north-east of the surveyed area. These are responses that present clear variations from the background magnetic response that are too weak to provide an accurate interpretation for. Although caution is being exercised, most are likely related to modern agricultural activity.

Conclusions

2.13.15 The detailed gradiometer survey has detected areas of ridge and furrow as the only anomalies of archaeological origin within the dataset. These are thought to be possibly post-medieval in origin due to their relatively straight nature. There is no further evidence of medieval or post-medieval activity. The survey has also identified several modern agricultural features across the area. These include land drains and disturbance caused by green waste fertiliser.

2.14 CA4-2810 land south-east of Moor Hall

Site details

2.14.1 A geophysical survey was carried out over area CA4-2810 at land south-east of Moor Hall, Madeley, Staffordshire (centred on NGR 376692,344326 (Figure 67)).

2.14.2 The area was selected because of the undated ditches, identified from aerial photography, within the survey area with traces of medieval and post medieval field systems and mineral extraction adjacent to the survey area.

2.14.3 The survey area comprises the western portion of two fields located north of Bar Hill, approximately 0.7km south-west of Madeley and 11.4km to the west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries for the majority of the survey area and open arable land to the east. The gradiometer survey covered the entire 4ha of the survey area.

2.14.4 The survey area lies on a gentle north facing slope. The northern portion of the survey area lies at approximately 117m AOD and drops to 115m AOD at the very southern extent.

2.14.5 An overhead cable traverses the southernmost portion of the survey area.

2.14.6 The solid geology is recorded as mudstone, siltstone, and sandstone of the Halesowen formation across the survey area. Superficial deposits of till are recorded across the northern part of the area[28]. The underlying soils are likely to comprise the typical stagnogley soils of the Clifton (711n) association[29]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.14.7 The aerial photography assessment has identified a number of ditches across the survey area and extending to the east. These are of unknown date or function, but are thought to be more extensive than those identified in the photographs. In the surrounding area LiDAR has highlighted several linear features, some of which are probable former field boundaries (LiDAR3080, 3082, 3083, 3079). Several ponds are

[28] British Geological Survey (2015)
[29] Soil Survey of England and Wales (1983)

depicted on historic maps to the north and east of the survey area and may be sites of former mineral extraction. LiDAR has also found a possible extractive pit 140m to the east (LiDAR3077).

2.14.8 Moor Hall is located just to the north-west of the survey area, which is depicted on the 1st edition Ordnance Survey map. This is believed to stand on top of a probable medieval moated site, part of which may extend into the north-eastern corner of the survey area (SHER MST3724).

Results

2.14.9 The gradiometer survey carried out between 14 – 15 November 2016 using hand-held systems has identified no anomalies of definite archaeological interest, but has identified anomalies consistent with agricultural features along with numerous trends and ferrous responses.

2.14.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –68 - 70). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 70).

Interpretation: agricultural

2.14.11 Across the survey area, numerous low magnitude, parallel linear trend anomalies have been identified (4-2810-001-4-2810-003), most prominent in the southern portion of the dataset. These are aligned north-north-west to south-south-east and have been interpreted as evidence of modern ploughing.

2.14.12 Sporadic areas of a variable magnetic response have been identified across the survey area (4-2810-004 and 4-2810-005). This response is consistent with the spreading of green waste as a means of fertilisation.

Interpretation: modern

2.14.13 In the west of the northern portion of the survey area (4-2810-006) and in the north-east of the southern portion (4-2810-007), two distinctive areas of higher magnetic response have been identified. These have been interpreted as areas of made ground, as they correlate with former ponds recorded on historic mapping (1st edition Ordnance Survey map 1877-91). Magnetically susceptible deposits are often included in the fill material resulting in an increased magnetic response.

2.14.14 The southern portion of the survey area contains a network of interconnecting linear anomalies of variable magnetic susceptibility (4-2810-008, 4-2810-009). This response is consistent with fired material, such as clay pipes. These have been interpreted as land drains.

Conclusions

2.14.15 The detailed gradiometer survey has not detected any anomalies of archaeological interest within the survey area. There is no evidence for medieval or post-medieval

field systems or extraction within the dataset, although it is recorded adjacent to the area. Whilst areas of ferrous responses related to the spreading of green waste are seen across the dataset, which have the potential to mask weaker archaeological anomalies, their localised nature means the majority of the area is clear and unaffected. Several trends can be seen that are consistent with modern agricultural practices, as well as modern drains.

2.15 CA4-2876 land north of Barhill Wood, Madeley

Site details

2.15.1 A geophysical survey was carried out over area CA4-2876 at land north of Barhill Wood, Madeley, Staffordshire (centred on NGR 376348, 344350 (Figure 71)).

2.15.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to evidence of medieval agricultural practices and possibly prehistoric funerary monuments in the surrounding area.

2.15.3 The survey area comprises an irregular parcel of land covering three fields on the western periphery of the village of Madeley, Staffordshire, approximately 1km west of Madeley and 12km west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries as well as undefined survey boundaries. The gradiometer survey covered 4.9ha of the 7.0ha survey area, with the remaining area deemed unsuitable for survey due to steep slopes and overgrown vegetation.

2.15.4 This survey area lies on a north-east facing slope, resting at approximately 158m AOD to the south-west and falling to approximately 120m in the north-east. There are no overhead cables or water courses present over the survey area.

2.15.5 The underlying geology to the east of the survey area is recorded as Halesowen Formation mudstone, siltstone and sandstone, with superficial till deposits across the central and eastern part of the area. In the west, the geology is Chester Pebble Beds formation of sandstone with no superficial deposits[30]. The soils underlying the majority of the area are likely composed of typical brown sands of the Bridgenorth (551a) association, with typical stagnogley soils of the Clifton (711n) association[31]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.15.6 Within the survey area, LiDAR data indicates the presence of a faint 200m long linear feature running south-west to north-east across the middle of the survey area (LiDAR 3082). This is of unknown date or provenance, but may be a former path. LiDAR has also identified a small parcel of possible ridge and furrow which partially lies within the

[30] British Geological Survey (2015)
[31] Soil Survey of England and Wales (1983)

north-west of the survey area (LiDAR 3081). In the surrounding area it has also highlighted several former field boundaries (LiDAR 3080, 3083, 3079). Several ponds depicted on historic maps in the surrounding fields, may be sites of former mineral extraction.

2.15.7 Moor Hall is located just to the north-east of the survey area, which is depicted on the 1st edition Ordnance Survey map. This is believed to stand on top of a probable medieval moated site, part of which may extend into the north-eastern corner of the survey area (SHERMST3724).

2.15.8 Two mounds are recorded approximately 80m to the west of the survey area (SHERMST491). These have been interpreted as possible Bronze Age round barrows.

Results

2.15.9 The gradiometer survey carried out between 15 – 16 November 2016 using hand-held systems has identified anomalies relating to ridge and furrow and possible archaeological activity, as well as modern agricultural activity and ferrous responses.

2.15.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –72 - 74). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trend (Figure 74).

Interpretation: archaeology

2.15.11 An area of parallel linear anomalies (4-2876-001) spaced at 3-4m has been detected in the west of the survey area. This is indicative of an area of agricultural activity, such as ploughing. The relatively narrow, straight and uniform nature of these anomalies suggests that this is possibly post medieval in date.

2.15.12 Several low magnitude together with higher, dipolar linear anomalies (4-2876-002) form a network of interconnected anomalies that have been interpreted as possible archaeology. The anomalies form rectilinear enclosures, ranging in size from 22m by 20m to 4m by 6m. Anomalies of this type are indicative of animal enclosures and field systems. A probable medieval moated site to the north-east of the survey area may be related, but enclosures of similar construction are common in earlier periods.

2.15.13 Some of the dipolar linear anomalies interpretations relating to 4-2876-002 should be considered tentative; as such responses can represent fired material. These linear anomalies may therefore be a continuation of the land drain system to the north (4-2876-006) or, to a lesser likelihood, represent foundations or robbed out walls of buildings perhaps associated with the possible medieval moated site. The potential of the area has led to a cautious interpretation of these possible features.

2.15.14 A discrete area of dipolar responses (4-2876-003) lies on the southern boundary of the survey area, in the same location as 4-2876-002. The relationship between these

anomalies is not clear, with 4-2876-003 possibly indicating the location of burning activity, such as a kiln or fire. Made ground can on occasion present a similar response.

Interpretation: agricultural

2.15.15 An area of closely-spaced parallel linear trend anomalies (4-2876-004) has been identified in the east of the dataset. These are aligned broadly north-east to south-west and are indicative of agricultural activity, such as ploughing.

2.15.16 In the western portion of the survey area, across a large portion of the survey, a varied magnetic response has been detected (4-2876-005). This has been interpreted as evidence of green waste spreading as a method of fertilisation. However, anomalies of both a low and high magnitude have been detected within the spread.

2.15.17 Evenly spaced, parallel anomalies with a variable low magnitude (+/- 2 – 4 nT), dipolar responses have been identified (4-2876-006). This sort of response is indicative of burnt or fired material, such as ceramics. Due to their alignment to each other and other surrounding anomalies, these anomalies have been interpreted as part of a network of land drains.

Interpretation: geological or natural

2.15.18 Several low magnitude linear trend anomalies have been identified to the north-western portion of the survey area (4-2876-007 and 4-2876-008). These anomalies have been interpreted as indicative of variations in the underlying geology or soils magnetic susceptibility and are therefore considered of natural origin.

Interpretation: modern utilities

2.15.19 In the north-east corner of the survey area, three high magnitude (+/- 100 nT) linear anomalies (4-2876-009 – 4-2876-011) have been identified. These form an interconnecting triangle, and are likely related to modern utilities.

Interpretation: modern

2.15.20 At the south-eastern extreme of the survey area, a spread of ferrous disturbance has been detected (4-2876-012). This appears to relate to a hard-core surface spread in the vicinity of an entrance to the field.

Conclusions

2.15.21 The survey has identified an area of ridge and furrow, as well as anomalies of possible archaeological origin. A network of possible enclosures has been identified as well as a possible area of burning or made ground. The area has yielded notable ferrous anomalies, including utility pipes and surface compactions as well as evidence of more modern agricultural activity, such as ploughing and green waste fertilisation. The green waste fertilisation does have the potential to mask weaker archaeological anomalies.

2.16 CA4-2890 Bowerend Farm, Madeley

Site details

2.16.1 A geophysical survey was carried out over area CA4-2890 Bowerend Farm, Madeley, Staffordshire (centred on NGR 376050, 344868 (Figure 75)).

2.16.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of medieval and post medieval activity seen in the LiDAR data and on aerial photography.

2.16.3 The survey area comprises four pasture fields to the north of Bower End Lane, approximately 1km west of Madeley and 11.5km to the west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries for the majority of the survey area, with a fence line and farm buildings forming the eastern boundary. The gradiometer survey covered 2.7ha of the 16ha survey area.

2.16.4 This survey area lies on a north facing slope. The northern boundary of the survey area lies at approximately 105m AOD and rises to 145m AOD at the very south-western extent.

2.16.5 There are two small ponds within the survey area to the north and south, an overhead cable also traverses the southern field from north-east to south-west. Internal field boundaries are formed of hedgerows and fence lines.

2.16.6 The solid geology is recorded as mudstone, siltstone, and sandstone of the Halesowen formation across the majority of this survey area, with pebbly sandstone of the Chester Pebble Beds formation along the western boundary. Superficial deposits of Devensian till are recorded across the majority of the survey area, with none along the western boundary[32]. The soils underlying this survey area are likely to comprise the typical stagnogley soils of the Clifton (711n) association[33]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.16.7 There is currently a lack of evidence for prehistoric, Romano-British, and Saxon activity on the survey area or within the surrounding area, with no recorded sites, findspots, or features. Archaeological records for this area predominantly relate to the medieval and post-medieval periods.

2.16.8 An area of post-medieval ridge and furrow can be seen on aerial photography across the south of the survey area (AP159). Whilst LiDAR data has detected ridge features likely relating to former field boundaries or land management features (LiDAR3092), as well as a large pit thought to relate to extraction or quarrying (LiDAR3087).

[32] British Geological Survey (2015)
[33] Soil Survey of England and Wales (1983)

2.16.9 The west of the survey area is bound by an area of ancient woodland containing a series of associated boundary banks and ditches (SHERMST26677). Drainage features and possible areas of ridge and furrow are also visible to the east of the survey area (LiDAR3085).

Results

2.16.10 The gradiometer survey carried out between 2 – 4 August 2016 using a cart based system has identified anomalies of possible archaeological interest and agricultural features along with numerous trends and ferrous responses.

2.16.11 Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (Figures –76 - 77). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 77).

Interpretation: archaeology

2.16.12 A weak (-1.5 nT) negative linear anomaly (4-2890-001) has been identified in the east of the surveyed area. This is indicative of a bank feature, possibly part of a former field boundary or land division.

2.16.13 An area of strong (+/-100 nT) dipolar responses (4-2890-002) has been detected in the north-west of the surveyed area. This is indicative of an area of possible back filling which may relate to post medieval quarrying and extraction, as recorded in the surrounding area.

2.16.14 A small number of unidentified trends have also been highlighted in the north-east of the surveyed area. These are responses that present clear variations from the background magnetic response however are too weak to provide an accurate interpretation. These trends are most likely related to modern agricultural activity.

Interpretation: agricultural

2.16.15 Areas of linear dipolar responses can be seen in the centre (4-2890-003) and south-west (4-2890-004) of the surveyed area. These anomalies are indicative of burnt or fired materials, such as ceramics, suggesting that they are likely part of a land drainage system.

Interpretation: geological or natural

2.16.16 Four areas of slightly increased (1-2 nT) magnetic response (4-2890-005 to 4-2890-007) have been identified within the survey area. These anomalies area amorphous in shape and pattern, and as such are thought to relate to natural variation in the superficial geological deposits of the area.

Interpretation: modern services

2.16.17 A strong (+/-100 nT) magnetic linear anomaly (4-2890-008) runs north to south through the north of the surveyed area. This is indicative of a modern utility, such as a

pipe or cable. Land drains identified at 4-2890-003 appear to terminate at the utility, suggesting that it may be a large drainage pipe.

Conclusions

2.16.18 The detailed gradiometer survey has detected anomalies of possible archaeological interest within the survey area, as well as natural features, and modern services. Several weak trends have also been identified of unknown origin. The anomalies of possible archaeological interest include a linear feature that may relate to a former field boundary or other agricultural activity, and an area of made ground that may be evidence of a back filled extraction pit. A complex of land drains, possibly connecting to a larger drainage pipe, has also been detected in the centre and north of the area.

2.17 CA4-2910 east of Wrinehill Wood, Madeley

Site details

2.17.1 A geophysical survey was carried out over area CA4-2910 at land East of Wrinehill Wood, Madeley, Staffordshire (centred on NGR 375604, 345205 (Figure 78)).

2.17.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to evidence of medieval agricultural and quarry practices in the surrounding area.

2.17.3 The survey area comprises an irregular parcel of land covering one field to the north-west of the village of Madeley, Staffordshire, approximately 1.8km north-west of Madeley and 12.5km west north-west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries as well as undefined survey boundaries. The gradiometer survey covered 5.4ha of the 6.3ha survey area, with the remaining area deemed unsuitable for survey due to overgrown vegetation and waterlogged ground.

2.17.4 The survey area lies on a west facing slope, resting at approximately 90m AOD to the west, rising to approximately 101m in the east. There are no overhead cables or water courses present over the survey area.

2.17.5 The underlying geology of the survey area is mapped as Sidmouth Mudston Formation with superficial deposits of till recorded[34]. The underlying soils are likely to be typical stagnogley soils of the Clifton (711n) association[35]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.17.6 To the south and west of the survey area lies what was the previous extent of Wrinehill Wood, an area of Ancient Woodland, now much reduced in size (SHERMST2677). A

[34] British Geological Survey (2015)
[35] Soil Survey of England and Wales (1983)

polished stone axe of possible Neolithic or Bronze Age is recorded as being found, following tree clearance in Wrinehill Wood (SHERMST2652), which could suggest further prehistoric activity in the area.

2.17.7 Just to the north and west of the survey area ridge and furrow earthworks suggest post medieval cultivation (LiDAR3188, AP158). Further ridge features identified to the east may relate to previous woodland management (LiDAR3092).

2.17.8 A series of irregularly shaped pit features to the north of the survey area may indicate previous extraction (LiDAR3093).

Results

2.17.9 The gradiometer survey carried out between 16 – 17 November 2016 using hand-held systems has identified possible archaeological anomalies, as well those relating to modern agricultural activity and ferrous responses.

2.17.10 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 79 - 81). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trend (Figure 81).

Interpretation: archaeology

2.17.11 Several positive anomalies have been identified by the survey (4-2910-001 – 4-2910-005). These anomalies have been interpreted as possible locations of extraction pits due to the size and magnitude of the anomalies. These may relate to known medieval activity in the surrounding area. However, similar anomalies would be cause by natural pitting in the bedrock. 4-2910-001 does have a more linear in shape, suggesting that it could be related to material extraction or associated infrastructure.

Interpretation: agricultural

2.17.12 Throughout the dataset, a large number of anomalies of likely agricultural origin have been identified. Centrally, two low magnitude, dipolar linear anomalies traverse the dataset aligned approximately north-west to south-east (4-2910-006 and 4-2910-007). Their width and length as well as their variable magnetic response are indicative of an infilled ditch. These features have been interpreted as former field boundaries, although no evidence is recorded on available historic mapping of the area.

2.17.13 Parallel linear trend anomalies have been identified at 4-2910-008 to the west of 4-2910-006 aligned north-north-west to south-south-east. These anomalies are indicative of ploughing activity in the area. Furthermore, these features respect and run parallel to 4-2910-006, giving some strength to its interpretation as a former field boundary.

2.17.14 Three areas of variable magnetic response (4-2910-009 – 4-2910-011) have been detected in the central and eastern area of the survey. These have a subtly increased magnetic background response to the surrounding survey and as such have been

interpreted as areas of possible green waste spread as a method of fertilisation. Such spreads can have the potential to mask weaker archaeological remains, but some features have been identified within these areas.

2.17.15 Several areas of land drains have been identified across the survey area as closely spaced low magnitude, dipolar linear anomalies (4-2910-012 – 4-2910-015).

Interpretation: geological or natural

2.17.16 Two areas of very low magnitude (+0.5 nT), variable background response have been identified in the central northern area of the survey (4-2910-016 and 4-2910-017). Due to their low magnitude, these have been interpreted as localised, natural variations in the underlying geology or soils caused by a slight increase in the deposits magnetic susceptibility.

Conclusions

2.17.17 The survey has identified some anomalies of possible archaeological origin relating to possible extraction pits. A substantial network of land drains has been identified across the survey. The area has yielded notable ferrous anomalies, as well as evidence of more modern agricultural activity, such as ploughing and fertilisation.

2.18 CA4-2941 east of Wrinehill Wood, Madeley

Site details

2.18.1 A geophysical survey was carried out over area CA4-2941 east of Wrinehill Wood, Madeley, Staffordshire (centred on NGR 375277, 345330 (Figure 82)).

2.18.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to presence of post-medieval agricultural activity and evidence for quarrying.

2.18.3 The survey area comprises an irregular parcel of land covering the north-east corner within a single field south of Wrinehill Hall Farm, Staffordshire, 12km to the west of the centre of Stoke-on-Trent. The limits of the survey area are defined by hedgerow field boundaries as well as undefined survey boundaries. The gradiometer survey covered the entire survey area of 0.9ha. This survey area lies on relatively flat ground at approximately 89m AOD. There are no overhead cables or water courses present over the survey area.

2.18.4 The underlying geology is recorded as Wilkesley Halite Member with superficial glaciofluvial deposits[36]. The underlying soils are likely to be typical stagnogley soils of the Clifton (711n) association[37]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

[36] British Geological Survey (2015)
[37] Soil Survey of England and Wales (1983)

Archaeological background

2.18.5 To the south and west of the survey area lies what was the previous extent of Wrinehill Wood, an area of Ancient Woodland, now much reduced in size (SHERMST2677). A polished stone axe of possible Neolithic or Bronze Age is recorded as being, following tree clearance in Wrinehill Wood (SHERMST2652), which could suggest further prehistoric activity in the area.

2.18.6 Narrow ridge and furrow cultivation has been identified in the aerial photography within the Site (AP158). Also to the east of the survey area ridge and furrow earthworks suggest post-medieval cultivation (LiDAR3188).

2.18.7 A series of irregularly shaped pit features to the north-east of the survey area may indicate previous extraction (LiDAR3093). The LiDAR has also identified two linear features to the east and north-east representing probable former field boundaries (LiDAR3094, 3188).

Results

2.18.8 The gradiometer survey carried out on the 17 November 2016 using hand-held systems has identified anomalies relating to natural and ferrous responses.

2.18.9 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures –83 - 85). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trend (Figure 85).

Interpretation: geological or natural

2.18.10 A single low magnitude (+2 nT), sub-oval anomaly has been identified towards the south of the survey area (4-2941-001). The north-eastern end of the anomaly appears to be partially masked by ferrous disturbance making a confident interpretation more difficult. The anomaly has been interpreted as an area of natural variation in the underlying geology or soils resulting in an increased, albeit weak, magnetic response.

Interpretation: modern

2.18.11 Along the eastern periphery of the survey area along the fields boundary, a large area of high magnitude (+/- 70-100 nT) has been detected (4-2941-002). Visible on aerial photography, this has been interpreted as a modern trackway.

Conclusions

2.18.12 The survey has not identified any anomalies of definite archaeological origin and has little or no further evidence of activity. There is no evidence of post-medieval agriculture or material extraction within the dataset, although this is recorded in the surrounding area. The area has yielded notable ferrous disturbance along the eastern edge, the result of the modern trackway as well as some natural variation in the deposits.

2.19 CA4-2947 north of Beechfields, Madeley

Site details

2.19.1 A geophysical survey was carried out over area CA4-2947 at land north-west of Madeley, Staffordshire (centred on NGR 375678,344910 (Figure 86)).

2.19.2 The area was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to its position as an area of former ancient woodland and as such any features within are likely to relate to land use or earlier activity.

2.19.3 The survey area comprises an irregular parcel of land covering or partially covering six fields just north of Beechfields, Bower End Lane, Madeley, Staffordshire, approximately 1.7km west of Madeley and approximately 12.5km west of the centre of Stoke-on-Trent. The limits of the geophysical survey area are defined by hedgerow field boundaries as well as undefined survey boundaries. The gradiometer survey covered 12.8ha of the 15.2ha survey, with the remaining area deemed unsuitable for survey as a result of over growing boundary hedges and present woodland. The survey area lies on a north-east facing slope at resting at approximately 125m AOD in the south-west and dropping to approximately 100m AOD to the north-east of the survey area. There are no overhead cables or water courses present over the survey area.

2.19.4 The underlying geology of the north-western and central parts of the survey area is mapped as the Sidmouth Mudstone Formation with Chester Pebble Beds Formation of Sandstone in the south-eastern part of the area. Superficial deposits of till are recorded within the central part of the area with areas of glaciofluvial deposits to the north-west and south-east. The underlying soils for the area are likely to comprise typical stagnogley soils of the Clifton (711n) association. Although the presence of overlying deposits of till may reduce the effectiveness of the magnetometer survey, potentially providing random false positive readings in the geophysical survey, soils derived from these parent geological materials are considered suitable for magnetometry.

Archaeological background

2.19.5 The survey area lies within what was previously a large area of ancient woodland, now much reduced (SHERMST2677). A series of linear features within and adjacent to the survey area, which previously lay in the wood, are possibly natural in origin (LiDAR3091). To the east an area of ridge features may relate to the previous woodland land use (LiDAR3092).

2.19.6 A polished stone axe of possible Neolithic or Bronze Age is recorded as being, following tree clearance in Wrinehill Wood (SHERMST2652), which could suggest further prehistoric activity in the area.

2.19.7 A large are of ridge and furrow earthworks has been identified from aerial photographs immediately to the south of the survey area. The characteristically narrow form of these earthworks suggests a post-medieval date. Also within this area a large sub-circular depression may be the remains of a former extraction pit (LiDAR3087).

Results

2.19.8 The gradiometer survey carried out between 15 – 18 November 2016 using a cart based system has identified anomalies of archaeological interest, as well as modern agricultural activity and ferrous responses.

2.19.9 Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (Figures –87 - 90). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trend (Figure 88 and 90).

Interpretation: archaeological

2.19.10 The detailed gradiometer survey has identified an area of likely archaeological anomalies (4-2947-001, 4-2947-002 and 4-2947-003). In the south-east of the survey, three linear anomalies of varying lengths have been noted. 4-2947-001 presents a low magnitude positive anomaly (+2-4 nT) measuring 1m across and approximately 25m long, aligned east to west. 4-2947-002 identifies a linear feature with similar characteristics, aligned north-east to south-west. 4-2947-003 presents a sub-rectilinear feature with a similar positive low magnitude aligned north-north-west to south-south-east and a right-angled alignment north-east – south-west. Due to the area having been ancient woodland until the mid 20th century, these types of anomalies are likely to be indicative of earlier land use or activity within the woodland, such as animal enclosures or land divisions.

