



Greater Cambridge Partnership

CAMBOURNE TO CAMBRIDGE

Environmental Statement

Technical Report 7, Appendix TR7.2: Geophysical
Report

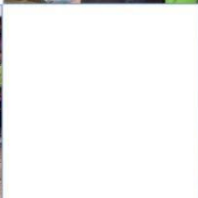
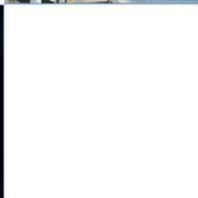


Cambourne to Cambridge Scheme Cambridgeshire Archaeological Geophysical Survey

National Grid Reference: TL 40125 59352 (centre)

AOC Project No:40331

Date: November 2022



AOC
Archaeology
Group

ARCHAEOLOGY

HERITAGE

CONSERVATION

Cambourne to Cambridge Scheme

Cambridgeshire

Archaeological Geophysical Survey

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National Grid Reference (NGR):	TL 40125 59352 (centre)
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This document has been prepared in accordance with AOC standard operating procedures.

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Non-Technical Summary

AOC Archaeology Group was commissioned by WSP to undertake archaeological geophysical gradiometer surveys to investigate the potential for buried archaeological remains ahead of the proposed development of the Cambourne to Cambridge Scheme (TL 40125 59352 (centre)). The scheme is being carried out as part of the Greater Cambridge Partnerships in advance of a proposed new busway and infrastructure between Cambourne (Figure1). The surveys were undertaken in April, August, and September 2022 to accommodate the arable ground conditions.

A total of 57.56 hectares were surveyed across 16 areas and the results of the survey have identified the following.

The gradiometer survey has successfully identified three concentrations of definite and probable archaeology across the scheme which are supported by evidence gathered in the Historic Environment Desk Based Assessment (HEDBA(WSP 2022)).

Elsewhere, possible archaeological responses have also been detected that have no supporting background information and suggest previously unknown archaeological sites.

Additional anomalies of an unclear origin have also been recorded. For the most part these are likely to be due to natural variations in the soils and agricultural activity, but archaeological origins cannot be wholly dismissed.

Several former field boundaries have been mapped which show good correlation with historic mapping.

Most of the datasets show the presence of past ridge and furrow cultivation, often providing magnetically strong responses showing that the soils and geology of the development area are very suitable for magnetic prospection.

The survey has shown the course of several potential utility pipes and drainage features and evidence of modern disturbance. In places the interference has been considerable and may have hidden or obscured coincident anomalies generated by archaeological deposits.

1 Introduction

- 1.1 AOC Archaeology Group was commissioned by WSP to undertake archaeological geophysical gradiometer surveys at predefined areas along the Cambourne to Cambridge Scheme, Cambridgeshire. The survey was conducted in April, August, and September 2002 as part of a wider scheme of archaeological assessment in advance of the proposed development.
- 1.2 Archaeological geophysical survey uses non-intrusive and non-destructive techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures, or deposits, as far as is reasonably possible (CIfA, 2020).
- 1.3 The survey was carried out to provide information on the extent and significance of potential buried archaeological remains within the proposed development Site.

2 Site Location and Description

- 2.1 The proposed busway development scheme (hereafter 'the Site') is located between Cambourne (TL 33102 59594) and Cambridge, Cambridgeshire (TL 43986 58230) (Figure 1). The scheme comprises the proposed construction of a 12km new busway from Cambourne to Cambridge, a new park & ride hub near Scotland Farm, a 2km new cycle/footpath from the new park & ride to Dry Drayton, together with new bridges with piled foundations over the M11 and Bin Brook, new junctions with existing roads, new bus stops, associated landscaping, drainage works/attenuation ponds and temporary works
- 2.2 The Site covers approximately 57.56 hectares (ha) across 16 discrete areas along the proposed scheme which occupy arable and pasture fields (Figure 2). The survey areas lie within a low-lying, gently undulating landscape, divided by broad, shallow valleys. It is generally lowest towards the east, within and around Cambridge. The land rises slightly to the west towards Coton and beyond, before dipping again beyond the Site, in association with the Bourn Valley to the south-west.
- 2.3 In the west of the Site superficial deposits of glacial till (Oadby Member, Diamicton) are underlain by Mudstone bedrock (Gault Formation). Within the centre of the Site, West Melbury Marly Chalk Formation is overlain by superficial deposits of glacial till (Oadby Member, Diamicton) in some areas. In the east of the Site the recorded bedrock geology is Mudstone bedrock of the Gault Formation with no significant superficial deposits, though River Terrace Sands and Gravels are indicated as overlying the bedrock at the far eastern end of the scheme. These are overlain by Lime-rich loamy and clayey soils with impeded drainage (Soilscapes, 2022).
- 2.4 Gradiometer survey is suggested to provide a good response over chalk and mixed responses over mudstones (David *et al.* 2008, 15). In this case, the clarity of the geophysical results were good, and the local geology was deemed not to have had a detrimental effect on the visibility of trends within the dataset.

3 Archaeological Background

- 3.1 The archaeological background below is summarised from the Historic Environment Desk-based Assessment (HEDBA) of the Site, undertaken in WSP (WSP 2022).
- 3.2 For the purposes of the HEDBA, the Site has been divided into five sections, from west to east:
 - Section 1 – Cambourne to Childerley Gate (2.5km);
 - Section 2 – Childerley Gate to Long Road (3.6km);
 - Section 3 – Scotland Farm to Dry Drayton (2.7km);

- Section 4 – Long Road to the M11 (3.2km);
- Section 5 – M11 to Grange Road, Cambridge (2.3km).

- 3.3 No geophysical survey has been carried out within Section 1 during this phase of survey due to land access availability and previous work already completed and as a result the HEDBA for Section 1 is excluded from the summary below.
- 3.4 The HEDBA has assessed a broad range of standard documentary and cartographic sources, including results from any archaeological investigations, within the Site and a 250m radius study area around it to determine the likely nature, extent, preservation and significance of any known or possible heritage assets that may be present within or adjacent to the Site.
- 3.5 The Site does not contain any nationally designated (protected) heritage assets, such as scheduled monuments or listed buildings.

Prehistoric (800,000 BC – AD 43)

- 3.6 Section 2 of the Site has moderate to high potential to contain prehistoric remains, most particularly Iron Age remains. There are no known finds or features predating the Iron Age within this section of the Site, a late Bronze Age/early Iron Age pit containing a burnt deposit has been recorded just outside the Site, and a Mesolithic colluvial deposit which possibly extended into the Site. Further Mesolithic to Early Neolithic activity is possible in the vicinity of the winterbournes (seasonal watercourses) where features may be sealed by colluvium, or occupation material may have been transported along with colluvial sediment. Historic aerial photographs have revealed a polygonal enclosure with a possible round house in the centre, and a second curvilinear enclosure, both thought to be part of a potential Iron Age or Romano-British settlement. Other past archaeological investigations have revealed evidence of possible occupation during the late Iron Age or early Roman period 160m south of the Site, as well as Iron Age or Roman enclosures and ditches 110m south and 170m north of the Site. It is possible therefore that remains dated to the Iron Age will be present within this section of the Site.
- 3.7 Section 3 of the Site has high potential to contain prehistoric remains, most particularly Iron Age remains. Two pits containing burnt deposits and late Bronze Age/early Iron Age pottery sherds have been recorded during archaeological investigations in the far southern end of the proposed park & ride Site. The same investigations recorded a series of early/middle Iron Age quarry pits, together with associated parallel ditches which also extended into the Site. Late Iron Age settlement activity has also been recorded during archaeological investigations 180m to the west of the park & ride Site. It is likely that further remains, most particularly Iron Age remains, will be present in the rest of the park & ride Site and potentially elsewhere in Section 3, though due to the limited nature of past archaeological investigation across Section 3, the potential across the area to the north of the park & ride Site is uncertain.
- 3.8 Section 4 of the Site has uncertain, but possibly moderate to high potential to contain prehistoric remains, most particularly Iron Age remains. During the Iron Age, the Site likely lay within a landscape which was dotted with small, ditched farmsteads and their associated field systems, including a late Iron Age/Romano-British settlement recorded during a past archaeological investigation 270m north of the Site (to the north of the A1303 near Brierly House). In addition, a curvilinear enclosure and associated ditches, thought to be of possible later prehistoric and/or Roman origin, have been identified on historic aerial photographs to the immediate south-west of Brierly House and extending into the Site. Evidence of late Neolithic/early Bronze Age occupation has also been found during archaeological investigations just outside Section 4 of the Site, 120–340m west of the Coton waterworks. The limited nature of archaeological investigation across this section of the Site, combined

with the prevalence of Iron Age remains across the rest of the Site and Study Area, makes it possible that such remains may be present.

- 3.9 Section 5 of the Site has moderate to high potential to contain prehistoric remains, most particularly Iron Age remains. Like Section 4, during the Iron Age, the Site likely lay within a landscape which was dotted with small, ditched farmsteads and their associated field systems, including a small Iron Age settlement and possible trackway were identified during an archaeological trial trench evaluation 40–250m north of the Site and evidence for Iron Age activity at the former Vicar's Farm 220m north of the Site. Geophysical survey has also revealed what were interpreted as multiple enclosures and ditches of possible late Iron Age/Roman date just outside the Site, 2-3 ditches seeming to extend into the Site itself. Furthermore, just outside the Site (30m to the south), human remains were found during the construction of a soakaway and later identified during archaeological salvage recording as a possible Bronze Age or Iron Age burial. Evidence of Iron Age pits and ditches has also been found during other archaeological investigations within the surrounding study area. There is also (albeit limited) evidence for activity prior to the Iron Age, from the Mesolithic period onwards.

Roman (AD 43 – 410)

- 3.10 Section 2 of the Site has high potential to contain Roman remains. Past archaeological investigations have revealed evidence of what was thought to be a substantial 1st to the 4th century Roman settlement within the Site, either side of Long Road (at the eastern end of Section 2 and the western end of Section 4). This is thought to extend beyond those areas already investigated. Past archaeological investigations have also revealed a Roman ladder settlement to the north-east of Childerley Gate. The remains which extended into Section 2 of the Site included three graves (one within the Site) and a large hoard of late 3rd century copper alloy coins 20m north of the Site. Further Roman remains are therefore likely within the Site.
- 3.11 Section 3 of the Site has uncertain, possibly moderate, potential to contain Roman remains. There are no known remains dating to this period within this section of the Site or the surrounding study area. Given the proximity to what is thought to be a former Roman road, the projected line of which lies 150m south of the south-eastern corner of the proposed park & ride Site, and the known remains from this period across other areas of the Site, it is possible that Roman remains may also be found in this section of the Site. However, Roman cultural material tends to be readily identifiable and abundant in the archaeological record. Therefore, the lack of activity in Section 3 suggests that this absence of evidence may be genuine and not simply a reflection of limited fieldwork.
- 3.12 Section 4 of the Site has high potential to contain Roman remains. As mentioned above, past archaeological investigations have revealed evidence of what was thought to be a substantial 1st to the 4th century Roman settlement within the Site, either side of Long Road (at the western end of Section 4 and the eastern end of Section 2). This is thought to extend beyond those areas already investigated. Further remains from this period may also be present elsewhere within Section 4 of the Site, including the area to the south-west of Brierly House where a curvilinear enclosure and associated ditches, thought to be of possible later prehistoric and/or Roman origin have been identified on historic aerial photographs.
- 3.13 Section 5 of the Site has high potential to contain Roman remains. There is a lot of evidence for Roman activity, including settlement activity, within and close to this section of the Site. This includes an important 4th century Roman settlement which was identified during an archaeological excavation in 1999–2000 at Vicar's Farm, 220m north of the Site and multiple enclosures and ditches of possible late Iron Age/Roman date identified during geophysical survey just outside the Site, 2–3 ditches seeming to extend into the Site itself. This section of the Site is also crossed by a former major Roman

road, Akeman Street, evidence for which has been found in past archaeological investigations 30m north of the Site, and possibly, 40m south of the Site, as well as on aerial photographs running through the Site. Further evidence for the Roman road, and associated roadside development, potentially burials, as well as other activity (farmsteads, field systems) may be found within the Site.

Early Medieval / Saxon (AD410-1066)

- 3.14 Section 2 of the Site has unknown potential to contain early medieval (Saxon) remains. There is no known evidence for activity during this period within Section 2 and the surrounding study area. There is the possibility of encountering hitherto unrecorded early medieval settlement especially from the 5th to 8th centuries, prior to the establishment of settlements recorded in the Domesday Book. The 1086 survey indicated that later Saxon settlement was centred around Childerley and Hardwick (with these settlements having households of 25 and 11 respectively), which would suggest that settlement derived in these villages prior to the later medieval period. It is likely that Section 2 was therefore in agricultural hinterlands associated with these settlements.
- 3.15 Section 3 of the Site has unknown potential to contain early medieval remains. Within Section 3 the only known find or feature that might potentially date to this period is an early/high medieval pin-beater, found in a linear feature during an archaeological trial trench evaluation at 31 Park Street, Dry Drayton, 160m north-east of the Site. Settlement at Dry Drayton is indicated to be 52 households in 1086, with Childerley indicated to have had 25 households in 1086, suggesting an early medieval origin for these settlements. Therefore, it is likely that Section 3 of the Site is situated within the agricultural landscape associated with these settlements. Though the lack of other evidence may be related to the limited nature of past archaeological investigation in this section of the Site and the surrounding study area, the paucity of evidence elsewhere in the Site and study area suggests low potential.
- 3.16 Section 4 of the Site has unknown potential to contain early medieval remains. There is no known evidence for activity during this period within Section 4 and the surrounding study area. Settlement has been identified at Madingley and Coton in the Domesday, with 28 and 11 households respectively in 1086. These suggest that the settlements derived prior to the later medieval period, and that the Site would have been part of the agricultural landscape associated with these settlements. Though the lack of other evidence may be related to the limited nature of past archaeological investigation in this section of the Site and the surrounding study area, the paucity of evidence elsewhere in the Site and study area suggests low potential.
- 3.17 Section 5 of the Site has unknown potential to contain early medieval remains. Archaeological investigations 70m south-east of the Site revealed early medieval drainage ditches and the partly in-turned entrance of a sub-circular enclosure. In addition, a small number of Anglo-Saxon burials (the 'Grange Road Skeletons') are recorded as having been found 230m south-west of the Site. A further Anglo-Saxon burial Site was found during archaeological trial trench evaluation at King's Garden hostel 230m east of the Site. These in combination with the Domesday Book highlighting 31 households in Cambridge in 1086, suggest some form of settlement activity in this part of Cambridge and it is possible that further remains may be found within the Site.

Later Medieval / Post medieval (AD1066-1540)

- 3.18 All sections of the Site have high potential to contain later medieval and/or post-medieval remains, most likely evidence of ridge & furrow and/or former field boundaries. The Site takes in an area known as the 'west fields of Cambridge' which, up to the late 20th century, survived as a single expanse of unbroken arable field. Extensive evidence of the presence of former ridge & furrow, which could date to either the later medieval or post-medieval period, together with former field boundaries, ditches and trackways, have been recorded from aerial photographs, geophysical survey and intrusive investigations across the Site and study area.

Modern

- 3.19 Sections 2-4 of the Site have low potential for modern remains of any significance. The vast majority of these sections are still in agricultural use, with the remaining located within the footprint of existing/modern roads.
- 3.20 Section 5 of the Site has moderate to high potential for the foundation remains of a former WW2 pillbox. The HER records a former WW2 pillbox which was located on the west bank of the Bin Brook. While no longer extant, it is possible that evidence of the pillbox, in the form of shallow buried foundations, may survive below ground level. Hangers, workshops and stores constructed in the early 1940's, operated by Short Sebro Ltd, were situated to the north and south of the Site. These were demolished in 1972 and their former position is now occupied by buildings belonging to the University's High Cross Campus.
- 3.21 Evidence of the former university rifle range, operating between the late 19th century and 1939, may also be present at the eastern end of Section 5. A linear anomaly, recorded during ASWYAS's 2018 geophysical survey, running from the 1000-yard firing point towards the target butts is likely to be associated with the operation of the range. Most likely, this was a field telephone connection allowing the Range Control Officer to control the raising/lowering of targets.
- 3.22 In the years immediately following the end of the Second World War the rifle range, having been abandoned since 1939, was selected as the Site for the University's first radio telescope. This facility comprised temporary structures, some of which are visible on post-war aerial photographs (HE, 2022). Following the decommissioning of the telescope, the target butts and bund at the western end of the range were demolished and returned to farmland. The eastern portion remains in use as training facilities for the University Rugby Club.

4 Aims

- 4.1 The aim of the geophysical survey was to identify any potential archaeological anomalies that would enhance the current understanding of the archaeological resource within the proposed survey area.
- 4.2 Specifically, the aims of the gradiometer survey were;
- To locate, record and characterise any surviving sub-surface archaeological remains within the survey area,
 - To provide an assessment of the potential significance of any identified archaeological remains in a local, regional and (if relevant) national context,
 - To produce a comprehensive Site archive (Appendix 1) and report.

5 Methodology

- 5.1 The geophysical survey was undertaken in April, August, and September 2022
- 5.2 All geophysical survey work was carried out in line with ClfA guidance (2020), and was carried out in adherence to an approved WSP WSI (2022 (Feb)) and also in line with the Cambridgeshire Historic Environment Team (HET) Brief for archaeological evaluation (Gdaniec, K., 2022) and recommended good practice specified in the EAC guideline documents published by Historic England (Schmidt et al. 2016).
- 5.3 Parameters and survey methods were selected that were suitable for the prospective aims of the survey and in accordance with recommended professional good practice (Schmidt et al. 2016).

- 5.4 Digital photographs of each survey area were taken before, during and after geophysical survey to show any changes to field conditions following the programme of works. The photos were downloaded and stored off Site.
- 5.5 The gradiometer survey was carried out using a Bartington Non-Magnetic Cart. The cart system utilises six Grad-01 fluxgate gradiometer sensors mounted upon a carbon fibre frame 1m apart, along with data logging equipment and batteries (see Appendix 2). Before each session of use, the cart system was balanced around a single set up point within the Site specifically chosen for being magnetically quiet. In balancing the machine around this point, it produces a more uniform dataset throughout and allows all data to be plotted with ease.
- 5.6 Data was collected using zig-zag traverses alongside a constant stream of GPS data collected through a Trimble R10 GPS, enabling the collected data to be spatially georeferenced without the need for a pre-determined grid system. The data was collected through a laptop mounted to the cart using Geomar MLGrad601 software.
- 5.7 A total of 57.56 ha were surveyed using the Bartington cart.
- 5.8 Care was taken to attempt to avoid metal obstacles present within the survey area, such as metal fencing around hedge boundaries as gradiometer survey is affected by 'above-ground noise' and avoiding these improves the overall data quality and results obtained.
- 5.9 The data was downloaded from MLGrad601 and converted into a .xyz file in Geomar MultiGrad601 before being processed along with the GPS data in TerraSurveyor v3.0.34.10. The details of these processed can be found in Appendices 2 and 3.
- 5.10 Interpretations of the data were created in ArcGIS Pro and the technical terminology used to describe the identified features can be found in Appendix 4.

6 Results and Interpretation

- 6.1 The gradiometer survey results have been visualised as greyscale plots and XY traces. Overview greyscale images of the processed data is provided in Figures 3.1 – 3.5 at a scale of 1:5000, with accompanying summary interpretations provided in Figures 4.1 – 4.5. The processed data is plotted at -1nT to 2nT as a scale of 1:1250 in Figures 5.1 – 5.16. Interpretations of the data can be seen in Figures 6.1 – 6.16. The minimally processed data is displayed as XY traces plotted at 40nT per cm in Figures 7.1 – 7.16.
- 6.2 For the most part, only trends of a possible archaeological or historical origin have been assigned an anomaly letter on the interpretation figures. Trends that are integral to the discussion have also been assigned anomaly letters. The anomaly ID letter is prefixed with the Area number indicated on Figure 2.

Area 1, Section 3(Figures 3.1, 4.1, 5.1-5.4, 6.1-6.4, 7.1-7.4)

- 6.3 Area 1 is a narrow strip no more than 40m wide running parallel to Scotland Road. Interpretation of narrow strips of data is cautious as the limited extent of the survey prevents a full appreciation of the background levels of magnetic response and the effect of natural variations in the underlying geology/topography and agricultural disturbance. This is further compounded by a modern service running through the southern half of the survey area.

Definite and Probable Archaeology

- 6.4 No anomalies of a definite or probable archaeological origin have been identified.

Possible Archaeology

- 6.5 No anomalies suggestive of a possible archaeological origin have been identified.

Unclear Origins

- 6.6 Several linear trends [1A] and [1B] have been highlighted in the north of Area 1 as having unclear origins. There is the possibility that they represent the remains of enclosure features, though it is probable that these anomalies are due to ploughing.
- 6.7 The magnetically strong anomaly [1C] may be a burnt feature associated with occupation, though a ferrous and modern origin is probable hence it being classified as having an unclear origin.
- 6.8 Several discrete areas of enhanced magnetism have been noted throughout the survey area. The origin of these is unclear. While an archaeological origin cannot be dismissed, they form no coherent pattern and are equally likely to be due to natural variations or more deeply buried ferrous material.

Agricultural

- 6.9 Parallel linear trends aligned broadly east-west and north-south have been identified throughout the survey area and have been produced by agricultural activity. Given the narrow width of the survey area it is not clear if they are due to modern ploughing or possibly past ridge and furrow cultivation. However the form of the trends suggests that some of those aligned east-west are due to past ridge and furrow cultivation, while other and those aligned north-south are due to modern ploughing.
- 6.10 The 1st Edition OS map of 1888 shows this field was subdivided into four land parcels. None of these former field boundaries have been clearly identified in the data. However, they are on the same alignment as the postulated ridge and furrow cultivation.

Non - Archaeology

- 6.11 Magnetic disturbance from a modern service dominates the results in the southern half of the survey area while a pipe or highly magnetic material in the adjacent boundary has produced similar interference at the survey's northern limit.
- 6.12 Magnetic disturbance along the western limits of the area is due to ferrous material in and adjacent to the field boundary.
- 6.13 Scattered, small scale ferrous objects of likely modern origin are present throughout the survey area.

Area 2, Section 3(Figures 3.2, 4.2, 5.5-5.6, 6.5-6.6, 7.5-7.6)

Definite and Probable Archaeology

- 6.14 No anomalies indicating the presence of definitive or probable archaeological remains have been identified within the dataset.

Possible Archaeology

- 6.15 A group of linear responses and trends [2A], of varying magnetic strength, have been detected in the western half of the survey. They suggest fragments of enclosure ditches and the possible focus of a former settlement. However, the interpretation remains cautious as it is noted that the anomalies align with modern boundaries and drainage features hence it being categorised as possible archaeology rather than probable archaeology.

Unclear Origins

- 6.16 Weaker linear trends [2B] apparently associated with [2A] are also apparent within the data. However, these have been noted as having an unclear origin due to their weaker nature and the ambiguity of their origin which could be due to modern agricultural activity.

- 6.17 Additional trends [2C] and discrete areas of magnetic enhancement [2D] have also been noted. The origin of these is unclear as they form no coherent archaeological pattern and may be due to modern agricultural activity and natural variations and / or more deeply buried ferrous material, respectively.

Agricultural

- 6.18 Two linear trends have been identified running northeast to southwest through the dataset [2E]. When cross referenced with historical mapping from 1888; the trend has been confirmed as a former field boundary (NLS, 2022). Enhanced magnetism surrounding the former boundary likely relates to material from the feature having been ploughed out into the surrounding subsoil.
- 6.19 A linear zone of enhanced magnetism in the north-west of the dataset [2F] correlates with the location of a former farm building visible on historical mapping from 188 to 1961 (NLS, 2022). However the nature of the response suggests a likely track that potentially led to a small, now demolished, structure or infilled pond at the edge of the survey area, although no such feature is depicted on historic mapping.
- 6.20 In the eastern half of the survey area widely spaced parallel trend suggestive of past ridge and furrow cultivation are apparent in the data. However, there is some caution to such an interpretation as some of the responses are more consistent with modern field drains. Some clear land drains have been detected in the northeast of the survey area.
- 6.21 Parallel linear trends aligned NW-SE and SW-NE have been highlighted. These run parallel to existing field boundaries and are assumed to be due to modern ploughing.

Non - Archaeology

- 6.22 Magnetic disturbance due to a modern service extends along the northwest edge of the survey area.
- 6.23 Magnetic interference is evident along all field boundaries due to adjacent field boundaries and associated ferrous debris.
- 6.24 A moderate to high level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 3, Section 3 (Figures 3.2, 4.2, 5.7, 6.7, 7.7)

Definite and Probable Archaeology

- 6.25 A double ditched polygonal enclosure [3A] with a possible round house in the centre [3B] has been detected midway along the northern limits of this survey area. This corresponds with the features described in the HEDBA thought to be part of an Iron Age or Romano-British settlement complex.
- 6.26 Further anomalies indicate two well-defined enclosures [3C] immediately to the north of the polygonal enclosure [3A].
- 6.27 Additional other smaller responses [3D] suggest possible pit features and internal subdivisions within the complex.

Possible Archaeology

- 6.28 Several additional discrete zones of enhanced magnetism [3E] have been detected by the survey. These are noted as having a possible archaeological origin due to their more ephemeral and amorphous form but are highly likely to be associated with the enclosure complex discussed above. Discrete pit type response [3F] have also been noted which may indicate archaeological deposits.

Unclear Origins

- 6.29 A few weaker, more amorphous zones of enhancement and pit type anomalies [3G] and trends [3H] have been noted but interpretation of these responses is less confident; they could be due to natural variations or modern agriculture.
- 6.30 The origin of the two parallel trends [3I] in the east of the area is unclear. It is likely that they are associated with past ridge and furrow cultivation which has been detected to the south east, but they may have an earlier archaeological origin, or be due to more recent agricultural activity.

Agricultural

- 6.31 Several linear trends orientated broadly north-south are shown on the interpretation diagram. Two groups of slightly curving, more widely spaced, trends have been highlighted which are believed to be associated with past ridge and furrow cultivation. Weaker trends parallel to the modern field boundaries are due to modern ploughing.

Non - Archaeology

- 6.32 A pipe skirting the north-eastern edge of the survey area probably relates to adjacent housing and further inference coincides with boundary fences.
- 6.33 A small number of isolated dipolar anomalies (ferrous / iron spikes) are visible in the dataset and likely modern in origin.

Area 4, Section 4 (Figures 3.3, 4.3, 5.8-5.9, 6.8-6.9, 7.8-7.9)

- 6.34 Area 4 is divided into two parts by a narrow boundary.

Definite and Probable Archaeology

- 6.35 Part of a settlement complex has been identified on the eastern edge of the survey area and is related to 1st to 4th century Roman occupation recorded either side of Long Road, as detailed in the HEDBA.
- 6.36 The survey has detected several linear features [4A] of varying magnetic strength forming enclosures and subdivisions.

Possible Archaeology

- 6.37 An anomalous region [4B] of enhanced magnetism has been detected in the centre of the enclosure complex discussed above and may represent pit features and other archaeological deposits indicating a focus of occupation.
- 6.38 Several additional linear trends [4C] have been detected which are very likely to be part of the settlement complex discussed above, but are slightly less well-defined.

Unclear Origins

- 6.39 A few linear responses and trends [4D] have been detected to the west and north of the settlement complex and may have been produced by associated field systems. However, for the most they are ill defined and could well be due to more recent agricultural activity.
- 6.40 To the south of the settlement complex an ephemeral circular trend [4E] is just discernible in the data together with a larger curving trend. The origin of this is unclear. While an archaeological cannot be dismissed, they may simply be due to modern agricultural activity.
- 6.41 Additional weak trends and areas of increased magnetic response have been noted. The origin of these is unclear but it is likely that they are due to natural variations and recent agricultural activity.

Agricultural

- 6.42 A fragmentary linear trend [4E] has been identified running approximately north-south through the southeast of the survey area. When cross referenced with historical mapping from 1888; the trend has been confirmed as a former field boundary (NLS, 2022).
- 6.43 Magnetically strong and closely spaced ridge and furrow features broadly aligned east-west are in evidence throughout Area 4. A very clear 20m gap in the features in the east of the area may show the course of a former trackway or boundary associated with the ridge and furrow.
- 6.44 Weak parallel trends which run parallel to the extant field boundaries are due to modern ploughing.

Non - Archaeology

- 6.45 Ferrous disturbance has been generated by adjacent boundary fences, modern drainage features, and electricity poles.
- 6.46 A low level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 5, Section 4 (Figures 3.3, 4.3, 5.94, 6.9, 7.9)

Definite and Probable Archaeology

- 6.47 A ditched type of response [5A] is a continuation of the settlement complex identified in Area 4 to the west.

Possible Archaeology

- 6.48 An additional linear trend [5B] has been detected which runs parallel to trend [5A] and is likely to be part of the settlement complex. However, it has been noted as only being of a possible archaeological origin as it may be a former field division associated with the ridge and furrow cultivation.

Unclear Origins

- 6.49 The linear trend [5C] may have an archaeological origin and be part of a wider field system associated with the settlement complex. However, it has been categorised as having an unclear origin as it may have an agricultural origin.
- 6.50 Given the proximity of the archaeological complex, a region of increased magnetic response [5D], in the eastern half of the dataset, may indicate where archaeological features have been lost to ploughing, particularly given the strength of the ridge and furrow responses in the immediate area. However, it should be noted that the likely explanation for this increased enhancement is modern debris or localised natural variations in the soils.

Agricultural

- 6.51 The survey has mapped well-defined linear trends from past ridge and furrow cultivation on two distinct alignments indicating past land parcels.
- 6.52 Weak parallel trends which run parallel to the extant field boundaries are due to modern ploughing.

