E86

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

Background Information and Data

CA1: Fradley to Colton

Cultural heritage survey reports (BID-CH-004-001)

July 2017

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Department for Transport

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1 Introduction

1.1.1 This document presents the results of cultural heritage surveys carried out in the Fradley to Colton community area (CA1) 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 report

2.1 Introduction

2.1.1 This section presents the results of the geophysical survey carried out within the Fradley to Colton 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' Standard 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 undertaken for the Proposed Scheme. This report provides the results of non-intrusive geophysical survey on the Fradley to Colton area of the route of the Proposed Scheme between August 2016 and January 2017. The Fradley to Colton area section of the route is approximately 18km from the north of Lichfield travelling north-west to the west of Colton.

2.1.4 The geophysical surveys undertaken 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 with reference to the risk model.

2.1.5 Archaeological background for each survey area presents a brief summary of known archaeological assets within and surrounding 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 assets 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 survey will be combined with data from other archaeological assessments carried out as part of the project, including desk-top studies and LiDAR data, in order to analyse the archaeological potential of 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] 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

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

2.3 Methods

Introduction

2.3.1 All surveys detailed in this report adhere to the same methodology, as set out below, and conform to HE guidelines and recommendations[4].

Grid location

2.3.2 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. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the duration of the 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 0.03nT, in accordance with HE guidelines[6].

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 Global Positioning System (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) 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.

[4] English Heritage (2008)
[5] English Heritage (2008)
[6] English Heritage (2008)

2.3.8 Further details of 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 archaeological features may be present that cannot be 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).

2.3.14 Further details of the interpretation of geophysical survey results are provided in Annex B.

Sources

2.3.15 Reference numbers used within the archaeological background sections below are derived from the following sources:

- National Heritage List for England = NHLE (designated assets);
- SHER = Staffordshire Historic Environment Record;
- CHER = Cheshire HER;
- AP= Aerial Photograph; and
- LiDAR = Light Detection and Ranging.

2.4 CA1-075 and 093 Cranberry, west of Fradley Junction

Site details

2.4.1 A geophysical survey was carried out over area CA1-075 and 093, Cranberry, west of Fradley Junction (centred on National Grid Reference (NGR) 413214, 314074 (Figure 2)).

2.4.2 The survey 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 agriculture and possible prehistoric funerary activity in the surrounding area.

2.4.3 The survey area comprises an irregular shaped parcel of land covering areas within four fields, approximately 4.5km east of the centre of Lichfield. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 21ha of the 25.6ha survey area with the remaining area deemed unsuitable for survey due to overgrown vegetation, woodland and buildings. This survey area is therefore considered to be completed.

2.4.4 The survey area lies on a gentle gradient, the south of which peaks at approximately 70m above Ordnance Datum (AOD) and falls to 64m AOD at the northern extent.

2.4.5 There are no overhead cables present over the survey area. There is a small water course recorded on Ordnance Survey mapping traversing the western portion of the survey area. Internal field boundaries are formed of hedgerows and dykes.

2.4.6 The underlying geology is mapped as the Mercia Mudstone Group. Superficial deposits of Quaternary Glaciofluvial Sheet Deposits of sand and gravel are mapped across most of the survey, with a band of alluvium running north south across the middle of the area near Pyford Brook[7]. The underlying soils across the majority of the area are likely to be typical sandy gley soils of the Blackwood (821b) association, with an area of typical brown sands of the Bridgnorth (551d) formation in the east[8]. 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 Two possible ring ditches are located to the north of the survey area (SHERNST3961). These may be the remains of Bronze Age ring ditches or barrows, although they could also be the result of modern cultivation processes.

2.4.8 Within the northern part of the survey area two linear features identified from the LiDAR data can be seen to correspond to former field boundaries visible on the 1st edition Ordnance Survey map (LiDAR1190, 1191). Also depicted on this map are two former extraction pits; now within woodland to the east and west of the survey area, one of which is labelled as an Old Marl Pit. LiDAR has also detected several other possible extractive pits in the locality (LiDAR1001, 1002).

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

Results

2.4.9 The gradiometer survey carried out between 31 October – 8 November 2016 using hand-held systems has not identified any anomalies of definite archaeological interest. However, other possible anomalies can be seen. Areas of modern debris/burning, modern services, and ploughing have been detected, along with numerous trends.

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 – 11). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figures 5, 8, and 11).

Interpretation: archaeology

2.4.11 The survey has not identified any anomalies thought to be of definite archaeological potential, although some linear features and further discreet features have been interpreted as of possible archaeological origin. A small number of unidentified trends have been highlighted across the surveyed area. These are responses that present clear variations from the background magnetic response but are too weak to provide an accurate interpretation.

2.4.12 In the northern portion of the survey area, a single fragmented linear anomaly (1-93 and 75-001) runs east to west across the survey area. Several small, discreet anomalies are also present (1-93 and 75-002), which could indicate pits. However, this interpretation is tentative and the linear may represent an unrecorded former field boundary.

2.4.13 To the south-west of the survey area, a curvilinear anomaly has been identified predominantly aligned north-west to south-east, curving round to the south-west (1-93 and 75-003). Further information, resulting from invasive work, would be required to allow further interpretation of this this potential archaeological feature.

Interpretation: agricultural

2.4.14 Linear anomalies have been identified to the south-west of the survey area. The first is aligned north to south along the west side of the southern area (1-93 and 75-004 and 1-93 and 75-005). 1-93 and 75-006 is aligned east to west perpendicular to 1-93 and 75-005. The anomalies have been interpreted as former field boundaries, visible on the earliest available Ordnance Survey mapping from 1883. Likely to be associated with these is 1-93 and 75-015, identified as a linear of uncertain origin. It is likely to be anthropogenic and runs parallel with 1-93 and 75-004 but is not clearly a former field boundary itself. These are roughly aligned with the nearby brook.

2.4.15 A linear band of varied magnetic response was detected aligned east to west across the eastern part of the southern area (1-93 and 75-007). This has been interpreted as a former trackway visible on the earliest available Ordnance Survey mapping.

2.4.16 Across the survey area, numerous low to moderate magnitude anomalies were detected aligned at irregular and inconsistent alignments (1-93 and 75-008 to 1-93 and 75-012). These have been interpreted as land drains. A single, high magnitude linear anomaly aligned north to south, roughly parallel to 1-93 and 75-005, was detected

across the southern portion of the survey area (1-93 and 75-0013). This anomaly has been interpreted as a land drain and possibly forms part of a network of drains as several linear anomalies can be seen to adjoin it.

2.4.17 To the north of the survey area, several areas of closely spaced parallel linear anomalies have been detected on north-north-east to south-south-west and north-west to south-east orientations. These have been interpreted as evidence of modern agricultural activity, such as ploughing.

Interpretation: geological or natural

2.4.18 A single, high magnitude linear anomaly traverses east to west across the northern portion of the survey area 1-93 and 75-016 and 1-93 and 75-017. This is indicative of a modern service pipe.

Interpretation: modern

2.4.19 To the south-east of the survey area, a large area of increased magnetic response has been identified at 1-93 and 75-018. The anomaly does not correspond to any features of historic or modern mapping. However, it has two linear trends within it and may indicate an area of debris or modern burning.

Conclusions

2.4.20 The survey has identified several anomalies thought to be of possible archaeological origin. These include a fragmented, linear, pit-like feature, and a ditch-like feature. A number of former field boundaries have also been detected. The remaining anomalies identified are thought to be natural or modern in origin, including areas of terrace deposits, modern debris / burning, agricultural activity, and modern services.

2.5 CA1-159 Barn Farm, Rileyhill

Site details

2.5.1 A geophysical survey was carried out over area CA1-159, over land at Barn Farm, east of Rileyhill (centred on NGR 412430,315014 (Figure 12)).

2.5.2 The survey area, CA1-159, was selected for geophysical survey as it is considered to be an area with elevated archaeological potential due to the presence of crop marks indicating a possible prehistoric barrow, pit alignment and enclosures.

2.5.3 The survey area comprised an irregular shaped parcel of land covering areas within seven fields to the east of Barn Farm, Rileyhill, approximately 5.7km north-east of Lichfield and approximately 8.3km south-east of Rugeley. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 12.5 ha of the 22.9 ha survey area, with the remaining areas to be surveyed at a later date.

2.5.4 This survey area lies on a relatively flat ground, between approximately 63 and 67m AOD.

2.5.5 There are no overhead cables or water courses present over the survey area. Internal field boundaries are formed of hedgerows and dykes.

2.5.6 The underlying geology is recorded as the Mercia Mudstone Group with superficial glaciofluvial deposits of sands and gravels recorded[9]. The underlying soils are likely to be typical sandy gley soils of the Blackwood (821b) association[10]. 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 A complex of cropmarks comprising Bronze Age barrows, probable Iron Age pit alignments and field boundaries, a possible late prehistoric enclosure and post-medieval field boundaries has been identified immediately to the north-west of the survey area (SHERMST1492, AP7). Several of the pit alignments extend up to, and stop abruptly at the road line. However, these features may once have extended into the western part of the survey area.

2.5.8 Two possible enclosures, as well as post-medieval field boundaries, have been recorded to the east, extending into the north-eastern part of the survey area (SHERMST4172, AP1). Another possible enclosure has been identified from aerial photographs immediately to the north of the survey area (SHERMST3953).

2.5.9 Further probable prehistoric cropmark features lie to the south-west and north-east of the survey area including several possible Bronze Age barrows and Iron Age boundaries (SHERMST1322, AP2, 10). A possible Iron Age or Romano-British settlement, also identified from aerial photographs, lies to the east of the survey area (AP1).

Results

2.5.10 The gradiometer survey, carried out between 22 – 25 November 2016 using a cart system, identified a linear anomaly of unknown origin, which may represent a ditch feature. Areas of modern debris, agricultural activity and natural variations, along with numerous trends were identified.

2.5.11 Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:2000 (Figures 13 – 16). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous / burnt or fired objects, and magnetic trends (Figures 14 and 16).

Interpretation: archaeology

2.5.12 A low magnitude (+1 - +2 nT) linear anomaly was identified to the north-east of the survey area (1-159-001). The anomaly is aligned north-east to south-west, measuring approximately 2 by 85m. This is indicative of a former ditch feature. However, its weak and isolated nature makes accurate interpretation difficult. Whilst the anomaly may be archaeological in origin, it could equally be an unrecorded former field boundary.

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

Interpretation: agricultural

2.5.13 Several low magnitude parallel linear trend anomalies were identified across the survey area. To the south-west these are aligned west-north-west to east-south-east (1-159-002 and 1-159-003). To the north, these are aligned north-west to south-east (1-159-004) and to the south-centre of the surveyed are west-north-west to east south-east (1-159-005). These are interpreted as evidence of modern agricultural activity, such as ploughing.

2.5.14 In the centre of the survey area, a pattern of dipolar interlocking linear anomalies has been identified (1-159-008). This is a typical network of land drains in a 'herringbone' pattern. Further land drains are evident to the south at 1-159-007 and east at 1-159-008. The drain at 1-159-007 runs along the route of a known former field boundary.

2.5.15 Several spreads of dipolar responses have been identified across the survey area (1-159-009 – 1-159-012). This type of anomaly could be indicative of the spreading of green-waste as a method of fertilisation.

Interpretation: geological or natural

2.5.16 Areas of slightly increased magnitude were identified across the east of the survey area (1-159-013 to 1-159-016). These anomalies are considered to be natural in origin, and are thought to be the result of a variable underlying geology with magnetically susceptible deposits.

Conclusions

2.5.17 The survey has identified a linear anomaly of unknown origin. This may relate to an archaeological ditch, but could equally represent a former field boundary. The remaining anomalies identified are for the most part thought to be agricultural in origin, including areas of spreading, ploughing, and land drains. Notable variations in the underlying geology have also been identified.

2.6 CA1-484 and 486 Woodhouse Farm, Pipe Ridware

Site details

2.6.1 A geophysical survey was carried out over area CA1-484 and 486, south-west of Woodhouse Farm, Pipe Ridware (centred on NGR 408928, 318634 (Figure 17)).

2.6.2 The survey area, CA1-484 and 486, 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 an irregular shaped parcel of land covering areas within two fields to the west of Pipe Wood Lane, Pipe Ridware, approximately 4.5km east of the centre of Rugeley. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered 8.9ha of the 9.7ha survey area, with the remaining areas to be surveyed at a later date.

2.6.4 This survey area lies on a south facing slope, the north of which peaks at approximately 85m AOD and falls to 70m AOD at the southern extent.

2.6.5 There are no overhead cables present over the survey area. There is a small water course recorded on Ordnance Survey mapping extending from the surrounding dyke into the northern field. However, this was not present during survey. Internal field boundaries are formed of hedgerows and dykes.

2.6.6 The underlying geology is recorded as the Mercia Mudstone Group with no superficial deposits across the south-eastern half of the survey area. The north-western part is recorded as Bromsgrove Sandstone Formation, again with no superficial deposits[11]. The underlying soils are likely to be typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[12]. 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 The survey area coincides with several parcels of ridge and furrow, boundaries and tracks mapped from aerial photographs (AP36, 38). Several of the boundaries are depicted on the 1st and 2nd edition Ordnance Survey maps. These maps also show a depression, a probable former extractive pit, near the centre of the south-western boundary of the survey area, as well as a pond that may also have been a former extractive pit on the north-eastern boundary.

2.6.8 The site of a medieval moated manor house at Pipehalle with an associated fishpond is located immediately to the south-west of the survey area (SHERMST968), with the more recent house of Quintin's Orchard situated beyond it. The Grade II Listed Woodhouse Farmhouse is situated just to the north-east of the survey area on the opposite side of Pipe Wood Lane (NHLE1248904, SHERMST10170, 14350). This dates from at least the 17th century, although it was extensively added to and remodelled in the 18th century.

Results

2.6.9 The gradiometer survey, carried out between 28 – 30 September 2016 using a cart system, has not identified any anomalies likely to be of archaeological origin. Areas of modern made ground, modern services, and ploughing have been identified, along with numerous trends.

2.6.10 Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (Figures 18 – 21). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figures 19 and 21).

Interpretation: agricultural

2.6.11 Two areas of parallel linear anomalies have been detected in the north (1-484 and 486-001) and south (1-484 and486-002) of the dataset. These are likely related to modern agricultural activity, such as ploughing.

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

Interpretation: modern service

2.6.12 Two magnetically strong linear anomalies (1-484 and 486-008 and 1-484 and 486-009) run on a roughly north-east to south-west orientation across the south of the area. These are indicative of modern services; such as pipes or cables.

Interpretation: modern

2.6.13 Two areas of strong magnetic responses have been identified in the east of the survey. These are indicative of areas of made ground. The northern of the two areas (1-484 and 486-003) is likely related to the backfilling of a former pond visible on the 1882 edition Ordnance Survey map of the area, whilst the southern (1-484 and 486-004) is likely related to the removal of an area of woodland visible on the same map. A weaker area of magnetic disturbance (1-484 and 486-005) is seen in the centre of the dataset. This is likely to be modern in origin, possibly relating to an area or spread of modern debris. Similar responses (1-484 and 486-006 and 1-484 and486-007) seen along the north-eastern boundary are also likely to relate to modern debris.

Conclusions

2.6.14 The survey has not identified any anomalies thought to be of archaeological or possible archaeological origin. No evidence has been identified in the dataset for the ridge and furrow cultivation seen on aerial photography. The anomalies identified are all thought to be modern in origin, including areas of made ground, agricultural activity, areas of debris and modern services.

2.7 CA1-619 north of Hadley Gate Field Farm

Site details

2.7.1 A geophysical survey was carried out over area CA1-619 North of Hadley Gate Field Farm, Staffordshire (centred on NGR 407155, 319874 (Figure 22)).

2.7.2 The survey area was selected for geophysical survey as the archaeological potential is currently poorly understood. This survey has the potential to identify features that add to the currently limited archaeological background.

2.7.3 The survey area comprises two arable fields to the west of Stoneyford Lane. The survey area lies approximately 1.1km south-west of Blithbury and approximately 3.2km north-east of Rugeley, Staffordshire. The limits of the survey area are defined by hedgerows to the north-west and north-east, and open boundaries forming the south-western perimeter of the survey area. The two fields are separated by a track way. The gradiometer survey has covered approximately 2.1ha of the 2.5ha survey area, with the remaining areas consisting of the dividing farm track and was therefore considered not suitable for survey. The survey is considered to be complete.

2.7.4 The survey lies on predominantly flat ground, at approximately 100m AOD.

2.7.5 There are no overhead cables or water courses recorded within the survey area.

2.7.6 The solid geology is recorded as mudstone the Mercia Mudstone Group across the whole area with superficial deposits of till recorded in the north-east of the survey area[13]. The soils underlying the area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[14]. Although the presence of till deposits can cause an increased magnetic response in detailed gradiometer surveys, soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies.

Archaeological background

2.7.7 Several parcels of narrow ridge and furrow and associated land divisions have been identified to the south and east of the survey area from aerial photographs and assessments of LiDAR data (AP48, LiDAR1201, 1202). These features may extend into the southern part of the survey area. Another parcel of narrow ridge and furrow and a former field boundary have been identified to the north-east of the survey area (AP50, LiDAR1111).

2.7.8 The 1st edition Ordnance Survey map shows a small pond and a trackway within the southern part of the survey area, the former of which may have originated as an extraction pit. The site now occupied by Hadley Gate Field Farm, to the south of the survey area, is shown as undeveloped land on late 19th and early 20th century Ordnance Survey maps.

2.7.9 A probable hollow-way from at least the 18th century was identified approximately 200m to the west of the survey area during top-soil stripping along the course of a pipeline (SHERMST4656). The route, which was marked on the 1889 Ordnance Survey map as 'Nettles Lane', is now the course of a footpath.

Results

2.7.10 The gradiometer survey carried out on 5 December 2016 using hand-held systems has identified no anomalies of archaeological origin, although several agricultural features, a modern service, and numerous trends and ferrous responses have been identified.

2.7.11 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 23 – 25). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 25).

Interpretation: agricultural

2.7.12 Parallel linear anomalies have been identified aligned north-west to south-east across the north of the survey area (1-619-001). These low magnitude anomalies are consistent with modern agricultural activity, such as ploughing.

2.7.13 A network of interconnecting, high-magnitude, linear anomalies have been identified parallel to the western perimeter and the south of the survey area (1-619-002). Anomalies with this magnitude and alignment pattern are indicative of land drains.

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

Due to their response, these drains are likely to be constructed from metal rather than ceramic. These features are likely to continue outside of the survey area to the west.

Interpretation: modern service

2.7.14 A single, high magnitude, dipolar linear anomaly has been identified aligned north-east to south-west across the southern portion of the survey area (1-619-003). This anomaly is indicative of highly ferrous modern utility.

Interpretation: modern

2.7.15 A small area of magnetic disturbance has been identified in the south of the survey area (1-619-004). This type of anomaly is likely to be the results of made ground associated with the surrounding farm buildings.

Conclusions

2.7.16 The detailed gradiometer survey has not identified any anomalies of archaeological origin. There is no evidence present within the dataset for ridge and furrow cultivation or material extraction, which is recorded in the surrounding area. Whilst it is possible that the evidence of modern ploughing recorded in the north-east of the area could mask weaker archaeological anomalies, it is unlikely that this is the case across the entire dataset. Anomalies indicative of modern agricultural practice have been identified, as well as a modern service and an area of made ground.

2.8 CA1-797 Stockwell Heath

Site details

2.8.1 A geophysical survey was carried out over area CA1-797 Stockwell Heath, Staffordshire (centred on NGR 405004, 321932 (Figure 26)).

2.8.2 The survey 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.

2.8.3 The survey area is split over two areas, comprising four arable fields to the east of the B5013, with two further arable fields to the south-east, north of Moor Lane. This survey area lies to the immediate north-west of Stockwell Heath, approximately 3.5km north-east of Rugeley, Staffordshire. The limits of the geophysical survey area are defined by hedgerow field boundaries for the majority of the survey area, with open boundaries forming the eastern extents of both areas. The gradiometer survey has covered approximately 6.3ha of the 14.1ha survey area, with the remaining areas to be surveyed at a later date.

2.8.4 The north-western area of this survey area is covered by a shallow valley. The southern and northern boundaries lie at approximately 100m AOD, with a drop to 95m AOD in the centre of the area. The south-eastern area lies on a south facing slope, dropping from 100m AOD in the north to 85m AOD in the south.

2.8.5 There are no overhead cables recorded at the survey area. However, a small water course forms the field boundary between two of the northern fields. Other internal field boundaries are formed of predominantly hedgerows.

2.8.6 The solid geology is recorded as mudstone the Mercia Mudstone Group across the survey area with no recorded superficial deposits[15]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[16]. 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 There is currently a lack of evidence for prehistoric, Romano-British, and early medieval activity in the survey area or within the surrounding area; with no recorded sites, find spots, or features. Archaeological records for this area predominantly cover the medieval and post-medieval periods.

2.8.8 Aerial photography assessment has identified two large areas of post-medieval ridge and furrow (AP64, 58) within the survey area. Further large areas of medieval to post medieval ridge and furrow (AP54, 61, 65) have been identified from aerial photography alongside the route of a possible medieval track or hollow-way to the north-west of the survey area (AP63, 66). Analysis of LiDAR data has identified numerous former post-medieval field boundaries, some of which lie immediately adjacent to the southern boundary of the area (LiDAR1119, 1207).

2.8.9 A former extraction pit of probable post-medieval date has been detected within the survey area during assessments of LiDAR data (LiDAR1028). Numerous other probable extraction pits were also identified in the surrounding area (LiDAR1027, 1033, 1034, 1036, 1037).

Results

2.8.10 The gradiometer survey carried out on 8 – 10 August 2016 using hand-held systems identified anomalies of possible archaeological origin, along with agricultural and geological features, 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 27 – 29). The interpretation of the datasets highlights the presence of possible archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 29).

Interpretation: archaeology

2.8.12 The survey has not identified any anomalies that can confidently be characterised as being of archaeological origin. However, there are several anomalies of possible archaeological origin.

2.8.13 Weakly positive linear anomalies (1-797-001) are seen in the south of the north-western area. These appear to form part of a rectilinear arrangement, likely relating to field boundaries or former land divisions.

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

2.8.14 At the northern extent of 1-797-001 there is an area of increased magnetic responses (1-797-002). This may be a plough damaged extension of 1-797-001 or evidence of quarrying, which is recorded in the surrounding area.

2.8.15 Two small anomalies of possible archaeological origin are evident in the south-eastern area. A small (2 - 3m diameter) sub-circular trend (1-797-003) has been detected in the south-east. The negative response of this feature suggests that it may relate to a former bank. However, it does not take the form of any recognisable archaeological feature. Further investigation would be required to provide a more confident interpretation.

2.8.16 A small discrete positive anomaly (1-797-004) is also present within the east of the area. This is indicative of a small cut feature, such as a pit, but its exact origin is not clear. Whilst it may be of archaeological origin, its isolated nature suggests it is more likely to relate to a tree throw or natural pitting of the underlying geology.

Interpretation: agricultural

2.8.17 Areas of regularly spaced parallel linear anomalies are seen across much of dataset. These are indicative of modern agricultural activity, such as ploughing.

2.8.18 Various weak unidentified trends are seen across the south-eastern area. Whilst it is not possible to determine their origin with any degree of confidence, they are more likely to relate to plough scars than archaeological features, as they do not form any discernible pattern.

Interpretation: geological or natural

2.8.19 A broad (4 - 6m) sinuous anomaly (1-797-005) has been identified at the south-western edge of the north-western area. The weak negative (-1 nT) nature of this response combined with its lack of regular shape or pattern suggests that it is likely related to natural geological variation.

Conclusions

2.8.20 The detailed gradiometer survey has not detected any anomalies that can confidently be interpreted as being of archaeological origin. However, a small number of anomalies of possible archaeological origin have been identified. The possible archaeological anomalies in the north-west are likely related to former field boundaries or land divisions. However, their age is not clear. The anomalies in the south-east are of less clear origin, but are more likely to be natural features than archaeology. However, there is still the possibility that they relate to an archaeological bank and a pit respectively.

2.8.21 The majority of the anomalies identified in the data relate to modern agricultural activity, with ploughing seen across much of the surveyed area.

2.9 CA1 - 801 Stockwell Heath, Colton

Site details

2.9.1 A geophysical survey was carried out over area CA1-801 Stockwell Heath, Colton (centred on NGR 405013, 321715 (Figure 30)).

2.9.2 The survey 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.

2.9.3 The survey area comprises eight fields of pasture and lawns to the north of Moor Lane approximately 500m west of Stockwell Heath, and 2.5km north of Rugeley, Staffordshire. The limits of the geophysical survey area are defined by hedgerow field boundaries for the majority of the survey area, with a small area of woodland on the eastern boundary and farm buildings and a wooded boundary in the west. The gradiometer survey covered 4.7ha of the 8.6ha survey area, with the remaining areas to be surveyed at a later date.

