

Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 4 – Technical Appendices

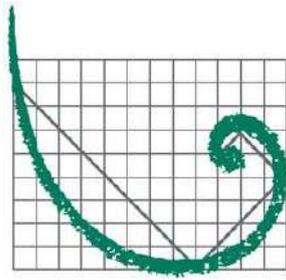
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ERM

**DETAILED GRADIOMETER
SURVEY REPORT**

**LAND TO THE WEST OF A1, NORTH OF STAYTHORPE,
NOTTINGHAMSHIRE
(EAST OF EAKRING, MAPLEBECK ESTATE, SOUTH OF OLLERTON
ROAD)**

CULTURAL HERITAGE REPORT NUMBER: 40439

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TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	1
2	INTRODUCTION	2
	2.1 Project Background	2
	2.2 Scope of document	2
3	SITE LOCATION, GEOLOGY AND TOPOGRAPHY	2
4	ARCHAEOLOGICAL BACKGROUND	3
	4.1 Introduction	3
	4.2 Previous Investigations	3
	4.3 Historical and archaeological background	3
	4.3.1 Prehistoric	3
	4.3.2 Romano-British	4
	4.3.3 Anglo-Saxon	4
	4.3.4 Medieval	5
	4.3.5 Post-medieval and Modern.....	5
	4.3.6 Undated	6
5	METHODOLOGY	6
	5.1 Introduction	6
	5.2 Aims and objectives	6
	5.3 Fieldwork Methodology	6
	5.4 Data processing	7
6	DATA PRESENTATION	7
7	EAST OF EAKRING FIELDS 205 - 209	8
	7.1 Site details	8
	7.2 Archaeological background	8
	7.3 Detailed gradiometer survey results	8
	7.3.1 Interpretation: Possible Archaeology	8
	7.3.2 Interpretation: Historical Agriculture	9
	7.3.3 Interpretation: Modern Agriculture	9
	7.3.4 Interpretation: Modern	9
	7.3.5 Interpretation: Unknown	9
	7.4 Preliminary Conclusions	10

8	MAPLEBECK ESTATE - FIELDS 185 – 187, 191-197, AND 200-202	10
8.1	Site details	10
8.2	Archaeological background	11
8.3	Detailed gradiometer survey results	11
8.3.1	<i>Interpretation: Archaeology and Possible Archaeology</i>	11
8.3.2	<i>Interpretation: Historical Agriculture</i>	13
8.3.3	<i>Interpretation: Modern Agriculture</i>	13
8.3.5	<i>Interpretation: Modern</i>	14
8.3.6	<i>Interpretation: Unknown</i>	14
8.4	Preliminary Conclusions	15
9	FIELDS 171 – 175 AND 264-265	16
9.1	Site details	16
9.2	Archaeological background	16
9.3	Detailed gradiometer survey results	17
9.3.1	<i>Interpretation: Archaeology and Possible Archaeology</i>	17
9.3.2	<i>Interpretation: Historical Agriculture</i>	17
9.3.3	<i>Interpretation: Natural</i>	17
9.3.4	<i>Interpretation: Modern</i>	17
9.3.5	<i>Interpretation: Unknown</i>	18
9.4	Preliminary Conclusions	18
10	APPENDICES	20
10.1	Appendix 1: Gradiometer Survey Equipment and Data Processing (Sensys) 20	
10.2	Appendix 2: Geophysical Interpretation	21

List of Figures

Figure 1: Site Location

Figure 2: Survey Areas

Figure 3.1: Processed Gradiometer Data- Overview - Parcel 1: East of Eakring

Figure 3.2: Processed Gradiometer Data – Overview - Parcel 2: Maplebeck estate

Figure 3.3: Processed Gradiometer Data – Overview - Parcel 3: South of Ollerton Road

Figure 4.1: Interpretation of the Processed Gradiometer Data – Overview - Parcel 1: East of Eakring

Figure 4.2: Interpretation of the Processed Gradiometer Data – Overview - Parcel 2: Maplebeck estate

Figure 4.3: Interpretation of the Processed Gradiometer Data – Overview - Parcel 3: South of Ollerton Road

Figures 5.1 – 5.5: Processed Gradiometer Data – Greyscale Plot – Detailed - Parcel 1: East of Eakring