Non - Archaeology

- 6.53 A broad area of magnetic disturbance in the north-eastern part of the survey area is due to a possible pipe and an apparent reservoir facility immediately to the north of Area 5.
- 6.54 A moderate level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 6, Section 4 (Figures 3.3, 4.3, 5.10, 6.10, 7.10)

Definite and Probable Archaeology

- 6.55 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.56 No anomalies indicating the presence of possible archaeological remains have been identified in the dataset.

Unclear Origins

- 6.57 Four linear trends [6A] have been detected and highlighted. While an archaeological origin cannot be dismissed for these trends, they are most likely to represent modern disturbance and agricultural activity.

Agricultural

- 6.58 North-south aligned ridge and furrow cultivation can be seen to extend across the whole dataset.
- 6.59 Weaker linear trends aligned north-south, east-west, and parallel to the eastern boundary are due to modern ploughing.
- 6.60 The nature of the linear trend [6B] is consistent with a field drain but could be a modern service.

Non - Archaeology

- 6.61 A substantial anomaly generated by a modern service runs east-west across the northern part of the survey area.
- 6.62 A low level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 7, Section 4 (Figures 3.3, 4.3, 5.10-5.11, 6.10-6.11, 7.10-7.11)**Definite and Probable Archaeology**

- 6.63 No anomalies considered to have a definite or probable archaeological origin have been identified.

Possible Archaeology

- 6.64 No anomalies considered to be of possible archaeological interest have been identified.

Unclear Origins

- 6.65 A weak curving trend [7A] has been noted in the centre of the survey area. While archaeological origin is possible, but it may be due to natural variations or recent agricultural activity. The magnetic disturbance due to the ferrous pipe running through the area together with a generally elevated level of background response is limiting confidence in interpretation.
- 6.66 Trends [7B] in the west of the area have been noted as having an unclear origin but are most likely to be associated with agricultural activity.

Agricultural

- 6.67 A number of linear trends on two orthogonal orientations are thought to relate to agricultural activity. Some of the trends aligned NNW-SSE may be due to ridge and furrow cultivation but given the elevated level of background response and the fact they are parallel to the modern ploughing means they cannot confidently be categorised as such.

Non - Archaeology

- 6.68 A strong ferrous response shows a continuation of the pipeline from Area 6 running NW-SE from the reservoir immediately north of Area 5. The level of interference is extensive, and any responses produced by archaeological features in this area will be masked by the disturbance,
- 6.69 The level of background magnetic response appears to be elevated when compared to the results from Area 6. Different agricultural practises may account for this, or possibly magnetically enhanced material may have been imported from elsewhere.

Area 8, Section 4 (Figures 3.3, 4.3, 5.11, 6.11, 7.11)

Definite and Probable Archaeology

- 6.70 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.71 No anomalies indicating the presence of possible archaeological remains have been identified in the dataset.

Unclear Origins

- 6.72 Two short linear responses [8A] has been detected in the south-eastern corner of the survey area. While an archaeological origin for these cannot be dismissed, it is likely that they are associated with recent agricultural activity.

Agricultural

- 6.73 The short negative linear trend [8B] corresponds with a linear feature on the 1:25000 OS maps of 1937 – 1961 and appears to be part of an area of regular plating, most likely an orchard (NLS, 2022).
- 6.74 Linear anomalies consistent with past ridge and furrow cultivation have been detected on a NW-SE alignment in the east of the survey area.

Non - Archaeology

- 6.75 A band of magnetic disturbance extending across the northern part of the survey area coincides with surface debris and disturbance visible on aerial photographs. A pile of debris has resulted in a small gap in the data where survey could not be undertaken.
- 6.76 As with Area 7, which is within the same field, the level of background magnetic response appears to be elevated. Different agricultural practises may account for this, or possibly magnetically enhanced material may have been imported from elsewhere.

Area 9, Section 4 (Figures 3.3, 4.3, 5.11-12, 6.1112, 7.11-12)

Definite and Probable Archaeology

- 6.77 The results show a dense complex [9A] of linear and curvilinear responses, of varying magnetic strength, in the western half of the dataset. They suggest the presence of enclosures; perhaps a possible ladder settlement. This does not appear to have been identified in the HEDBA or recorded within the Cambridgeshire HER but is highly probable to be archaeological in origin based on the form and nature of the anomalies.
- 6.78 Interpretation is complicated by the heightened level of background magnetic response, which may be due to partial plough damage of archaeological features, and the identical alignment of past ridge and

furrow cultivation and modern agricultural disturbance. Due to this uncertainty several anomalies have been categorised as being of a possible archaeological origin.

Possible Archaeology

- 6.79 The linear and curvilinear trends [9B] are highly likely to be part of the enclosure complex discussed above but have been classified as possible archaeology due to ambiguity caused by possible ridge and furrow cultivation and modern ploughing which have comparable alignments.
- 6.80 Several discrete areas of enhanced magnetism have been recorded within the complex and appear to suggest the foci of occupation activity [9C]. However, they could be due to natural variations indicating a north extension to possible natural responses discussed below (para 6.83)
- 6.81 A weak, but well-defined, rectilinear trend [9D] has been detected in the southeast of the survey area. The form of this response suggests an archaeological origin. Its alignment is not consistent with the complex discussed above and it is unlikely to be contemporary.

Unclear Origins

- 6.82 Several linear trends [9E] have been identified as having unclear origins. These are less well defined and may be due in part to past agricultural activity, although an archaeological origin for some cannot be excluded.
- 6.83 A swathe of discrete areas of magnetic enhancement [9F] have been detected immediately to the south of the enclosure complex. The origin of these is unclear. They may indicate *in-situ* or plough damaged archaeological deposits. However, the form is also consistent with natural variations in the subsoil or superficial deposits. They appear to coincide with a broad crop / soil mark visible in aerial photographs.

Agricultural

- 6.84 Parallel trends aligned northwest to southeast extend across the Site. These are consistent with agricultural activity may be due to past ridge and furrow cultivation but given the elevated level of background response and the fact they are parallel to the modern ploughing means they cannot confidently be categorised as such.

Non - Archaeology

- 6.85 Strong magnetic disturbance from the ferrous pipe previously recorded in the fields to the west extends across the north-eastern corner of the dataset.
- 6.86 A high level of isolated ferrous responses has been noted which primarily indicate a spread of modern ferrous or fired material in the topsoil. However, some of the ferrous responses in close proximity to the recorded archaeological anomalies may have older origins.

Area 10, Section 4 (Figures 3.4, 4.4, 5.11-5.12, 6.11-6.12, 7.11-7.12)

Definite and Probable Archaeology

- 6.87 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.88 No anomalies indicating the presence of possible archaeological remains have been identified in the dataset.

Unclear Origins

- 6.89 One magnetically weak linear anomaly **[10A]** has been detected in the northern part of the survey area. While an archaeological origin cannot be dismissed, it is insubstantial and may be modern/agricultural in origin.
- 6.90 A group of linear trends **[10B]** have been detected in the east of the area. While the form suggests a possible weak enclosure, it is highly likely that these are due to agricultural activity.

Agricultural

- 6.91 A linear trend has been identified running east-west through the centre of the survey area **[10C]**. When cross referenced with historical mapping from 1888, the trend has been confirmed as a former field boundary (NLS, 2022). Enhanced magnetism surrounding the former boundary likely relates to material from the feature having been ploughed out into the surrounding subsoil.
- 6.92 A number of linear trends have been identified aligned northwest to southeast. These are consistent with agricultural activity may be due to past ridge and furrow cultivation but given the elevated level of background response and the fact they are parallel to the modern ploughing means they cannot confidently be categorised as such.

Non - Archaeology

- 6.93 A ferrous pipe extending across the southern part of the dataset has caused widespread interference. A smaller pipe runs along the boundary at the eastern limit of the survey area.
- 6.94 The level of background magnetic response appears to be elevated. Different agricultural practises may account for this, or possibly magnetically enhanced material may have been imported from elsewhere.

Area 11, Section 4 (Figures 3.4, 4.4, 5.13, 6.13, 7.13)

Definite and Probable Archaeology

- 6.95 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.96 No anomalies indicating the presence of possible archaeological remains have been identified in the dataset.

Unclear Origins

- 6.97 Three weak linear trends **[11A]** have been detected in the northern part of the dataset. However, they are thought more likely to be due to modern disturbance and ploughing.

Agricultural

- 6.98 A number of linear trends have been identified aligned northwest to southeast. These are consistent with agricultural activity may be due to past ridge and furrow cultivation but given the elevated level of background response and the fact they are parallel to the modern ploughing means they cannot confidently be categorised as such.

Non - Archaeology

- 6.99 A triangular region of magnetic disturbance at the western end of the survey area was generated by two ferrous pipes converging on the south-western corner of the Site.
- 6.100 The level of background magnetic response appears to be elevated. Different agricultural practises may account for this, or possibly magnetically enhanced material may have been imported from elsewhere.

Area 12, Section 4 (Figures 3.4, 4.4, 5.13, 6.13, 7.13)**Definite and Probable Archaeology**

- 6.101 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.102 A linear anomaly [12A], comprising several linear trends and linear zones of enhanced magnetism, crosses the southern half of the survey area on an WSW-ENE alignment and continues into Area 13 immediately to the east. The data suggest a possible double ditched feature. However, the response is fragmentary and could be due to a more recent field boundary and associated track. Although no such feature is indicated on historic mapping, the anomaly does appear to be an extension of extant field boundaries to the west.

Unclear Origins

- 6.103 A well-defined band of increased magnetic response [12B], measuring some 15m wide, runs parallel and adjacent to the western boundary. The origin of this response is unclear. It may indicate the Site of a headland, a boundary, or the surface of a former trackway although no such feature is indicated on past mapping. It may be a natural feature but there are no indications of it continuing across the field to the north as might be expected.
- 6.104 Narrow zones of magnetic enhancement [12C] have been detected in the east of the survey area. These may be due to ridge and furrow cultivation although they are stronger and broader than the trends noted. They may simply be due to the migration of field.
- 6.105 A few well-defined pit-like anomalies [12D] have been detected in the southeast of the survey area. The origin of these is unclear but they may be due to past chalk extraction as old chalk pits are recorded on the OS mapping from 1888 (NLS, 2022). However, they may simply be due to natural variations or more deeply buried ferrous material.

Agricultural

- 6.106 Anomalies associated with ridge and furrow cultivation are present across the dataset and are aligned northwest to southeast.
- 6.107 Additional, weaker, parallel trends which respect the modern field boundaries are apparent in the data and are due to modern ploughing.

Non - Archaeology

- 6.108 Magnetic disturbance is visible along the southern limits of the survey area and is likely to be due to debris related to adjacent gardens, houses, and associated services.
- 6.109 A moderate level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 13, Section 4 (Figures 3.4, 4.4, 5.14, 6.14, 7.14)**Definite and Probable Archaeology**

- 6.110 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.111 The linear trend identified in Area 12 continues eastward **[13A]** across the entire width of Area 13. As discussed above, the data suggests a possible double ditched feature. However, the response is fragmentary and could be due to a more recent field boundary and associated track.

Unclear Origins

- 6.112 Several well-defined pit-type responses **[13B]** have been identified and are noticeably confined to the south of the linear anomaly **[13A]**. These are noted as having an unclear origin as an archaeological interpretation remains cautious. They may be due to past chalk extraction but could have been produced by ferrous debris buried at greater depth, modern disturbance, natural variations.

Agricultural

- 6.113 Intermittent linear trends running northwest to southeast throughout the survey area are believed to be remnants of past ridge and furrow cultivation.
- 6.114 Weaker trends, parallel to the modern field boundaries, are due to modern ploughing.

Non - Archaeology

- 6.115 Magnetic disturbance is visible along the various angles of the southern boundary and is due to fencing and adjacent infrastructure.
- 6.116 A moderate level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 14, Section 5 (Figures 3.5, 4.5, 5.15, 6.15, 7.15)

Definite and Probable Archaeology

- 6.117 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.118 No anomalies indicating the presence of possible archaeological remains have been identified in the dataset.

Unclear Origins

- 6.119 A partially ferrous anomaly **[14A]** runs southwest to northeast across the western end of the survey area. It appears to be a boundary as it relates to a change in the direction of ridge and furrow features discussed below. However, such a boundary is not indicated on historic mapping hence it being classified as having an unclear origin.
- 6.120 The origin of the linear trend **[14B]** in the east of the area is unclear. The geometry of the response is suggestive of a field drain, but an archaeological origin cannot be wholly excluded.

Agricultural

- 6.121 Two sets of ridge and furrow have been detected. Those in the west are aligned NW-SE while those in the east run SW-NE.
- 6.122 Weaker trends on broadly east-west and north-south alignments are associated with modern agricultural activity.

Non - Archaeology

- 6.123 Several quite large ferrous responses, presumed to be modern in origin, have been recorded. These are likely to be associated with previous use of the area.
- 6.124 A band of interference along the southern boundary is due to the presence of a modern service.

- 6.125 A high level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 15, Section 5 (Figures 3.5, 4.5, 5.15, 6.15, 7.15)

Definite and Probable Archaeology

- 6.126 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.127 A very well defined curving linear anomaly [15A] has been recorded in the south-eastern corner of dataset and is thought to relate to part of an enclosure or ring-ditch. The HEDBA indicates that extensive pre-historic and Roman archaeological deposits were encountered during building on land immediately to the north of the survey area and it is thought that [15A] is part of a larger complex of features. However, given the limited size of the survey area and the elevated level of background response it has been classified as having a possible, rather than a probable, archaeological origin.

Unclear Origins

- 6.128 The dataset from this survey area has a high level of background magnetic response which complicates interpretation as only the clearly distinguished responses will be identified. No anomalies of an unclear origin have been identified.

Agricultural

- 6.129 Clearly defined linear trends running east-west indicate the course of former ridge and furrow cultivation.
- 6.130 Negative trends aligned north-south are thought to potentially indicate field drains.

Non - Archaeology

- 6.131 Strong magnetic disturbance along the southern boundary in has been produced by a ferrous pipe.
- 6.132 Further interference has been detected along the western and northern boundaries.
- 6.133 A high level of isolated ferrous responses has been noted which indicate a spread of modern ferrous or fired material in the topsoil.

Area 16, Section 5 (Figures 3.5, 4.5, 5.16, 6.16, 7.16)

- 6.134 A number of gaps in the survey data are due to mature trees; until recently the area had been overgrown suggesting that the fields had been out of use for some time.

Definite and Probable Archaeology

- 6.135 No anomalies indicating the presence of definitive or probable archaeological remains have been identified in the dataset.

Possible Archaeology

- 6.136 An apparent oval double ditched enclosure [16A] has been recorded in the north-eastern corner of the survey area. It is quite well defined but is partly obscured by strong magnetic disturbance and anomalies assumed to be due to ridge and furrow. However, the exact origin of this is unclear. While an archaeological origin is possible given pre-historic and Roman archaeology has been recorded to

the north of the survey area, it could be associated with more recent land use including formal gardens or recreation features not documented on past mapping.

Unclear Origins

- 6.137 A linear zone of enhanced magnetism [16B] and a linear trend potentially associated with [16A] have been highlighted. An archaeological interpretation is cautious as they may represent modern disturbance and/or agricultural activity hence them being classified as having an unclear origin.
- 6.138 Weak trends have been noted in the west of the area. It is likely that these are associated with agricultural activity. The east-west aligned trend [16C] is likely to be due to past ridge and furrow cultivation but appears to be a continuation of a linear trend detected in Area 14 immediately to the west which could indicate a land drain.

Agricultural

- 6.139 Anomalies associated with ridge and furrow cultivation have been noted and are aligned with the present pattern of field boundaries.

Non - Archaeology

- 6.140 Widespread and often strong magnetic disturbance is apparent throughout the survey results. Some are due to drainage features and services connected to adjacent housing but ferrous material may have been dumped on the Site.

7 Conclusion

- 7.1 The gradiometer survey has successfully identified three concentrations of definite and probable archaeology across the scheme which are supported by evidence gathered in the HEDBA.
- 7.2 Elsewhere, possible archaeological responses have also been detected that have no supporting background information and suggest previously unknown archaeological Sites.
- 7.3 Additional anomalies of an unclear origin have also been recorded. For the most part these are likely to be due to natural variations in the soils and agricultural activity, but archaeological origins cannot be wholly dismissed.
- 7.4 Several former field boundaries have been mapped which show good correlation with historic mapping.
- 7.5 Most of the datasets show the presence of past ridge and furrow cultivation; often providing magnetically strong responses showing that the soils and geology of the development area are very suitable for magnetic prospection.
- 7.6 The survey has shown the course of several pipes and drainage features and evidence of modern disturbance. In places the interference has been considerable and may have hidden or obscured coincident anomalies generated by archaeological deposits.
- 7.7 In assessing the results of the geophysical survey against the specific aims set out in Section 4;
- The survey has succeeded in locating, recording and characterising surviving sub-surface remains within the Site, though more remains may be present that are not suitable for detection through magnetometry;
 - The survey will help in determining the next stage of works as it has provided evidence that remains of an uncertain origin are most likely present on Site, and has provided a number of targets for further investigation;

- It is not possible to provide an assessment of the potential significance of the identified remains in a local, regional or national context as it has not been possible to definitively characterise the nature of the anomalies identified through survey alone;
- The survey has resulted in a comprehensive report and archive.

7.8 The geophysical survey has produced good quality gradiometer results which have successfully helped to clarify whether archaeological or uncertain remains are present across the Site. There is a high confidence level that the methodology and survey strategy chosen were appropriate to assess the archaeological potential across the Site.

8 Statement of Indemnity

- 8.1 Although the results and interpretation detailed in this report have been produced as accurately as possible, it should be noted that the conclusions offered are a subjective assessment of collected data sets.
- 8.2 The success of a geophysical survey in identifying archaeological remains can be heavily influenced by several factors, including geology, seasonality, field conditions and the properties of the features being detected. Therefore, the geophysical interpretation may only reveal certain archaeological features and not produce a complete plan of all the archaeological remains within a survey area.

9 Archive Deposition

- 9.1 In accordance professional standard practice an 'Online Access to the Index of archaeological investigations' ('OASIS') record will be completed for submission to the HER and Archaeological Data Service (ADS) (Appendix 1).
- 9.2 One digital and hard copy of the report and data will be submitted to the relevant Historic Environment Record (HER) at the Client's discretion.
- 9.3 A digital copy of the report and data will also be submitted to the ADS at the Client's discretion.

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11 Plates



Plate 1 Area 2 facing south



Plate 2 Area 5 facing west



Plate 3 Area 6 facing west



Plate 4 Area 7 facing east



Plate 5 Area 9 facing northeast



Plate 6 Area 11 facing southeast



Plate 7 Area 13 facing northwest



Plate 8 Area 16 facing southwest

12 Figures

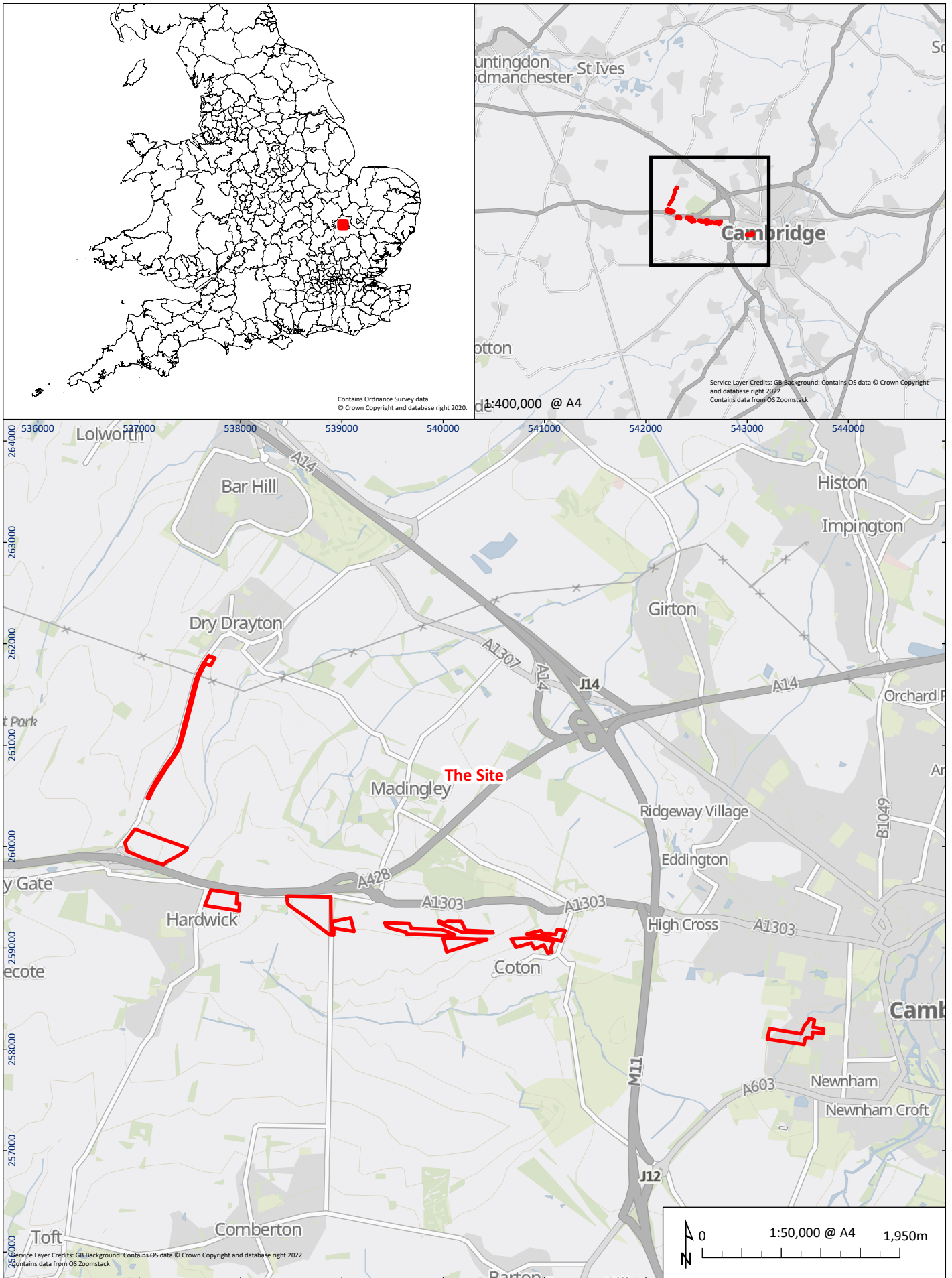


Figure 1: Site Location

05/40331/GEO/01/01

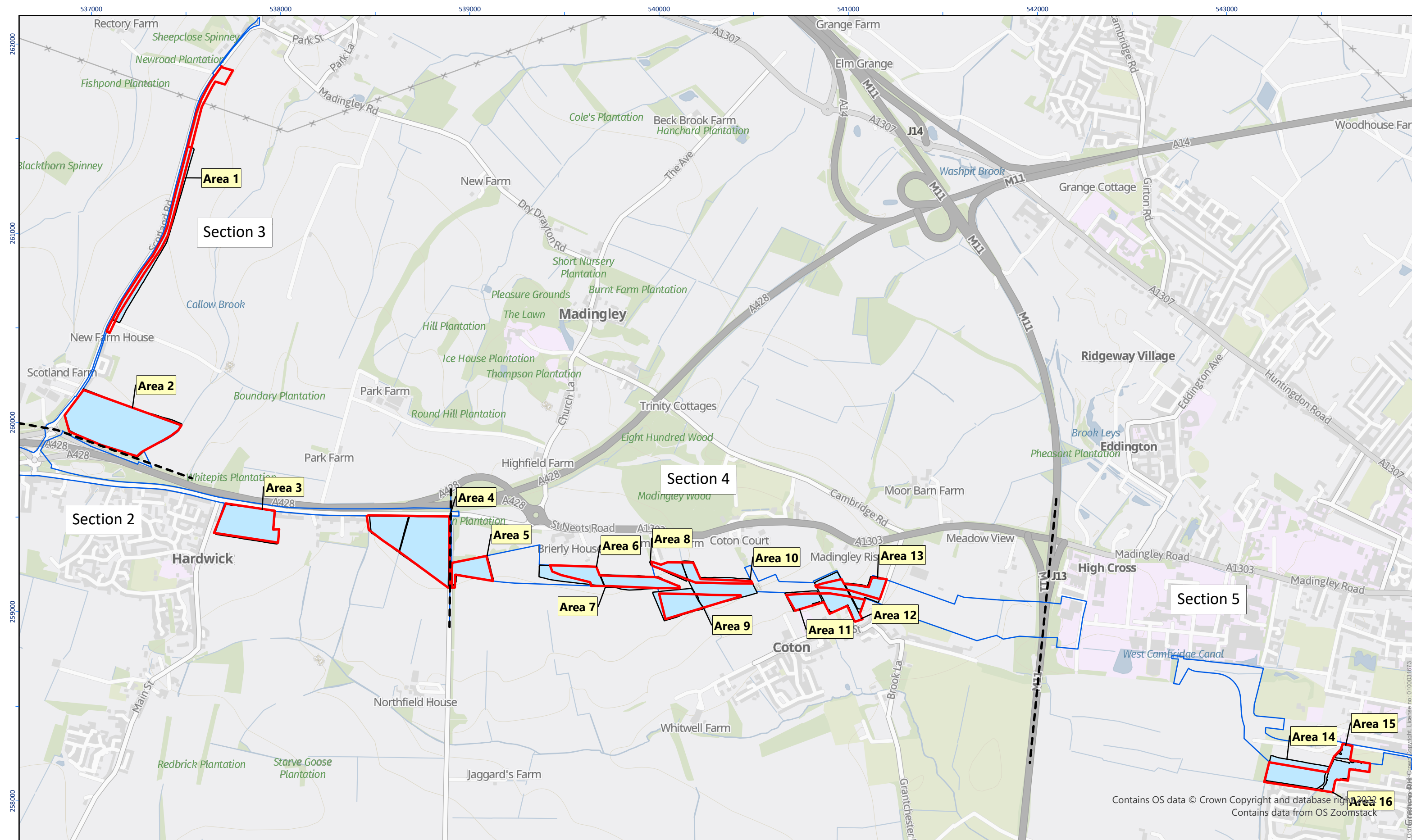


Figure
02

— Site Boundary — Red Line Boundary
 --- Section Lines ■ Surveyed - Bartington Cart

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Drawing Number: 05/40331/GEO/02/01
 Created by: SO Date: 28/10/2022
 Checked by: JL Date: 04/11/2022
 Approved by: JL Date: 04/11/2022

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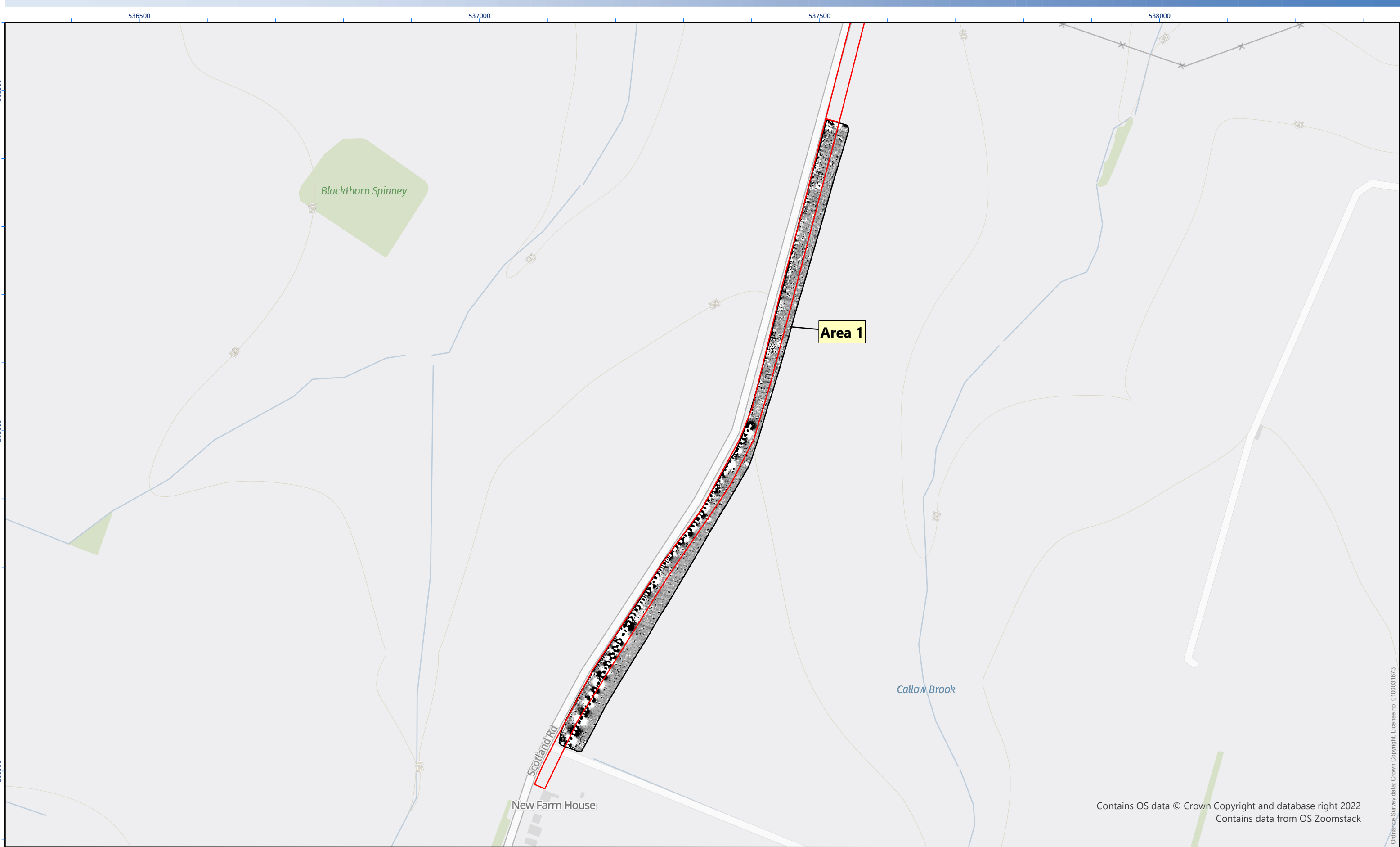