2.19.11 Across the survey area numerous low magnitude positive anomalies with no defined shape or pattern have been identified (4-2947-004 – 4-2947-008). These types of anomaly are often indicative of extraction pits relating to past activity in the area. However, this interpretation is considered tentative as the anomalies could also represent infilled tree throw holes as a result of the removal of the woodland in the mid 20th century.

Interpretation: agricultural

2.19.12 Several low magnitude, parallel linear trend anomalies have been identified within the survey area (4-2947-009 and 4-2947-010). 4-2947-009 presents anomalies with a north-west to south-east alignment and further to the south 4-2947-010 shows anomalies with a north-east to south-west alignment. Due to their alignment and regular spacing, these anomalies have been interpreted as evidence of agricultural activity in the area. As the area was formerly woodland this would be assumed to be relatively modern activity.

Interpretation: geological or natural

2.19.13 Two areas of low magnitude, broadly spread anomalies within the centre of the survey area have been identified (4-2947-011 and 4-2947-012). These have been interpreted as being the result of a build-up of magnetically susceptible deposits in the underlying geology and soils and are considered to be natural in origin.

Interpretation: modern

2.19.14 Some areas of variable magnetic response have been identified, notably in the centre north-west (4-2947-013) and to the north-east (4-2947-014 and 4-2947-015) of the survey. 4-2947-013 presents a lower magnitude, variable response and is indicative of an area of burning, possibly associated with the removal of the woodland in the mid-20th century. 4-2947-014 and 4-2947-015 present a much higher magnitude response (+/- 80-100 nT). This could also be an area of burning or workings during the removal of the woodland, or could be an area of made ground.

Conclusions

2.19.15 The survey has identified several anomalies of likely archaeological origin that could relate to medieval or earlier animal enclosures or land division. Further anomalies of possible archaeological origin have been identified, and are tentatively considered to be extraction pits. However, these anomalies could also represent tree throws. The area has yielded notable ferrous disturbances that are considered to be related to the clearance of ancient woodland in the mid 20th century, and are the possible result of burning or ground works. Natural variations in the underlying geology have also been identified.

3 Remote sensing report

3.1 Introduction

3.1.1 This report outlines the results of the archaeological remote sensing survey of the Whitmore Heath to Madeley area. The survey involved the systematic mapping, recording, analysis and interpretation of potential archaeological sites from aerial photographs, multi-spectral imagery and LiDAR data.

3.1.2 The aim was to accurately map and record the form and extent of archaeological features visible as cropmarks, soil marks, earthworks or structures in order to inform the baseline assessment of the cultural heritage resource.

3.2 Study area

3.2.1 The study area comprised a 250m buffer for LiDAR and multi-spectral data, and a 350m buffer for aerial photographic survey extending from the limits of the land required for the Proposed Scheme.

3.3 Methodology

LiDAR data

3.3.1 Airborne LiDAR data is produced by an aircraft-mounted laser linked to a differential Global Positioning System (dGPS) and an Inertial Navigation System (INS). A cloud of measurement points is taken as the aircraft flies over the landscape by firing the laser at the ground in a regular pattern and measuring the time it takes for signals to be reflected to the instrument. The resultant 'point cloud' is typically recorded at spatial resolutions of between 0.25m and 2m, with a vertical tolerance of up to 0.2 m, and this can be used to generate highly detailed landscape visualisations.

3.3.2 These visualisations can be used to identify archaeological features, which are expressed in the form of localised and often subtle variations in ground profile (e.g. earthworks). This can include features that are barely, if at all perceptible at ground level.

3.3.3 Point clouds can be presented in the form of a Digital Surface Model (DSM), which includes the heights of objects such as buildings, vegetation and vehicles, as well as the terrain surface.

3.3.4 The data can also be filtered digitally to create a Digital Terrain Model (DTM), filters out objects (e.g. vegetation cover) and models the underlying ground surface.

3.3.5 The use of DTMs in archaeological prospection offers an advantage over conventional aerial photograph assessment as features can often be identified in areas of relatively dense tree or vegetation cover.

3.3.6 Where a laser pulse encounters multiple surfaces, such as a tree canopy and the ground beneath, multiple measurable reflections can be recorded. The first returned pulse represents the first surface encountered with the last return representing the final surface encountered. By filtering out all but the last returns the ground surface beneath vegetation can be represented.

3.3.7 Surface and terrain models can be processed to create shaded relief, or 'hillshade' images to visualise the LiDAR data. This process entails the casting of a simulated light source at a fixed altitude and azimuth across the landscape to create virtual shadows which emphasise variations in relief. The examination of hillshade images is particularly useful for the purposes of archaeological prospection, as features which retain some surface expression can appear more prominent when illuminated by an artificial light source.

Multi-spectral imagery

3.3.8 Multi-spectral data is gathered using an airborne sensor which is capable of detecting electromagnetic radiant energy from the ground surface in the form of reflected solar radiation or thermal radiation emitted by target objects. Data is typically collected within a number of discrete spectral bands, ranging from the visible to the longwave infra-red.

3.3.9 The resultant data can be used to generate a series of geo-referenced images within discrete regions of the electromagnetic spectrum, such as the Near-Infrared (NIR), or manipulated to generate a spectral transformation of two or more spectral bands. Subsequent examination of the multi-spectral imaging can enable the identification of archaeological features via a range of physical, chemical, biological and environmental signatures, including some which may be undetectable, or poorly resolved in visible wave lengths.

3.3.10 For example, it has long been recognised that contrasting patterns of vegetation stress or vigour can be correlated with sub-surface archaeological features. These proxy indicators have traditionally been detected via cropmarks visible on conventional aerial photography. However, wavelengths outside the visible spectrum are also sensitive to changes in vegetation health. Under certain conditions, vegetation stress and vigour responses can be expressed more clearly within these wavelengths than within visible spectra. Thus, examination of multi-spectral imaging offers the potential to improve detection rates of archaeological features over remote sensing techniques, which rely solely on the narrow visible range of the electromagnetic spectrum.

Aerial photography

3.3.11 Two types of aerial photograph were used for this assessment. Vertical aerial photographs are taken for military, commercial and general-purpose survey using a camera mounted inside a modified aircraft. The aircraft is flown on a pre-planned set

of overlapping flight-lines, which cover the survey area completely. The camera points straight towards the ground. The vertical viewpoint provides aerial photographic coverage from a fixed scale and constant 180° angles at the centre of each frame. The overlap between the areas covered by each consecutive frame is usually 60%. This overlap between frames enables the photo interpreter to study each pair of vertical photos under a stereoscope and see the landscape in 3D.

3.3.12 The stereoscope combines the two images to allow the interpreter to see a single three-dimensional image of the ground surface. Vertical aerial photographs carry inherent distortions introduced by variations in perspective and ground height, but are essentially 'map-like' in appearance. They are generally taken for non-archaeological, civil and military purposes and form the basic data from which most modern maps are compiled. Vertical aerial photographs are a very useful source of archaeological data, particularly in areas such as this, where features survive as earthworks

3.3.13 Oblique aerial photographs are taken using a hand held camera by an aerial archaeologist to portray features, which have been identified during specialist survey. These photos are extremely useful, but contain inherent perspective distortions, which must be accounted for in rectification and mapping procedures. In this case, both vertical aerial photographs, and specialist oblique aerials were available for interpretation. The sources of aerial photographs used for this assessment are detailed below.

3.4 Data sources

LiDAR

3.4.1 Two LiDAR datasets were acquired for the purposes of the assessment. The first of these, at 0.2m horizontal cell resolution, was acquired specifically for the purposes of informing the design and EIA process for the Proposed Scheme. The 0.2m LiDAR data was captured during a series of flights between June and July 2014 and covers an area of 500m either side of the Proposed Scheme centreline. This does not provide full coverage of the study area.

3.4.2 The second dataset, at 2m horizontal cell resolution, was sourced from Environment Agency LiDAR data archive and was consulted as it provided greater coverage of the study area.

3.4.3 Both LiDAR datasets were supplied in ASCII format as a DTM, processed to create a series of hillshade images lit from the north-west, north-east, south-east and south-west. A composite shaded relief image was also created from each of the LiDAR datasets using a technique known as Principal Component Analysis (PCA). No additional processing of the LiDAR data was undertaken for the purposes of this assessment.

Multi-spectral

3.4.4 The multi-spectral data used in this assessment was acquired in tandem with the 0.2m LiDAR data. The imagery was supplied in the following spectral bands and indices: Simple Ratio Index (SR), Normalized Difference Vegetation Index (NDVI), Near Infra-Red (NIR), False Colour Infra-Red and Red-Green-Blue (RGB) (i.e. conventional imagery within the visible region of the electromagnetic spectrum). No additional processing of the multi-spectral data was undertaken for the purposes of this assessment.

Aerial photography

3.4.5 The following sources of aerial photographs and data were searched and used for this assessment:

- Historic England Archive: The Engine House, Fire Fly Avenue, Swindon. Air photo enquiry number 98518, undertaken in January 2016, covered both the Whitmore Heath to Madeley area and the South Cheshire area. The search identified one specialist oblique aerial photo within the Whitmore Heath to Madeley area, and identified 44 vertical aerial photographic sorties containing 489 frames taken between 1945 and 2001. Some 1955 and post 1989 photographs were not held as prints for consultation. The 1940s verticals however provided a good insight into the landscape, as did later surveys, which were available in the archive;
- Cambridge University Collection of Aerial Photographs (CUCAP): Department of Geography, University of Cambridge. This collection was closed during the timeframe of this project, however some irregular access was granted for limited periods during February and March 2016, and prior to its full closure in June 2016. The CUCAP archive contains no aerial photographs, which cover the Whitmore Heath to Madeley area or the South Cheshire area;
- online aerial images: All timelines of ortho-rectified mosaics of vertical aerial photographs at www.earth.google.com (Google Earth) were consulted online for this assessment and used extensively between January and April 2016; and
- The HE National Mapping Programme (NMP) did not cover this area in the timeframe of this assessment.

Others

3.4.6 The following additional sources were used to aid the identification and interpretation of features:

- records contained within the Historic Environment Record (HER); and
- Ordnance Survey 25-inch scale (1:2,500) mapping, surveyed and published from the 1870s through to the 1920s, and six-inch (1:10,560) maps produced from the 1880s through to the 1950s.

3.5 Identification, digitisation and interpretation

LiDAR and multi-spectral

3.5.1 Features of potential archaeological interest were identified by detailed visual examination of both the multi-spectral and LiDAR imagery, in conjunction with other relevant datasets (outlined below). The 3D Analyst tool in ArcGIS 10.2.2 was used to examine changes in ground profile on the DTMs where features of potential interest were identified. Digitisation of identified features was then undertaken manually within ArcGIS 10.2.2.

3.5.2 Surviving historical features within the landscape, such as field systems, ponds, roads, farms and other structures were excluded where these are recorded on current Ordnance Survey mapping. Exceptions were made where the assessment indicated that archaeological or historical landscape features might extend beyond their current mapped extents.

3.5.3 Identified features were assigned a unique numerical identifier and briefly described. The potential origin of each feature was interpreted based on a consideration of its form, landscape context and other relevant datasets, described below. Where possible, a broad date range was assigned to each feature by reference to conventionally defined archaeological periods.

Aerial photography

3.5.4 The oblique aerial photographs were sorted into individual sites, which later became the aerial photography sites listed in Annex C, then examined in detail visually, either on screen or as paper prints. The stereo pairs or runs of vertical aerial photographs were examined using a magnifying mirror stereoscope to identify detail in 3D. Single vertical images were examined visually and under 4x magnification.

3.5.5 With permission from the archives, the paper photographs were captured digitally by re-photographing them and digital photographs were captured as JPG files. These images are very numerous, and may not be reproduced or published but have been used to derived the digitised interpretative data within the GIS. All timelines, which were available at Google Earth, were interpreted in detail and selected portions saved as JPG file images for geo-referencing and interpretation.

3.5.6 Following selection and sorting into site areas, photographs were filed and referenced as JPG images and were geo-referenced using control points derived from the 1:2500 scale Ordnance Survey Mastermap data layer, using the Quantum GIS 2.10 referencer tool and AirPhoto 3.58. The georeferenced raster files were set as a separate layer in QGIS and digitised to project standards to create SHP files for the line and polygon data, which recorded the interpretations of ditched, embanked and other features identified during the survey.

3.5.7 As with the multi-spectral and LiDAR surveys, the aerial photographic survey excluded surviving historical features within the landscape, such as field systems, ponds, roads, farms and other structures these are recorded on current Ordnance Survey mapping. Exceptions were made where the assessment indicated that archaeological or historical landscape features might extend beyond their current mapped extents or held some interest or significance to the survey.

3.5.8 Identified features were assigned a unique numerical identifier and briefly described within the GIS attribute tables assigned to each polygon which identified a 'site' or area of interest. As with the multi-spectral and LiDAR recording protocols, the potential origin of each feature was interpreted based on a consideration of its form, landscape context and other relevant datasets, described below. Where possible, a broad date range was assigned to each feature by reference to conventionally defined archaeological periods, or if this was not certain or possible, an 'unknown' date was assigned.

3.6 Limitations

Coverage

LiDAR and multi-spectral

3.6.1 The study area for the assessment of LiDAR and multi-spectral data was based on the land required Proposed Scheme.

3.6.2 The 0.2 m LiDAR and multi-spectral data were collected within a 500m buffer extending from the centre of the Proposed Scheme.

3.6.3 Despite gaps in each of the datasets, the entirety of the study area was encompassed by the combined coverage of the 2m and 20cm LiDAR, and multi-spectral datasets.

Aerial photographs

3.6.4 The data from the aerial photographic cover search at HE were converted to CSV files and integrated to the working GIS to assess the coverage of both vertical and oblique aerial photos.

3.6.5 There is only one oblique available for the Whitmore Heath to Madeley area, over Old Madeley Manor at site 154, just outside the study area. This is in direct contrast to the Fradley to Colton area and the Colton to Yarlet area and in common with the Stone and Swynnerton area. As always, apparently 'blank' areas where no obliques are present may contain sub-surface features, which will only become apparent when the topsoil is disturbed or removed.

3.6.6 The Whitmore Heath to Madeley area was covered by sorties of vertical aerial photos dating from the 1940s and partially covered by more locally oriented surveys since. The more recent images at Google Earth supplied full coverage of the area, and were

used for this assessment in accordance with observations made by Scollar and Palmer[38].

Analysis

LiDAR and multi-spectral

3.6.7 Aside from gaps in the coverage of the datasets, outlined above, a number of other factors can be expected to have affected the detection rates and interpretation of archaeological features during the assessment.

3.6.8 One of the principal limitations of the assessment is that features were identified and interpreted in the absence of ground level observations. This can result in interpretation errors where localised variations in ground profile, which are of very recent or natural origin resemble archaeological features. This issue was alleviated by comparing the LiDAR images against conventional aerial photographic imagery (i.e. within the visible region of the electromagnetic spectrum). In addition, the veracity of the survey results will be tested in the field during further stages of work.

3.6.9 There are also certain methodological limitations, which are inherent to the remote sensing techniques employed during the assessment. For instance, multi-spectral imaging, unlike filtered LiDAR data, is rarely of use for identifying archaeological features within wooded environments.

3.6.10 Although shaded relief images can greatly aid visualisation of LiDAR data, no single direction of illumination can simultaneously reveal all relief features. For example, when a hillshade is lit from a single direction, any features aligned with the source of light can be hidden, since they do not cast any shadow. This technical imitation was overcome by examining a composite shaded relief image, alongside a series of hillshades illuminated from multiple directions.

3.6.11 The angle of illumination can also influence the visibility of relief features. For example, visualisation of subtle variations in relief may require low illumination elevation, which can in turn obscure detail in steeper areas of the image. As the imagery used during the assessment was illuminated from a single fixed angle, this may have influenced the detection rates of archaeological features. However, the effect of this is likely to be relatively slight, as the study area is not characterised by dramatic changes in relief.

3.6.12 The filtering process, which is applied to LiDAR data when generating a DTM, may not be able to entirely remove the masking effect of low-level vegetation, and can also result in some loss of detail. The latter effect was seen intermittently across the 20cm LiDAR imagery, where the filtering occasionally produced a greatly simplified geometric surface. This may have obscured some features of interest, although only within extremely localised areas.

[38] Scollar, I. and Palmer, R. (2008), *Using Google Earth Imagery*, AARGnews 37, 15 – 21

3.6.13 The horizontal cell resolution of LiDAR data can also influence the detection rates of archaeological features. This can occur where the spacing of point measurements is sufficiently wide to conceal, or reduce the visibility of small archaeological features. However, this is unlikely to have affected the assessment due to the availability of highly detailed 20cm resolution LiDAR data.

3.6.14 It was determined that some types of feature, particularly vestigial ridge and furrow landforms, were often more clearly visible on the LiDAR imagery generated from the 2m resolution data than the 20cm data. It is possible that, despite filtering, subtle changes in ground profile may have been masked by low level vegetation due to the fine granularity of the 20cm data, whereas this effect was 'evened out' in the images generated from the coarser 2m data. Consequently, the detection rates for some types of archaeological feature may have been reduced where 2m resolution LiDAR data was unavailable.

3.6.15 Multi-spectral signatures are widely used in other environmental disciplines to accurately classify and map vegetation and geology types. Unfortunately, archaeological sites and features have not been demonstrated to exhibit distinctive spectral signatures that can be used for generic detection purposes. The effectiveness of using multi-spectral data to identify archaeology can be significantly influenced by a range of factors, including the underlying geology, soil moisture content and vegetation cover. However, current understanding of the processes which determine whether and how archaeological features are expressed in the electromagnetic spectrum is incomplete. In practise, this means that it can be difficult to predict whether archaeological features will be identifiable in any given sensor.

3.6.16 Aerial photograph assessments are often based on sequences of historical imagery, which provide a series of 'snapshots' of the landscape under different conditions. In contrast, LiDAR and multi-spectral data are typically gathered at a single or series of closely spaced points in time. This can explain why features identified from aerial photographs cannot always be detected on LiDAR and multi-spectral images of the same area. For example, multi-spectral data collection may be undertaken outside of the window of opportunity where conditions are optimal for the detection of archaeological features which, as noted previously, can be difficult to predict.

3.6.17 Ploughing or development may have destroyed any surface expression of archaeological features that are recognisable on historical aerial photographs. This was evidently the case at a number of locations within the study area, where examination of the LiDAR and multi-spectral data was unable to replicate the results of conventional aerial photographic surveys.

3.6.18 Much of the study area coincides with arable fields, which have been subject to intensive modern agricultural techniques. As a result, the prominence of archaeological features may have been greatly reduced by ploughing across large parts of the study area. This may have resulted in a differential in the detection rate of

archaeological features between fields, which have been intensively ploughed, and areas which have not, such as within parks (unless extensively landscaped) or land which has predominantly been under pasture.

Aerial photographs

3.6.19 Interpretation of aerial photographs relies on visual identification of heritage assets on aerial photos as typically; the effects they have on growing crops and other vegetation; marks in soils; or as surviving features or earthworks which are more visible at times of clear low light..

3.6.20 It is important to note that aerial photographs usually only show part of the horizontal and vertical extent of buried and upstanding features. Their capacity to reveal features as crop marks, vegetation marks, soil marks or as the shadows cast by banks, ditches and walls, depends upon a number of environmental and agricultural factors prevalent at the time of the photographic survey. It is perfectly possible for many years' photography over one site to show nothing at all, and then for one instance of survey to reveal complex buried crop marked features. The direction of light at the time of photography, with reference to shadows cast and crop or soil marked features highlighted, can also affect the visibility of features on aerial photographs. Unlike digitally processed LiDAR and other data, the azimuth of the sun cannot be changed on a conventional aerial photo.

3.6.21 Past and present land use also presents limitations to the visibility of features. A cropped arable regime of cereals often allows the formation of crop marks, whereas grassland, unless seen in times of extreme moisture stress, can mask the appearance of buried features.

3.6.22 Aerial photographs cannot be used to detect features in heavily wooded areas in the same manner as LiDAR surveys. LiDAR may penetrate gaps in the tree canopy to provide a digital model of the ground surface beneath.

3.6.23 Aerial photographic evidence is thus limited by seasonal, agricultural, land use, meteorological, lighting and environmental factors which affect the extent to which either buried or upstanding archaeological features and structures can be detected.

3.6.24 It is thus advantageous to examine a range of photos taken under a variety of environmental conditions to build up a comprehensive interpretation of the archaeological landscape. The visibility of archaeological features may differ from year to year and be obscured by differential depths of soil or differing types of vegetation, and individual photographs most often record only a small percentage of the actual extent of buried or upstanding features.

3.6.25 The aerial photos taken in the 1940s often recorded surviving medieval fields and parkland features, and provided a starting point for the assessment of erosion and attrition of features due to modern ploughing. This ability to 'see back in time' and the

use of aerial photos as historic documents is helpful when constructing landscape histories or tracing the progress of erosion.

3.6.26 Buried features are also 'masked' in areas of unsuitable land use for site visibility or the formation of crop marks, such as woodland, scrub, unimproved pasture or alluviated areas. Medieval ploughing is visible as patterns of ridge and furrows caused by the turning of a heavy ox-drawn plough. This often masks underlying deposits on aerial imagery.

3.6.27 It is important to note that the perception of the environment and expectation of what is to be found often may limit the interpreter's openness to all features, which may be noticed and identified. This perception factor is mitigated by repeated examination of imagery taken in different years and under different conditions, and by teamwork between two or more interpreters checking the data. 'Photo fatigue' is also a factor in drop-off rates of discovery or perception of features and in this case could have been a very real limitation to consistent and accurate observation. This was mitigated by alternating activities, checking with team workers and taking adequate visual breaks particularly when using a stereoscope to see large sorties over extensive areas of land.

3.6.28 These limitations and advantages were considered carefully whilst interpreting features from aerial photographs and the interpretations are built up from observations of many photographs, if available, over a range of instances of photography by two or more air photo analysts.

3.6.29 The study area presented no apparent evidence for crop marked buried prehistoric sites, over a mixture of clayey substrates and a higher proportion of pastoral land use.

3.7 Results

LiDAR and multi-spectral

Overview

3.7.1 A total of 64 individual features, or groups of features of possible archaeological interest were identified within the study area. The majority of these were identified on the LiDAR imagery, with a smaller number also visible on the multi-spectral imagery. Very few features were visible solely on the multi-spectral imagery.

3.7.2 The features could predominantly be ascribed to one of three interpretative classes; vestigial ridge and furrow landforms, relict field boundaries or disused extractive pits. Very few features of potentially elevated archaeological significance were identified during the assessment.

3.7.3 Features identified during the remote sensing assessment are described in Annex C, illustrated in Figures 91 - 98 and listed in CH-002-004. The principal findings of the assessment are presented below.

Former channels near Wrinehill Mill and other water management features

3.7.4 A series of possible infilled water channels (3095, 3096, 3099 and 3104; Figure 98) were identified in the area surrounding Wrinehill Hall and Wrinehill Mill (SHER MST2218), to the east of the confluence of the Checkley Brook and the River Lea. Several of these features are relatively straight suggesting that they are the result of human activity, although others are more sinuous in form, which could indicate that they are of natural origin.

3.7.5 Some of these channels may have been associated with the water-powered Wrinehill Mill and its mill pond, which appear to have been extant by the late 18th century. However, it is also possible that some of these features may have been related to water management and drainage of meadows and pasture between the River Lea and the Checkley Brook.

3.7.6 Features which may have been associated with drainage and water management of meadows and pasture were also identified in a number of other locations within the study area (e.g. 3043, Figure 94; 3050, Figure 95), including further to the west, on land adjacent to the River Lea between Checkley New Farm and Wrinehill Hall (3098; Figure 98).

Ridge and furrow

3.7.7 Amongst the most common features identified during the assessment were characteristic landforms derived from medieval and / or post-medieval ridge and furrow cultivation. These included groups of selions contained within individual parcels ('furlongs', 'gores' and 'butts') and, less commonly, the vestigial ploughing headlands, foreras (access routes) and baulks, which divided them. None of the ridge and furrow landforms identified from the LiDAR and multi-spectral data appear to have previously been recorded in the Staffordshire HER.

3.7.8 The vestigial ridge and furrow landforms identified during the assessment were distributed intermittently across the study area. However, notable concentrations of ridge and furrow landforms were identified between Manor Farm and Hey House Lodge (3061; Figure 95), in the areas surrounding Bar Hill House Farm (3072; Figure 96), to the east of Bowerend Farm (3085; Figure 97), north of Whitmore Heath (3030 and 3033; Figure 94) and south of Whitmore (3013; Figures 92 and 93).

3.7.9 The distribution of these landforms across the study area is likely to reflect differential rates of preservation, which are likely to have been heavily influenced by the location and intensity of modern and historical ploughing. However, these areas of relict ridge and furrow could provide some indication that areas of associated medieval and / or early post-medieval occupation may be located in their vicinity.

