A417 Missing Link
TR010056

6.4 Environmental Statement
Appendix 6.4 Geophysical Survey Target Notes

Planning Act 2008

APFP Regulation 5(2)(a)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A417 Missing Link

Development Consent Order 202[x]

6.4 Environmental Statement
Appendix 6.4 Geophysical Survey Report

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A417 Missing Link, Birdlip, Gloucestershire

Detailed Gradiometer Interim Survey Report

Report Ref.: 220300.03
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Document Information

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Summary

A detailed gradiometer survey was conducted over land at A417 Missing Link Scheme, Birdlip, and Gloucestershire. This covers a route running from the south-east of Gloucester at Witcome (NGR 394415 216095), heading west to the Air Balloon roundabout near Ullenwood (NGR 391500 215860) and then south to the north-west of Birdlip (NGR 395190 213065). The project was commissioned by Arup with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the construction of a dual carriageway to replace the current section of A417 between the Air Balloon roundabout and Cowley Roundabout, as well as widening the existing carriageway by Crickley hill.

The site comprises 91.6 ha across 31 land parcels currently utilised for mixed agricultural purposes. The geophysical survey was undertaken between 9 September and 28 November 2019. It has been successful in detecting a significant number of anomalies that are thought to be archaeological origin. The majority of these are thought to be associated with Iron Age / Romano-British settlement activity, as well as a probable cemetery of the same date.

Perhaps the clearest evidence for settlement activity is located within the most southerly area of the scheme (Area 10). This is located directly north of the Roman road which follows the present course of the A417, known as Ermin Street. At Area 8, a further concentration archaeological activity has been identified that is characterised by a more concentrated recti-linear enclosure 1.5 km north of the focus of activity in Area 10. This also comprises numerous ditch-like features, which are segmented in a rectangular arrangement. At the centre of this there is a large rectangular pit-like feature. Although somewhat speculative, it is suggested that this may relate to a sunken feature building. Such features are ascribed to periods later than the Romano-British period and further investigation would be required to ascertain the precise nature of this activity.

Despite the widespread evidence for archaeological activity, there are very few direct examples of structures. The best example of probable structural remains is located in Area 1, where a ring ditch has been located that is thought to be associated with a probable Iron Age / Romano-British roundhouse. There are no further clear examples of such features across the scheme, but there are several concentrations of pit-like anomalies that could relate to further such remains.

Possible funerary remains have been identified in Area 6, 1 km north of the modern village of Birdlip. Here a series of north – south aligned anomalies are located in close proximity and are interpreted as possible graves, due to their oval shape and size. 1902 mapping indicates that human remains were located in this area in 1897 and it is very likely that there may be further, more discrete, remains of this nature that have not been detected by this survey. Moreover, in the southern portion of the same field is possible structural feature that is interpreted as a possible shrine or religious building of Iron Age to Romano-British date.

Elsewhere across the scheme are a variety of further linear features that are thought to relate to the more widespread divisions of a field system. It is probable that these are also associated with the agricultural landscape of the Iron Age / Romano-British period. In addition, a significant number of anomalies have been interpreted as evidence of former extraction, many of which are detailed by the historical mapping.

Anomalies associated with superficial geology and modern activity have also been recorded across the scheme, with areas of former woodland, services, trackways, ploughing, and extensive drainage at various locations.

Acknowledgements

Wessex Archaeology would like to thank Arup for commissioning the geophysical survey. The assistance of Jim Keyte is gratefully acknowledged in this regard.

The fieldwork was undertaken by Rok Plesnicar, Jenna Jackson, Thomas King, Amy Dunn, Matthew Tooke, Robin Pelling, Cameron Lee, Scott Chaussee, and Brett Howard. Rok Plesnicar, Patricia Voke, Jenna Jackson, and Scott Chaussee processed and interpreted the geophysical data. Rok Plesnicar prepared the illustrations and wrote the report with contributions from Alexander Schmidt and Nicholas Crabb. The geophysical work was quality controlled by Nicholas Crabb and the project was managed on behalf of Wessex Archaeology by Tom Richardson.

A417 Missing Link
Birdlip, Gloucestershire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Arup to carry out a geophysical survey long the A417 Missing Link scheme, Birdlip, Gloucestershire (hereafter referred to as 'the scheme'). It covers a 2.1 km section of the A417 along Crickley Hill and a proposed 3.6 km of dual carriageway to replace the current section of A417 between the Air Balloon roundabout and Colwey Roundabout (between NGR 394415 216095 to the north-east, 391500 215860 to the north-west and 395190 213065 to the south) (**Figure 1**).

1.2 Scope of document

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

1.3 The site

1.3.1 The site is situated in a gently undulating landscape north-east of Birdlip and 7 km south of Cheltenham, in the county of Gloucestershire.

1.3.1 The survey comprises 91.6 ha of mixed agricultural land across 31 land parcels. For ease of reference, specific details of the location and site conditions of these areas will be discussed with reference to the geophysical survey results (see Section 4.2).

1.3.2 The A417 is central to most of the survey area and is on a north facing slope from 295 m above Ordnance Datum (aOD) at the southern edge to 240 m aOD to the northern edge. Throughout the east of the site, the land is higher ranging from 290 to 270 m aOD. The land level falls to the west of the A417 from 273 m aOD close to the A417 to 174 m aOD.

1.3.3 The solid geology is complex and comprises limestone of the Lias Group and Inferior Oolite Group (undifferentiated) as well as bands of Birdlip, Aston, Salperton, Hampen, White Limestone Formations throughout the north. Areas of Fuller's Earth Formation – Mudstone and Great Oolite Group - Limestone are also noted throughout the southern portion of the site. There are no superficial deposits recorded (BGS 2019).

1.3.4 The soils underlying the site are likely to consist of brown rendzinas soils of the 343a (Elmton 1) and 343d (Sherborne) association as well as typical stagnogley soils of the 711d (Martock) association (SSEW SE Sheet 5 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

2 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a prior archaeological assessment (Cotswold Archaeology 2019), which considered the recorded historic environment resource within a 300 m study area of the proposed development. The document used information from the Gloucestershire Historic Environment Record (HER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The findings are summarised below.

2.2 Summary of the archaeological resource

2.2.1 A number of scheduled monuments have been identified in the surrounding landscape by the archaeological assessment. Emma's Grove bowl barrows (NHLE 1017079), lying within the 300 m study area to the north of the survey, has been outlined as a heritage asset of high significance. These features are undated but could have their origin in the Late Neolithic to Late Bronze Age.

2.2.2 Crickley Hill camp (NHLE 1003586), which is thought to be prehistoric or Romano-British in origin, and the medieval moat and fishpond at Bentham Manor (NHLE 1016764) have also been highlighted as heritage assets of high significance in the archaeological assessment. Some of the settlements identifiable from crop mark evidence are likely to have been in use during Iron Age and Romano-British periods, however, securely dating evidence is sparse across the study area.

2.2.3 Within the study area, extensive records of Romano-British occupation have been identified in the archaeological assessment. Road alignments, settlement sites including villas and rural estates, field systems, cemetery sites, and findspots have all been identified. Ermin Way, the Roman Road linking Cirencester and Gloucester, is noted south of the study area. Parts of the road may survive beneath the modern dual carriageway (A417 to the south).

2.2.4 Dryhill Roman villa (NHLE 1004848) has been identified 1 km north of the northern portion of the survey area but is outside the 300 m buffer area addressed by the archaeological assessment. A second Roman villa (NHLE 1405896) is noted south of Coberley, 2.5 km east of the site. An undated long barrow (NHLE 1002129) is also noted south-west of Coberley, 1.5 km north-east of the site. Several more scheduled monuments are noted in the landscape that date from the Bronze Age to the medieval period.

2.2.5 Earthworks thought to be associated with the Stockwell deserted medieval village are noted in the 300 m buffer area toward the southern portion of the site.

2.2.6 Numerous listed buildings are noted in the wider landscape surrounding the site. These are predominantly Grade II listed 17th – 19th century farm houses and associated buildings as well as dwellings in the surrounding settlements of Birdlip to the south-east, Cowley to the east, Little Witcombe to the west, and Coberley to the north-east.

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between 9th September and 28th November 2019 with intermittent breaks. This was to enable access to be agreed and for site conditions to improve at some locations.

3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex archaeology 2019), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and
- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and
- Where possible, to determine the general nature of any anomalies of archaeological potential.

3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four Bartington Grad-01-1000L gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of 0.03 nT at a rate of 10 Hz, producing intervals of 0.15 m along transects spaced 4 m apart.

3.4 Data processing

3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'DeStripe' function (±5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

4.1.1 The detailed gradiometer survey has identified numerous magnetic anomalies across the scheme that are likely to represent archaeological remains in Areas 1, 6, 8 and 9. The majority of this is associated with ditch and pit-like features that are thought to be associated with probable Iron Age and Romano-British settlement activity at the southern end of the scheme, near Birdlip and adjacent to the Roman road known as Ermin Street (now partly the A417). In addition, a probable cemetery of the same date has been located at Area 6, as well as extensive evidence of former quarrying noted in Area 2, 3, 6, and 9. Anomalies indicating former field boundaries, evidence for historic cultivation, and superficial geological variation have also been identified across the scheme. Results are presented as a series of greyscale plots, and archaeological interpretations at a scale of 1:2,000 (**Figures 8** – **41**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images.

4.1.2 For ease of reference, an overview of the results and an index to the detailed figures is provided at a scale of 1:7,500 (**Figure 2** – **7**). The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figures 25** – **41**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

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

4.2 Area 1

4.2.1 This is the most north-westerly area covered by the geophysical survey (**Figures 8** and **25**). It comprises two land parcels located 1.5 km to the east of Gloucester and is divided by the present course of the A417. The southern field is the larger of the two, and each field is surrounded by existing field boundaries or hedge lines.

4.2.2 The topography of this area gradually rises form west – east, ranging from 90 m aOD to 101 m aOD.

Results

4.2.3 At the eastern end of the Area 1, there is a weakly positive circular anomaly at **4000**. The anomaly is fragmented but is 16 m in diameter and 1.5 m wide. This indicates a ring-ditch feature and is most likely associated with a roundhouse of Iron Age – Romano-British date. It is also possible that it relates to a Bronze Age round barrow, but given the amount of Iron Age and Roman activity in the vicinity that is considered less likely.

4.2.4 Immediately to the west and abutting **4000** is a second, weakly positive circular anomaly. This is 15 m in diameter. It is possible that this anomaly represents a further ring-ditch.

However, as the anomaly is poorly defined further investigation would be required to confirm this.

4.2.5 To the north-east side of **4000** there are two positive responses that could be adjacent pit-like features. These are roughly circular in form and are 3.5 m and 2.5 m in diameter respectively.

4.2.6 In the north-east of Area 1 there is a series of positive linear anomalies at **4001**. These are ditch-like features, with the most prominent, situated on a slightly curved south-west to north-east alignment. This extends 70 m and is up to 2 m in width. There are two further positive responses perpendicular to this at either end, which are slightly weaker. These are 1.4 m wide and 17 m and 23 m in length respectively. They likely continue beyond the survey area and together they form a probable rectilinear ditched enclosure.

4.2.7 Within **4001**, there are two further linear anomalies, which indicate ditch-like features. These are 18 m and 7 m long by 2 m wide. They are situated on an east – west alignment and may, therefore, not relate to the larger enclosure that surrounds them. In addition to this, several discrete anomalies have been located within the enclosure, which are thought to be pit-like features up to 1.5 m in diameter.

4.2.8 At the southern extent of Area 1 there is a series of positive linear responses at **4002**. These represent further ditch-like features comprising two parallel 1.8 m wide features on a north – south alignment, extending for 50 m and 11 m respectively with a 3 m gap between them. Perpendicular to this, are two other shorter positive responses. The first branches off the longer linear response towards the south-south-west for 17 m and likely extends outside of the survey area. The second extends 13 m in the opposite direction. Together with **4001**, it is possible that these anomalies represent part of a former field system.

4.2.9 At **4003** there is a positive curvilinear anomaly situated on a broadly south-west to north-east alignment. This extends 140 m and is up to 3.5 m across. This anomaly is indicative of a ditch-like feature. It is slightly sinuous but positioned roughly parallel to the alignment of the ridge and furrow within the field. This suggests that it is a boundary feature associated with this medieval or post-medieval activity. However, further investigation would be required in order to ascertain the precise origin of this anomaly.

4.2.10 To the north of **4003** there are several positive discrete anomalies that are up to 4 m in diameter. Responses of this kind are interpreted as pit-like features of a possible archaeological origin, but it is equally possible that they are associated with natural variation in the underlying bedrock.

4.2.11 There are at least two slightly different alignments of weakly positive linear anomalies in this field. For the most part, these are on an approximate north-east to south-west orientation, but along the south-western boundary they are oriented north-west to south-east. They are distributed at regular 8 m intervals throughout the field and are likely associated with ridge and furrow ploughing of medieval or post-medieval date.

4.2.12 Along the north-western boundary of the southern field within Area 1, is an area of increased magnetic response at **4004**. This is most likely the consequence of the made ground and may relate to a deposit of material at the edge of this field, possibly associated with the consolidation of a trackway to the north or the construction of the nearby A417.

4.2.13 Traversing the centre of the site is a weak, slightly amorphous positive and negative anomaly that is characteristic of near surface geology. It is on an east – west alignment and is 220 m in length. The anomaly varies in width becoming wider and more diffuse to the east and is in places obscured by a series of strong ferrous responses (**4006**).

4.2.14 A series of strong dipolar anomalies are present in the centre of the site. These are indicative of buried ferrous material and may be associated with a former fence line. A

footpath is indicated on historical mapping dating to 1888. It is therefore plausible that a former field boundary may have been located at this location.

4.2.15 At the southern part of the field there is a strong dipolar linear anomaly (**4007**). This is characteristic of a modern service, such as a pipe of cable.

4.2.16 Within the field to the north of the A417 no significant have been identified, other than some disturbance caused by the presence of the modern buildings to the north of the area.

Area 2

4.2.17 Area 2 (**Figures 9** and **26**) is located south-west of the roundabout at Air Balloon Cottages and is intersected by the present course of the A417. It comprises three fields to the south, and a single, smaller field on the north side of the road. The land is currently utilised as pasture and is surrounded by small patches of woodland and field boundaries.

4.2.18 The terrain is relatively steep, inclining from 168 aOD in the north-west to 226 m aOD in the south-east.

Results

4.2.19 Area 2 is dominated by responses associated with former quarrying activity. These are characterised by strong positive anomalies surrounded by negative responses on the outer edges. They are irregular in form and variable in size but cover larger portions of the field to the south of the A417. For example, at **4100** – **4103** several large amorphous anomaly can be clearly identified. The largest of these is 140 m by 120 m (**4100**), while the smallest (**4101**) covers 18 m by 16 m. Given that an 'Old Gravel Pit' is recorded on 1888 OS mapping of the area, it is likely that these are associated with post-medieval extraction activity.

4.2.20 At **4104** there is a series of 3.5 m diameter or less pit-like anomalies. These are all characterised by a discrete positive magnetic response. Surrounding this there is a weakly positive 22 m diameter circular trend. It is possible that these anomalies represent postholes and a ring-ditch associated with a roundhouse of Iron Age or Romano-British origin. However, given the amount of quarrying activity nearby and its poor definition, it is impossible to provide a confident interpretation and further investigation would be required to confirm this.

4.2.21 At **4105**, there are two further uncertain features that may relate to archaeological activity. These comprise two positive linear anomalies, with the longer being 18 m in length and the smaller example 8 m. They are both up to 1.4 m in width. Next to the longer ditch-like anomaly is an oval shaped, weakly positive anomaly that covers an area of 8 m by 3.5 m. This could relate to a pit-like feature of uncertain date or may relate to the extensive quarrying activity within the vicinity.

4.2.22 Within the eastern part of area 2, further evidence of historic extraction is located at **4106** – **4108**. These are most likely associated with gravel quarrying in the area. They are strong dipolar anomalies predominantly located at the eastern end of the Area 2. They are more regular in form than the anomalies at **4100** – **4103** and are slightly stronger. Their linear form may suggest that they are related to infrastructure surrounding the quarry as opposed to direct evidence of extraction.

4.2.23 Heading south from **4106** are two parallel strong dipolar linear anomalies (**4109**) on a north – south alignment. This corresponds with a feature visible on 1902 OS mapping likely associated with a field boundary and footpath. It is 60 m long and 10 m across. Just to the south there is a strong dipolar response that correlates with a former field boundary also on the 1902 map. It is on a south-west to north-east alignment for 40 m before it turns south-east and continues for a further 22 m.

4.2.24 To the east of **4109** there are three weakly positive linear anomalies (**4110** – **4112**) that are aligned perpendicular to the aforementioned layout. They are parallel to each other and there is 59 m and 40 m between them respectively. They are between 16 m and 19 m long by 2.5 m wide. These are thought to be related to further former field divisions within the area, but do not appear on any of the available historical mapping.

4.2.25 Throughout the central and largest field within Area 2, there are indications for historical cultivation associated with ridge and furrow. These are represented as series of weakly positive linear anomalies that are evenly separated by 4.5 m – 6.5 m and are aligned on a slightly curing north-west to south-east alignment.

4.2.26 At the south-western perimeter of the southern fields in Area 2 is a series of 1 – 2 m diameter pit-like responses at **4113**. These are all characterised by positive magnetic values. In addition, a larger oval-shaped positive anomaly is also located here that is 8.5 m by 4 m. This could be related to a bigger pit-like feature, but it could also be a consequence of the natural variation in the underlying geology. As there is no recognisable form to these features and as such, they have been interpreted as superficial geology.

4.2.27 Along the northern edge of the southern field is a highly magnetic, dipolar linear anomaly (**4114**). This is situated on an east – west alignment and is indicative of a modern service, such as a pipe or cable.

Area 3

4.2.28 Area 3 (**Figures 10** and **27**) is a relatively small area, located to the south-west of the roundabout at Air Balloon Cottage (NGR 393244 215974). It comprises part of a single field, currently utilised as pasture and covered by short grass. The local terrain rises from west to east from 225 m aOD to 243 m aOD and from the north to south, rising from 225 m aOD to 247 m aOD.

Results

4.2.29 At the southern extent of Area 3 there is evidence for past quarrying activity at **4200**. Here it is possible to identify a collection of strong dipolar responses covering an area of 66 m by 37 m, and likely extending further towards the south and west, outside of the survey area. A similar response is noted at the south-east of the dataset at **4201** that occupies an area of 21 m by 14 m extending towards the east, south, and north, outside of the survey area.

4.2.30 At **4202** an area of increased magnetic response is located at the northern portion of Area 3. This could relate to former quarrying activity but is more likely a result of made ground, possibly associated with an entrance into the field.

4.2.31 At the north-western part of the Area 3 at **4203** there is a series of five negative linear responses running parallel to each other on a south-west to north-east alignment. Furthermore, two negative linear anomalies have been identified at **4204**, just to the north of **4200** on a north-west to south-east alignment. This is characteristic of underlying land drains.

4.2.32 A strong linear dipolar response (**4205**) is noted traversing across Area 3 on a north-west to south-east alignment, which is related to the location of a modern service.

Area 4

4.2.33 Area 4 (**Figures 11** and **28**) is located 130 m to the north-east of the roundabout at Air Balloon Cottages (centred on NGR 393613 216265). It comprises a single field, covered by a short grass, currently utilised as pasture.