Figure 3.1

2nT

-1nT

Red Line Boundary

Summary Greyscale

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Scale: 1:5,000 @ A3

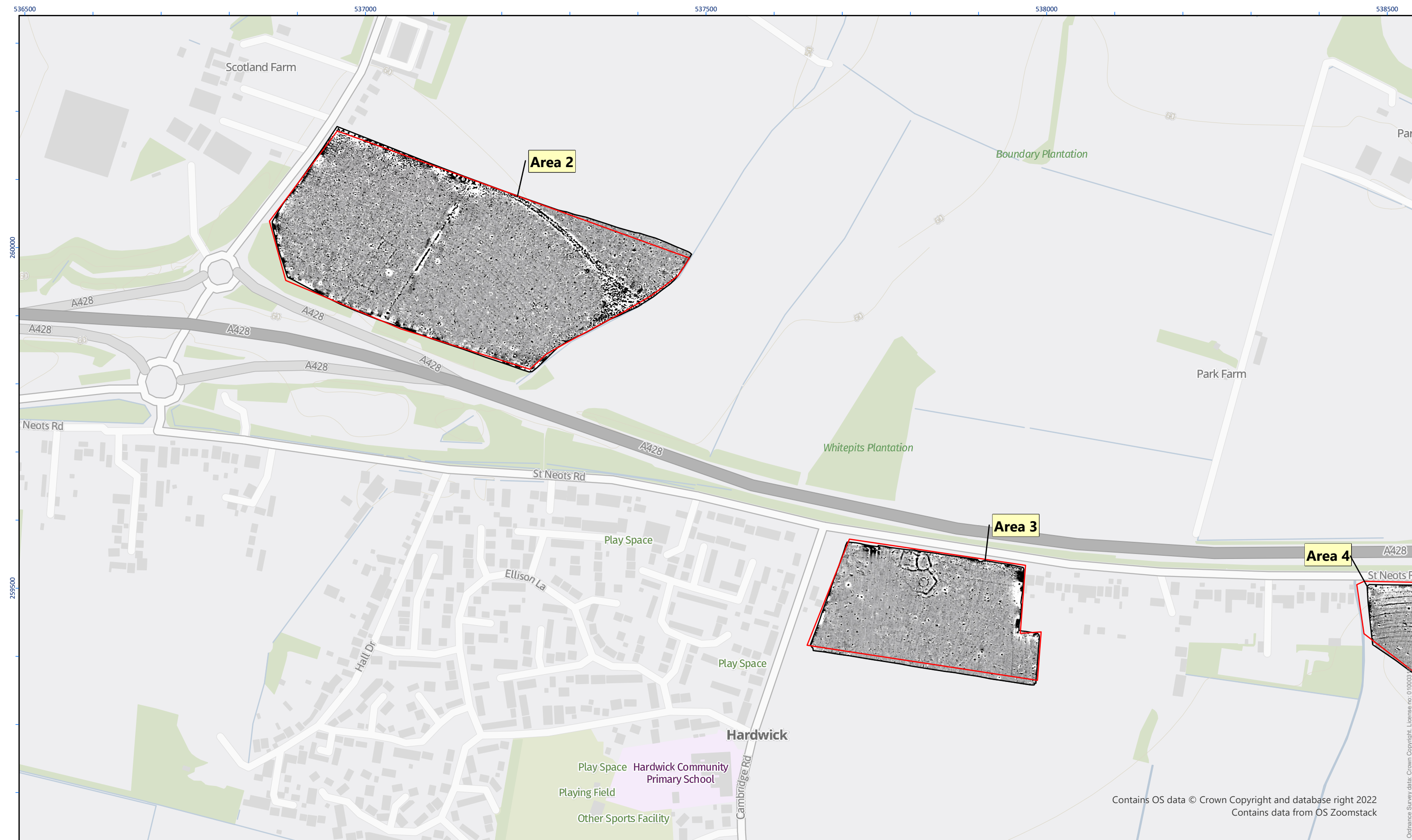
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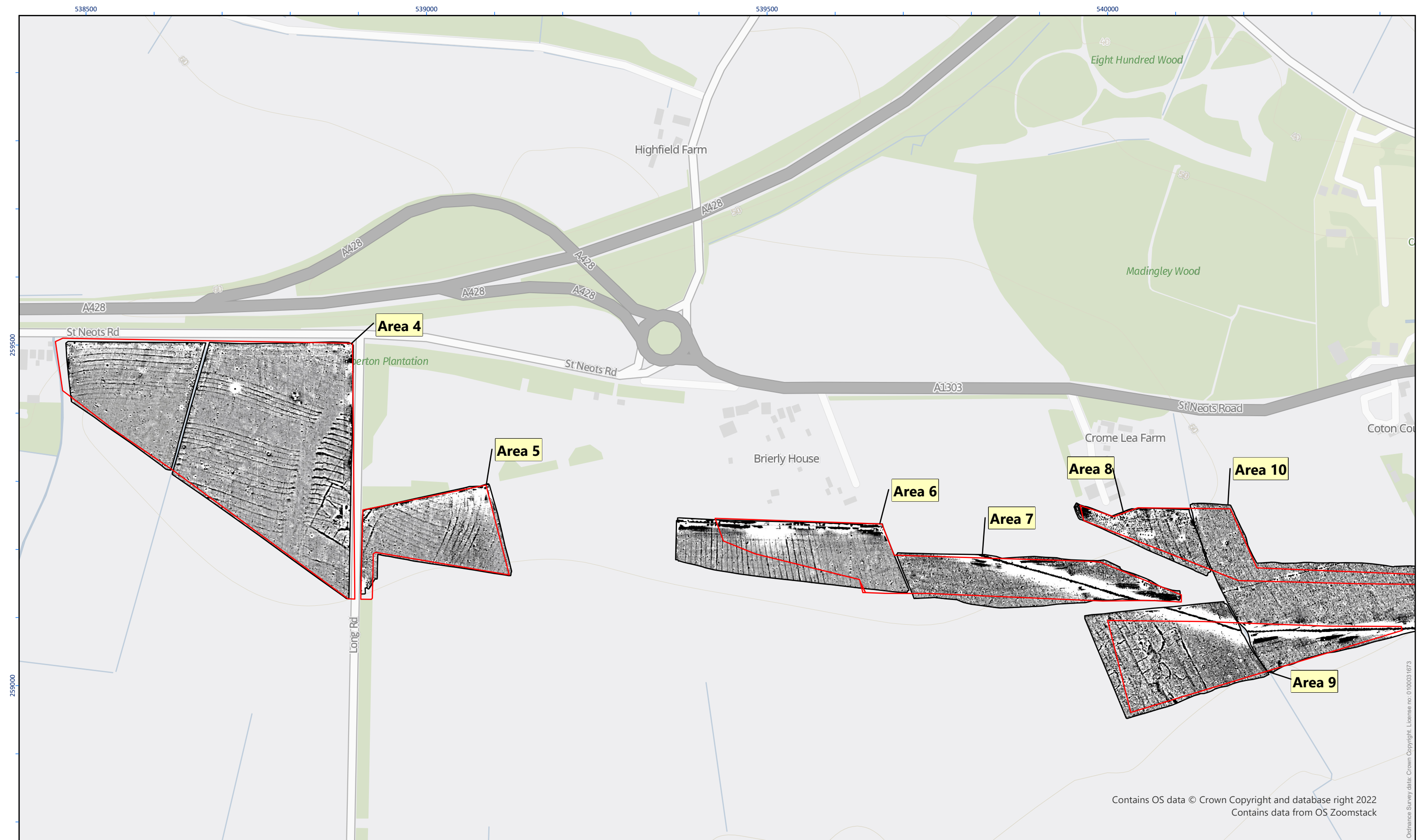
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Approved by: JL Date: 04/11/2022

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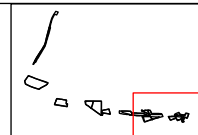
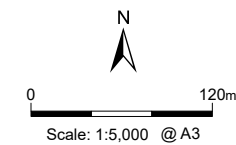




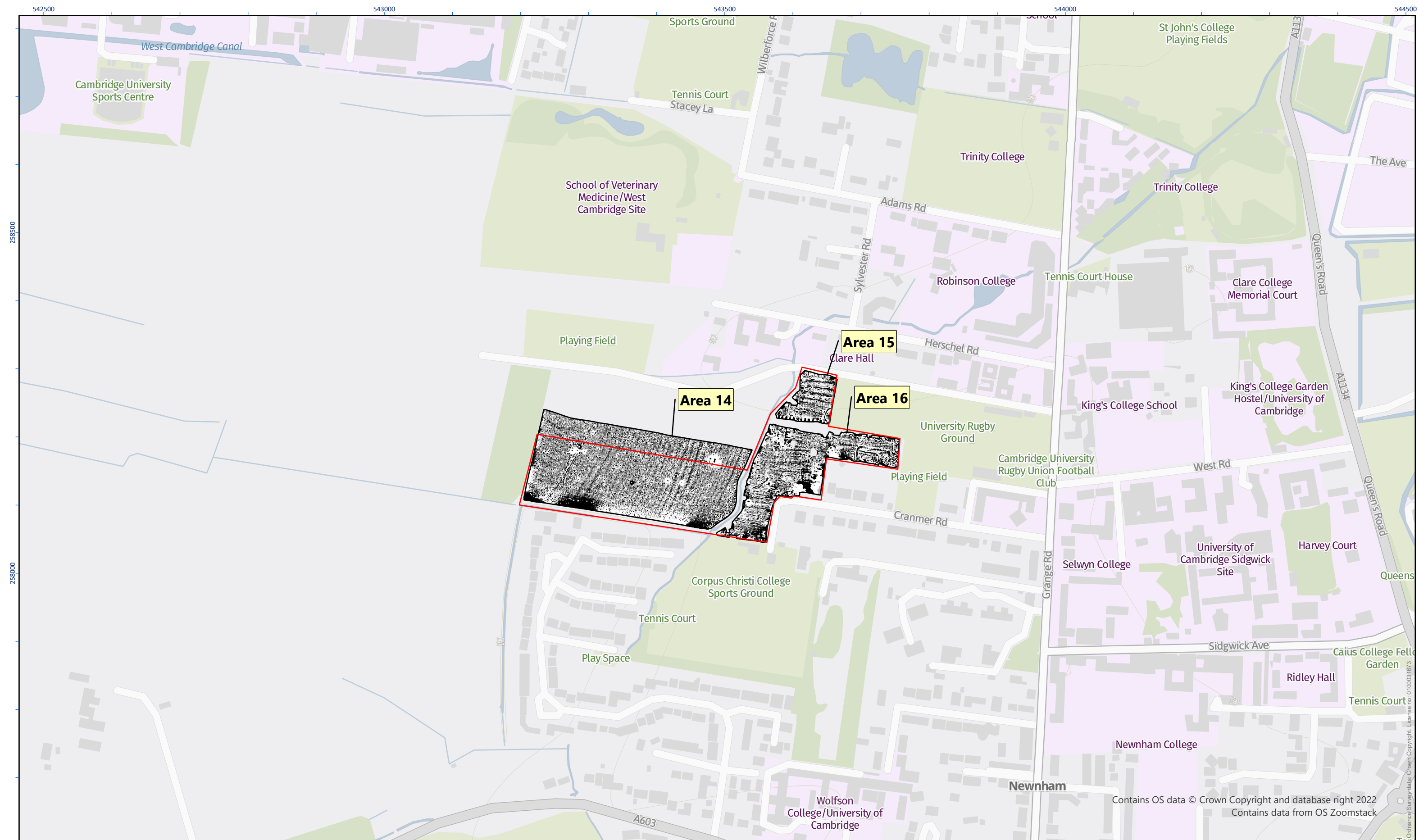


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 Red Line Boundary



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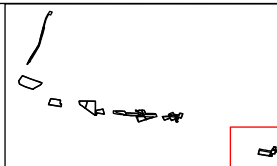
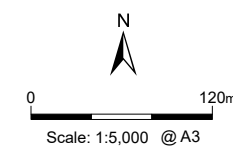


Contains OS data © Crown Copyright and database right 2022
Contains data from OS Zoomstack

Figure
3.5

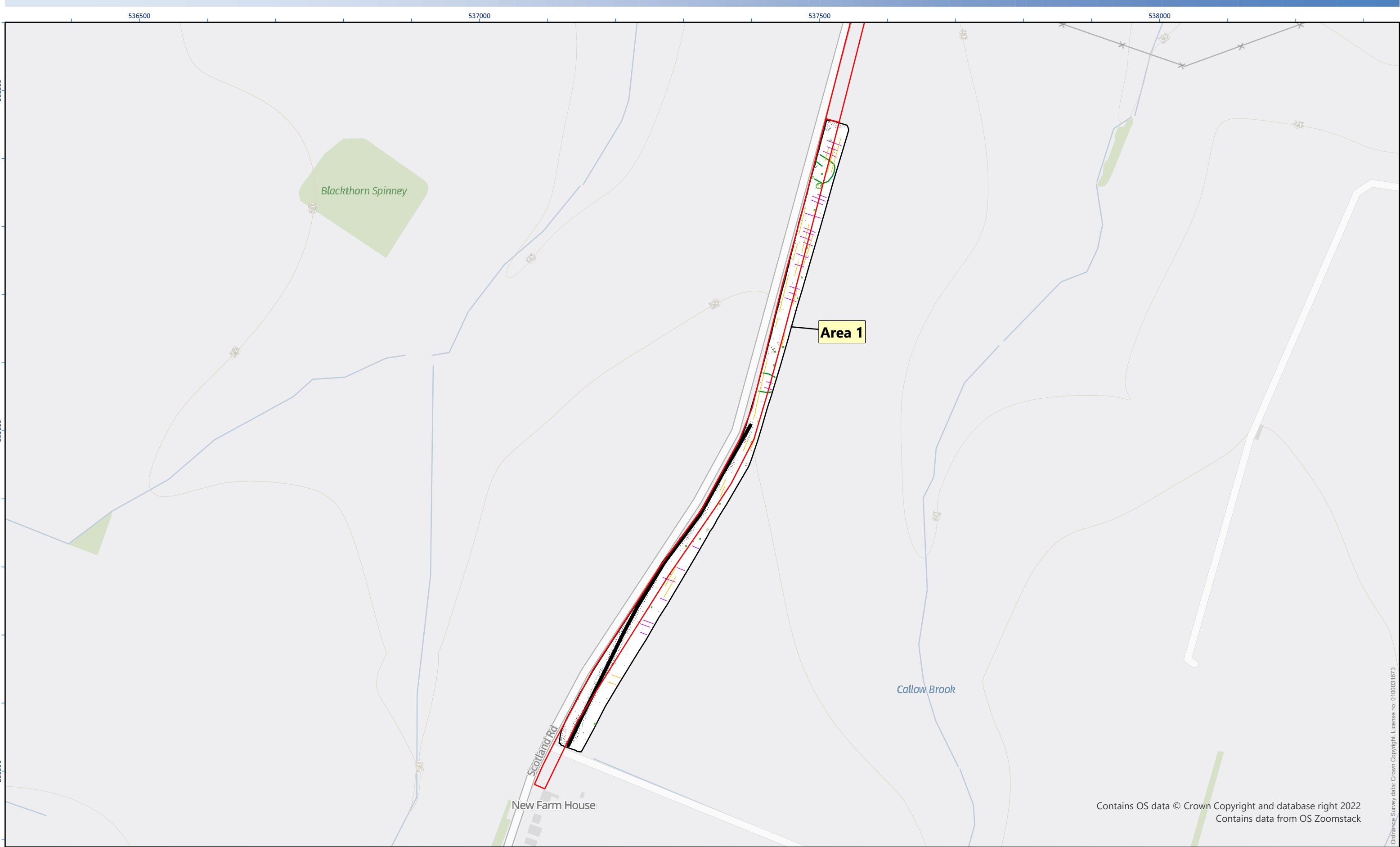


Red Line Boundary



Drawing Number: 05/40331/GEO/3.5/01
Created by: SO Date: 28/10/2022
Checked by: CS Date: 04/11/2022
Approved by: JL Date: 04/11/2022

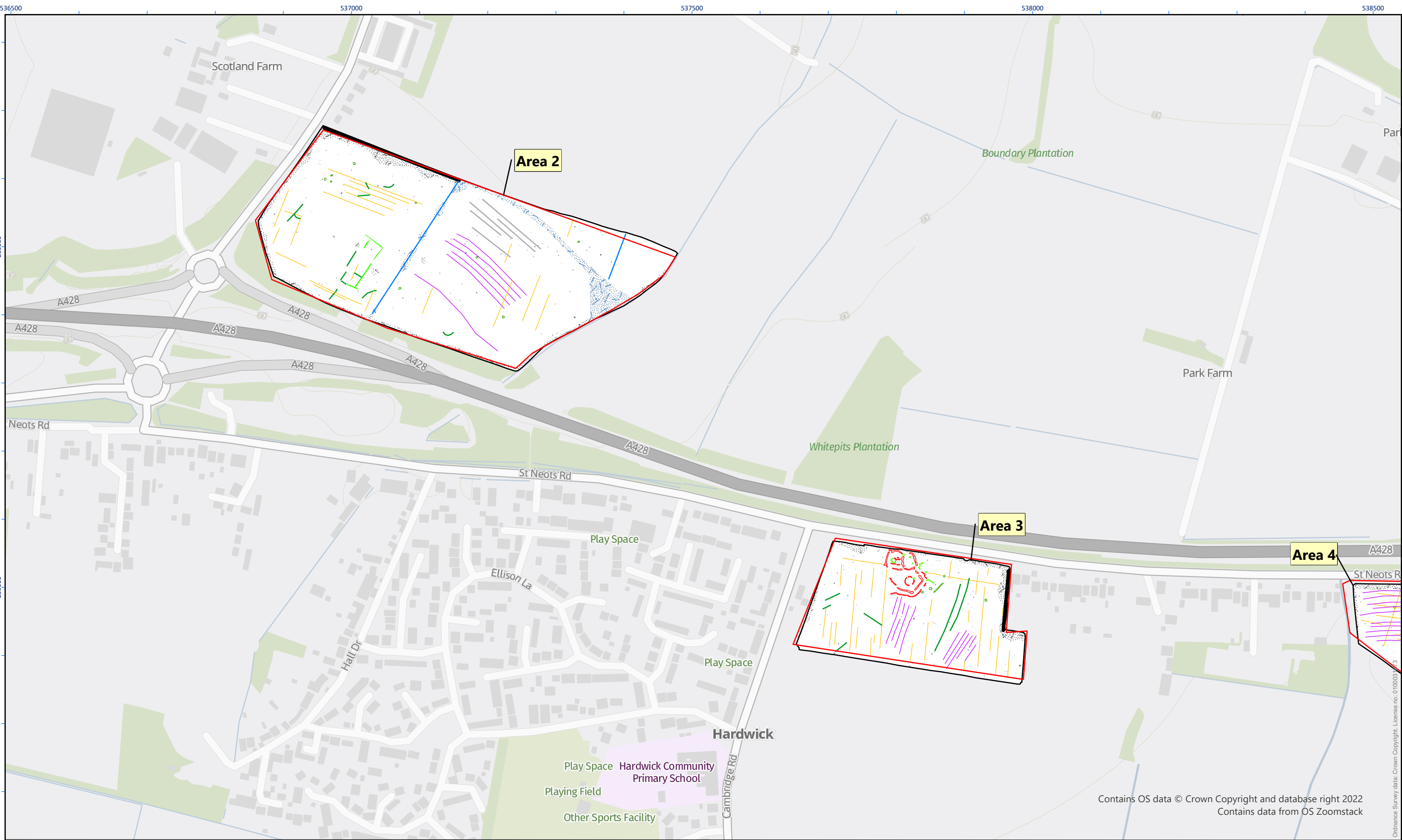
AOC
Archaeology
Group



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Ordnance Survey data: Crown Copyright. License no. 0100031673

Figure 4.1	Summary Interpretation							Drawing Number: 05/40331/GEO/4.1/01		
	Red Line Boundary	Enhanced Magnetism (Unclear Origin)	Linear Trend (Ridge and Furrow)	Created by: SO	Date: 28/10/2022					
	Enhanced Magnetism (Modern)	Enhanced Magnetism (Utility)	Linear Trend (Utility)	Checked by: JL	Date: 04/11/2022					
	Ferrous/Iron Spike	Linear Trend (Ploughing)	Trend (Unclear Origin)	Approved by: JL	Date: 04/11/2022					

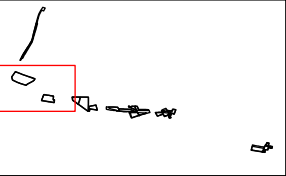
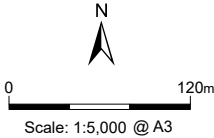


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Ordnance Survey data: Crown Copyright. License no. 010003173

Summary Interpretation

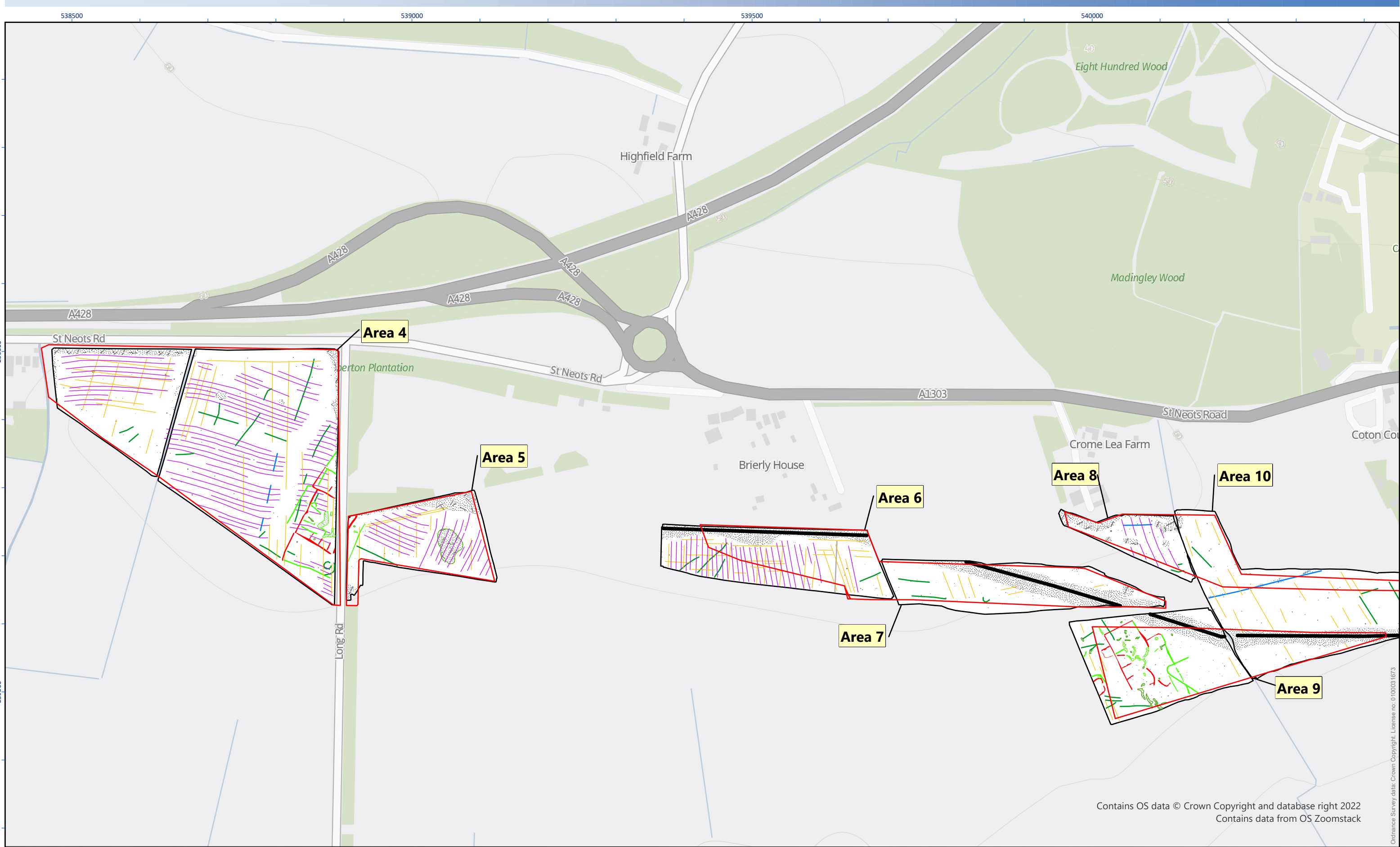
- | | | |
|---------------------------------------|---|---------------------------------|
| Red Line Boundary | Enhanced Magnetism (Possible Archaeology) | Linear Trend (Ploughing) |
| Enhanced Magnetism (Archaeology) | Ferrous/Iron Spike | Trend (Possible Archaeology) |
| Enhanced Magnetism (Historic Feature) | Enhanced Magnetism (Unclear Origin) | Linear Trend (Ridge and Furrow) |
| Enhanced Magnetism (Modern) | Linear Trend (Drainage) | Linear Trend (Utility) |
| Linear Trend (Possible Archaeology) | Linear Trend (Historic Feature) | Trend (Unclear Origin) |



Drawing Number: 05/40331/GEO/4.2/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Figure
4.2



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Contains data from OS Zoomstack

Figure
4.3

<div><div></div>Red Line Boundary</div> <div><div></div>Linear Trend (Archaeology)</div> <div><div></div>Enhanced Magnetism (Historic Feature)</div> <div><div></div>Enhanced Magnetism (Modern)</div> <div><div></div>Linear Trend (Possible Archaeology)</div>	<div><div></div>Enhanced Magnetism (Possible Archaeology)</div> <div><div></div>Ferrous/Iron Spike</div> <div><div></div>Enhanced Magnetism (Unclear Origin)</div> <div><div></div>Enhanced Magnetism (Utility)</div> <div><div></div>Trend (Archaeology)</div>	<div><div></div>Linear Trend (Drainage)</div> <div><div></div>Linear Trend (Historic Feature)</div> <div><div></div>Linear Trend (Ploughing)</div> <div><div></div>Trend (Possible Archaeology)</div> <div><div></div>Linear Trend (Ridge and Furrow)</div>	<div><div></div>Linear Trend (Utility)</div> <div><div></div>Trend (Unclear Origin)</div>
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N

0120m

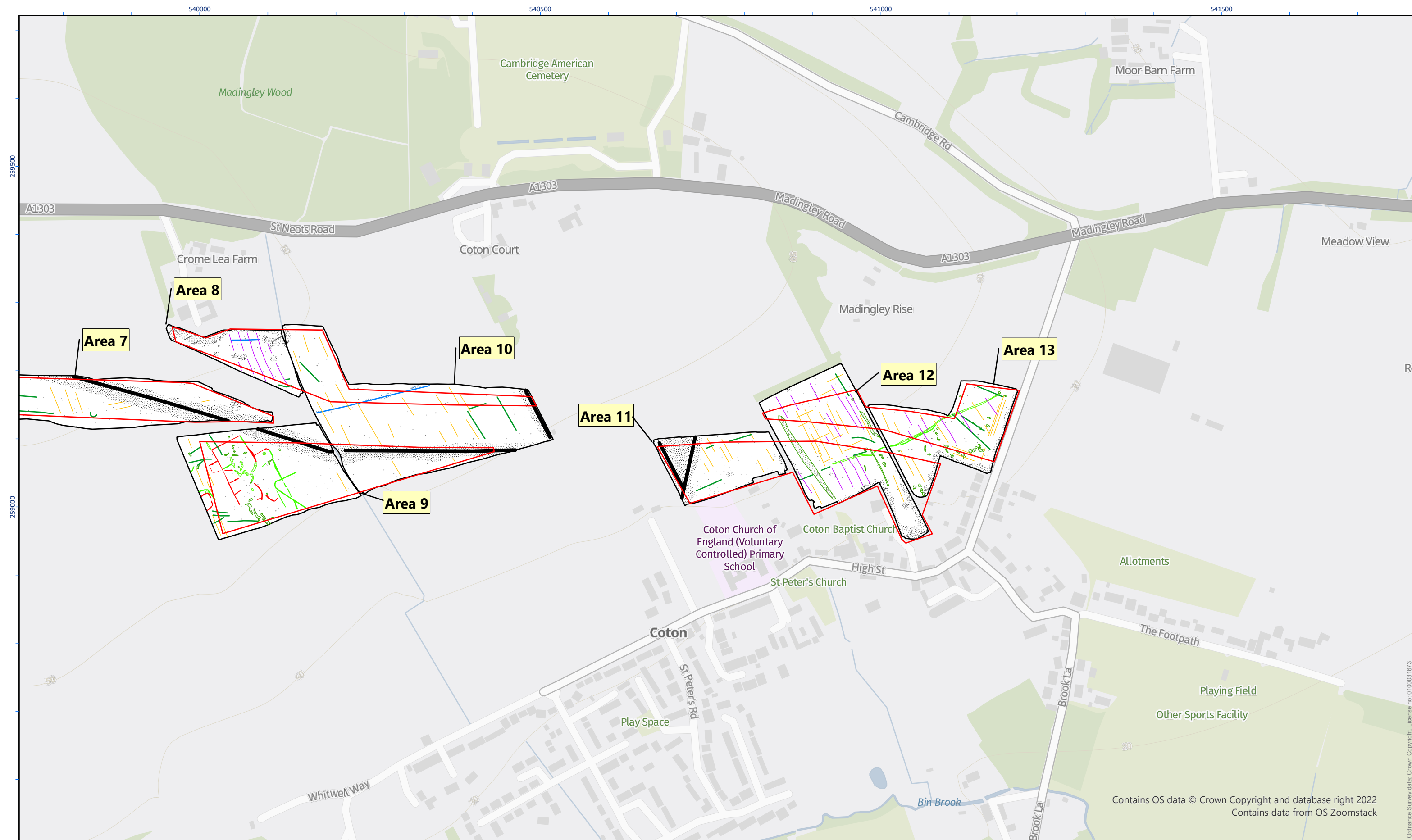
Scale: 1:5,000 @ A3

Drawing Number: 05/40331/GEO/4.3/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