2.9.4 This survey area lies on a south facing slope. The northern boundary of CA1 - 100 lies at approximately 95m AOD and drops to 85m AOD at the southern extents.

2.9.5 There are no overhead cables or water courses recorded at the survey area. Internal field boundaries are formed of fence lines and hedgerows.

2.9.6 The solid geology is recorded as mudstone of the Mercia Mudstone group across the survey area with no recorded superficial deposits[17]. The soils underlying the survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[18]. 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 The survey area is situated immediately adjacent to the Grade II Listed Hamley House (NHLE1038775), which is of 17th century date, and its early 18th century gate piers and walls (NHLE1374299).

2.9.8 Assessments of aerial photographs have identified levelled earthworks associated with post medieval narrow ridge and furrow (AP58) within the survey area. Analysis of LiDAR data has also identified traces of ridge and furrow (LiDAR1217), and several possible former field boundaries of medieval to post-medieval date (LiDAR1118, 1119, 1124), within and adjacent to the survey area. A number of features associated with post medieval extraction have also been detected within the survey area (LiDAR1028, 1035).

2.9.9 Further areas of post-medieval ridge and furrow (AP59, 61, 64), and numerous former field boundaries and extraction pits have been identified in the wider landscape, beyond the survey area.

2.9.10 The Staffordshire HER records the location of a mill, which was documented in the 1086 Domesday Book, approximately 200m to the south-west of the survey area (SHERMST874).

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

Results

2.9.11 The gradiometer survey carried out on 11 – 12 August 2016 using hand-held systems has identified an area of ridge and furrow and anomalies of possible archaeological origin. Modern agricultural features, numerous trends, and ferrous responses have also been identified.

2.9.12 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).

Interpretation: archaeology

2.9.13 Two areas of magnetically strong dipolar responses (1-801-001 and 1-801-002) were identified in the south of the dataset. The larger of the two (1-8001-002) covers an irregularly shaped area approximately 45 by 25m. These may be related to post-medieval quarrying or extraction, as has been identified in the surrounding area by LiDAR. Further areas of strong dipolar anomalies (1-801-003 to 1-801-006) are thought to be modern in origin. The more diffuse scatter of dipole anomalies is indicative of an area of modern debris rather than the backfilling of a quarry pit.

2.9.14 Three broad (2 - 2.5m wide) linear anomalies (1-801-007) are identified in the north-west of the dataset on an approximate south-west to north-east orientation. These are spaced at regular intervals of approximately 9m and are indicative of ridge and furrow cultivation. Further evidence of post-medieval ridge and furrow is present in the surrounding area, identified by LiDAR and aerial photography.

Interpretation: agricultural

2.9.15 Areas of regularly spaced parallel linear anomalies are seen across much of the dataset. These are indicative of modern agricultural activity, such as ploughing.

2.9.16 A linear area of strong magnetic response (1-801-008) can be seen in the south of dataset. This correlates to a feature identified within LiDAR data (LiDAR1118) as a medieval or post medieval field boundary and is also present on 1902 Ordnance Survey mapping.

2.9.17 Three clusters of linear anomalies are present in the south and east of dataset (1-801-009 to 1-801-011), which are likely to relate to land drains. 1-801-009 and 1-801-010 are weak (+/-3 nT) dipolar responses, typical of clay land drains. 1-801-011 is an area of stronger (+9 nT) anomalies with associated negative responses, suggesting that these drains may be constructed of a different material.

Interpretation: uncertain

2.9.18 A small 'Y' shaped positive anomaly (1-801-012) has been identified in the south of dataset. Whilst this could be indicative of a cut feature, the exact cause of this anomaly is not clear. Furthermore, its proximity to a former field boundary and land drains suggests it is likely agricultural or natural in origin.

Conclusions

2.9.19 The detailed gradiometer survey has identified possible archaeological features. These are thought to be areas of backfilling, likely relating to medieval or post-medieval quarrying. Evidence of ridge and furrow is also seen in the north-west. Further evidence of both quarrying ridge and furrow activity is apparent in the area surrounding the survey area.

2.9.20 The majority of the anomalies detected relate to agricultural activity. Areas of modern ploughing are present across much of the dataset, whilst a former field boundary has been identified in the south. Three areas of land drains have been identified across the east of the area, while areas of modern debris are also present across the dataset.

2.10 CA1-847 Lea Hall Farm, Admaston

Site details

2.10.1 A geophysical survey was carried out over area CA1-847 Lea Hall Farm, Admaston (centred on NGR 404049, 322298 (Figure 34)).

2.10.2 This survey 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, as well as a number of unknown features, seen in the LiDAR data.

2.10.3 The area of CA1-847 surveyed to date comprises two pasture fields at the centre of the land parcel. This survey area lies to the west of the B5013, approximately 500m south of Admaston and 3.5km to the north of Rugeley, Staffordshire. The limits of the geophysical survey area covered so far are defined mostly by hedgerow field boundaries, with an area of woodland in the north-west and a pond on the eastern boundary. The gradiometer survey covered 3.5ha of the 14.1ha survey area, with the remaining areas to be surveyed at a later date.

2.10.4 The area surveyed to date lies on a slight south-west facing slope. The north-eastern boundary lies at approximately 85m AOD and to approximately 82m AOD at the south-western extent.

2.10.5 There are no overhead cables or water courses recorded at the survey area. Internal field boundaries are formed of hedgerows or dykes.

2.10.6 The solid geology is recorded as mudstone of the Mercia Mudstone Group formation across the survey area with no recorded superficial deposits[19]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[20]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

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

Archaeological background

2.10.7 Two Grade II listed buildings; the early 18th century Lea Hall Farm Cottage (NHLE1038773) and the early 19th century Lea Hall Farmhouse (NHLE1190472) lie adjacent to the northern edge of the survey area. The Staffordshire HER records the location of a now demolished 19th century outfarm (SHERMST17735), which was linked to Lea Hall Farm, just outside of the survey area. The Staffordshire HER also records the location of a post-medieval water meadow along the south-western edge of the survey area, which has also been identified from LiDAR data (SHERMST17336, LiDAR1054).

2.10.8 The parish boundary between Colton and Blithfield, as shown on early Ordnance Survey maps, crosses the north-eastern part of the survey area.

2.10.9 A number of features have been identified through analysis of aerial photographs and LiDAR data within and adjacent to the survey area. The majority of these are associated with medieval to post-medieval agriculture, which includes areas of ridge and furrow, former field boundaries and drainage ditches (AP65, 70, 61, LiDAR1056, 1125, 1126, 1127, 1128, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1208, 1218, 1247).

2.10.10 Assessments of aerial photographs and LiDAR data have also identified features within the survey area, which have been interpreted as medieval to post-medieval tracks or hollow-ways (AP63, 66, LiDAR1039, 1057).

2.10.11 Other features identified in this area have been interpreted as the remnants of post-medieval extraction operations (LiDAR 1038, 1040, 1170), while the function and origin of others are currently unknown (AP62, LiDAR1055, 1058, 1059, 1219).

Results

2.10.12 The gradiometer survey carried out on 2 – 3 August 2016 using hand-held systems has identified anomalies of possible archaeological origin, as well as those thought to relate to modern agricultural activity or natural variation, 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 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

2.10.14 The survey has not identified any anomalies that are thought to be of archaeological origin. A small number of uncertain trends are seen across the dataset. However, these are more likely to relate to modern agricultural or drainage activity.

2.10.15 There are several small, irregular, sub-circular weak (0 - 2nT) positive anomalies in the southern portion of the dataset, which are interpreted as possible archaeology (1-847-001). There is no discernible pattern to the anomalies, and it is possible that they may relate to natural pitting in the bedrock.

Interpretation: agricultural

2.10.16 Areas of regularly spaced parallel linear anomalies are seen across the west of the dataset. These are indicative of modern agricultural activity, such as ploughing. Further, more isolated, evidence of ploughing is evident in the south-east of the area.

2.10.17 A series of weak (mostly +/-2 nT) dipolar linear anomalies (1-847-002 and 1-847-003) are evident within the dataset. These anomalies are indicative of a complex of land drains.

Interpretation: geological or natural

2.10.18 At the eastern extent of the survey area, is a weakly positive (+2 nT) irregularly shaped cluster of features surrounded by a very weak negative response (1-847-004). This is not clearly represented, but is likely to be associated with an isolated area of natural or geological variation.

Interpretation: modern

2.10.19 As well as the aforementioned ferrous anomalies present throughout the dataset, there is an area of moderately strong (11 nT) positive anomalies with associated negative responses in the north of the area (1-847-005). The exact cause of this anomaly is not clear. However, its strength suggests it is likely related to a modern cut feature, such as a former pond.

Conclusions

2.10.20 The detailed gradiometer survey has not detected any anomalies that can confidently be attributed an archaeological origin. Areas of pit-like features can be seen, but these are difficult to distinguish from geological features. There is no evidence of medieval agricultural activity, which is recorded in the surrounding area. The surveyed area is dominated by modern agricultural features including a complex of land drains and ploughing. A number of uncertain trends can be seen in the data. However, these are most likely related to ploughing or drainage. Evidence of natural variation, possibly caused by pitting in the bedrock, is also seen in the south-west of the dataset.

2.11 CA1-853 north-west Lount Farm, Colton

Site details

2.11.1 A geophysical survey was carried out over area CA1-853 north-west of Lount Farm, Colton, Staffordshire (centred on NGR 403716,321803 (Figure 38)).

2.11.2 This survey 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, as well as a number of unknown features, seen in the LiDAR data.

2.11.3 The area comprises four pasture fields across CA1-853. The survey area lies to the west of the B5013, approximately 2km north-west of Colton and 3.6km to the north of Rugeley, Staffordshire. The limits of the geophysical survey area are defined mostly by hedgerow field boundaries, with a farm access track splitting two portions of the survey. The gradiometer survey covered 4.6ha of the 6.1ha survey area, with the remaining areas to be surveyed at a later date.

2.11.4 The area surveyed so far lies on a slight south facing slope. The northern boundary lies at approximately 83m AOD, dropping to approximately 79m AOD at the south-eastern extent.

2.11.5 Overhead cables traverse the south-west of the survey area. No water courses are recorded within the survey area. Internal field boundaries are formed of hedgerows and a farm track.

2.11.6 The solid geology is recorded as mudstone of the Mercia Mudstone Group formation across the whole area with superficial deposits of alluvium recorded across the eastern majority of the dataset with no superficial deposits recorded to the west[21]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[22]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.11.7 The survey area partially coincides with a large expanse of relict post-medieval water meadows identified from historic mapping and aerial photography (SHERMST17336). The water meadows now survive only as a series of eroded earthwork and cropmark features. An area of possible post-medieval narrow ridge and furrow has also been identified from aerial photographs in the northern part of the survey area (AP70), although it is possible that these features may be associated with the water meadows, rather than arable cultivation.

2.11.8 Four possible Bronze Age burnt mounds were identified along the line of the Morton Brook immediately to the east and south-east of the survey area during a geophysical survey undertaken in 1995 (SHERMST4588, MST4589, MST4590, MST4591).

2.11.9 The site of a probable medieval glassworks has been identified by the recovery of crucible fragments and glazed stone to the east of the survey area (SHERMST5995). A possible glass furnace was subsequently identified at the site during the geophysical survey that revealed the aforementioned burnt mounds.

2.11.10 Lount Farm, which is located just beyond the southern edge of the survey area, is depicted by the 1st edition Ordnance Survey map. However, it is possible that the site of the farmstead may have been occupied considerably earlier than the date of the survey.

Results

2.11.11 The gradiometer survey carried out on 23 – 24 November 2016 using hand-held systems has identified anomalies of possible archaeological origin, evidence of modern agricultural activity or natural variation, as well as trends and ferrous responses.

2.11.12 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 39 – 41). The interpretation of the

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

datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 41).

Interpretation: archaeology

2.11.13 Two areas in relatively close proximity were identified as possible archaeological anomalies to the east of the surveyed area (1-853-001 and 1-853-002). These magnetically variable (-66 – +74 nT) anomalies are indicative of pits, often relating to extraction activity in the area. In this instance, 1-853-001 presents a much larger, sub-circular anomaly, whereas 1-853-002 indicates several smaller anomalies of varying sizes and magnetic response. Whilst there are no areas of post-medieval extraction marked on historic mapping or visible in aerial photography, the anomalies could represent earlier activity in the area. However, alluvial deposits are recorded in the area and therefore these potential features may be natural in origin.

Interpretation: agricultural

2.11.14 To the north of the survey area, parallel linear anomalies have been identified aligned north-north-west to south-south-east (1-853-003) and on a north-west to south-east alignment to the south (1-853-004). This is indicative of agricultural activity in the area, such as ploughing.

2.11.15 A linear area of dipolar responses runs north-west to south-east along the east of the survey area (1-853-005), with a short southerly projection. This anomaly relates to a land drain marked on historic mapping of the area.

Interpretation: geological or natural

2.11.16 Geological variation is mapped across the survey area, including alluvial deposits to the east. This is noticeable in the survey results, where a more varied magnetic background is noted to the west, whereas the east presents a smoother response. Areas of natural variation are evident within the alluvial deposits to the north and east of the survey (1-853-008 to 1-853-010).

Interpretation: modern

2.11.17 Amorphous areas of dipolar responses are seen in the centre (1-853-006) and south-west (1-853-007) of the dataset. These are indicative of areas of made ground. Whilst these may be evidence of material extraction, that they are present along extant boundaries and a land drain suggest that they are more likely related to post-medieval or modern agricultural activity.

2.11.18 One large, high magnitude (+/- 100 nT) anomaly has been identified to the west of the survey area (1-853-011). This is the result of an extant pylon within the survey area.

Conclusions

2.11.19 The detailed gradiometer survey has detected several anomalies of possible archaeological origin that may represent historic quarrying or extraction activity. Probable alluvial deposits across the east of the area may be masking weaker archaeological anomalies. The north and west of the survey area is dominated by modern agricultural features, predominantly ploughing and areas of made ground.

2.12 CA1-860 north of Lount Farm, Colton

Site details

2.12.1 A geophysical survey was carried out over area CA1-860 North of Lount Farm, Colton, Staffordshire (centred on NGR 403551,321975 (Figure 42)).

2.12.2 This survey 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.

2.12.3 The area of CA1-860 comprises four pasture fields across the land parcel. This survey area lies to the west of the B5013, approximately 2.1km north-west of Colton and 3.7km to the north of Rugeley, Staffordshire. The limits of the geophysical survey area are defined mostly by hedgerow field boundaries. The gradiometer survey covered 5.0ha of the 5.8ha survey area, with the remaining areas to be surveyed at a later date.

2.12.4 The area surveyed lies on a relatively flat portion of land at approximately 82m AOD.

2.12.5 Overhead cables traverse western side of the survey area. No water courses are recorded within the survey area. Internal field boundaries are formed of hedgerows and a farm track.

2.12.6 The solid geology is recorded as mudstone of the Mercia Mudstone Group formation across the whole area with no superficial deposits recorded[23]. The soils underlying this survey area are likely to comprise the typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[24]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.12.7 The northern part of the survey area coincides with a large expanse of relict post-medieval water meadows identified from historic mapping and aerial photography (SHERMST17336). The water meadows now survive only as a series of eroded earthwork and cropmark features. An area of possible post-medieval narrow ridge and furrow has also been identified from aerial photographs in this part of the survey area (AP70), although it is possible that these features may be associated with the water meadows, rather than arable cultivation.

2.12.8 Four possible Bronze Age burnt mounds were identified along the line of the Morton Brook to the east and south-east of the survey area during a geophysical survey undertaken in 1995 (SHERMST4588, MST4589, MST4590, MST4591).

2.12.9 The site of a probable medieval glassworks has been identified by the recovery of crucible fragments and glazed stone approximately 300m to the east of the survey area (MST5995). A possible glass furnace was subsequently identified at the site during geophysical survey that revealed the aforementioned burnt mounds.

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

2.12.10 Lount Farm, which is located just beyond the southern edge of the survey area, is depicted by the 1st edition Ordnance Survey map. However, it is possible that the site of the farmstead may have been occupied considerably earlier than the date of the survey.

Results

2.12.11 The gradiometer survey carried out on 22 – 23 November 2016 using hand-held systems has identified anomalies thought to relate to modern agricultural activity or natural variation as well as trends and ferrous responses.

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

Interpretation: agricultural

2.12.13 Within the southern portion of the survey area, parallel linear anomalies have been identified aligned north-east to south-west (1-860-001). These anomalies are indicative of agricultural activity, such as ploughing.

Interpretation: geological or natural

2.12.14 To the north of the survey area, an area of variable magnetic background has been detected. This is represented as several low magnitude, irregular anomalies with no specific alignment (1-860-002). This anomaly has been interpreted as an area of magnetically susceptible deposits within the underlying geology or soils, possibly relating to an area of alluvium to the west, and is therefore considered to be natural in origin.

Interpretation: modern

2.12.15 A small area of increased magnetic variation has been recorded in the north of the survey area (1-860-003). This has been interpreted as a modern spread, probably related to farming activity, possibly a former spoil or manure heap. A large, high magnitude (+/- 100 nT) anomaly has been identified to the north-west of the survey area (1-860-004). This is the result of an extant pylon within the survey area.

Conclusions

2.12.16 The detailed gradiometer survey has detected no anomalies of archaeological origin within the area. There is no evidence available within the dataset for medieval or post-medieval activity, which is recorded in the surrounding area. The survey has revealed a relatively sterile magnetic background, broken by several anomalies predominantly relating to modern agricultural practice as well as some geological variation.

2.13 CA1-861 Moreton Grange, Little Haywood

Site details

2.13.1 A geophysical survey was carried out over area CA1-861, at Moreton Grange, Little Haywood (centred on NGR 403155, 322650 (Figure 46)).

2.13.2 This survey 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. An undated, uncharacterised circular bank feature has also been identified within the area.

2.13.3 This survey area comprises an irregular shaped parcel of land covering areas within several fields to the east of Moreton Grange, Little Haywood, approximately 4.7km north-west of the centre of Rugeley. The limits of the geophysical survey area are defined by hedgerow field boundaries and predefined survey extents within fields. The gradiometer survey covered the entire 6.7ha survey area.

2.13.4 The survey area lies on an east facing slope, the north-east of which peaks at approximately 97m AOD and falls to 80m AOD in the eastern fields surrounding Moreton Brook.

2.13.5 There are no overhead cables or water courses recorded at the survey area. Internal field boundaries consist of dykes.

2.13.6 The underlying geology is mapped as the Mercia Mudstone Group, overlain by superficial deposits of alluvium at the eastern edge[25]. The underlying soils are likely to be typical stagnogleyic argillic brown earths of the Whimple 3 (572f) association[26]. Soils in such geological settings have been demonstrated to produce magnetic contrasts suitable for the detection of anomalies through gradiometer survey.

Archaeological background

2.13.7 The south-eastern part of the survey area lies within an area of former water meadows of likely post-medieval date (SHERMST17336). Several linear features visible within the LiDAR data are likely to relate to water management and drainage (LiDAR1054, 1126, 1127, 1143). Other linear and curvilinear features observed in the LiDAR data are thought to be post-medieval drainage features associated with Moreton Brook (LiDAR1128, 1130, 1137, 1139).

2.13.8 A circular bank feature with a smaller mound immediately to the north was noted in the LiDAR data within the survey area (LiDAR1042). The exact nature and date of this feature is unknown.

2.13.9 Post-medieval ridge and furrow has been identified through aerial photograph assessment within the north-western part of the survey area (AP76, LiDAR1053) and immediately to the south of the area (AP72). Possible medieval ridge and furrow has been observed to the west of the survey area (AP75, LiDAR1052).

2.13.10 Parallel linear features just to the south of the area are thought most-likely to relate to former field boundaries or drainage (LiDAR1135, 1136). A depression just to the east of these, marked as a water-filled hollow on the 1st edition Ordnance Survey map, is likely to be a former extraction pit. Other similar features lie to the south and north of the area noted in the LiDAR data and marked on the 1st and 2nd edition Ordnance

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

Survey maps (LiDAR1041). Grange Farm, to the south-west of the survey area, dates from at least the 19th century (SHERMST21274).

Results

2.13.11 The gradiometer survey, carried out between 26 – 27 September 2016 using a cart system, identified an area of ridge and furrow, anomalies likely of agricultural and geological origin, along with some trends and numerous ferrous responses.

2.13.12 Results are presented as a series of greyscale and archaeological interpretations, at a scale of 1:2000 (Figures 47 – 50). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 48 and 50).

Interpretation: archaeology

2.13.13 A series of linear anomalies aligned north-east to south-west have been identified within the dataset (1-861-001). Given the regular spacing of approximately 10m between each linear, it is likely that these are remnant furrows, related to the ridge and furrow agricultural features identified in the wider landscape.

Interpretation: agricultural

2.13.14 A complex of dipolar anomalies aligned predominantly north-west to south-east, spaced approximately 9m apart has been identified as a system of drainage features 1-861-002.

Interpretation: geological or natural

2.13.15 A series of variable positive anomalies in the southern fields have been identified 1-861-003 and 1-861-004. These have no clear correlation in scale, orientation or patterning and have been interpreted as geological features. They are likely pitting or changes in the superficial underlying geology.

Conclusions

2.13.16 Geophysical survey has identified an area of parallel linear anomalies thought to relate to ridge and furrow cultivation, which is recorded in the surrounding area. More recent agricultural activity is seen in the form of land drains. A number of geological responses have also been identified.

3 Remote sensing report

3.1 Introduction

3.1.1 This section outlines the results of the archaeological remote sensing survey of the Fradley to Colton 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 are 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 0.2m, and this can be used to generate highly detailed landscape visualisations.

3.3.2 These visualisations can be used to identify archaeological assets which are expressed in the form of localised and often subtle variations in ground profile (e.g. earthworks). This can include assets 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, 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 wavelengths.

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 obliques 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 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 route of the Proposed Scheme. This does not provide full coverage of the study area.

3.4.2 The second dataset, at 2m horizontal cell resolution, was sourced from the Environment Agency's 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. 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 0.2 m LiDAR data. The imagery was supplied in the following spectral bands and indices: Simple Ratio Index (SR), Normalized Difference Vegetation Index (NDVI), 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 98516, undertaken in January 2016, identified 38 vertical aerial photographic sorties containing 376 frames taken between 1948 and 2000. Some of these frames were held as negatives, but the majority were available in the archive as prints. 48 oblique aerial photos were identified,

which were taken between 1966 and 2010;

- 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 33 oblique aerial photographs taken between 1950 and 1979 and 1 stereo pair of vertical aerial photographs taken in July 1976;
- 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
- Historic England National Mapping Programme (NMP) provided high quality GIS-ready detailed digital mapping over part of the Fradley to Colton area to the north of the River Trent, within the ongoing Staffordshire NMP survey area[27]. This was exported from AutoCad Map to GIS as SHP files. HE also supplied data derived from the National Forest NMP as scanned and georeferenced hand drawn overlays to Ordnance Survey quarter sheets SJ 92NW and SK11NW to the south of the River Trent.

Others

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

- NMP data, where available;
- 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 Extant historical assets 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

[27] Bax, S. (2014), *Staffordshire National Mapping Programme, Phase 1 – Eastern River Confluences,* Aerial Survey Mapping Summary Report, National Heritage Protection Commissions Programme: Project Number 6613, Archaeological Research Services Ltd, English Heritage

that archaeological or historical landscape assets might extend beyond their current mapped extents.

3.5.3 Identified assets were assigned a unique numerical identifier and briefly described. The potential origin of each asset 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 asset 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 The NMP data were checked to the original aerial photographs which were used to produce them, and its accuracy checked to geo-referenced samples of the photos which were cited as sources. Due to the high quality and accuracy of the GIS-ready Staffordshire NMP data supplied by HE, the data were incorporated to the mapping for this project, as SHP files which clearly identify their source as NMP.

3.5.7 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 Ordance 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 which were identified during the survey.

3.5.8 As with the multi-spectral and LiDAR surveys, the aerial photographic survey excluded extant historical assets 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 assets might extend beyond their current mapped extents or held some interest or significance to the survey.

3.5.9 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 (temporarily or permanently) for construction and/or operation of the proposed scheme.

3.6.2 The 0.2 m LiDAR and multi-spectral data were collected within a 500m buffer extending from the route of the Proposed Scheme. As a result, some parts of the study area within the Colwich to Yarlet area were excluded from the coverage of these datasets.

3.6.3 The 2m resolution LiDAR data was only available for a small part of the study area within the Fradley to Colton area, covering the areas around Pipe Ridware and the southern end of the route near Fradley Wood.

3.6.4 The total area excluded from the combined coverage of the 2m and 0.2m LiDAR, and multi-spectral datasets represented only a small area of the overall study area within the Fradley to Colton area.

Aerial photographs

3.6.5 The data from the aerial photographic cover searches were converted to CSV (comma separated values) files and integrated to the working GIS to assess the coverage of both vertical and oblique aerial photos.