4.2.34 There is a gentle slope from the northern edge of the field at 234 m aOD to the southern side at 240 m aOD.

Results

4.2.35 There is a weak positive linear anomaly on a south-west to north-east alignment in the centre of the area at **4300**. This measures 40 m by 6 m but is quite poorly defined. It is interpreted as possible archaeology and may represent a ditch-like feature or former land division.

4.2.36 5 m to the north at **4301** there is a series of equally spaced (1 – 2 m) weak parallel positive anomalies that are on a north-west to south-east alignment. These are thought to be associated with ridge and furrow cultivation. On the western side there is a negative response on the same alignment. This is 35 m in length and 1 – 1.5 m wide. It is possible this relates to an old field boundary and is noted as a very faint cropmark on satellite imagery for the area.

4.2.37 In the south of Area 4 there is an area of increased magnetic response (**4302**) that covers 36 m – 20 m on a south-west to north-east orientation. This is visible as a concentration of indistinct dipolar responses and is probably a result of made ground or infilling, possibly associated with the construction of the roundabout.

4.2.38 Just to the east of **4302** there is a strong linear dipolar anomaly (**4303**) that is noted on a south-west to north-east alignment. The anomaly extends for 14 m and is likely associated with a modern service, such as a pipe or cable.

Area 5

4.2.39 Area 5 (**Figures 12** and **29**) is located 500 m to the north of the village of Birdlip (centred on NGR 392741 214736). The area is currently utilised as pasture surrounded by field boundaries, apart from the open agricultural land to the north-east. It is relatively flat at 291 m aOD.

Results

4.2.40 At **4400** and **4401** there are two areas of increased magnetic response noted as a group of positive and negative responses. These cover an area of 25 m by 65 m and are 6 m apart. Due to their subtle nature they are unlikely to be associated with quarrying activities that are common in the area and may simply be associated with variation in the natural geology.

4.2.41 To the west of **4400**, eight positive discrete anomalies have been identified. These measure up to 3 m in diameter and represent possible pit-like features. However, this may also be a result of natural variation in the magnetic susceptibility of the underlying deposits. To the east of **4401**, there are two irregularly shaped positive anomalies measuring 5.5 m by 4 m. These are likely pit-like features of uncertain origin and could similarly be the result of localised extraction or natural variation.

4.2.42 At the south-western edge of the survey area there are positive linear anomalies on a north-west to south-east alignment, separated by 1 – 2 m. This is indicative of modern ploughing.

Area 6

4.2.43 Area 6 (**Figures 13** – **15** and **30** - **32**) is located 800 m to the north-east of the village of Birdlip (centred on NGR 393418 215190) and is bounded by the A417 along the western extent. It comprises three land parcels across four fields currently utilised as arable land.

4.2.44 There is a gentle rise from the north at 274 m aOD towards the southern corner at 291 m aOD. From this point eastwards, the area is relatively flat with a slight south-facing slope.

Results

4.2.45 In the irregularly shaped parcel of land within the northernmost field is a series of anomalies that are thought to be associated with possible funerary activity **4500**. This includes a dense concentration of oval-shaped positive anomalies that are 2 m by 1 m in size, although there are larger circular examples measuring up to 3.5 m in diameter. These are generally aligned north – south and are predominantly clustered in an area covering 26 m by 20 m. Although there is a large number of similar responses surrounding this that may also relate to more of these features. According to 1902 OS mapping, human remains were found at this location in 1879 and it is therefore very likely that these anomalies are associated with a series of burials forming a small cemetery. The orientation of these features is suggestive of a non-Christian burial tradition and could therefore date from the Iron Age to the early medieval period. However, further investigation would be required in order to confirm the precise nature of these possible graves.

4.2.46 50 m to the south-east of **4500** is a further concentration of positive anomalies of similar dimensions that may also be associated with funerary activity. These are not as well defined and are not distributed in such a regular fashion but are centred on a distinctive response at **4501** that comprises a square arrangement of positive and negative magnetic values. The negative element of this feature could be associated with structural remains, comprising an 8 x 8 m outer stone wall, although the southern aspect of this appears to be missing. Within this there is a possible 3 x 3 m inner wall and between these walls is a positive response that may be associated with a cut feature, such as a ditch. There is also a well-defined positive response at the very centre that could relate to a central pit-like feature. The two square negative anomalies are 1 m wide. Structures comprising inner and outer walls such as this are often associated with Romano-British religious buildings such as small shrines (Historic England 2018). Given the proximity to the location of several probable burials, it is likely that this indicates a building of a possible funerary or religious function. However, further investigation would be necessary to establish the exact nature of these remains.

4.2.47 20 m to the north of **4500** there is a positive linear response that is orientated on a south-west to north-east alignment (**4502**). This is 33 m long by 1.5 m wide and is most likely a ditch-like feature, possibly enclosing the activity to the south. There are also several positive linear anomalies that are noted on a south-west to north-east alignment, but it is not clear what these may relate to. It is possible that they represent further ditch-like features but are perhaps more likely associated with former ploughing furrows.

4.2.48 In the eastern part of this field there is a dense concentration of strongly positive linear anomalies. These are located on two axes, north-west to south-east and north-east to south-west. These are thought to relate to drainage in the area, and the dominance of these feature makes it difficult to identify any evidence for further archaeological features. However, there are four positive linear anomalies that are thought to relate to ditch-like features (**4503**). The western of these are parallel to each other, extending for 32 m on a north-west to south-east alignment and are 1 m apart. Traversing both anomalies on a north – south alignment is a further anomaly that measures 32 m in length. To the east of this an 'L' shaped feature is recorded for 16 m on a south-east to north-west alignment before turning to a south-west to north-east alignment for a further 14 m. None of these are represented on any historical mapping, and it is probable that they relate to ditch-like features of an uncertain date.

4.2.49 Throughout the majority of Area 6 there are several discrete positive anomalies. These vary in size from 1 – 4 m in diameter and are thought to relate to pit-like features. Whilst some of these may relate to natural pitting in the underlying bedrock, there are numerous clusters

that are more likely to relate to archaeological features (**4504** – **4507**). However, it is not possible to ascribe a more specific date interpretation to these features.

4.2.50 Within the eastern most field of Area 6, there is a strong positive linear anomaly at **4508**. This is aligned north-west to south-east and is segmented into three separate parts, covering a total distance of 67 m. It is 4 m wide and the two western gaps measure less than 1 m, with the eastern break measuring 4 m. This is a probable ditch-like feature not detailed on any of the available historical mapping. As such, it is possible that it relates to an archaeological feature of uncertain origin.

4.2.51 At the western extent of **4508**, there is a large amorphous weakly positive and negative anomaly at **4509**. This is irregular in form but covers an area measuring 26 x 12 m. Given that there is extensive quarrying recorded on historical mapping of the area, it is possible that this is associated with an area of extraction. However, its weak nature suggests that this may be quite limited or that it could relate to natural variation in the underlying geology. Despite this, there are further anomalies recorded across Area 6 that are more convincingly associated with extraction. For example, along the eastern edge of Area 6, a large area of increased magnetic response has been recorded at **4510**. This is irregular in form and covers a 29 m by 25 m area. It corresponds with a notable depression on the site and the enhanced response is most likely associated with the infilling of a quarry pit.

4.2.52 In the western field, there are four further examples of probable quarrying activity (**4511** – **4514**). These are all characterised by strongly positive anomalies that vary in size, ranging from 8 m x 9 m to 22 m x 27 m. Although none of these are specifically detailed on historical mapping, such strong responses are characteristic of large cut features and are thought to relate to unrecorded areas of extraction of probable post-medieval date.

4.2.53 At the south-western-most extent of Area 6, there is a weakly positive linear anomaly at **4515**. This is aligned south-west to north-east with a large dipolar response at the centre. The linear element of this corresponds to a field boundary on historical OS mapping and measures 74 m in length by 1 m wide. It is probable that the strong anomaly at the centre is associated with a large ferrous item and may be associated with former gateposts.

4.2.54 In the eastern most field, there are two broad areas that are represented by weak positive and negative magnetic values. Both of these are sinuous, but roughly aligned on a linear north-south alignment (**4516**; **4517**). The western example of these is slightly larger, measuring 157 m in length and up to 19 m wide (**4516**). In the southern extent it curves towards the east, following the break of slope in the area. It is generally characterised by a positive response on the outer edges, with a weaker or negative response in the centre. As this follows the topography of the area, it is likely that this is associated with localised superficial deposits resulting from hill-slope processes.

4.2.55 40 m to the east of **4516**, a smaller weakly positive anomaly has been located at **4517**. This is 101 m long by up to 12 m wide and is amorphous in form. It is probable that this is also associated with natural variation in the underlying deposits, but its linear form may suggest that it is associated with a former boundary or extraction activity. As such, further investigation would be required to confirm the exact origin of this anomaly.

4.2.56 Within the same area as **4516** and **4517** is a series of weakly positive linear anomalies. These are distributed in a herringbone pattern and are thought to be associated with modern drainage of the area.

4.2.57 Across the entirety of Area 6, there is a large number of closely spaced weakly positive parallel linear anomalies. In the southern fields, these are aligned north-north-west to south-south-east and in the northern field they are aligned north-east to south-west. These are associated with ploughing furrows and are thought to be of modern origin.

4.2.58 A strong linear dipolar response is located on an east – west alignment (**4518**). This continues for a total distance of 342 m and is only broken by the current field boundary. This feature relates to a modern service, such as a pipe or cable. Similarly, at the far northern edge of Area 6, there is a further strong linear dipolar anomaly on an east – west alignment, which also pertains to a modern service (**4519**).

Area 7

4.2.59 Area 7 (**Figures 16** and **33**) is located at the north-eastern part of the scheme (centred on NGR 393943 215736) and comprises a single field currently utilised as a pasture. It is irregularly shaped and bounded by the modern field boundaries on all sides, with woodland located to the east.

4.2.60 The topography is characterised by a decline from the south-west at 277 m aOD to the north-eastern corner 262 m aOD.

Results

4.2.61 The entirety of Area 7 is characterised by a slightly enhanced magnetic background. This may be associated with recorded variation of the geology in this area (BGS 2020), but it is considered more likely to be related to an area of former woodland. The area directly west of the field is currently occupied by a small woodland, and this is illustrated as a larger area covering part of the field on mapping dating to the late 19th century. Moreover, given the dense concentration of randomly dispersed, sub-circular positive anomalies, it is possible that much of this field has been cleared of woodland.

4.2.62 The enhanced background makes it difficult to identify discrete features that might be associated with archaeological activity, but there are a small number of discrete weakly positive anomalies that may be associated with pit-like features.

4.2.63 There are several poorly defined linear anomalies in the area that could also relate to archaeological features. Perhaps the clearest of these is at **4600**, where a strong positive anomaly with a corresponding negative response on the northern edge has been located. This measures 45 m in long by 2 m wide and is associated with a ditch-like feature of uncertain origin. Elsewhere within the field there are several weaker positive and negative linear trends, but these are too poorly defined to be confidently interpreted as pertaining to possible archaeological features.

4.2.64 Situated on a north – south alignment in the eastern part of the field are two parallel, weakly positive linear anomalies (**4601**). These are both 2 m wide and extend 135 m. It is possible that they continue, but they become weaker at the northern and southern extents. They are separated by 10 m and in the intervening space are a number of stronger ferrous anomalies. This relates to a former boundary present on the 1902 OS mapping of the area.

4.2.65 Traversing the northern portion of the field are two broad areas of strongly positive and negative response, which are both orientated on an east-north-east to west-south-west alignment. The smaller and most southerly of these is 98 m by 12 m (**4602**). 30 m to the north of this is a larger, less distinct area measuring 185 m by 30 m (**4603**). Both responses are probably related to the superficial geology of the area and may be associated with hill slope processes. However, they are also both quite well defined and are visible as cropmarks on satellite imagery. As such, further investigation may be required to clarify the nature of these features.

4.2.66 Extending from the northern field boundary of the western part of the field is a line of strong dipolar anomalies (**4604**). As this follows the same alignment it is probable that this is associate with a former fence line, with the ferrous response being associated with a series of posts.

4.2.67 Following the shape of the field are a series of parallel linear anomalies. These are associated with ploughing furrows and are slightly stronger than those located in the centre of the area on a north-east to south-west alignment.

Area 8

4.2.68 Area 8 is located south of Shab Hill, to the south-west of Area 5, and south of Area 7 (centred on NGR 394141 214996). It comprises eight fields, with the northern fields currently used as pasture and the southern field being under arable cultivation. Besides the existing field boundaries, the survey areas extend onto open agricultural land.

4.2.69 In the most northern field, there is gentle slope from the east at 274 m aOD towards the west at 281 m aOD. In the southern field there is a slightly more pronounced slope from 274 m aOD to 261 m aOD, centred around a slight hill at Stockwell.

Results

4.2.70 There is a dense concentration of anomalies that are thought to be associated with archaeological remains located in the centre of Area 8, to the west of Pinkham. These are focussed around an orthogonal arrangement of positive linear anomalies and are thought to be associated with an enclosure (**Figure 34**). They cover an irregular rectangular area measuring 70 m by 45 m and are orientated north – south and east – west. These are indicative of ditch-like features measuring 2.5 m in width (**4700** – **4703**). Within this there are numerous other anomalies that are likely related to associated activity, as well as several breaks, and other details which detract from the rectangular layout (**4704** – **4707**). It is likely that this relates to a probable Iron Age / Romano-British enclosure, with some evidence for possible settlement activity. However, there are some suggestions that it may extend into later periods (e.g. **4706**).

4.2.71 Along the western edge of the enclosure there is a 9 m gap, which likely forms a large entrance to the enclosure (**4700**). There are also gaps in the south-eastern corner and on the eastern edge that are smaller and less well defined, but these are also likely to be entrances or genuine breaks in the enclosure ditch. The north-eastern corner of the enclosure extends to form a triangular projection of the northern boundary (**4701**). The linear anomaly that forms the southern side extends beyond the enclosed area for an additional 45 m towards the east and 25 m towards the west (**4702**). In addition, 17 m west of the western enclosure focus is a further linear anomaly that extends 49 m on the same north – south alignment (**4703**). These extensions are slightly weaker and may therefore be associated with a different phase or function of the enclosure. Alternatively, as they are further removed from the centre of the enclosure, it is possible that this is a result of the fills of the ditch comprising less archaeological material than those at the centre.

4.2.72 Within the enclosure there are internal divisions that segregate the area into smaller parts. This includes several weakly positive linear anomalies that are on the same orthogonal alignment (**4704**; **4705**). It is likely that these are associated with further, less extensive ditch-like features, and may have had a more specific function, but this is not apparent from these geophysical survey results alone.

4.2.73 In the centre of the enclosure, there is a moderately strong positive anomaly, surrounded by a negative response (**4706**). This covers an area of 4.5 m by 5.5 m and is characteristic of a large pit-like feature. One possible interpretation of this is that it is associated with a sunken-feature building, but this is somewhat speculative and further investigation would be required to confirm this.

4.2.74 Elsewhere within the enclosure, there are numerous discrete positive anomalies. These generally measure between 1 and 2.5 m in dimeter and are likely associated with pit-like

features. There is a notable concentration of these at **4707**, which may represent focussed settlement activity. In addition, there are some dipolar anomalies that have the negative response located on the northern edge, which could denote an area of thermoremanent magnetisation as a consequence of burning. However, it is not clear what this activity may relate to.

4.2.75 Several discrete positive anomalies are located surrounding the enclosure. These are similar in size to those located within at **4707** and are likely associated with further archaeological activity (**4708**).

4.2.76 At the south-western corner of the enclosure, a large strongly positive anomaly surrounded by a negative response on the northern edge has been identified (**4709**). This covers an area of 15 m by 8 m and is likely associated with extraction activity. However, it is not clear if this is related to the enclosure or post-medieval quarrying which has been widely observed in the results of this survey.

4.2.77 To the north-east of the enclosure there is a positive linear anomaly at **4710**. This is 25 m long by 1.5 m wide and most likely indicates a ditch-like feature. 10 m to the south there is a cluster of four weakly positive anomalies. Three are orientated east – west, with the western most orientated north – south. These could all indicate further ditch-like features, perhaps associated with the division of land surrounding the enclosure.

4.2.78 In the fields to the south of the enclosure there are several linear anomalies that relate to ditch-like features (**4711**; **4712**). This includes a series of 3 m wide, weakly positive responses orientated on a west-north-west to east-north-east orientation. This is segmented into at least six different parts that run for a combined distance of 265 m.

4.2.79 Extending from the southern end of **4711** are two very weakly positive linear trends. These are parallel with one another and extend 130 m. This is associated with a track visible on historical mapping and was also noted at the time of survey.

4.2.80 Extending south from the eastern end of **4712**, are two positive linear anomalies situated on a north – south alignment (**4713**). Both are 1.5 m wide and the longest measures 70 m in length, with the second being much more sinuous and extending 30 m. These anomalies likely represent further ditch-like features and are probably associated with the enclosure to the north.

4.2.81 To the north of **4711**, in the field to the west of the enclosure, there is a series of sinuous, weakly positive linear anomalies situated on south-west to north-east alignment at **4714** – **4719**. The anomalies vary in width from 1 m – 4.5 m and are generally segmented in various locations. Some of these examples branch at the northern end (e.g. **4716** and **4717**). Given the weak and slightly diffuse nature of these anomalies, it is possible that they relate to natural variation in the underlying geology. They are also perpendicular to the break of slope and may have been caused by localised areas of erosion. However, their linear nature suggests that they could relate to ditch-like features and it is not possible, therefore, to rule out a possible archaeological interpretation.

4.2.82 In the southern-most field, a weakly positive linear anomaly at **4720** extends 234 m on a north-west to south-east alignment. After 58 m there is a 12 m break before it continues for another 164 m. this is indicative of a ditch-like feature and may be associated with a wider field system of possible Iron Age or Romano-British date.

4.2.83 At the southern end of **4720**, there is a cluster of weak positive discrete anomalies at **4721**. These vary in size from 1.5 m to 6 m in diameter and indicate the presence of pit-like features that could be archaeological in origin. However, they may also indicate natural pitting in the bedrock.

4.2.84 A large number of parallel positive linear anomalies have also been identified surrounding **4720**. These are distributed at regular intervals and are associated with modern drainage.

4.2.85 In the north-eastern field of Area 8 is a series of broadly linear, strongly positive anomalies (**4722**; **4723**). These are orientated south-east to north-west and are perpendicular to the break of the slope. This is located in an area of localised geological variation on BGS mapping (BGS 2020). However, as the area located directly to the east of this is identified as "Old Quarry" on 1902 mapping it is possible that this may include some areas of extraction activity.

4.2.86 There is a more isolated and roughly oval shaped positive anomaly at **4724**, which is also thought to relate to natural variation in the underlying bedrock. This is 32 m long and up to 18 m wide.

4.2.87 Throughout the entirety of Area 8, there are numerous weakly positive linear anomalies that are associated with ridge and furrow cultivation at **4725** – **4728**. They are predominantly running on a north-west to south-east alignment and are separated by a distance of 4.5 m – 10 m.

4.2.88 A linear arrangement of dipolar responses orientated on north-west – south-east alignment has been located in the southern field at **4729**. This extends for 301 m and may continue for a further 100 m as a weak linear trend further to the south. This feature is detailed on 1902 mapping, continuing from the existing boundary at southern end of the field, and therefore likely represents a former fence or hedge line.

Area 9

4.2.89 Area 9 is located to the south of Area 8, to the south-east of Stockwell (centred on NGR 394900 213700). It is currently utilised as pasture and aside from the existing field boundaries the survey areas are bounded by open agricultural land (**Figures 19** – **20** and **36** – **37**).