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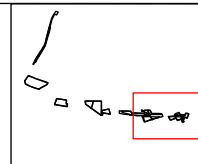
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Summary Interpretation

- | | | |
|---------------------------------------|---|---------------------------------|
| Red Line Boundary | Enhanced Magnetism (Possible Archaeology) | Linear Trend (Ploughing) |
| Linear Trend (Archaeology) | Ferrous/Iron Spike | Trend (Possible Archaeology) |
| Enhanced Magnetism (Historic Feature) | Enhanced Magnetism (Unclear Origin) | Linear Trend (Ridge and Furrow) |
| Enhanced Magnetism (Modern) | Enhanced Magnetism (Utility) | Linear Trend (Utility) |
| Linear Trend (Possible Archaeology) | Linear Trend (Historic Feature) | Trend (Unclear Origin) |

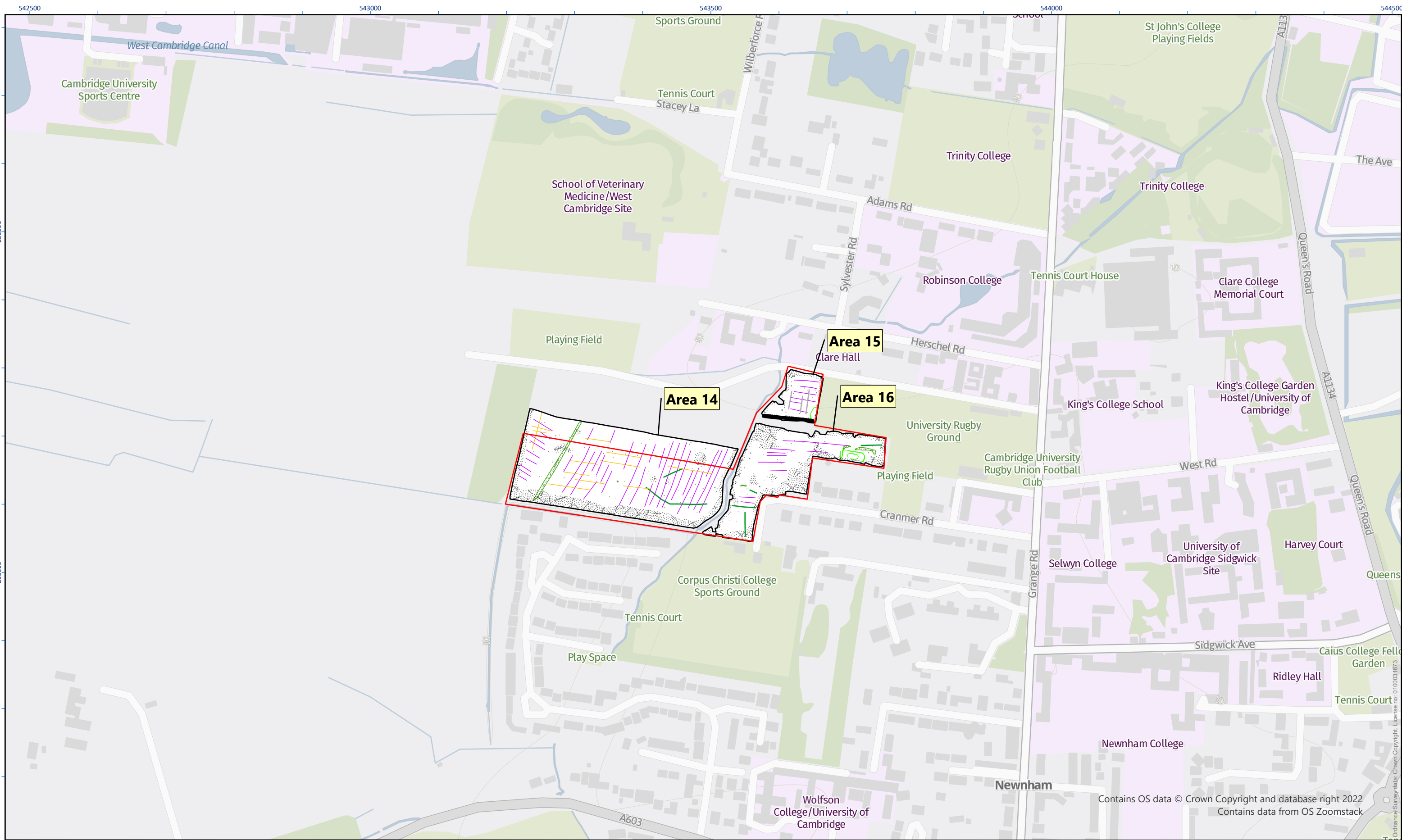


Drawing Number: 05/40331/GEO/4.4/01

Created by: SO Date: 28/10/2022

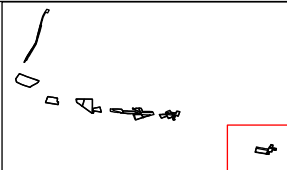
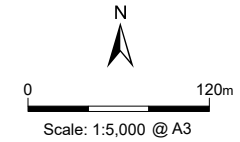
Checked by: JL Date: 04/11/2022

Approved by: JL Date: 04/11/2022



Summary Interpretation

- | | | |
|-------------------------------------|-------------------------------------|------------------------|
| Red Line Boundary | Enhanced Magnetism (Unclear Origin) | Linear Trend (Utility) |
| Enhanced Magnetism (Modern) | Linear Trend (Drainage) | Trend (Unclear Origin) |
| Linear Trend (Possible Archaeology) | Linear Trend (Ploughing) | |
| Ferrous/Iron Spike | Linear Trend (Ridge and Furrow) | |



Drawing Number: 05/40331/GEO/4.5/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

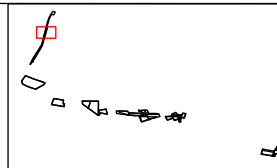
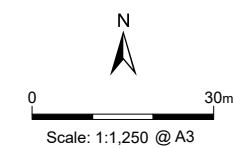


Figure
4.5

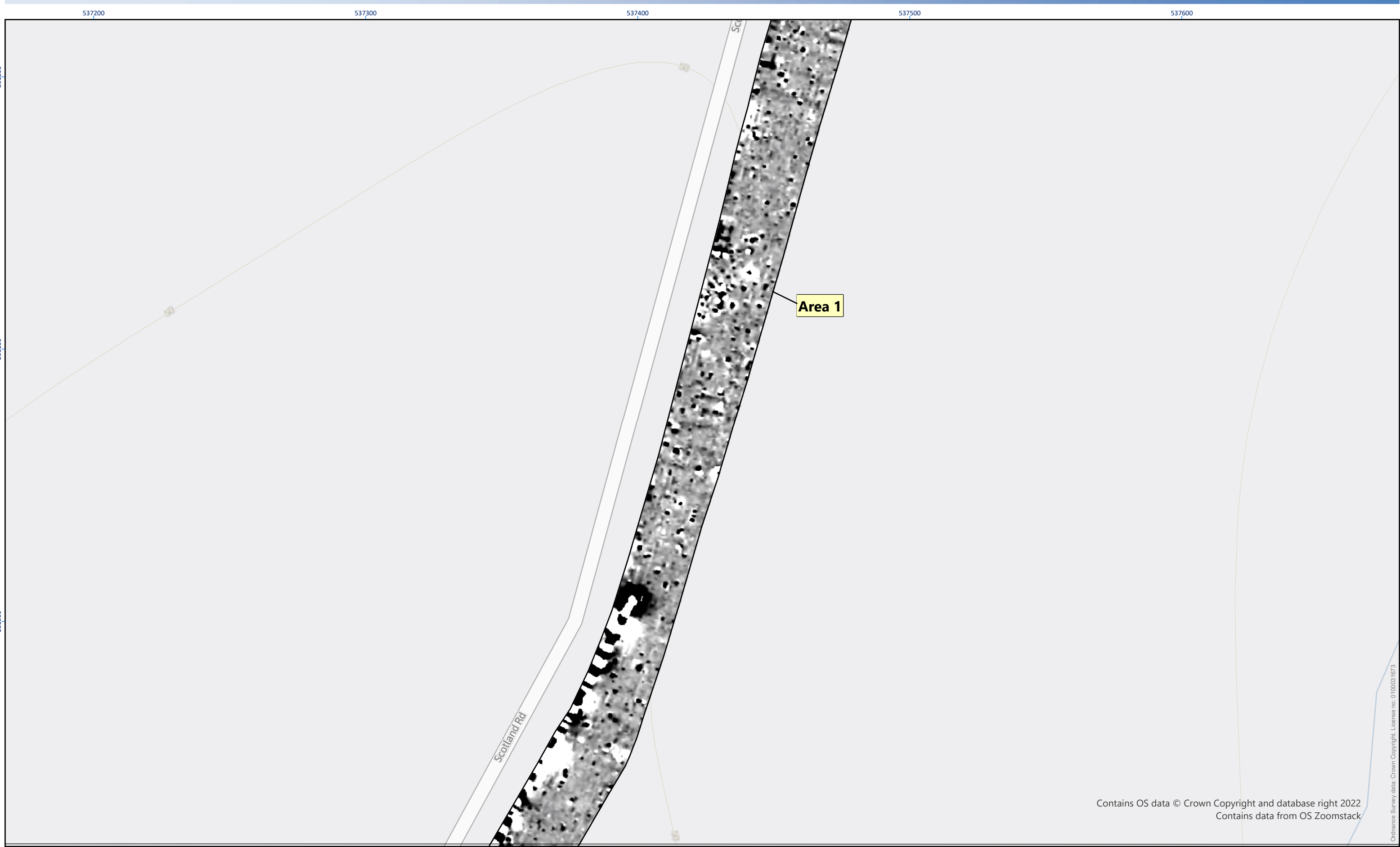


Processed Gradiometer Data - Greyscale Image

Figure
5.1



Drawing Number: 05/40331/GEO/5.1/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Processed Gradiometer Data - Greyscale Image

Figure 5.2				Drawing Number: 05/40331/GEO/5.2/01		
				Created by: SO	Date: 28/10/2022	
				Checked by: JL	Date: 04/11/2022	
				Approved by: JL	Date: 04/11/2022	

537100

537200

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537500

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Scotland Rd

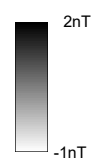
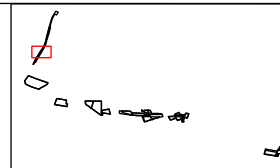
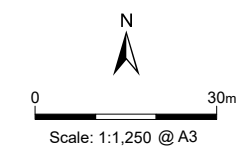
Scotland

Area 1

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Processed Gradiometer Data - Greyscale Image

Figure
5.3



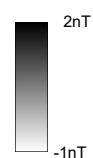
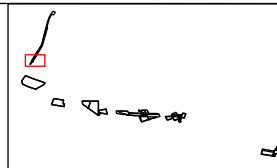
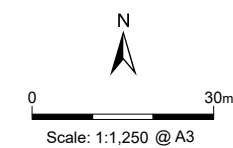
Drawing Number: 05/40331/GEO/5.3/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022





Processed Gradiometer Data - Greyscale Image

Figure
5.4



Drawing Number: 05/40331/GEO/5.4/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

536800

536900

537000

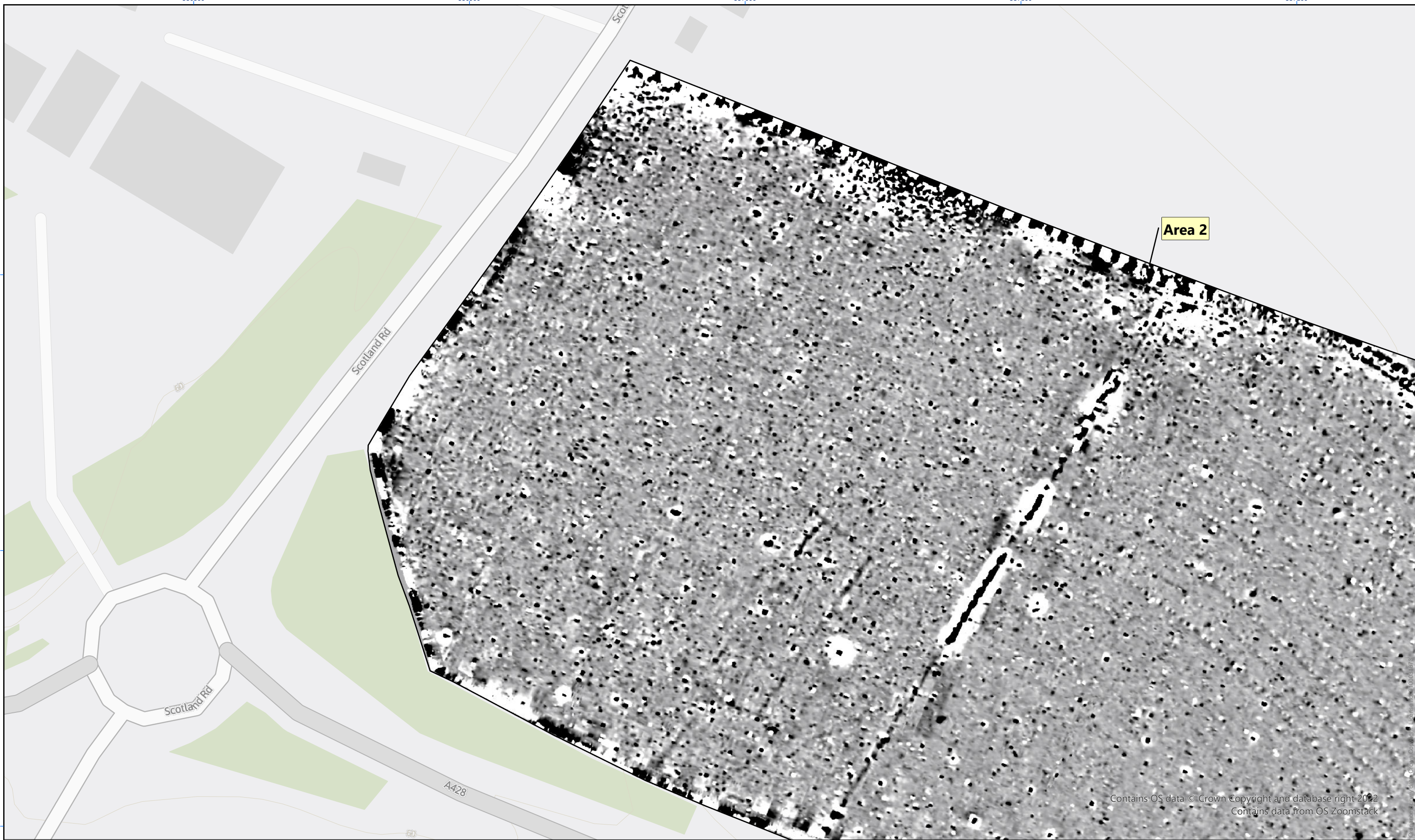
537100

537200

260100

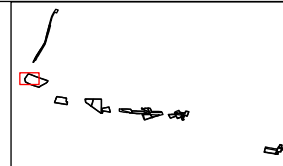
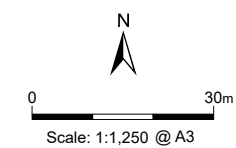
260000

259900



Processed Gradiometer Data - Greyscale Image

Figure
5.5



Drawing Number: 05/40331/GEO/5.5/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

537000

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537400

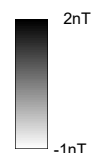
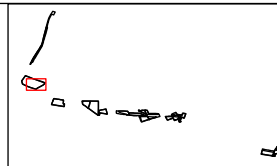
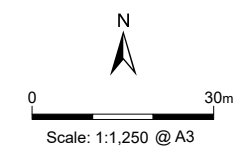
537500

Area 2

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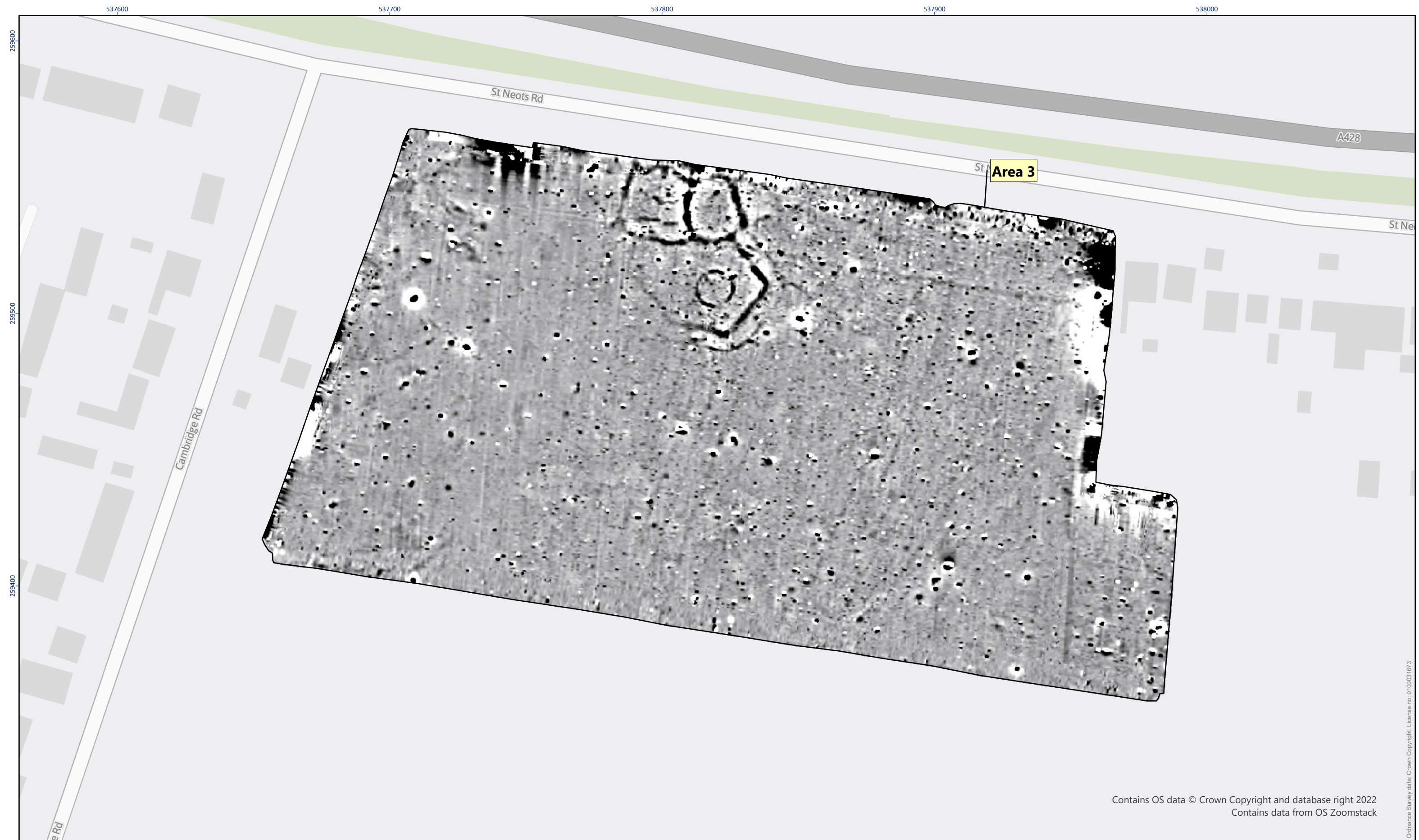
Processed Gradiometer Data - Greyscale Image

Figure
5.6



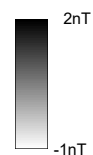
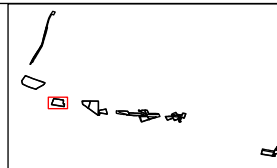
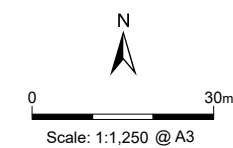
Drawing Number: 05/40331/GEO/5.6/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

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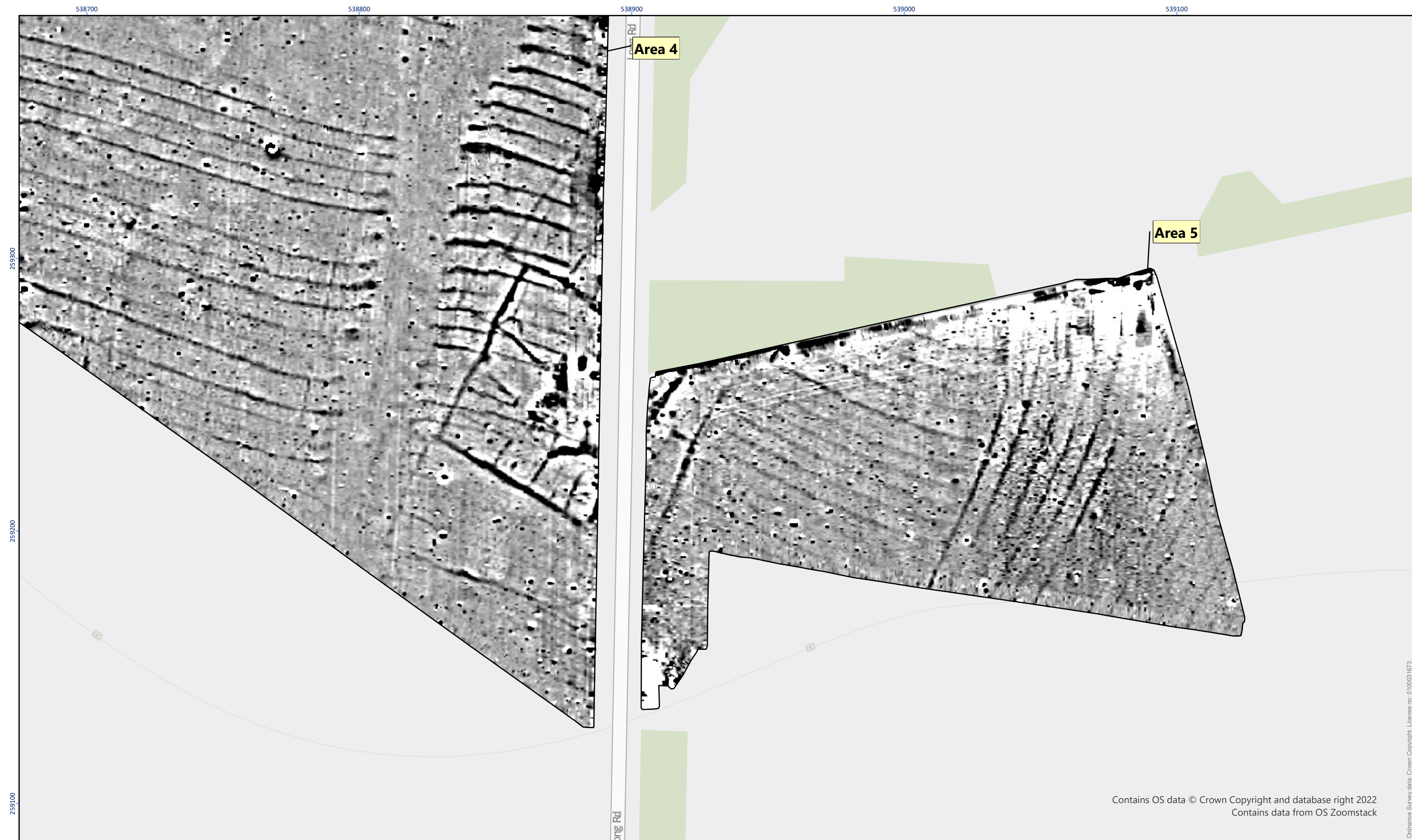


Processed Gradiometer Data - Greyscale Image

Figure
5.7

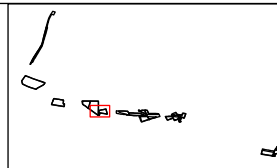
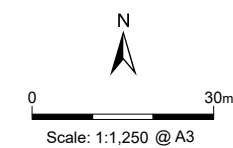


Drawing Number: 05/40331/GEO/5.7/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Processed Gradiometer Data - Greyscale Image

Figure
5.9



Drawing Number: 05/40331/GEO/5.9/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

539400

539500

539600

539700

539800

Brierly House

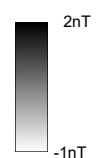
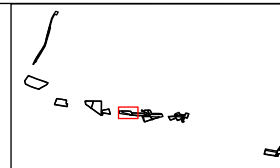
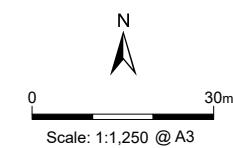
Area 6

Area 7

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Processed Gradiometer Data - Greyscale Image

Figure
5.10

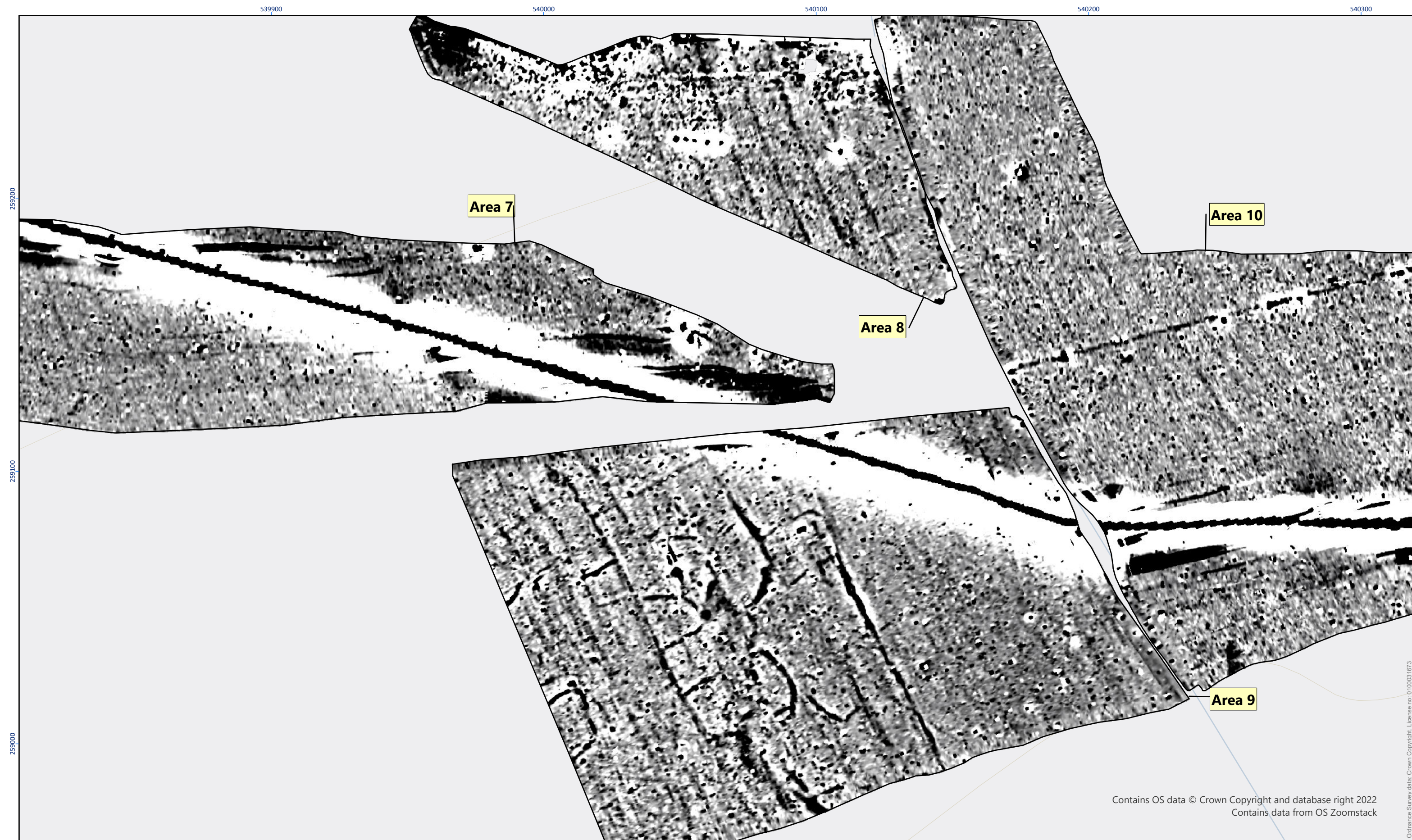


Drawing Number: 05/40331/GEO/5.10/01

Created by: SO Date: 28/10/2022

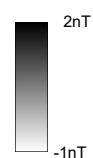
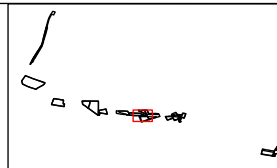
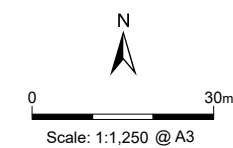
Checked by: JL Date: 04/11/2022

Approved by: JL Date: 04/11/2022



Processed Gradiometer Data - Greyscale Image

Figure
5.11



Drawing Number: 05/40331/GEO/5.11/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



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Processed Gradiometer Data - Greyscale Image

Figure
5.12

2nT

-1nT

N

030m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/5.12/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

AOC

Archaeology

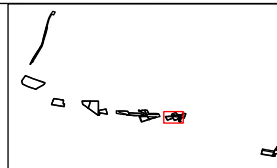
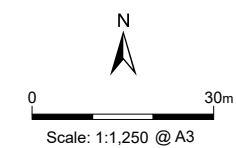
Group



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Processed Gradiometer Data - Greyscale Image

Figure
5.13



Drawing Number: 05/40331/GEO/5.13/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