3.6.6 The area of the Trent Valley gravel deposits was attractive to former settlers, and a high level of crop marked data has been recorded by specialist aerial surveyors, generating many oblique aerial photos in these areas. The obliques are not present for areas where no sites were seen during surveys, and these 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.

3.6.7 The Fradley to Colton area was covered by sorties of vertical aerial photos dating from the 1940s and 1950s, 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[28].

Analysis

LiDAR and multi-spectral

3.6.8 Aside from minor 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 assets during the assessment.

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

3.6.9 One of the principal limitations of the assessment is that assets 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 assets. 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.

3.6.10 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 assets within wooded environments.

3.6.11 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 assets 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.

3.6.12 The angle of illumination can also influence the visibility of relief assets. 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.

3.6.13 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 0.2m 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.

3.6.14 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 0.2m resolution LiDAR data.

3.6.15 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 0.2m 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 0.2m 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 assets may have been reduced where 2m resolution LiDAR data was unavailable.

3.6.16 Multi-spectral signatures are widely used in other environmental disciplines to accurately classify and map vegetation and geology types. Unfortunately, archaeological sites and assets 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 assets 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.

3.6.17 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.

3.6.18 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.

3.6.19 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

3.6.20 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 extant features or earthworks which are more visible at times of clear low light which casts shadows.

3.6.21 It is important to note that aerial photographs usually only show part of the horizontal and vertical extent of buried and upstanding assets. Their capacity to reveal assets 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 assets highlighted, can also affect the visibility of assets on aerial photographs. Unlike

digitally processed LiDAR and other data, the azimuth of the sun cannot be changed on a conventional aerial photo.

3.6.22 Past and present land use also presents limitations to the visibility of assets. 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 assets.

3.6.23 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.

3.6.24 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 assets and structures can be detected.

3.6.25 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 assets 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 assets.

3.6.26 The aerial photos taken in the 1940s often recorded extant medieval fields 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 in places is helpful when constructing landscape histories or tracing the progress of erosion.

3.6.27 Buried assets 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 - the typical ridges and furrows caused by the turning of a heavy ox-drawn plough - also often masks underlying deposits on aerial imagery.

3.6.28 The remit of past oblique aerial surveys, the survey areas and the visibility of sites to the aerial surveyor can often determine the content and coverage of oblique aerial photography, which is a 'subjective' and 'target driven' activity rather than the uni-directional 'blanket' coverage achieved by vertical aerial surveys. The study area was well covered by both oblique surveys, and the possibility of new discovery is still to be considered carefully, and, in aerial terms, absence of evidence may be indicative of unsuitable land use or other masking factors rather than evidence for absence of buried heritage assets. There are some specific areas where crop marks show likely Prehistoric and Roman landscapes, where the soils and geology are more favourable to the development of cropmarks over buried features, but nothing like the extent of crop marked landscapes recorded in the Trent Valley in the Fradley to Colton area.

3.6.29 It is also 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.

3.6.30 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.

3.6.31 The study area comprises a mixture of clayey substrates with some areas of glacio-fluvial drift, especially around Ingestre where conditions in some parts were suitable for the formation of crop marks over buried features.

3.7 Results

LiDAR and multi-spectral

Overview

3.7.1 A total of 173 individual assets, or groups of assets of possible archaeological interest were identified within study area. The majority of these were identified on the LiDAR plots, 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, relict field boundaries or disused extractive pits. However, a number of sites and features of potentially elevated archaeological significance were also identified during the assessment.

3.7.3 Features identified during the remote sensing assessment are described in Annex C, illustrated in Figures 51 - 70 and listed in Appendix CH-002-001. The principal findings of the assessment are presented below.

Ring ditches south of Kings Bromley

3.7.4 The most notable assets identified within the Fradley to Colton area are two probable ring ditches, situated within arable fields approximately 900m and 1.2km south of King's Bromley. The characteristic form of these assets enables them to be interpreted with a moderate to high degree of confidence as Late Neolithic-Bronze Age round barrows.

3.7.5 One of the ring ditches, 1103 (Figure 54), is virtually undetectable in the LiDAR imagery, though clearly evident in the NDVI imagery. Similarly, 1104 (Figure 54) is only visible in the NIR imagery. Any earthworks that may have once formed part of the monuments appear to have been levelled, presumably due to historical and modern ploughing.

3.7.6 Ring ditches 1103 and 1104 were also identified from aerial photographs as part of the remote sensing survey, within sites 5 and 8 respectively (Figure 54). Both of these

features have also been also detected during earlier assessments of aerial photographs and recorded by the Staffordshire HER (MST 1489, 1490).

3.7.7 The probable ring ditches appear, on the basis of aerial photograph assessments and records held by the Staffordshire HER, to coincide with an area along the course of the River Trent which contains a relative abundance of evidence for prehistoric activity. However, no other assets that could be confidently interpreted as being of prehistoric origin were identified within the study area from the LiDAR and multi-spectral imagery.

Water meadows

3.7.8 The creation of water-meadows during the 17th, 18th and 19th centuries frequently gave rise to landforms which are superficially similar to those generated by earlier ridge and furrow cultivation. However, these can often be distinguished by their riverine location, and subtle differences in morphology and layout.

3.7.9 Parts of a former water meadow system (1054, 1126-9, 1137-43; Figures 69 and 70) was identified at the western edge of the Fradley to Colton area, within land now under pasture on either side of the Moreton Brook. Visible traces of the water meadow system consisted of numerous linear earthworks, which represent former drains, carriers and headers. The area identified from the LiDAR data coincided with only part of a considerably larger expanse of water meadows previously identified from historic mapping and aerial photography (SHER MST17336). The water meadow system appears to have once extended along the Moreton Brook to the east, partially beyond the limits of the study area, as far as the western edge of Colton.

3.7.10 A number of possible drainage ditches and slight banks (1106, 1144-6; Figure 56) were also identified within another area of relict water meadows, which has previously been identified to the south of the River Trent, east of Pipe Ridware (SHER MST13441). Several of these linear features are also depicted as land divisions on late 19th century Ordnance Survey maps.

Possible enclosure east of Pipe Ridware

3.7.11 A possible enclosure (1244, Figure 56), encompassing an area approximately 160m by 130m in extent, was identified to the east of Pipe Ridware. The south-eastern side of the putative enclosure corresponds with an extant watercourse or drain. The interior of the putative enclosure also contains a series of faint earthworks. The origin of these features is uncertain, although it is possible that they may form part of a network of water meadows recorded in the Staffordshire HER (MST13441).

Ridge and furrow

3.7.12 Amongst the most common assets 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 and baulks which divided them.

3.7.13 The majority of the vestigial ridge and furrow landforms identified during the assessment were spatially isolated from one another and distributed intermittently

across the study area. 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, one notable concentration of ridge and furrow (1084, 1211-4, 1220 and 1246; Figures 65 and 67) was identified to the south of Stockwell Heath.

3.7.14 Identified traces of ridge and furrow could frequently be correlated with features previously recorded during the Staffordshire NMP[29] and/or during the aerial photograph assessment undertaken in association with the Proposed Scheme EIA. However, assessments of aerial photographs have identified considerably larger and more numerous expanses of relict ridge and furrow across the study area than were detected during the assessment of LiDAR and multi-spectral imagery. This could suggest that the prominence of vestigial ridge and furrow landforms across the study area has been significantly diminished in the relatively recent past.

Field boundaries

3.7.15 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.

3.7.16 Subsequent opening out of previously enclosed fields, particularly during the 20th century, has resulted in the loss of numerous field boundaries recorded on late 19th century and early 20th century Ordnance Survey maps. Many of these former field boundaries can be detected in the LiDAR imagery in the form of (often very faint) linear banks and depressions.

3.7.17 A total of 39 possible former field boundaries were identified within the study area. Amongst these are numerous examples which appear on early Ordnance Survey mapping.

Extractive pits and ponds

3.7.18 Amongst the most frequently identified features were small depressions, often sub-circular in plan and typically in the range of 20m-50m in diameter. A total of 57 such features were identified within the study area. These depressions were distributed throughout the study area without any obviously meaningful spatial patterning. The features were most commonly identified within, or at the edges of agricultural fields. However, a small number were also identified within woodland, or in close proximity to areas of settlement.

3.7.19 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. 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.

[29] Bax (2014)

3.7.20 Many of the numerous ponds which exist across the rural landscape of the study area may also have originated as extractive pits. 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.

3.7.21 A post-medieval date is likely for the majority of these features, although occasional examples could be earlier in origin. In many instances, a minimum age can be confirmed on the basis that they can be correlated with features depicted by late 19th and early 20th century Ordnance Survey mapping.

3.7.22 Where shown on early Ordnance Survey maps, these features are often labelled as 'Old Marl Pits' (e.g. 1021-2, Figures 63 and 64; 1098, Figure 58). Although this term may have been used generically to refer to various types of disused extractive pit, a large proportion of the features may genuinely represent former marl pits. Other pits may have been dug to quarry stone or aggregates (e.g. 1003, Figure 53, which is labelled as a 'Gravel Pit' by late 19th century Ordnance Survey maps), while some may have been used to extract clay for local brick production.

3.7.23 Corresponding mounds, which might represent the spoil heaps derived from these excavations, were only occasionally identified in the vicinity of the depressions. This may mean 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.

3.7.24 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.

Other features

3.7.25 Other assets identified during the assessment included a poorly defined linear depression (1011, Figure 56) south-east of Pipe Ridware. The origin of the asset is uncertain, although it may be associated with an area of water meadows recorded in the Staffordshire HER (MST13441). Its alignment also corresponds, albeit only very approximately, with a pit-alignment previously recorded from aerial photographs (SHER MST1481).

3.7.26 Another faint linear asset (1251, Figure 54) was traced for a distance of approximately 290m to the south-west of Shawlane Farm. It does not correspond with existing field boundaries, or any features shown on early Ordnance Survey maps. The feature appears to be very straight and uniform in plan, suggesting that it may be of modern origin.

3.7.27 Numerous other features noted during the assessment are also of ambiguous origin. These include a very faint sub-circular mound (1055, Figure 69), approximately 6m in

diameter, which was identified at the edge of an arable field at the western end of the Fradley to Colton area, and a series of three small irregular mounds (1004-6, Figure 54) west of Kings Bromley.

3.7.28 A group of 13 small circular features (1102, Figure 61) of between 2m and 10m in diameter was also identified within an area of pasture, south of Blithbury. Although not conclusively interpreted, these assets are possibly derived from modern or possibly late post-medieval agricultural activity. Several other small circular or sub-circular features were also identified within the Fradley to Colton area (e.g. 1024-6, and 1215-6; Figures 65 and 66), although these appear to represent the former sites of animal feeders and are therefore likely to be of negligible archaeological interest.

3.7.29 Finally, of note is a trapezoidal mound (1019, Figure 60) located to the east of New House Farm, Blithbury. The origin of this feature is uncertain. It is not depicted on early editions of Ordnance Survey mapping, there is no corresponding record in the Staffordshire HER and the asset does not appear to have been identified during assessments of aerial photographs. The mound bears superficial similarities in scale and form to Neolithic long-barrows, although no flanking quarry ditches are evident. However, the feature is perhaps more likely to represent a spoil heap, possibly derived from groundworks involved in the construction of the large modern agricultural buildings within the adjacent farm complex.

Aerial photographs

Overview

3.7.30 Features identified from aerial photographs during the remote sensing assessment are described in Annex C, illustrated in Figures 51 - 70 and listed in Appendix CH-002-001. The principal findings of the assessment are presented below.

3.7.31 The southern section of the Fradley to Colton area, which is predominately used for arable agriculture, lies on the gravel terraces of the River Trent, to the north of Handsacre. The underlying river terrace drift gives rise to deep well drained coarse sandy and loamy soils which are free draining and facilitate the formation of detailed marks in crops over buried natural and anthropogenic features. This environment, near to the alluviated floodplain, was attractive to former settlers and has been used extensively and continuously for agricultural, settlement, access and funerary activities since early prehistory. Traces of medieval fields are visible throughout the Fradley to Colton area, overlying earlier deposits, in addition to crop marked evidence for post enclosure field boundaries and more recent land use changes.

3.7.32 This area near the river Trent, to the north and west of Kings Bromley has been subject to intense specialist archaeological aerial survey over the latter half of the 20th century, notably by JK St Joseph, J Pickering, and HE. There is thus a large collection of oblique aerial photos, in contrast to the very sparse available material to the north of the Fradley to Colton area.

3.7.33 The southern part of the Fradley to Colton area thus contains the majority of the known crop marked prehistoric and medieval assets, where discovery rates have been high and the buried archaeological landscape is complex and highly visible as marks in crops and soil.

3.7.34 This assessment divided what is in reality a contiguous pre-modern landscape into a series of areas for recording and GIS analysis purposes.

3.7.35 The archaeological landscape recorded from aerial photos begins to the south of Kings Bromley, where site 1 (Figure 53) was recorded from oblique aerial photos as a series of partially overlying eroded and buried small rectilinear ditched enclosures which is likely to have been a pre-medieval, possibly Iron Age (IA)/Roman rural settlement area or small farmstead.

3.7.36 To the immediate northeast of site 1 (Figure 53), a contiguous multi-period buried landscape of boundaries, pit alignments, funerary sites, rectilinear and curvilinear pit-defined enclosures, small rectilinear ditched enclosures, and ditched access tracks extends below the modern landscape towards Glebe Farm.

3.7.37 Gazetteer sites FRC002, FRC003 and FRC004 (Figure 53) lie within an area where a large curvilinear former field boundary was removed in the latter part of the 20th century, opening out the modern fields for mechanised agriculture. This curvilinear boundary shows intermittently as a mark in crops.

Undated, or tentatively dated, sites

3.7.38 Pit alignments, pit defined enclosures and ditched boundaries are clearly visible and extend into adjacent site 5 - 11 (Figures 53 and 54) and northwards within sites 14 - 16 (Figures 54 - 56). These are likely to be former boundaries, of unknown date, and are visible as crop marks alongside distinctive ovoid pit defined enclosures. The function of these curvilinear features is unclear from the aerial photos. The enclosure within site 11 is visible only on one oblique aerial photo taken by Dr JK St Joseph, and the control point information is not optimum, so its mapped position may be less than 100% accurate.

3.7.39 Pit alignments within site 7 (Figure 54) define a coherent land boundary system to the south of a small watercourse, alongside other ditches which are aligned slightly differently to the pits.

3.7.40 The pit alignments underlie the modern landscape, which cuts them visibly at Pool Cottage and Riley Hill at co-ordinates 411886,315270. The relationship here to a partially visible ring ditch cannot be discerned from aerial photos, but there are two visible phases of pit defined boundaries and ditched boundaries. A parallel, less regular alignment is visible in site 4adjacent but not definitely associated with a sub-rectangular pit defined enclosure within site 3 (Figure 54). Other single alignments traverse the area of sites 2 and 5 (Figure 54). A more regularly spaced and aligned parallel pit alignment is also visible in site 4 alongside a curvilinear former boundary and various linear and curvilinear boundary ditches.

3.7.41 The assets cannot be firmly dated and phased from the AP data alone. The alignments of the ditched features and pit-defined boundaries are often contrary, the pits are cut by the modern landscape features in places, and relationship with the likely Bronze Age ring ditches is not apparent. The NMP dates similar pit alignments in the Fradley to Colton area (for example in site 28; Figures 53 and 56) to the Iron Age or Roman periods, and a stratigraphic relationship of a pit alignment with a causewayed enclosure is noted in site 28 near Glebe Farm at co-ordinates 409949,316791.

3.7.42 Without further intrusive investigation, the pit alignments can only be firmly dated to pre-modern periods. They are not contemporary with the visible traces of eroded medieval fields which show as marks in crops.

3.7.43 Ditched assets within sites 13 - 16 (Figures 54 - 56) are likely to be post-enclosure field boundaries which have now been removed. These assets are cut buy or cut a pit alignment at Echills within site 14 (Figure 55), where ridge and furrow is also visible as crop marks. A pit alignment is cut by the modern landscape between sites 15 and 16 (Figure 56) to the west of Rookery Plantation, in addition to what is likely to be a Bronze Age barrow cemetery. The pit alignment also cuts, or is cut by (the relationship is again not discernible) part of a sub rectangular buried ditched enclosure at co-ordinates 410369,317012. Boundaries and rectilinear enclosures visible at around and to the north of Pipe Ridware are dated by the NMP to the Iron Age or Roman periods.

3.7.44 It is likely that there are three phases of agricultural land use showing in the crop marked record in the area. However, one ditch within site 14 is associated with and continued by a north-south aligned pit alignment between sites 14 and 15 which indicates use of pits for boundaries in differing phases of use within this landscape.

Prehistoric periods

3.7.45 Site 28 (Figure 59) contains a buried ditched sub-curvilinear causewayed enclosure at co-ordinates 409949,316791, which was mapped by the Staffordshire NMP project[30], and dated by the NMP to the Neolithic period.

3.7.46 To its immediate west, a large curvilinear ditched enclosure was identified and dated tentatively to the 'earlier prehistoric periods'.

3.7.47 There are many visible small and larger curvilinear and circular enclosures within this landscape, which are likely to be the remains of single ditched and multi-ditched eroded Bronze Age funerary monuments. They show consistently and clearly on the oblique aerial photos, on some of the Ordnance Survey verticals and at some of the Google Earth timelines, which give more precise locational detail to the features. It is reasonable to conclude that this area, and all areas towards and around the river, were used for funerary purposes in the prehistoric periods and that further funerary sites will be present but not visible on the aerial photographs due to limitations of the survey technique which are described above.

3.7.48 To the west and north-east of Glebe Farm, sites 16, 17 (which is now partially destroyed by gravel extraction, Figure 56), 28 and 29 (Figures 53, 55 and 56) contain a series of curvilinear and sub-rectangular buried ditched enclosures, ring ditches and multiple ring ditches which indicate a complex prehistoric funerary and possible ritual or settlement buried landscape. The individual periods of these assets - beyond the assumption that the ring ditches and multiple ring ditches may be Bronze Age round barrows - cannot be discerned using AP analysis alone.

[30] Bax (2014)

3.7.49 Further buried ring ditches have been identified within sites 20 and 21 (Figures 56 and 57) to the east and west of Pipe Ridware.

3.7.50 To the north of Pipe Ridware, the known and recorded crop marked landscape becomes much sparser and less apparent from the evidence recorded by existing aerial photographs. There are some crop marked sites, notably post-enclosure field boundaries, possible Iron Age/Roman boundaries, and an enclosure at site 42 (Figure 61), which are discussed below. The possibility for further discovery of prehistoric sites is underlined by the recording of a crop marked ring ditch by NMP from the 2010 timeline at Google Earth (referenced by the NMP as Next Perspectives 2010), likely a Bronze Age round barrow, at site 49 (Figure 61), co-ordinates 407937,318934, at Bentley Hall Cottage. The presence of this site, and an enclosure at site 42, indicates that there is potential for new discovery in this area and that possibly reconnaissance has not fully covered the area as it may not have been perceived as fruitful of discovery as the valley of the River Trent.

Iron Age/Roman periods

3.7.51 As discussed above, some of the ditched former boundaries have been dated to the Iron Age or Roman periods by NMP, and there is a question over the dating of these features.

3.7.52 A rectilinear enclosure within the west side of site 29 (Figure 57) shows as crop marks and is dated by the NMP to the Iron Age or Roman periods.

3.7.53 The dating of boundaries and pit alignments between Kings Bromley and Pipe Ridware to the Iron Age/Roman periods may be a logical approach, but they must remain classified as undated, likely Iron Age/Roman features, until ground based investigations have been conducted where appropriate to affirm dating evidence.

3.7.54 Site 42 (Figure 61) at Pipewood College, South of Blithbury at co-ordinates 408274,319493, was mapped from CUCAP obliques by the NMP, and is classified as an Iron Age/Roman enclosure, no doubt due to its shape and appearance.

3.7.55 The area between Pipe Ridware and Blithbury must be considered to have some further potential for discovery from the air, as outlined above. There are some hints of possible buried sites, such as 23 and 27 (Figures 58 and 65) which may contain ditched enclosure assets, visible at the 2010 timeline on Google Earth, which further reinforce this assertion that the archaeological potential of the northern part of the Fradley to Colton area is not fully reflected in the aerial photographic record.

Medieval

3.7.56 The Fradley to Colton area was farmed extensively in the medieval period. To the south of Pipe Ridware, the majority of the ridge and furrow is heavily eroded and shows in palimpsest as crop marks or very residual earthworks. To the centre and north, the recorded landscape is dominated by extensive areas of residual or eroded ridge and furrow, which away from the very well drained gravel areas of the river valleys may be masking or inhibiting the formation of crop marks, in conjunction with a higher proportion of pastoral rather than intense arable land use.

3.7.57 These medieval fields have been recorded schematically where visible over the Fradley to Colton area.

3.7.58 In addition to the agricultural landscape, a medieval moat, fishponds and outlying tracks field and associated boundaries were at sites 36 and 37 (Figure 59) by the NMP, at Quintin's Orchard, co-ordinates 408712,318575. These features have been partially eroded and are visible as vestigial earthworks.

3.7.59 A medieval road and a likely continuation of this as a medieval hollow way were identified by the NMP at sites 63 and 66 (Figures 68 and 69) to the north of Hamley Heath House at co-ordinates 404545,321868.

Post-medieval

3.7.60 The post-medieval landscape is visible on aerial photographs as a series of crop marked former field boundaries, which fit in with the modern 'post enclosure' boundary systems which now form the modern rural landscape in the Fradley to Colton area.

3.7.61 There are some areas of residual water meadows at sites 19 and 21 (Figures 56 and 57) near Pipe Ridware.

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 assets 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, correlate with medieval land divisions.

3.8.2 The assessment also identified that vestigial ridge and furrow of medieval or earlier post-medieval date survive intermittently across the study area. However, the assessment failed to replicate the results of aerial photographic assessments, which have identified substantially more widespread traces of relict ridge and furrow within the Fradley to Colton area. Consequently, the assessment has provided very limited new evidence for the location and extent of medieval open field systems, or areas associated with contemporary settlement activity across the Fradley to Colton area.

3.8.3 Although few sites or features of potentially elevated significance were confidently identified within the Fradley to Colton area, notable exceptions include two ring ditches south of Kings Bromley, one of which lies entirely and the other partially, within the limits of the proposed scheme.

Aerial photographs

3.8.4 Aerial photographs taken between the 1940s and the present time show a complex palimpsest of buried eroded cropmarked features between Kings Bromley and Pipe Ridware in the southern part of the Fradley to Colton area on the gravel soils near the River Trent. Multiple ring ditches indicate large areas of Bronze Age funerary monuments, with likely earlier Neolithic enclosures and other later features near Pipe

Ridware. To the south of the area, curvilinear and linear pit defined enclosures and pit alignments show clearly as crop marks alongside boundaries, tracks, barrows and enclosures. The change in the visible landscape to the north of Pipe Ridware is marked, and the reason for this maybe environmental, as features maybe invisible from the air due to unsuitable soils or land use, or a genuine reduction in the level of pre-medieval settlement remains. The presence of some isolated ring ditches and enclosure features indicate potential for further buried remains.

3.8.5 The Fradley to Colton area was largely farmed in the medieval period, with areas of rural settlement and land use visible as residual earthworks at a moated site and possible medieval road.

3.8.6 No traces of defined Deserted Medieval Villages (DMV) have been seen in the Fradley to Colton area, and areas of medieval settlement may have been overbuilt by modern settlements

3.8.7 Post-medieval boundaries and narrow ridge and furrow show throughout the Fradley to Colton area on aerial photos.

3.9 Conclusions

3.9.1 A significant concentration of likely prehistoric activity is situated within the south-eastern portion of the Fradley to Colton area, largely identified from APs. Throughout the rest of the area field boundaries and ridge and furrow indicate a later medieval and post-medieval agricultural landscape.

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

3.9.3 The locations of previously identified AP Sites do not precisely coincide with sites mapped and recorded within the HER. This may be due to the 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 the location indicated.

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Annex A: Survey equipment and data processing

Survey methods and equipment

The magnetic data was acquired using both a Bartington 601-2 dual magnetic gradiometer system and a non-magnetic cart system. The handheld instrument has two gradiometer assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. The cart instrument has four gradiometers fixed horizontally 1m apart allowing multiple traverses to be recorded simultaneously. The gradiometers are the same, each containing two fluxgate magnetometers arranged vertically with a 1m separation, and measure 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[31] over a ±100nT range, and measurements from each sensor are logged at intervals of 0.25m.

Detailed handheld gradiometer survey was undertaken using an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK Global Navigation Satellite System (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

[31] nT = a unit of magnetic flux density

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 for hand-held data 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; and
- 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 data and image processing steps for the non-magnetic cart fitted system may include:

- smooth – applying a smooth function removes any small scale spiking or 'fuzziness', generally caused by internal system noise. This effectively 'destripes' the data and reduces the appearance of dominant anomalous readings; and
- spline interpolation – gridding the data with splines allows the application of minimum and maximum data values and reduces oscillations for potential fields such as gravity or magnetic.