4.2.90 There is a gentle slope from the north of the area at 279 m aOD to the south at 262 m aOD, but there are several more localised undulations within this.

Results

4.2.91 To the north of Area 9 there are several responses that are interpreted as archaeological in origin. A positive linear anomaly (**4800**) is has been identified slightly curving from west to north-east for 168 m. After 130 m there is a 3 m gap, before the anomaly continues for another 18 m. It measures between 2 and 4 m in width. This continues into the field to the north-east for 5 m before it exits the survey area (**4801**). This indicates a ditch-like feature and could be a Late Iron Age or later Romano-British boundary.

4.2.92 A positive linear anomaly has been identified on a west – east alignment at **4802**, crossing **4800** toward the eastern end. The anomaly is 25 m in length before becoming obscured by **4800** for 35 m and then continues for 123 m. The anomaly is 2.5 m wide and indicates a ditch-like feature. The anomaly corresponds to a former footpath on 1902 mapping.

4.2.93 18 m to the south there is a positive linear anomaly at **4803** on a north – south alignment for 30 m. The anomaly is up to 1.5m wide. This continues to the south at **4804** on the same alignment, where it continues on its trajectory for 23 m before meeting the edge of the survey area. A positive, parallel anomaly is noted 4 m to the south-east at **4804**. It continues for 14 m. These are indicative of ditch-like features of uncertain origin.

4.2.94 At **4805**, 85 m to the south-east there is a weak positive curvilinear anomaly that is 41 m long and 1.5 m wide. This is on a south-east to north-west alignment and turns towards the

east at its northern end. This ditch-like feature is of uncertain origin and has been interpreted as possible archaeology due to its weak magnitude.

4.2.95 To the south of **4805** there are two parallel weakly positive anomalies on a south-west to north-east alignment 5 m apart (**4806**). The northern anomaly is 90 m in length including a 10 m gap. The southern extends 72 m. These ditch-like features are of uncertain origin and are interpreted as possibly archaeological due to their weak magnitude.

4.2.96 Broadly spaced, parallel linear anomalies have been identified in the northern portion of the field surrounding **4800**. These are interpreted as medieval ridge and furrow cultivation (**4807**).

4.2.97 A weak positive anomaly is located at **4808**. This covers an area of 210 m by 8 m on an east – west orientation. On the eastern side it slightly curves towards south-east. This is indicative of natural geological variation.

4.2.98 At **4809** two positive parallel linear anomalies have been detected. These are on a south-west to north-east alignment with 3 m separation. The eastern anomaly is 168 m long and 2.5 m wide. Towards its southern end the anomaly becomes weaker and is slightly curved towards the east. This is indicative of a ditch-like feature which follows the break of slope within this field, likely representing a former boundary or trackway. Directly to the west of the anomalies is an amorphous anomaly that may be natural in origin. It is possible that this is associated with a natural variation in the underlying bedrock.

4.2.99 To the east of **4809** there is a strong positive linear anomaly at **4810** on a north-west to south-east alignment. It is 107 m in length with a width of 2.5 m. This ditch-like feature is interpreted as archaeology and may be associated with the boundary or trackway feature identified at **4809**.

4.2.100 North of **4810** is a sub-circular anomaly at **4811**. It covers an area of 15 m by 12 m. To the south of it, at the south-east corner of the field, there is a similar response at **4812**. This is oval shaped and covers an area of 13 m by 8.5 m. These anomalies indicate cut features and are probably related to past quarrying activities in the area.

4.2.101 Along the southern edge of the field there is a series of weakly positive parallel linear anomalies on a north-west – south-east alignment at **4813**. These are separated by 6 m. It is probable that this is further evidence for medieval or post medieval ridge and furrow cultivation.

4.2.102 Numerous sinuous anomalies are noted at **4814** that are aligned across the field following the local terrain on an east – west alignment. These cover an area 63 m wide by 185 m long and are likely the result of superficial geological deposits that have accumulated along the valley as a result of hill slope processes.

4.2.103 A highly magnetic dipolar linear anomaly is noted at **4815** on an east – west alignment. This is indicative of a modern service, such as a pipe or cable.

4.2.104 Weakly positive linear anomalies are also noted throughout the northern portion of Area 9 at **4816** on a north-west to south-east alignment. These indicate field drains.

Area 10

4.2.105 Area 10 is located to the south of Area 9 to the north-east of the A417 and Cowley roundabout (centred on NGR 394900 213700). The area is currently agricultural pasture. Besides the existing field boundaries, the survey areas are bounded by open agricultural land, and the A417 and a modern quarry to the south (**Figure 21** – **24** and **38** – **41**).

The topography of the area undulates gently, with a slight dip located to the north of Cowley roundabout at 264 m aOD. This then gently rises to the north-west to 273 m aOD and to the south-west at 270 m aOD, before declining again towards the A417 at 258 m aOD.

Results

4.2.106 A complex interconnected network of positive linear anomalies has been identified throughout the central portion of Area 10 (**4900** – **4922**). Numerous anomalies surrounding these are also likely associated with the co-axial network consisting of peripheral land use features such as enclosures or boundaries. These are discussed in detail below.

4.2.107 On a north – south alignment, an interconnected network of recti-linear anomalies has been identified from **4900** in the north to **4907** in the south. This is interpreted as an alignment of distinct enclosures of variable sizes perpendicular to a long curvilinear anomaly on a broadly north – south alignment that measures 165 m in length and 2 m wide (**4908**). The enclosures are varied in size but measure 53 – 77 m at their widest points with their boundaries formed of 2 m wide ditches. Numerous positive and dipolar anomalies are noted within these enclosures that are ascribed an interpretation of possible archaeology. These could indicate internal features or activity such as refuse pits, extraction activity, or areas of burning.

4.2.108 In the centre of the network of anomalies on a north – south alignment at **4905**, a second alignment of interconnected rectilinear anomalies protrudes to the south-west (**4909** – **4913**). These anomalies are similarly sized and likely comprise a further network of ditched enclosures. The southern boundary of this feature appears to continue further to the north-west through the enclosure at **4905** and towards **4914**.

4.2.109 To the south-west and perpendicular to **4914**, several further anomalies are noted that form further enclosures. At **4915** a distinct recti-linear anomaly measuring 28 m by 18 m is noted. A second enclosure is noted to the north, although only the north and east sides are present in the data due to the modern field boundary (**4916**). To the south at **4917**, further positive linear anomalies have been identified that likely form a further enclosure, although again, this is unclear to the presence of a modern service and evidence of former quarrying.

4.2.110 To the south-west of the network of anomalies, further positive linear anomalies are noted. At **4918**, a clear rectilinear anomaly is noted on broadly the same north-east to south-west alignment as the anomalies at **4915** – **4917**. The exact dimensions of the anomaly are unclear due to the size and edge of the survey area, although the ditch-feature is some 2 m wide. Several internal linear and recti-linear trends have also been identified (**4919**) as well as further weaker positive linear anomalies to the north-west at **4920**. These are also likely to be archaeological in origin. While it is not possible to discern any relationship between these anomalies and those to the north-east, it is likely they indicate further ditch-features.

4.2.111 Towards the north-west of Area 10, a positive curvilinear response at **4921** is noted that continues for 91 m. This ditch-like response is 1.7 m wide and is of uncertain origin, but likely forms part of the archaeological activity identified in the wider landscape to the south.

4.2.112 A weaker linear anomaly is noted on a west-north-west to east-south-east alignment at **4922**. This is 242 m long by 1.5 m wide. At its eastern end a perpendicular anomaly protrudes to the south and continues for 75 m with a 9 m gap at the northern end. These responses likely indicate a ditch feature, possibly indicating an earlier land division.

4.2.113 To the south-east of the anomalies at **4900** – **4922**, numerous weaker linear trends have been identified (**4923** – **4928**). These are on various alignments but tend to be on a north-west to south-east or north-east to south-west alignment, similar to the anomalies to the north-west. It is possible these indicate further activity associated with the features identified to the north-west, although, due to their weak magnitude, a more confident interpretation is not possible.

4.2.114 It is not possible to discern any relationship between or an exact time period for any of these anomalies. However, they are adjacent to the known course of the Roman road of Ermin Street, which occupies the present route of the A417 in this area. This strongly suggests that these features likely originate in the Iron Age or Romano-British period.

4.2.115 A variable anomaly on a north – south alignment has been identified at **4929**. The anomaly is 210 m in length and 2 – 3 m wide. This anomaly corresponds to a former field boundary visible on 1884 OS mapping. Toward its southern end a building is recorded on the same map. No clear anomaly associated with this building has been identified at this location although a large area of increased magnetic response could indicate demolition rubble or debris (**4930**). Toward the west side of the increased response, a distinct rectangular anomaly has been identified at **4931**. It is possible this indicates a similar structure although this is not clearly delineated on historical mapping. This has therefore been interpreted as possibly archaeological in origin.

4.2.116 Numerous broadly spaced, positive, parallel linear anomalies have been identified throughout Area 10. These are largely noted on a west-north-west to east-south-east alignment or a north to south alignment. These are likely indicative of medieval ridge and furrow cultivation, widely noted in the surrounding landscape and other areas of survey.

4.2.117 Widely spaced, positive linear anomalies have been identified throughout Area 10. These are noted in a distinctive 'herring-bone' pattern to the north of the survey area, as well as parallel on a north-east to south-west alignment to the east of the survey area. These are indicative of field drains.

4.2.118 Several highly magnetic dipolar linear anomalies have been identified traversing the survey area at **4932**. These are indicative of modern services, such as pipes or cables.

5 DISCUSSION

5.1.1 The detailed gradiometer survey has been successful in detecting a significant number of anomalies that are thought to be archaeological. The majority of these are thought to be associated with Iron Age or Romano-British settlement activity, as well as a probable cemetery of the same date.

5.1.2 The clearest evidence for settlement activity is located within the most southerly area of the scheme (Area 10). This is located directly north of the Roman road which follows the present course of the A417, known as Ermin street. Extending from this is a large number of linear ditch-like features which project on a coaxial arrangement from a central north – south line. These comprise numerous rectangular enclosures, as well as more isolated examples, delineating the layout of a series of probable paddocks or field systems. In addition, there is also a large number of pit-like features that may relate to settlement activity, though it is not clear form these results alone what this may be associated with.

5.1.3 At Area 8, a further concentration of archaeological activity has been identified. This is characterised by a more concentrated recti-linear enclosure 1.5 km north of the focus of activity in Area 10. It comprises numerous ditch-like features, which are segmented in a rectangular arrangement. There are several internal divisions as well as pit-like features which are also thought to relate to settlement activity. Most notably, at the centre of this there is a large rectangular pit-like feature. Although somewhat speculative, it is suggested that this may relate to a sunken feature building. Such features are ascribed to the Saxon period and further investigation would be required to ascertain the precise nature of this activity.

5.1.4 Despite the widespread evidence for archaeological activity, there are very few direct examples of structures. The best example of probable structural remains is located in Area 1, where a ring ditch has been located that is thought to be associated with an Iron Age /

Romano-British roundhouse. There are no further clear examples of such features across the scheme, but there are several concentrations of pit-like anomalies that could relate to further such remains.

5.1.5 In Area 6 possible funerary remains have been identified, 4 km north of the modern village of Birdlip. Here a series of north – south aligned anomalies have been located in close proximity and are interpreted as possible graves, due to their oval shape and size. 1902 mapping indicates that human remains were located in this area in 1897 and it is very likely that there may be further, more discrete, remains of this nature that have not been detected by this survey. Moreover, in the southern portion of the same field there is a possible structural feature that is interpreted as a possible shrine or religious building Iron Age to Romano-British date. The precise form and size of this feature is consistent with other examples of this type of building (Historic England 2018) and it is clear that there may be significant levels of funerary activity within this part of the site.

5.1.6 Elsewhere across the scheme are a variety of further linear features that are thought to relate to more widespread divisions of a field system. Given the level of activity dating to the Iron Age and Romano-British activity within the area, it is probable that these are associated with the agricultural landscape of this period. However, it is probable that some of these features may predate or continued in use into later periods. There is also evidence of a wide range of former field boundaries that are no longer present but are visible on historical mapping of the area dating to the later 19th century. In addition, a significant number of features have been interpreted as evidence of former extraction, many of which are detailed on the historical mapping. However, there are also further examples of this activity that are not recorded, such as the extensive remains of this activity identified in Area 2.

5.1.7 Superficial geological deposits and modern activity has also been recorded across the scheme, with areas of former woodland, services, trackways, ploughing, and extensive drainage at various locations.

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Historic England 2018. An introduction to Roman and post-Roman shrines. https://historicengland.org.uk/images-books/publications/iha-shrines-roman-post-roman/

Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A and Fassbinder, J. 2015 *Guidelines for the use of geophysics in archaeology: questions to ask and points to consider.* EAC Guidelines 2, Belgium: European Archaeological Council.

Cartographic and documentary sources

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 5, Soils of South West England.* Southampton.

Online resources

British Geological Survey Geology of Britain Viewer (accessed January 2020) http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Old Maps (accessed January 2020) https://www.old-maps.co.uk

APPENDICES

Appendix 1: Survey Equipment and Data Processing

Survey methods and equipment

The magnetic data for this project were acquired using a non-magnetic cart fitted with 4x Bartington Grad-01-1000L magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03 nT over a ±100 nT range, and measurements from each sensor are logged at intervals of 0.25 m. All of the data are then relayed to a Leica Viva CS35 tablet, running the MLgrad601 program, which is used to record the survey data from the array of Grad601 probes at a rate of 10 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Viva system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

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 0.125 m intervals along traverses spaced up to 0.25m apart.

Post-processing

The magnetic data collected during the detail survey are downloaded from the Bartington cart system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

The cart-based system generally requires a lesser amount of post-processing than the handheld Bartington Grad 601-2 fluxgate gradiometer instrument. This is largely because mounting the gradiometers on the cart reduces the occurrence of operator error; caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

Typical data and image processing steps may include:

- GPS DeStripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.

- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).

- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies. XY plots can be made available upon request.

- 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.

Appendix 2: Geophysical Interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural, and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.

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

The modern category is used for anomalies that are presumed to be relatively modern in date:

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

- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.

- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.

- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.

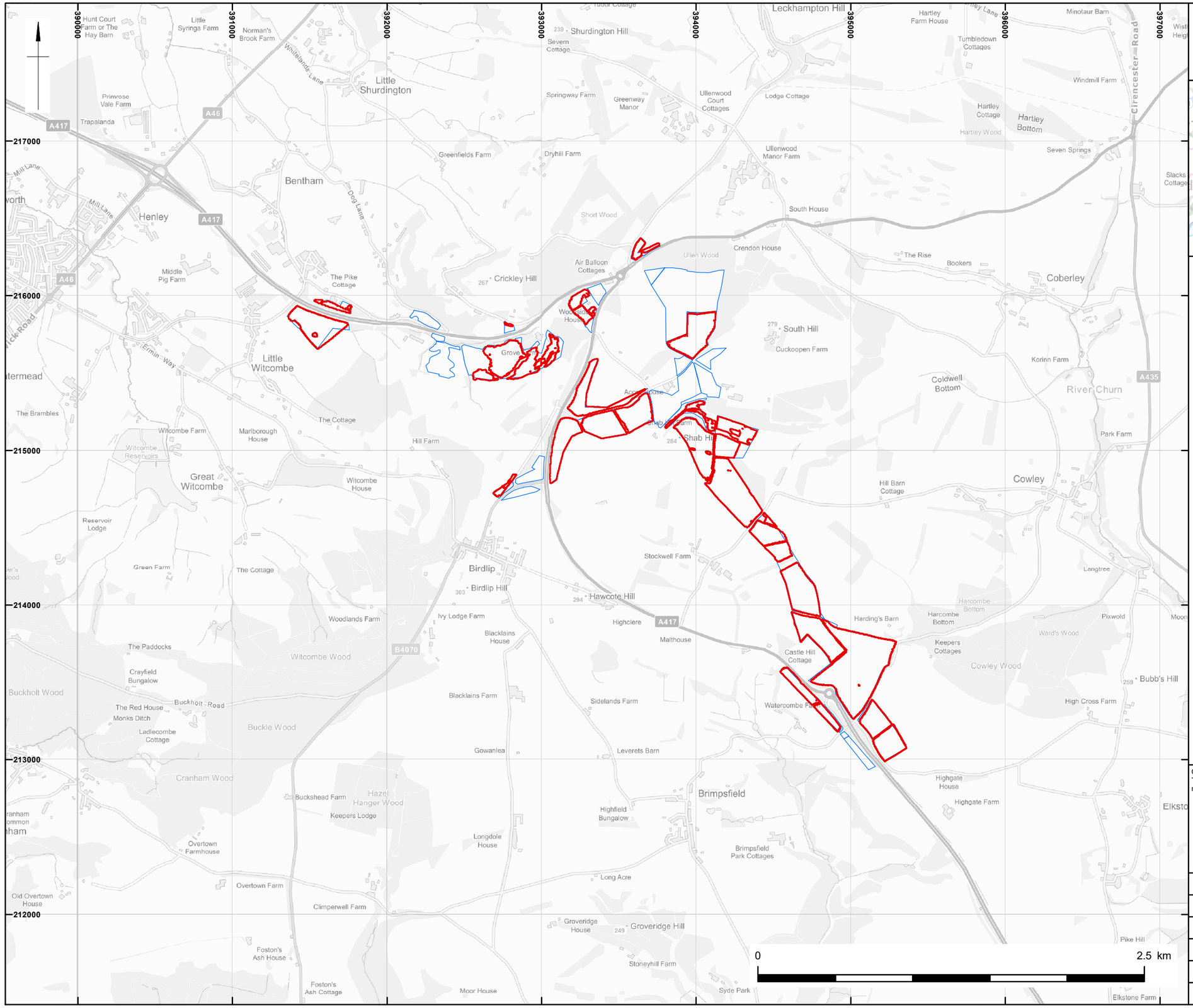
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating dipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.

- Trend – used for low amplitude or indistinct linear anomalies.

- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad dipolar (positive and negative) anomalies.