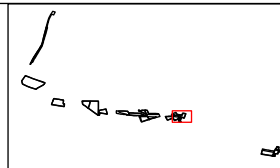
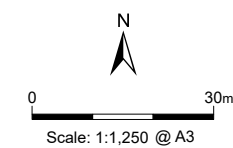
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Figure
5.14



Processed Gradiometer Data - Greyscale Image

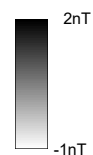
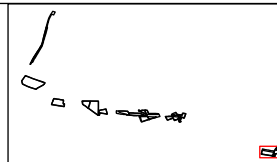
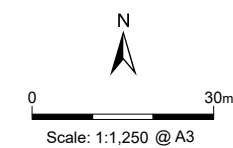


Drawing Number: 05/40331/GEO/5.14/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Processed Gradiometer Data - Greyscale Image

Figure
5.15

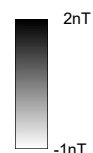
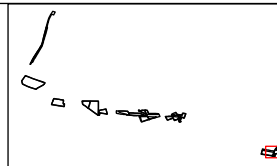
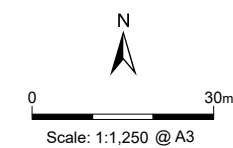


Drawing Number: 05/40331/GEO/5.15/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

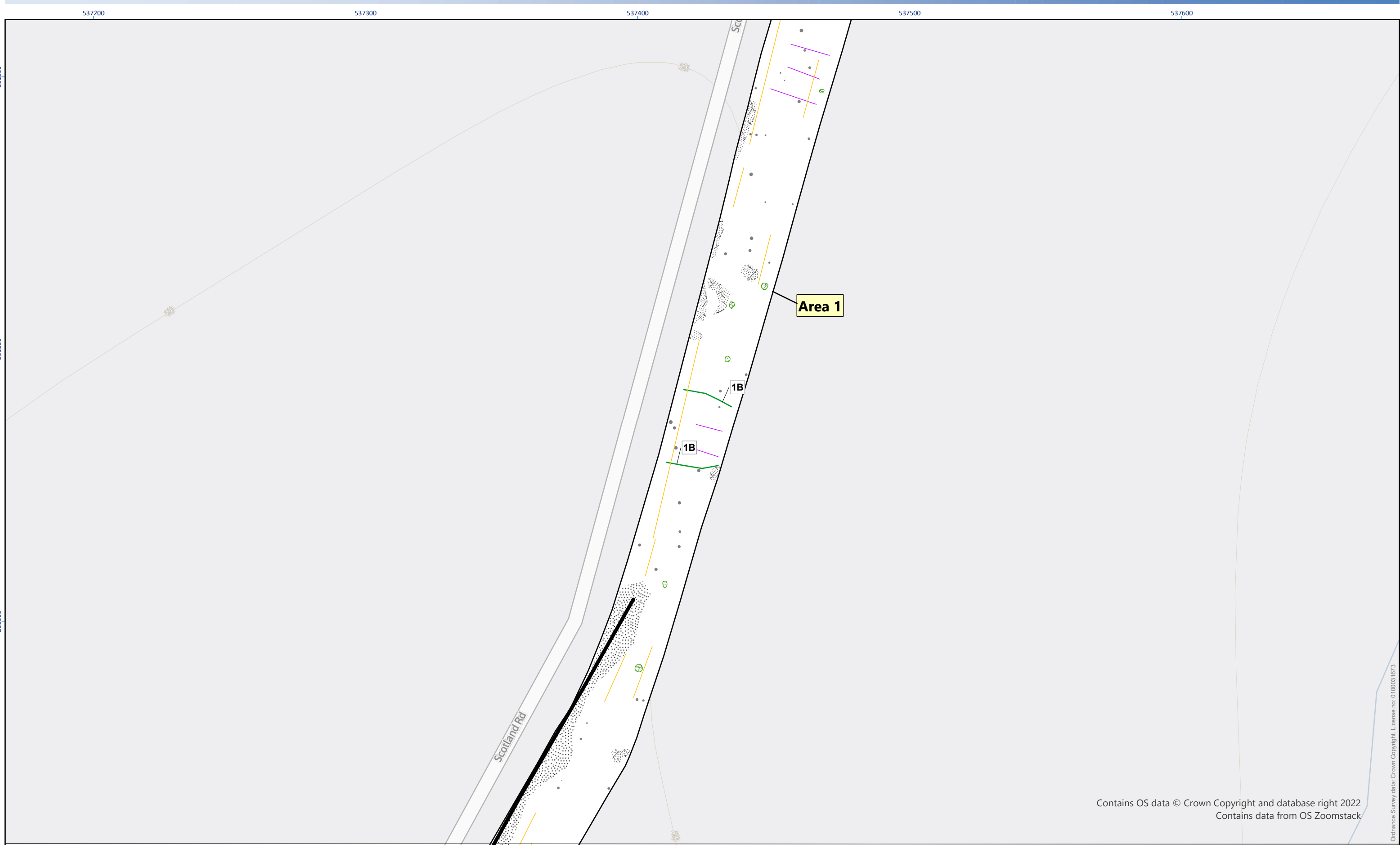


Processed Gradiometer Data - Greyscale Image

Figure
5.16



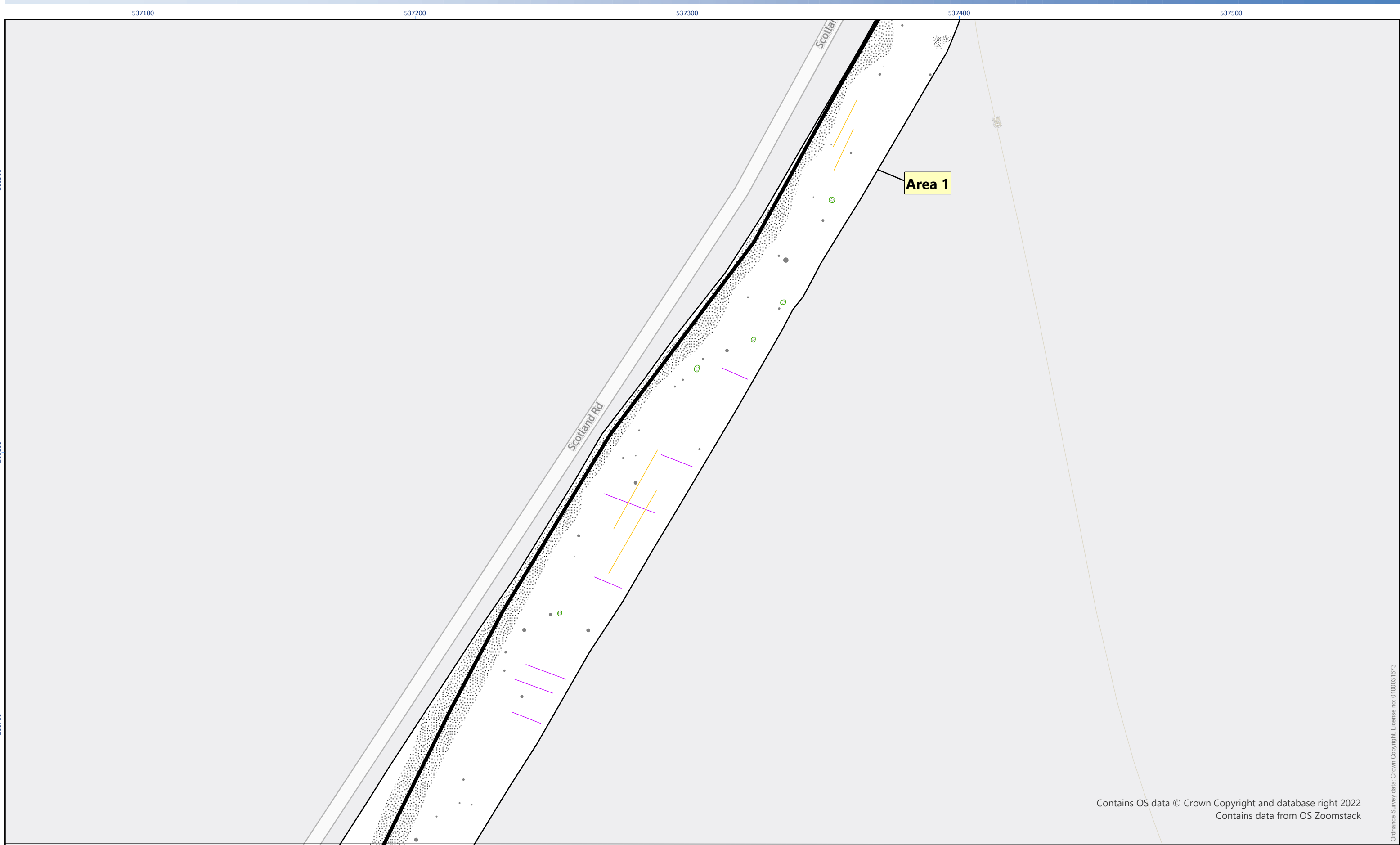
Drawing Number: 05/40331/GEO/5.16/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



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Figure 6.2	Interpretation of Processed Gradiometer Data					 Scale: 1:1,250 @ A3	Drawing Number: 05/40331/GEO/6.2/01	
	Enhanced Magnetism (Modern)	Enhanced Magnetism (Unclear Origin)	Created by: SO	Date: 28/10/2022				
	Ferrous/Iron Spike	Enhanced Magnetism (Utility)	Checked by: JL	Date: 04/11/2022				
			Approved by: JL	Date: 04/11/2022				



Interpretation of Processed Gradiometer Data

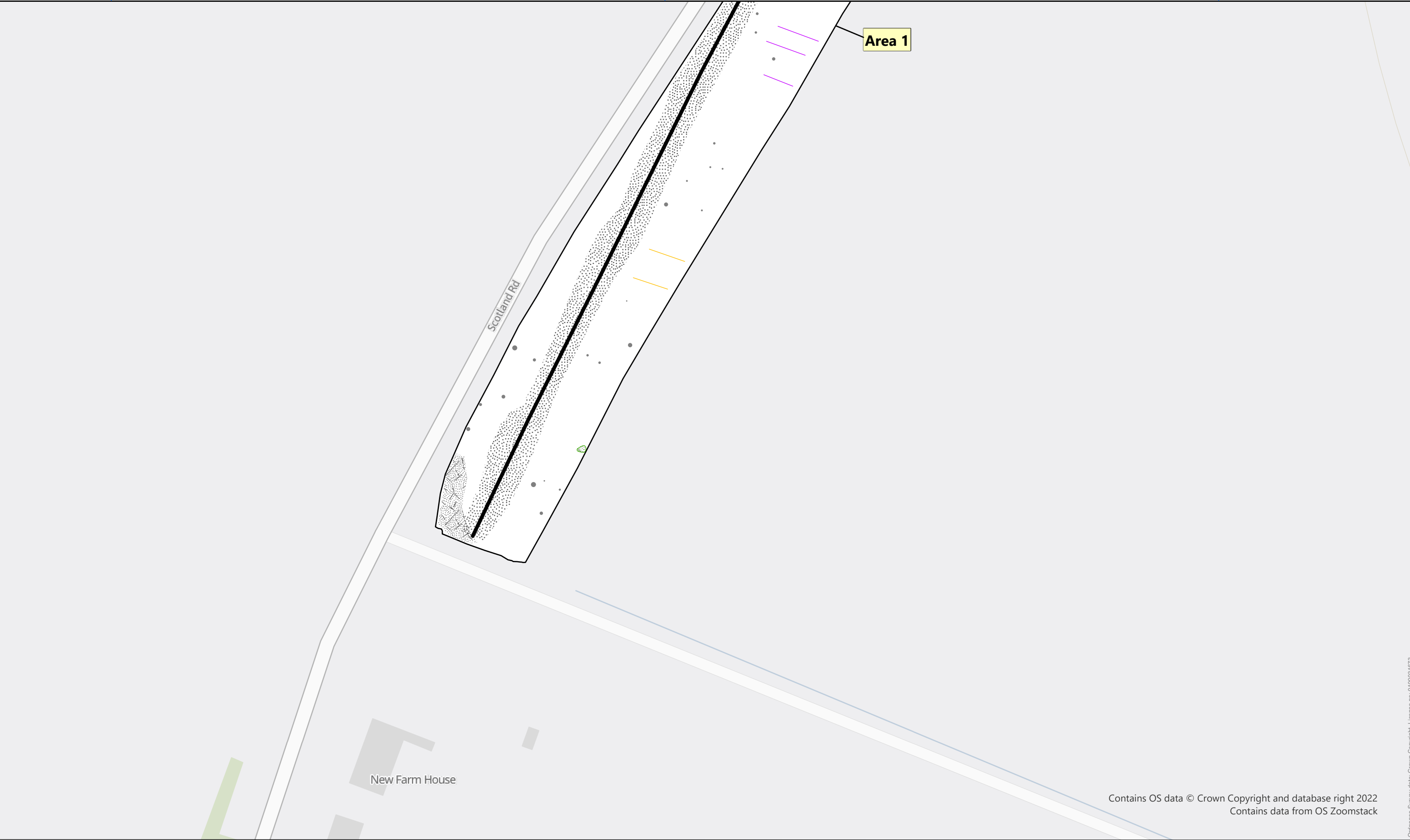
Figure 6.3		<div><div><div><div></div></div><div>Enhanced Magnetism (Modern)</div></div><div><div></div></div><div>Ferrous/Iron Spike</div></div> <div><div><div><div></div></div><div>Enhanced Magnetism (Unclear Origin)</div></div><div><div></div></div><div>Enhanced Magnetism (Utility)</div></div>			Drawing Number: 05/40331/GEO/6.3/01		
					Created by: SO	Date: 28/10/2022	
					Checked by: JL	Date: 04/11/2022	
					Approved by: JL	Date: 04/11/2022	

537000 537100 537200 537300 537400

260700

260600

260500

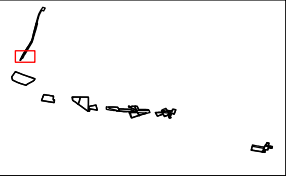
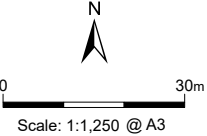


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Interpretation of Processed Gradiometer Data

- Enhanced Magnetism (Modern)
- Enhanced Magnetism (Unclear Origin)
- Ferrous/Iron Spike
- Enhanced Magnetism (Utility)



Drawing Number: 05/40331/GEO/6.4/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Figure
6.4

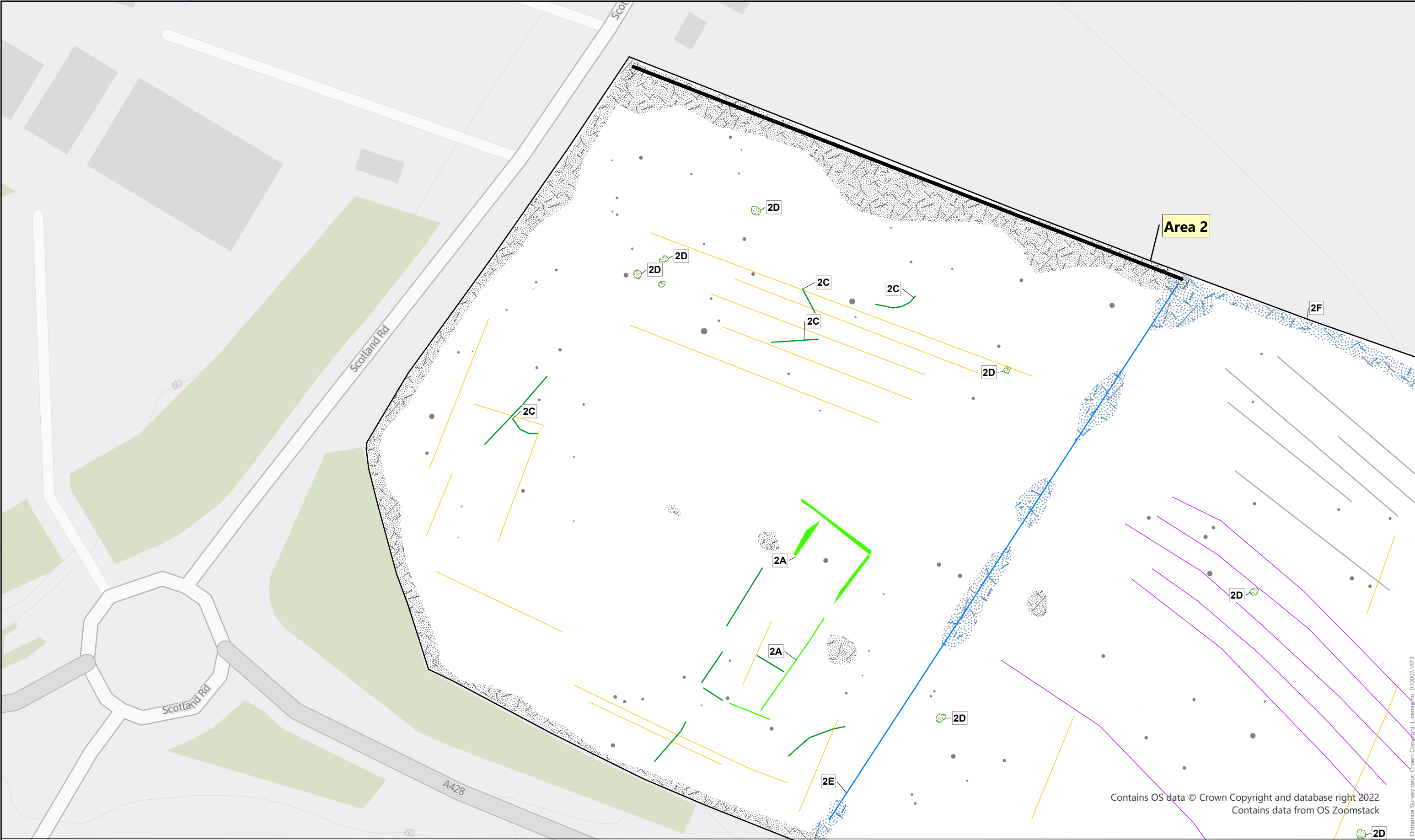
536800

536900

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537100

537200



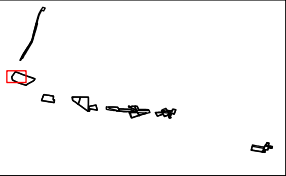
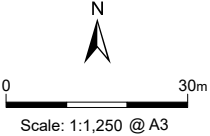
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Interpretation of Processed Gradiometer Data

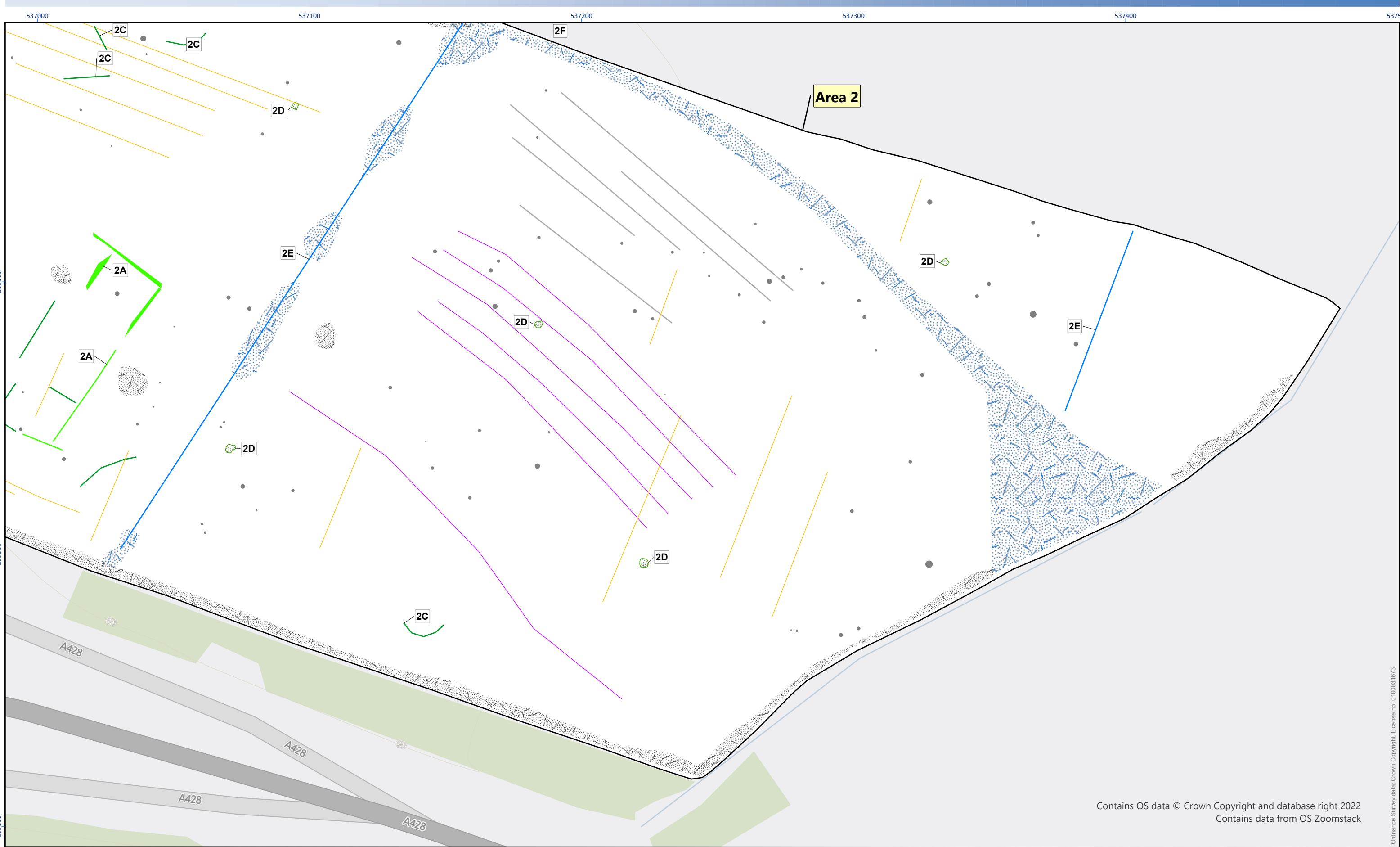
Figure
6.5

- | | |
|---|---|
|  Enhanced Magnetism (Historic Feature) |  Ferrous/Iron Spike |
|  Enhanced Magnetism (Modern) |  Enhanced Magnetism (Unclear Origin) |
|  Linear Trend (Possible Archaeology) | |



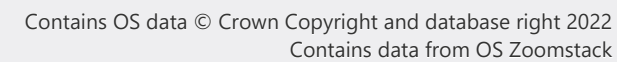
Drawing Number: 05/40331/GEO/6.5/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



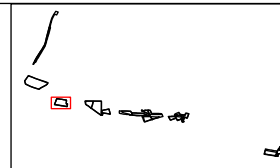
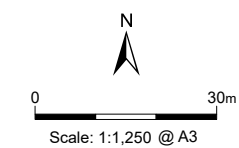


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Figure 6.6	Interpretation of Processed Gradiometer Data			Drawing Number: 05/40331/GEO/6.6/01		
	Enhanced Magnetism (Historic Feature)	Ferrous/Iron Spike		Created by: SO	Date: 28/10/2022	
	Enhanced Magnetism (Modern)	Enhanced Magnetism (Unclear Origin)		Checked by: JL	Date: 04/11/2022	
	Linear Trend (Possible Archaeology)			Approved by: JL	Date: 04/11/2022	



Interpretation of Processed Gradiometer Data



Drawing Number: 05/40331/GEO/6.7/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

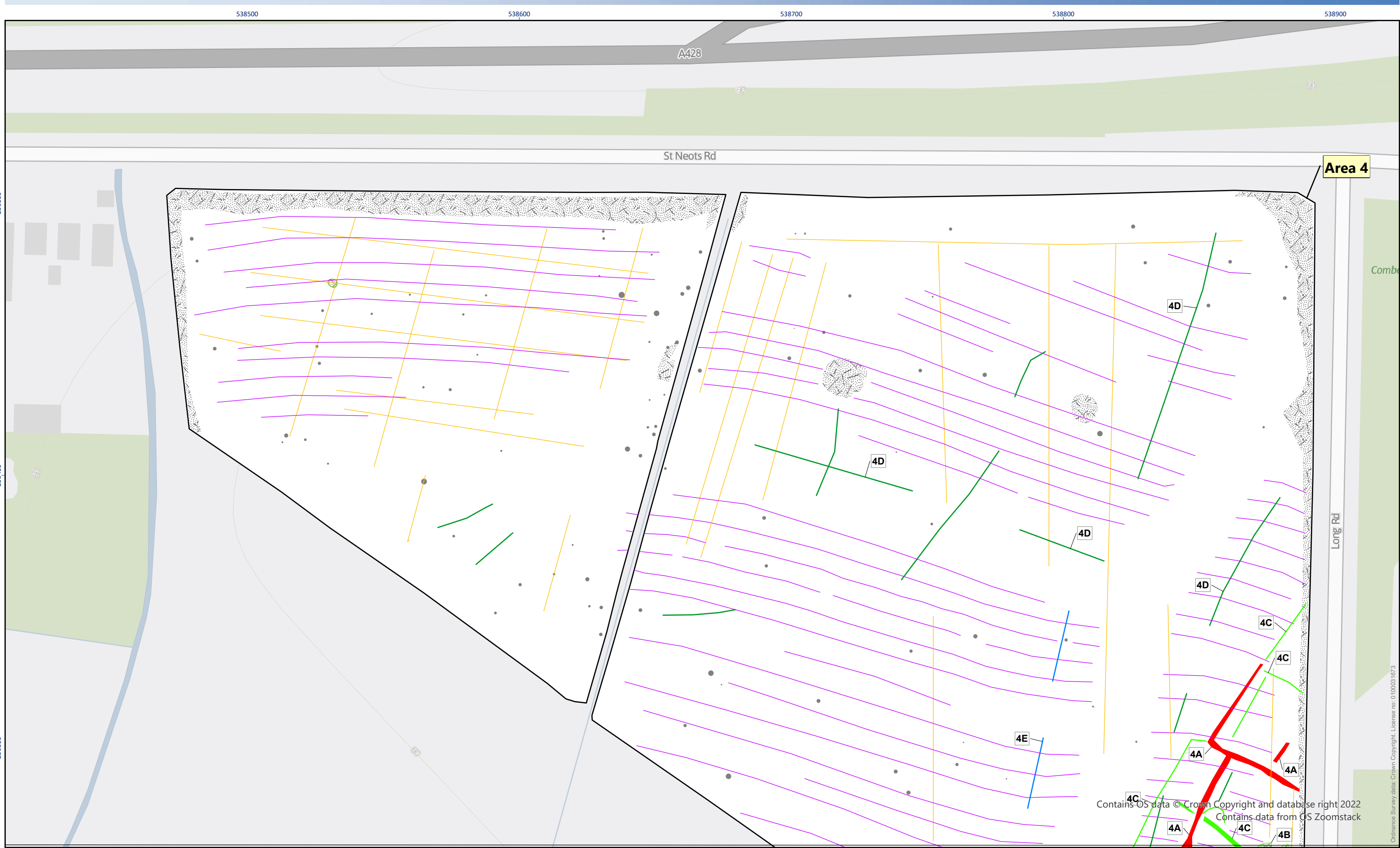


Figure
6.8

Linear Trend (Archaeology)

Enhanced Magnetism (Modern)

Linear Trend (Possible Archaeology)

Enhanced Magnetism (Possible Archaeology)

Ferrous/Iron Spike

Enhanced Magnetism (Unclear Origin)