Typical displays of the data used during processing and analysis:

- XY Plot (hand-held data only) – 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; and
- 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 separated 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; and
- possible archaeology - used for features that give a response but that 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 that 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; and
- 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 Fradley to Colton area

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1001			Post-medieval	One of two small sub-rectangular mounds (with 1002), located in close proximity to one another, at the corners of adjoining fields. Possibly represents a spoil heap derived from the excavation of the adjacent (extant) pond. Approximately 30m by 11m.
1002			Post-medieval	One of two small sub-rectangular mounds (with 1001), located in close proximity to one another, at the corners of adjoining fields. Possibly represents a spoil heap derived from the excavation of the adjacent (extant) pond. Approximately 32m by 13m.
1003			Post-medieval	Small sub-rectangular depression, measuring approximately 45 m by 20 m, currently obscured by trees. Corresponds with the shape and location of a 'Gravel Pit' depicted by the 1st Edition six-inch Ordnance Survey map of 1883.
1004			Possibly modern	One of three small mounds (with 1005 and 1006) situated to the south-west of a modern gravel pit. Sub-rectangular in plan, measures approximately 25m by 10m. Origin uncertain, but may be derived from activities associated with modern extraction.
1005			Possibly modern	One of three small mounds (with 1004 and 1006) situated to the south-west of a modern gravel pit. Sub-oval in plan, measures approximately 15m by 10m. Origin uncertain, but may be derived from activities associated with modern extraction.
1006			Possibly modern	One of three small mounds (with 1004 and 1005) situated to the south-west of a modern gravel pit. Irregular in plan, measures approximately 17m by 15m. Origin uncertain, but may be derived from activities associated with modern extraction.
1007			Medieval/post-medieval	Approximately sub-rectangular area containing possible vestigial ridge and furrow, now obscured by woodland (Tomlinson's Spinney). 190m by 120m in extent. Ridge and furrow NNW to SSW. The area is defined to the south and east by a possible internal bank and external ditch. The north-west corner of the area is traversed by a faint ENE-WSW aligned linear depression, which may represent a former or extant trackway or path.
1008			Possibly post-medieval	Sub-circular depression, approximately 9m in diameter, located at the corner of a small pasture field.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				Partially obscured by mature tress within adjoining woodland (Tomlinson's Spinney). May represent a former extractive pit or pond. Corresponds with the position and approximate size of a pond depicted by the 1st Edition six-inch Ordnance Survey map of 1884.
1010			Medieval/post-medieval	Approximately sub-rectangular area containing vestigial ridge and furrow now situated within a larger, irregular pasture field. 110m by 50m in extent. Ridge and furrow aligned E-W. Slight 'reverse-S' shape in plan.
1011			Unknown	Poorly defined linear depression, approximately 120m by 11m, aligned NW-SE. Traverses the western half of a pasture field, beyond which the feature is not visible. Origin uncertain- could demarcate a former trackway or possible lynchet/field boundary.
1012			Possibly post-medieval	Poorly defined sub-circular depression, approximately 8m in diameter, located close the NW corner of a pasture field. May represent a former pond or extractive pit.
1013			Medieval/post-medieval	Approximately sub-rectangular area containing possible vestigial ridge and furrow. Situated within a narrow rectilinear parcel of land, now forming part of a private garden, but depicted as the northern part of a formerly larger enclosure or field (possibly a medieval strip-field) by the 1st Edition six-inch Ordnance Survey map of 1883. The map also depicts a short section of an E-W watercourse immediately to the north, which could indicate that these features are related to drainage, rather than ridge and furrow agriculture. Area is 90m by 35m in extent. Ridge and furrow aligned N-S.
1014			Post-medieval	Slightly irregular sub-oval depression, approximately 50m by 2m in extent, now obscured by a small stand of mature trees. A small square structure (presumably a modern agricultural feature) is situated immediately adjacent. May represent a former extractive pit or pond. The 1924 edition six-inch Ordnance Survey map depicts a number of 'Old Marl Pits' in the immediate area, although none of these correspond with 1014. Located immediately west of possible extraction pit 1054.
1015			Possibly post-medieval	Possible sub-oval feature or anomaly, approximately 30m by 20m in extent. Heavily obscured by existing vegetation cover (coincides with a small stand of trees at the edge of a large agricultural field), and not clearly defined within the filtered LiDAR data. Late 19th and early 20th century Ordnance Survey maps depict a former pond, or 'Old Marl Pit' in this location.
1016			Possibly post-medieval	Poorly defined sub-oval depression, approximately 35m by 15m in extent. Now obscured by extant vegetation/tree cover. Located centrally within a large agricultural field. Late 19th and early 20th century Ordnance Survey maps depict a former pond, or 'Old Marl Pit' in this location.
1017			Post-medieval	Small sub-oval depression located at the corner of a field. May represent a former pond or extractive

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				pit. Approximately 20m by 10m in extent.
1018			Post-medieval	Small sub-oval depression located at the edge of a field. Approximately 30 m by 15 m in extent. Corresponds approximately with the position of one of a number of features labelled as 'Old Quarries' on the 1924 edition six-inch Ordnance Survey map (also depicted by the 1884 edition map). Likely to represent a former pond or extractive pit.
1019			Unknown	Elongated sub-oval or trapezoidal mound, measuring approximately 35m by 16m. Orientated NNW-SSE. Widest to SSE. Not depicted on early editions of Ordnance Survey mapping. The southern end of the mound is covered by a small fenced enclosure containing small trees or shrubs. The origin of the feature is uncertain. The mound bears similarities to Neolithic long-barrows, although no flanking quarry ditches are evident. The feature may be more likely to be modern, rather than prehistoric in origin.
1020	44		Medieval/post-medieval	Irregular area, measuring approximately 115m by 30m, containing possible vestigial ridge and furrow. Contained within parts of two adjoining pasture fields. The possible ridge and furrow is orientated E-W, and is overlain by an extant NNW-SSE access route to New House Farm.
1021			Post-medieval	Small sub-oval depression located at the south-eastern corner of a field. Approximately 34m by 25m in extent. Corresponds with a former extractive pit or 'Old Marl Pit' depicted in this location by late 19th and early 20th century Ordnance Survey maps.
1022			Post-medieval	Small sub-oval depression situated immediately adjacent to an existing pond. Approximately 23m in diameter. The existing pond and the small sub-oval depression correspond with former extractive pits or 'Old Marl Pits' depicted in this location by late 19th and early 20th century Ordnance Survey maps.
1023			Post-medieval	Sub-oval pond, measuring 24m by 14m, situated within the centre of an agricultural field. Possibly a former extractive pit.
1024			Unknown, possibly modern	On of a group of similar features (with 1025, 1026, 1215 and 1216) located within a pasture field adjacent to an existing farm track. Formed of a sub-oval depression, encompassing a central flattened platform. Likely to represent the sites of former animal feeding stations. Approximately 8.5m by 6.5m.
1025			Unknown, possibly modern	On of a group of similar features (with 1024, 1026, 1215 and 1216) located within a pasture field adjacent to an existing farm track. Formed of a sub-oval depression, encompassing a central flattened platform. Likely to represent the sites of former animal feeding stations. Approximately 7.5m by 6m.
1026			Unknown, possibly modern	On of a group of similar features (with 1024, 1025, 1215 and 1216) located within a pasture field

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				adjacent to an existing farm track. Formed of a sub-oval depression, encompassing a central flattened platform. Likely to represent the sites of former animal feeding stations. Approximately 7m by 6m.
1028			Post-medieval	Sub-oval pond or depression, measuring 20m by 13m, located at the edge of an agricultural field. Possibly a former extractive pit.
1029			Post-medieval	Sub-oval depression, measuring 9 m by 6 m, located at the edge of an agricultural field. Possibly a former extractive pit.
1030			Post-medieval	Sub-oval depression, measuring 14m by 10m, located at the edge of an agricultural field. Possibly a former extractive pit.
1031	61		Medieval/post-medieval	Sub-rectangular area, 185m by 90m, containing possible vestigial ridge and furrow. Orientated NW-SE, perpendicular to existing land divisions that subdivide the areas of pasture containing the features.
1032			Post-medieval	Sub-oval depression, measuring 21m by 14m, located at the edge of an agricultural field, and an existing road. Possibly a former extractive pit or pond. Corresponds with a pond depicted by the 1884 edition six-inch Ordnance Survey map.
1033			Post-medieval	Sub-circular depression, approximately 70m in diameter. Substantially more pronounced to the east. Corresponds with a probable former extractive pit depicted by the 1884 edition six-inch Ordnance Survey map.
1034			Post-medieval	Very faint sub-circular depression, approximately 30 m in diameter. Corresponds with the position of two small ponds depicted by the 1884 edition six-inch Ordnance Survey map. May represent a former extractive pit.
1035			Post-medieval/ modern	Very faint sub-circular depression, approximately 7m in diameter. May represent a former extractive pit, although could represent the former site of a modern animal feeding station.
1036			Possibly post-medieval	L-Shaped scarp, which corresponds with the southern edge of an extant field for approximately 120 m. May be the product of quarrying activities, although alternatively may be a lynchet. Corresponds with a feature demarcated by hachures on the 1884 edition six-inch Ordnance Survey map.
1037			Possibly post-medieval	Very faint sub-circular / irregular depression, approximately 65m in diameter. May represent a former extractive pit.
1038			Post-medieval	Sub-rectangular depression, measuring approximately 35m by 24m. Corresponds with a probable

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				former extractive pit/ pond depicted by the 1884 edition six-inch Ordnance Survey map.
1039			Unknown	Gently arcing linear depression, approximately 210m long by 9m wide. Does not appear to extend beyond the boundaries of the pasture field in which it is located. May represent a former trackway or holloway.
1040			Post-medieval	Very faint sub-circular depression, approximately 9m in diameter. Corresponds with the position of a small pond depicted by the 1884 edition six-inch Ordnance Survey map at the edge of a field, which has subsequently been opened out. May represent a former extractive pit.
1054		FRC132; FRC132	Post-medieval	Narrow sub-rectangular parcel of land situated parallel to the Moreton Brook approximately 345m by 80m in extent. Contains numerous very faint, closely spaced parallel linear features, orientated NNW-SSE along the long axis of the area. Several parallel linear features run perpendicular to these, spaced approximately 70m apart. Although very indistinct on the LiDAR plot, it is possible that these features represent the vestiges of Post-medieval water management/drainage.
1055			Unknown	Very faint sub-circular mound, approximately 6m in diameter. Origin uncertain.
1056			Medieval/post-medieval	Sub-rectangular area containing vestigial ridge and furrow, now obscured by woodland (Spencer's Plantation). 100m by 80m in extent. Ridge and furrow aligned NW-SE. The area is bounded by a possible bank and ditch, which is poorly defined on the filtered LiDAR plot.
1057	65		Possibly post-medieval	Linear depression approximately 230m in length and 8m wide. Orientated NE-SW, parallel to existing field boundaries. The 1884 edition six-inch Ordnance Survey map depicts a sporadic line of trees along the line of the feature, which may represent the position of a former field boundary, or a former trackway.
1058			Unknown	One of two faint sub-rectangular depressions (with 1059), located at the SW corner of a field. Approximately 12m by 8m. Origin uncertain.
1059			Unknown	One of two faint sub-rectangular depressions (with 1058), located at the SW corner of a field. Approximately 20m by 8m. May form part of a larger sub-rectangular feature, which extends to the north, beyond the edge of the LiDAR plot [1219]. Quite regular in form. Origin uncertain.
1082			Post-medieval	Small sub-oval depression, measuring approximately 11m by 8m, currently obscured by trees, located at the corner of a pasture field. Corresponds approximately with the shape and location of a possible extractive pit depicted by the 1st Edition six-inch Ordnance Survey map of 1886.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1083			Post-medieval	Small sub-oval depression, measuring approximately 23m by 20m, currently obscured by trees, located at the corner of a pasture field. Corresponds approximately with the shape and location of a possible extractive pit depicted by the 1st Edition six-inch Ordnance Survey map of 1886.
1084		FRC117	Medieval/post-medieval	Approximately sub-rectangular area containing faintly defined traces of ridge and furrow, now situated within a larger, irregular pasture field. 54m by 35m in extent. Ridge and furrow aligned NNW-SSE. Situated in an area (with 1211, 1212 and 1220) containing other parcels of land with traces of residual ridge and furrow.
1085			Post-medieval	Faint sub-circular depression, approximately 43m in diameter. Corresponds with the position of a pond depicted by the 1885 edition six-inch Ordnance Survey map. May represent a former extractive pit.
1086			Post-medieval	Shallow depression, approximately 20m by 15m, located at the edge of a field, adjacent to Newlands Lane. May represent a former extractive pit, or may be associated with road maintenance/construction. Corresponds with a feature demarcated by hachures on the 1884 edition six-inch Ordnance Survey map.
1087			Possibly post-medieval	One, or possibly two faintly defined sub-circular or sub-oval depressions, contained within an area of approximately 50m diameter. May represent former extractive pits.
1088			Possibly post-medieval	Very faintly defined sub-circular depressions, approximately 35m in diameter. May represent a former pond or extractive pit.
1089			Possibly post-medieval	Faint elongated sub-oval depression, approximately 42m by 10m. Corresponds with the position of a pond depicted by the 1884 edition six-inch Ordnance Survey map. May represent a former extractive pit.
1090			Possibly post-medieval	Irregular depression, approximately 140m by 50m in extent, located at the corner of a field. Now obscured by woodland (named 'Hurstwood'). Represents a series of intercut extractive pits which are labelled as 'Hurstwood Pit' by the 1st Edition six-inch Ordnance Survey map of 1884.
1091			Post-medieval	Two small sub-oval or sub-rectangular depressions, located at the corners of adjoining fields. Contained within an area of approximately 100m by 37m. Situated close to a number of other former extraction pits. Corresponds with features depicted by the 1st Edition six-inch Ordnance Survey map of 1884.
1092			Possibly post-medieval	Irregular depression, approximately 140m by 50m in extent, located at the corner of a field. Now obscured by woodland (labelled as Hurstwood by the 1884 Ordnance Survey map). Situated approximately 120m to the south of 'Hurstwood Pit' (1090). Represents a series of intercut extractive

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				pits depicted by the 1st Edition six-inch Ordnance Survey map of 1884. An extant pond, which lies immediately adjacent, is also presumably, a former extraction pit.
1093			Post-medieval	Small sub-oval depression, likely to represent a former extraction pit. Approximately 25 m by 13 m. Situated at the edge of a field, in an area containing a number of other former extraction pits, several of which are depicted by late 19th and early 20th century Ordnance Survey maps.
1094			Possibly medieval/ post-medieval	Large irregular field containing possible vestigial ridge and furrow, approximately 190 m by 175 m in extent. Ridge and furrow aligned N-S. Alternatively, may be the product of modern ploughing.
1095			Medieval/post-medieval	Small pasture field containing traces of possible N-S ridge and furrow, approximately 62 m by 30 m in extent.
1096			Possibly post-medieval	Very faintly defined sub-circular depression, approximately 15m in diameter. May represent a former pond or extractive pit. However, may be a natural variation in topography.
1097			Post-medieval	Very faint sub-circular depression, approximately 35m by 20m in extent. Corresponds with the position of a pond depicted by the 1884 edition six-inch Ordnance Survey map at the edge of a field, which has subsequently been opened out. May represent a former extractive pit.
1098			Post-medieval	Irregular depression likely to represent a former extraction pit or series of intercut extraction pits. Now obscured by tree cover. Approximately 65m x30m. Corresponds with a probable former extraction pits ('Old Marl Pits') depicted by late 19th and early 20th century Ordnance Survey maps.
1099			Possibly post-medieval	Faintly defined sub-circular depression, approximately 16m in diameter. May represent a former pond or extractive pit. However, may be a natural variation in topography.
1100	36		Post-medieval/ modern	Large sub-rectangular field, approximately 155m by 140m in extent, containing a series of uniform parallel raised linear features, approximately 2m in width. These are regularly spaced, approximately 15m apart and orientated NNE-SSW. May be related to post-medieval drainage. Alternatively, may be the product of modern ploughing.
1101	44		Medieval/post-medieval	Narrow strip of ridge and furrow approximately 20m by 150m. Possible remnant of strip fields near the village of Blithbury.
1102			Unknown, possibly modern	A collection of 13 small circular features varying from 2m to 10 m in diameter. Possibly associated with linear features (1200). May be related to modern agricultural activity- possible former animal feeding stations.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1103	5	FRC020	Possibly Late Neolithic to Bronze Age	Ring ditch, approximately 25m in diameter. Possible round barrow associated with 1104
1104	8	FRC020	Possibly Late Neolithic to Bronze Age	Ring-ditch, approximately 2.5m wide and 20m in diameter. Virtually undetectable in LiDAR plots, but clearly visible in near infra-red and satellite imagery. Possibly represents a Late-Neolithic to Bronze Age barrow, possible associated with 1103.
1106			Post-medieval	Linear feature, probably a post-medieval field boundary approximately 160m long, running south from the River Trent. It follows the line of a field boundary depicted on historic maps.
1107		FRC074	Post-medieval	Linear feature, probably a post-medieval field boundary, approximately 140m long, running north from the River Trent. It follows the line of a field boundary depicted on historic maps including 1902 Ordnance Survey.
1108			Post-medieval	Linear feature, probably a post-medieval trackway approximately 250m long, running north-south near Littleton House Farm. It follows the line of a track depicted on historic maps, including 1902 Ordnance Survey.
1109			Post-medieval/ modern	Roughly oval shaped mound measuring 55m by 30m. Covering an area depicted as two ponds/extraction pits depicted on historic maps including 1902 Ordnance Survey.
1110			Unknown	Possible former drainage ditch or dried up stream approximately 180m long running east-west.
1111		FRC038	Post-medieval	Linear straight ditch feature, possible former field boundary approximately 300 m long. Not depicted on 1902 Ordnance Survey map.
1112			Post-medieval	Linear feature 40m long (although may extend beyond the limit of the LiDAR data). Possible post-medieval field boundary.
1113			Medieval/post-medieval	Linear feature approximately 75m long. Probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map
1114			Post-medieval	Linear feature with several kinks approximately 375m long. Probable post-medieval field boundary, possibly for drainage as it connects with a tributary of Moreton Brook. Depicted on 1902 Ordancne Survey map
1115			Medieval/post-medieval	Straight linear feature approximately 150m long north of Littlehay Manor. Probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1116			Medieval/post-medieval	Straight linear feature approximately 150m long south of Hamley House Farm. Probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1117			Medieval/post-medieval	Straight linear feature approximately 80m long south of Hamley House Farm. Probable medieval or post-medieval trackway the other part of (1205). Depicted on 1902 Ordnance Survey map.
1118			Medieval/post-medieval	Straight linear feature approximately 100 m long west of Hamley House Farm. Probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1119			Medieval/post-Medieval	Slightly curved linear feature approximately 390m long, parallel alignment of the current field boundaries. Possible former field boundary of a medieval strip field or post-medieval field drainage. Not depicted on historic maps. Similar to (1124).
1120			Medieval/post-medieval	One of four linear features (1120-1123) approximately 80m to 120m long (although may extend beyond the limit of the LiDAR data) running north-south. Possible former field boundaries or partial traces of ridge and furrow.
1121			Medieval/post-medieval	One of four linear features (1120-1123) approximately 80m to 120m long (although may extend beyond the limit of the LiDAR data) orientated north-south. Possible former field boundaries or partial traces of ridge and furrow.
1122			Medieval/post-medieval	One of four linear features (1120-1123) approximately 80m to 120m long (although may extend beyond the limit of the LiDAR data) orientated north-south. Possible former field boundaries or partial traces of ridge and furrow.
1123			Medieval/post-medieval	One of four linear features (1120-1123) approximately 80m to 120m long (although may extend beyond the limit of the LiDAR data) running north-south. Possible former field boundaries or partial traces of ridge and furrow.
1124			Medieval/post-medieval	Slightly curved linear feature approximately 340m long, parallel alignment of the current field boundaries. Possible former field boundary of a medieval strip field or post-medieval field drainage. Not depicted on historic maps. Similar to (1119).
1125			Post-medieval	Linear feature, approximately 160m long. Connected with (1208). Probable post-medieval former field boundary or drainage ditch.
1126		FRC132	Post-medieval	Linear features, probable post-medieval water management ditches, either for drainage or water meadows. Not visible on Ordnance Survey maps.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1128			Post-medieval	Long linear feature, over 700m (extends beyond buffer and LiDAR data). Probable post-medieval drainage ditch on a similar alignment to, and 30m to the east of, Moreton Brook.
1137			Post-medieval	Linear feature, approximately 275m. Parallel to [1128]. Probable post-medieval drainage ditch connected to Moreton Brook.
1138			Post-medieval	Linear feature, approximately 50m long. Connected at the southern end to a drainage ditch feeding into Moreton Brook. Possible post-medieval drainage ditch connected to Moreton Brook or former field boundary. Not depicted on historic maps
1139		FRC132	Post-medieval	Linear feature, approximately 175m long. Diagonal across the existing field, connecting a drainage ditch to Moreton Brook. Possible post-medieval drainage ditch or former field boundary. Not depicted on historic maps.
1140			Unknown	Linear feature, approximately 180m long. Not on the same alignment as existing field boundaries. Possible former field boundary. Not depicted on 1901 Ordnance Survey historic map.
1141			Unknown	Linear ditch feature, approximately 90m long. On the same alignment as existing field boundaries. Possible former post-medieval field boundary. Not depicted on 1901 Ordnance Survey historic map
1142		FRC132	Unknown	Ditch feature which with [1143] forms a rectangular enclosure approximately 30m by 18m. Unknown date or function. Same alignment as probable post-medieval field boundary and features, possibly related.
1143		FRC132	Post-medieval	Linear ditch feature, running parallel to field boundary and elements of [1126 and 1127]. Also forms north-west boundary of [1142]. Probably part of a system of post-medieval water management ditches, either for drainage or water meadows.
1144			Unknown	Linear bank feature approximately 220 m long. Unknown date or function. Not depicted on 1902 Ordnance Survey map
1145			Post-medieval	Linear feature approximately 185m long. Probable former post-medieval field boundary between the River Trent and tributary. Depicted on 1902 Ordnance Survey map
1146			Unknown	Linear feature approximately 260m long. Unknown date or function. Not depicted on 1902 Ordnance Survey map
1170			Post-medieval	Scarp probably caused by mineral or stone extraction given the proximity of several extraction pits to

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				the north-west. Probable post-medieval origin.
1171			Medieval/post-medieval	Linear feature approximately 110m. Medieval or post-medieval field boundary. Depicted on 1901 Ordnance Survey map
1172			Post-medieval	L-shaped linear feature approximately 40m wide and 140m long. Probable post-medieval field boundary. Depicted on 1901 Ordnance Survey map
1173			Post-medieval	Linear depression along the line of a footpath depicted on 1901 Ordnance Survey map approximately 75m long. Possible post-medieval date, although may be earlier.
1174			Medieval/post-medieval	Irregular curvilinear ditch feature approximately 160m long. Probable former medieval or post-medieval field boundary. Depicted on 1901 Ordnance Survey map.
1175			Post-medieval	Linear feature approximately 100m long. Former probable Post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1176			Medieval/post-medieval	Linear feature approximately 100m long. Former probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1177			Medieval/post-medieval	Linear feature approximately 70m long. Former probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1178			Medieval/post-medieval	Linear feature approximately 105m long. Former probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1179			Medieval/post-medieval	Linear feature approximately 95m long. Former probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1180			Medieval/post-medieval	Linear feature approximately 70m long. Continuation of existing drainage or boundary ditch. Probable Medieval or post-medieval date. Depicted on 1902 Ordnance Survey map.
1181			Medieval/post-medieval	Linear feature approximately 115m long. Part of a former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1182			Medieval/post-medieval	Curved linear feature approximately 135m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1183			Medieval/post-medieval	Linear feature approximately 150m long. Former medieval or post-medieval field boundary, depicted