Detailed Survey Extents

Proposed Geophysical Survey Boundary

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Revision Number:	0
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Illustrator:	RM
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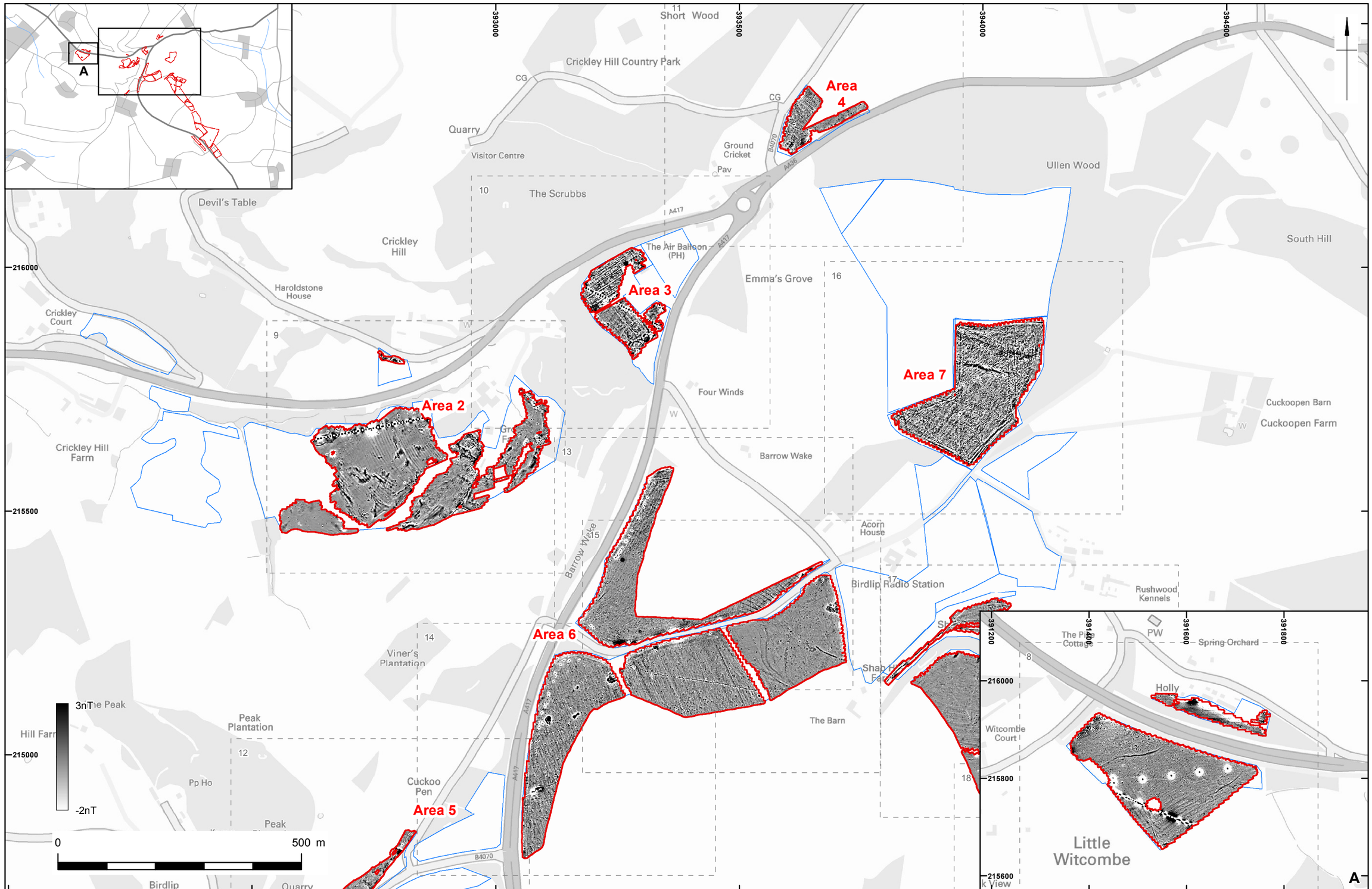
	FigsMXD\2020_01_08

Site location and detailed survey extents

Figure 1



Detailed Survey Extents

Proposed Geophysical Survey Boundary

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Path:	X:\PROJECTS\220300\GIS\FigsMXD\2020_01_08		

Greyscale overview (north) and index to detailed figures

Figure 2

Area 5
Area 6
Area 7
Area 8
Area 9
Four Winds
Barrow Wake
Barrow Wake
Acorn House
Birdlip Radio Station
Rushwood Kennels
Cuckoopen Barn
Cuckoopen Farm
Viner's Plantation
Peak Plantation
Peak Plantation
Quarry
Cuckoo Pen
Shab Hill Farm
The Barn
Cally Hill Plantation
Coldwell Bottom
Springs
Hotel
Cricket Ground
Pav
Birdlip Farm
Birdlip
Birdlip Primary School
PW
Highgreen Farm
Kellands Farm
Depot
Parson's Pitch
Stockwell
Stockwell Farm
The Rise
A417
B4070
13
14
15
17
18
19
20
21
393500
394000
394500
395000
215000
214500
214000
3nT
-2nT
0
500 m

Detailed Survey Extents
Proposed Geophysical Survey Boundary

Date:	08/01/2020	Revision Number:	0
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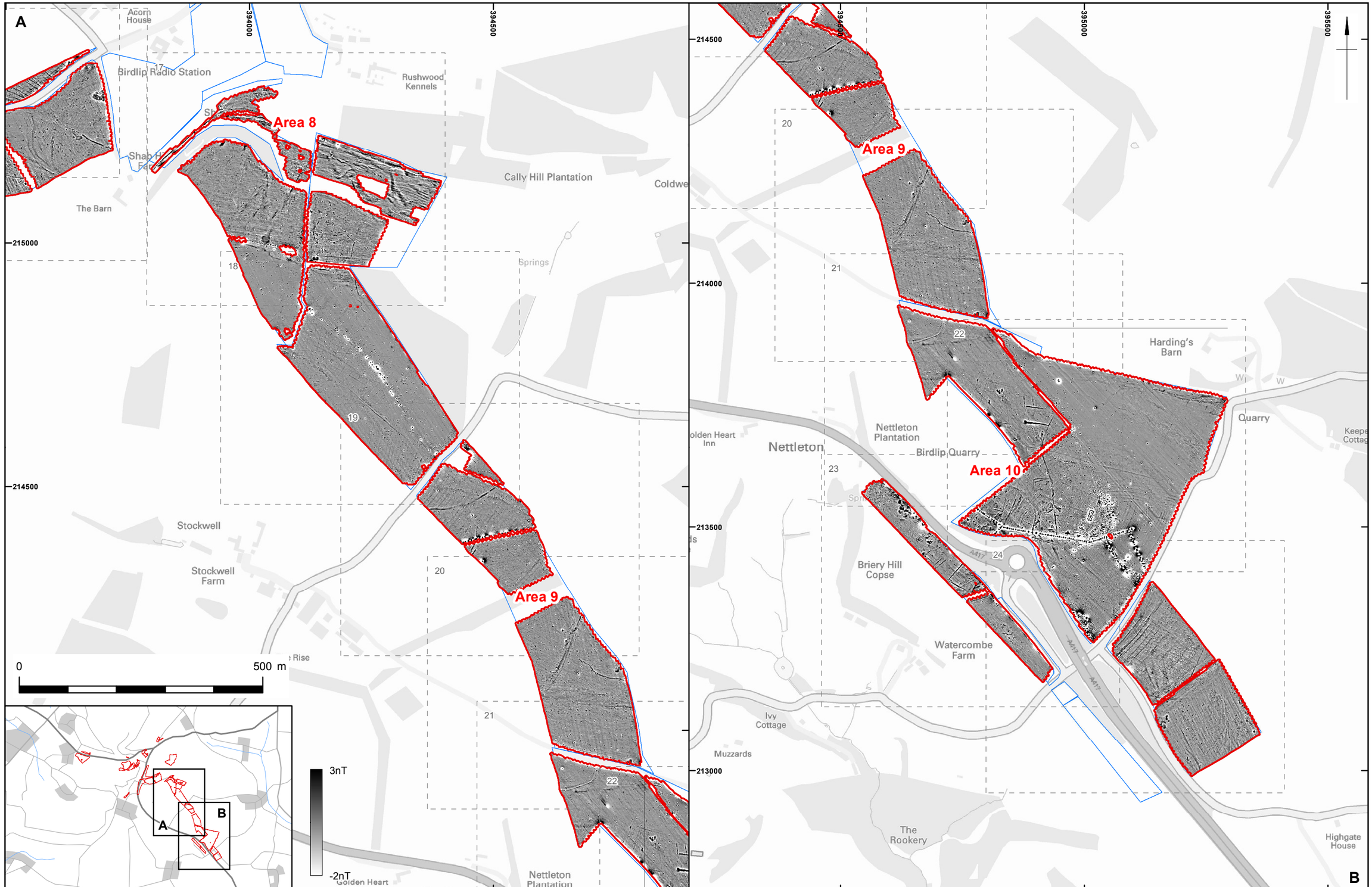
Greyscale overview (central) and index to detailed figures

Figure 3



Detailed Survey Extents

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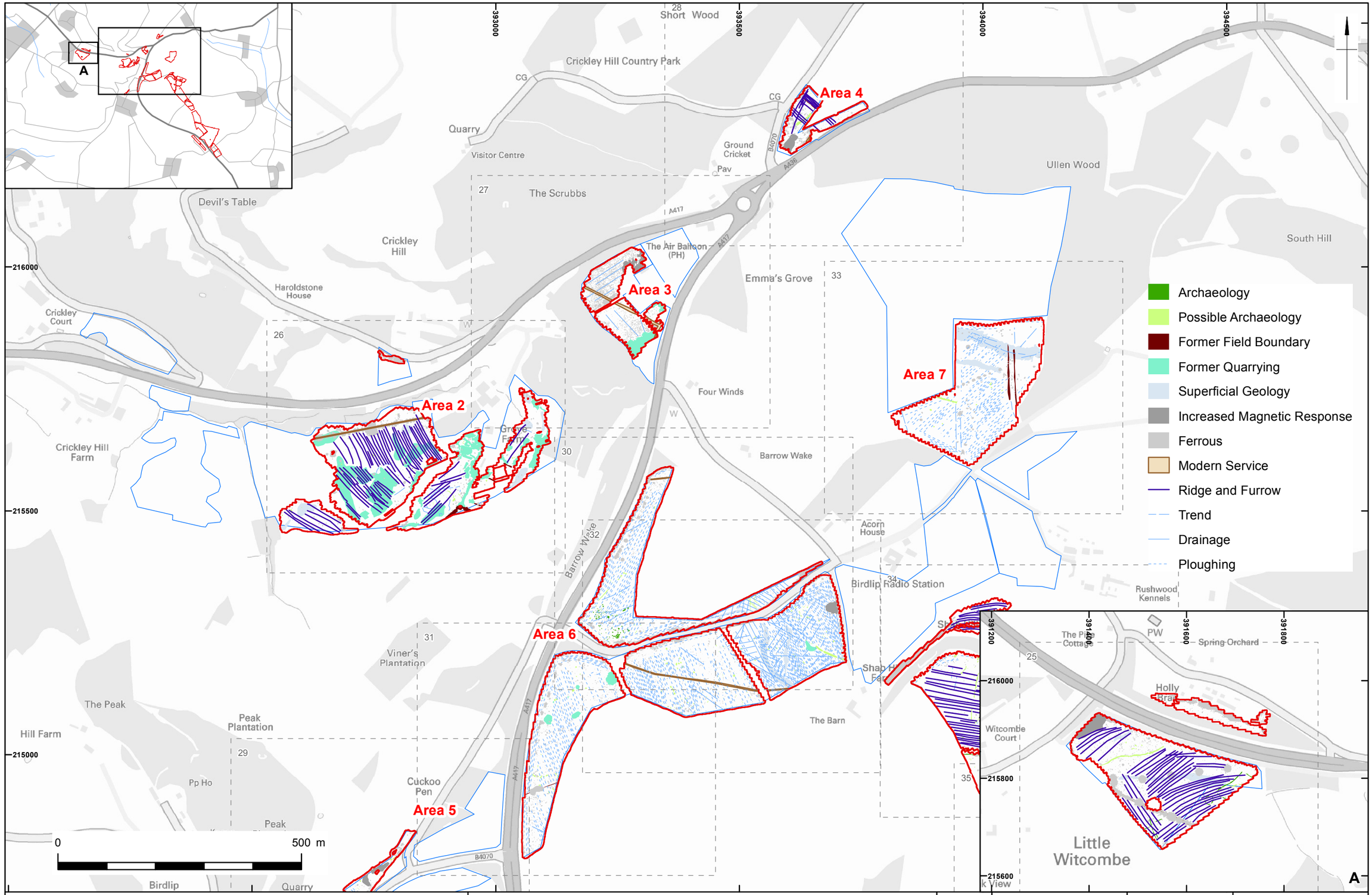
Greyscale overview (south) and index to detailed figures

Figure 4



Detailed Survey Extents

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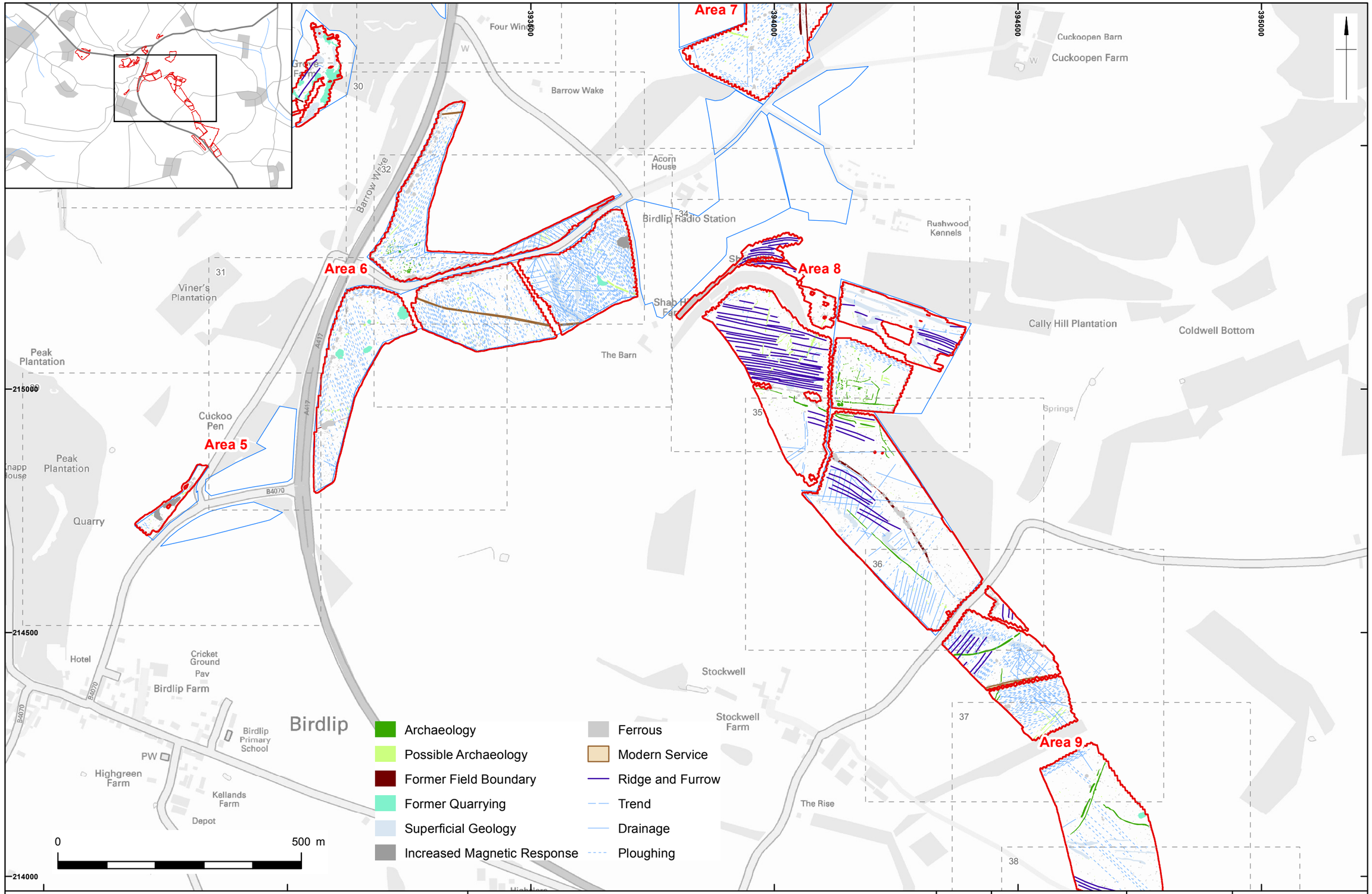
Interpretation overview (north) and index to detailed figures

Figure 5



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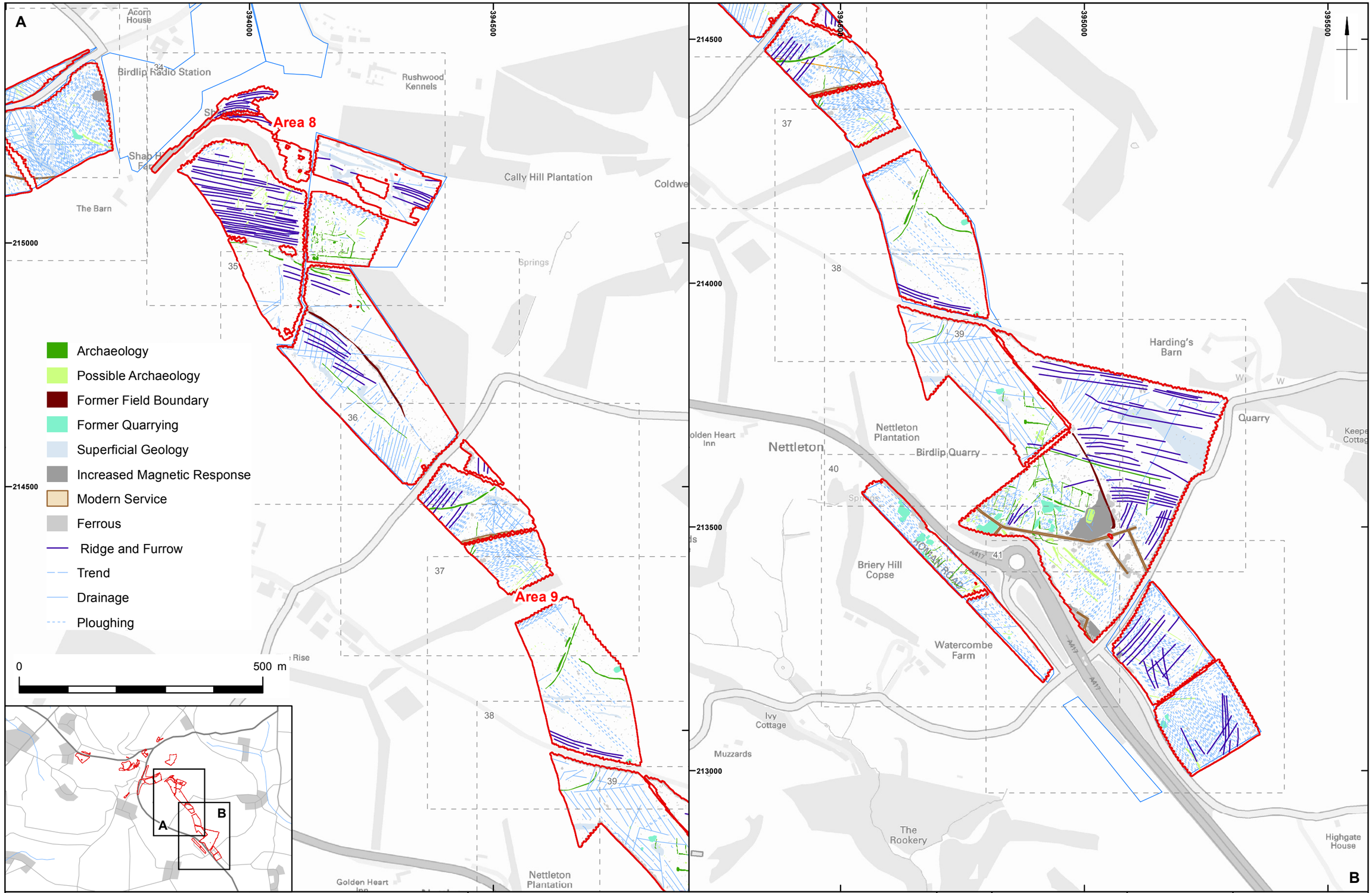
Interpretation overview (central) and index to detailed figures

Figure 6



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Interpretation overview (south) and index to detailed figures