Figures 5.6 – 5.19: Processed Gradiometer Data – Greyscale Plot – Detailed - Parcel 2: Maplebeck estate

Figures 5.20 – 5.23: Processed Gradiometer Data – Greyscale Plot – Detailed - Parcel 3: South of Ollerton Road

Figures 6.1 – 6.5: Interpretation of Processed Gradiometer Data – Detailed - Parcel 1: East of Eakring

Figures 6.6 – 6.19: Interpretation of Processed Gradiometer Data – Greyscale Plot – Detailed - Parcel 2: Maplebeck estate

Figures 6.20 – 6.23: Interpretation of Processed Gradiometer Data – Greyscale Plot – Detailed - Parcel 3: South of Ollerton Road

Figures 7.1 – 7.5: Minimally Processed Gradiometer Data – XY Trace

Figures 7.6 – 7.19: Minimally Processed Gradiometer Data – XY Trace

Figures 7.20 – 7.23: Minimally Processed Gradiometer Data – XY Trace

1 EXECUTIVE SUMMARY

The document comprises a report on detailed gradiometer surveys on the site north of Staythorpe between 17th October 2022 and 22nd February 2023. The project was commissioned by ERM with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features to assess the archaeological potential of land parcels and their suitability for development.

The survey is split over three separate survey parcels: Parcel I is located to the east of the village of Eakring. Parcel II is land belonging to the Maplebeck estate encompassing the village of Maplebeck, and Parcel III is land south of Ollerton Road. A total of 397.6 ha have been surveyed

Across all three survey blocks magnetic anomalies have exhibited a moderate to good contrast with background magnetic noise. Anomalies of archaeological origins have been interpreted from the Maplebeck estate and the parcel identified to the south of Ollerton Road. Anomalies of possible archaeological origins have been identified in all three survey areas, along with anomalies of unknown origins.

Two enclosures of probable later prehistoric or Romano-British date have been identified from the survey data of the Maplebeck estate survey area. A possible settlement has been identified from strong magnetic signals, forming ring ditches and pits associated with enclosures. Other possible enclosures have been interpreted from the survey data of the Maplebeck estate, along with two more from the survey area south of Ollerton Road.

Possible archaeology from the Maplebeck estate survey block includes an area of possible habitation and three large and strongly enhanced anomalies that could reflect either large pits or limekilns. Other anomalies across all three areas potentially reflect unmapped former field boundaries.

Across all three survey blocks there have been discrete and linear anomalies of unknown origins. For the land south of Ollerton road intersecting anomalies could relate to either sand and gravel deposits or unmapped field systems.

Anomalies aligning with former field boundaries and footpaths identifiable on historical OS maps, have been identified across all three survey blocks. Anomalies consistent with cultivation also appear to respect the outline of many of the fields identifiable on historical maps across all three survey areas. Different regimes of ridge and furrow cultivation have also been interpreted from the survey data of all three survey areas. Other anomalies from the Maplebeck estate data reflect the locations of a former bank and two former buildings identifiable on historical OS mapping.

Underlying geology is reflected by linear trends, which correlate with a band of dolomitic siltstone, and areas of magnetic variation mottling reflecting either variation in the mudstone geology or change of soil types. In the north of the Maplebeck estate survey area several anomalies relate to palaeochannels.

Other anomalies reflect ploughing, drainage activity, modern services, ferrous debris and ferrous objects in the topsoil.

2 INTRODUCTION

2.1 Project Background

ERM commissioned a geophysical survey on land to the north of A167 and the west of A1, Nottinghamshire. The survey area covers approximately 2100 ha and comprise a detailed gradiometer survey intended to assess the archaeological potential of land parcels and their suitability for development. This report covers 397.6 ha of this scheme.

2.2 Scope of document

This report presents a brief description of the overall site details, archaeological background and methodology. This is followed by detailed survey results and the archaeological interpretation of the geophysical data for each land parcel.

3 SITE LOCATION, GEOLOGY AND TOPOGRAPHY

The following gives an overview of the site, with further details presented for the individual land parcels.