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				on 1902 Ordnance Survey map.
1184			Medieval/post-medieval	Linear feature approximately 170m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1185			Medieval/post-medieval	Linear feature approximately 90m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1186			Medieval/post-medieval	Linear feature approximately 80m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1187		FRC020	Medieval/post-medieval	Linear feature approximately 400m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1188		FRC020	Medieval/post-medieval	Regular u-shaped linear feature, possible bank. Approximately 160m by 150m, bound to the west by Shawlane Farm. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1189		FRC020	Medieval/post-medieval	Linear feature approximately 160m long. Former medieval or post-medieval field boundary, depicted on 1902 Ordnance Survey map.
1190			Post-medieval	Post-medieval field boundary depicted ton the 1902 Ordnance Survey map approximately 160m long.
1191			Post-medieval	Curvilinear post-medieval field boundary depicted on the 1902 Ordnance Survey map approximately 120m long.
1195			Medieval/post-medieval	Linear feature approximately 185m long. Possible former field boundary, not depicted on 1902 Ordnance Survey map. Located in a field containing ridge and furrow feature 1264, and is similarly aligned running north-east to south-west.
1196			Medieval/post-medieval	Curvilinear feature, probably bank and ditch approximately 160m long. Combined with (1197) they form a possible trackway of medieval or post-medieval date.
1197			Medieval/post-medieval	Curvilinear feature, probably bank and ditch approximately 90m long. Combined with (1196) it forms a possible trackway of medieval or post-medieval date.
1198	?44		Medieval/post-medieval	Several linear features in an area approximately 150m by 50m lying to the south of the village of Blithbury. Probably former field boundaries, some elements depicted on the 1902 Ordnance Survey

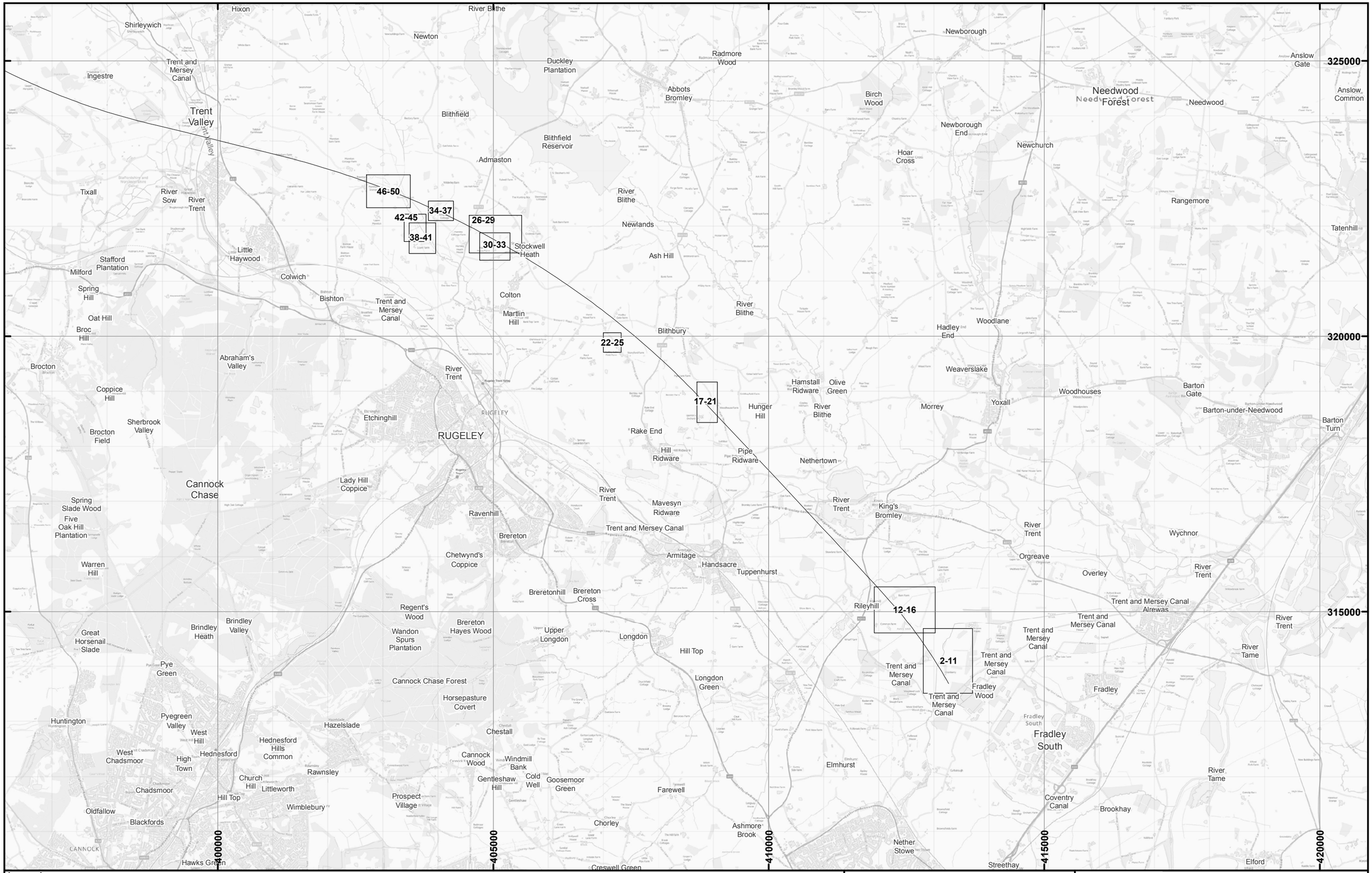
LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				map. May represent medieval strip fields or post-medieval boundaries.
1200			Unknown	Four linear bank features from approximately 40m to 80m long. Roughly north-south alignment. Possibly related to [1102]. Unknown date or function.
1201	?48		Medieval/post-medieval	Three linear features, approximately 290m to 320m long. Former field boundaries, possible remnants of medieval strip fields. Depicted on 1902 Ordnance Survey map. Associated with [1202].
1202	?48		Medieval/post-medieval	Similar to [1201]. Linear feature, 250m long. Probable medieval or post-medieval field boundary. Depicted on 1902 Ordnance Survey map.
1203	8	FRC020	Medieval/post-medieval	Linear feature approximately 200m long. Possible medieval or post-medieval field boundary. Not depicted on 1902 Ordnance Survey map.
1205			Medieval/post-medieval	Linear ditch feature approximately 80m long. With [1117] possibly defines a medieval or post-medieval trackway, or adjacent field boundary depicted on 1901 Ordnance Survey map.
1206			Post-medieval	Probable post-medieval field boundary approximately 40m long situated to the south of Hamley House Farm. Depicted on 1901 Ordnance Survey map.
1207			Unknown	Linear feature 120m long. Not depicted on 1901 Ordnance Survey map. Unknown date.
1208			Medieval/post-medieval	Several linear features. Probable field boundaries or drainage ditches. Associated with [1125]. Not depicted on 1901 Ordnance Survey map.
1209	51		Medieval/post-medieval	Thin field, approximately 40m by 240 m containing remnants of ridge and furrow cultivation. Ridge and furrow aligned E-W.
1210			Medieval/post-medieval	Sub-circular feature approximately 40m in diameter. May represent a former extractive pit or pond. Not depicted on 1902 Ordnance Survey map.
1211	54	FRC117	Medieval/post-medieval	Approximately sub-rectangular area containing faintly defined traces of ridge and furrow, now situated within a larger pasture field. Approximately 155m by 100m in extent. Ridge and furrow aligned NNW-SSE. Situated in an area (with 1084, 1212 and 1220) containing other traces of residual ridge and furrow.
1212	54	FRC117	Medieval/post-medieval	Irregular area containing faintly defined traces of ridge and furrow, now situated within an irregular pasture field. 85m by 52m in extent. Ridge and furrow aligned NW-SE, and with a slight 'reverse-S' shape in plan. Situated in an area (with 1211, 1084 and 1220) containing traces of residual ridge and

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				furrow.
1213	54		Medieval/post-medieval	Sub-rectangular field approximately 90m by 100m to the east of Stockwell Heath. Contains remnants of ridge and furrow cultivation aligned north-west to south-east.
1214	54		Medieval/post-medieval	Sub-rectangular field approximately 70 m by 40 m containing traces of ridge and furrow cultivation. Ridge and furrow aligned north-west to south-east. Situated to the north of Littlehay Manor.
1215			Modern	Small sub-circular feature approximately 4m in diameter. One of a group of similar features (with 1024, 1025, 1026 and 1216) located within a pasture field adjacent to an existing farm track. Likely to represent the sites of former animal feeding stations.
1216			Modern	One of a group of similar features (with 1024, 1025, 1026 and 1215) located within a pasture field adjacent to an existing farm track. Formed of a sub-circular depression, encompassing a central flattened platform. Likely to represent the sites of former animal feeding stations. Approximately 7.5m in diameter.
1217	58		Medieval/post-medieval	Approximately triangular parcel of E-W aligned ridge and furrow. Very faintly defined. Approximately 120m by 90m in extent.
1218	65		Medieval/post-medieval	Irregular sub-rectangular area of ridge and furrow cultivation at the eastern end of a larger field. Approximately 120m by 150m in extent. Aligned east-west.
1219			Unknown	Rectangular depression feature, extending beyond the LiDAR survey extents. [1059] lies within the southern end of the feature. Approximately 21m wide, unknown length. Unknown origin.
1220	54	FRC117	Medieval/post-medieval	Irregular sub-rectangular field approximately 150m by 110m containing traces of ridge and furrow cultivation to the south-east of Stockwell Heath. Ridge and furrow aligned north-east to south-west. Situated in area with other traces of ridge and furrow [1084, 1211 and 1212].
1242			Post-medieval	Sub oval probable former extractive pit approximately 30m by 20m. Probable post-medieval date.
1243			Medieval/post-medieval	Small rectangular area of ridge and furrow cultivation approximately 80m by 40m. Lies to the north of Shawland Farm. Probable medieval or post-medieval date.
1244			Unknown	Irregular U-shaped ditch to the south of the River Trent. Deepest to the south-east. Not depicted on historic maps. Probably modern in origin as result of drainage and/or activity within field. Approximately 160m by 130m.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1245			Medieval- Post-Medieval	Sub oval probable former extractive pit approximately 50m by 20m. Probable post-medieval date.
1246			Medieval/post-medieval	Small area of probable ridge and furrow approximately 60m by 30m south of Stockwell Heath.
1247	65		Medieval/post-medieval	Sub-rectangular area approximately 230m by 180m of probable ridge and furrow or post-medieval cultivation.
1252	4	FRC020	Unknown	Linear feature approximately 100m long. Not depicted on historic maps. Unknown date or function.
1254			Post-medieval	Slightly irregular sub-circular depression, approximately 16m in diameter. May represent a former extractive pit or pond. The 1924 edition six-inch Ordnance Survey map depicts several 'Old Marl Pits' in the immediate area, although none of these correspond with 1254. Located immediately east of possible extraction pit 1014.
1255			Post-medieval	Sub-elliptical depression, approximately 60m in length and 35m wide, orientated roughly north - south. May represent a former extractive pit or pond. Visible on the 1924 edition six-inch Ordnance Survey map depicts a number of 'Old Marl Pits' in the immediate area, although none of these correspond with 1255. Located immediately west of possible extraction pit 1014.
1256	23		Post-medieval	Sub-circular depression, approximately 28 m in diameter. Represent a former extractive pit or pond. Visible on the 1870s edition County Series Ordnance Survey map.
1257			Medieval/post-medieval	Field containing faintly defined traces of ridge and furrow, now being used as pasture, 270m by 260m in extent. Ridge and furrow aligned NE-SW.
1258			Unknown	Faint linear bank and ditch, 200m long and 30m wide, orientated north-south. Respects orientation of existing field boundaries in the area. Possibly a former field boundary or portion of faint ridge and furrow.
1259			Post-medieval	Slight sub-circular depression, 20m in diameter. Possible former pond depicted in the north-east extent of a field on the 1870s County Series Ordnance Survey map with ponds in on the same alignment in nearby fields to the north-west and south-east.
1260	48		Post-medieval	Sub-elliptical depression, 50m long and 40m wide. Former pond visible on the 1870s editions of the Ordnance Survey County Series map.
1261	50		Medieval/post-medieval	Area of faintly defined ridge and furrow, located in the eastern area of current pasture field. Area is 160m long and 55m wide and is orientated north-east to south-west, as is the ridge and furrow. Forms

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
				part of a wider area of remnant ridge and furrow including features 1094, 1095, 1262 – 1265.
1262	50		Medieval/post-medieval	Area of faintly defined ridge and furrow, located in current arable field 160m long and 90m wide. Ridge and furrow is orientated north to south. Forms part of a wider area of remnant ridge and furrow including features 1094, 1095, 1261, 1263, 1264 and 1265.
1263	50		Medieval/post-medieval	Area of faintly defined ridge and furrow, located in current pasture field 211m long and 80m wide. Ridge and furrow is orientated north-east to south-west. Forms part of a wider area of remnant ridge and furrow including features 1094, 1095, 1261, 1262, 1264 and 1265.
1264	50		Medieval/post-medieval	Area of faintly defined ridge and furrow, located in current pasture field 215m long and 170m wide. Ridge and furrow is orientated north-east to south-west. Forms part of a wider area of remnant ridge and furrow including features 1094, 1095, 1261, 1262, 1263 and 1265. Field also contains feature 1195, a possible former boundary on the same alignment as the ridge and furrow.
1265	50		Medieval/post-medieval	Area of faintly defined ridge and furrow, located in current pasture field 220m long and 140m wide. Ridge and furrow is orientated north-east to south-west. Forms part of a wider area of remnant ridge and furrow including features 1094, 1095, 1261, 1262, 1263 and 1264.
1266	54		Medieval/post-medieval	Linear bank feature, 240m long and 30m wide, orientated north-east to south-west. Lies on the location of a former field boundary visible on the 1890s Ordnance Survey County Series map.
1267			Unknown	Sub-circular depression, approximately 40m in diameter. Possibly a former pond or extraction pit.
1268			Medieval/post-medieval	Linear depression, 130m long and 26m wide, orientated north-east to south-west. The southern extent of the feature overlies a pit or pond visible on the 1870s Ordnance Survey County Series map.
1269			Medieval/post-medieval	Area of faint ridge and furrow orientated north-east to south-west. Area is 75m long and 45m wide and is in the north-east corner of current pasture field.
1270			Post-medieval	Linear cut feature 83m long orientated NEE to SWW. Feature is represented on the 1870s Ordnance Survey County Series map as a field boundary.
1271			Unknown	Linear depression 93m long and orientated north-east to south-west. Possible a former field boundary or trackway of unknown date.
1272			Medieval/post-medieval	Linear cut feature 180m long orientated north-east to south-west. Roughly located on the site of a former field boundary visible on the 1870s Ordnance Survey County Series map.

LiDAR and multi-spectral site ID	Aerial photography site ID	Gazetteer ID	Period	Description
1273		FRC145	Medieval/post-medieval	Linear cut feature 180m long orientated north-east to south-west. Feature is a former field boundary visible on the 1870s Ordnance Survey County Series map.
1274			Unknown	Linear bank feature, runs 127 m roughly east – west before turning south for 35m and turning back east for a further 158m. Possible former series of field boundaries, central north to south portion of feature is visible on the 1870s.



Legend

—— HS2 Phase 2a centre line

Map Number: Figure 1

Map Name: CA1 Surveyed Areas - Geophysics

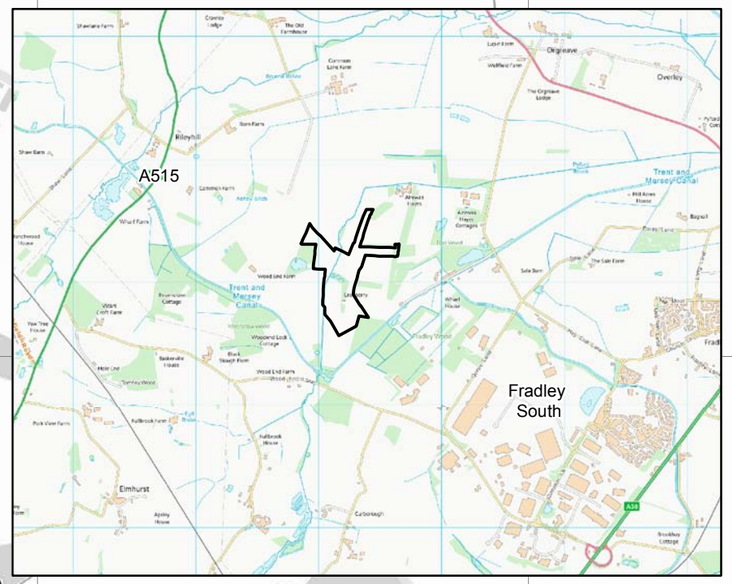
Community Area: 1

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



Pyford Brook
Alrewas Hayes
Alrewas Hayes Cottages
Pool Wood
Fradley Reservoir
Caravan Park
PH
Lock
Watersmeet
Fradley Junction
Middle Lock
Shade House
Shade House Lock
Honeybed
Cranberry
Brokendown Wood
Fradley Gorse
Fradley Wood
Depot
Woodend Common Barn
Ravenshaw Wood
Woodend Lock Cottage
Woodend Lock
Woods Farm
Black Slough Farm
Trent & Mersey Canal

314500
314000
313500
412000
412500
413000
413500
414000

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 2

Map Name: CA1-93 & 75 Site location

Community Area: 1-93 & 75

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

Scale at A3: 1:6,250

0 60 120 180 240 Metres

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

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600

314600
314500
314400
314300
314200

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 3

Map Name
CA1-93 & 75 Greyscale (north)

Community Area:
1-93 & 75

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

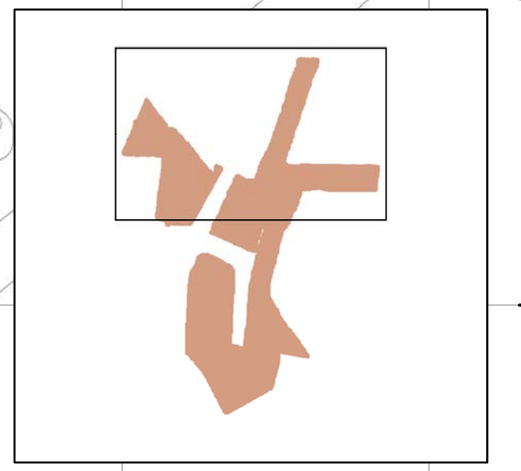
Doc Number: C861-ARP-EV-MAP-WE01-000001

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600

314600
314500
314400
314300
314200

+25nT
-25nT



Legend

Site boundary
Detail Survey Extents

Map Number
Figure 4

Map Name
CA1-93 & 75 XY Trace (north)

Community Area:
1-93 & 75

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-WE01-000001

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600
314600
314500
314400
314300
314200
1-93&75-010
1-93&75-001
1-93&75-002
1-93&75-017
1-93&75-016
1-93&75-008
1-93&75-012
1-93&75-014
1-93&75-009

Legend

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

Map Number
Figure 5

Map Name
CA1-93 & 75 Interpretation (north)

Community Area:
1-93 & 75

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-WE01-000001

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600
314300
314200
314100
314000
313900
+3nT
-2nT
Cranberry

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 6

Map Name
CA1-93 & 75 Greyscale (central)

Community Area:
1-93 & 75

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-WE01-000001

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600
314300
314200
314100
314000
313900
+25nT
-25nT
Cranberry

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 7

Map Name
CA1-93 & 75 XY Trace (central)

Community Area:
1-93 & 75

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-WE01-000001

Date: 21/04/17

412900
413000
413100
413200
413300
413400
413500
413600
314300
314200
314100
314000
313900
1-93&75-008
1-93&75-014
1-93&75-009
1-93&75-011
1-93&75-015
1-93&75-004
1-93&75-003
1-93&75-013
1-93&75-018
Cranberry

Legend

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

Map Number
Figure 8

Map Name
CA1-93 & 75 Interpretation (central)

Community Area:
1-93 & 75

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-WE01-000001

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 9

Map Name: CA1-93 & 75 Greyscale (south)

Community Area: 1-93 & 75

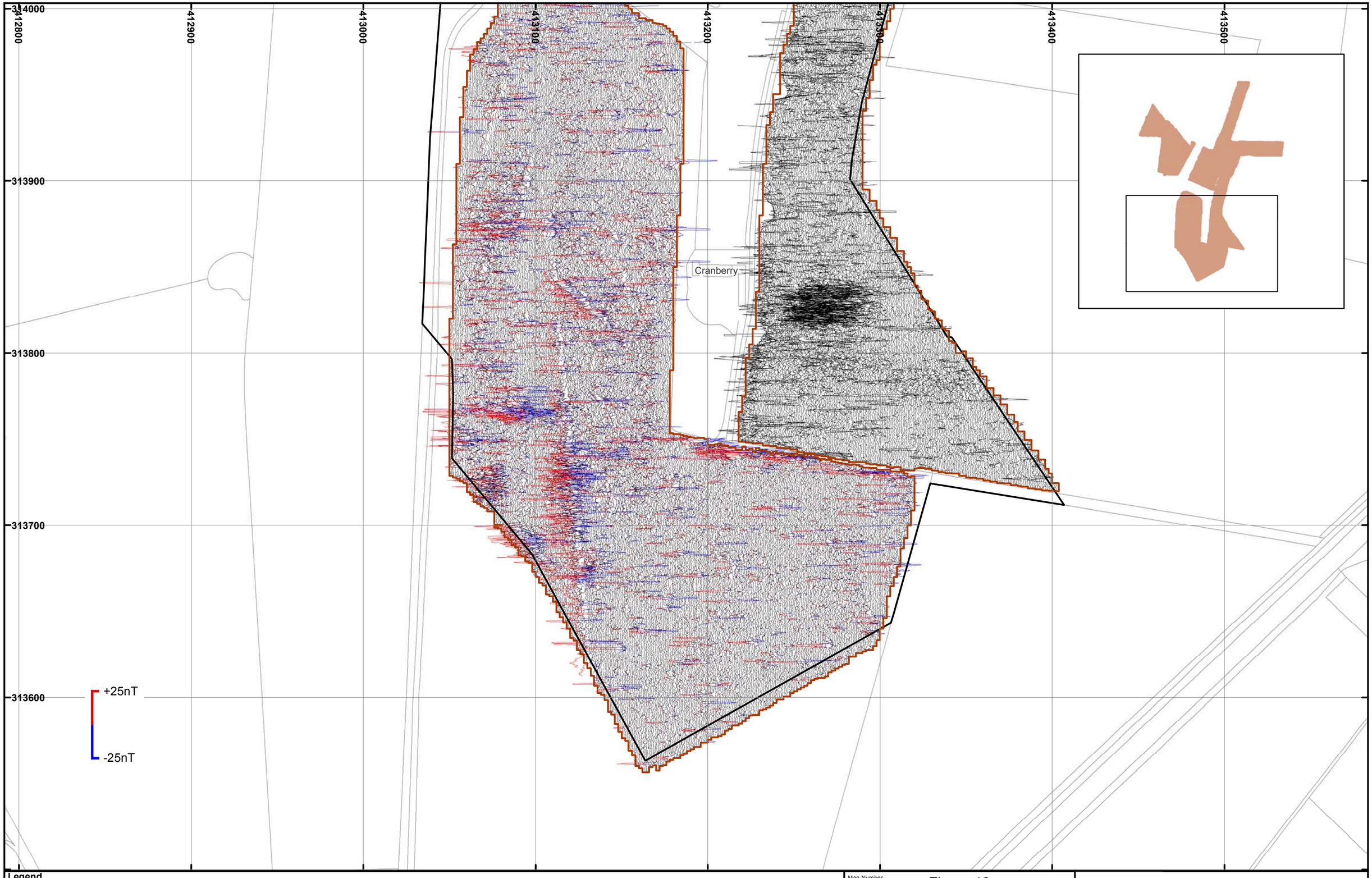
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 10

Map Name: CA1-93 & 75 XY Trace (south)

Community Area: 1-93 & 75

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-WE01-000001

Date: 21/04/17

Legend

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

Map Number: Figure 11

Map Name: CA1-93 & 75 Interpretation (south)

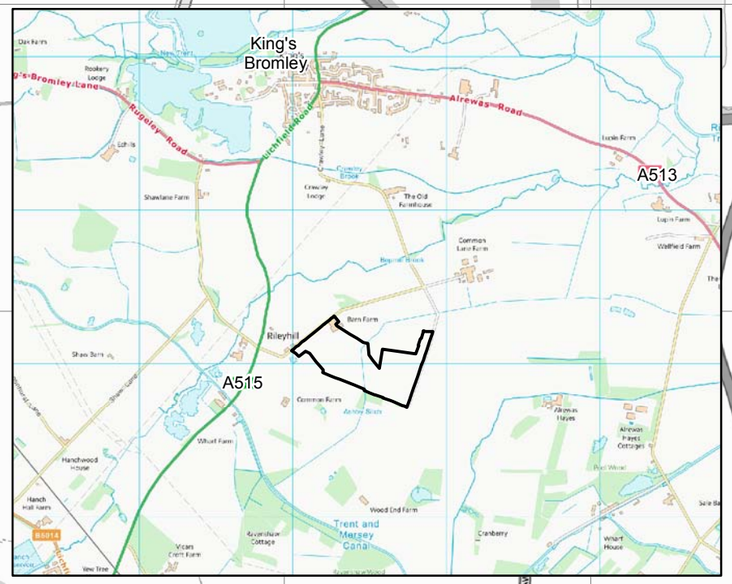
Community Area: 1-93 & 75

Scale at A3: 1:2,000

0 20 40 60 80 Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number	Figure 12
Map Name	CA1-159 Site location
Community Area:	1-159