Field boundaries

3.7.10 A large proportion of the geographical expanse contained within the study area is composed of fields under a mixture of arable cultivation and pasture. It is probable

that the spatial patterning of these field systems is largely the product of the Enclosure acts of the 18th and 19th centuries. However, some elements within the spatial patterning of these field systems may correspond with earlier land divisions, including fossilised components of medieval open field systems.

3.7.11 Subsequent opening out of previously enclosed fields, particularly during the 20th century, has resulted in the loss of numerous field boundaries, including many examples recorded on late 19th century and early 20th century Ordnance Survey maps.

3.7.12 Numerous linear features were evident on the LiDAR imagery, typically in the form of (often very faint) linear banks and depressions. In many instances, these features were interpreted as former field boundaries on the basis that they appeared to respect existing field systems and/or could be correlated with land divisions shown on early Ordnance Survey maps.

Extractive pits and ponds

3.7.13 Amongst the most frequently identified features were small depressions, often sub-circular, though occasionally irregular in plan, and typically in the range of 20-50m in diameter. Although a natural origin might be ascribed to some of the depressions, the majority of these features are likely to be the result of human activity.

3.7.14 Although their date and original purpose often cannot be distinguished with certainty, it is likely that many of these features represent various forms of extractive pits, or open-cast workings. At least 17 individual features were identified as possible former extraction pits within the study area. Many of the numerous ponds which exist across the rural landscape of the study area may also have originated as extractive pits. A post-medieval date is likely for the majority of these features, although occasional examples could be earlier in origin.

3.7.15 Few of these can correlated with features depicted by early Ordnance Survey mapping. However, notable exceptions include two irregular features (3024; Figure 93) within woodland on Whitmore Heath, which coincide approximately with a series of 'Gravel Pits' shown on late 19th and early 20th century maps.

3.7.16 Other disused extractive pits identified within the study area may also have been excavated to quarry gravel. However, some of the other identified features may have been dug for other purposes, for example to quarry stone or sand, or to extract clay for marling. A series of possible infilled pits (3093; Figure 97) to the south of Wrinehill Hall could have been excavated to provide clay extraction for brick production, as these are located in close proximity to the possible site of a former brickworks (SHER MST2219). The brickworks site is known from the place name 'Brick Kiln Field', recorded by the Madeley Parish Tithe Map and apportionment of approximately 1840.

3.7.17 Corresponding mounds, which might represent the spoil heaps derived from these excavations, were only occasionally identified in the vicinity of the depressions. This may corroborate the suggestion that these were predominantly dug with the aim of

extracting material in bulk, rather than creating hollows in the land surface for some other purpose. However, subsequent levelling by ploughing or natural processes may have significantly reduced the visibility of any former spoil heaps.

3.7.18 Extractive pits were often associated with trackways, either deliberately constructed or formed naturally through use, for the hauling away of excavated material. However, few traces of any such features were identified. These depressions rarely exhibited any other characteristics in form that might be expected of former extractive pits, such as a shallow approach or access on one side, or steeper working faces. However, this might be readily explained by the fact that many have become substantially infilled.

3.7.19 In a few instances, the depressions identified during the assessment may have been deliberately excavated to create ponds rather than for extractive purposes, for example to provide access to water for farm animals, or for other agricultural uses.

Other features

3.7.20 A number of linear features, which do not clearly appear to respect existing field systems or correspond with land divisions, shown on early Ordnance Survey maps were also identified (e.g. 3035, Figure 93; 3049, Figure 95; 3052, Figure 95; 3082, Figure 96; 3078, Figure 96). The origins of these features are uncertain, although plausible interpretations include former post-medieval field boundaries, drains and trackways or footpaths. However, some of these features could be considerably older and potentially of greater significance.

3.7.21 Other features identified during the assessment included a series of linear depressions and banks in Hey Sprink (3047 and 3048; Figure 95), which may derive from woodland management practises. A series of faint parallel linear features within Whitmore Wood (3042; Figure 94) could also be the result of woodland management activities, although these might be vestigial traces of ridge and furrow cultivation.

3.7.22 A small group of linear features (3102; Figure 98) within existing woodland associated with Wrinehill Hall are also of uncertain origin, although it is possible that these are related to the formal gardens attached to the house (SHER MST6261).

3.7.23 Finally, of note is the location of Madely Cemetery, which is clearly visible on the LiDAR imagery (3064; Figure 95) and appears to be of modern (mid 20th century) origin.

3.7.24 A single mound of unknown origin (3189; Figure 95) was noted to the south of Madeley and it is possible that this could be a Bronze Age barrow or similar.

Aerial photographs

Overview

3.7.25 Features identified from aerial photographs during the remote sensing assessment are described in Annex C, illustrated in Figures 91 - 98 and listed in Appendix CH-002-004. The principal findings of the assessment are presented below.

3.7.26 The Whitmore Heath to Madeley area had not at the time of survey (January - May 2016) been surveyed by NMP projects, and contains only 1 oblique photo derived from specialist archaeological survey just outside the study area, which portrays a moated site.

3.7.27 The Whitmore Heath to Madeley area contains extensive areas of surviving and more eroded medieval agricultural, which in places may overlie and mask earlier deposits.

3.7.28 An absence or very low level of visible crop marked evidence for buried features presents a challenge to non-intrusive survey, which may not be as effective in these environments as parts of the Fradley to Colton area and the Colton to Yarlet area, which lie over gravel substrates.

Undated

3.7.29 Site 163 at Moor Hall Farm to the east of Madeley, contains some levelled earthworks which show as slight ditches on a vertical aerial photo taken by Meridian Air Maps Ltd in 1971. The features which also show at the 2006 timeline at Google Earth are of unknown date and origin and could be heritage assets.

Prehistoric periods

3.7.30 No sites have been identified from aerial photographs in the Whitmore Heath to Madeley area which may date to the Prehistoric period. Due to the limitations of this non-intrusive survey technique, this does not indicate total absence of possible prehistoric heritage assets.

Iron Age/Roman

3.7.31 No sites have been identified from aerial photos in the Whitmore Heath to Madeley area which may date to the Iron Age or Roman periods. Due to the limitations of non-intrusive survey, this does not indicate total absence of possible Iron Age or Roman heritage assets.

Medieval

3.7.32 The Whitmore Heath to Madeley area was farmed in the medieval period and there are areas of eroded and slightly upstanding ridge and furrow. There are no visible areas of medieval settlement, which may be defined from aerial photos and it is likely that these may lie beneath modern settlements and hamlets in this area.

3.7.33 Part of a moat and former fishponds are visible at Old Madeley manor just outside the study area at site 154 (Figure 95), at coordinates 377241, 342382 where a hollow way or track is visible just within the study area.

Post-medieval

3.7.34 The post-medieval landscape is visible on aerial photographs in a more sparse fashion in the Whitmore Heath to Madeley area, which contains some small areas of narrow ridge and furrow and boundaries.

3.7.35 Some possible, but not conclusively identified, water meadows may be present at site 157 (Figure 92) in a low lying and wet area. These features may be drains and are situated beside a watercourse to the north of Shelton Under Harley Farm at coordinates 381170, 339853.

Modern

3.7.36 The Whitmore Heath to Madeley area contains some former ponds and extraction pits which are likely to be post-medieval or modern.

3.8 Summary

LiDAR and multi-spectral

3.8.1 The results of the assessment were largely consistent with expectations based on the rural character of the study area. The majority of features identified during the assessment are likely to represent disused extractive pits or quarries of post medieval date, or former field boundaries laid out, or formalised in the 18th or 19th centuries. The former field boundaries may, in some instances, also correlate with medieval land divisions. The assessment also identified several areas containing vestigial ridge and furrow landforms, none of which appear to have been previously recorded in the Staffordshire HER.

3.8.2 Few, if any sites or features of elevated significance were confidently identified within the Whitmore Heath to Madeley area. However, possible exceptions include infilled channels close to Wrinehill Mill and occasional linear features which could not be correlated with land divisions shown on early Ordnance Survey maps or existing field systems.

Aerial photographs

3.8.3 Aerial photographs taken between the 1940s and the present time show no firm evidence for crop marked pre-modern landscapes in the Whitmore Heath to Madeley area. This may be due to lack of specialist reconnaissance, coupled with a less responsive more pastoral land use regime.

3.8.4 Site 163 contains a series of undated residual ditches, which may be heritage assets.

3.8.5 The Whitmore Heath to Madeley area was farmed in the medieval period, with areas of medieval agricultural land use visible as residual earthworks in specific places.

3.8.6 Post-medieval boundaries and narrow ridge and furrow show within the Whitmore Heath to Madeley area on aerial photos, but their occurrence if sparse in comparison to the Fradley to Colton area, the Colton to Yarlet area and the Stone and Swynnerton area.

3.8.7 There is evidence for possible drains or water meadows, although this is not conclusive.

3.8.8 The potential for further discovery within the Whitmore Heath to Madeley area is unknown, and non-intrusive survey may not provide the correct level of detail to fully evaluate the potential for the presence of below-ground heritage assets.

3.9 Conclusions

3.9.1 Features identified within the Whitmore Heath to Madeley area from the LiDAR and aerial photography largely relate to medieval and post-medieval agricultural activity.

3.9.2 Where there is a lack of correlation between the LiDAR and AP assessments this suggests that many of the features identified from APs no longer survive as earthwork features, however, this does not preclude the below ground survival of archaeological remains.

3.9.3 There are inherent difficulties involved in transcribing and accurately locating cropmark features. Accordingly, degree of caution should be exercised in relying on position of individual features, as these may in actually fact be located some distance from location indicated.

4 References

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Annex A: Survey equipment and data processing

Survey methods and equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. The system was either handheld or cart based. The handheld instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. The cart instrument has a number of sensor pairs fixed horizontally 1m apart allowing multiple traverses to be recorded simultaneously. The sensors are the same and each contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03nT over a ±100nT range, and measurements from each sensor are logged at intervals of 0.25m.

Wessex Archaeology conducts detailed handheld gradiometer surveys using an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument. The cart-based system relies upon accurate GPS location data which is collected using a Leica Viva system with rover and base station. The Leica Viva systems receive 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 HE for geophysical surveys.

The detailed surveys consist of 20m by 20m or 30m by 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.

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 HE for characterisation surveys.

Post-processing

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

The cart-based system generally requires a lesser amount of post-processing than the handheld Bartington Grad 601-2 fluxgate gradiometer instrument. This is largely because mounting the

gradiometers on the cart reduces the occurrence of operator error; caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

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.

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.

Annex B: Geophysical interpretation

Interpretation categories

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

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.

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:

- agricultural - used for linear trends that can be shown to relate to agricultural activity including ridge and furrow, drainage and ploughing scars.
- 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.
- natural - used for spreads of anomalies that are considered to be geological or more discrete anomalies considered to be natural.

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

Annex C: Sites identified by remote sensing

Table 1: LiDAR and multi-spectral sites within the Whitmore Heath to Madeley area

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
3013			Medieval/ modern	A series of former field boundaries can be traced to the south of Church Farm. A central, sinuous ditch, on an approximate N-S alignment, can be traced for 490m and is abutted by a series of shorted perpendicular features. Three blocks of probable ridge and furrow can be traced within the former field boundaries and cover an area of 2.7 hectares. The features lie on an approximate E-W alignment.
3014			Post-medieval/ modern	An 80m long, NW-SE aligned section of former field boundary to the north of Close End. To the east of Close End lies an additional curved linear feature, 385m in length, which appears to follow the path of another former field boundary.
3016			Post-medieval/ modern	Two linear features to the east of Bent Lane, both representing former field boundaries. The southern feature lies on an approximate E-W and can be traced for 190m. The northern feature lies perpendicular and can be traced for 355m.
3019			Post-medieval/ modern	A small block of possible ridge and furrow, covering an area of 0.6 hectares, can be traced to the east of The Old School. A right-angled feature, measuring 145m in length, representing the remains of a former field boundary, can be traced immediately to east of the ridge and furrow.
3021			Post-medieval/ modern	A 200m long, WSW-ENE aligned feature representing the remains of a former field boundary and a 225m long feature, on a largely NW-SE alignment, representing the position of a further former field boundary, can be traced to the west of The Old Vicarage.
3023			Post-medieval/ modern	A faint, 200m long, WSW-ENE aligned feature representing a possible section of a former field boundary.
3024			Post-medieval/ modern	Two amorphous large cut features within woodland on Whitmore Heath and representing former gravel pits in the area. The larger southern pits measures 3.3 hectares in size and the northern feature measures 0.3 hectares in size.
3026			Post-medieval/ modern	A number of former field boundaries to the east of Snapehall present as a series of slight bank features. The features measures approximately 60m in length.
3028			Unknown	A sub-circular pit feature, 17m in diameter and possibly representing extraction.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
3029			Unknown	An oval mound overlying possible ridge and furrow. The feature measures 45m in length and 25m at its widest point. The feature may represent spoil from extraction.
3030		WHM021	Medieval/post-medieval	Six blocks of possible ridge and furrow near Snapehall, ranging in size from 2 hectares to 0.5 hectares. All features follow and approximate WSW-ENE alignment. Some of the features may represent recent agricultural activity.
3033		WHM014	Medieval/post-medieval	A block of ridge and furrow to the east of Whitmore Wood. The features lie on a N-S alignment and cover an area of 1.1 hectares. A 120m long N-S aligned linear feature cuts through the centre of the block and may present the location of a former field boundary.
3035		WHM014	Unknown	Faint ditch features to the south of Whitmore Wood. The features are unmapped but may represent former field boundaries. A 160m long NW-SE aligned linear feature is abutted by a dog-legged, largely SW-NE aligned ditch measuring 210m in length.
3037		WHM014	Unknown	A series of N-S aligned ridge features are present in Whitmore Wood. The features appear similar in form to ridge and furrow, but may also be related to woodland management. The features are contained within a 0.8 hectare block.
3038			Unknown, possibly medieval/post-medieval	Three blocks of possible ridge and furrow to the north of Whitmore Wood. The small north-eastern block is aligned SSE-NNW and contained within a 35m by 20m area. The south-western block covers 0.6 hectares and the large western block covers 2.9 hectares. The features in this larger block appear comparatively modern.
3040			Unknown	Possible former field boundaries to the north of Whitmore Wood. The southern feature measures 125m in length and lies on a WSW-ENE alignment. A second 40m linear features lies perpendicular to the north.
3042		WHM014	Unknown	SSE-NNW aligned features within Whitmore Wood, possibly related to woodland management, though could be relict ridge and furrow. The feature covers an area of 0.7 hectares.
3043		WHM021	Unknown	A series of parallel drainage channels located between the railway line and a ditch. The features are aligned SW-NE and are probably fairly recent in date.
3046			Medieval/post-medieval	An area of ridge and furrow located across 4.4 hectares. The features are aligned SSW-NNE. Some of the features may be the result of modern agricultural activity. A bank appearing. Additional linear features, possibly representing former field boundaries, are also present and lie on a NW-SE alignment.

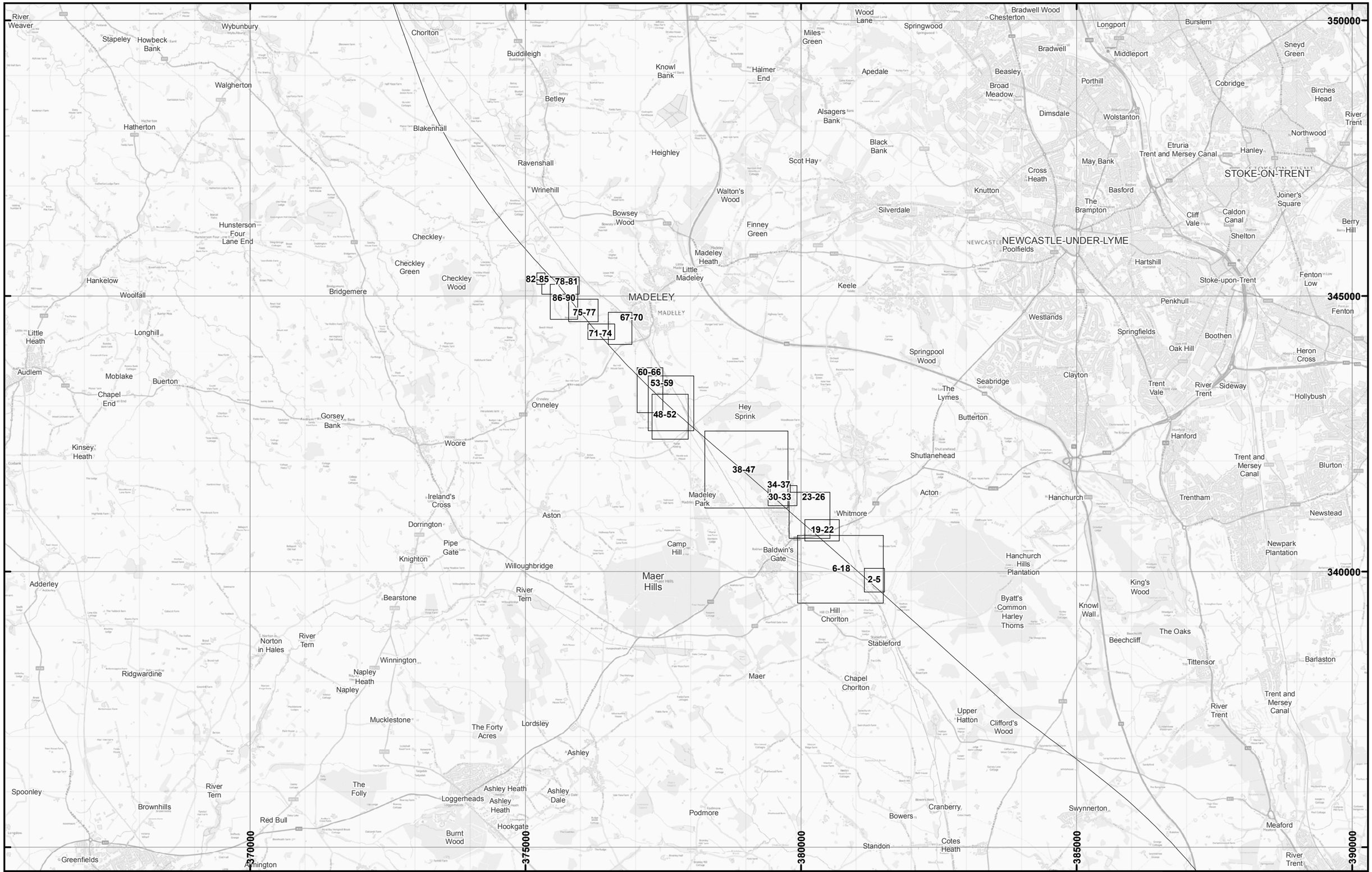
LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
3047			Unknown	Well defined ridge features in woodland, probably related to woodland management. A series of ditches can also be traced, again likely to be related to woodland management. The features are located across 1.6 hectares. Woodland is present on both historic and modern mapping.
3048			Unknown	A series of ditch features can be traced in woodland. They are split into two groups and cover a combined 0.6 hectares.
3049			Unknown	Two slight bank features located to the west of Hey Sprink. The features are unmapped but may represent former field boundaries. The western feature measures 130m in length and is aligned SW-NE. The eastern feature is aligned E-W and runs for 130m.
3050		WHM027	Post-medieval/ modern	A series of linear features to the south of Hey House. Some of the features may represent the remains of former field boundaries, although none of the features are present on historic mapping. As a group, the features follow the same sinuous N-S alignment as the modern field boundary to the east. The longest of the features, measuring 800m N-S, extends southwards into a drainage ditch, suggesting that some of these features may also be related to drainage.
3051			Unknown	A large, shallow pit feature, sub-circular in form and measuring 60m in diameter in a field to the south of Hey House. The feature may be related to previous extraction.
3052			Unknown	A 160m long, N-S aligned linear feature to the north of Hey House. It shares a similar position to a path recorded on historic mapping.
3053	164		Medieval/post-medieval	Two blocks of ridge and furrow between Manor Road and the railway line to the north of Hey House. They are divided by a 105m long SW-NE aligned ditch feature that appears to represent a former field boundary. The south-east block is contained within 0.5 hectares, with features aligned N-S. The north-west block measures 1.5 hectares, with ridges aligned WSW-ENE. To the north-west lie additional ditch features which may represent former field boundaries or the locations of further, fainter furrows associated with the ridge and furrow immediately to the south.
3055		WHM027; WHM028	Medieval/post-medieval	Two blocks of ridge and furrow to the east of Manor Cottages, divided by a track. The northern features are aligned E-W and cover an area of 0.3 hectares. The features to the south follow a similar alignment, although they are more sinuous in nature.
3056			Unknown	Linear features to the east of Manor Farm comprised of two ditches to the east and a bank to the west. All features follow a NNW-SSE alignment. The western two measure 160m in length and the eastern feature 70m in length.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
3057			Medieval/post-medieval	A small block of ridge and furrow to the south of Manor Farm extending southwards out of dataset. The features lie on an approximate N-S alignment.
3060	160		Unknown	Three sub-circular cut features to the west of Hey House Lodge. The features measure 35m, 25m and 35m in diameter (N-S). They may represent former ponds or sand pits.
3061			Medieval/ modern	Several blocks of ridge and furrow and former field boundaries located to the west of Hey House Lodge and Manor Cottages. Six distinct blocks of ridge and furrow are present in the data, ranging in size from 1.8 to 0.2 hectares. The southern blocks are largely on a WSW-ENE alignment.
3064			Modern	Features related to Madeley Cemetery.
3067			Post-medieval/ modern	Former field boundaries to the south-east of Red Lane. Three are aligned WSW-ENE, with a fourth lying perpendicular.
3068			Unknown, possibly medieval/post-medieval	A small block of possible ridge and furrow to the west of Wayside. The features are contained within a 130m by70m area and are aligned WSW-ENE. The features may be of more recent origin.
3069			Post-medieval/ modern	Linear features to the west of Netherset Hey Lane. The westernmost feature is curved and follows the path of a former field boundary. An additional feature extends north-eastwards from the boundary in a SW-NE direction.
3070		WHM029	Unknown	A series of features contained within a 0.5 hectare area between the River Lea and Station Road. The features could represent the locations of a series of former buildings, although seem more likely to be related to post-medieval drainage or water management. Data coverage is restricted to 2m resolution and does not allow for closer scrutiny.
3072		WHM062	Medieval/post-medieval	Blocks of well-defined ridge and furrow in the area around Bar Hill, located across a combined 2.1 hectares. The features are generally aligned SW-NE, although a block immediately south of Bar Hill House Farm lies on an E-W alignment. The blocks are surrounded by a number of linear features, a number of which correspond with former field boundaries present on historic mapping. Further unmapped features extend eastwards as far as Wayside.
3074		WHM062	Post-medieval/ modern	A former pond or extractive pit measuring 25m in diameter.
3076		WHM062	Medieval/post-	A block of ridge and furrow to the north-east of Bar Hill House. It is present across a triangular area of 0.8 hectares.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
			medieval	The features are aligned SSW-NNE.
3077			Unknown	Oval shaped cut feature, 45m at its widest. It may represent an area of past extraction.
3078			Post-medieval/ modern	Linear features to the west of Old Barhill Cottage, representing a recorded former field boundary and other possible former boundaries. The features measure 50m-125m in length.
3079			Post-medieval/ modern	Linear features to the west of Barhill Wood representing the remains of former field boundaries.
3080		WHM061	Post-medieval/ modern	A 110m long, SSE-NNW aligned linear feature to the north of Barhill Wood, representing the remains of a former field boundary.
3081		WHM061	Unknown	Slight ridge features across 0.25 hectares, on an E-W alignment and possibly recent in origin. However, could be surviving ridge and furrow.
3082		WHM061	Modern	A slight feature can be traced for 200m on a generally WSW-ENE alignment. It may represent a path.
3083			Post-medieval/ modern	A 150m long, generally SSW-NNE aligned linear feature representing the remains of a former field boundary.
3084		WHM061	Post-medieval/ modern	A dog-legged linear feature, 235m in length and representing the remains of a former field boundary.
3085	159		Unknown, possibly medieval/ modern	Drainage features and possible ridge and furrow to the east of Bowerend Farm. Some of the possible ridge and furrow features in the south-east may be related to earlier woodland management on the site. Ridges follow a largely E-W alignment. The drainage features can be traced in the north-west and may be recent in origin. A cut feature is also present in the south and may be related to previous extraction.
3087			Unknown	A sub-circular pit feature, 35m in diameter and possibly representing extraction.
3088	159		Unknown, possibly medieval/ modern	An area of vestigial ridge features to the east of Beechfields, possibly representing ridge and furrow. The features are contained within a 1.1 hectare area. It is bounded to the north by a 95m long SW-NE aligned former field boundary.
3091			Unknown	A series of linear features can be traced within former woodland at Wrinehill. The features may be natural in origin.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
3092			Unknown	An area of ridge features within former woodland. The features may be related to previous woodland management. They are contained within a 1.1 hectare area and bounded to the south-east by a ditch feature.
3093		WHM066	Unknown	A series of irregularly shaped pit features between Wrinehill Hall and Wrinehill Wood, possibly representing previous extraction.
3094			Post-medieval/ modern	A 295m long linear feature to eth south of Wrinehill Hall, representing the remains of a former field boundary.
3095			Post-medieval/ modern	A 360m long ditch feature to the east of Wrinehill Hall, representing the remains of a former drainage channel.
3096		WHM066	Post-medieval/ modern	A sinuous, 690m long ditch feature to the south of the River Lea, representing sections of a former drainage ditch and a former field boundary. The feature lies on an approximate WSW-ENE alignment.
3097		WHM066	Post-medieval/ modern	A 175m long, NE-SW aligned feature that appears to represent the remains of a former boundary. To the west lies a further boundary, 140m and on the same alignment.
3098		WHM066	Unknown	A series of ridge features to the south of the River Lea on a WSW-ENE alignment, cut by a number of what appear to be drainage channels (one of which appears to relate to the location of a former field boundary). The features are located across 1.8 hectares.
3099		WHM067	Unknown	Linear features to the south of Wrinehill Hall, possibly representing drainage features.
3102		WHM067	Unknown	A small block of N-S aligned ridge features to the north of Wrinehill Hall, possibly related to previous woodland management. The features are contained within a 0.1 hectare block.
3104			Unknown	A 245m long ditch feature representing a stretch of a former channel to the west of Wrinehill Mill.
3187			Unknown, possibly medieval/post-medieval	Ridge features to the west of Hey Sprink, possibly representing ridge and furrow. The features may also represent recent agricultural activity. The features can be traced across a 0.7 hectare area.
3188			Unknown, possibly medieval/post-	A block of possible ridge and furrow can be traced to the west of Grafton's Wood. The features are aligned SW-NE and are contained within a 1.8 hectare area.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
			medieval	
3189		WHM028	Unknown, possibly Bronze Age	Sub-circular feature, 54m in diameter. Origin unknown but possible cemetery barrow.