The site consists of multiple land parcels extending along two arms, north-east and north-west of Staythorpe, in the county of Nottinghamshire, west of the River Trent and extending from 4 km north-west of Newark-on-Trent. The north-east route of the survey is 16 km long, extending from Staythorpe and running towards the villages of North Muskam, Carlton-on-Trent, Ossington and Moorhouse. The north-west route is shorter, extending for 9 km from Staythorpe towards Kersall, before bifurcating and heading towards Eakring and Kneesall.

The bedrock geology across the site is principally Mercia Mudstone but the area around Eakring at the western end of the site is recorded as Siltstone of the Tarporley formation¹. Superficial deposits comprising Holme Pierrepoint sand and gravel, and undifferentiated Alluvium are recorded on the western edge of the River Trent floodplain. Alluvial deposits are also recorded adjacent to Moorhouse Beck, at the northern end of the eastern route, and between Caunton and Kersall in the west. In addition, Diamicton Till and Glaciofluvial Deposits are also recorded at the northern end of the north-west cable route around Buckshaw farm.

Soils derived from the above geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey. However, in areas where thick deposits of superficial material (e.g. Alluvium) are recorded, archaeological remains may be too deeply buried to be identified through this geophysical technique.

The general topography varies of across the site, but the slope is generally gradual in most areas. The lowest-lying region is the area associated with the floodplain of the River Trent at the eastern extent of the survey area, which ranges between 10 and 16 m above Ordnance Datum (aOD)². The minor tributaries extending west from this also occupy moderately low-lying areas (30 – 45 m aOD), between Kersall and Caunton and alongside Moorhouse Beck. Adjacent to these, are several highpoints (>75 m aOD) at Eakring, Kneesall and Laxton.

¹ Geology of Britain viewer. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed on 01/04/2022)

² United Kingdom Topographic Map. <https://en-gb.topographic-map.com/maps/iu/United-Kingdom/> (Accessed 12/09/2022)

4 ARCHAEOLOGICAL BACKGROUND

4.1 Introduction

No desk-based assessment of the survey area has yet been undertaken. However, HER data for the survey site and a 1.5 km study area around the survey site has been obtained. The following gives an overview of the site, with further details presented for the individual land parcels.

4.2 Previous Investigations

There are few records of previous intrusive investigations within the site. With the exception of **ENT486**, which encountered post-medieval remains, none of the other intrusive surveys found evidence of archaeology (**ENT486**, **ENT1034**, **ENT3871**, **ENT3756** and **ENT3888**).

A detailed survey aerial photograph analysis exercise was undertaken along the route of the A1 and main settlements within the region (**ENT738** and **ENT1125**). A wealth of potential archaeological features were identified that reside within the site boundary or lie adjacent to it³. These are discussed in **section 4.3**.

Many archaeological surveys have been completed within the study area with concentrations found within the historic settlements of North Muskham, South Muskham, Little Carlton, Averham, and Cromwell. Some of the investigations have uncovered archaeological remains, which are discussed in **section 4.3** below.

4.3 Historical and archaeological background

4.3.1 Prehistoric

The Nottingham Historic Environment Record (NHER) holds limited evidence of Palaeolithic activity, mainly confined to Staythorpe to the south of the site, comprising the recovery of worked antler and bison bones (**MNT5596** and **MNT11139**). The only other Palaeolithic dated material is a handaxe found 1.5 km north-west of the site (**MNT4164**).

With the exception of the possible site of a Neolithic henge, all of the NHER records for the Neolithic comprise of lithic (flint) finds, with a particular concentration on land directly west of the site just north of North Muskham. The quantity of material recovered would imply a permanent presence within the landscape rather than reflecting seasonal migration of peoples. This fits with the current historical narrative, which indicates that the River Trent Valley was a focus of activity during the period⁴. However, it is possible that fine-grained minerogenic deposits of Holocene alluvium that are likely located within the floodplain of the River Trent, may have deeply buried further evidence of this.