0

30m

Scale: 1:1,250 @ A3

N

Drawing Number: 05/40331/GEO/6.8/01

Created by: SO Date: 28/10/2022

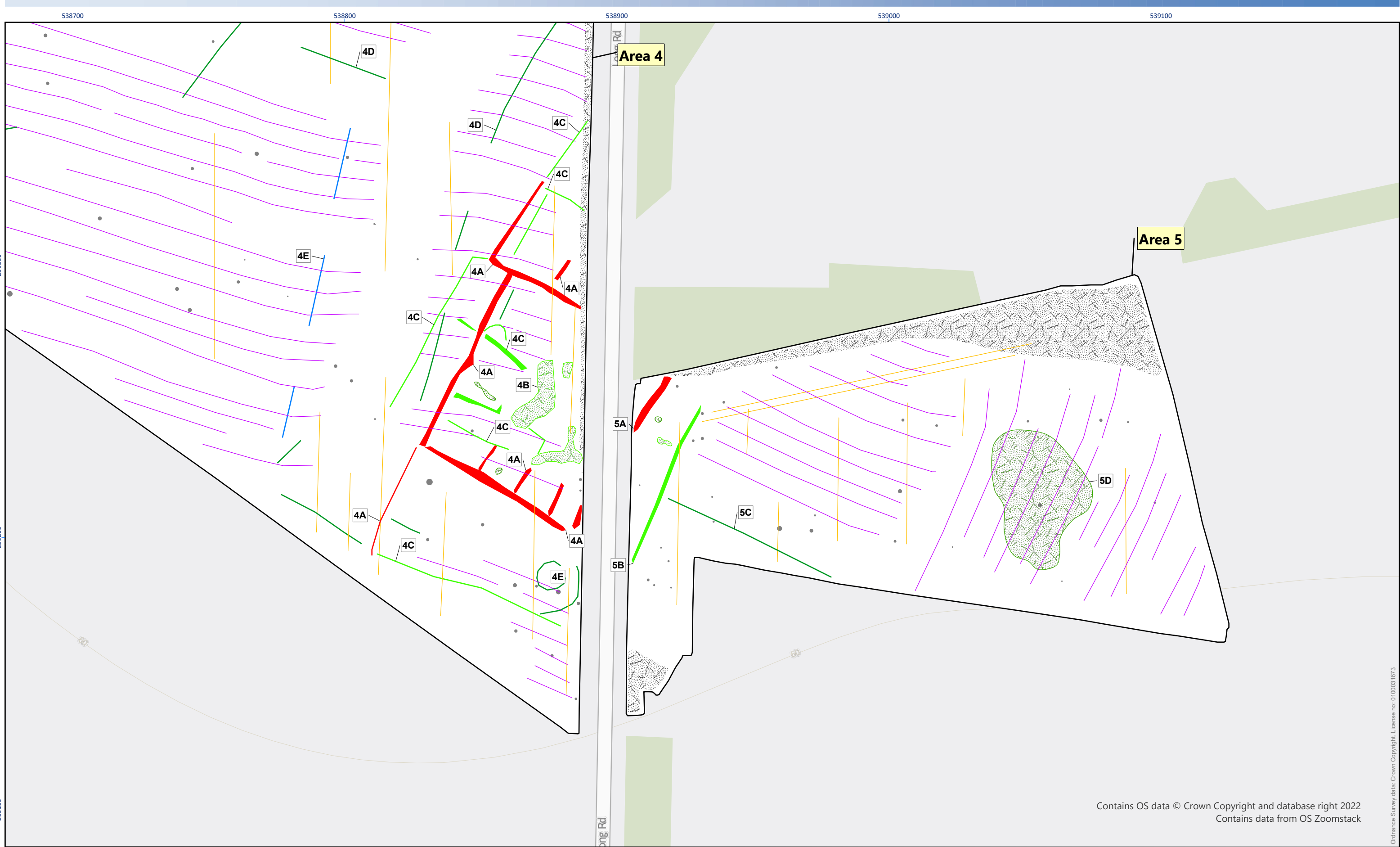
Checked by: JL Date: 04/11/2022

Approved by: JL Date: 04/11/2022

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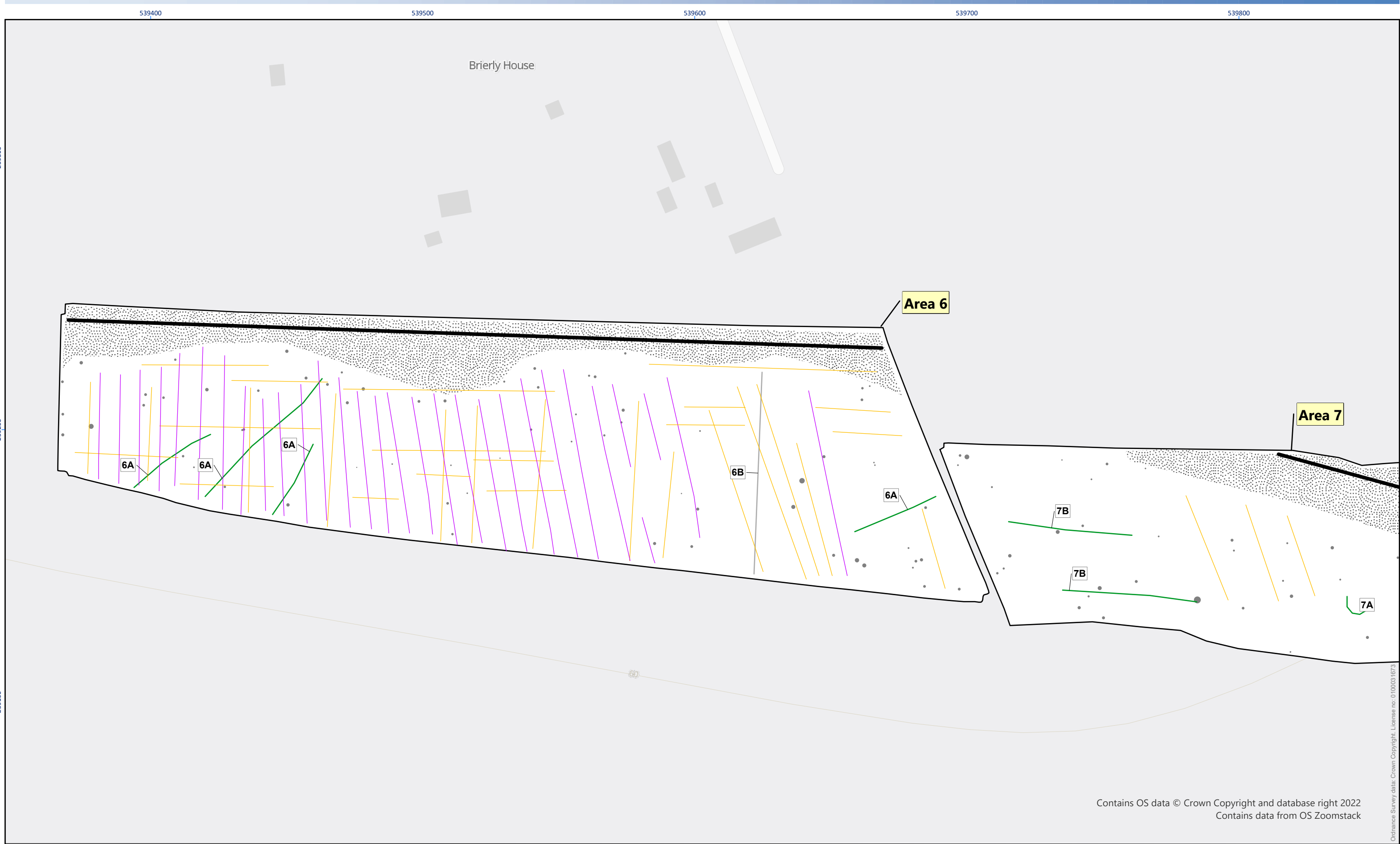
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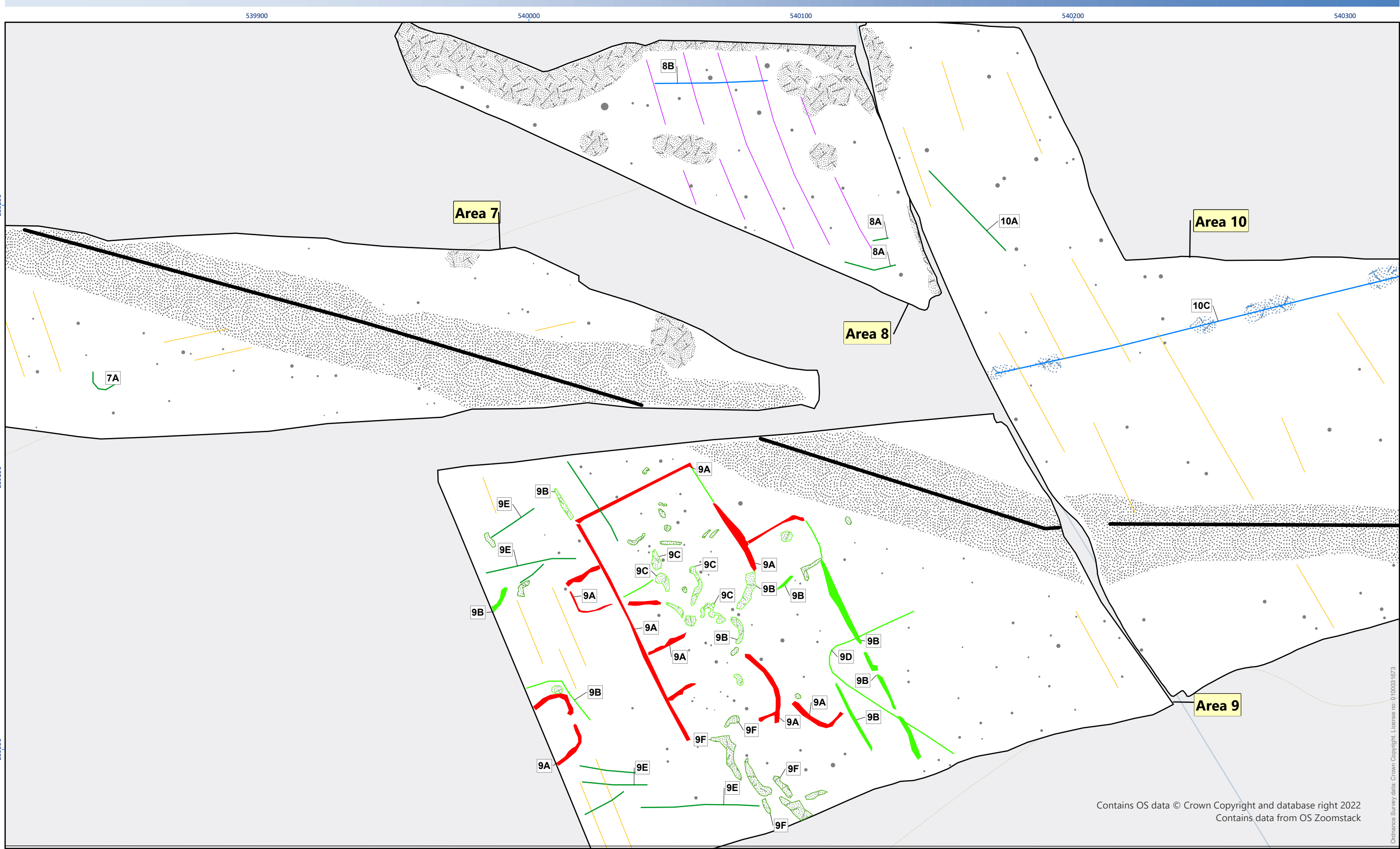
Interpretation of Processed Gradiometer Data

Figure 6.9	Linear Trend (Archaeology)	Enhanced Magnetism (Possible Archaeology)			Drawing Number: 05/40331/GEO/6.9/01		
	Enhanced Magnetism (Modern)	Ferrous/Iron Spike			Created by: SO	Date: 28/10/2022	
	Linear Trend (Possible Archaeology)	Enhanced Magnetism (Unclear Origin)			Checked by: JL	Date: 04/11/2022	
	Approved by: JL				Date: 04/11/2022		



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Interpretation of Processed Gradiometer Data					
Figure 6.10		<div><div></div>Ferrous/Iron Spike</div> <div><div></div>Enhanced Magnetism (Utility)</div>			Drawing Number: 05/40331/GEO/6.10/01
					Created by: SO Date: 28/10/2022
					Checked by: JL Date: 04/11/2022
					Approved by: JL Date: 04/11/2022



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Figure

6.11

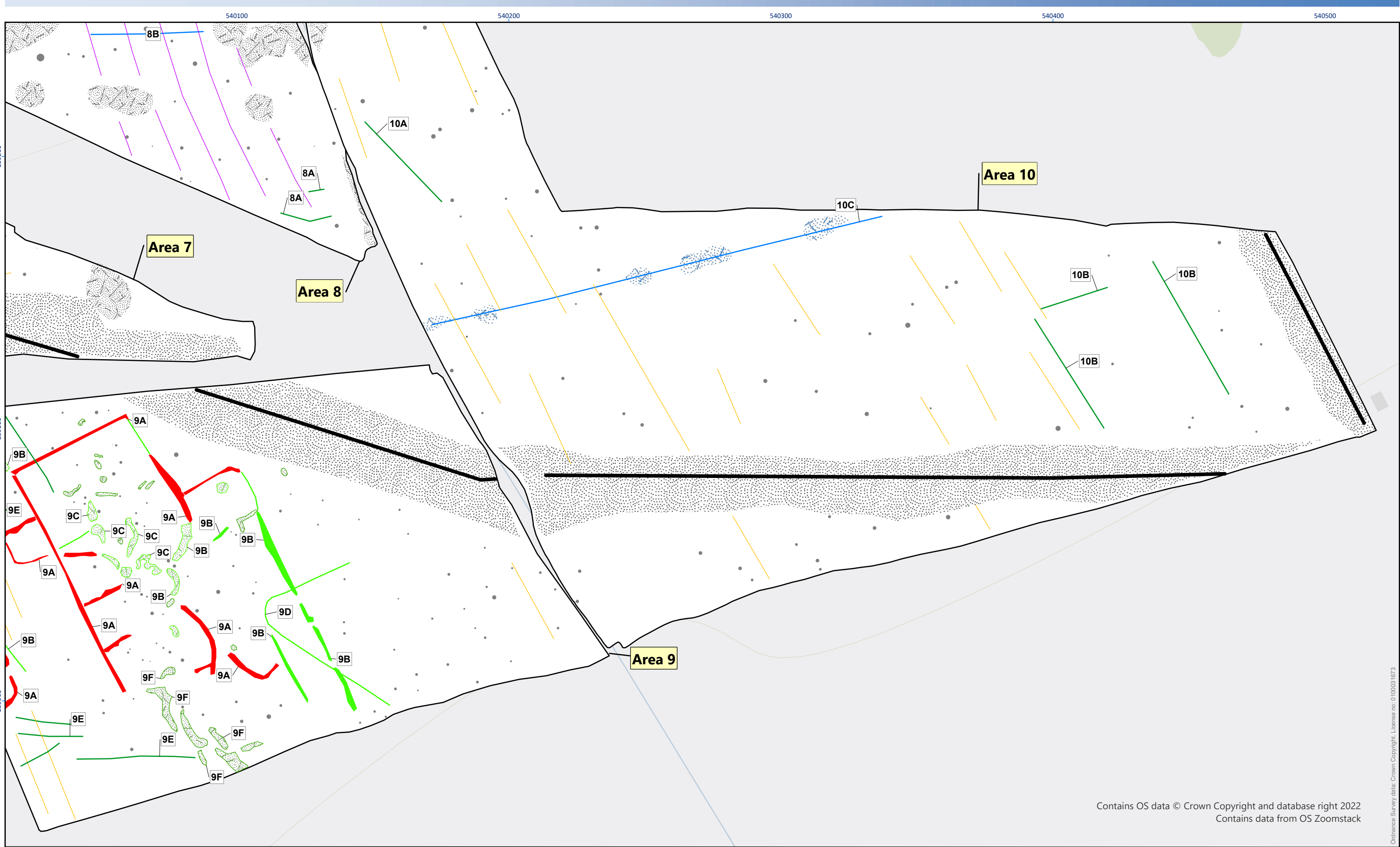
	Linear Trend (Archaeology)		Enhanced Magnetism (Possible Archaeology)
	Enhanced Magnetism (Historic Feature)		Ferrous/Iron Spike
	Enhanced Magnetism (Modern)		Enhanced Magnetism (Unclear Origin)
	Linear Trend (Possible Archaeology)		Enhanced Magnetism (Utility)

N

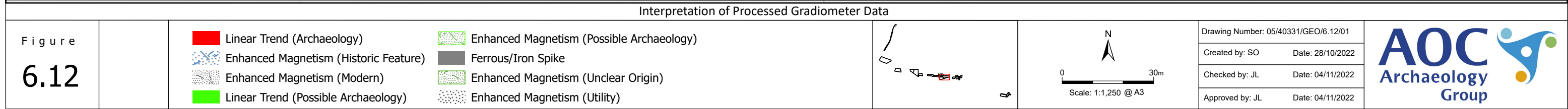
0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/6.11/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



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540700

540800

540900

541000

541100

259200

259100

259000

Area 11

Area 12

Area 13

11A

11A

11A

12B

12A

12D

12C

12D

12D

12C

13A

13B

13B

13B

13B

13B

13B

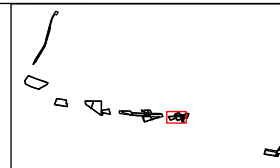
13B

Coton Baptist Church

Coton Church of
England (Voluntary
Controlled) Primary
SchoolContains OS data © Crown Copyright and database right 2022
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Interpretation of Processed Gradiometer Data

- | | | | |
|--|---|--|-------------------------------------|
| | Enhanced Magnetism (Modern) | | Enhanced Magnetism (Unclear Origin) |
| | Enhanced Magnetism (Possible Archaeology) | | Enhanced Magnetism (Utility) |
| | Ferrous/Iron Spike | | |



N

0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/6.13/01

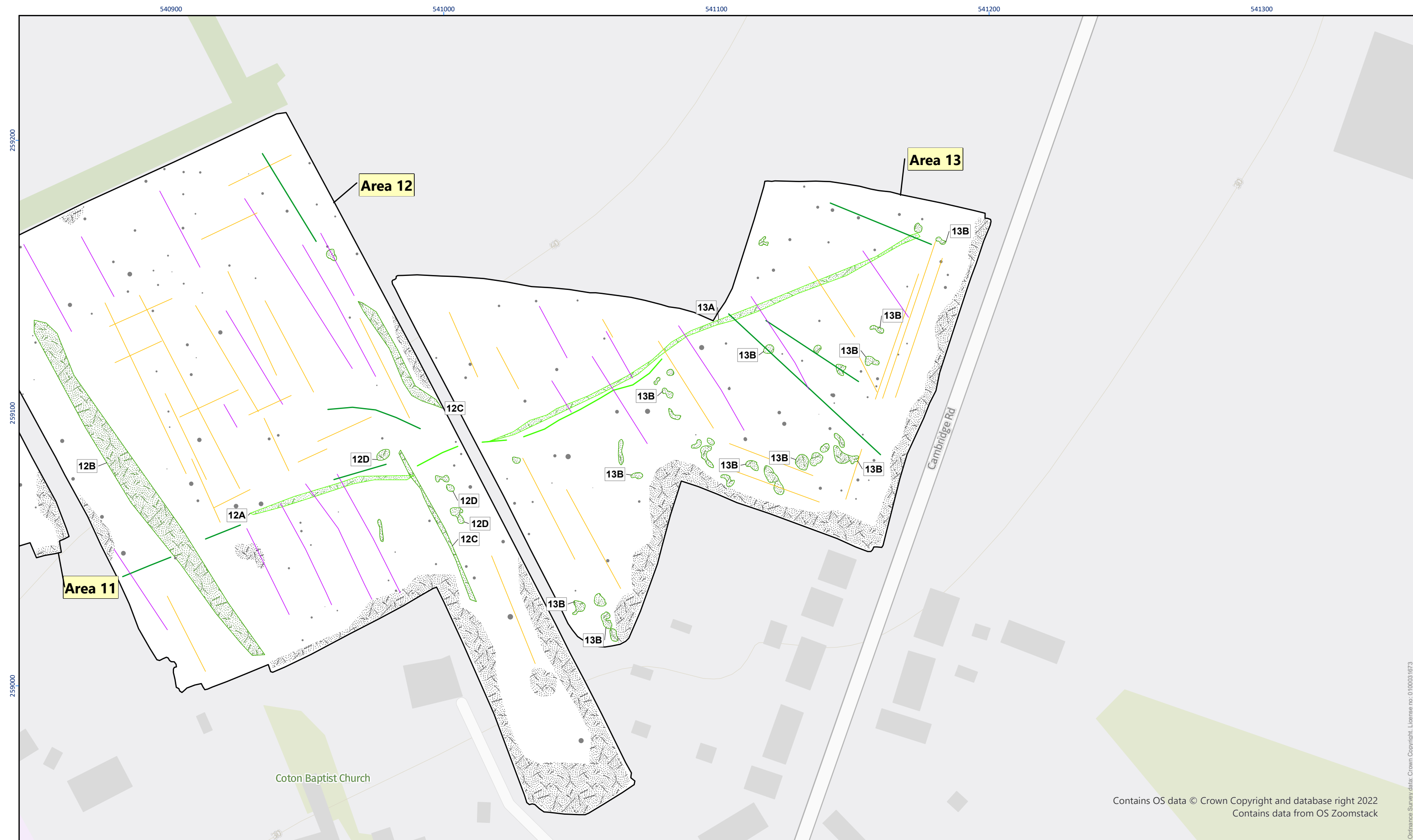
Created by: SO Date: 28/10/2022

Checked by: JL Date: 04/11/2022

Approved by: JL Date: 04/11/2022

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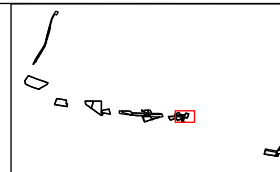
Figure
6.13



Interpretation of Processed Gradiometer Data

Figure
6.14

- | | | | |
|--|---|--|-------------------------------------|
| | Enhanced Magnetism (Modern) | | Ferrous/Iron Spike |
| | Enhanced Magnetism (Possible Archaeology) | | Enhanced Magnetism (Unclear Origin) |



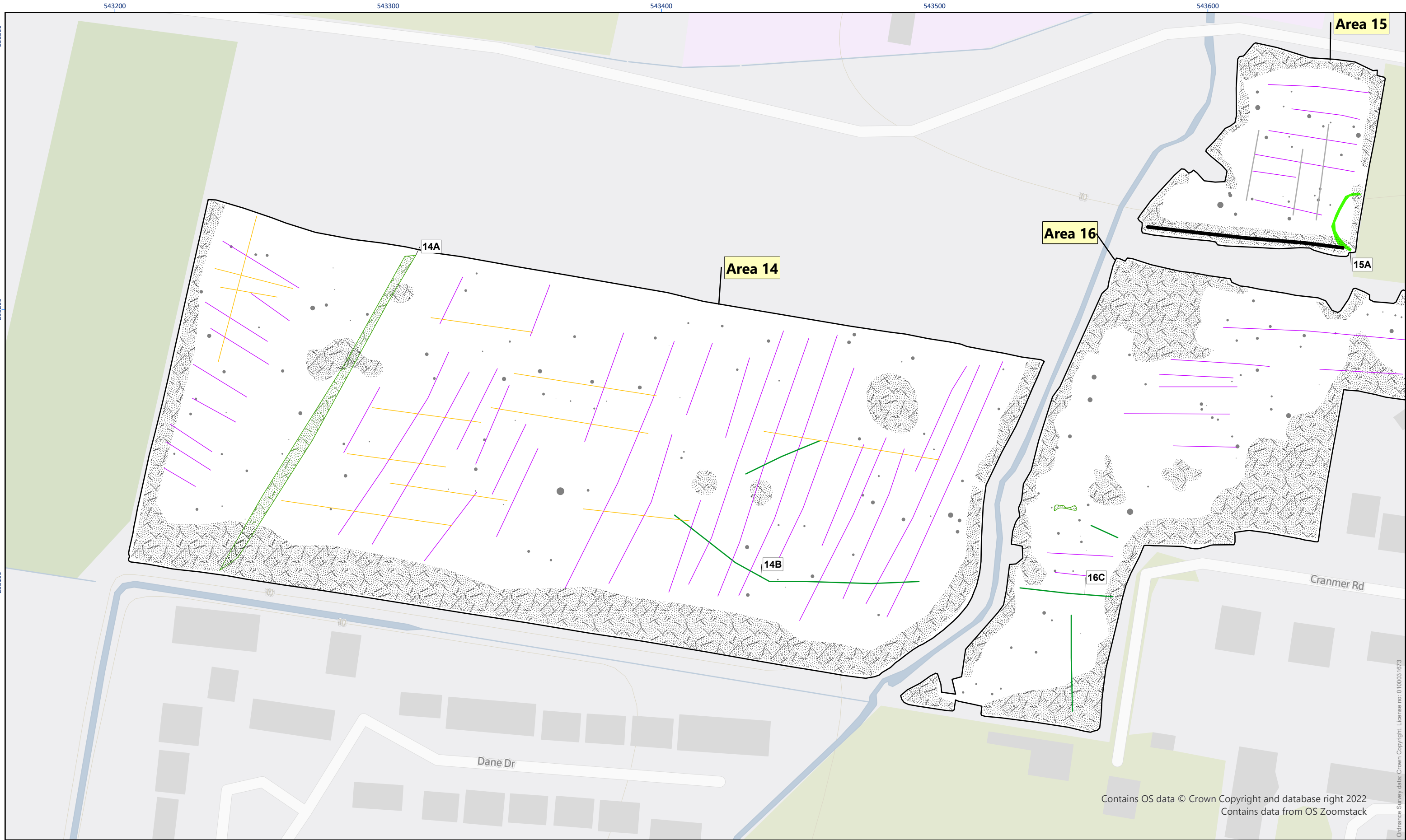
N

0 30m

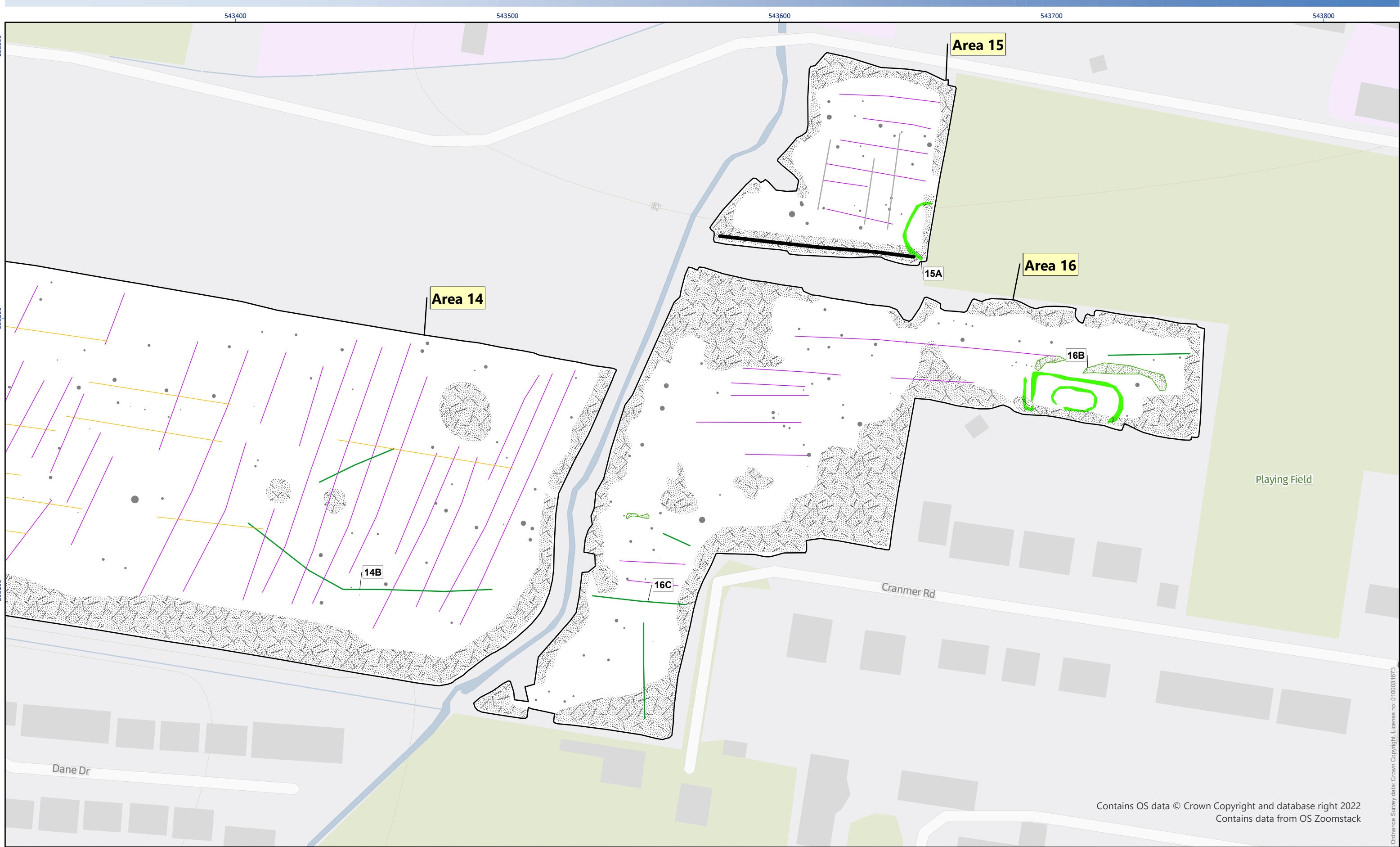
Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/6.14/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

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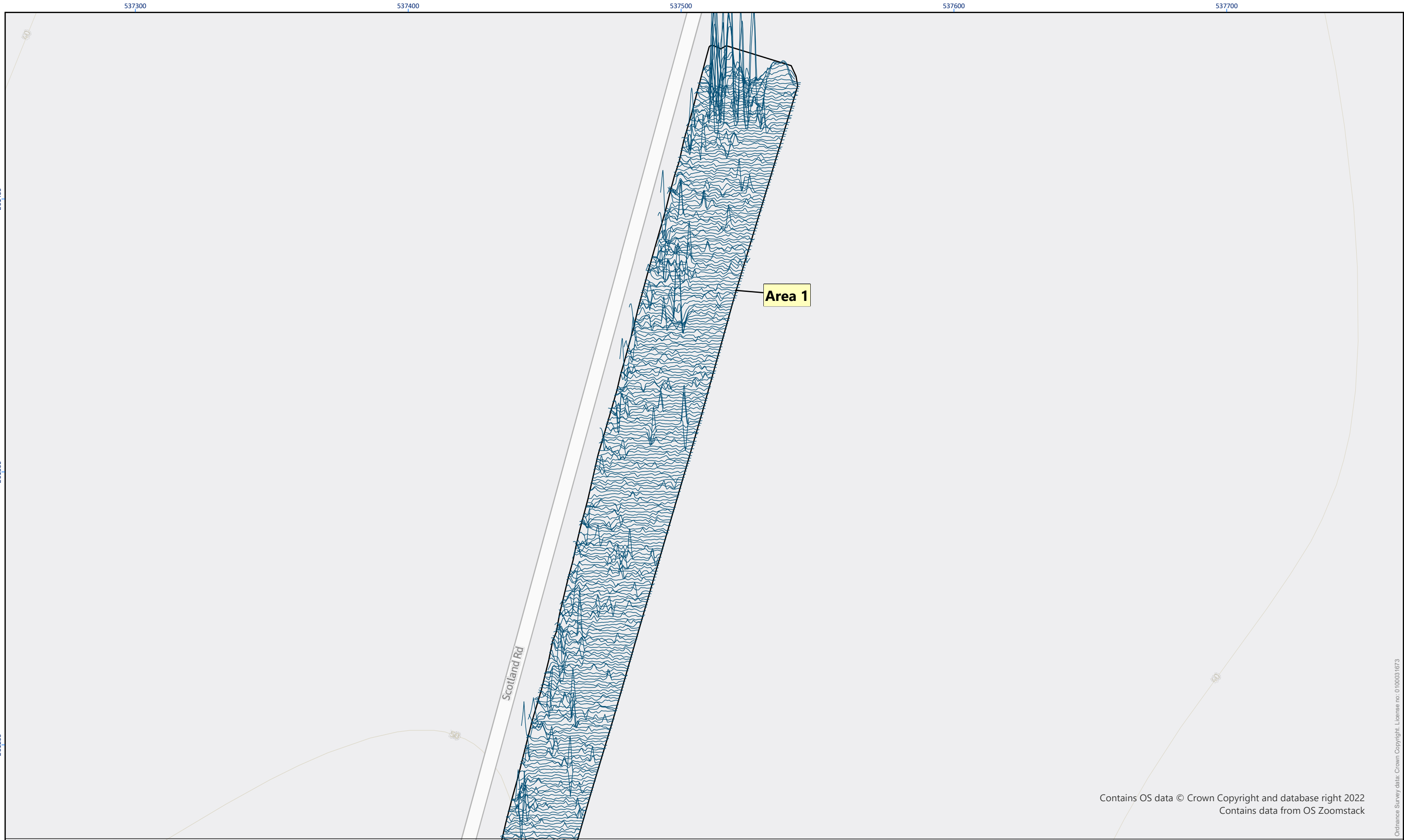
<p>Figure</p> <p>6.15</p>	<p>Enhanced Magnetism (Modern)</p> <p>Linear Trend (Possible Archaeology)</p>		<p>Ferrous/Iron Spike</p> <p>Enhanced Magnetism (Unclear Origin)</p>		<p>Scale: 1:1,250 @ A3</p>	<p>Drawing Number: 05/40331/GEO/6.15/01</p>		
						<p>Created by: SO Date: 28/10/2022</p>		
						<p>Checked by: JL Date: 04/11/2022</p>		
						<p>Approved by: JL Date: 04/11/2022</p>		