Legend

HS2 Phase 2a centre line

Map Number: Figure 1

Map Name: CA4 Surveyed Areas - Geophysics

Community Area: 4

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Scale at A3: 1:62,500

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Doc Number: C861-ARP-EV-MAP-WE01-000001

Date: 24/05/17

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 2

Map Name: CA4-2427 Site location

Community Area: 4-2427

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

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Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

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381100
381200
381300
381400
381500
381600
381700
340000
339900
339800
339700
339600

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 3

Map Name
CA4-2427 Greyscale plot

Community Area:
4-2427

Registered in England. Registration number 06791686.
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Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

381000
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381200
381300
381400
381500
381600
381700

340000
339900
339800
339700
339600

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 4

Map Name
CA4-2427 XY Trace

Community Area:
4-2427

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

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Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

381000
381100
381200
381300
381400
381500
381600
381700

340000
339900
339800
339700
339600

Legend

- Site boundary
- Detail Survey Extents
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous

Map Number
Figure 5

Map Name
CA4-2427 Interpretation

Community Area:
4-2427

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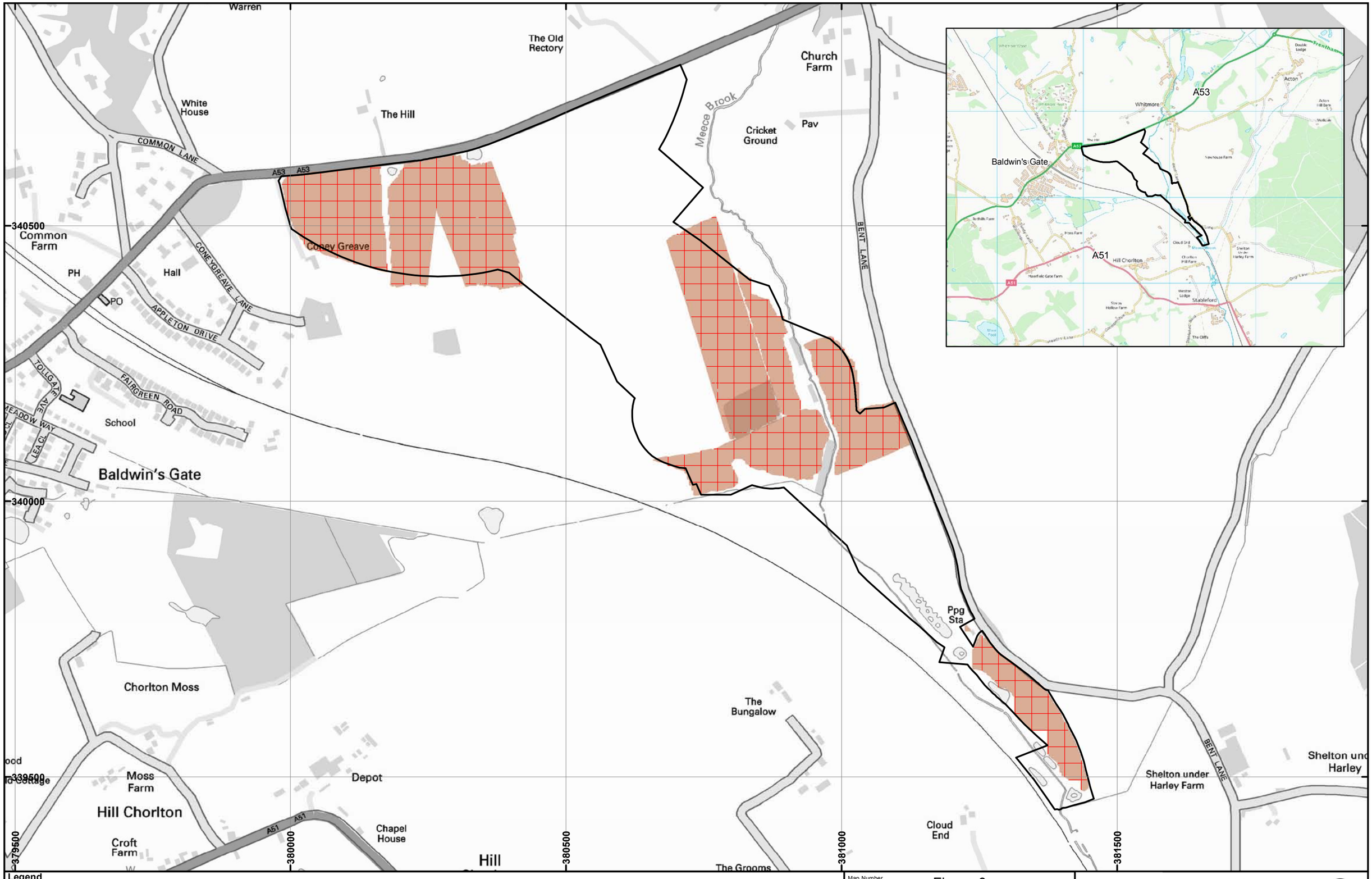
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 6

Map Name: CA4-2482 Site location

Community Area: 4-2482

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Scale at A3: 1:6,250

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Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379900
380000
380100
380200
380300
380400
380500
380600
340700
340600
340500
340400
340300
The Hill
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 7

Map Name
CA4-2482 Greyscale plot (north-west)

Community Area:
4-2482

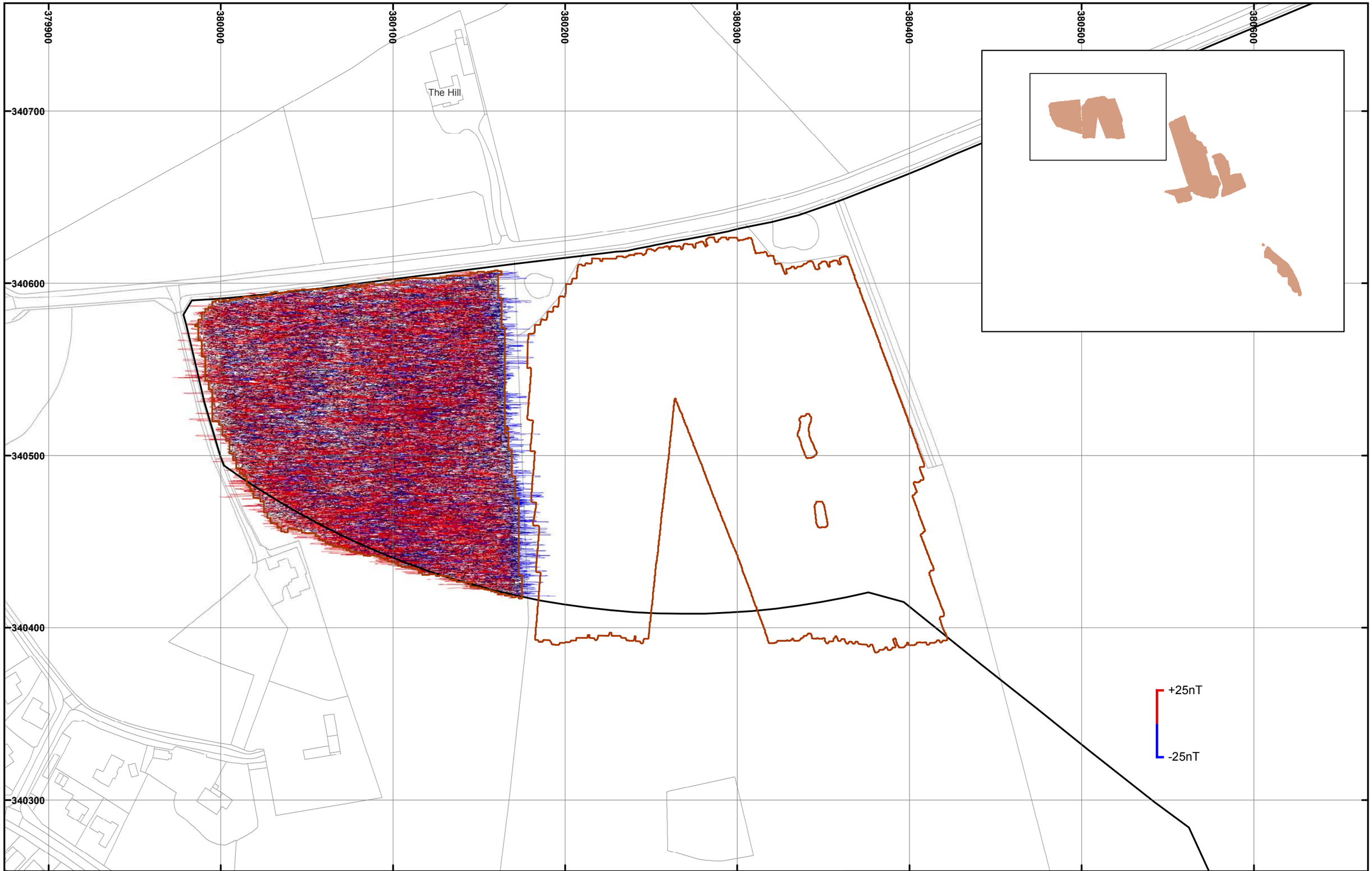
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 8

Map Name: CA4-2482 XY Trace (north-west)

Community Area: 4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379900
380000
380100
380200
380300
380400
380500
380600
340700
340600
340500
340400
340300
The Hill

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous

Map Number: Figure 9

Map Name: CA4-2482 Interpretation (north-west)

Community Area: 4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380500
380600
380700
380800
380900
381000
381100
381200

340500
340400
340300
340200
340100

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 10

Map Name
CA4-2482 Greyscale plot (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380500
380600
380700
380800
380900
381000
381100
381200

340500
340400
340300
340200
340100

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 11

Map Name
CA4-2482 XY Trace (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380500
380600
380700
380800
380900
381000
381100
381200
340500
340400
340300
340200
340100

4-2482-006
4-2482-001
4-2482-002
4-2482-003

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous

Map Number
Figure 12

Map Name
CA4-2482 Interpretation (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380600
380700
380800
380900
381000
381100
381200
340400
340300
340200
340100
340000

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 13

Map Name
CA4-2482 Greyscale plot (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380600
380700
380800
380900
381000
381100
381200
340400
340300
340200
340100
340000
+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 14

Map Name
CA4-2482 XY Trace (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380600
380700
380800
380900
381000
381100
381200
340400
340300
340200
340100
340000
4-2482-006
4-2482-001
4-2482-002
4-2482-003
4-2482-005

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous

Map Number
Figure 15

Map Name
CA4-2482 Interpretation (central)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

381100
381200
381300
381400
381500
381600
381700
381800
339800
339700
339600
339500
339400
Cloud End
Meece Brook
Shelton L
Harley F
+3nT
-2nT

Legend

- Site boundary
- Detail Survey Extents

Map Number
Figure 16

Map Name
CA4-2482 Greyscale plot (south-east)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:20,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

381100
381200
381300
381400
381500
381600
381700
381800

339800
339700
339600
339500
339400

Cloud End
Meece Brook
Shelton Under Harley Farm

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 17

Map Name
CA4-2482 XY Trace (south-east)

Community Area:
4-2482

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

381100
381200
381300
381400
381500
381600
381700
381800
339800
339700
339600
339500
339400
4-2482-004
Cloud End
Meece Brook
Shelton Under Harley Farm

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous

Map Number
Figure 18

Map Name
CA4-2482 Interpretation (south-east)

Community Area:
4-2482

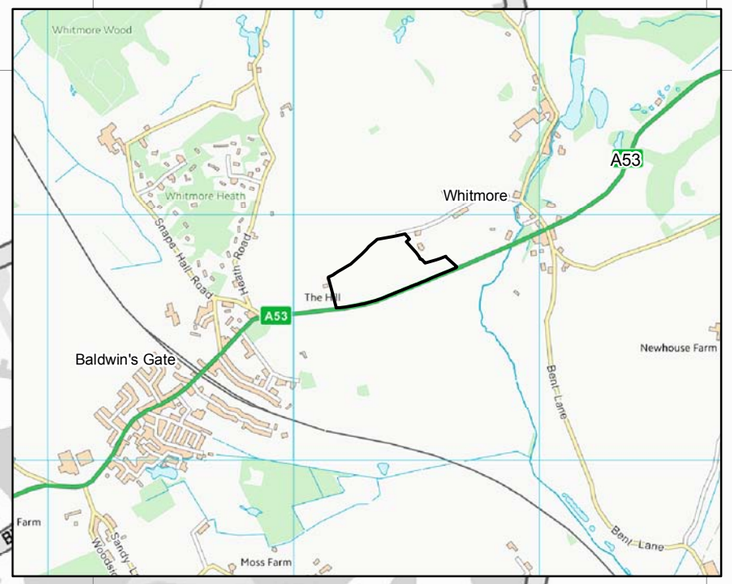
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:20,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 19

Map Name: CA4-2496 Site location

Community Area: 4-2496

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380100
380200
380300
380400
380500
380600
380700

341000
340900
340800
340700
340600

The Hill

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 20

Map Name
CA4-2496 Greyscale plot

Community Area:
4-2496

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380100
380200
380300
380400
380500
380600
380700

341000
340900
340800
340700
340600

The Hill

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 21

Map Name
CA4-2496 XY Trace

Community Area:
4-2496

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

380100
380200
380300
380400
380500
380600
380700
341000
340900
340800
340700
340600
4-2496-007
4-2496-001
4-2496-003
4-2496-004
4-2496-008
4-2496-002
4-2496-005
The Hill
4-2496-006
4-2496-009

Legend

- Site boundary
- Detail Survey Extents
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary

Map Number
Figure 22

Map Name
CA4-2496 Interpretation

Community Area:
4-2496

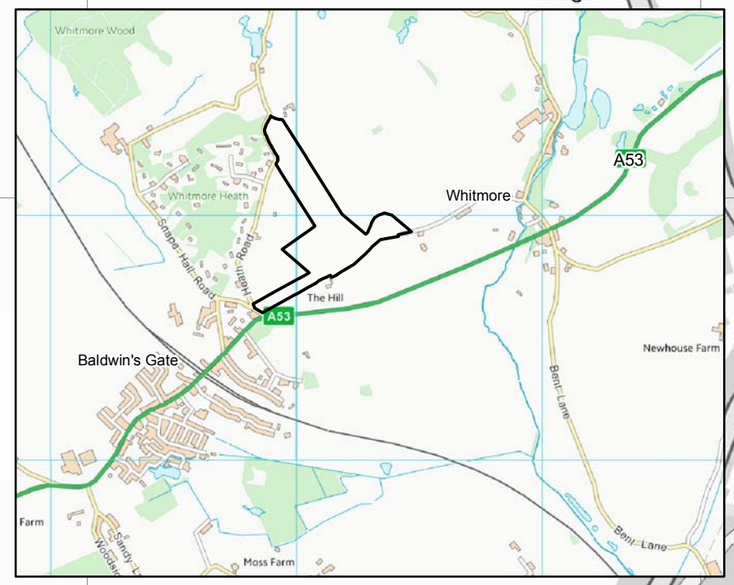
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Whitmore Wood

Hillside Lodge

Lake House

The Limpits

341500

Limepits

Limpits Farm

Snapehall Farm

SNAPE HALL ROAD

BIRCH TREE LANE

Whitmore Heath

HEATH ROAD

The Brackens

The Warren

341000

Ivy House

The Old School

Hawthorn Hill

PW

PH

The Old Rectory

Church Farm

White House

The Hill

Meece Brook

Cricket Ground

Pav

New House Farm

COMMON LANE

A53 A53

340500

379500 Common Farm

380000

Coney Greave

380500

381000

BENT LANE

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 23

Map Name: CA4-2501 Site location

Community Area: 4-2501

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379900
380000
380100
380200
380300
380400
380500
380600
341400
341300
341200
341100
341000
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 24

Map Name
CA4-2501 Greyscale plot (north)

Community Area:
4-2501

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

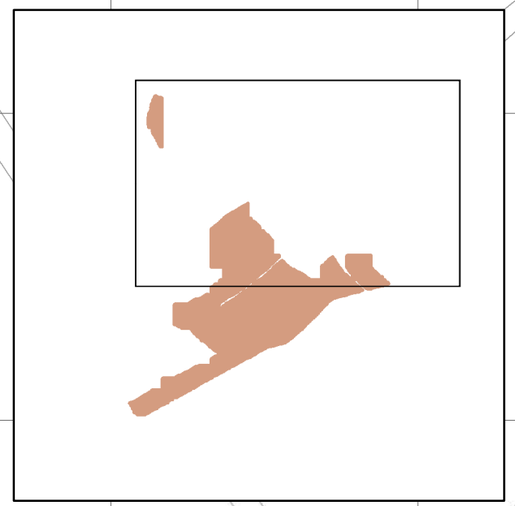
0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379900
380000
380100
380200
380300
380400
380500
380600
341400
341300
341200
341100
341000

+25nT
-25nT



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 25

Map Name: CA4-2501 XY Trace (north)

Community Area: 4-2501

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379900
380000
380100
380200
380300
380400
380500
380600
341400
341300
341200
341100
341000
4-2501-013
4-2501-003
4-2501-004
4-2501-014
4-2501-015
4-2501-005
4-2501-006
4-2501-011
4-2501-001

Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Former Field Boundary

Map Number
Figure 26

Map Name
CA4-2501 Interpretation (north)

Community Area:
4-2501

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379800
379900
380000
380100
380200
380300
380400
380500
341000
340900
340800
340700
+3nT
-2nT
The Hill

Legend

- Site boundary
- Detail Survey Extents

Map Number
Figure 27

Map Name
CA4-2501 Greyscale plot (south)

Community Area:
4-2501

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379800
379900
380000
380100
380200
380300
380400
380500
341000
340900
340800
340700
The Hill
+25nT
-25nT

Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 28

Map Name: CA4-2501 XY Trace (south)

Community Area: 4-2501

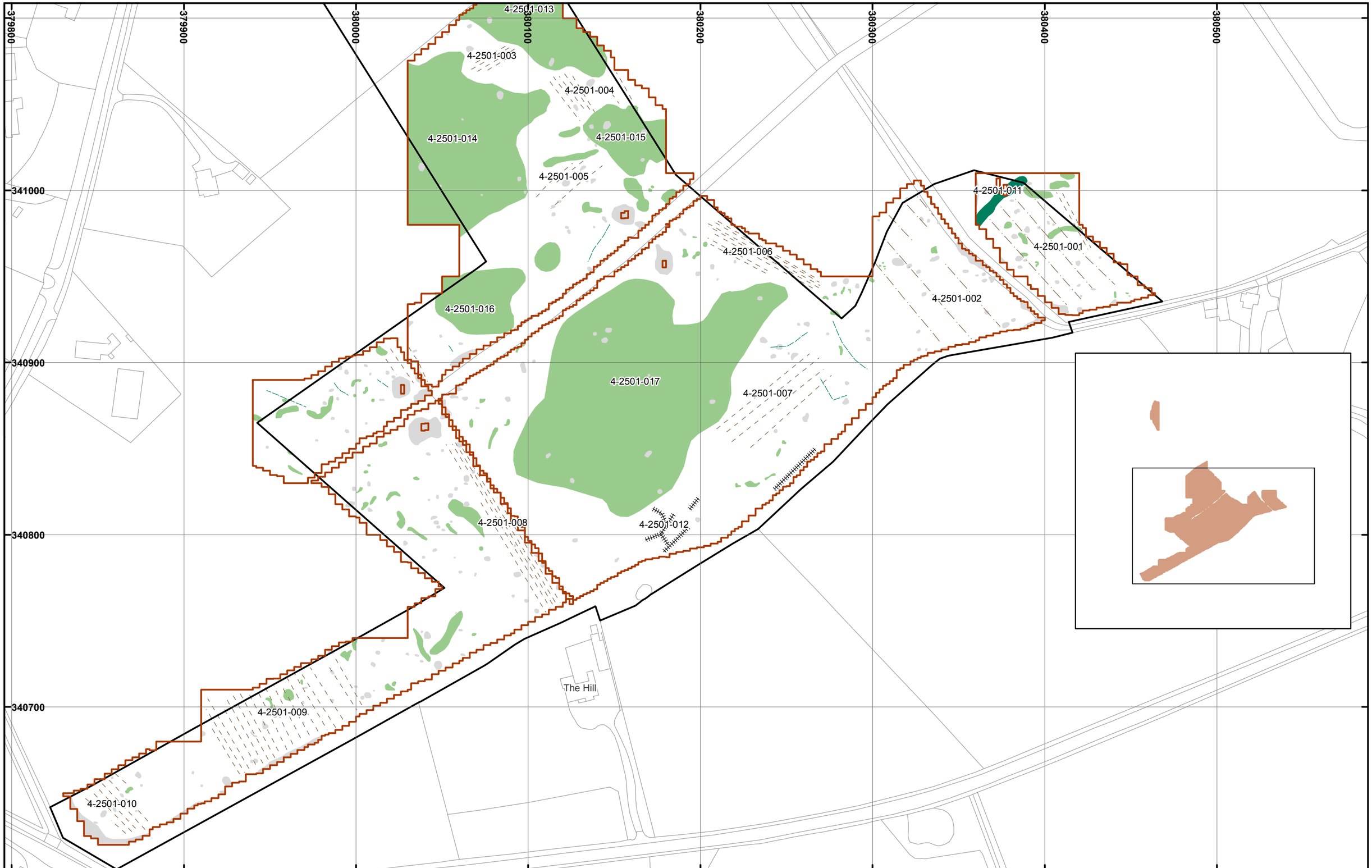
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Former Field Boundary

Map Number: Figure 29

Map Name: CA4-2501 Interpretation (south)

Community Area: 4-2501

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 30

Map Name: CA4-2591 Site location

Community Area: 4-2591

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300
379400
379500
379600
379700
379800
379900
380000

341600
341500
341400
341300
341200

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 31

Map Name
CA4-2591 Greyscale plot

Community Area:
4-2591

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300
379400
379500
379600
379700
379800
379900
380000

341600
341500
341400
341300
341200

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 32

Map Name
CA4-2591 XY Trace

Community Area:
4-2591

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300 379400 379500 379600 379700 379800 379900 380000

341600 341500 341400 341300 341200

4-2591-001
4-2591-002
4-2591-003
4-2591-004
4-2591-005
4-2591-006
4-2591-007
4-2591-008
4-2591-009