Alluvium is recorded in the eastern part of the site, on the floodplain of the River Trent. Previous studies within the Trent valley on alluvial deposits confirmed the presence of deeply buried organic material, offering the potential for the preservation of paleoenvironmental evidence⁵. Trenching around Staythorpe Power Station identified three paleochannels that, based on recovered organic evidence, provided four dates of between 6640 ± 60 BP. Together with pollen and insect data, this show that during the latter half of the Mesolithic period, the area was a mixture of alder, willow and aspen carr, with limited grassland and a background of oak, elm, and lime on the adjacent gravel terraces. The

³ Historic England, Aerial Archaeology Mapping Explorer, <https://historicengland.org.uk/research/results/aerial-archaeology-mapping-explorer/> (Accessed 12/09/2022)

⁴ Cooper, N (ed) 2006. The Archaeology of the East Midlands. Available at: <https://researchframeworks.org/emherf/>

⁵ The Archaeology of the East Midlands. Available at: <https://researchframeworks.org/emherf/> (Accessed on 12/09/2022)

later Mesolithic deposits also yielded a human femur and animal bones from a range of species including roe deer and aurochs.

For the Bronze Age, there is a more defined permanent presence evidenced by the construction of several barrow cemeteries (**MNT3597**, **MNT14748**, **MNT17094**, **MNT17127**, and **MNT8542**; NHLE list entry 1003492) and the identification of enclosures, hut circles/ring ditches and other features associated with land management during the aerial photography mapping exercises. These features are found on both sides of the river.

100 m to the east of the site lies the site of pit alignments scheduled monument (NHLE list entry 1003493). The listing of the scheduled monument is based on the old county number (OCN) scheduling record and provides no further information on the pit alignment itself. The recent aerial photography mapping exercise has, however, identified further pits around the scheduled monument (**MNT17099**). Although the pits have not been intrusively investigated, such features are typically of late prehistoric origin, although their use remains poorly understood⁶.

The exploitation of the River Trent Valley becomes clearer with the transition into the Iron Age. Several settlements, including a scheduled monument (NHLE list entry 1003494), have been found close to South and North Muskham (**MNT17097**, **MNT14313**, **MNT17091**, **MNT11991**, and **MNT14315**), while an isolated small riverside settlement was found near Cromwell (**MNT25849**). The Cromwell barrow cemetery also remained in use during the Iron Age (**MNT15145**). In addition to the above, the aerial mapping exercises have also recorded a plethora of field enclosures, boundaries, pit alignments, hut circles/ring ditches, and linear features that may be of late prehistoric origin. Overall, there is a wealth of evidence that shows that this part of the River Trent Valley was heavily settled and exploited during the Iron Age.

4.3.2 Romano-British

Based on the current evidence, the Romano-British period is marked by a general abandonment of the earlier settlement pattern and establishment of new settlements within the landscape. The land around South Muskham, North Muskham, and Little Carlton continued to be the focus for habitation with seven settlements discovered (**MNT17089**, **MNT17090**, **MNT8243**, **MNT8265**, **MNT17098**, **MNT8290**, and **MNT14318**). However, similar levels of activity appear around Cromwell with a possible Romano-British villa located 430 m to the east of the site and an extra-mural settlement, designated a scheduled monument (NHLE list entry 1003490), discovered 60 m west of the site.

Four of the settlements discussed above fall within the site (**MNT8243**, **MNT8265**, and **MNT17089**), including the Scheduled settlement discussed above (NHLE list entry 1003490). However, the aerial mapping exercises also identified a large number of regular enclosures which could be of Romano-British origin within the site's boundaries.

4.3.3 Anglo-Saxon

The Domesday Book of 1086 can be used to identify settlements that existed prior to the Norman Conquest. South Muskham, North Muskham, Little Carlton, Cromwell, Kneesall (referred to as 'Cauton'), Kelham, and Averham, all of which sit with the 1.5 km study area, are documented as being in existence in 1066 and would have had their origins in at least the Late Anglo-Saxon period.

Most of the NHER records relate to finds recovered during fieldwalking exercises completed on the fields that surround known Anglo-Saxon centres, such as North Muskham and South Muskham (**MNT11098**, **MNT11050**, **MNT11732**, **MNT11047**, **MNT8286**, **MNT2881**,

⁶ Cooper, N (ed) 2006. The Archaeology of the East Midlands. Available at: <https://researchframeworks.org/emherf/>

MNT11042, and **MNT3098**) and Kneesall (**MNT12174**, **MNT8556**, **MNT17128**, and **MNT12172**). The recovery of the material helps define the main areas of activity during the period showing that landscape use may have been confined to the immediate hinterland of known settlements.