Scale at A3: 1:10,000

0 100 200 300 400 Metres

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

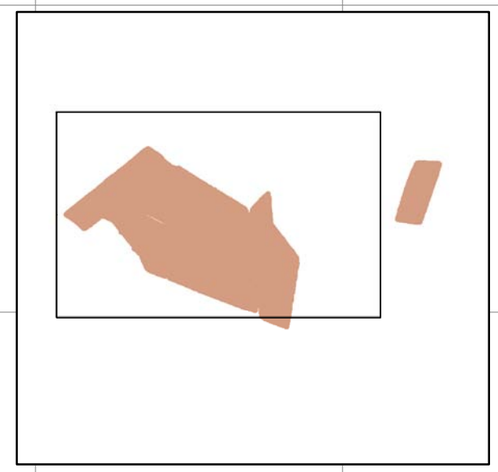
Date: 21/04/17

412000
412100
412200
412300
412400
412500
412600
412700

315300
315200
315100
315000
314900

Barn
Farm

+3nT
-2nT



Legend

Site boundary
Detail Survey Extents

Map Number
Figure 13

Map Name
CA1-159 Greyscale plot (west)

Community Area:
1-159

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-WE01-000001

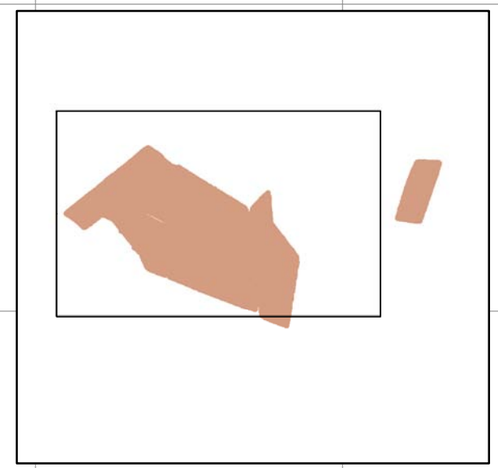
Date: 21/04/17

412000
412100
412200
412300
412400
412500
412600
412700

315300
315200
315100
315000
314900

Barn
Farm

1-159-009
1-159-004
1-159-002
1-159-010
1-159-008
1-159-006
1-159-015
1-159-003
1-159-013
1-159-001
1-159-011
1-159-005
1-159-014
1-159-007
1-159-012



Legend

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

Map Number

Figure 14

Map Name

CA1-159 Interpretation (west)

Community Area:
1-159

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-WE01-000001

Date: 21/04/17

Barn Farm

412200 412300 412400 412500 412600 412700 412800 412900

315200

100

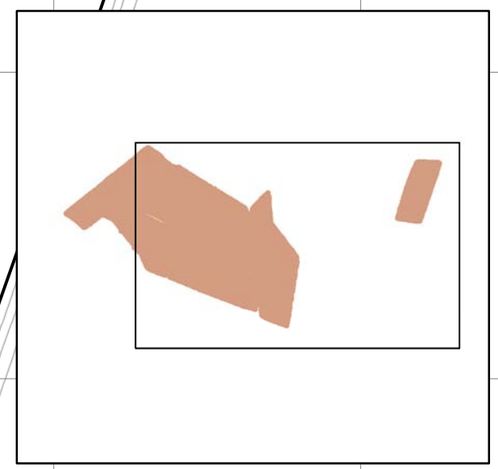
315000

314900

314800

+3nT

-2nT



Legend

Site boundary

Detail Survey Extents

Map Number

Figure 15

Map Name

CA1-159 Greyscale plot (east)

Community Area:
1-159

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17

412200
412300
412400
412500
412600
412700
412800
412900
315200
315100
315000
314900
314800
Barn Farm
1-159-009
1-159-004
1-159-010
1-159-008
1-159-006
1-159-015
1-159-003
1-159-013
1-159-001
1-159-011
1-159-005
1-159-014
1-159-007
1-159-012
1-159-016
1-159-001

Legend

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

Map Number
Figure 16

Map Name
CA1-159 Interpretation (east)

Community Area:
1-159

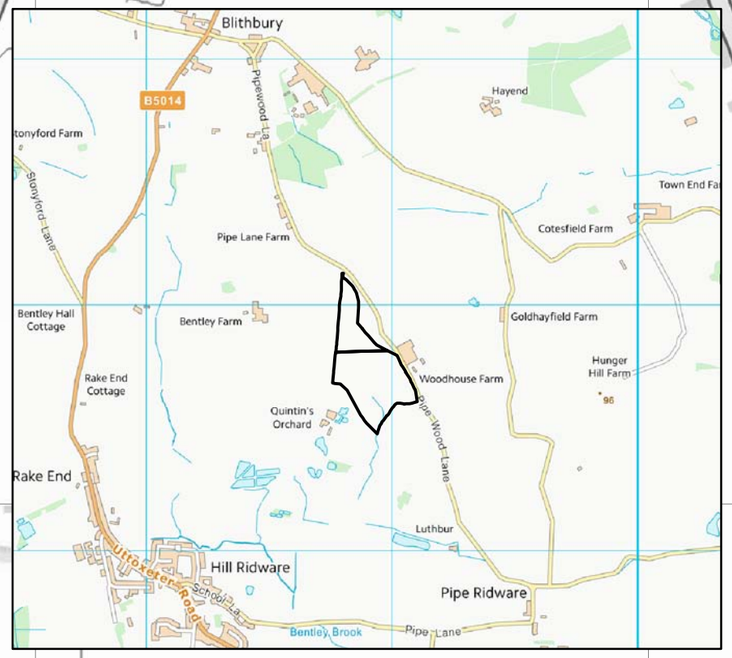
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



PIPE WOOD LANE

Cotesfield Farm

Exchange Farm

319000

Goldhayfield Farm

Woodhouse Farm

Hunger Hi Farm

Hunger Hill

Quintin's Orchard

318500

d

408000

408500

409000

409500

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 17

Map Name: CA1-484 & 486 Site location

Community Area: 1-484 & 486

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-WE01-000001

Date: 21/04/17

408500
408600
408700
408800
408900
409000
409100
409200
319100
319000
318900
318800
318700
Woodhouse Farm
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 18

Map Name
CA1-484 & 486 Greyscale plot (north)

Community Area:
1-484 & 486

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-WE01-000001

Date: 21/04/17

Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous
- Pipe, Modern Service

Map Number: Figure 19

Map Name: CA1-484 & 486 Interpretation (north)

Community Area: 1-484 & 486

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-WE01-000001

Date: 21/04/17

408600
408700
408800
408900
409000
409100
409200
318900
318800
318700
318600
318500

Woodhouse Farm

Quintin's Orchard

+3nT

-2nT

Legend

Site boundary

Detail Survey Extents

Map Number

Figure 20

Map Name

CA1-484 & 486 Greyscale plot (south)

Community Area:
1-484 & 486

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-WE01-000001

Date: 21/04/17

408600
408700
408800
408900
409000
409100
409200
318900
318800
318700
318600
318500
1-484&486-007
1-484&486-003
1-484&486-005
1-484&486-009
1-484&486-004
1-484&486-008
1-484&486-002
Woodhouse Farm
Quintin's Orchard

Legend

- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ploughing
- Industrial, Burnt-Fired, Increased Magnetic Response
- Ferrous
- Pipe, Modern Service

Map Number
Figure 21

Map Name
CA1-484 & 486 Interpretation (south)

Community Area:
1-484 & 486

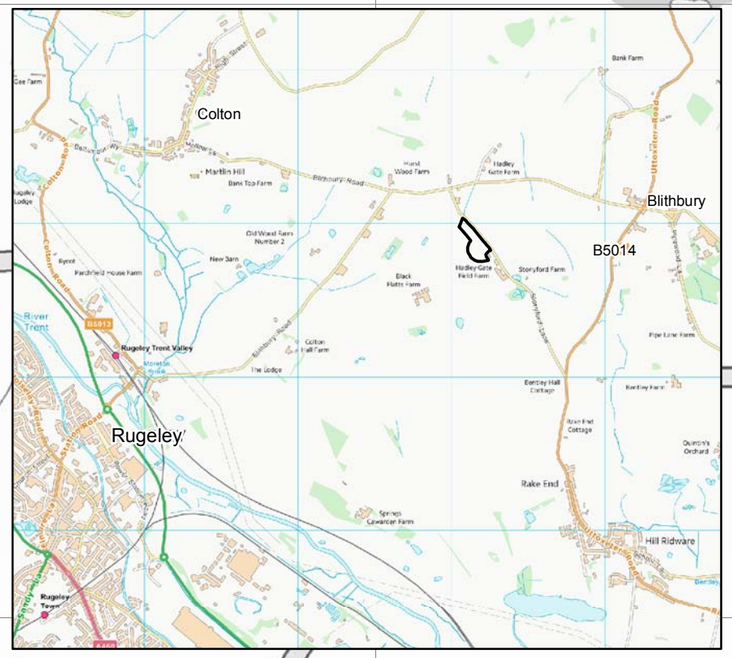
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 22

Map Name: CA1-619 Site location

Community Area: 1-619

Scale at A3: 1:5,000

0 50 100 150 200 Metres

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

Date: 21/04/17

406800
406900
407000
407100
407200
407300
407400
407500
320100
320000
319900
319800
319700

+3nT
-2nT

Hadley Gate Field Farm

Stonyford Farm

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 23

Map Name
CA1-619 Greyscale plot

Community Area:
1-619

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-WE01-000001

Date: 21/04/17

406800
406900
407000
407100
407200
407300
407400
407500
320100
320000
319900
319800
319700

+25nT
-25nT

Hadley Gate
Field Farm

Stonyford
Farm

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 24

Map Name
CA1-619 XY Trace

Community Area:
1-619

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-WE01-000001

Date: 21/04/17

406800
406900
407000
407100
407200
407300
407400
407500
320100
320000
319900
319800
319700

1-619-001
1-619-002
1-619-003
1-619-004

Hadley Gate Field Farm

Stonyford Farm

Legend

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

Map Number
Figure 25

Map Name
CA1-619 Interpretation

Community Area:
1-619

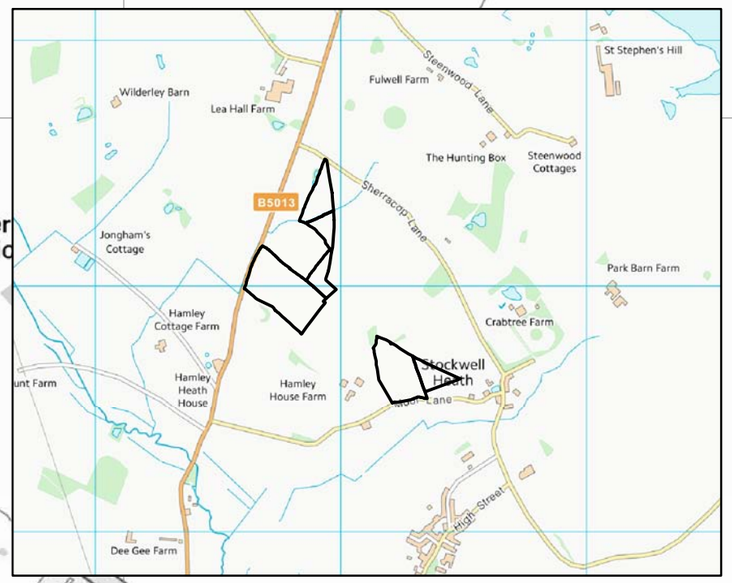
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 26

Map Name: CA1-797 Site location

Community Area: 1-797

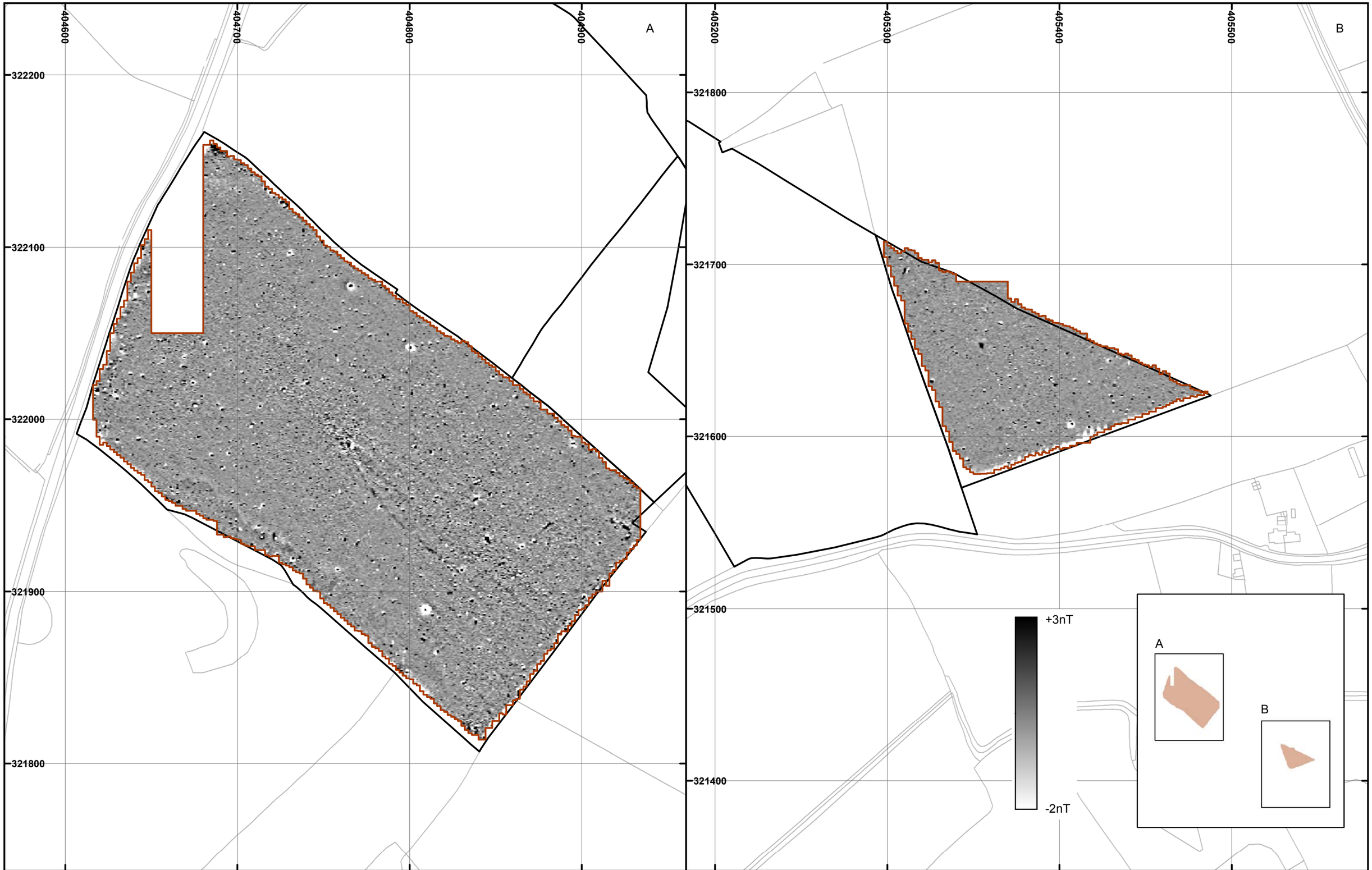
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 27

Map Name: CA1-797 Greyscale plot

Community Area: 1-797

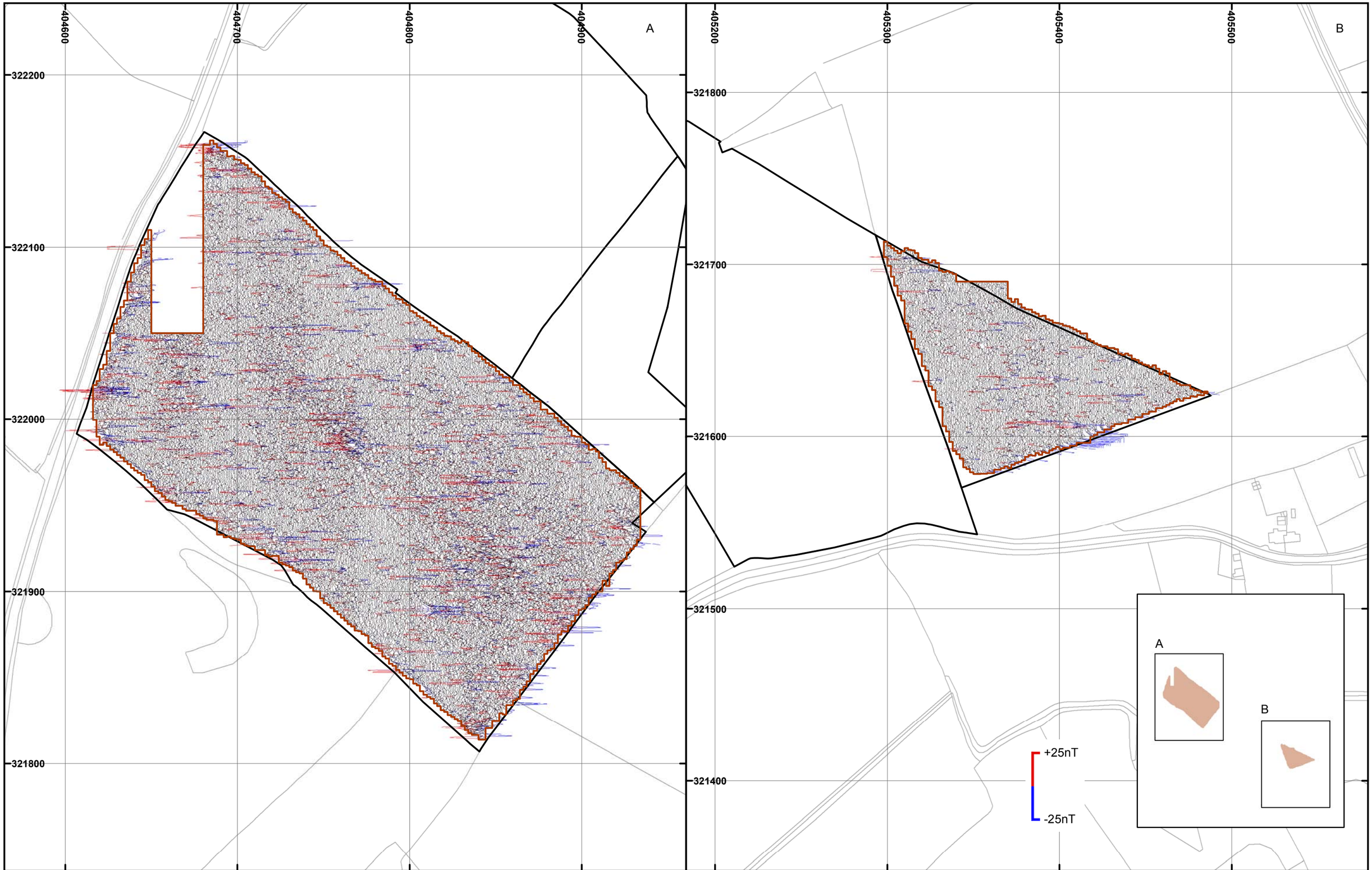
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80 Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 28

Map Name: CA1-797 XY trace

Community Area: 1-797

Scale at A3: 1:2,000

0 20 40 60 80 Metres

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

Date: 21/04/17

404600
404700
404800
404900
A
322200
322100
322000
321900
321800
1-797-002
1-797-005
1-797-001
405200
405300
405400
405500
B
321800
321700
321600
321500
321400
1-797-004
1-797-003
A
B

Legend

- Site boundary
- Detail Survey Extents
- Possible Archaeology
- Uncertain Origin
- Agriculture - Ploughing
- Natural
- Ferrous

Map Number
Figure 29

Map Name
CA1-797 Interpretation

Community Area:
1-797

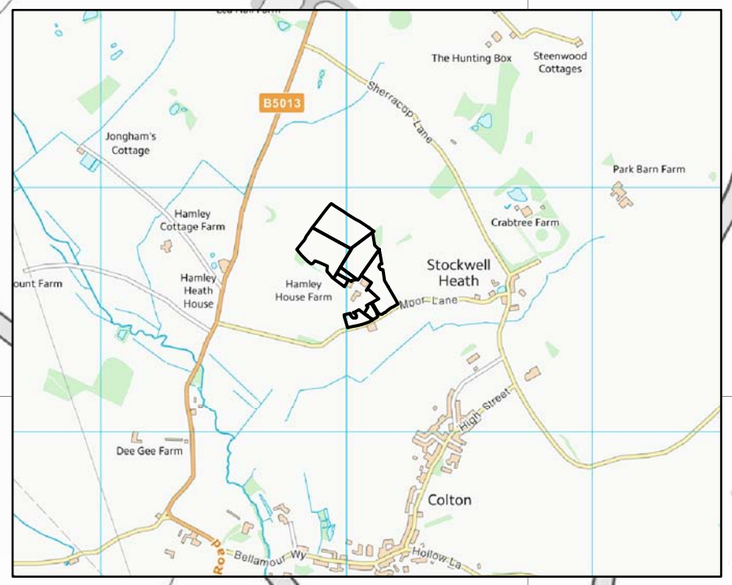
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Sherracop Plantation

SHERRACOP LANE

322000

Crabtree Farm

Park Lane

Stockwell Heath

Pool Farm

Ford

Hamley Cottage Farm

Hamley Heath House

Hamley House Farm

MOOR LANE

MOOR LANE

NARROW LANE

321500

404500

405000

405500

406000

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 30

Map Name: CA1-801 Site location

Community Area: 1-801

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-WE01-000001

Date: 21/04/17

404700
404800
404900
405000
405100
405200
405300
405400
321800
321700
321600
321500
321400
Hamley House Farm
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 31

Map Name
CA1-801 Greyscale plot

Community Area:
1-801

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-WE01-000001

Date: 21/04/17

404700
404800
404900
405000
405100
405200
405300
405400
321800
321700
321600
321500
321400
Hamley House Farm
+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 32

Map Name
CA1-801 XY trace

Community Area:
1-801

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-WE01-000001

Date: 21/04/17

404700
404800
404900
405000
405100
405200
405300
405400
321800
321700
321600
321500
321400
1-801-007
1-801-003
1-801-004
1-801-009
1-801-010
1-801-005
1-801-001
Hamley House Farm
1-801-006
1-801-002
1-801-011
1-801-008
1-801-012

Legend

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

Map Number
Figure 33

Map Name
CA1-801 Interpretation

Community Area:
1-801

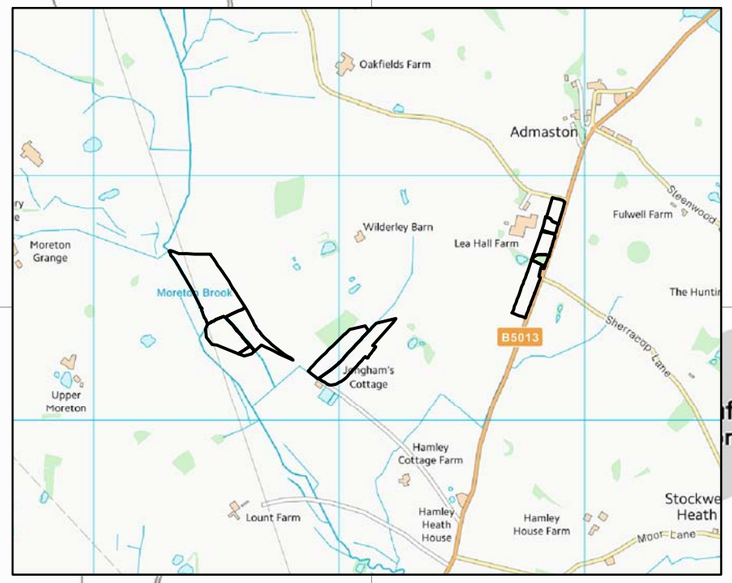
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 34