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous
- Pipe, Modern Service

Map Number
Figure 33

Map Name
CA4-2591 Interpretation

Community Area:
4-2591

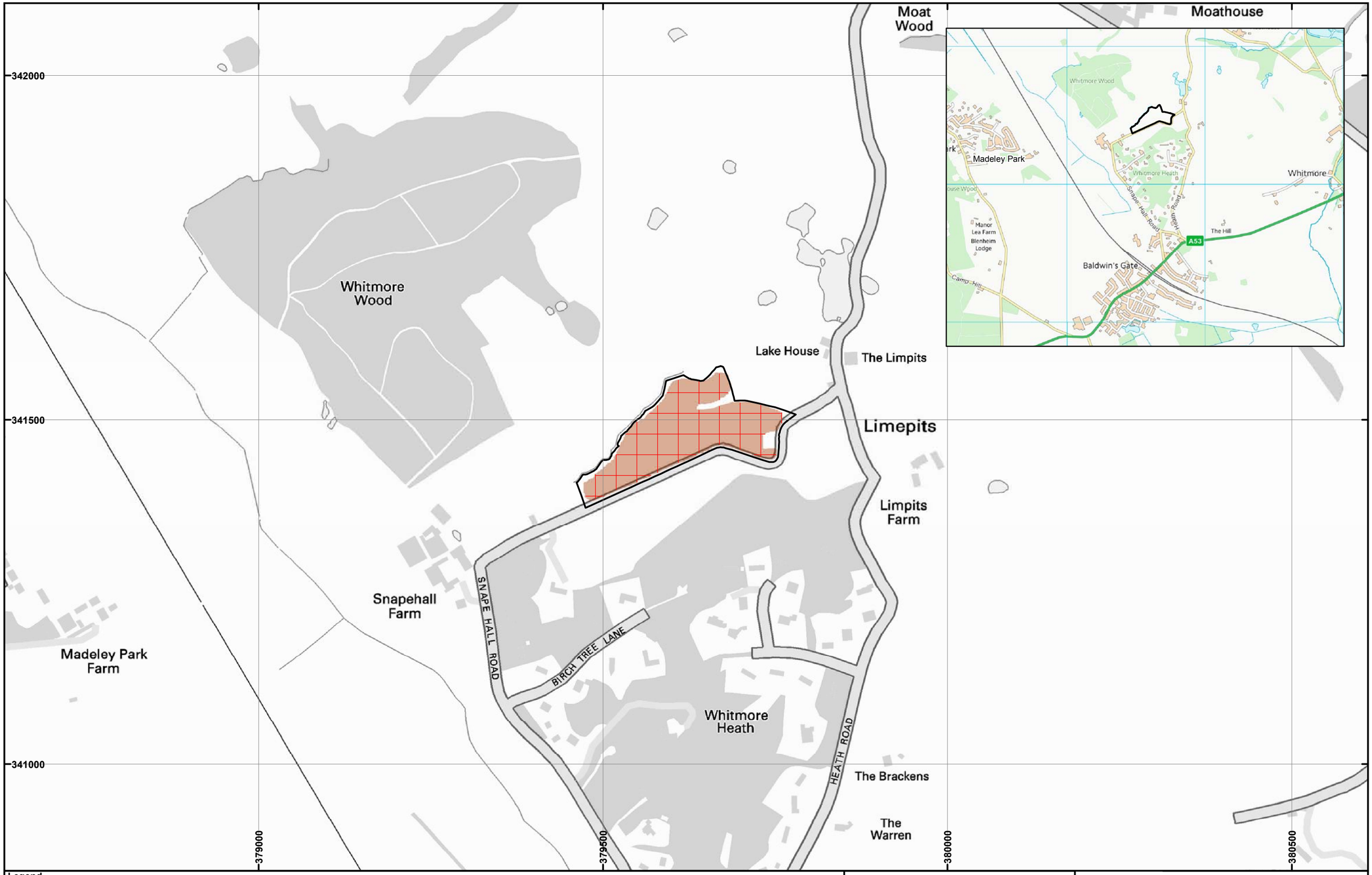
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 34

Map Name: CA4-2607 Site location

Community Area: 4-2607

Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300
379400
379500
379600
379700
379800
379900
380000

341700
341600
341500
341400
341300

+3nT
-2nT

Legend

- Detail Survey Extents
- Site boundary

Map Number: Figure 35

Map Name: CA4-2607 Greyscale plot

Community Area: 4-2607

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300
379400
379500
379600
379700
379800
379900
380000

341700
341600
341500
341400
341300

+25nT
-25nT

Legend

Detail Survey Extents
Site boundary

Map Number
Figure 36

Map Name
CA4-2607 XY Trace

Community Area:
4-2607

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

379300
379400
379500
379600
379700
379800
379900
380000

341700
341600
341500
341400
341300

4-2607-004
4-2607-003
4-2607-002
4-2607-001

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Agriculture - Ploughing
- Natural
- Ferrous
- Pipe, Modern Service

Map Number
Figure 37

Map Name
CA4-2607 Interpretation

Community Area:
4-2607

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

342500

342000

341500

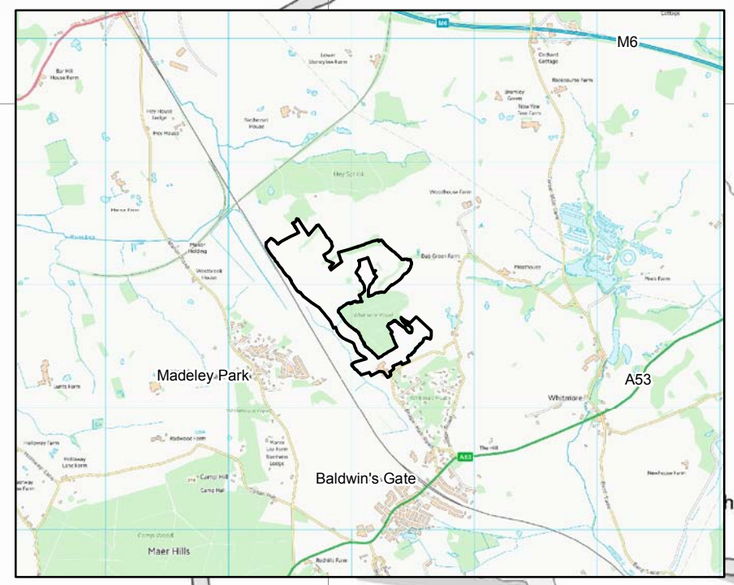
378000

378500

379000

379500

380000



Moat Wood

Whitmore Wood

Lake House

The Limpits

Limepits

Limpits Farm

EASTWOOD RISE

PARK WOOD DRIVE

SOUTH WOOD

WALLS WOOD

MANOR GLADE

Madeley Park Wood

Snapehall Farm

SNAPE HALL ROAD

BIRCH TREE LANE

Madeley Park Farm

Nursery

Whitmore

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 38

Map Name: CA4-2659 Site location

Community Area: 4-2659

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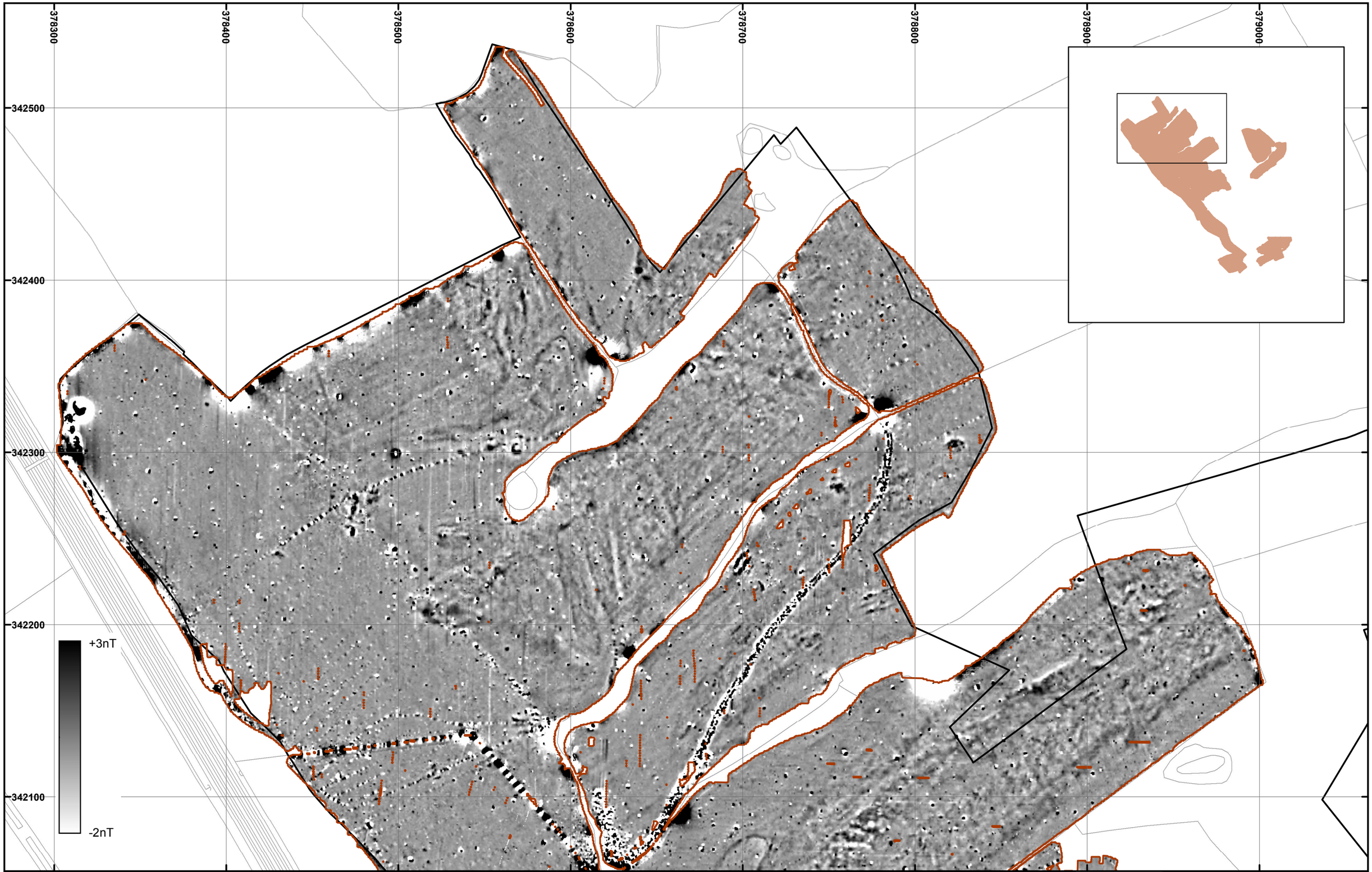
Scale at A3: 1:6,250

0 60 120 180 240 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number
Figure 39

Map Name
CA4-2659 Greyscale plot (north)

Community Area:
4-2659

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Pipe, Modern Service
- Trackway
- Former Field Boundary

Map Number: Figure 40

Map Name: CA4-2659 Interpretation (north)

Community Area: 4-2659

Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 41

Map Name: CA4-2659 Greyscale plot (north-east)

Community Area: 4-2659

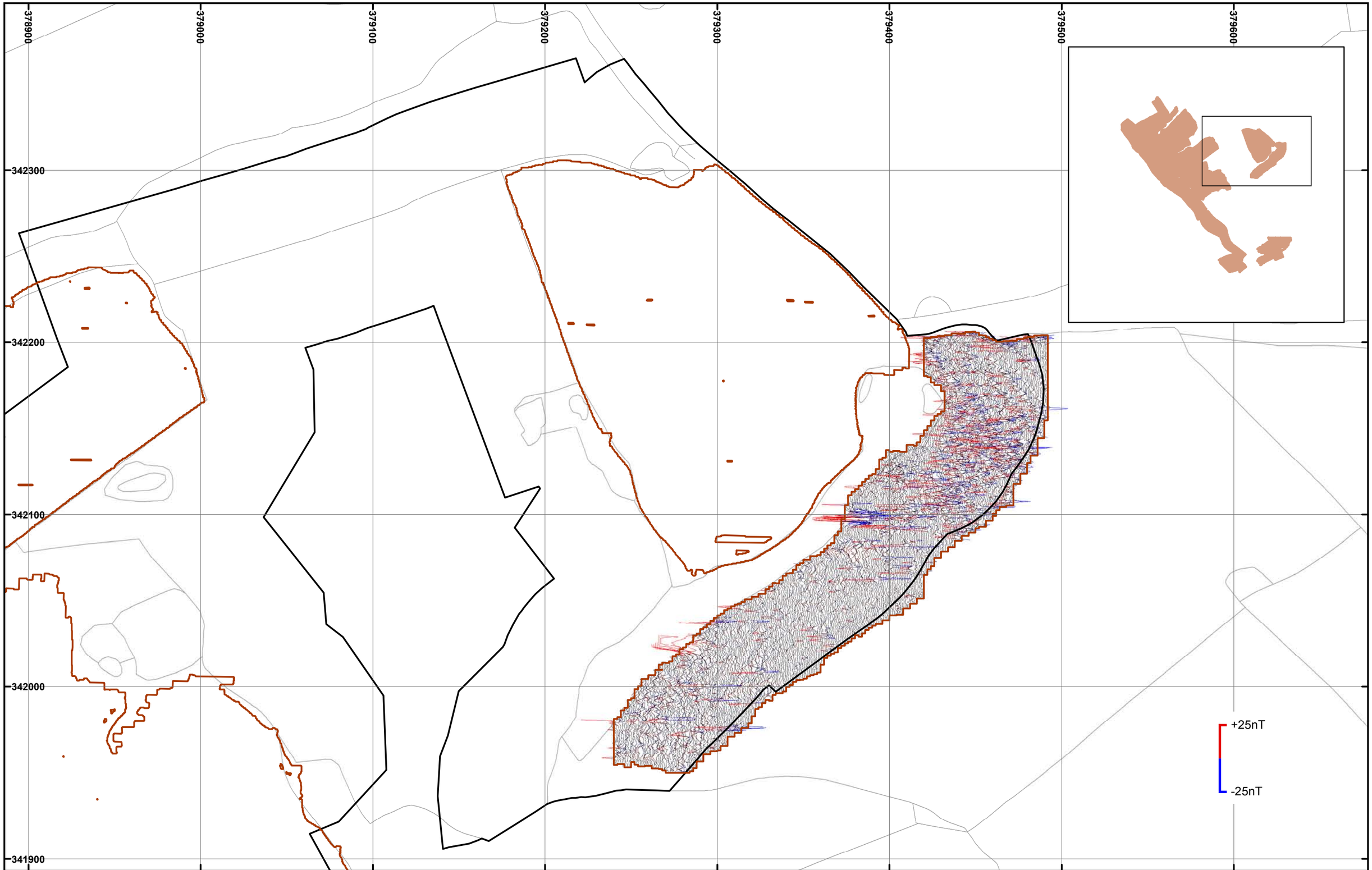
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number

Figure 42

Map Name

CA4-2659 XY Trace (north-east)

Community Area: 4-2659

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:25,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Pipe, Modern Service
- Trackway
- Former Field Boundary

Map Number

Figure 43

Map Name

CA4-2659 Interpretation (north-east)

Community Area:
4-2659

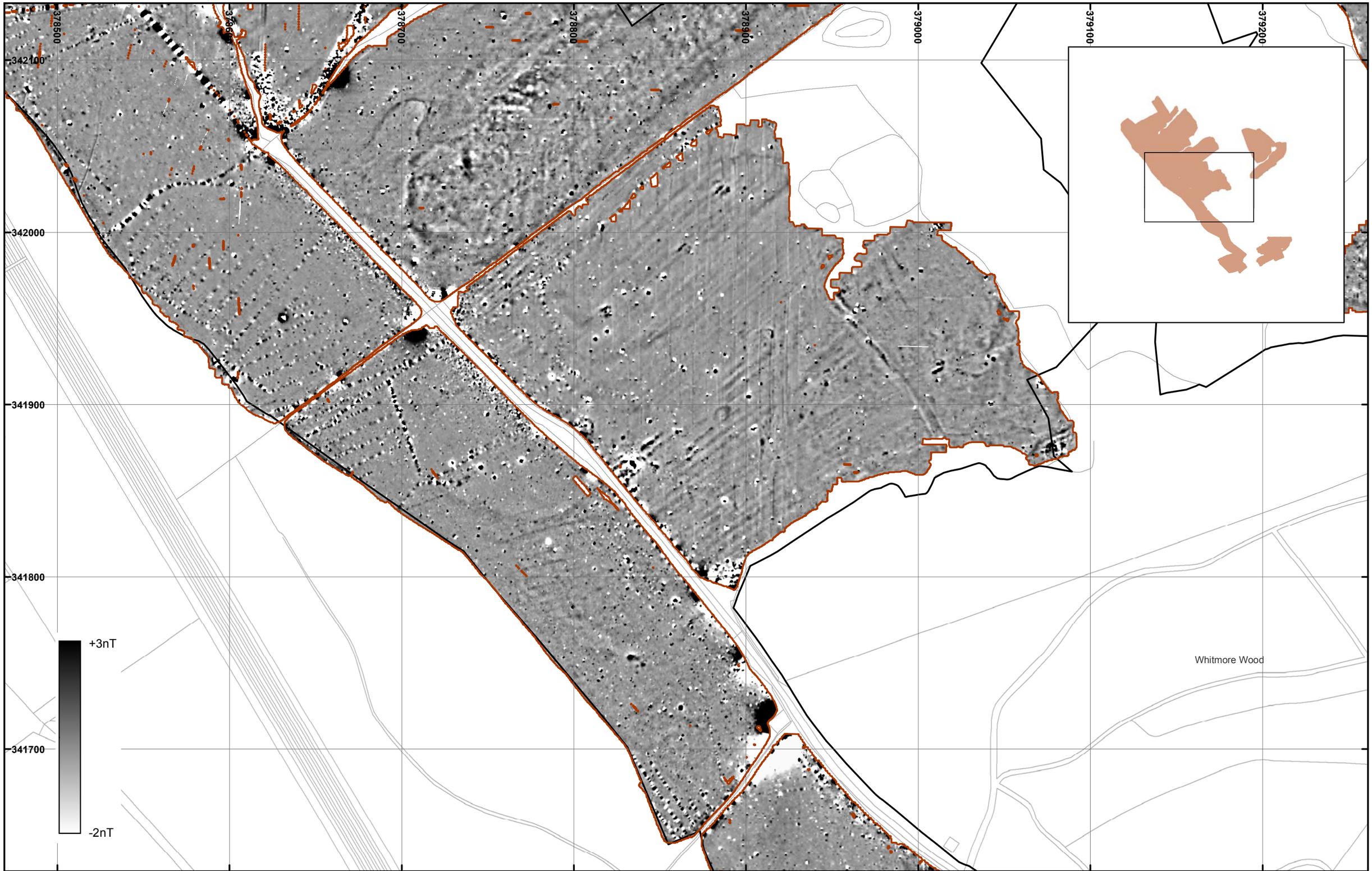
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 44

Map Name: CA4-2659 Greyscale plot (central)

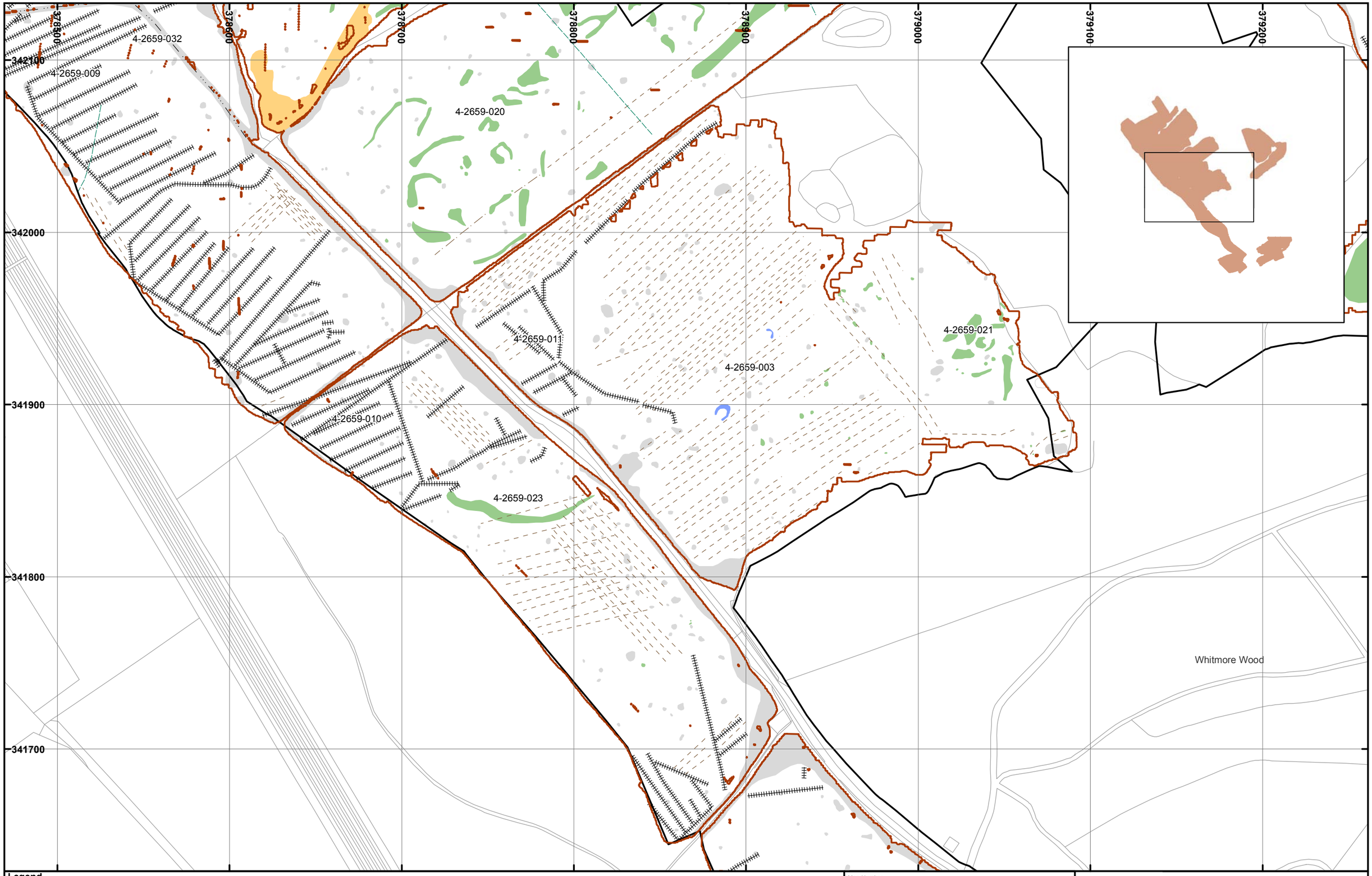
Community Area: 4-2659

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Pipe, Modern Service
- Trackway
- Former Field Boundary

Map Number: Figure 45

Map Name: CA4-2659 Interpretation (central)

Community Area: 4-2659

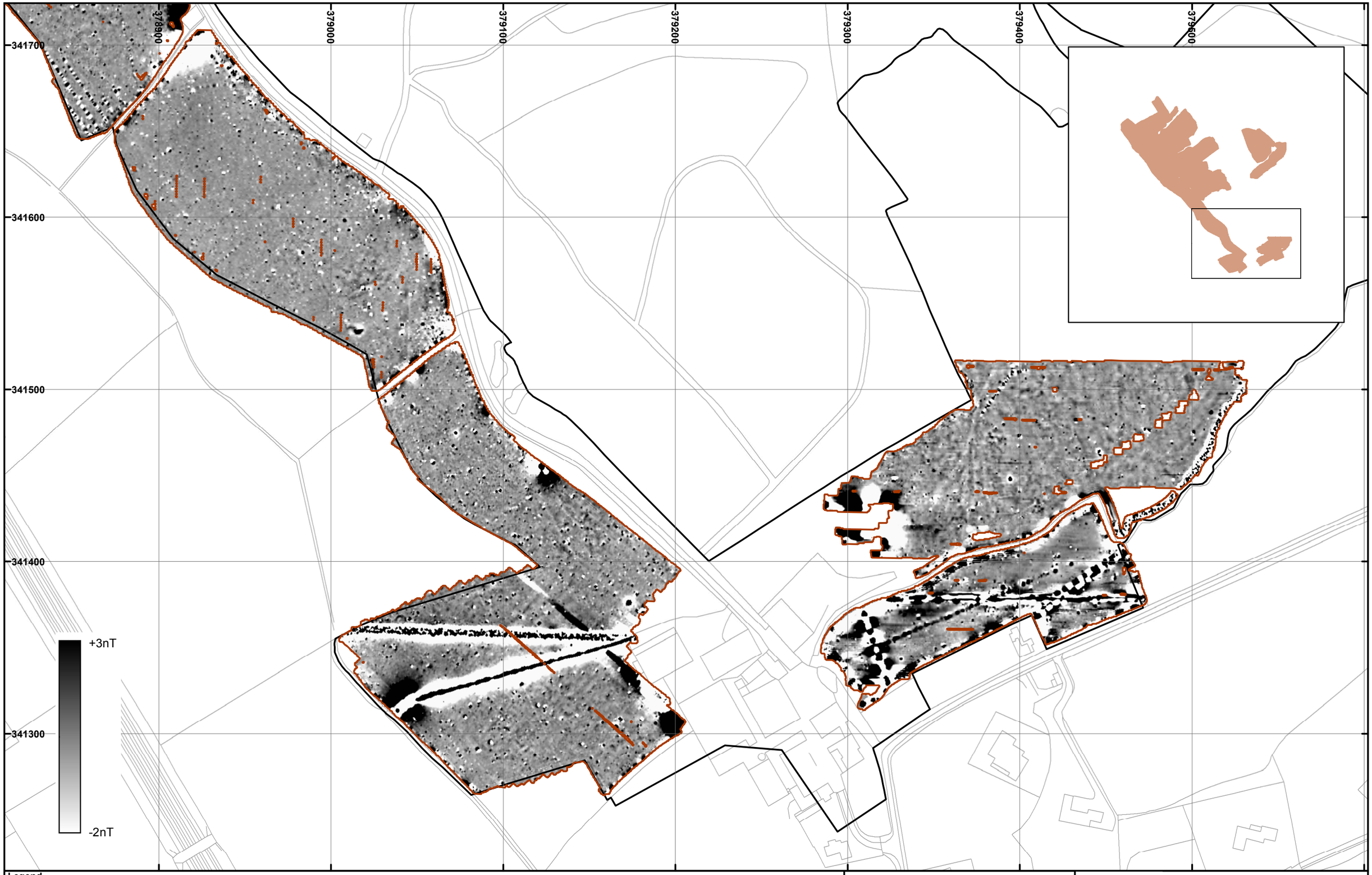
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 46