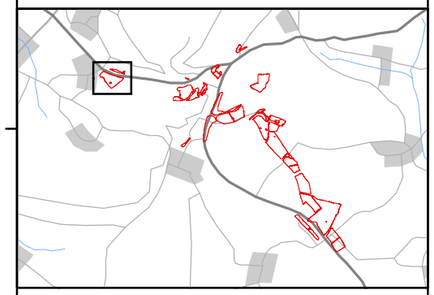
Figure 7

391300
391400
391500
391600
391700
391800

216000
215900
215800
215700
215600

Area 1

A417



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

Date:	08/01/2020
Revision Number:	0
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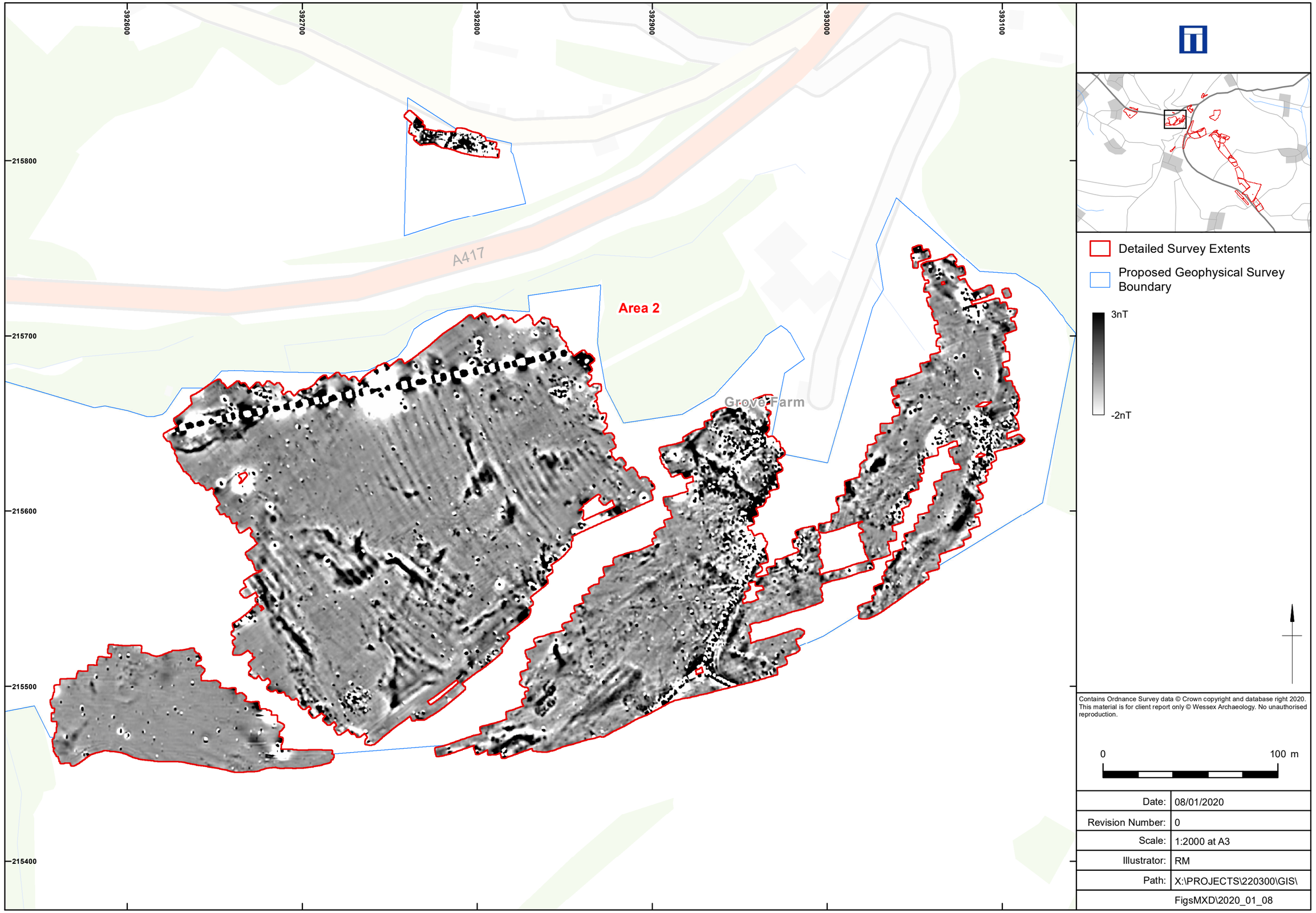
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\ FigsMXD\2020_01_08

Detailed greyscale plot Area 1

Figure 8



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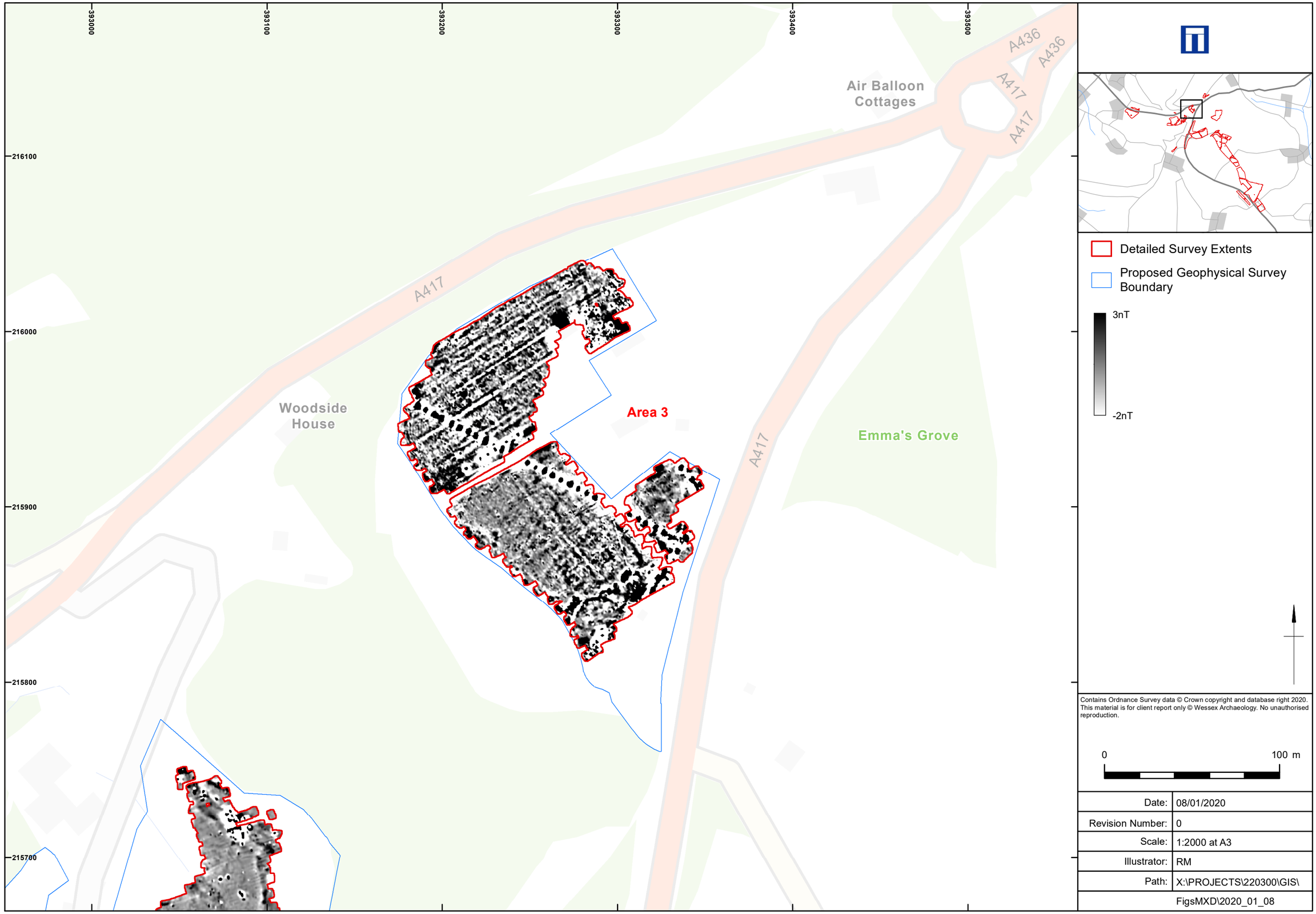
Detailed greyscale plot Area 2

Figure 9



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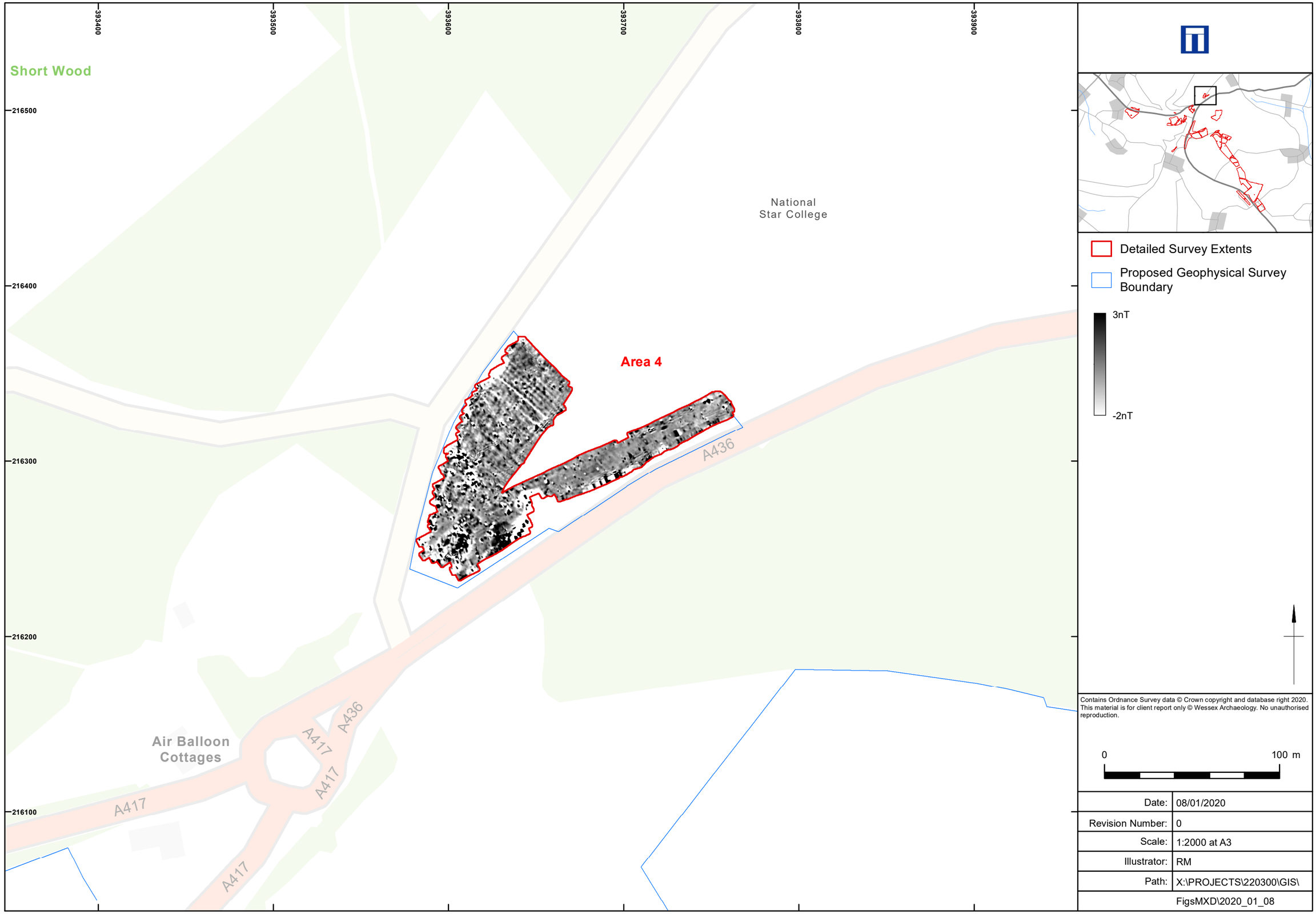
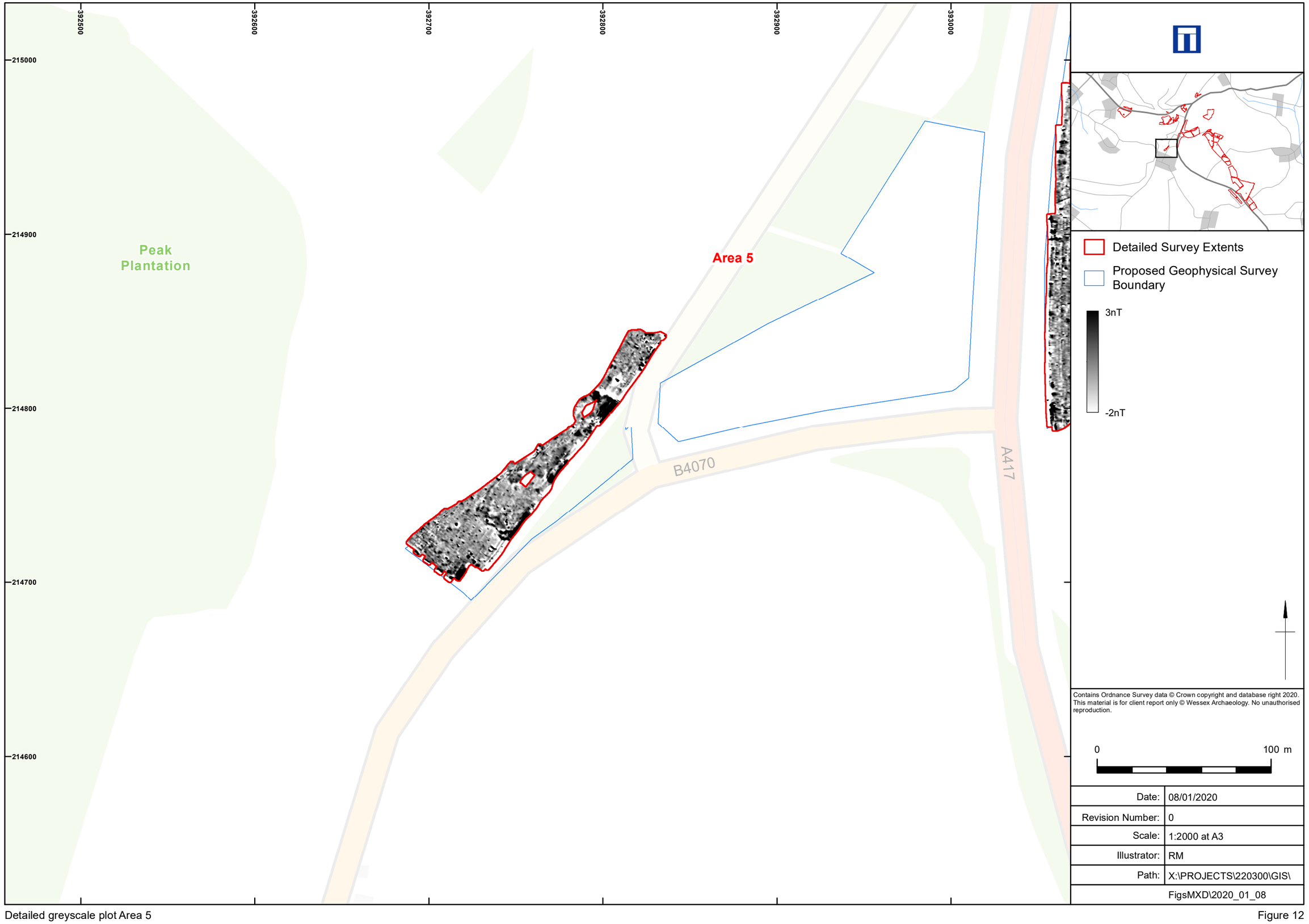
Detailed greyscale plot Area 3

Figure 10



Detailed greyscale plot Area 4

Figure 11



Detailed greyscale plot Area 5

Figure 12

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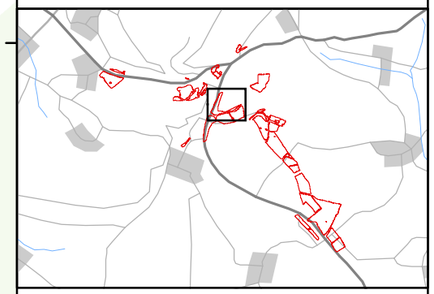
393300
393400
393500
393600
393700

215600
215500
215400
215300
215200

A417



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

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Revision Number:	0
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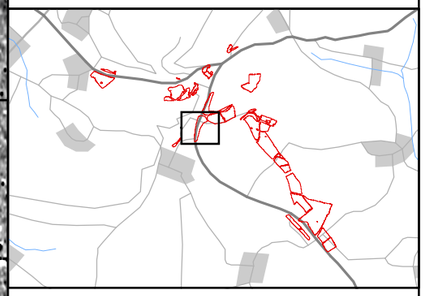
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 6 north

Figure 13

392900
393000
393100
393200
393300
393400
215200
215100
215000
214900
214800
Area 6
Area 5
A417
B4070



Detailed Survey Extents

Proposed Geophysical Survey Boundary

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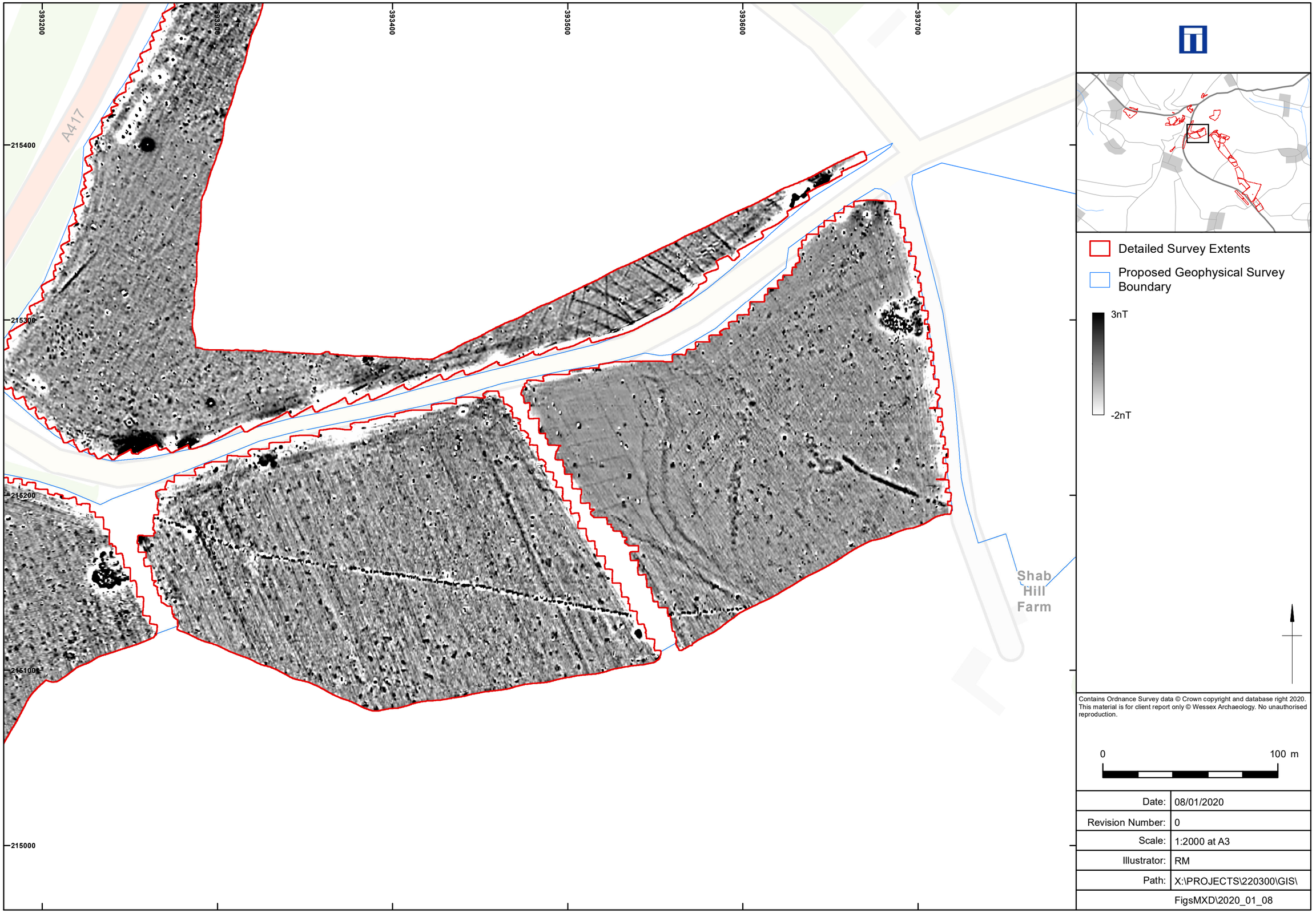
Detailed greyscale plot Area 6 south