Map Name: CA1-847 Site location

Community Area: 1-847

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-WE01-000001

Date: 21/04/17

403700
403800
403900
404000
404100
404200
404300
404400

322500
322400
322300
322200
322100

Jongham's Cottage

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 35

Map Name
CA1-847 Greyscale

Community Area:
1-847

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-WE01-000001

Date: 21/04/17

403700
403800
403900
404000
404100
404200
404300
404400

322500
322400
322300
322200
322100

Jongham's Cottage

+25nT
-25nT

Legend

Site boundary
Detail Survey Extents

Map Number: Figure 36

Map Name: CA1-847 XY trace

Community Area: 1-847

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-WE01-000001

Date: 21/04/17

403700
403800
403900
404000
404100
404200
404300
404400

322500
322400
322300
322200
322100

1-847-002
1-847-005
1-847-003
1-847-004
1-847-001

Jongham's
Cottage

Legend

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

Map Number
Figure 37

Map Name
CA1-847 Interpretation

Community Area:
1-847

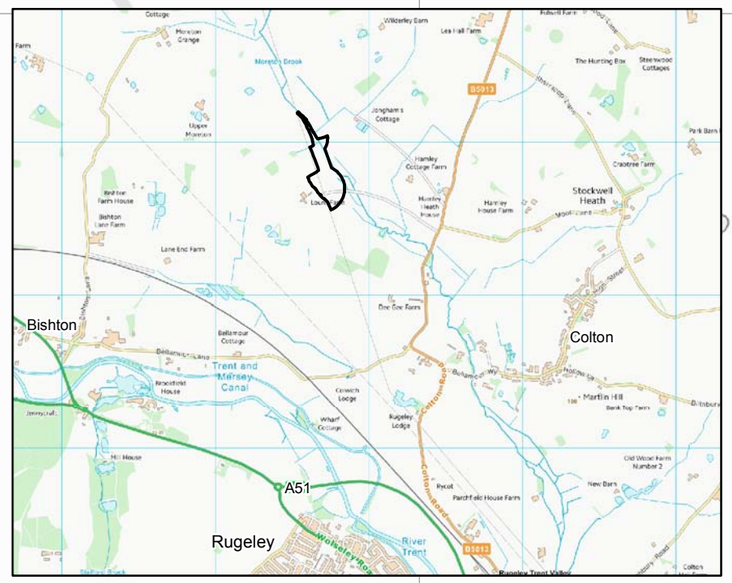
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Spencer's Plantation

Jongham's Cottage

Moreton Lane (Track)

Lount Farm

Hamley Cottage Farm

Stockwell Heath

Lane End Farm

322500

322000

321500

403000

403500

404000

404500

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 38

Map Name: CA1-853 Site location

Community Area: 1-853

Scale at A3: 1:5,000

0 50 100 150 200 Metres

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

Date: 21/04/17

403400
403500
403600
403700
403800
403900
404000
404100
322000
321900
321800
321700
321600
Lount Farm
+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 39

Map Name
CA1-853 Greyscale plot

Community Area:
1-853

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-WE01-000001

Date: 21/04/17

403400
403500
403600
403700
403800
403900
404000
404100

322000
321900
321800
321700
321600

Lount Farm

+25nT
-25nT

Legend

- Site boundary
- Detail Survey Extents

Map Number: Figure 40

Map Name: CA1-853 XY Trace

Community Area: 1-853

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-WE01-000001

Date: 21/04/17

403400
403500
403600
403700
403800
403900
404000
404100

322000
321900
321800
321700
321600

1-853-003
1-853-008
1-853-004
1-853-006
1-853-005
1-853-009
1-853-001
1-853-007
1-853-010
1-853-011
1-853-002

Lount Farm

Legend

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

Map Number
Figure 41

Map Name
CA1-853 Interpretation

Community Area:
1-853

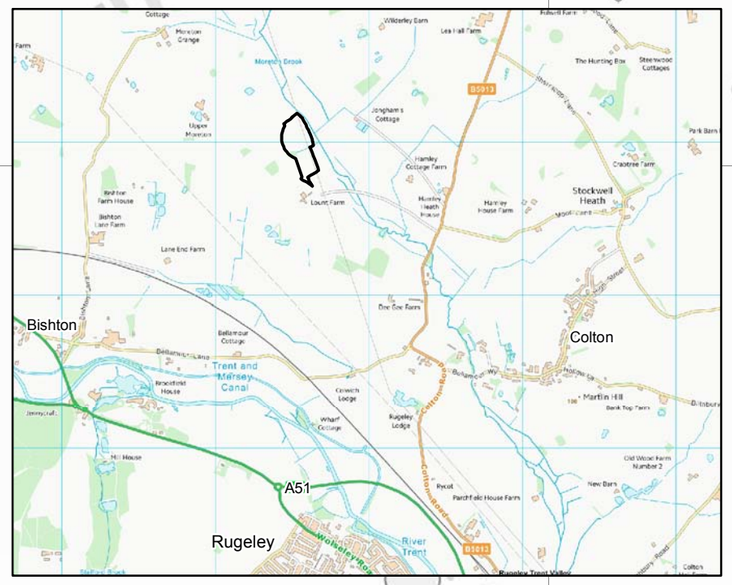
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Upper Moreton

Moreton Brook

Spencer's Plantation

Jongham's Cottage

Moreton Lane (Track)

Hamley Cottage Farm

Lount Farm

322500

322000

321500

403000

403500

404000

Legend

- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 42

Map Name: CA1-860 Site location

Community Area: 1-860

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-WE01-000001

Date: 21/04/17

403200
403300
403400
403500
403600
403700
403800
403900

322200
322100
322000
321900
321800

Jongham's Cottage

+3nT
-2nT

Legend

Site boundary
Detail Survey Extents

Map Number
Figure 43

Map Name
CA1-860 Greyscale plot

Community Area:
1-860

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-WE01-000001

Date: 21/04/17

403200
403300
403400
403500
403600
403700
403800
403900

322200
322100
322000
321900
321800

Jongham's Cottage

+25nT

-25nT

Legend

Site boundary

Detail Survey Extents

Map Number

Figure 44

Map Name

CA1-860 XY Trace

Community Area:
1-860

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-WE01-000001

Date: 21/04/17

403200
403300
403400
403500
403600
403700
403800
403900

322200
322100
322000
321900
321800

1-860-002
1-860-003
1-860-004
1-860-001

Jongham's Cottage

Legend

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

Map Number
Figure 45

Map Name
CA1-860 Interpretation

Community Area:
1-860

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-WE01-000001

Date: 21/04/17

Moreton Cottage Farm

Moreton House

Moreton Farm

323000

Wind Turbine

Moreton Grange

Moreton Brook

322500

Spencer's Plantation

Upper Moreton

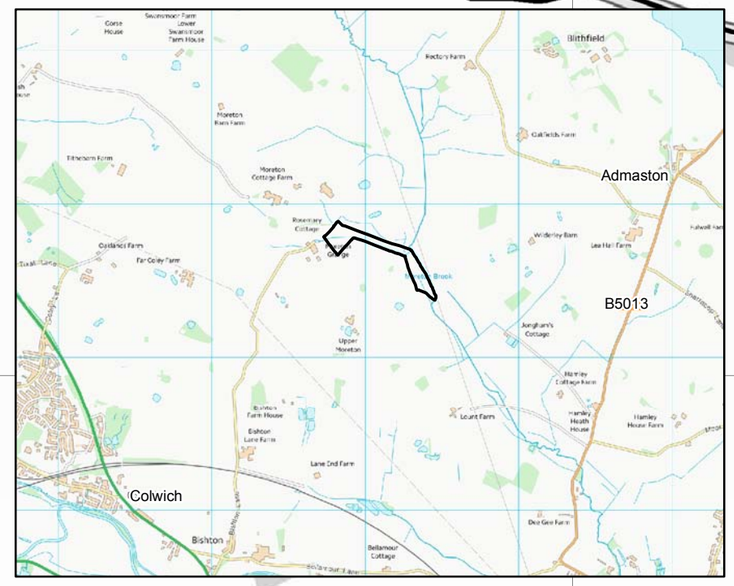
Jongham's Cottage

402500

403000

403500

404000



Legend

- CA boundary
- Site boundary
- Detail Survey Extents
- Survey grid divisions

Map Number: Figure 46

Map Name: CA1-861 Site location

Community Area: CA1-861

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-WE01-000001

Date: 21/04/17

402700
402800
402900
403000
403100
403200
403300
403400
323000
322900
322800
322700
322600
+3nT
-2nT

Legend

- CA boundary
- Site boundary
- Detail Survey Extents

Map Number
Figure 47

Map Name
CA1-861 Greyscale plot (north-west)

Community Area:
1-861

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-WE01-000001

Date: 21/04/17

402700
402800
402900
403000
403100
403200
403300
403400
323000
322900
322800
322700
322600
1-861-002
1-861-001
1-861-003

Legend

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

Map Number
Figure 48

Map Name
CA1-861 Interpretation (north-west)

Community Area:
1-861

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

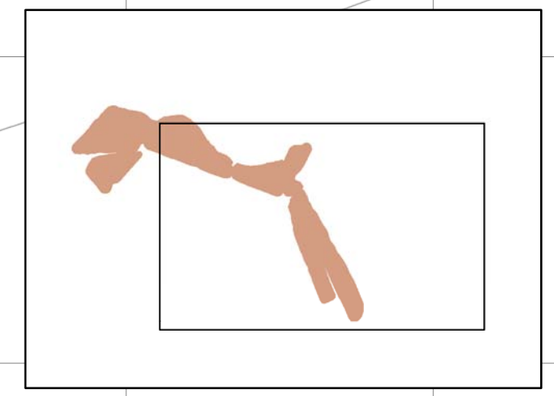
Doc Number: C861-ARP-EV-MAP-WE01-000001

Date: 21/04/17

403000
403100
403200
403300
403400
403500
403600
403700

322800
322700
322600
322500
322400

+3nT
-2nT



Legend

- CA boundary
- Site boundary
- Detail Survey Extents

Map Number: Figure 49

Map Name: CA1-861 Greyscale plot (south-east)

Community Area: 1-861

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-WE01-000001

Date: 21/04/17

403000
403100
403200
403300
403400
403500
403600
403700
322800
322700
322600
322500
322400
1-861-002
1-861-001
1-861-003
1-861-004

Legend

- CA boundary
- Site boundary
- Detail Survey Extents
- Uncertain Origin
- Agriculture - Ridge & Furrow
- Agriculture - Drain
- Natural
- Ferrous

Map Number
Figure 50

Map Name
CA1-861 Interpretation (south-east)

Community Area:
1-861

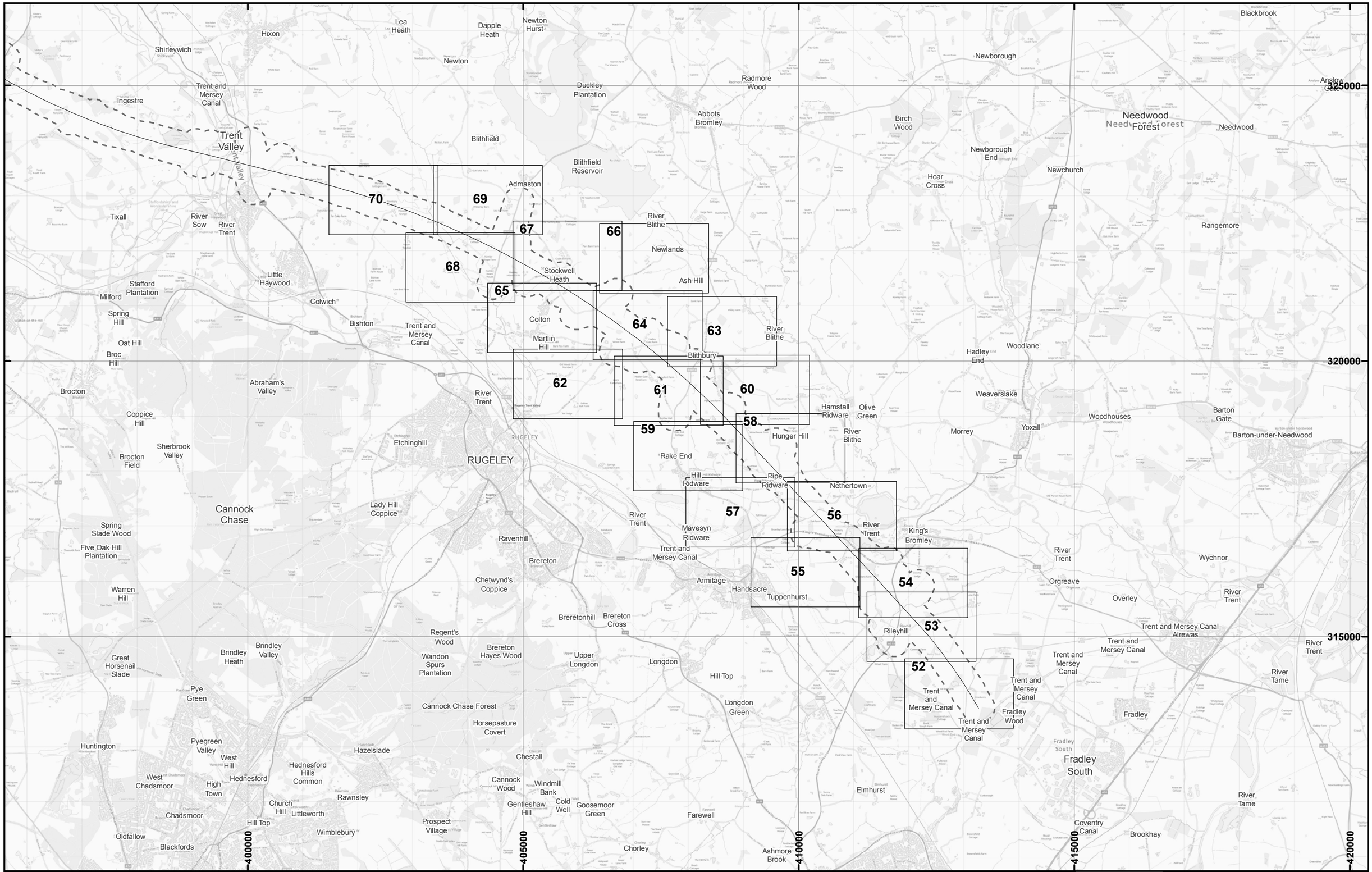
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:2,000

0 20 40 60 80
Metres

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

Date: 21/04/17



Legend

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

Map Number

Figure 51

Map Name

CA1 Remote Sensing Map Index

Community Area:
1

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

412000

413000

314000

189+300

189+200

189+100

189+000

188+900

188+800

188+700

188+600

188+500

188+400

188+300

1190

1191

1242

1001

1002

FRC008

FRC008

Legend

Land required for 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 52

Map Name

Remote Sensing Survey Data
CA1 (Map 1)

Community Area:
01

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

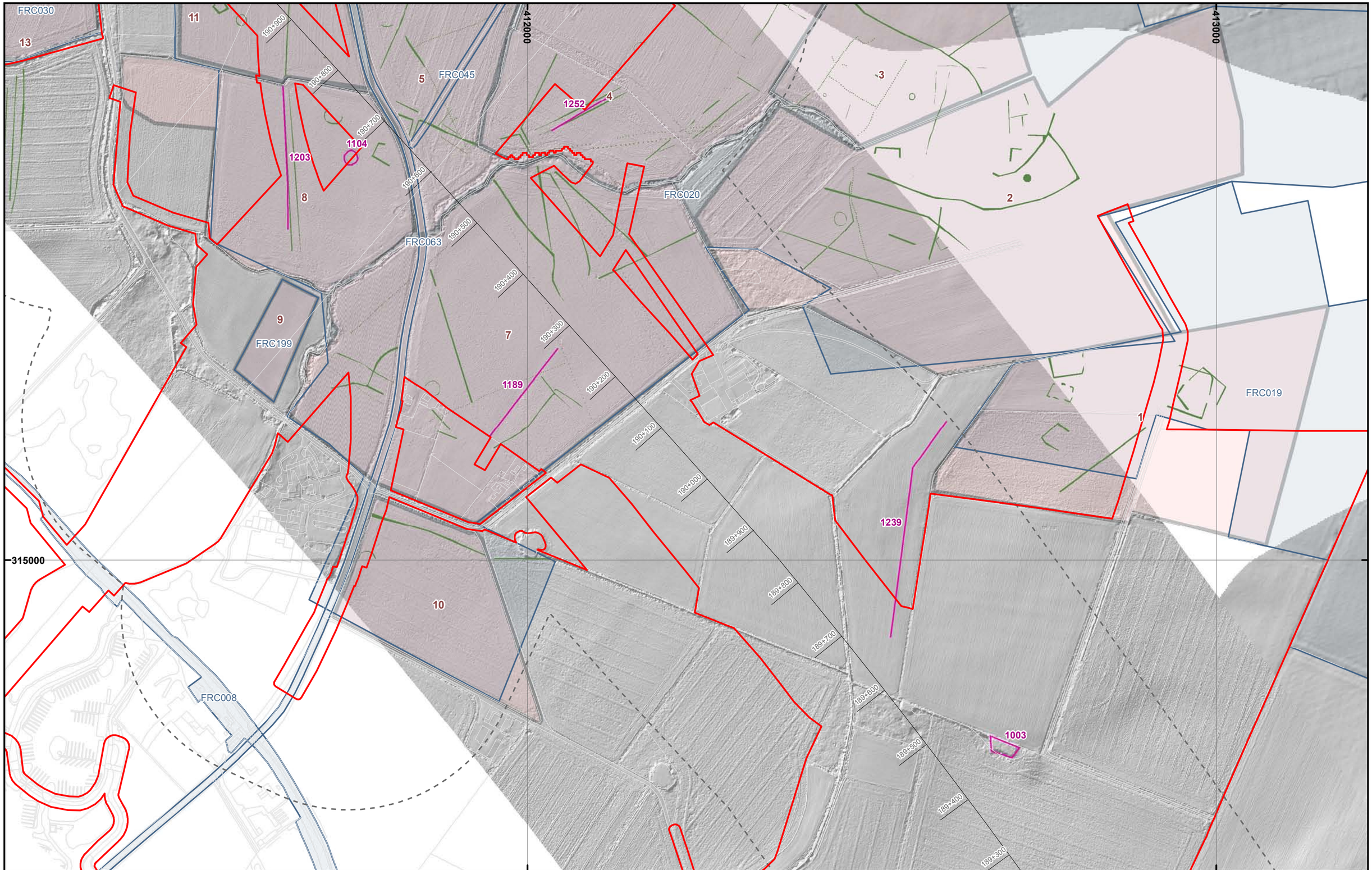
Scale at A3: 1:5,000

0 50 100 150 200

Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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 53

Map Name
Remote Sensing Survey Data
CA1 (Map 2)

Community Area:
01

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17

412000

413000

316000

FRC032

FRC064

FRC062

FRC031

FRC030

FRC063

FRC029

FRC045

FRC020

FRC019

FRC199

1005

1006

1004

1007

1008

1243

1251

1188

1187

1103

1252

1203

1104

18

12

6

13

5

4

11

3

8

2

7

9

1

191+600

191+500

191+400

191+300

191+200

191+100

191+000

190+900

190+800

190+700

190+600

190+500

190+400

Legend

- Land required for 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 54

Map Name

Remote Sensing Survey Data
CA1 (Map 3)

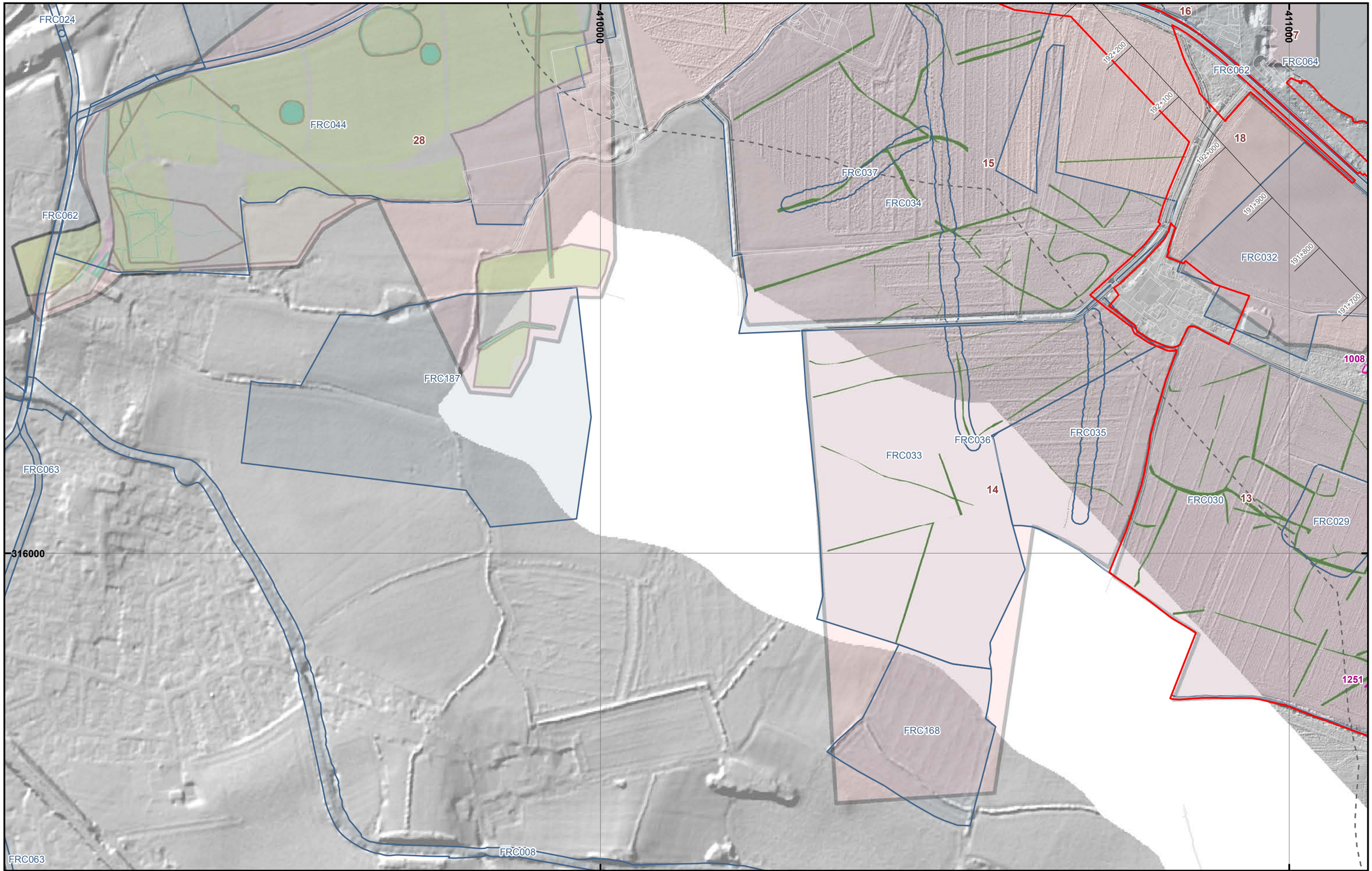
Community Area:
01

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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

LiDAR/multi-spectral

- Polygons
- Possible feature
- Structure
- Monument polygon
- Lines

Feature labelling

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

Map Number
Figure 55

Map Name
Remote Sensing Survey Data
CA1 (Map 4)

Community Area:
01

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

410000

411000

317000

193+500
193+400
193+300
193+200
193+100
193+000
192+900
192+800
192+700
192+600
192+500
192+400
192+300
192+200
192+100
192+000

20
30
29
28
19
16
15
17
18

FRC074
FRC042
FRC038
FRC039
FRC040
FRC062
FRC034
FRC044
FRC037
FRC036
FRC072
FRC096
FRC064
FRC032

1107
1244
1106
1270
1144
1145
1146
1011
1010

Legend

- Land required for 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 56

Map Name
Remote Sensing Survey Data
CA1 (Map 5)

Community Area:
01

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17

408000

469000

317000

36

32

FRC083

1012

1013

1108

193+700

20

193+600

FRC074

193+500

193+400

1107

FRC077

FRC076

FRC024

21

FRC072

1244

1146

31

30

29

28

FRC044

FRC062

FRC063

Legend

- Land required for 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 57

Map Name

Remote Sensing Survey Data
CA1 (Map 6)

Community Area:
01

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

319000
409000
410000
318000
39
1272
1015
FRC090
23
1016
38
1098
1183
1184
1256
35
1099
1100
1186
34
1014
1197
1196
1255
1254
FRC085
22
36
1109
1185
33
FRC084
1271
1108
32
FRC083
1012
1013
FRC074
20
194+900
194+800
194+700
194+600
194+500
194+400
194+300
194+200
194+100
194+000
193+900
193+800
193+700

Legend

- Land required for 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 58

Map Name: Remote Sensing Survey Data CA1 (Map 7)