Map Name: CA4-2659 Greyscale plot (south)

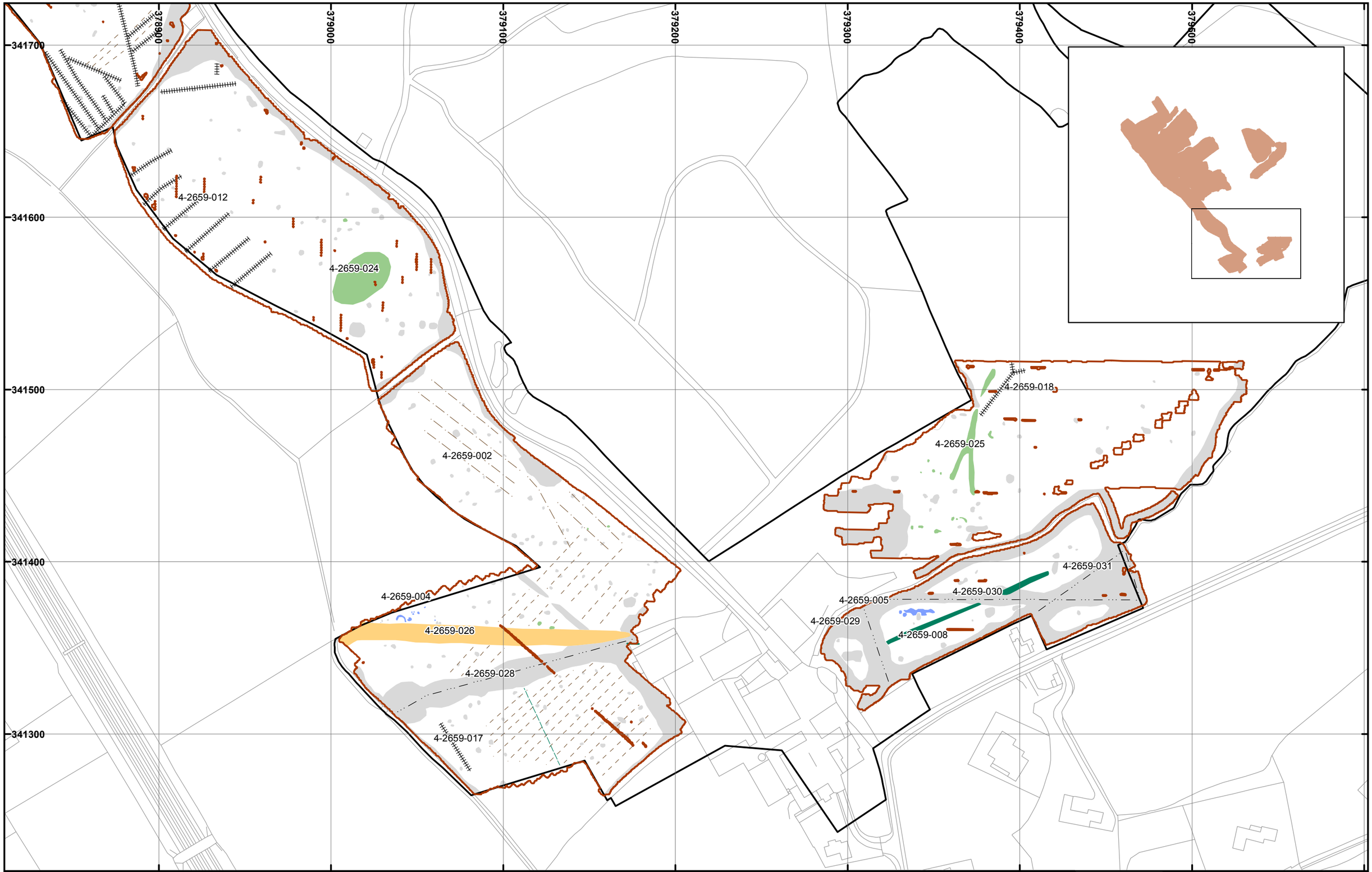
Community Area: 4-2659

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Natural
- Ferrous
- Pipe, Modern Service
- Trackway
- Former Field Boundary

Map Number

Figure 47

Map Name

CA4-2659 Interpretation (south)

Community Area:
4-2659

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000002

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 48

Map Name: CA4-2695 Site location

Community Area: 4-2695

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:7,500

0 75 150 225 300 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377300
377400
377500
377600
377700
377800
377900

343100
343000
342900
342800
342700

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 49

Map Name
CA4-2695 Greyscale plot (north)

Community Area:
4-2695

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

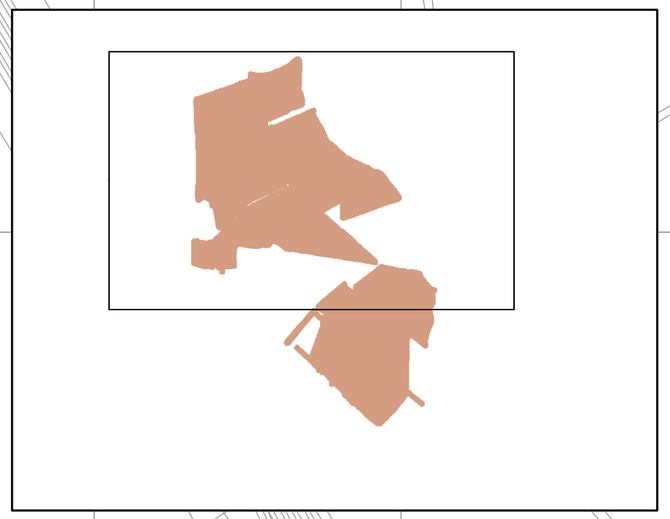
Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377300
377400
377500
377600
377700
377800
377900

343100
343000
342900
342800
342700

4-2695-012
4-2695-004
4-2695-013
4-2695-010
4-2695-014
4-2695-005
4-2695-015
4-2695-011
4-2695-016



Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary
- Trackway

Map Number

Figure 50

Map Name

CA4-2695 Interpretation (north)

Community Area:
4-2695

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377400
377500
377700
377800
377900
378000
378100
342900
342800
342700
342600
342500
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 51

Map Name
CA4-2695 Greyscale plot (south)

Community Area:
4-2695

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

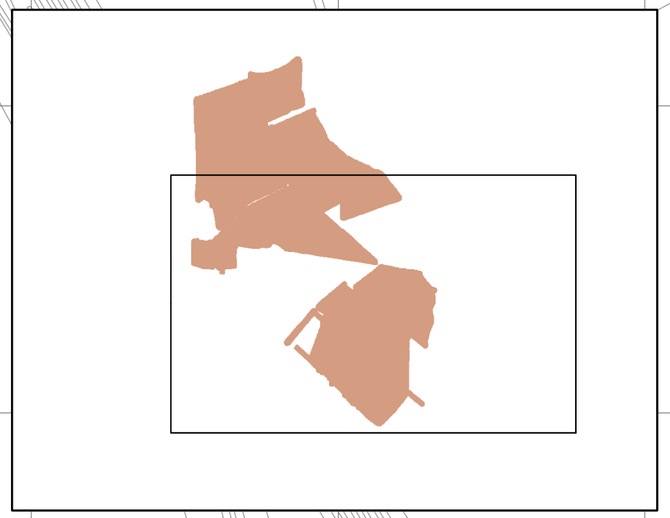
0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377400
377500
377600
377700
377800
377900
378000
378100
342900
342800
342700
342600
342500

4-2695-010
4-2695-014
4-2695-005
4-2695-015
4-2695-011
4-2695-016
4-2695-006
4-2695-002
4-2695-009
4-2695-007
4-2695-001
4-2695-008
4-2695-003



Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary
- Trackway

Map Number
Figure 52

Map Name
CA4-2695 Interpretation (south)

Community Area:
4-2695

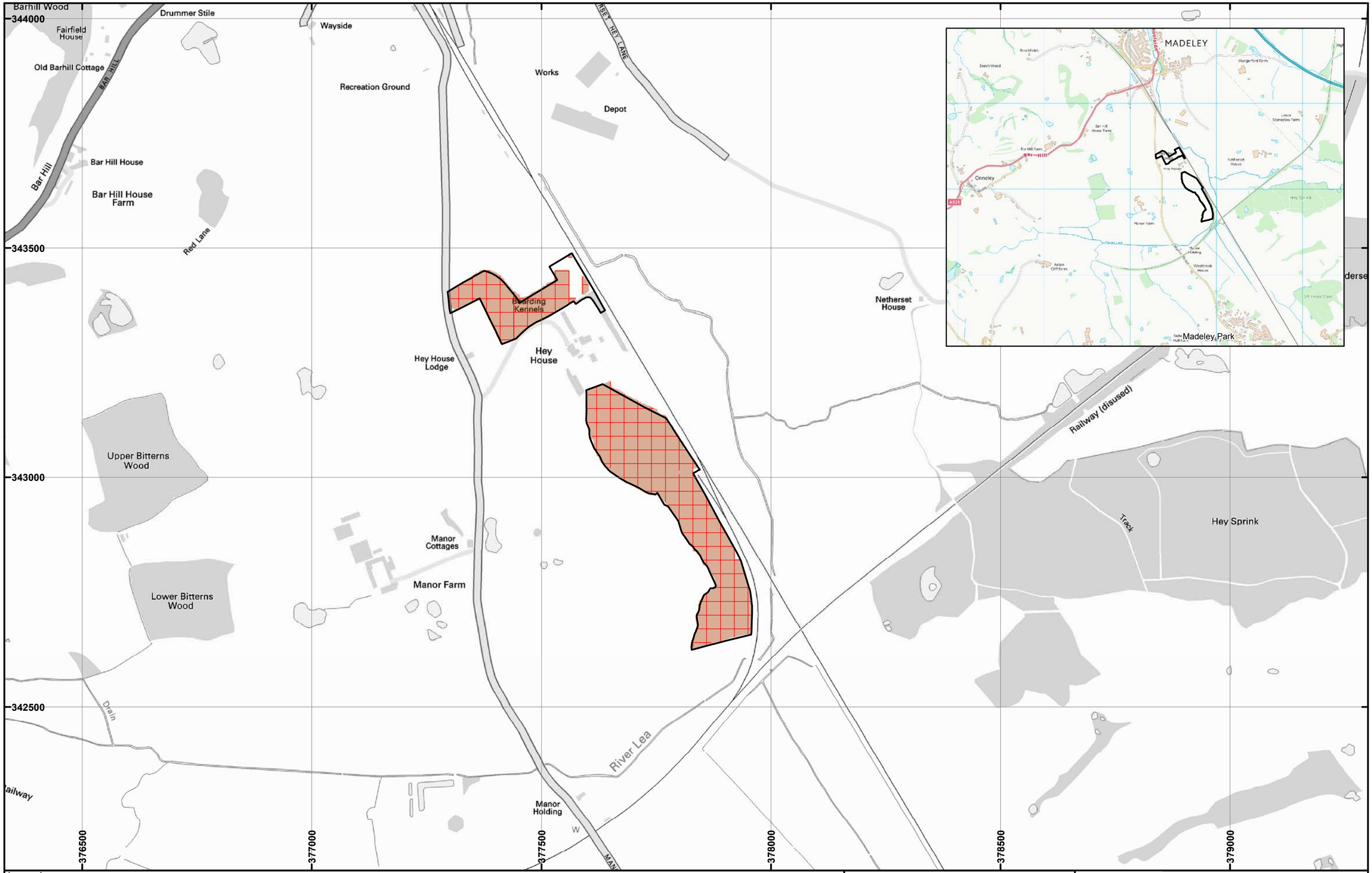
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 53

Map Name: CA4-2700 Site location

Community Area: 4-2700

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:7,500

0 75 150 225 300 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377300 377400 377500 377600 377700 377800 377900 378000

343500 343400 343300 343200 343100

Hey House Lodge

Hey House

+3nT

-2nT

Legend

Site boundary

Detail Survey Extents

Map Number: Figure 54

Map Name: CA4-2700 Greyscale plot (north)

Community Area: 4-2700

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377300
377400
377500
377600
377700
377800
377900
378000

343500
343400
343300
343200
343100

Hey House Lodge

Hey House

+25nT

-25nT

Legend

Site boundary

Detail Survey Extents

Map Number

Figure 55

Map Name

CA4-2700 XY Trace (north)

Community Area:
4-2700

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 24/03/17

377300
377400
377500
377600
377700
377800
377900
378000

343500
343400
343300
343200
343100

4-2700-005

4-2700-006

Hey House

Hey House Lodge

Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous
- Pipe, Modern Service

Map Number

Figure 56

Map Name

CA4-2700 Interpretation (north)

Community Area:
4-2700

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

343100
343000
342900
342800
342700

377500
377600
377700
377800
377900
378000
378100
378200

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 57

Map Name
CA4-2700 Greyscale plot (south)

Community Area:
4-2700

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:12,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

343100
343000
342900
342800
342700
377500
377600
377700
377800
377900
378000
378100
378200

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 58

Map Name
CA4-2700 XY Trace (south)

Community Area:
4-2700

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:12,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

343100
343000
342900
342800
342700
377500
377600
377700
377800
377900
378000
378100
378200
4-2700-006
4-2700-007
4-2700-004
4-2700-001
4-2700-002
4-2700-003

Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous
- Pipe, Modern Service

Map Number: Figure 59

Map Name: CA4-2700 Interpretation (south)

Community Area: 4-2700

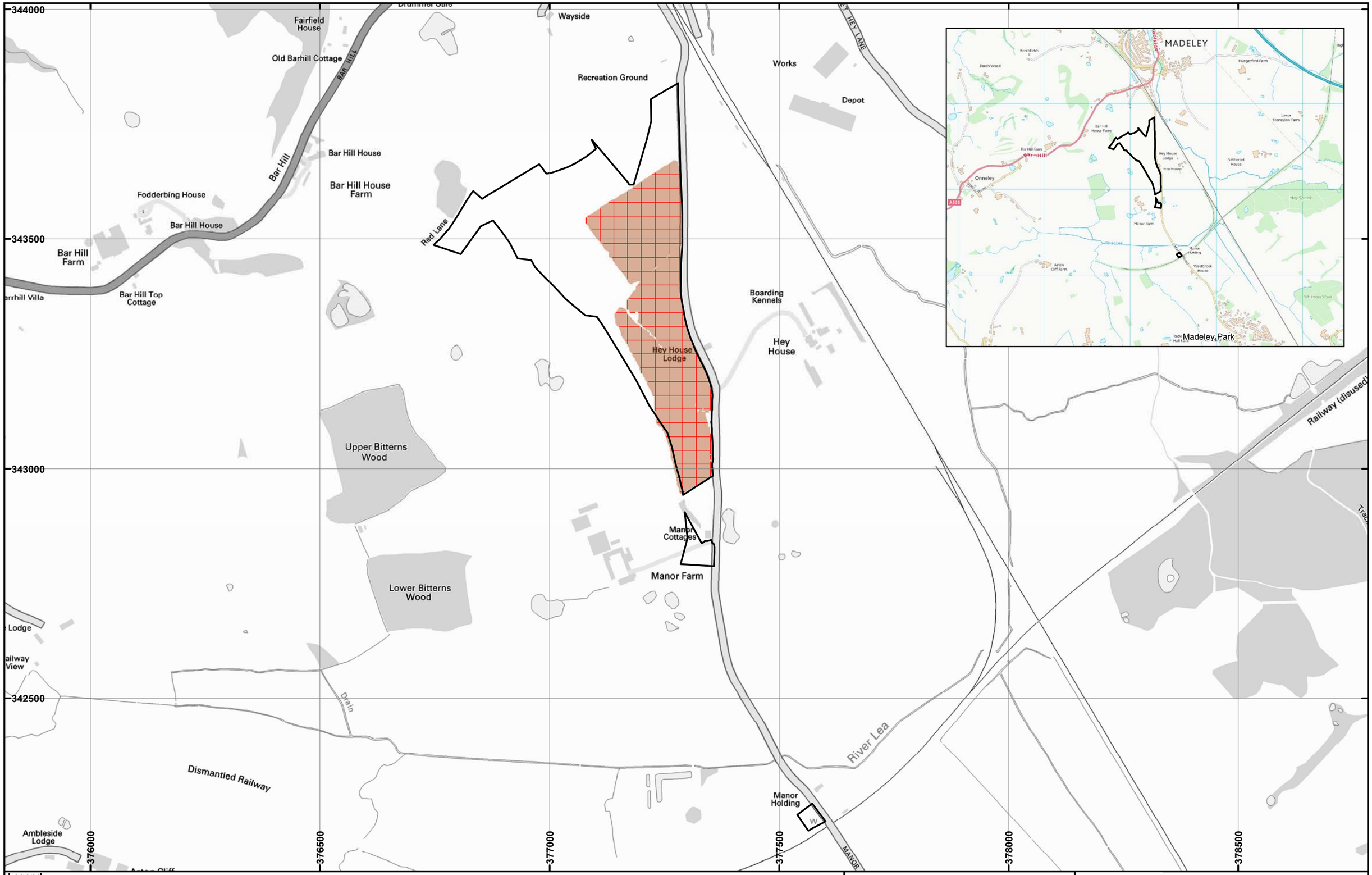
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:12,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 60

Map Name: CA4-2774 Site location

Community Area: 4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:7,500

0 75 150 225 300 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376900
377000
377100
377200
377300
377400
377500
377600
343600
343500
343400
343300
+3nT
-2nT
Hey House
Hey House Lodge

Legend

- Site boundary
- Detail Survey Extents

Map Number
Figure 61

Map Name
CA4-2774 Greyscale plot (north)

Community Area:
4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

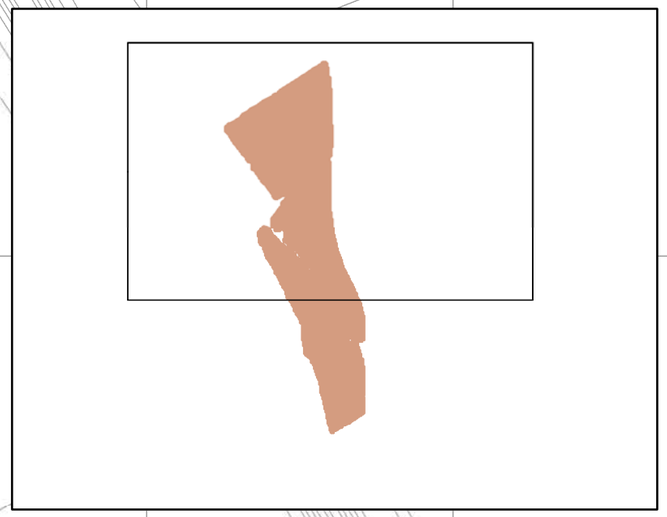
Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376900
377000
377100
377200
377300
377400
377500
377600
343600
343500
343400
343300



Hey House Lodge

Hey House

+25nT

-25nT

Legend

Site boundary

Detail Survey Extents

Map Number

Figure 62

Map Name

CA4-2774 XY Trace (north)

Community Area:
4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376900
377000
377100
377200
377300
377400
377500
377600
343600
343500
343400
343300
4-2774-003
4-2774-004
4-2774-006
4-2774-002
4-2774-008
4-2774-007
Hey House Lodge
Hey House

Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous

Map Number
Figure 63

Map Name
CA4-2774 Interpretation (north)

Community Area:
4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377000
377100
377200
377300
377400
377500
377600
377700

343300
343200
343100
343000
342900

Hey House
Lodge

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 64

Map Name
CA4-2774 Greyscale plot (south)

Community Area:
4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377000
377100
377200
377300
377400
377500
377600
377700

343300
343200
343100
343000
342900

Hey House
Lodge

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 65

Map Name
CA4-2774 XY Trace
(south)

Community Area:
4-2774

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

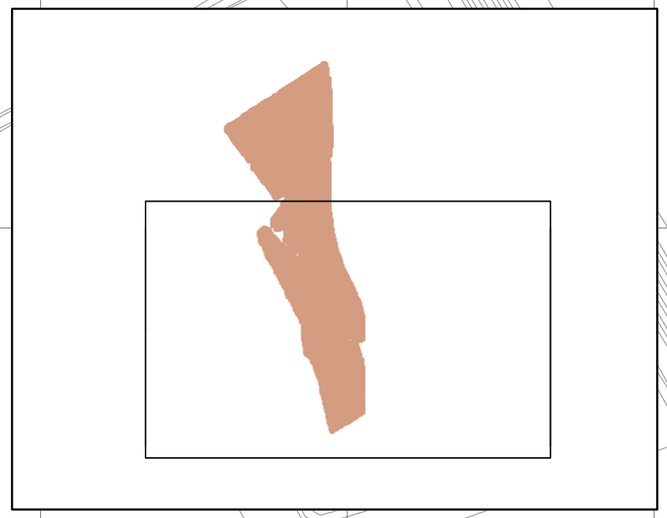
Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

377000
377100
377200
377300
377400
377500
377600
377700
343300
343200
343100
343000
342900
4-2774-006
4-2774-002
4-2774-008
4-2774-007
4-2774-001
4-2774-009
4-2774-005
Hey House Lodge



Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous

Map Number
Figure 66

Map Name
CA4-2774 Interpretation (south)

Community Area:
4-2774

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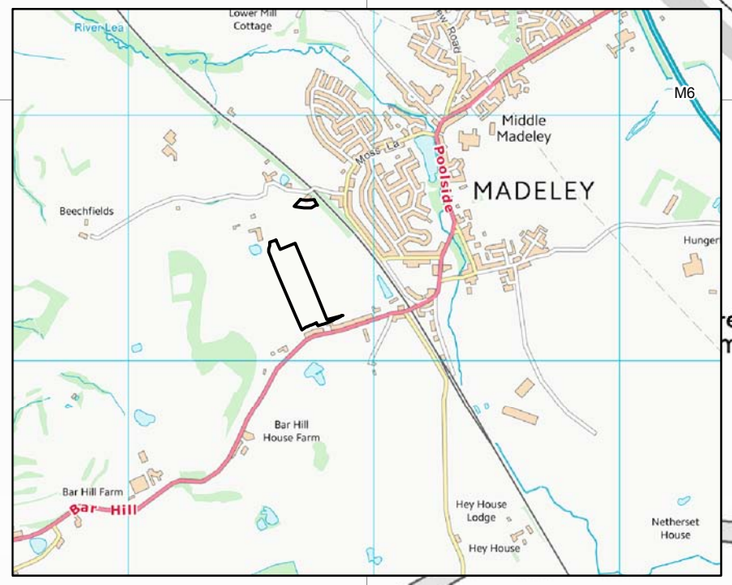
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 67