Figure 14



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

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Revision Number:	0
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Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 6 east

Figure 15

Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

Date:	08/01/2020
Revision Number:	0
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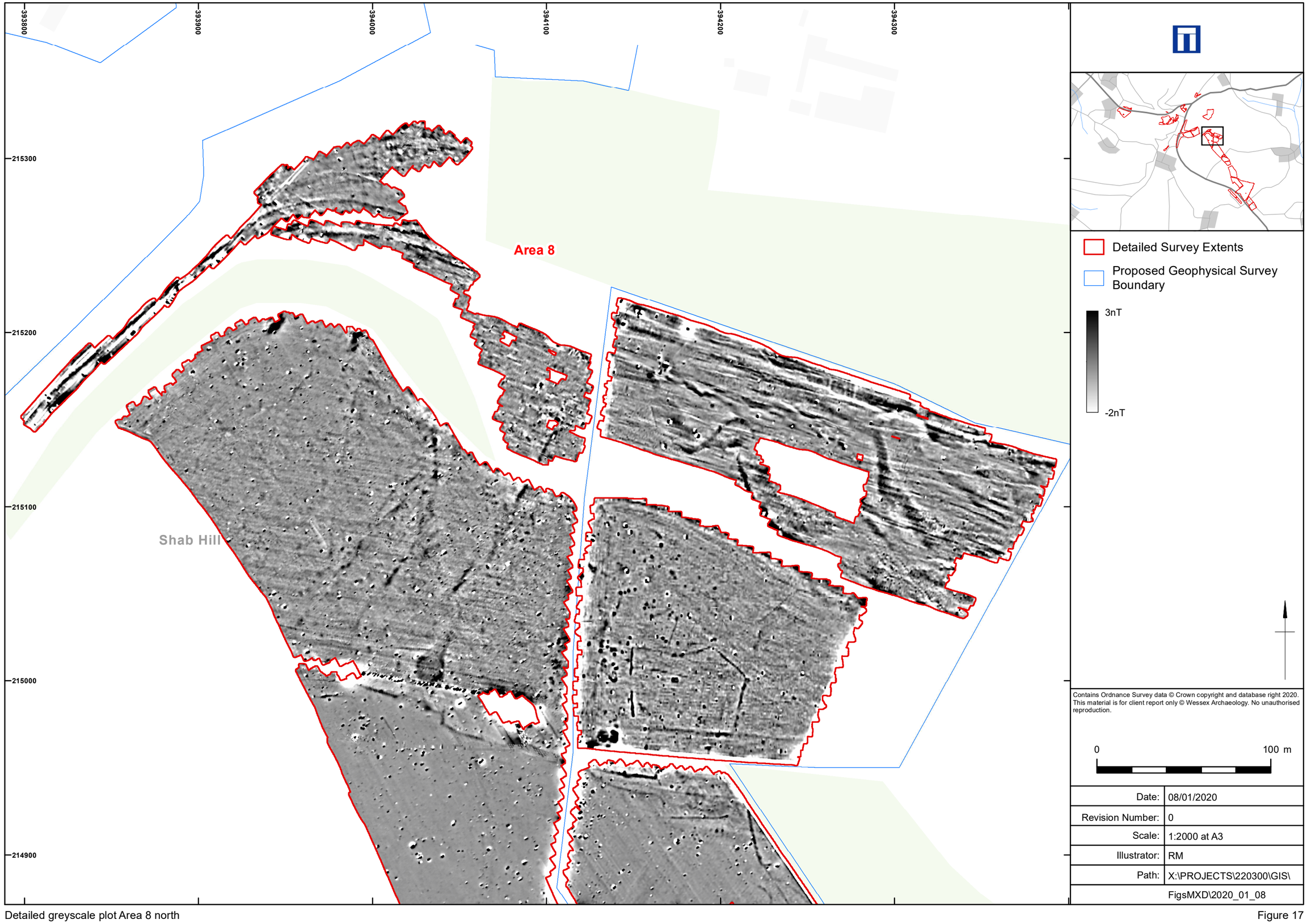
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 7

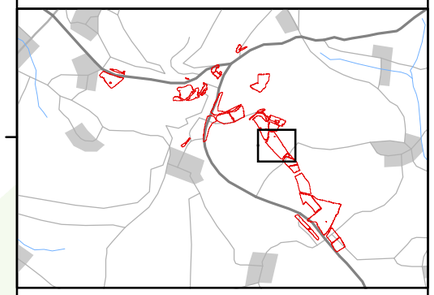
Figure 16



Detailed greyscale plot Area 8 north

Figure 17

394000
394100
394300
394400
394500
214900
214800
214700
214600
214500



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

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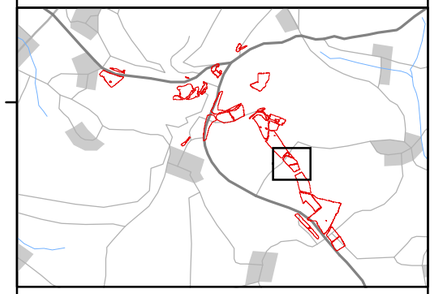
Detailed greyscale plot Area 8 south

Figure 18

394200
394300
394400
394500
394600
394700
214600
214500
214400
214300
214200
Area 9



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

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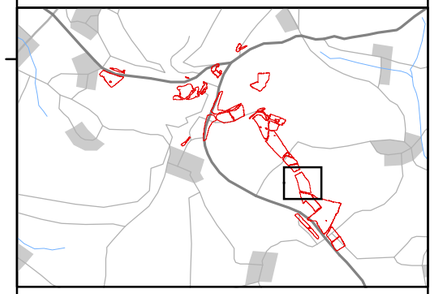
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 9 north

Figure 19

394400
394500
394600
394700
394800
394900
214300
214200
214100
214000
213900
Area 9



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

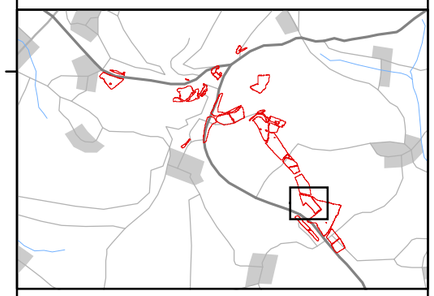
0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 9 north central

Figure 20

394500
394600
394700
394800
394900
395000
214000
213900
213800
213700
213600
Nettleton Plantation
Castle Hill Cottage
A417
Area 10



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 9 central

Figure 21

Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

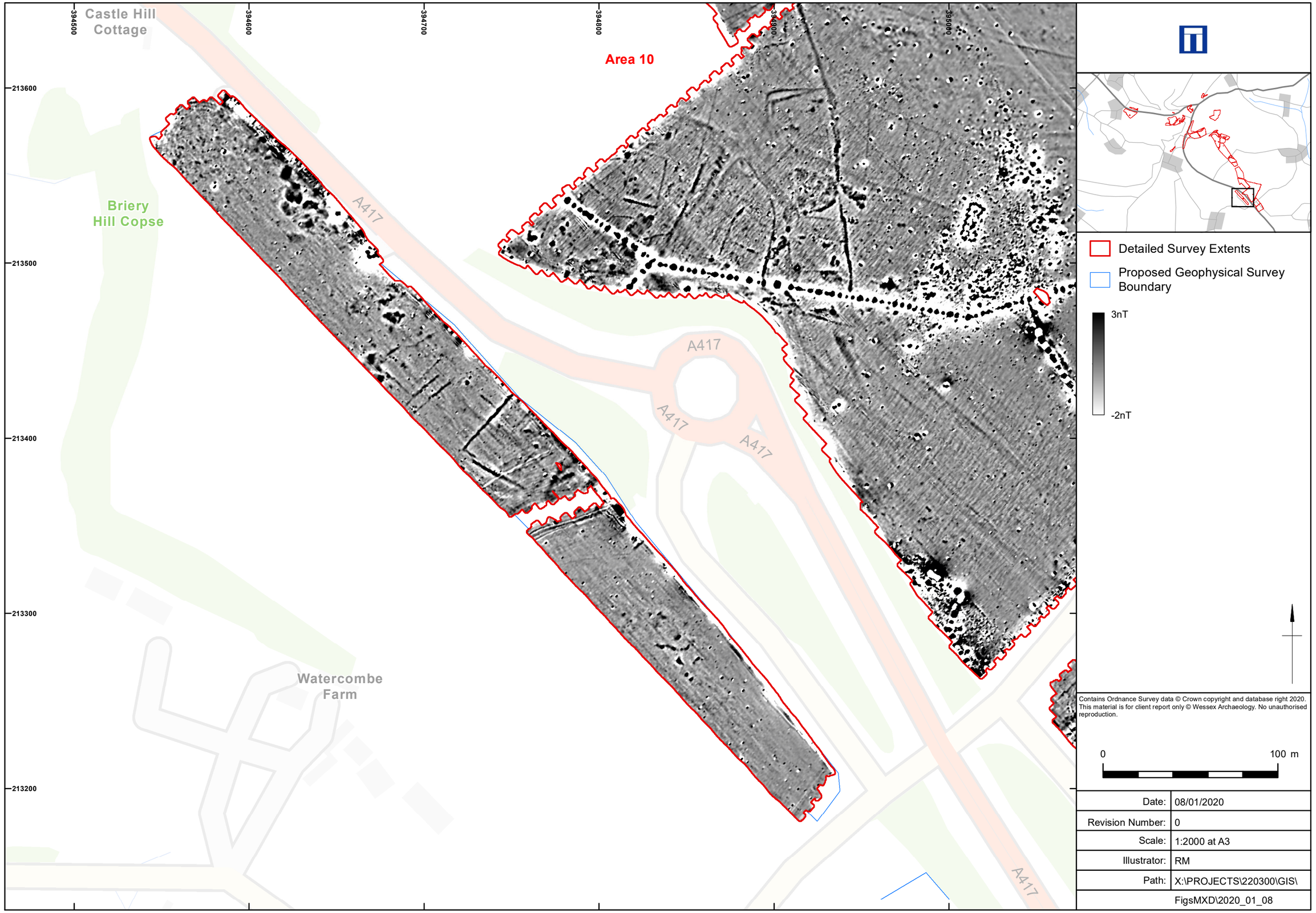
-2nT

0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\ FigsMXD\2020_01_08

Detailed greyscale plot Area 9 east

Figure 22



Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 9 west

Figure 23

Detailed Survey Extents

Proposed Geophysical Survey Boundary

3nT

-2nT

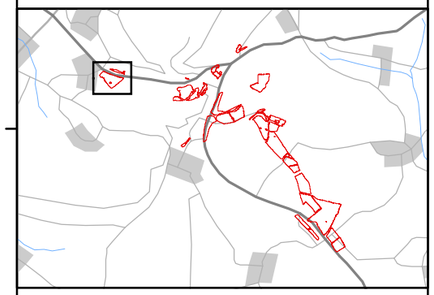
0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\
	FigsMXD\2020_01_08

Detailed greyscale plot Area 9 south

Figure 24

391300
391400
391500
391600
391700
391800
216000
215900
215800
215700
215600
Area 1
A417
4004
4003
4006
4005
4001
4000
4007
4002



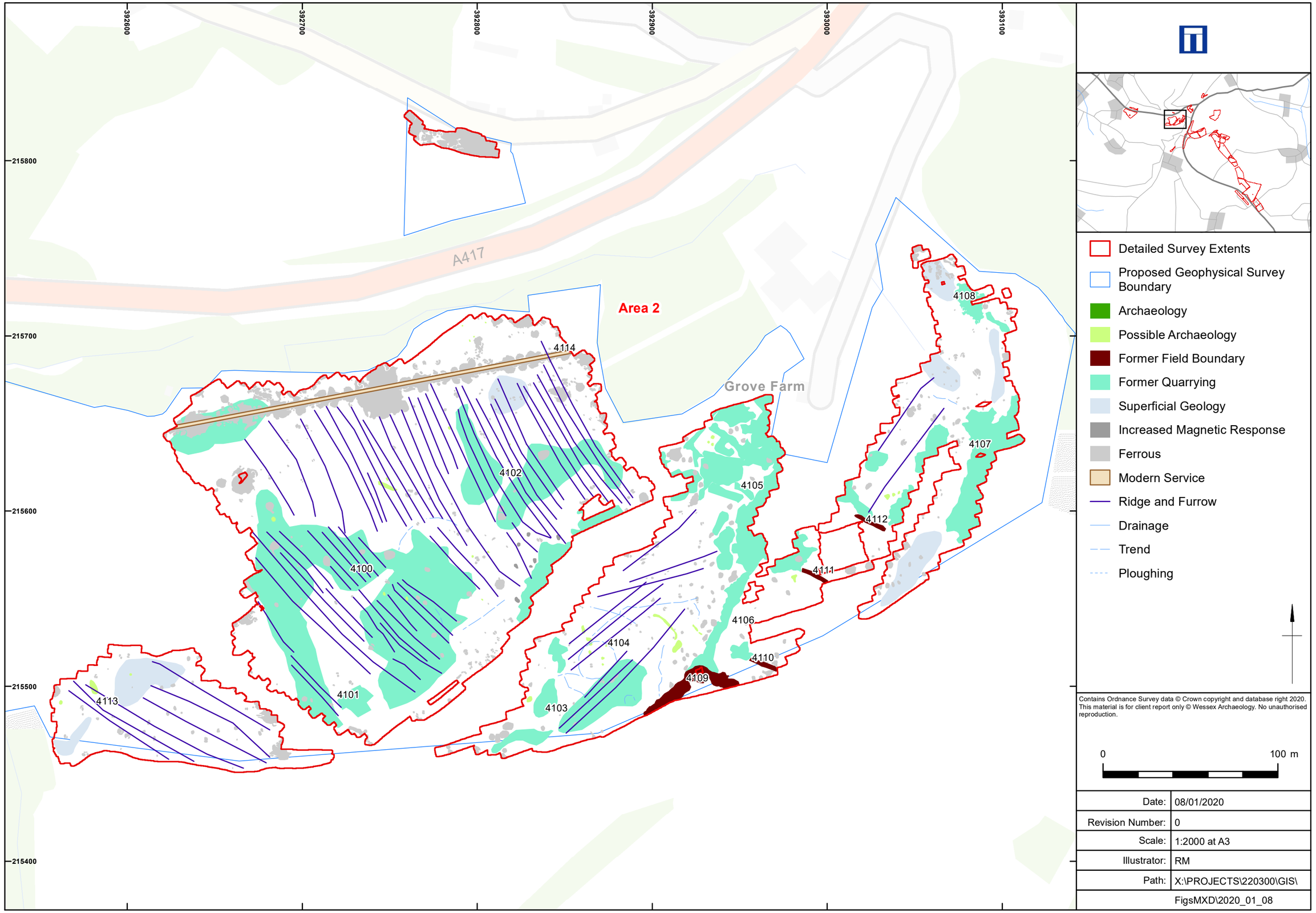
Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

Date:	08/01/2020
Revision Number:	0
Scale:	1:2000 at A3
Illustrator:	RM
Path:	X:\PROJECTS\220300\GIS\FigsMXD\2020_01_08

Detailed archaeological interpretation Area 1

Figure 25



0 100 m

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Revision Number:	0
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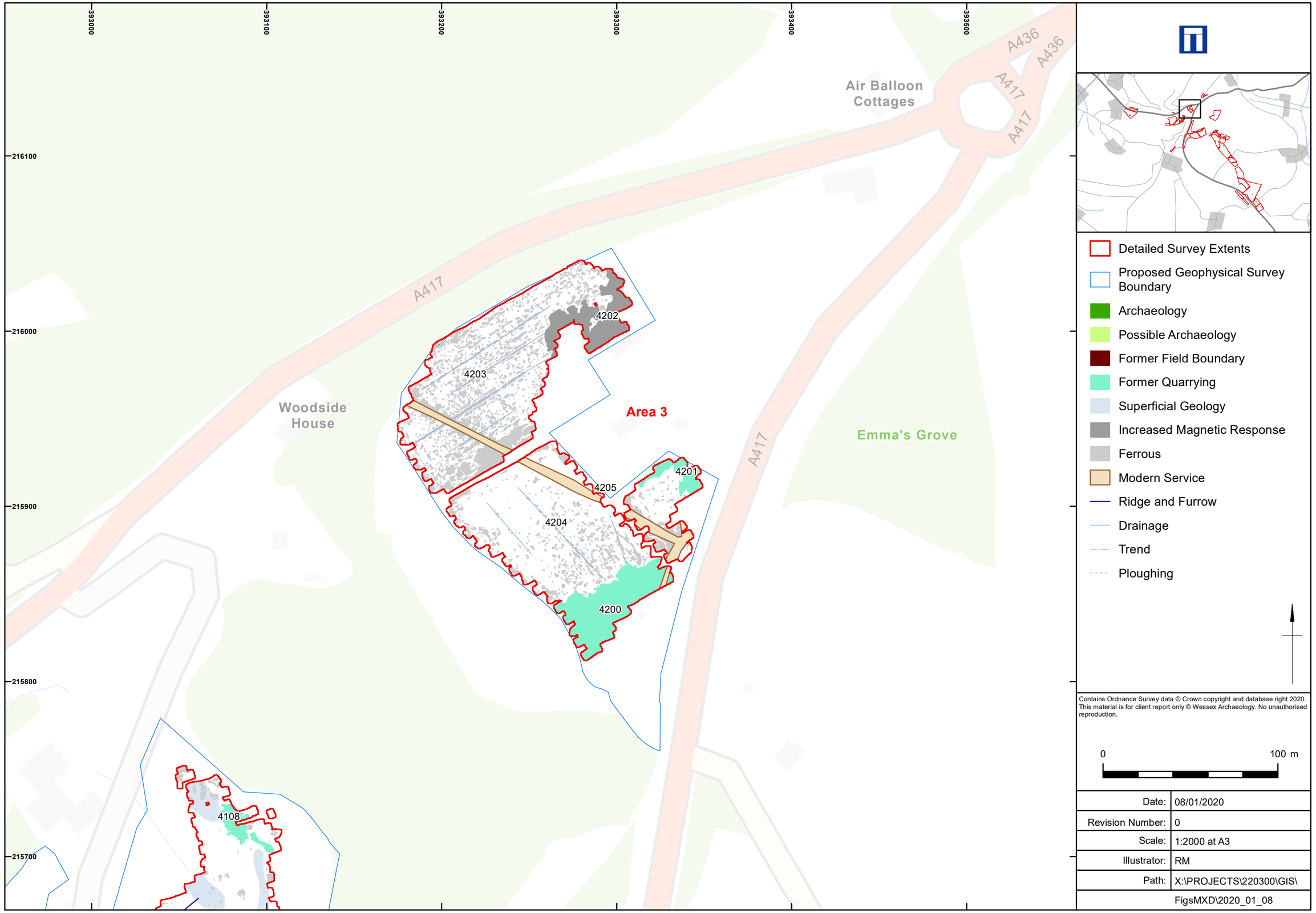
	FigsMXD\2020_01_08