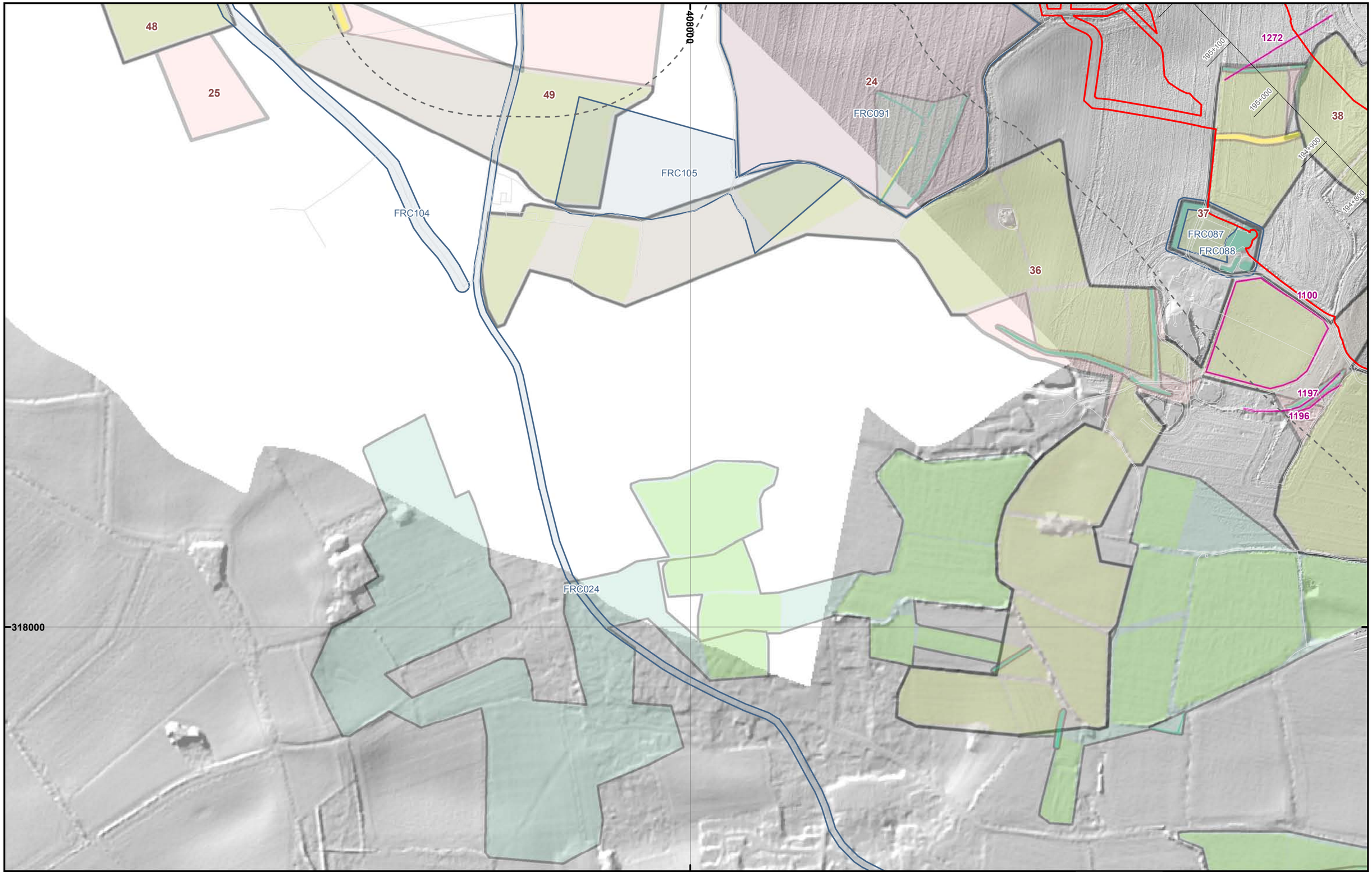
Community Area: 01

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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 59

Map Name: Remote Sensing Survey Data CA1 (Map 8)

Community Area: 01

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17

Legend

- Land required for 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 60

Map Name: Remote Sensing Survey Data CA1 (Map 9)

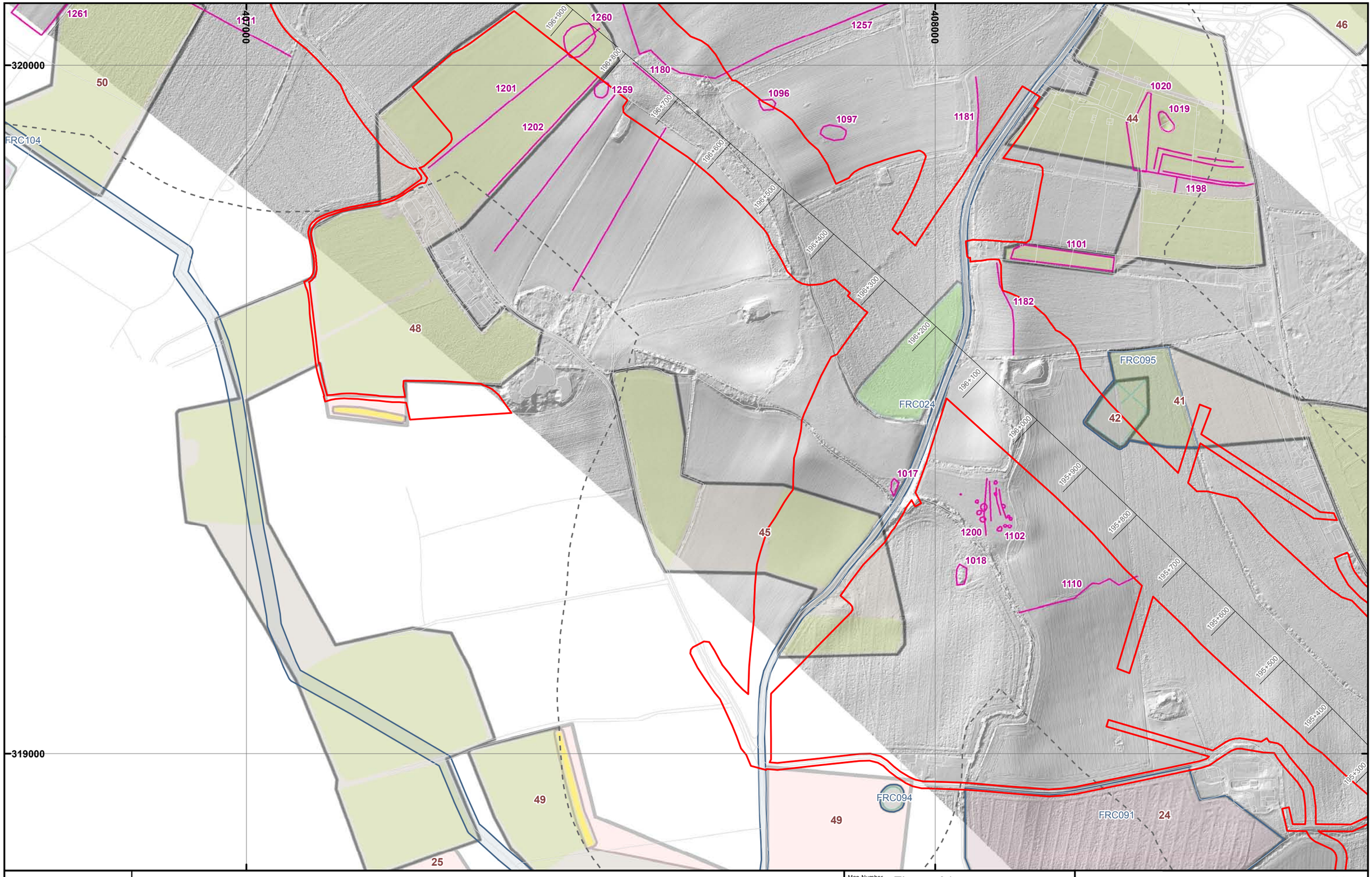
Community Area: 01

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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 61

Map Name
Remote Sensing Survey Data
CA1 (Map 10)

Community Area:
01

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17

405000

406000

320000

319000

54

55

50

1112

1263

1261

11

FRC104

Legend

- Land required for 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 62

Map Name: Remote Sensing Survey Data CA1 (Map 11)

Community Area: 01

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

408000

409000

321000

320000

53

52

51

46

44

47

FRC024

1021

1258

1257

1096

1097

1181

1020

1019

Legend

- Land required for 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 63

Map Name: Remote Sensing Survey Data CA1 (Map 12)

Community Area: 01

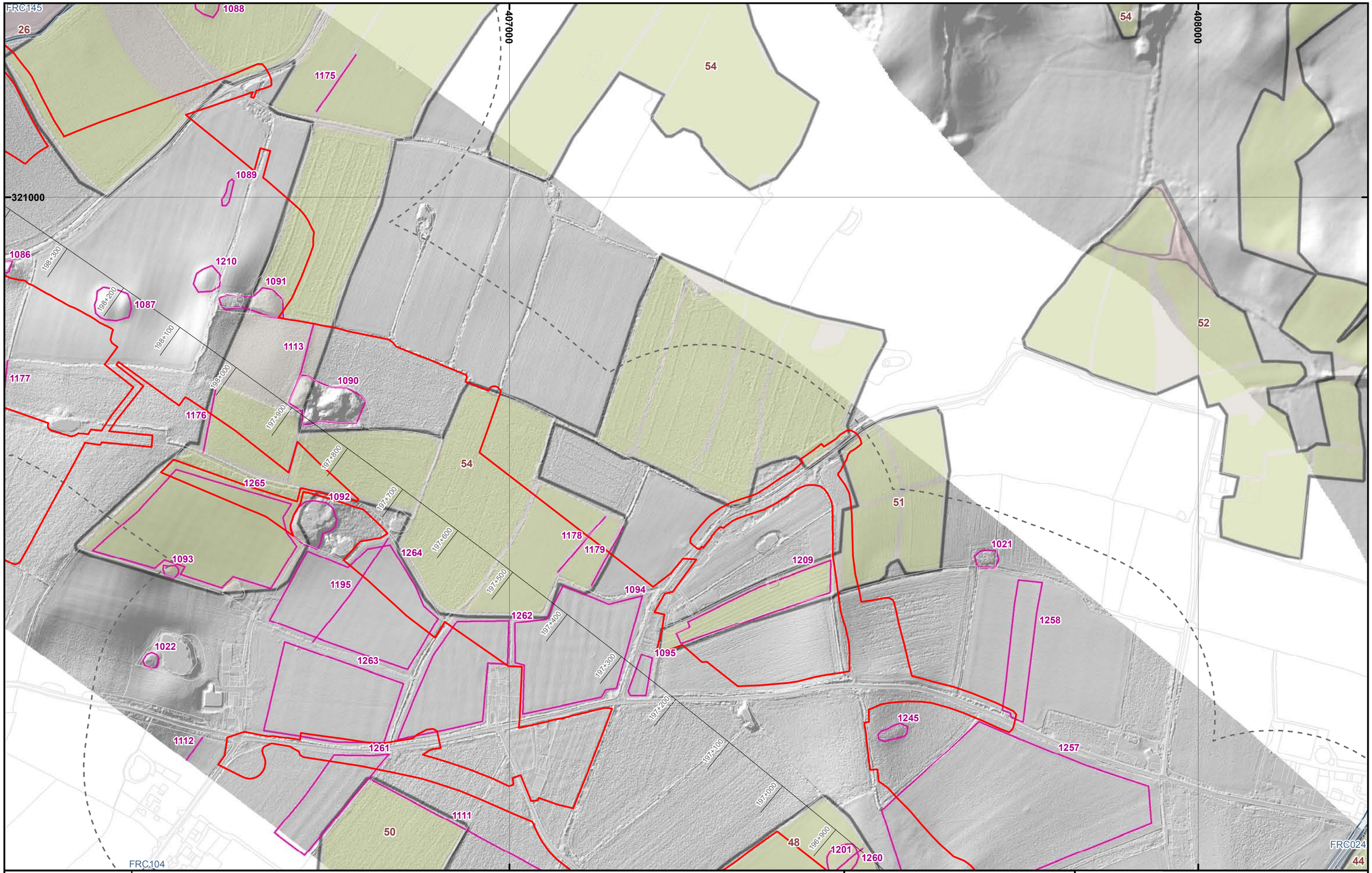
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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 64

Map Name
Remote Sensing Survey Data
CA1 (Map 13)

Community Area:
01

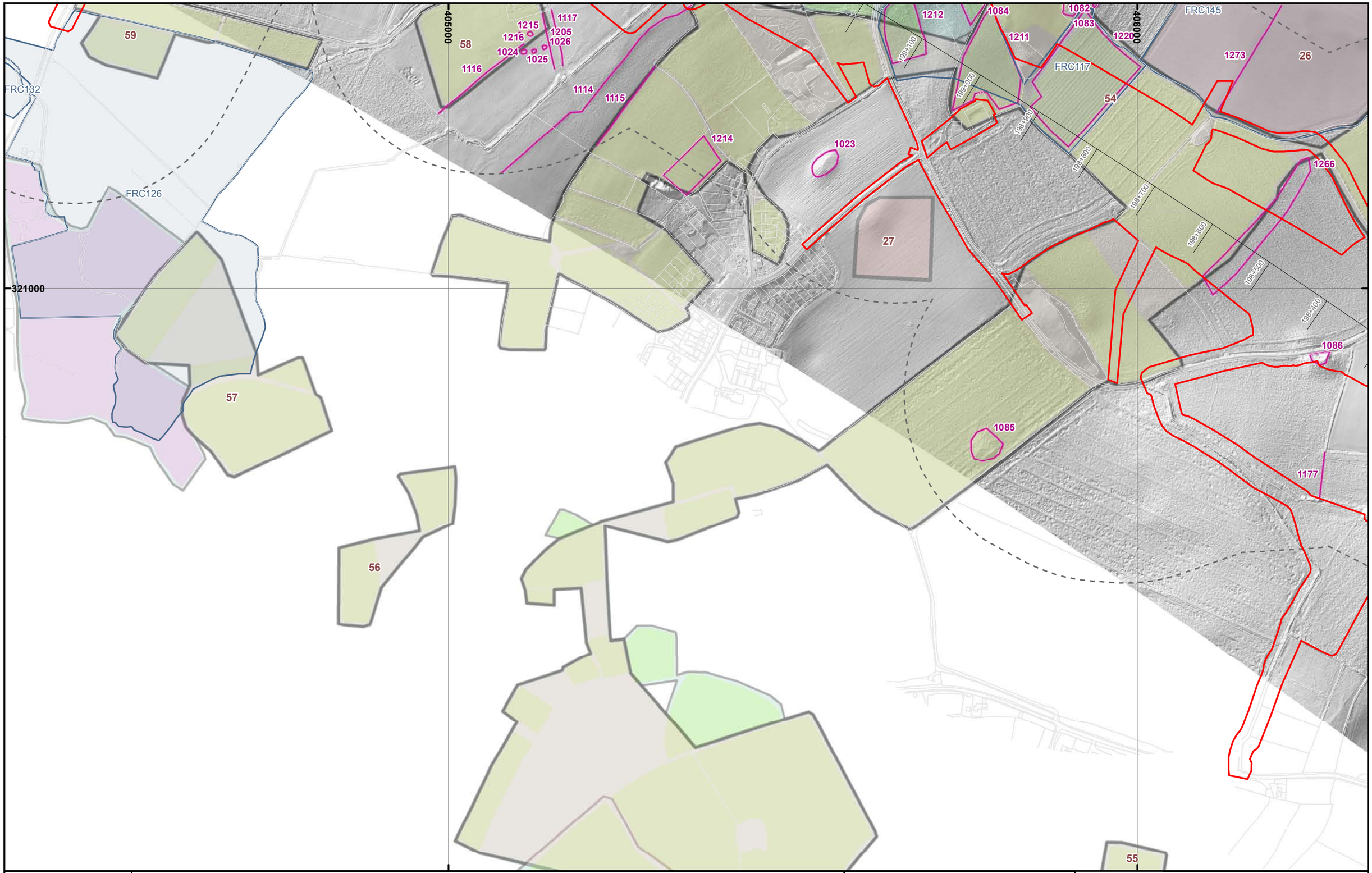
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17



Legend

- Land required for 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 65

Map Name: Remote Sensing Survey Data CA1 (Map 14)

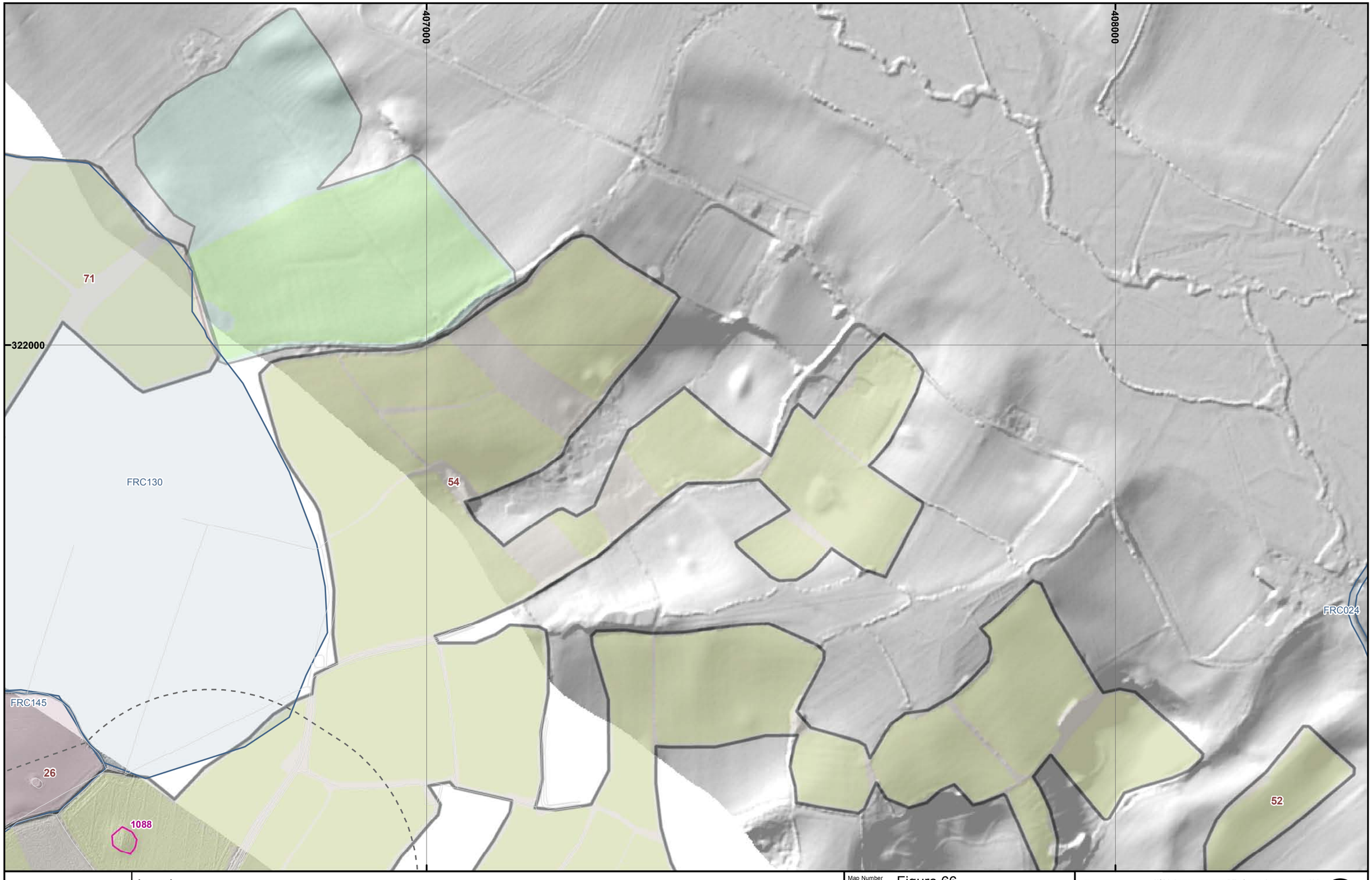
Community Area: 01

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17



Legend

Land required for 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

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

Feature labelling

42 = AP/NMP

FRC001 = Gazetteer

1102 = Remote Sensing

Map Number: Figure 66

Map Name: Remote Sensing Survey Data CA1 (Map 15)

Community Area: 01

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number:

Date: 25/05/17

405000

406000

322000

64

71

54

FRC130

1034

1268

1035

1267

1036

1028

200+000

199+900

199+800

199+700

199+600

199+500

199+400

199+300

199+200

199+100

199+000

58

1206

1217

1118

1174

1173

1246

1213

1172

54

1171

1084

1083

1082

1220

1212

FRC145

26

1211

FRC117

1273

59

1215

1205

1216

1024

1026

1025

1116

1117

1114

1115

1088

Legend

- Land required for 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 67

Map Name

Remote Sensing Survey Data
CA1 (Map 16)

Community Area:
01

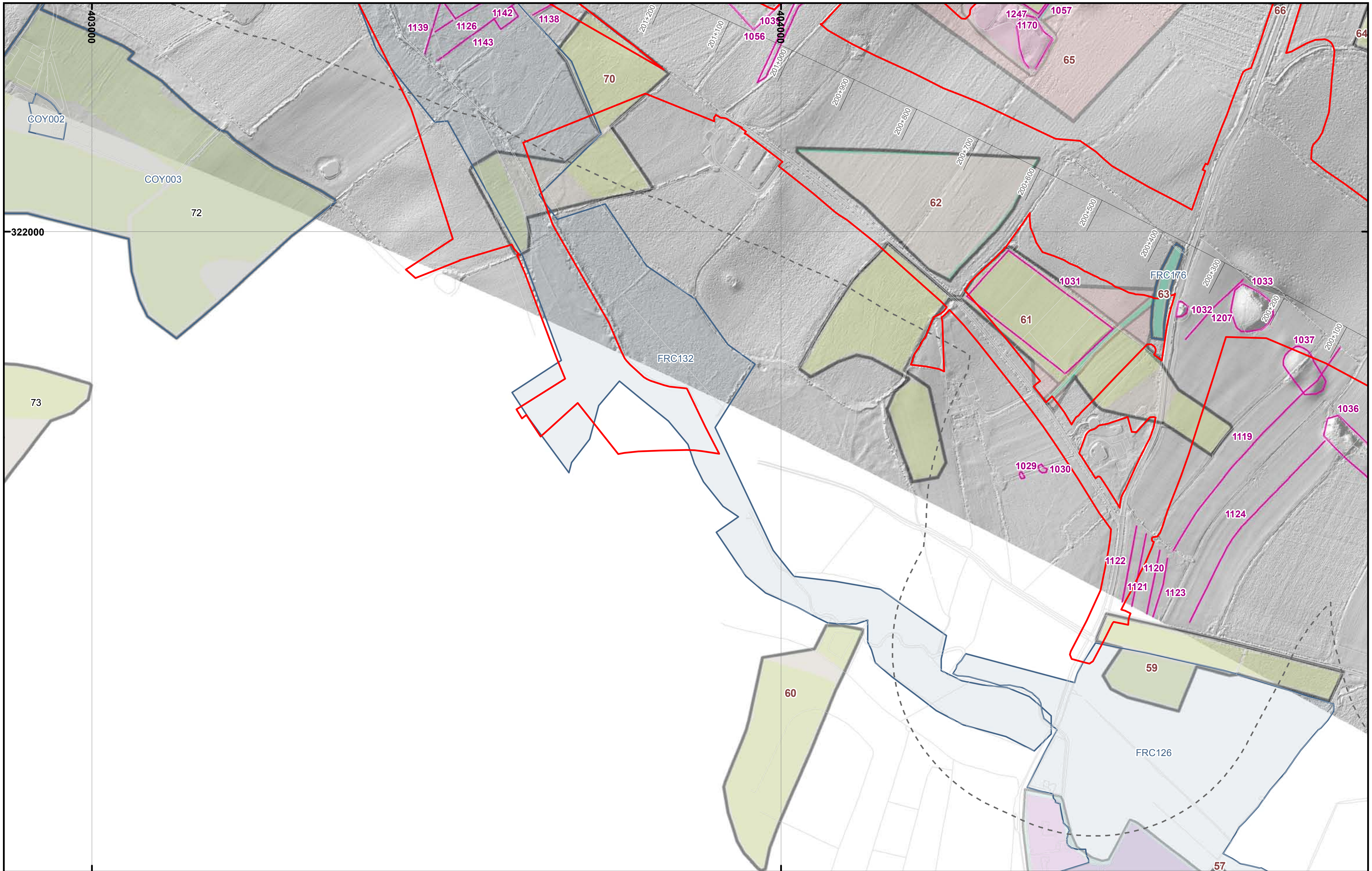
Registered in England. Registration number 06791686.
Registered office: Eland House, Bressenden Place, London SW1E 5DU.

Scale at A3: 1:5,000

0 50 100 150 200
Metres

Doc Number:

Date: 25/05/17



Legend

Land required for 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 68

Map Name

Remote Sensing Survey Data
CA1 (Map 17)

Community Area:
01

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

404000

405000

323000

68

69

66

67

65

64

FRC143

FRC132

1128

1040

1141

1054

1137

1269

1140

1139

1126

1142

1143

1138

1055

70

1218

1038

1056

1039

1208

1125

1247

1058

1059

1219

1057

1170

201+600

201+500

201+400

201+300

201+200

Legend

- Land required for 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 69

Map Name

Remote Sensing Survey Data
CA1 (Map 18)

Community Area:
01

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 for 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 70

Map Name

Remote Sensing Survey Data
CA1 (Map 19)

Community Area:
01

hs2

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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

N

Doc Number:

Date: 25/05/17

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HS2Enquiries@hs2.org.uk