Map Name: CA4-2810 Site location

Community Area: 4-2810

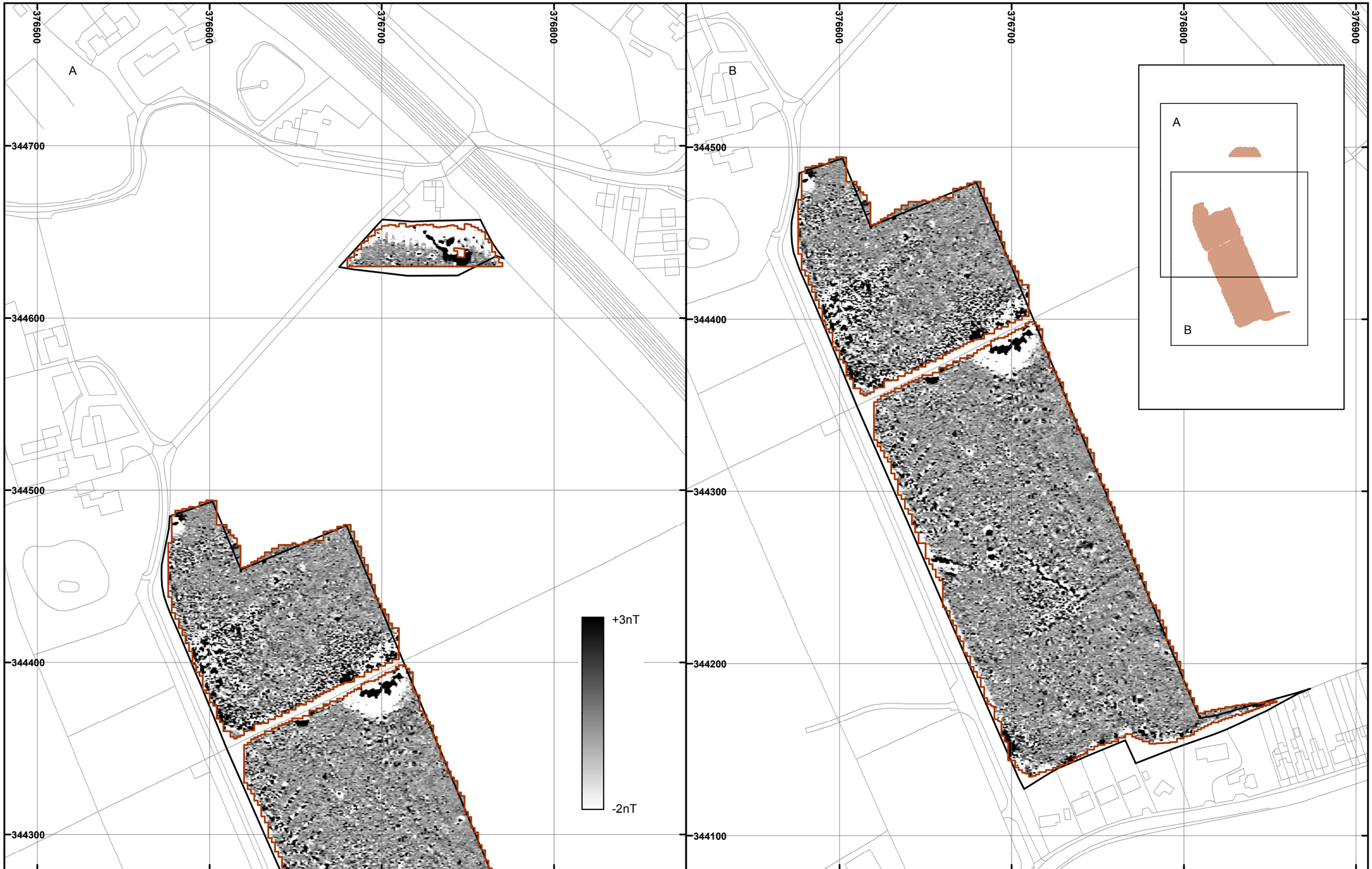
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 68

Map Name: CA4-2810 Greyscale plot

Community Area: 4-2810

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 24/03/17

376500
376600
376700
376800
376900
344700
344600
344500
344400
344300
344200
344100
A
B
+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 69

Map Name
CA4-2810 XY Trace

Community Area:
4-2810

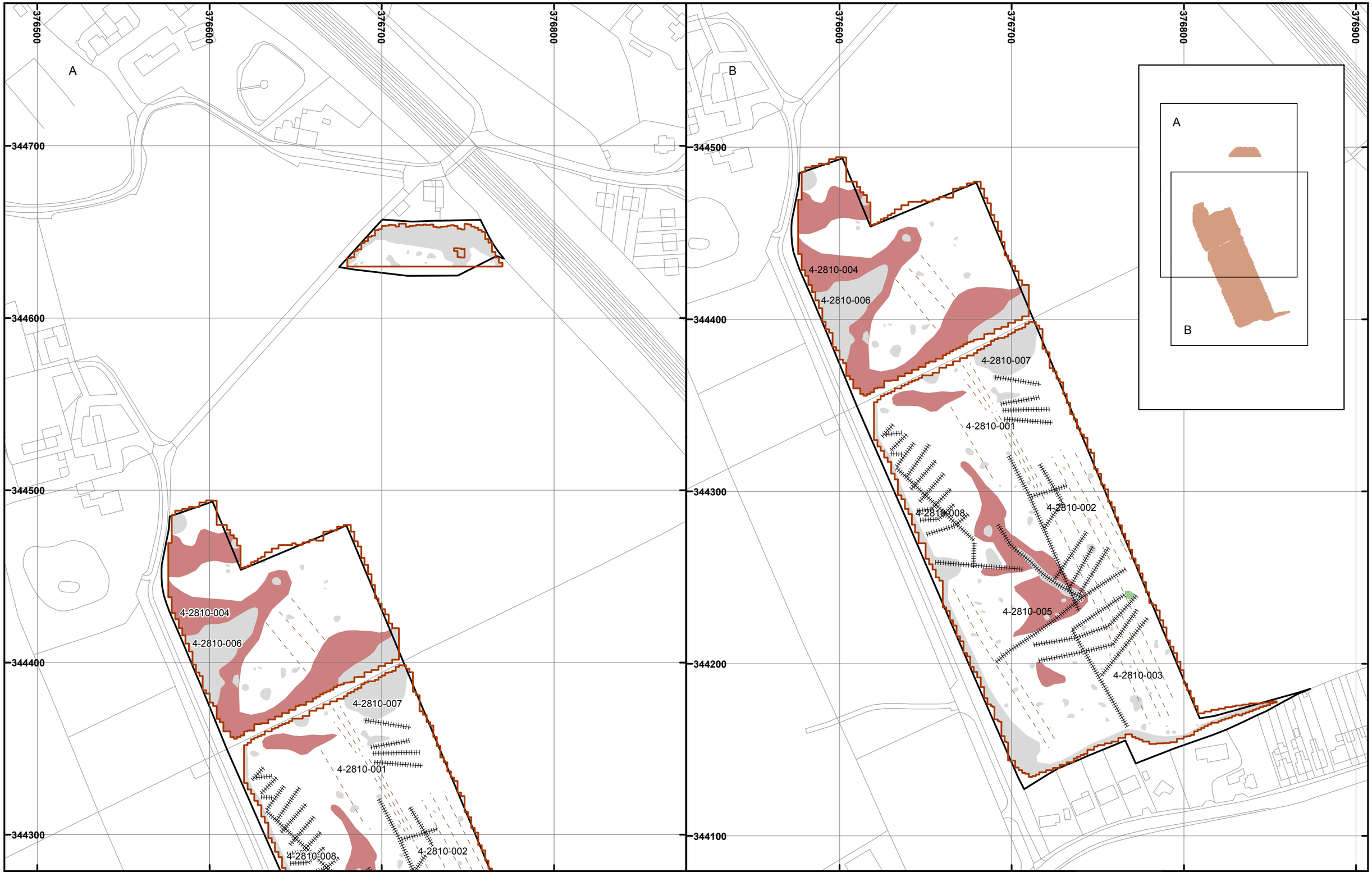
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous

Map Number: Figure 70

Map Name: CA4-2810 Interpretation

Community Area: 4-2810

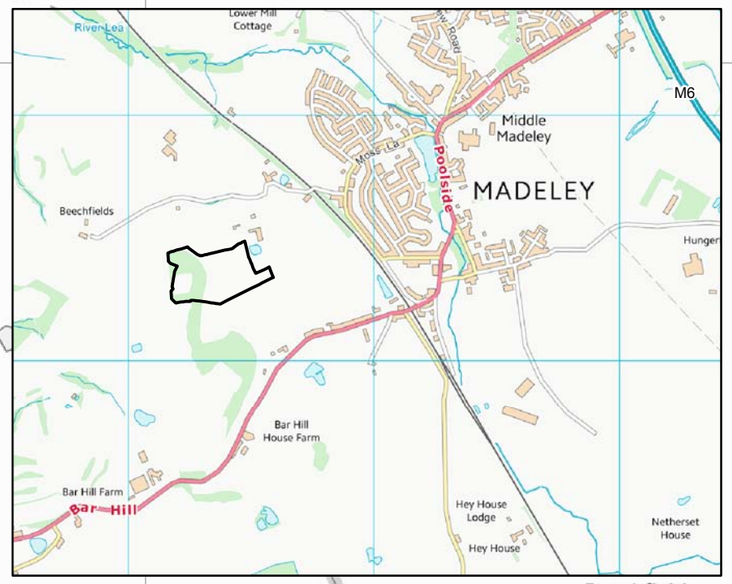
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Bowerend Farm

Moss House Farm

Moor Hall Cottages

Moor Hall Farm

Beech Wood

Beech Wood

Barr Hill Cottage

Barhill Wood

Fairfield House

Old Barhill Cottage

Sandfield House

Drummer Stile

Wayside

Recreation Ground

Hall

PEAR TREE DR

PRIMROSE DELL

CHARLES COTTON DR

BERESFORD DR

PLOVER F

THE BRIDLE PATH

BOWER END LANE

MOSS LANE

JOHN OFFLEY ROAD

CHERRY HILL

BRAMBLE LEA

MORNINGSIDE

BIRCH DALE

IZAAC WALTON WAY

School

Madeley Pool

River Lea

POOLSIDE

A525

PW

PH

VICAR

Almsh

STATION ROAD

RED LANE

BAR HILL

CG

Beechfields

345000

344560

344000

375500

376000

376500

377000

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 71

Map Name: CA4-2876 Site location

Community Area: 4-2876

Registered in England. Registration number 06791686. Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376100 376200 376300 376400 376500 376600 376700 376800

344600 344500 344400 344300 344200

+3nT

-2nT

Legend

Site boundary

Detail Survey Extents

Map Number

Figure 72

Map Name

CA4-2876 Greyscale plot

Community Area:
4-2876

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376100
376200
376300
376400
376500
376600
376700
376800

344600
344500
344400
344300
344200

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 73

Map Name
CA4-2876 XY Trace

Community Area:
4-2876

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

376100 376200 376300 376400 376500 376600 376700 376800

344600 344500 344400 344300 344200

4-2876-001
4-2876-002
4-2876-003
4-2876-004
4-2876-005
4-2876-006
4-2876-007
4-2876-008
4-2876-009
4-2876-010
4-2876-011
4-2876-012

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Agriculture -Ridge & Furrow
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Pipe, Modern Service

Map Number
Figure 74

Map Name
CA4-2876 Interpretation

Community Area:
4-2876

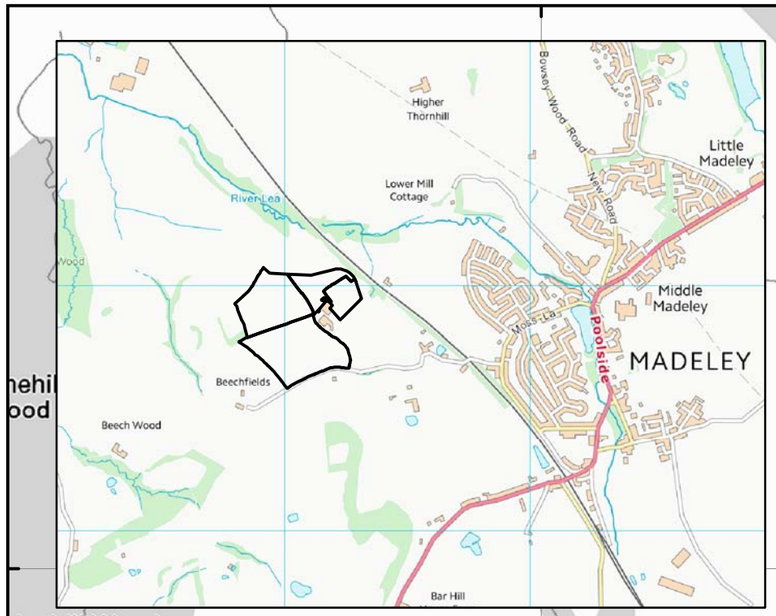
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



River Lea

Lower Mill Cottage

Lowermill House

FURNACE LANE

The Lum

APPLE C

THE BRIDLE PATH

FERN D

PEAR TREE DR

345000

PRIMROSE DELL

CHARLES COTTON DR

BERESFORD

PLOVER F

THE BRIDLE PATH

Bowerend Farm

Moss House Farm

BOWER END LANE

MOSS LANE

JOHN OFFLEY ROAD

Moor Hall Cottages

CG

Beechfields

Moor Hall Farm

344500

Beech Wood

375500

376000

376500

377000

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 75

Map Name: CA4-2890 Site location

Community Area: 4-2890

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375600
375900
376000
376100
376200
376300
376400
376500
344900
344800
344700
344600
344500
Beechfields
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 76

Map Name
CA4-2890 Greyscale plot

Community Area:
4-2890

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Drain
- Natural
- Ferrous
- Pipe, Modern Service

Map Number: Figure 77

Map Name: CA4-2890 Interpretation

Community Area: 4-2890

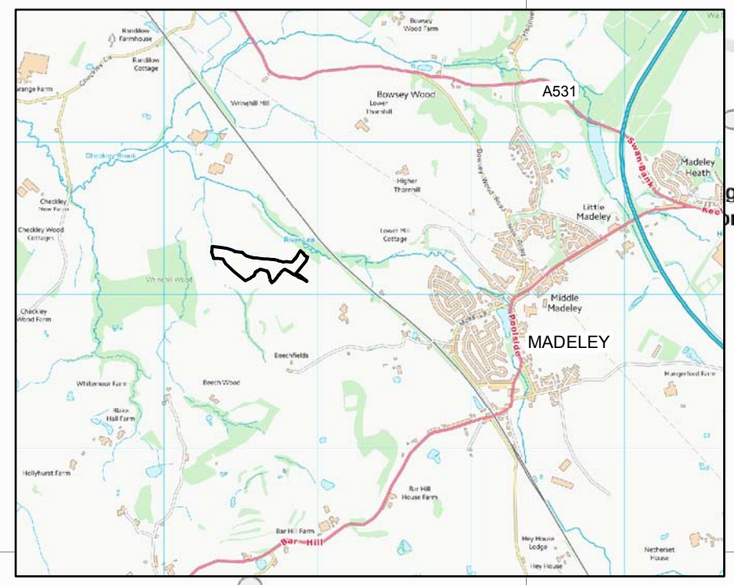
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Wrinehill Hall

River Lea

Grafton's Wood

River Lea

Lower Mill Cottage

The Lum

Wrinehill Wood

Wrinehill Wood

Wrinehill Wood

Wood

Bowerend Farm

Moss House Farm

345500

345000

375000

375500

376000

376500

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 78

Map Name: CA4-2910 Site location

Community Area: 4-2910

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375300
375400
375500
375600
375700
375800
375900
376000

345400
345300
345200
345100
345000

River Lea

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 79

Map Name
CA4-2910 Greyscale plot

Community Area:
4-2910

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375300
375400
375500
375600
375700
375800
375900
376000

345400
345300
345200
345100
345000

River Lea

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 80

Map Name
CA4-2910 XY Trace

Community Area:
4-2910

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375300
375400
375500
375600
375700
375800
375900
376000

345400
345300
345200
345100
345000

River Lea

4-2910-001
4-2910-002
4-2910-003
4-2910-004
4-2910-005
4-2910-006
4-2910-007
4-2910-008
4-2910-009
4-2910-010
4-2910-011
4-2910-012
4-2910-013
4-2910-014
4-2910-015
4-2910-016
4-2910-017

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ploughing
- Agriculture - Drain
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary

Map Number
Figure 81

Map Name
CA4-2910 Interpretation

Community Area:
4-2910

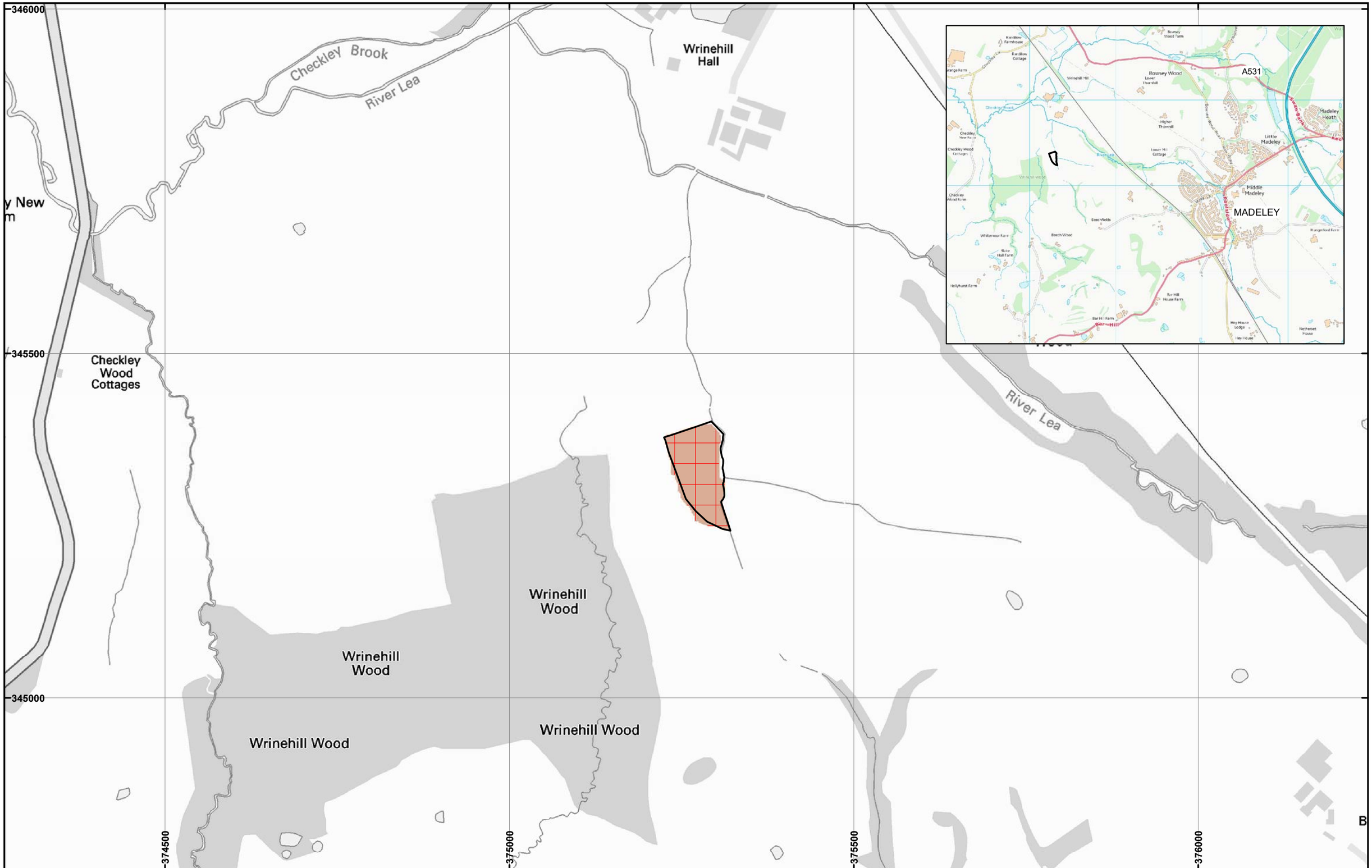
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 82

Map Name: CA4-2941 Site location

Community Area: 4-2941

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375000
375100
375200
375300
375400
375500
375600

345500
345400
345300
345200
345100

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 83

Map Name
CA4-2941 Greyscale plot

Community Area:
4-2941

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375000
375100
375200
375300
375400
375500
375600
345500
345400
345300
345200
345100
+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 84

Map Name
CA4-2941 XY Trace

Community Area:
4-2941

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375000
375100
375200
375300
375400
375500
375600
345500
345400
345300
345200
345100
4-2941-002
4-2941-001

Legend

- Site boundary
- Detail Survey Extents
- Natural
- Ferrous
- Trackway

Map Number
Figure 85

Map Name
CA4-2941 Interpretation

Community Area:
4-2941

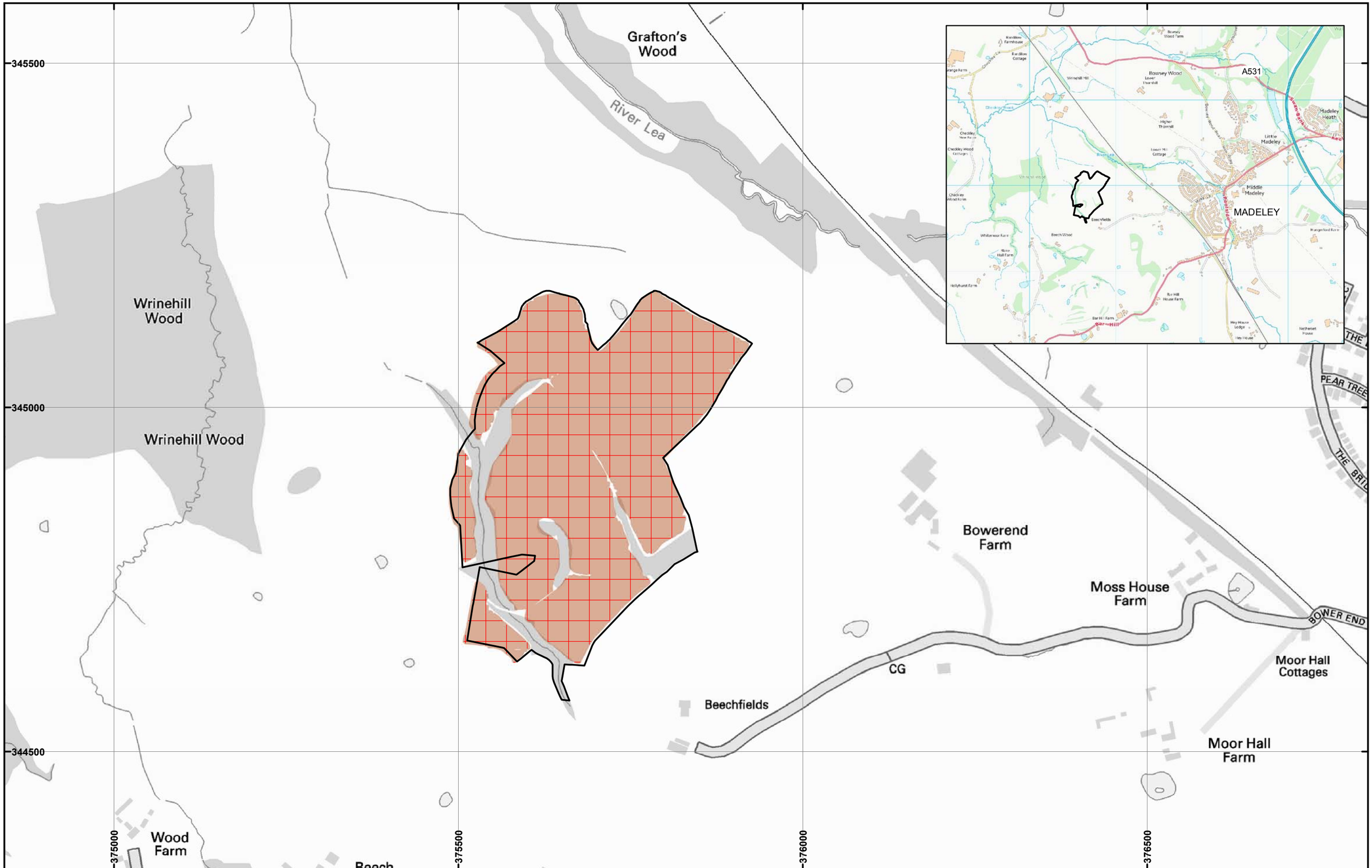
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 86

Map Name: CA4-2947 Site location

Community Area: 4-2947

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375400
375500
375600
375700
375800
375900
376000
376100

345200
345100
345000
344900
344800

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 87

Map Name
CA4-2947 Greyscale plot (north)

Community Area:
4-2947

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Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

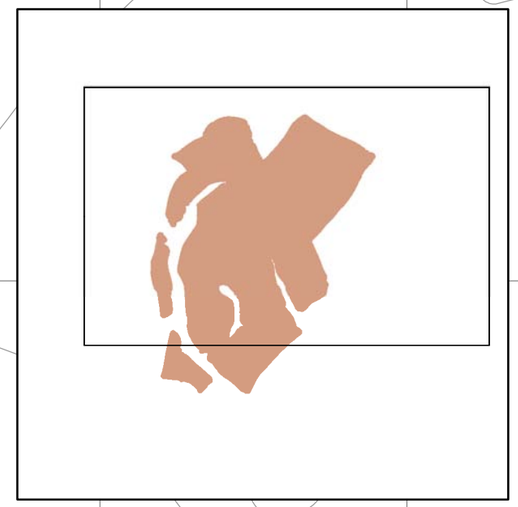
Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375400 375500 375600 375700 375800 375900 376000 376100

345200 345100 345000 344900 344800

4-2947-008
4-2947-014
4-2947-007
4-2947-015
4-2947-013
4-2947-011
4-2947-006
4-2947-002
4-2947-001
4-2947-004
4-2947-005
4-2947-012
4-2947-003
4-2947-009



Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary

Map Number
Figure 88

Map Name
CA4-2947 Interpretation (north)

Community Area:
4-2947

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375400
375500
375600
375700
375800
375900
376000
376100

345000
344900
344800
344700
344600

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 89

Map Name
CA4-2947 Greyscale plot (south)

Community Area:
4-2947

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17

375400
375500
375600
375700
375800
375900
376000
376100
345000
344900
344800
344700
344600
4-2947-007
4-2947-015
4-2947-013
4-2947-011
4-2947-006
4-2947-002
4-2947-001
4-2947-004
4-2947-005
4-2947-012
4-2947-003
4-2947-009
4-2947-010

Legend

- Site boundary
- Detail Survey Extents
- Archaeology
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Natural
- Ferrous
- Former Field Boundary

Map Number
Figure 90

Map Name
CA4-2947 Interpretation (south)

Community Area:
4-2947

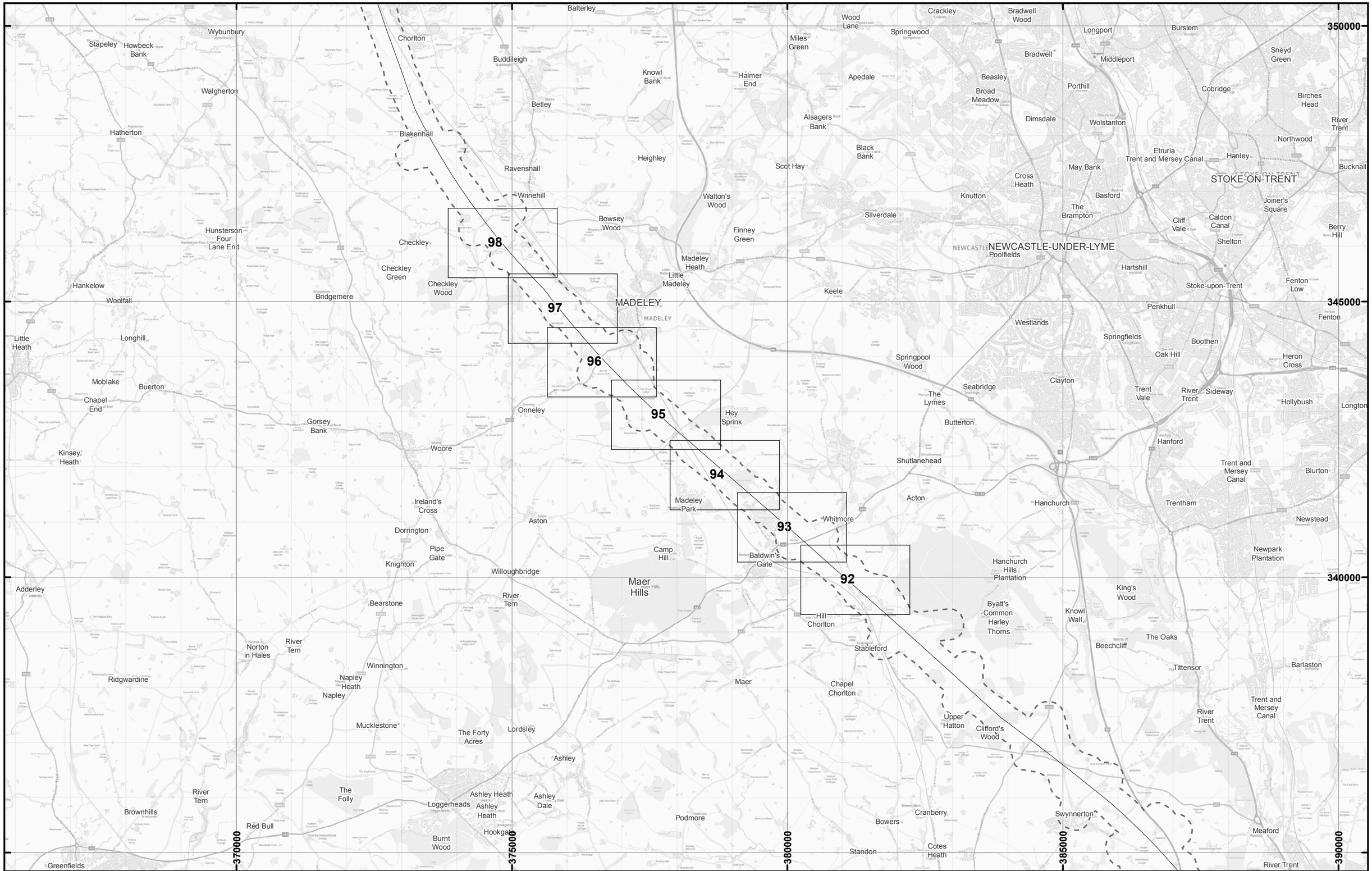
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

Doc Number: C861-ARP-EV-MAP-WS06-000003

Date: 21/04/17



Legend

- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line

Map Number: Figure 91

Map Name: CA4 Remote Sensing Map Index

Community Area: 4

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:62,500

0 625 1,250 1,875 2,500 Metres

Doc Number: C861-ARP-EV-MAP-WE01-000001

Date: 24/05/17

381000

382000

340000

3023

3013

3013

3016

3012

STS063

3008

3014

3011

STS062

3009

157

STS056

231+700
231+600
231+500
231+400
231+300
231+200
231+100
231+000
230+900
230+800
230+700
230+600
230+500
230+400
230+300
230+200
230+100
230+000

Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP
- Bank
- Ditch
- Extent of feature
- Ridge and furrow
- Structure
- Monument polygon

AP
- Bank
- Ditch
- Possible feature
- Structure
- Monument polygon

LiDAR/multi-spectral
- Polygons
- Lines

Feature labelling
42 = AP/NMP
FRC001 = Gazetteer
1102 = Remote Sensing

Map Number
Figure 92

Map Name
Remote Sensing Survey Data
CA4 (Map 1)

Community Area:
04

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17

380000

381000

341000

WHM014

WHM021

3035

3028

3030

3029

3026

3024

155

153

3019

3019

3021

3013

3023

3013

157

233+200

233+100

233+000

232+900

232+800

232+700

232+600

232+500

232+400

232+300

232+200

232+100

232+000

231+900

231+800

231+700

231+600

231+500

231+400

Legend

Land required by the Proposed Scheme

LiDAR/multi-spectral study area

HS2 Phase 2a centre line

Gazetteer entry with overlapping features

NMP

Bank

Ditch

Extent of feature

Ridge and furrow

Structure

Monument polygon

AP

Bank

Ditch

Possible feature

Structure

Monument polygon

LiDAR/multi-spectral

Polygons

Lines

Feature labelling

42 = AP/NMP

FRC001 = Gazetteer

1102 = Remote Sensing

Map Number

Figure 93

Map Name

Remote Sensing Survey Data
CA4 (Map 2)

Community Area:
04

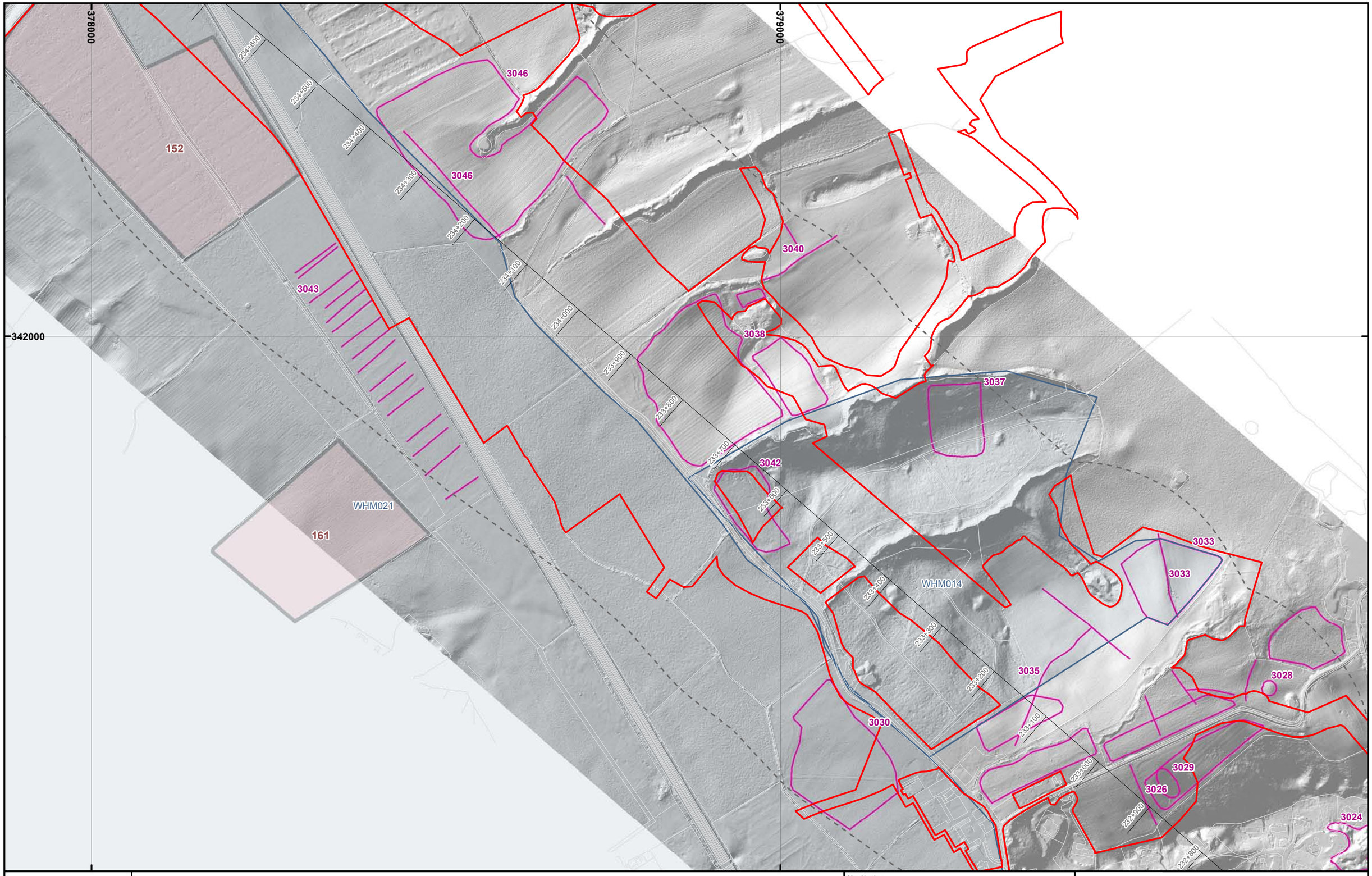
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17



Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP
- Bank
- Ditch
- Extent of feature
- Ridge and furrow
- Structure
- Monument polygon

AP
- Bank
- Ditch

- Possible feature
- Structure
- Monument polygon

LiDAR/multi-spectral
- Polygons
- Lines

Feature labelling

42 = AP/NMP

FRC001 = Gazetteer

1102 = Remote Sensing

Map Number: Figure 94

Map Name: Remote Sensing Survey Data CA4 (Map 3)

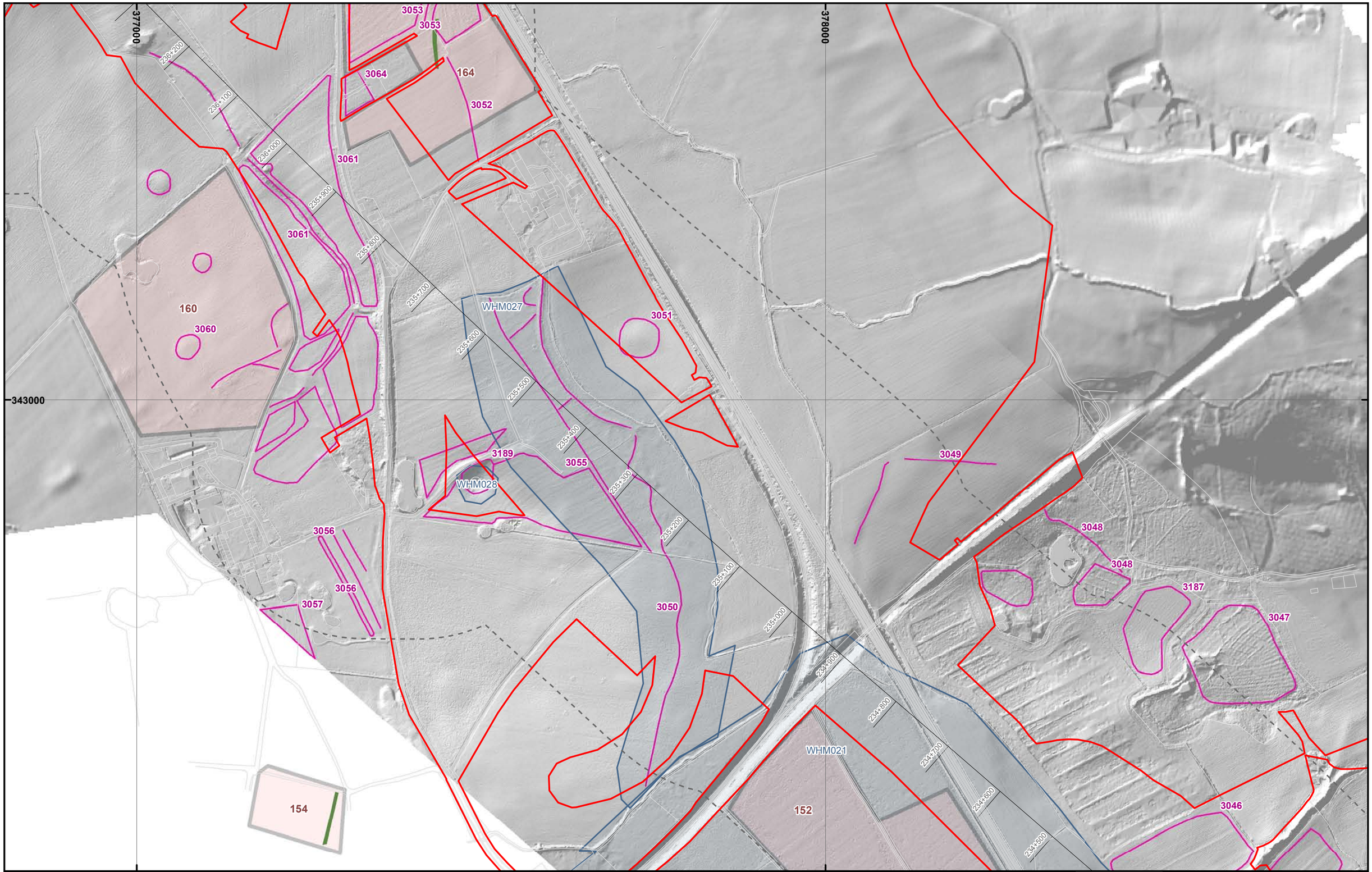
Community Area: 04

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP

- Bank
- Ditch
- Extent of feature
- Ridge and furrow
- Structure
- Monument polygon

AP

- Bank
- Ditch
- Possible feature
- Structure
- Monument polygon

LiDAR/multi-spectral

- Polygons
- Lines

Feature labelling

42 = AP/NMP
FRC001 = Gazetteer
1102 = Remote Sensing

Map Number
Figure 95

Map Name
Remote Sensing Survey Data
CA4 (Map 4)

Community Area:
04

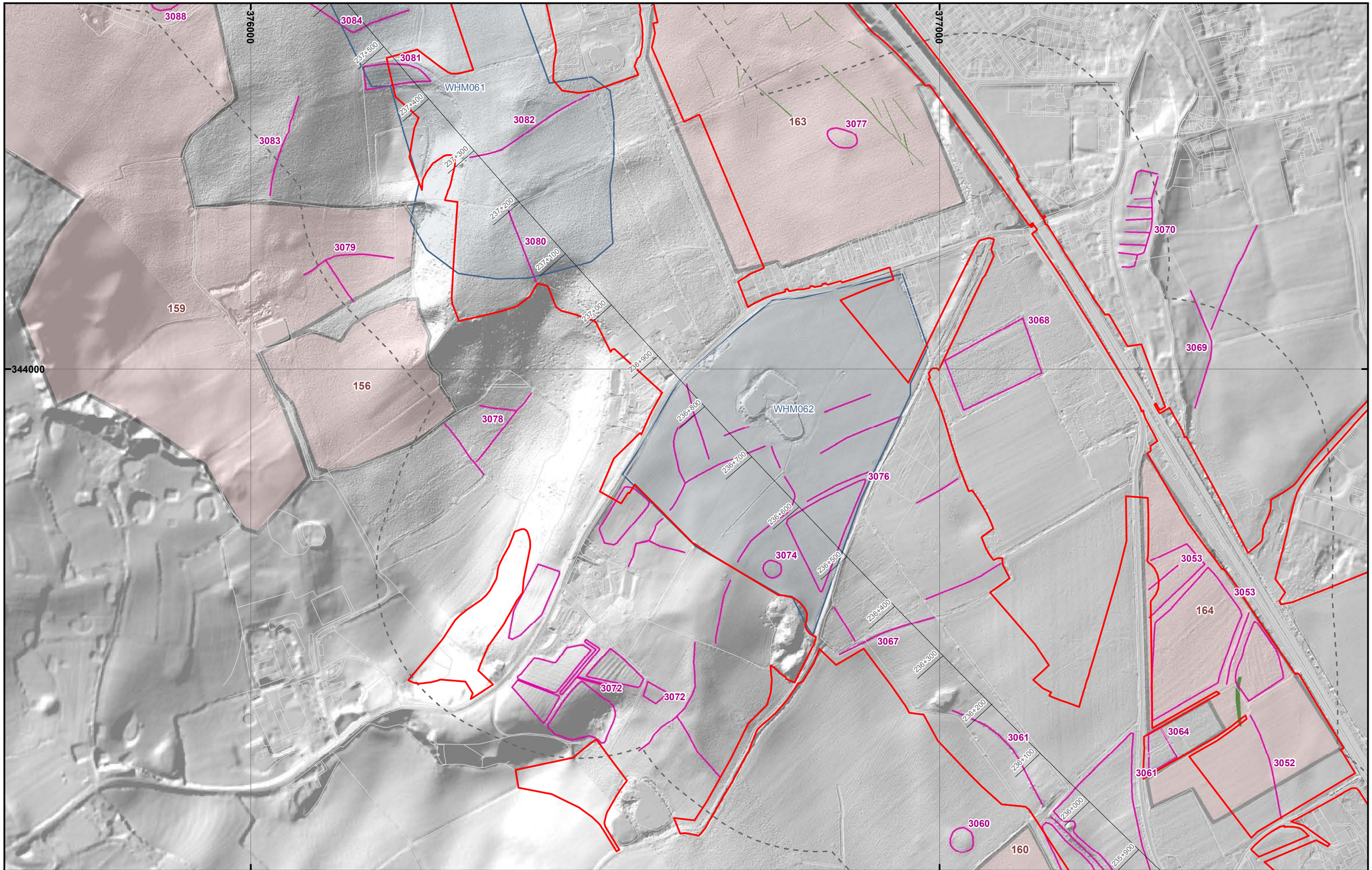
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17



Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP

- Bank
- Ditch
- Extent of feature
- Ridge and furrow
- Structure
- Monument polygon

AP

- Bank
- Ditch

- Possible feature
- Structure
- Monument polygon

LiDAR/multi-spectral

- Polygons
- Lines

Feature labelling

42 = AP/NMP
FRC001 = Gazetteer
1102 = Remote Sensing

Map Number: Figure 96

Map Name: Remote Sensing Survey Data CA4 (Map 5)

Community Area: 04

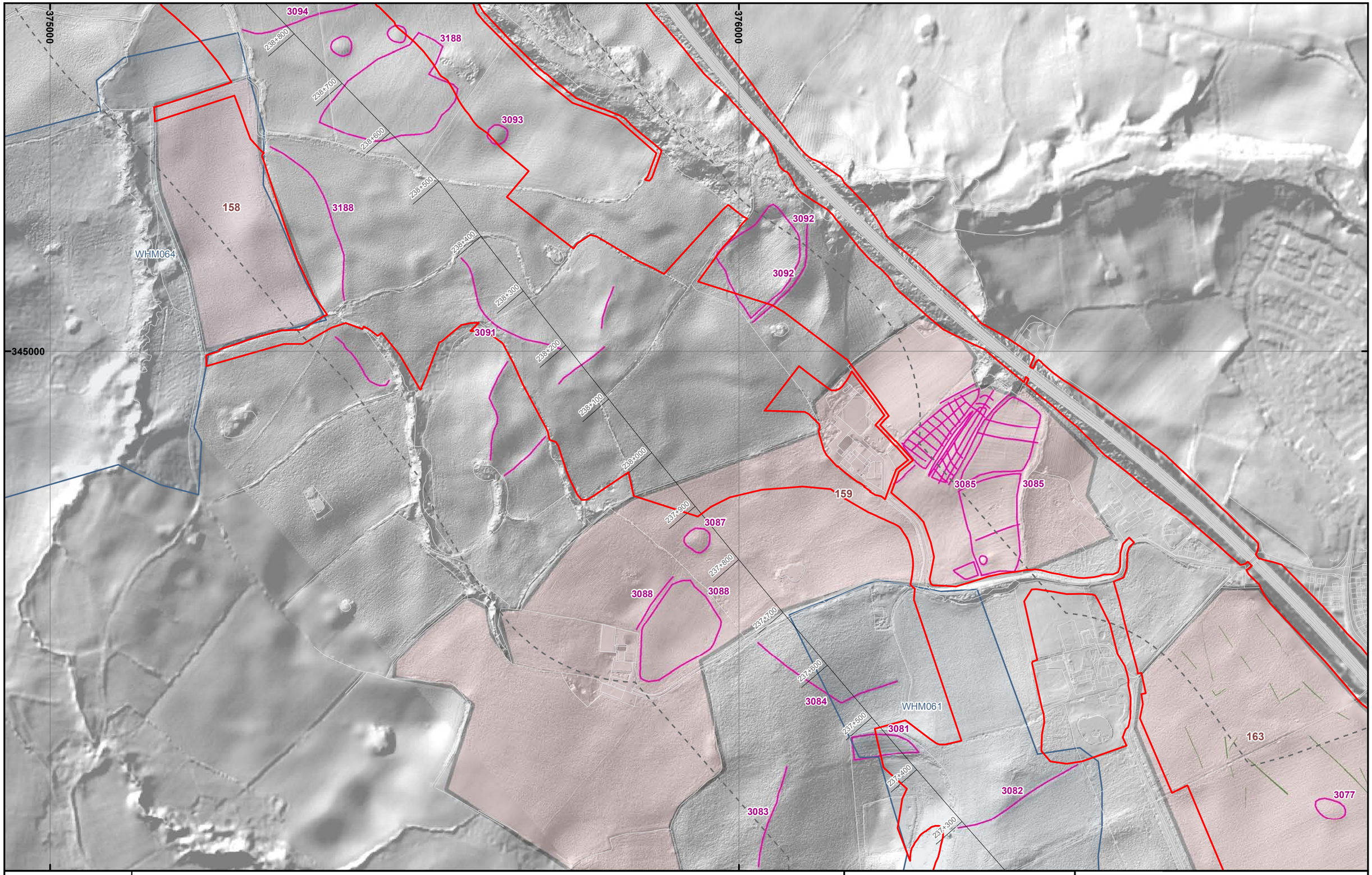
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP
- Bank
- Ditch
- Extent of feature
- Ridge and furrow

AP
- Structure
- Monument polygon
- Bank
- Ditch

LiDAR/multi-spectral
- Possible feature
- Structure
- Monument polygon
- Polygons

- Lines

Feature labelling

42 = AP/NMP

FRC001 = Gazetteer

1102 = Remote Sensing

Map Number: Figure 97

Map Name: Remote Sensing Survey Data CA4 (Map 6)

Community Area: 04

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17

374000

379000

346000

3116
3117
3118
3105
3106
3111
3112
3113
3108
3110
3103
3104
3102
3098
3098
3096
3097
162
SCH001
WHM066
WHM067
3099
3095
3093
3094
WHM064
3188

240+400
240+300
240+200
240+100
240+000
239+900
239+800
239+700
239+600
239+500
239+400
239+300
239+200
239+100
239+000
238+900
238+800

Legend

- Land required by the Proposed Scheme
- LiDAR/multi-spectral study area
- HS2 Phase 2a centre line
- Gazetteer entry with overlapping features

NMP

- Bank
- Ditch
- Extent of feature
- Ridge and furrow
- Structure
- Monument polygon

AP

- Bank
- Ditch
- Possible feature
- Structure
- Monument polygon

LiDAR/multi-spectral

- Polygons
- Lines

Feature labelling

42 = AP/NMP
FRC001 = Gazetteer
1102 = Remote Sensing

Map Number
Figure 98

Map Name
Remote Sensing Survey Data
CA4 (Map 7)

Community Area:
04

Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17

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E145