Detailed archaeological interpretation Area 2

Figure 26



Detailed Survey Extents

Proposed Geophysical Survey Boundary

Archaeology

Possible Archaeology

Former Field Boundary

Former Quarrying

Superficial Geology

Increased Magnetic Response

Ferrous

Modern Service

Ridge and Furrow

Drainage

Trend

Ploughing

0 100 m

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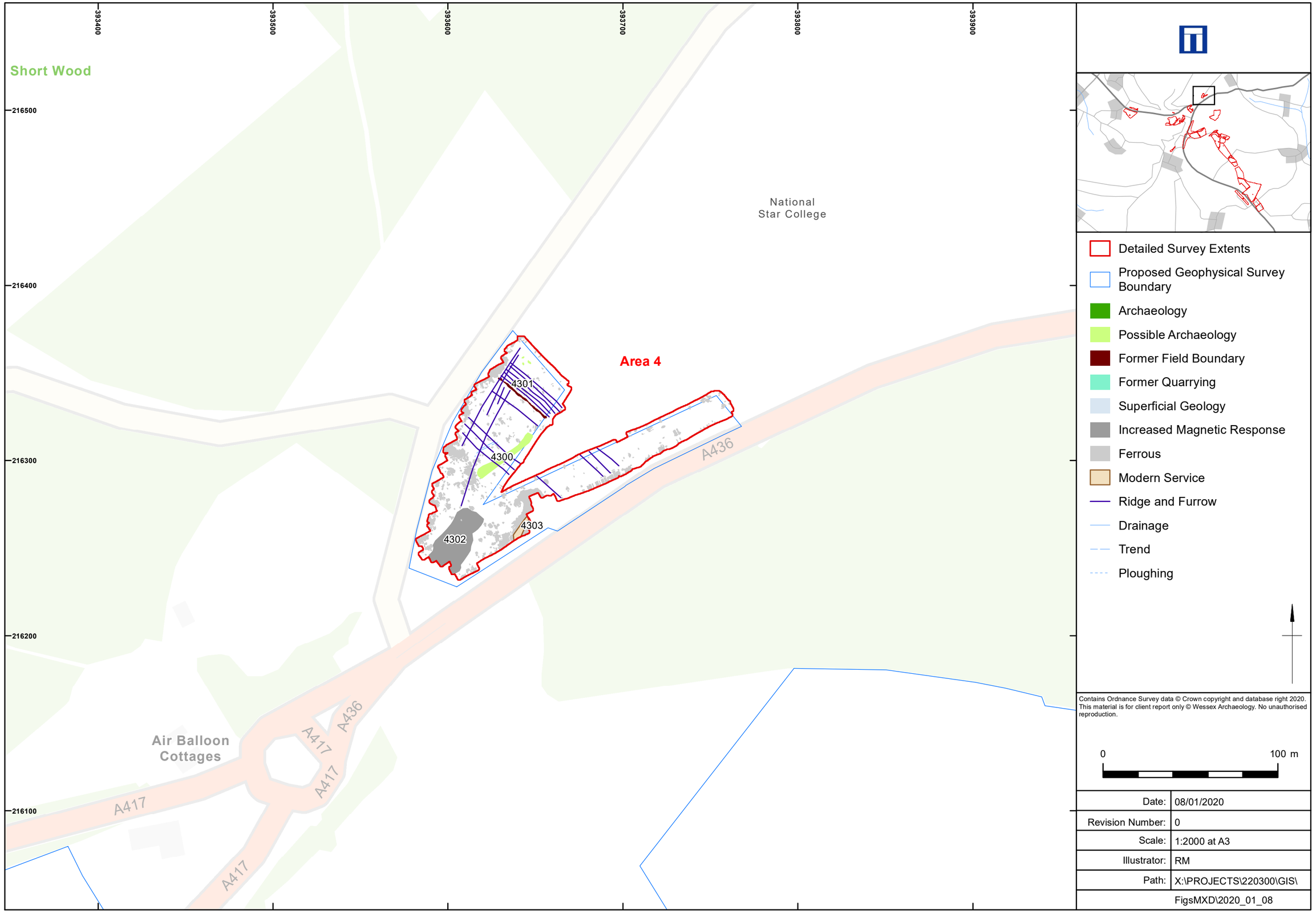
Detailed archaeological interpretation Area 3

Figure 27



Detailed archaeological interpretation Area 4

Figure 28

392500
392600
392700
392800
392900
393000
215000
214900
214800
214700
214600
Peak Plantation
Area 5
4401
4400
B4070
A417

Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

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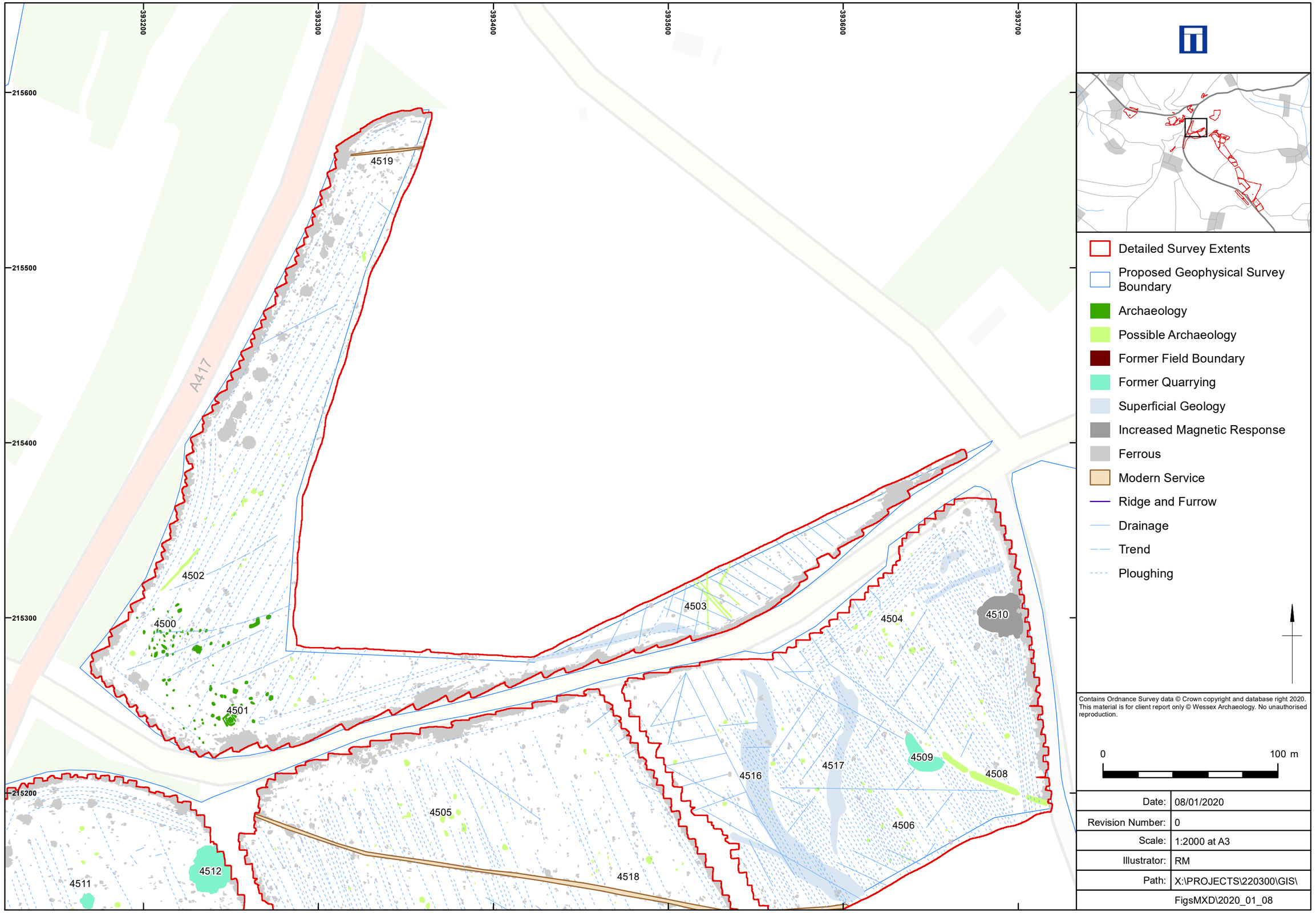
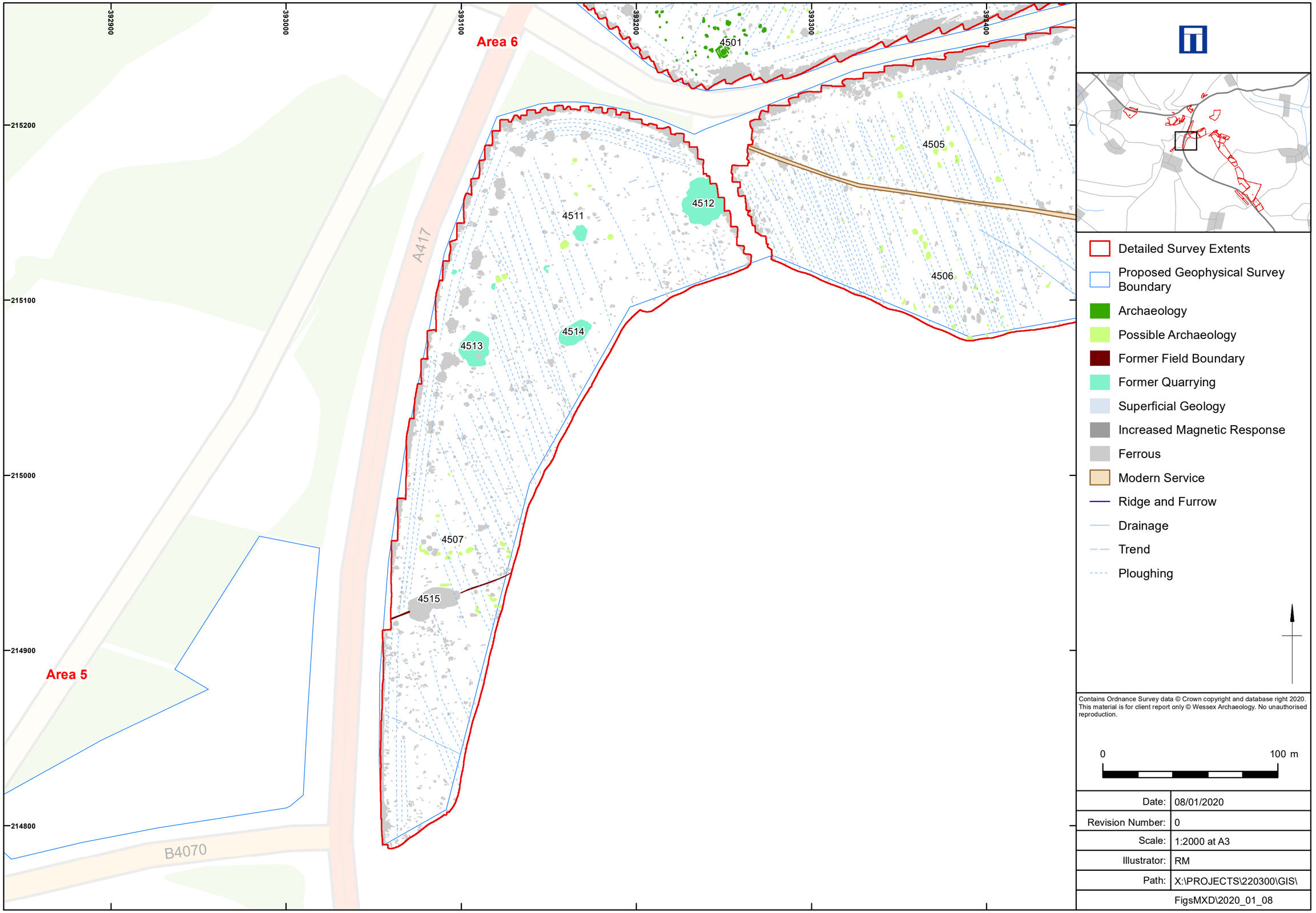
Detailed archaeological interpretation Area 5

Figure 29



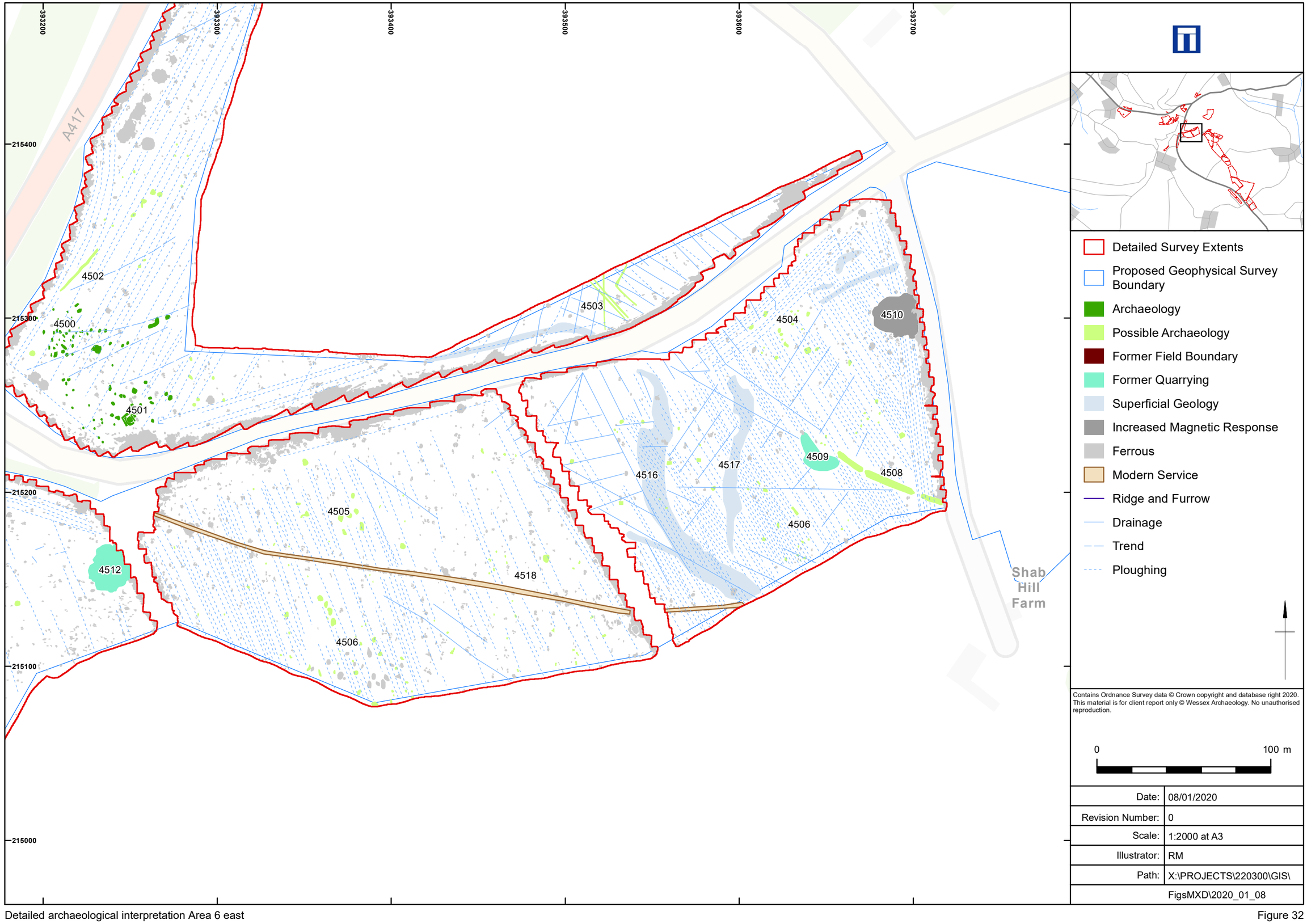
Detailed archaeological interpretation Area 6 north

Figure 30



Detailed archaeological interpretation Area 6 south

Figure 31



Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

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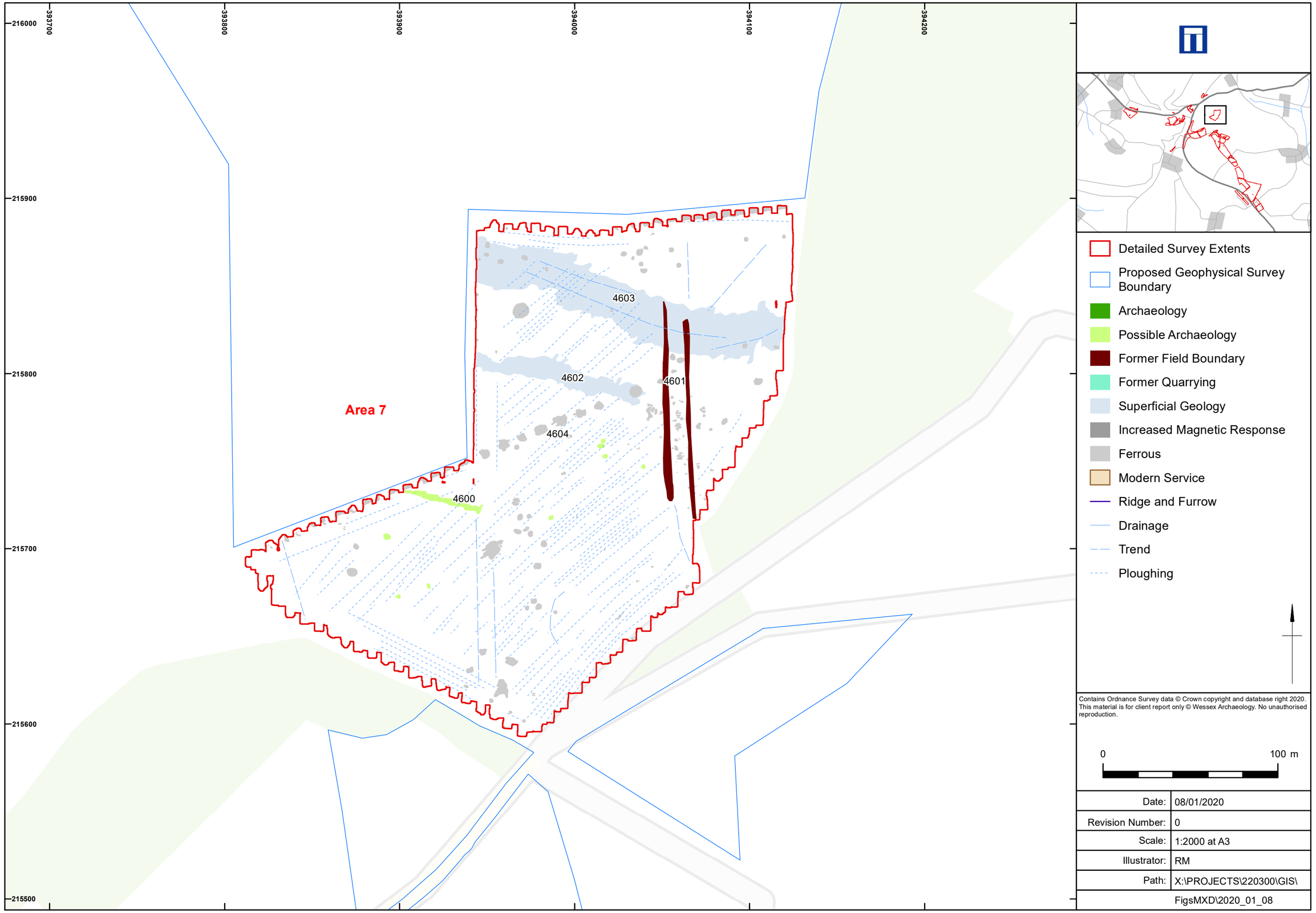
	FigsMXD\2020_01_08