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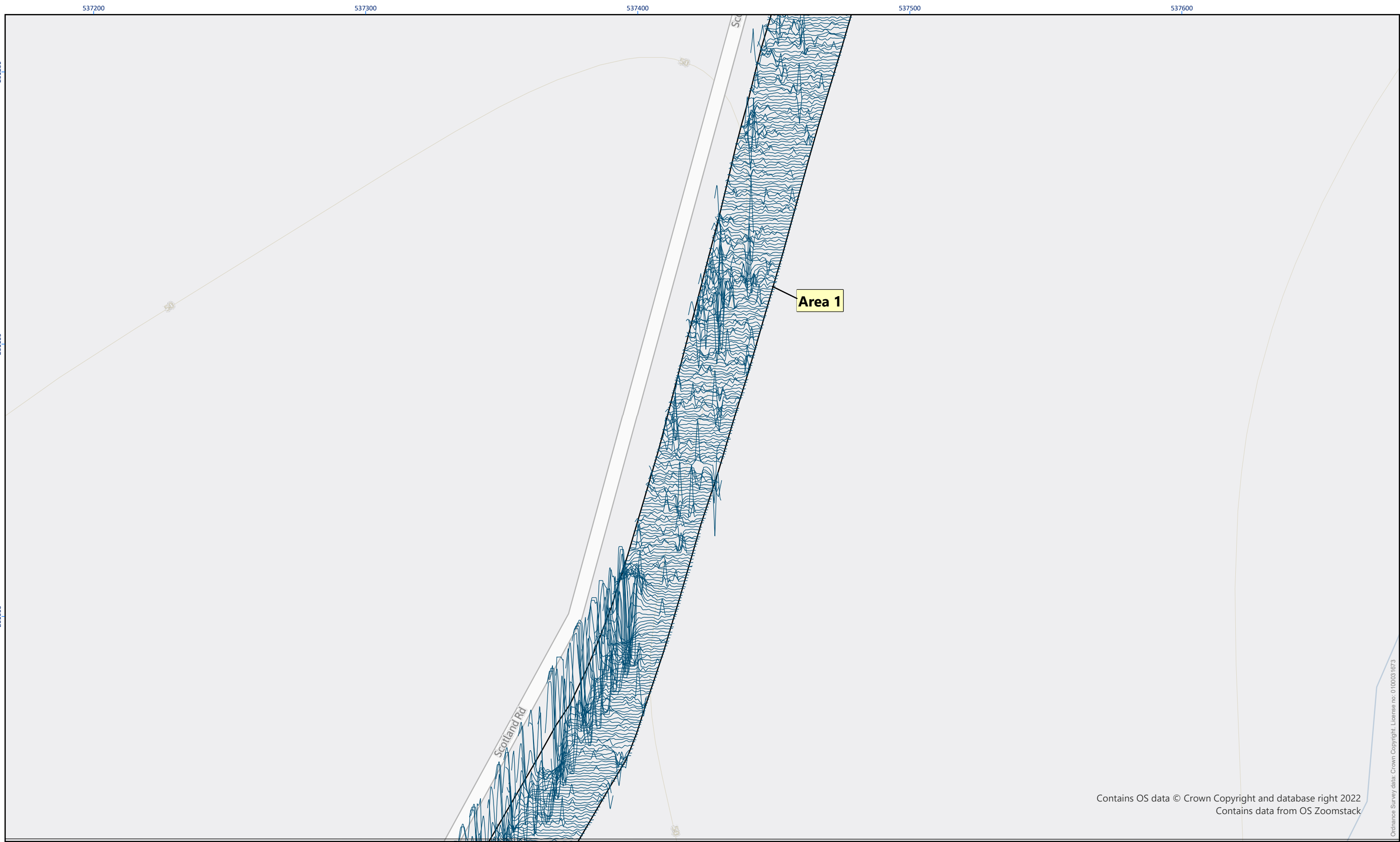
Interpretation of Processed Gradiometer Data

Figure 6.16		 Enhanced Magnetism (Modern) Linear Trend (Possible Archaeology) Ferrous/Iron Spike Enhanced Magnetism (Unclear Origin)		 Scale: 1:1,250 @ A3	Drawing Number: 05/40331/GEO/6.16/01	
					Created by: SO Date: 28/10/2022	
					Checked by: JL Date: 04/11/2022	
					Approved by: JL Date: 04/11/2022	



Minimally Processed Gradiometer Data - XY Trace

<div>Figure</div> <div>7.1</div>	<div>40nT</div> <div>-40nT</div>		<div>N</div> <div>0 30m</div> <div>Scale: 1:1,250 @ A3</div>	Drawing Number: 05/40331/GEO/7.1/01		
				Created by: SO	Date: 28/10/2022	
				Checked by: JL	Date: 04/11/2022	
				Approved by: JL	Date: 04/11/2022	



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Figure
7.2

30nT

-30nT

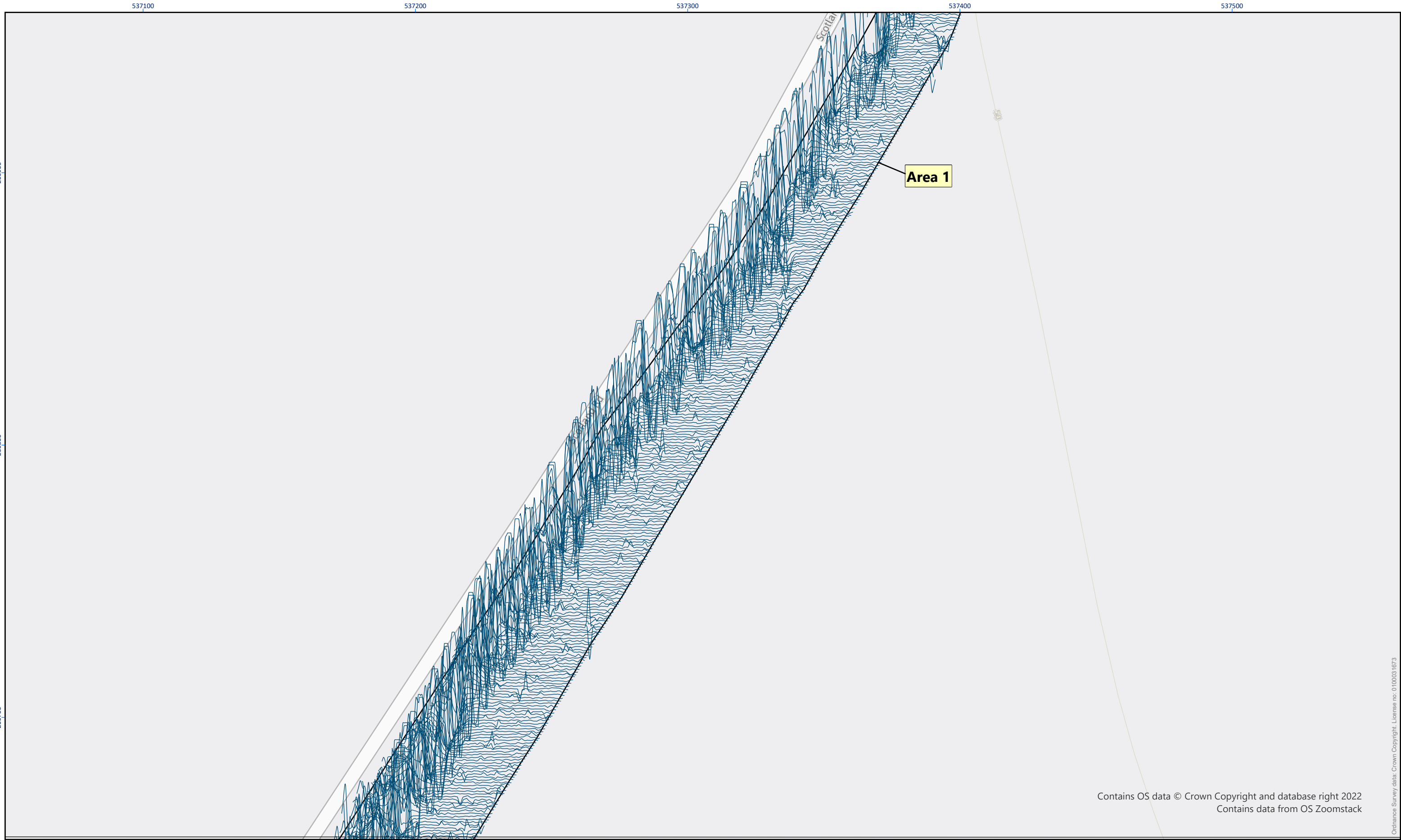
Minimally Processed Gradiometer Data - XY Trace

N

0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/7.2/01	
Created by: SO	Date: 28/10/2022
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Approved by: JL	Date: 04/11/2022



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Figure

7.3

30nT

-30nT

Minimally Processed Gradiometer Data - XY Trace

N

0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/7.3/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

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537000 537100 537200 537300 537400

260700

260600

260500



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Minimally Processed Gradiometer Data - XY Trace

<p>Figure</p> <p>7.4</p>	<p>30nT</p> <p>-30nT</p>		<p>N</p> <p>0 30m</p> <p>Scale: 1:1,250 @ A3</p>	Drawing Number: 05/40331/GEO/7.4/01		
				Created by: SO Date: 28/10/2022		
				Checked by: JL Date: 04/11/2022		
				Approved by: JL Date: 04/11/2022		

536800

536900

537000

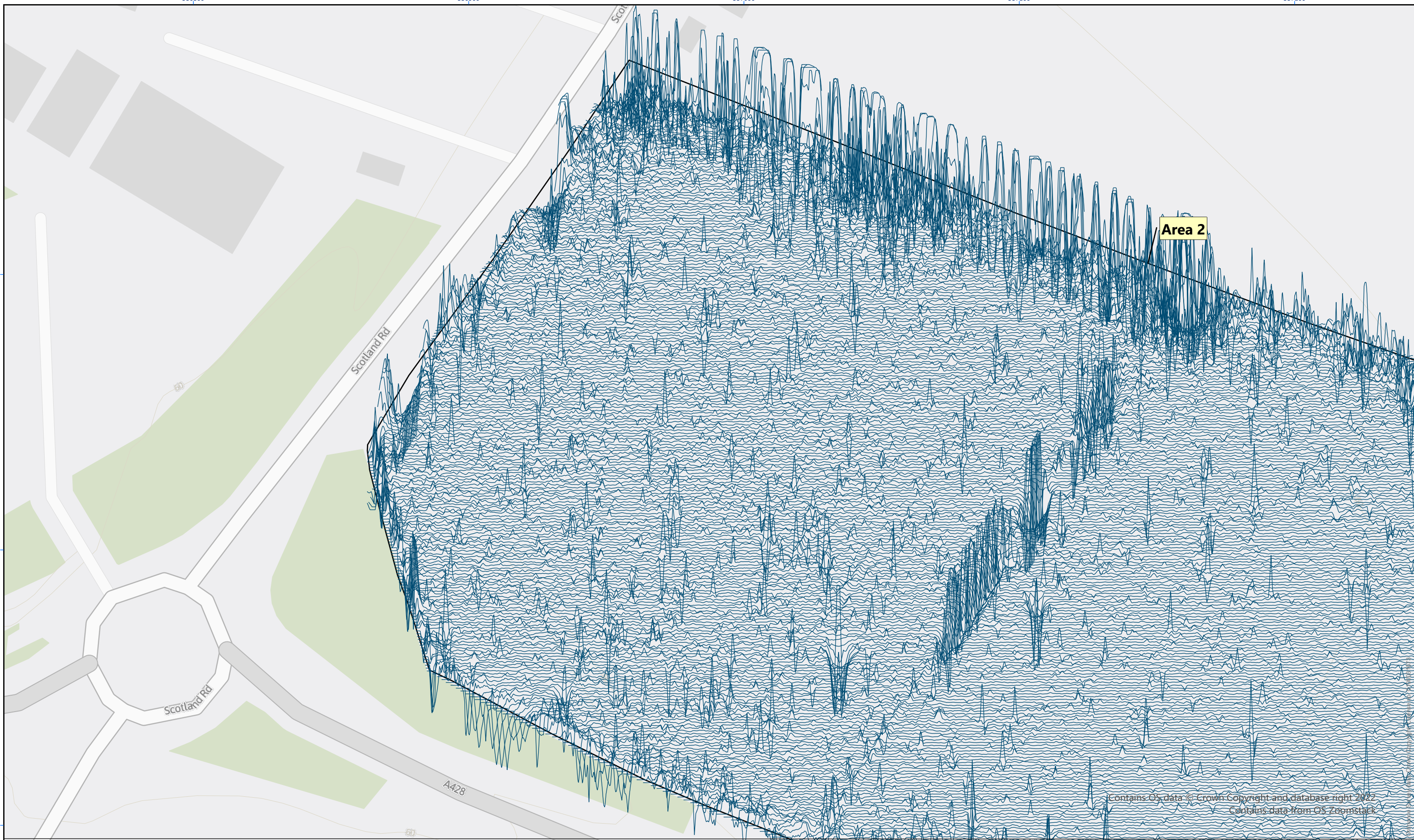
537100

537200

260100

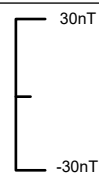
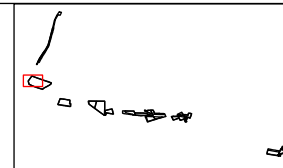
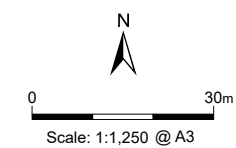
260000

259900



Minimally Processed Gradiometer Data - XY Trace

Figure
7.5



Drawing Number: 05/40331/GEO/7.5/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

AOC
Archaeology
Group

537000

537100

537200

537300

537400

537500

260000

259900

259800

Area 2

A428

A428

A428

A428

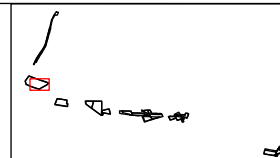
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Minimally Processed Gradiometer Data - XY Trace

Figure
7.6

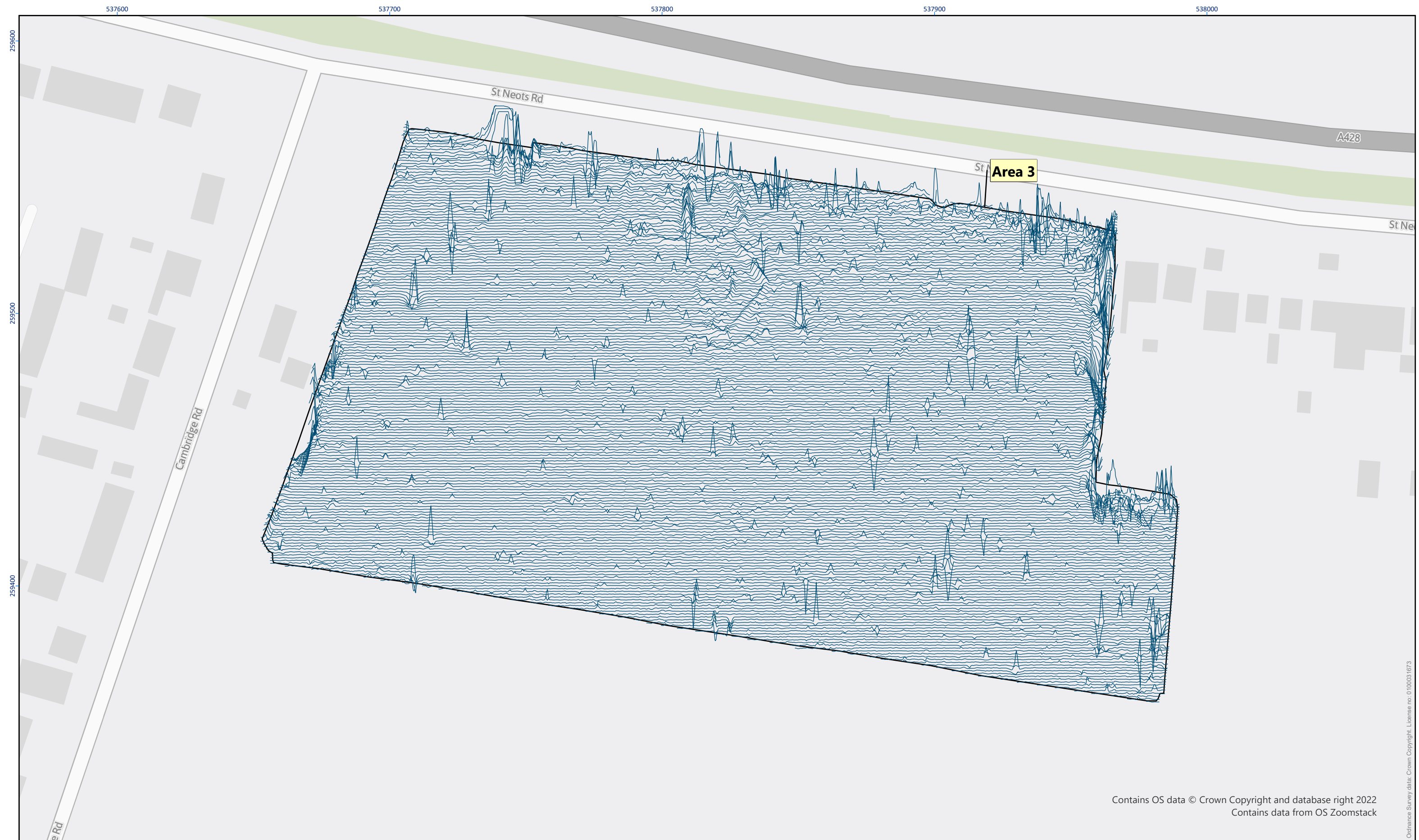
30nT
-30nT



N
0 30m
Scale: 1:1,250 @ A3

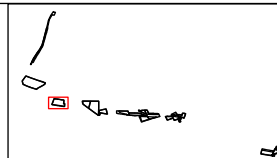
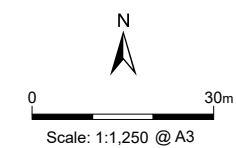
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Created by: SO Date: 28/10/2022
Checked by: JL Date: 04/11/2022
Approved by: JL Date: 04/11/2022

AOC
Archaeology
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Minimally Processed Gradiometer Data - XY Trace

Figure
7.7



Drawing Number: 05/40331/GEO/7.7/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

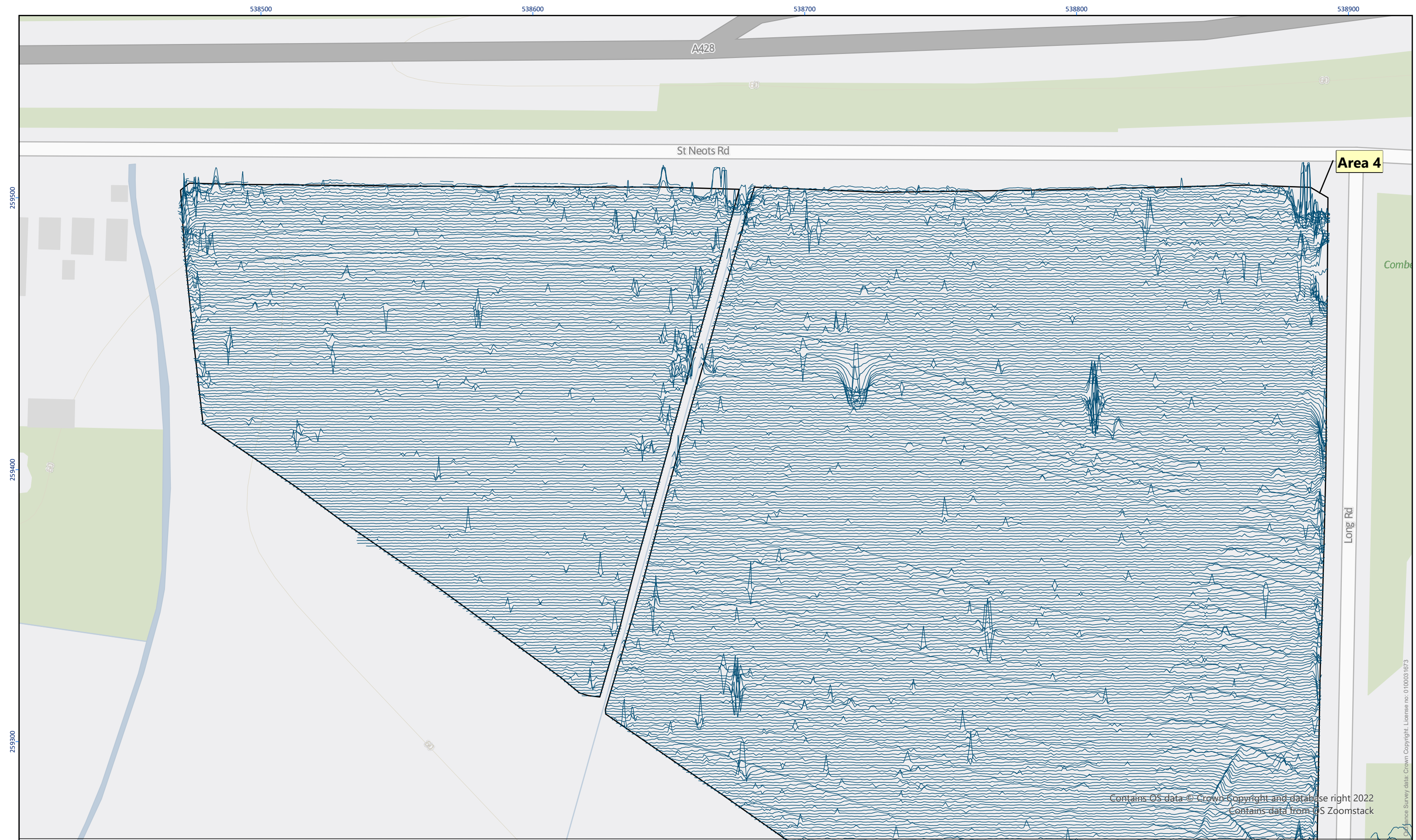
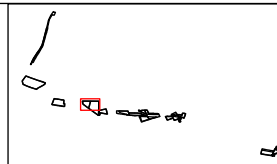
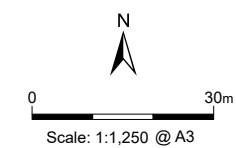
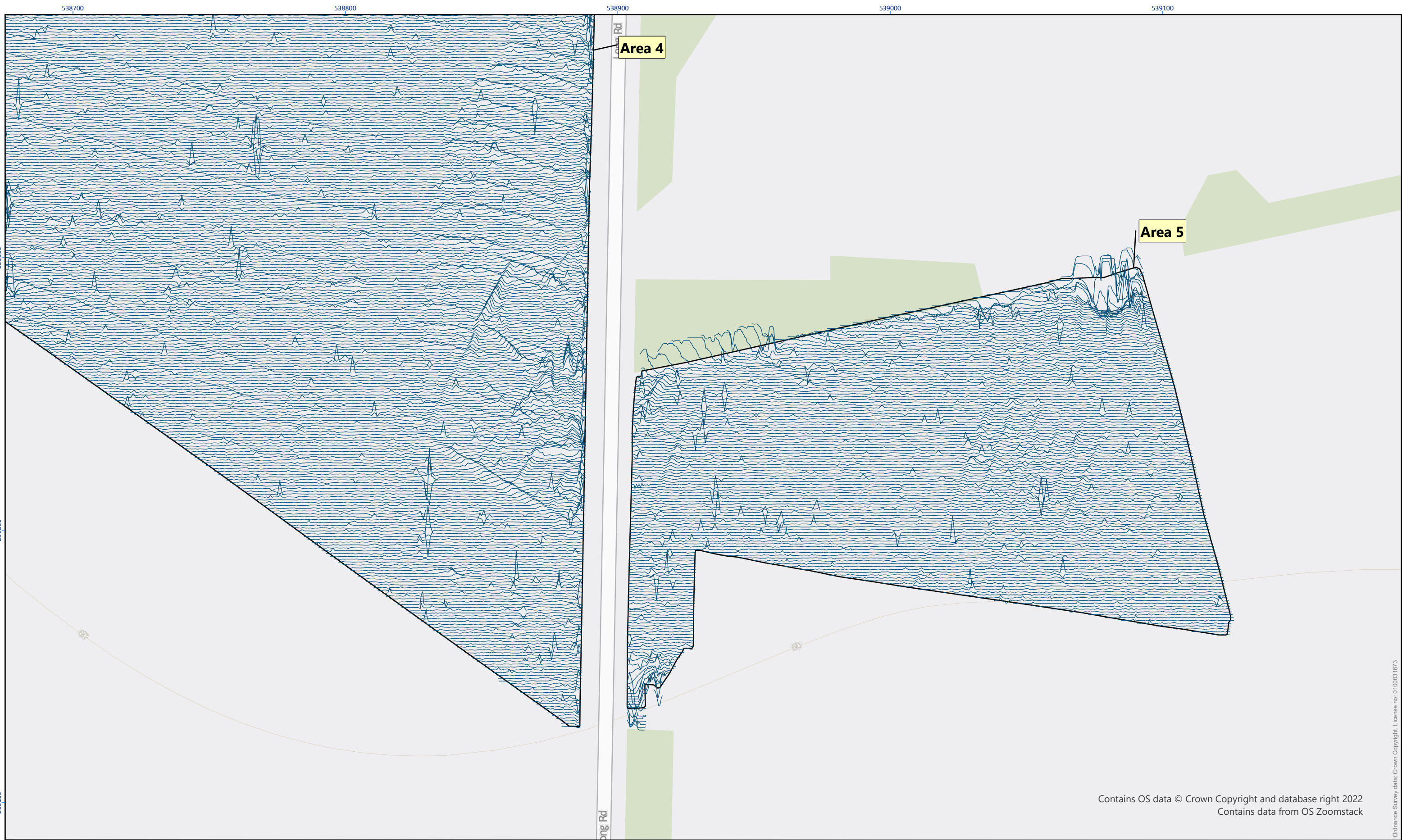


Figure
7.8



Drawing Number: 05/40331/GEO/7.8/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



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Figure
7.9

30nT

-30nT

Minimally Processed Gradiometer Data - XY Trace

N

0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/7.9/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

AOC

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539400

539500

539600

539700

539800

Brierly House

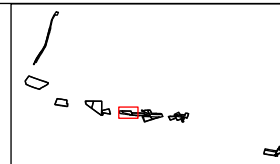
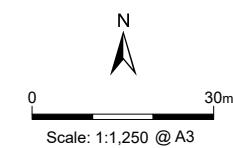
Area 6

Area 7

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Minimally Processed Gradiometer Data - XY Trace

Figure
7.10



Drawing Number: 05/40331/GEO/7.10/01

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Checked by: JL Date: 04/11/2022

Approved by: JL Date: 04/11/2022

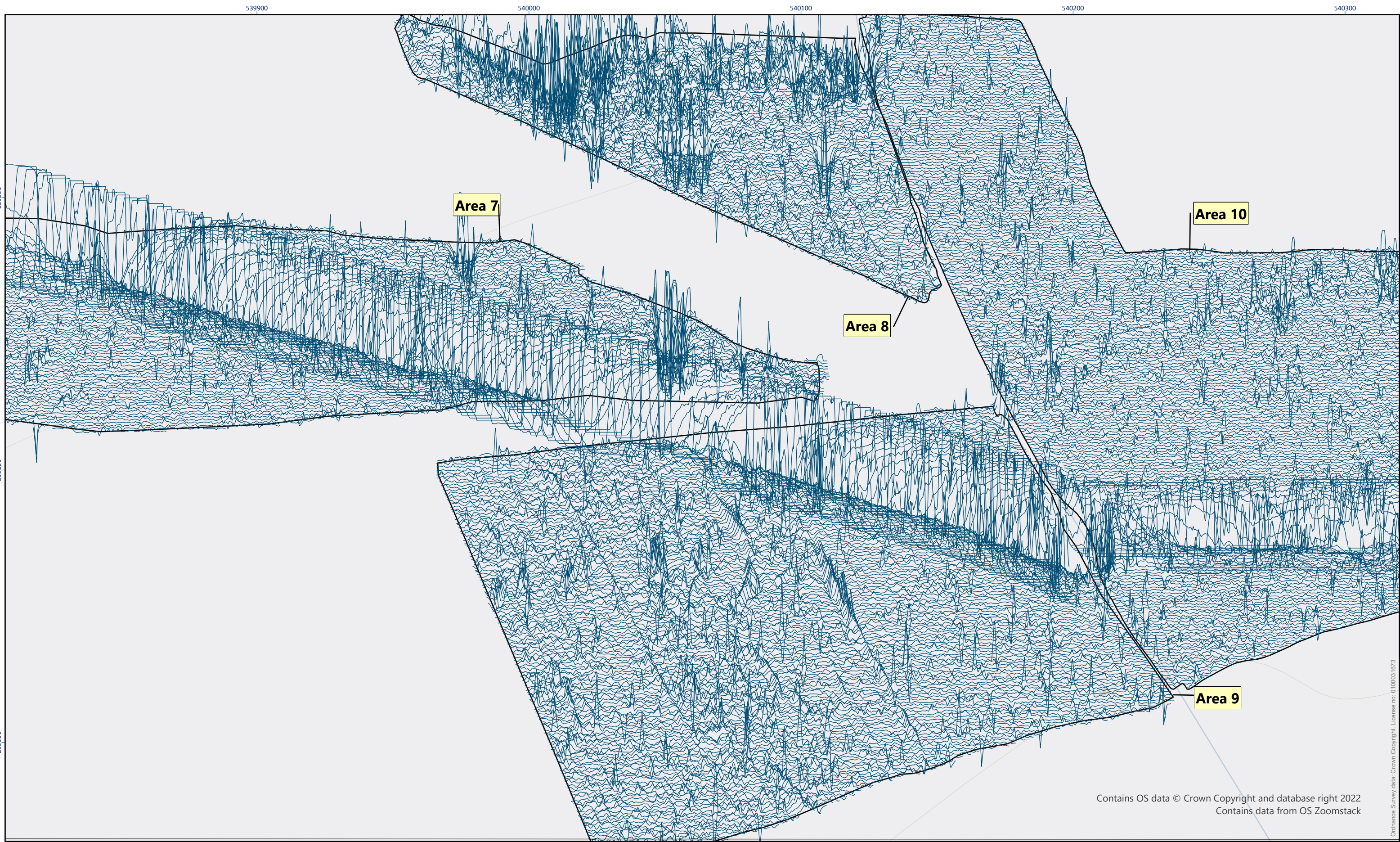


Figure
7.11

30nT

-30nT

Minimally Processed Gradiometer Data - XY Trace

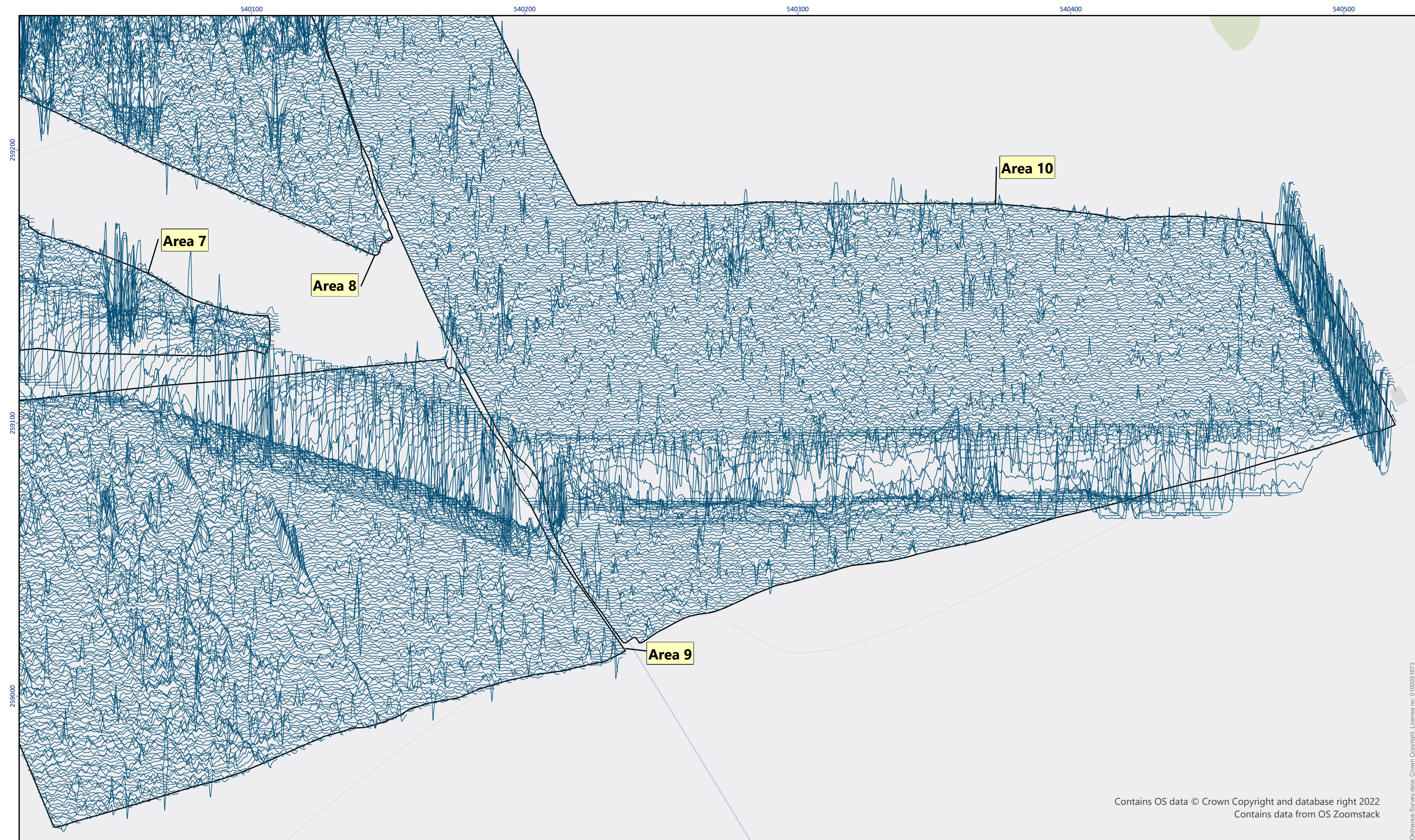
N

0 30m

Scale: 1:1,250 @ A3

Drawing Number: 05/40331/GEO/7.11/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

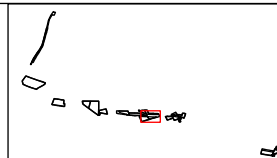
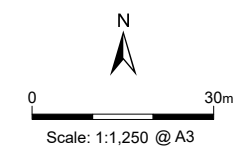
AOC
Archaeology
Group



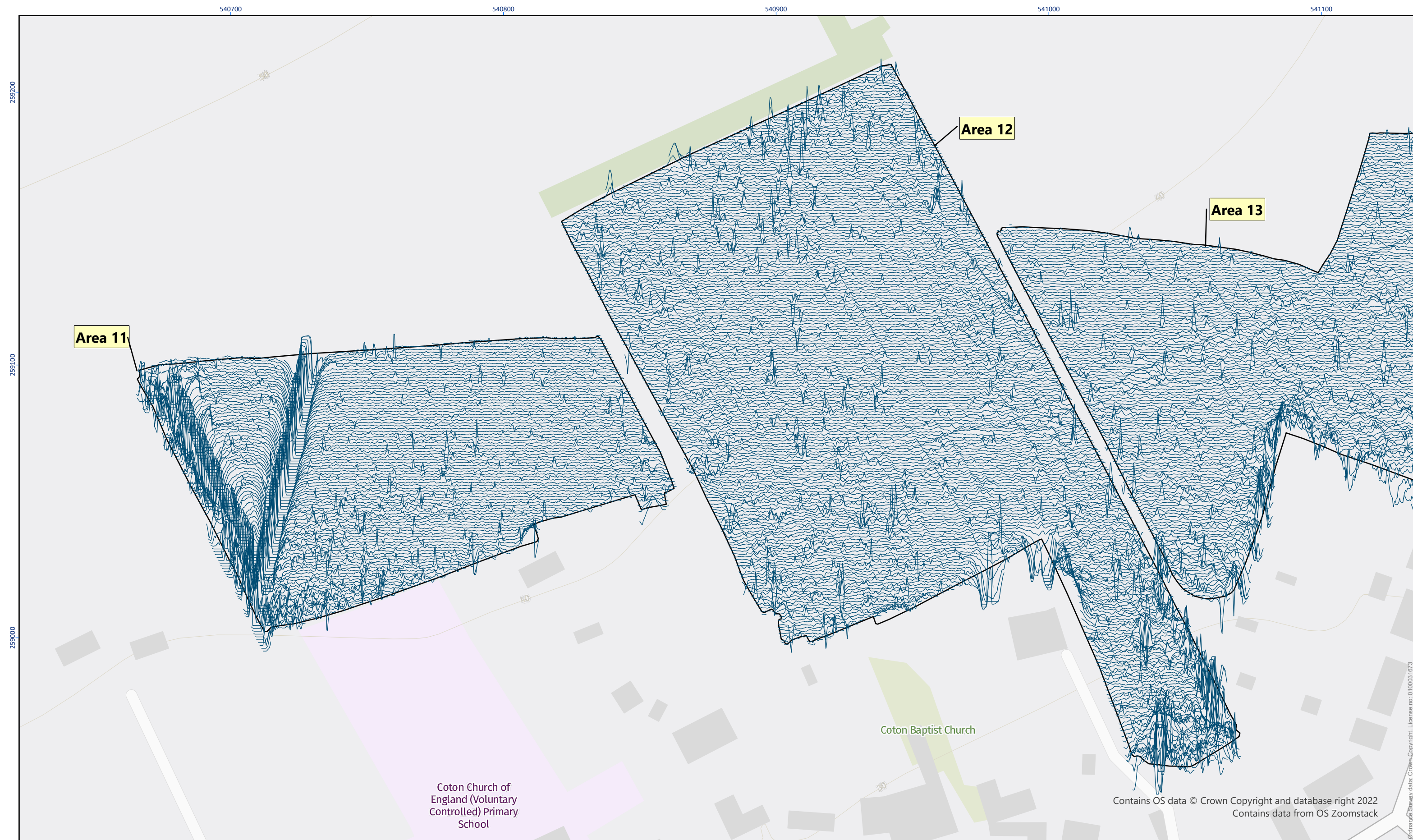
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Minimally Processed Gradiometer Data - XY Trace

Figure
7.12

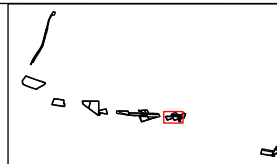
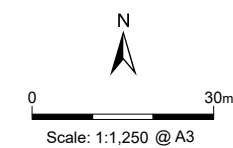


Drawing Number: 05/40331/GEO/7.12/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

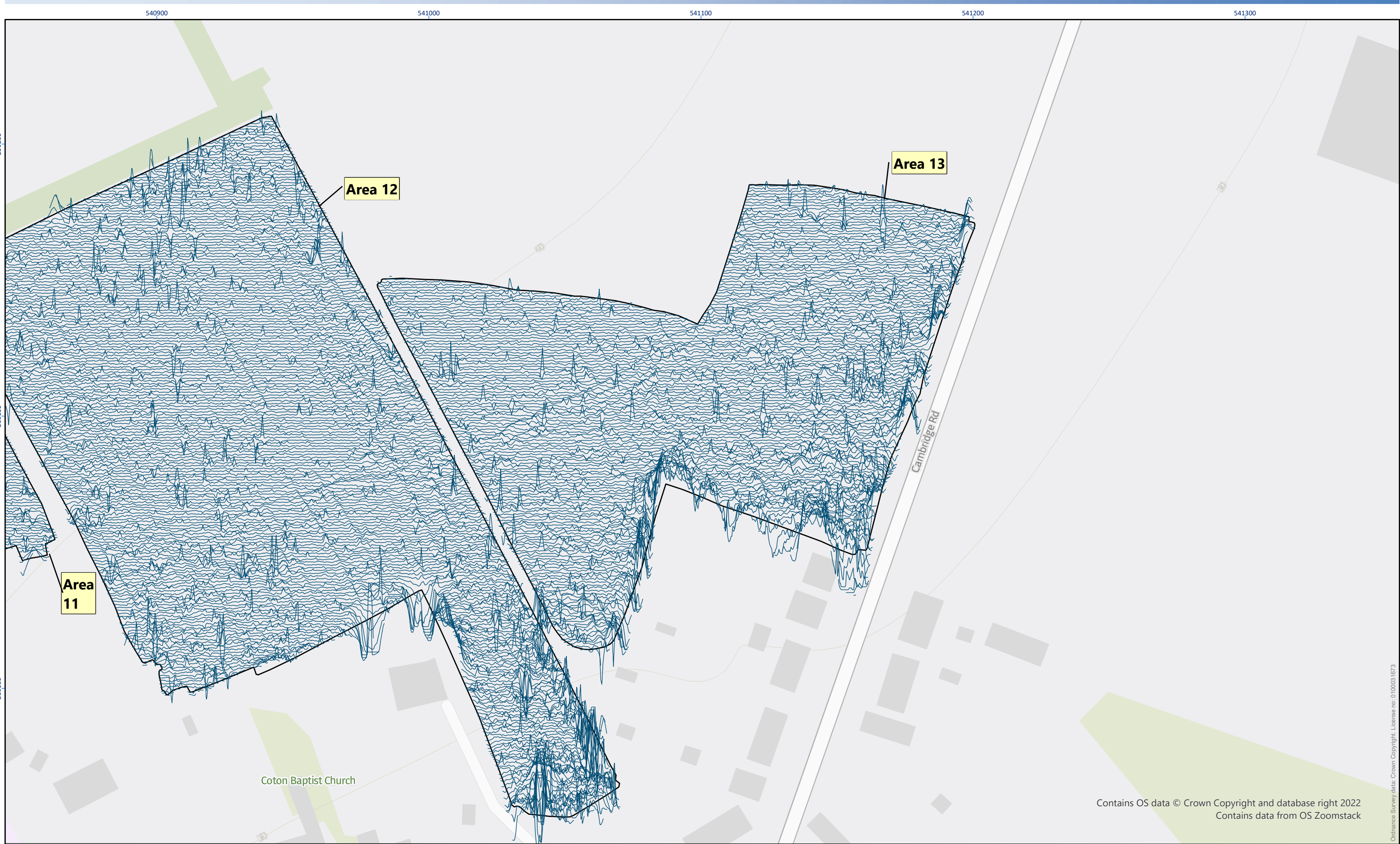


Minimally Processed Gradiometer Data - XY Trace

Figure
7.13



Drawing Number: 05/40331/GEO/7.13/01	
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Figure
7.14

30nT

-30nT

Minimally Processed Gradiometer Data - XY Trace

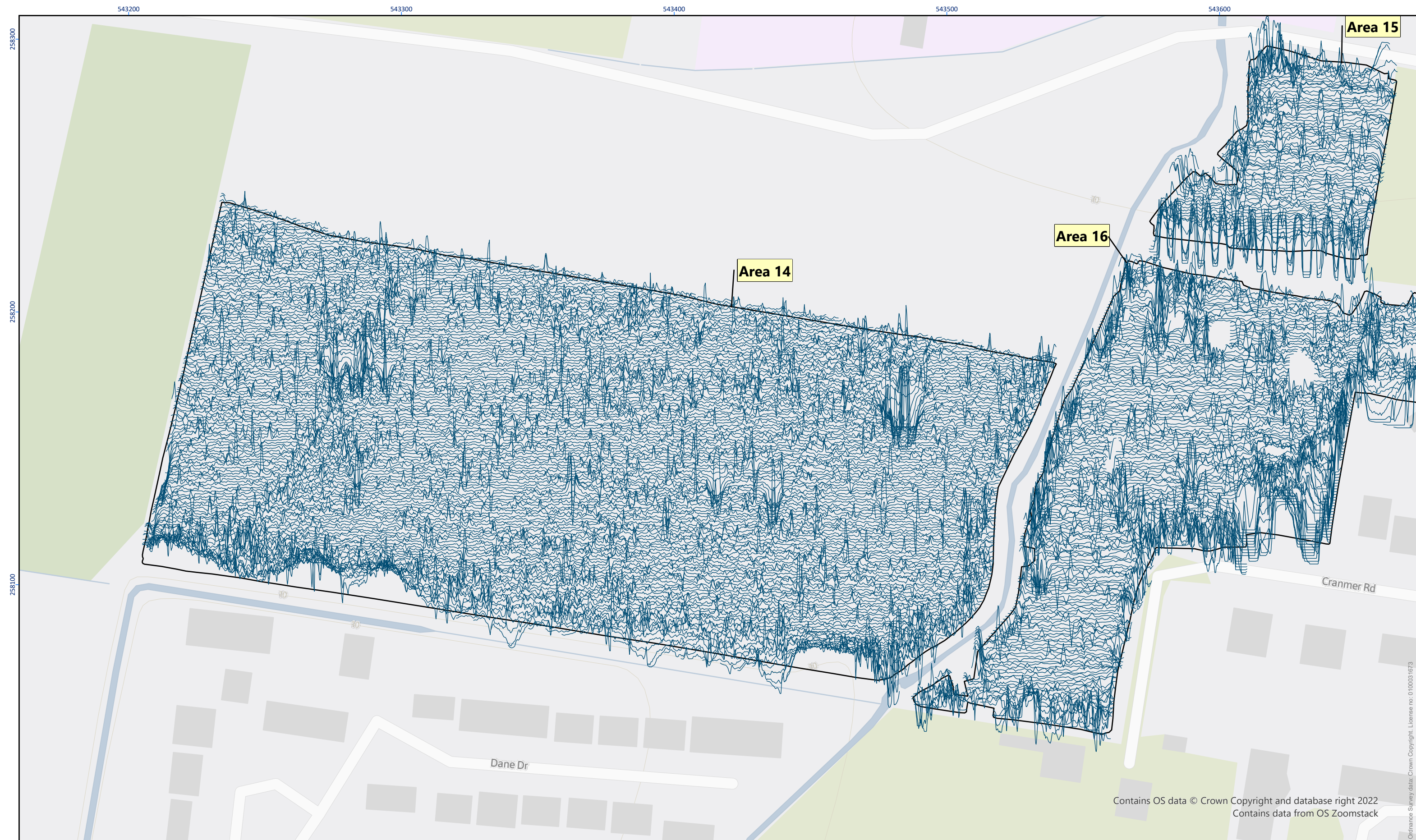
N

0 30m

Scale: 1:1,250 @ A3

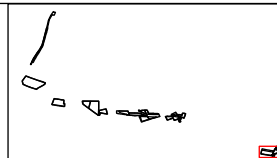
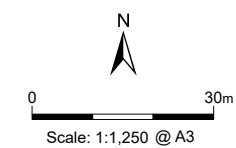
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Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

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Minimally Processed Gradiometer Data - XY Trace

Figure
7.15

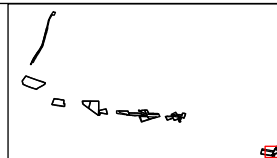
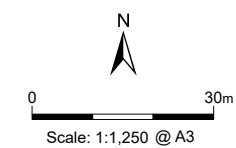


Drawing Number: 05/40331/GEO/7.15/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022



Minimally Processed Gradiometer Data - XY Trace

Figure
7.16



Drawing Number: 05/40331/GEO/7.16/01	
Created by: SO	Date: 28/10/2022
Checked by: JL	Date: 04/11/2022
Approved by: JL	Date: 04/11/2022

Appendix 1: Survey Metadata

Oasis ID: aocarcha1-505824

Field	Description
Surveying Company	AOC Archaeology
Data collection staff	A Galt, S O'connor, M Hall and R Martin
Client	WSP
Site name	Cambourne to Cambridge Scheme
County	Cambridgeshire
NGR	TL 40125 59352 (centre)
Land use/ field condition	Stubble, seeded, and pasture
Duration	April, August & September 2022
Weather	Mixed
Survey type	Gradiometer Survey
Instrumentation	Bartington cart survey: Bartington Non-Magnetic Cart, Six Grad-01-1000L Bartington sensors, Trimble R10 GNSS System
Area covered	57.56 ha
Download software	MLGrad601
Processing software	Geomar, MultiGrad601 and TerraSurveyor
Visualisation software	ArcGIS Pro
Geology	Gault Formation Mudstone & West Melbury Marly Chalk Formation (BGS, 2022)
Soils	Lime-rich loamy and clayey soils with impeded drainage (Soilscapes, 2022)
Scheduled Ancient Monument	No
Known archaeology on Site	Three prehistoric settlements
Historical documentation/ mapping on Site	None
Report title	Cambourne to Cambridge Scheme: Archaeological Geophysical Survey
Project number	40331
Report Author	Susan Ovenden
Quality Checked by	James Lawton

Appendix 2: Archaeological Prospection Techniques, Instrumentation and Software Utilised

Gradiometer Survey

Gradiometer surveys measure small changes in the earth's magnetic field. Archaeological materials and activity can be detected by identifying changes to the magnetic values caused by the presence of weakly magnetised iron oxides in the soil (Aspinall et al., 2008, 23; Sharma, 1997, 105). Human inhabitation often causes alterations to the magnetic properties of the ground (Aspinall et al, 2008, 21). There are two physical transformations that produce a significant contrast between the magnetic properties of archaeological features and the surrounding soil: the enhancement of magnetic susceptibility and thermoremanent magnetization (Aspinall et al., 2008, 21; Heron and Gaffney 1987, 72).

Ditches and pits can be easily detected through gradiometer survey as the topsoil is generally suggested to have a greater magnetisation than the subsoil caused by human habitation. Areas of burning or materials which have been subjected to heat commonly also have high magnetic signatures, such as hearths, kilns, fired clay and mudbricks (Clark 1996, 65; Lowe and Fogel 2010, 24).

It should be noted that negative anomalies can also be useful for characterising archaeological features. If the buried remains are composed of a material with a lower magnetisation compared to the surrounding soil, the surrounding soil will consequently have a greater magnetization, resulting in the feature in question displaying a negative signature. For example, stone materials of a structural nature that are composed of sedimentary rocks are considered non-magnetic and so will appear as negative features within the dataset.

Ferrous objects – i.e. iron and its alloys - are strongly magnetic and are typically detected as high-value peaks in gradiometer survey data, though it is not usually possible to determine whether these relate to archaeological or modern objects.

Although gradiometer surveys have been successfully carried out in all areas of the United Kingdom, the effectiveness of the technique is lessened in areas with complex geology, particularly where igneous and metamorphic bedrock is present or thick layers of alluvium or till. All magnetic geophysical surveys must therefore take the effects of background geological and geomorphological conditions into account.

Bartington Non-Magnetic Cart Instrumentation and Software

AOC Archaeology's cart-based surveys are carried out using a Bartington Non-Magnetic Cart. The cart enables multiple traverses of data to be collected at the same time, increasing the speed at which surveys may be carried out and offers the benefits of reduced random measurement noise and rapid area coverage (Schmidt et al 2015, 60-62, David et al. 2008, 21).

The cart uses a configuration of six Grad-01-1000L sensors mounted upon a carbon fibre frame 1m apart along with two DL601 dataloggers and one BC601 battery cassette. The sensors are normally positioned at 1m intervals on a horizontal bar, with the datalogger taking readings every 12.5cm along each traverse, though this can be altered to increase / reduce resolution if required. The data is georeferenced via a Trimble R10 Real Time Kinematic (RTK) VRS Now GNSS GPS which streams data throughout survey and allows the data to be recorded relative to a WGS1984 UTM coordinate system.

The gradiometer data is collected through Geomar MLGrad601 software on a laptop in real-time during the survey. The data is downloaded and converted into a .xyz file in Geomar MultiGrad601 before being processed along with the GPS data in TerraSurveyor v3.0.34.10 (see Appendix 4 for a summary of the processes used to create final data plots).

Appendix 3: Summary of Data Processing

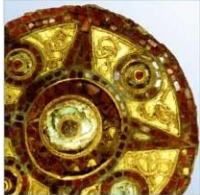
Process	Effect
Clip	Limits data values to within a specified range
De-spike	Removes exceptionally high readings in the data that can obscure the visibility of archaeological features. In resistivity survey, these can be caused by poor contact of the mobile probes with the ground. In gradiometer survey, these can be caused by highly magnetic items such as buried ferrous objects.
De-stagger	Corrects a misalignment of data when the survey is conducted in a zig-zag traverse pattern.
Discard Overlap (TerraSurveyor)	Removes datapoints which occur too closely together and can cause digital artefacts in the data which are caused by the overlapping of parallel traverses.
High pass filter	Removes low-frequency, large scale detail in order to remove background trends in the data, such as variations in geology.
Interpolate	Increases the resolution of a survey by interpolating new values between surveyed data points, creating a smoother overall effect.
Low Pass filter	Uses a Gaussian filter to remove high-frequency, small scale detail, typically for smoothing the data.
Periodic Filter	Used to either remove or reduce the appearance of constant and reoccurring features that distort other anomalies, such as plough lines.
Remove Turns (TerraSurveyor)	Uses analysis of the direction of travel derived from the GNSS data to break continuous streams of data into individual traverses.
Zero Mean Grid	Resets the mean value of each grid to zero, in order to counteract grid edge discontinuities in composite assemblies.
Zero Mean Traverse	Resets the mean value of each traverse to zero, in order to address the effect of striping in the data and counteract edge effects.

Processing Steps

Bartington Cart survey	
Process	Extent
Base Settings	Interval 0.13m, Track Radius 1.06m
Remove Turns	Threshold Angle 90°, Cut Length 5m
Discard Overlap	Threshold Distance 0.4m, Minimum Track 5, Newest
Despike	Mean Diameter 3 Threshold 12
Destripe	Mean Traverse SD 1.5
Clip	-30/30

Appendix 4: Technical Terminology

Type of Anomaly	Description
Archaeology	<i>Interpretation is supported by the presence of known archaeological remains or by other forms of evidence such as HER records, LiDAR data or cropmarks identified through aerial photography.</i>
Trend	Linear / curvilinear / rectilinear anomalies either characterised by an increase or decrease in values compared to the magnetic background.
Area of enhanced magnetism	A zone of enhanced magnetic responses over a localised area. These anomalies do not have the high dipolar response which are manifested in an 'iron spike' anomaly and likely have a relationship with nearby archaeological trends.
Pit	An anomaly composed of an increase in magnetic values with a patterning on the XY trace plot that is pit-like in appearance.
Possible Archaeology	<i>Trends are likely to have an archaeological origin, however without supporting evidence from known archaeological remains, HER records, LiDAR or aerial photography, they can only be classed as having a possible archaeological origin.</i>
Trend	Linear / curvilinear / rectilinear anomalies either characterised by an increase or decrease in values compared to the magnetic background.
Area of enhanced magnetism	A zone of enhanced magnetic responses over a localised area. These anomalies do not have the high dipolar response which are manifested in an 'iron spike' anomaly but lacks definitive records to be classed as being archaeological.
Pit-like anomaly	An anomaly composed of an increase in magnetic values with a patterning on the XY trace plot that is pit-like in appearance.
Burnt area	An anomaly with a patterning on the XY trace plot that is suggestive of industrial activity such as a kiln or hearth.
Unclear Origin	<i>Trends are magnetically weak, fractured or isolated and their context is difficult to ascertain. Whilst an archaeological origin is possible, an agricultural, geological or modern origin is also likely.</i>
Trend	Linear / curvilinear / rectilinear anomalies which are composed of a weak or different change in magnetic values. The trends do not appear to form a patterning that is suggestive of archaeological remains, such as enclosures or trackways.
Area of enhanced magnetism	A zone of enhanced magnetic responses which lack context for a conclusive interpretation. They do not appear to have a relationship with nearby trends of an archaeological origin. Can often be caused by areas of former woodland, geological variations or agricultural activity.
Agricultural	<i>Trends associated with agricultural activity, either historical or modern.</i>
Old Field Boundary	These isolated long linear anomalies, most often represented as a negative or fractured magnetic trend, relate to former field boundaries when their positioning is cross referenced with historical mapping.
Historical Features	Features observed on historical mapping that correspond with anomalies or trends in the data. Areas of enhanced magnetism could relate to former buildings, trackways, quarries or ponds.
Ridge and Furrow / Rig and Furrow	A series of regular linear or curvilinear anomalies either composed of an increased or decreased magnetic response compared to background values. The wide regular spacing between the anomalies is consistent with that of a ridge and furrow / rig and furrow ploughing regime. The anomalies often present as a positive 'ridge' trend adjacent to a negative 'furrow' trend.
Ploughing Trends	A series of regular linear anomalies either composed of an increased or decreased magnetic response compared to background values. Anomalies seen parallel to field edges are representative of headlands caused by ploughing.
Field Drainage	A series of magnetic linear anomalies of an indeterminate date, usually with a regular or herringbone patterning.
Non - Archaeology	<i>Trends which are likely to have derived from non-archaeological processes or activities.</i>
Geology / Natural	An area of enhanced magnetism that is composed of irregular weak increases or decreases in magnetic values compared with background readings. It is likely to indicate natural variations in soil composition or reflect variations in the bedrock or superficial geology.
Possible Modern Service	Anomalies of a linear form often composed of contrasting high positive and negative dipolar values. Such anomalies usually signify a feature with a high level of magnetisation and are likely to belong to modern activity such as pipes or modern services.
Magnetic Disturbance	A zone of highly magnetic disturbance that has been caused by or is a reflection of modern activity, such as metallic boundary fencing, gateways, roads, boreholes, adjacent buildings, rubbish at field edges or a spread of green waste material.
Isolated Dipolar Anomalies / Ferrous (iron spikes) and Ferrous Zones	A response caused by ferrous materials on the ground surface or within the subsoil, which causes a 'spike' in the data representing a rapid variation in the magnetic response. These generally represent modern material often re-deposited during manuring.



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