Detailed archaeological interpretation Area 6 east

Figure 32



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Scale:	1:2000 at A3
Illustrator:	RM
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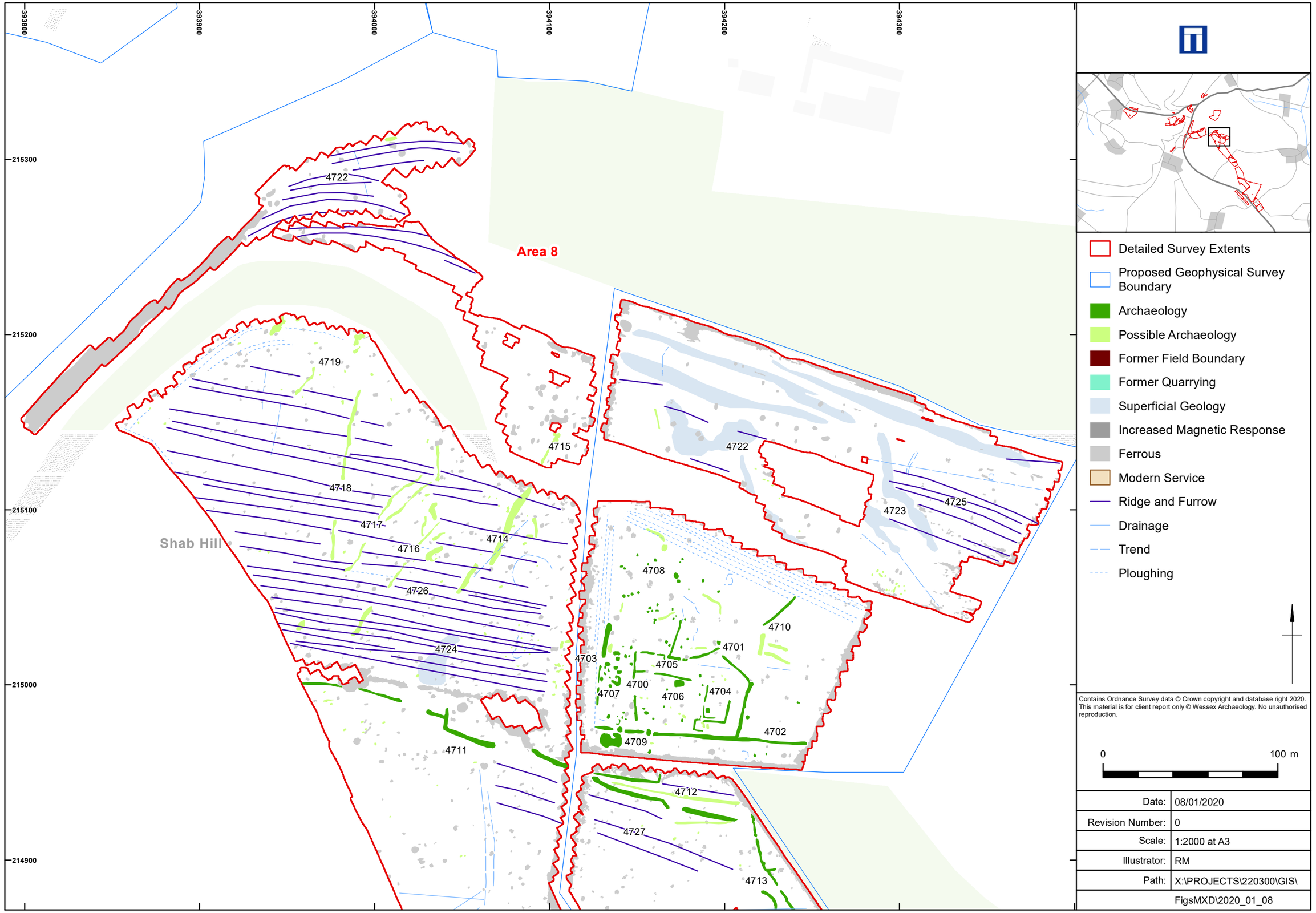
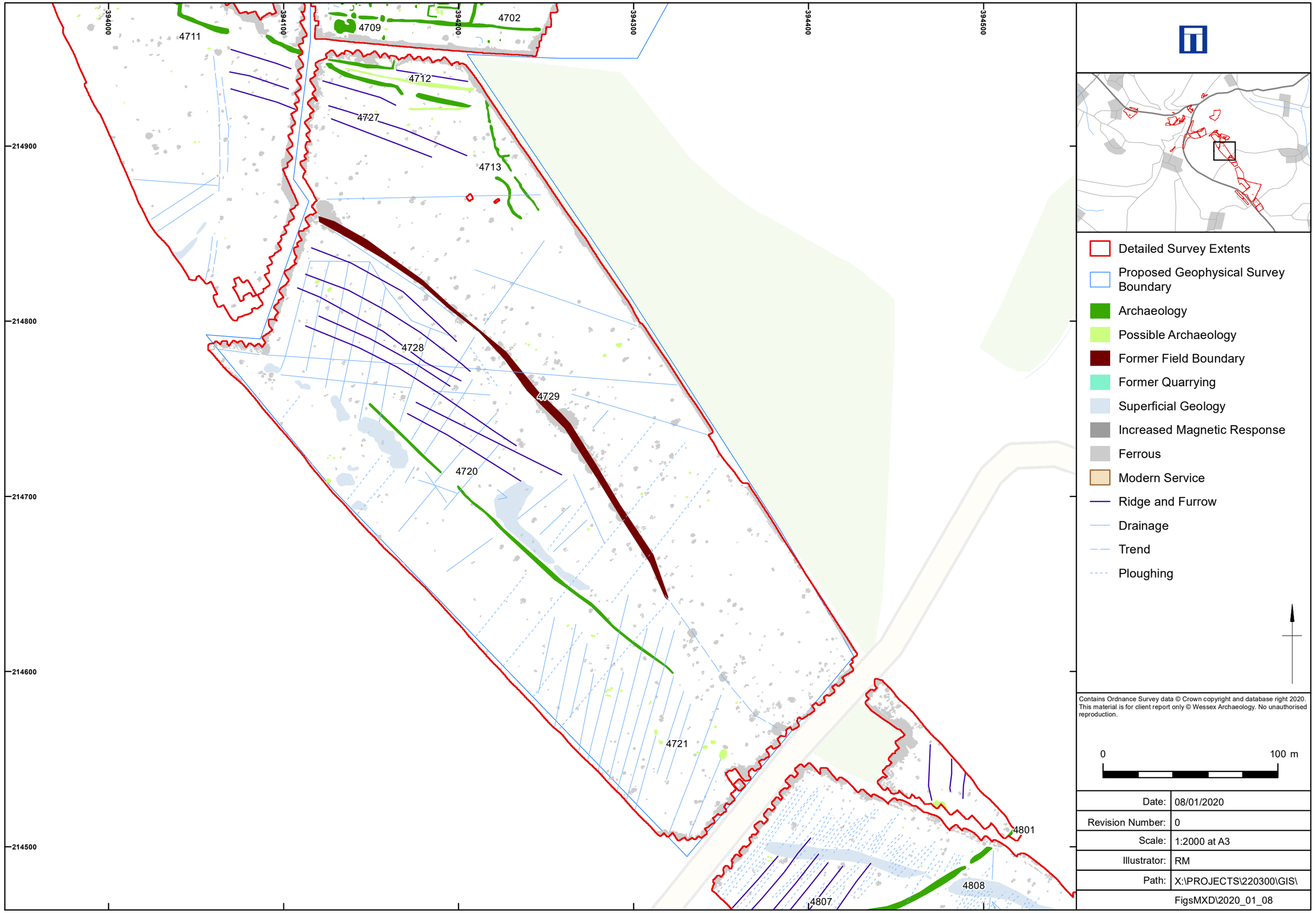
Detailed archaeological interpretation Area 7

Figure 33



Detailed archaeological interpretation Area 8 north

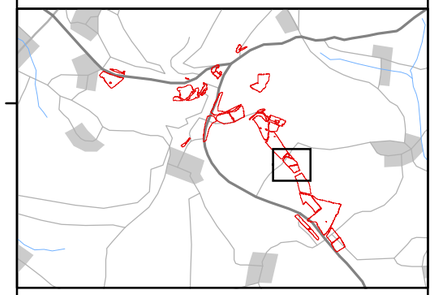
Figure 34



Detailed archaeological interpretation Area 8 south

Figure 35

394200
394300
394400
394500
394600
394700
214600
214500
214400
214300
214200
4721
4801
4808
4807
4800
4802
4815
4803
4815
4804
4805
4806
Area 9
4809



Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

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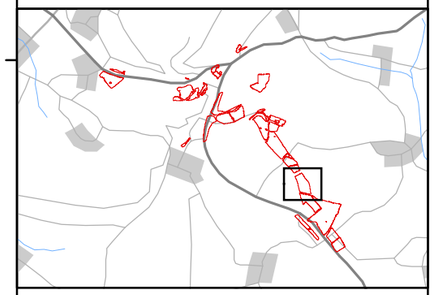
Detailed archaeological interpretation Area 9 north

Figure 36

394400
394500
394600
394700
394800
394900
214300
214200
214100
214000
213900
4805
4806
Area 9
4809
4811
4810
4814
4813
4812
4921



Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

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Detailed archaeological interpretation Area 9 south

Figure 37

394500
394600
394700
394800
394900
395000
214000
213900
213800
213700
213600
4814
4813
4812
4921
4900
4901
4902
4903
4908
4904
4905
4909
4910
4911
4912
4913
4914
4916
4915
4922
4929
Area 10
Nettleton Plantation
Castle Hill Cottage
A417

Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
Ploughing

0 100 m

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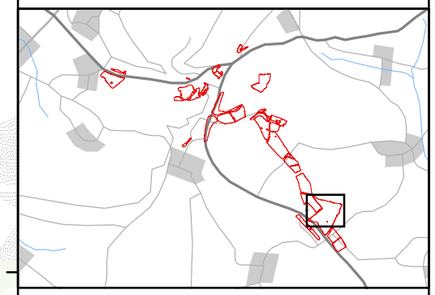
Detailed archaeological interpretation Area 10 north

Figure 38

394800
394900
395000
395100
395200
395300
213900
213800
213700
213600
213500
Harding's Barn
Area 10
4900
4901
4902
4903
4904
4905
4906
4907
4908
4909
4910
4911
4912
4913
4914
4915
4916
4917
4922
4929
4930
4931
4932
A417
A417



Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
Modern Service
Ridge and Furrow
Drainage
Trend
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0 100 m

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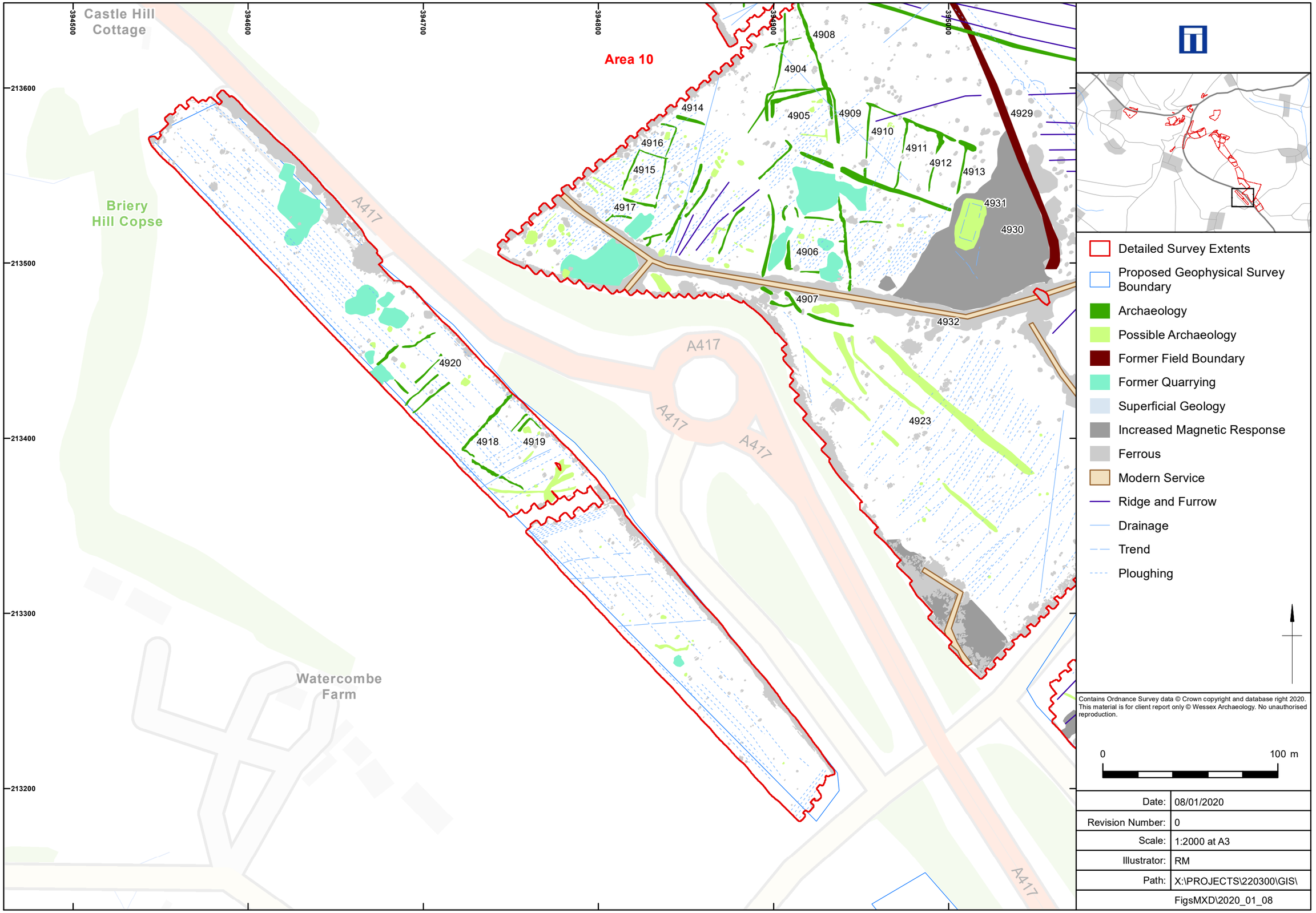
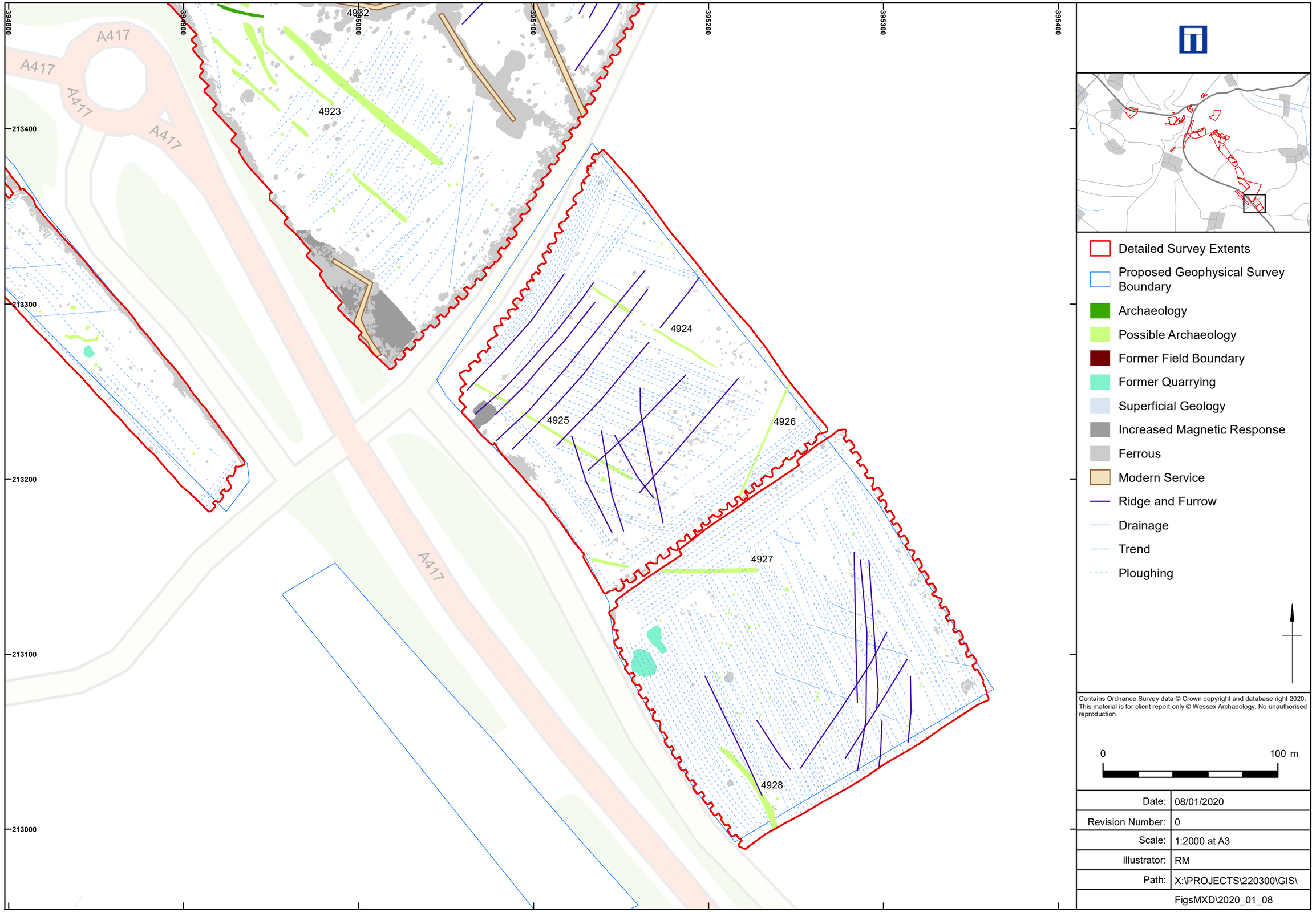
Detailed archaeological interpretation Area 10 east

Figure 39



Detailed archaeological interpretation Area 10 west

Figure 40



Detailed Survey Extents
Proposed Geophysical Survey Boundary
Archaeology
Possible Archaeology
Former Field Boundary
Former Quarrying
Superficial Geology
Increased Magnetic Response
Ferrous
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Ridge and Furrow
Drainage
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Detailed archaeological interpretation Area 10 south

Figure 41

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