4.3.4 Medieval

The medieval period is characterised by an intensification in settlement activity and landscape use within the River Trent valley. The NHER has mapped many former medieval villages/hamlets located in the study area, most represented as shrunken or deserted villages, alongside known sites of medieval manors and deer parks (some of the manor sites are designated as Scheduled Monuments). One of these, the medieval deserted village of Little Carlton, which is a scheduled monument, falls partially within the site (**MNT14312**; NHLE list entry 1019870).

Similar to the preceding periods, most of the archaeological evidence for medieval activity takes the form of finds recovered during fieldwalking exercises. While the material could reflect further areas of settlement, it was common practice to add pottery to fields as part of the arable farming regime. This data at least shows a wider utilisation of the study area for agricultural uses, and it is possible that some of the features identified during the aerial mapping exercises are of medieval origin.

4.3.5 Post-medieval and Modern

The post-medieval period was a time of continuity and development for the River Trent valley. Until the passing of Enclosures Acts, much of the landscape was not too dissimilar to what had been created during the medieval period. The medieval interspersed settlement pattern remained with the local peoples still relying on agriculture for employment. However, the period was also marked by the rise of the landed gentry and development of large estates. Within the study area are four parks of varying size associated with an existing or former large country house, and include Ossington Hall (**MNT26679**), Kelham Hall (**MNT26671**), Averham Park (**MNT26653**), Winkburn Park (**MNT26694**), and Beesthorpe Hall (**MNT26658**).

Of the parks discussed above, Averham Park falls within the site (**MNT26653**). The park is first shown on Chapman's map of 1774 and was described in 1835 as "park which was heretofore an ornament to the neighbourhood, and a splendid appendage to the mansion ... on it remains the keeper's house and a few of the park fence". Little is known of the original layout of the parkland as Chapman's map is of limited detail and later Ordnance Survey (OS) mapping shows the land as fields. Lost parkland features may fall within the site.

According to the NHER, two brick yards fell within the site. The first brick yard is located south-west of Little Carlton and was created during the post-medieval period (**MNT14403**). After it fell out use, woodland was planted over the brick yard, which is first shown on the 1st edition OS map. The second brick yard is of modern date and located northeast of Upton (**MNT14432**). The brickworks fell out of use by 1915.

Post-medieval mapping shows that the site was located within post-enclosure field systems by the end of the 19th century. Few changes have occurred to the field system since. In the study area, the main changes illustrated comprise the construction of the Great Northern Railway line, development of industrial sites and expansion of the villages/settlements.

The majority of the NHER records of post-medieval and modern date relate to former or existing structures found throughout the study area. They comprise of farmsteads, residential buildings, structures associated with the railway, estate structures, and former industrial sites.

4.3.6 Undated

As discussed above, aerial mapping exercises have identified a large number of cropmarks/features within the study area, many of which fall within the site's boundaries. The NHER entries for each designated set of cropmarks provided little detail about them, other than their general shape and form (i.e., regular enclosures, hut circles, linear etc). Apart from the hut circles/ring ditches, which are associated with prehistoric settlement practices, the rest of the cropmarks/features could be of any date prior to the establishment of the post-enclosure field systems.

5 METHODOLOGY

5.1 Introduction

The geophysical survey was undertaken between 17th August 2022 – 22nd February 2023. An overall coverage of 397.60ha was achieved.

The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation⁷ (WSI), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists⁸ and European Archaeologiae Consilium⁹.

5.2 Aims and objectives

The aims of the survey comprise the following:

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

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

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

5.3 Fieldwork Methodology

Cart-based gradiometer survey was carried out within the survey areas east of Eakring and the Maplebeck estate 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 1). 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. Balancing the machine around this point produces a more uniform dataset throughout and allows all data to be plotted with ease on the same palette. Such instruments allow positions to be determined with a precision of 0.02 m in real-time

⁷ ERM, 2022 Written Scheme of Investigation: Geophysical Survey Land to the West of A1, North of Staythorpe, Nottinghamshire. Report ref. 22036

⁸ Chartered Institute for Archaeologists [CIfA] 2014a Standards and guidance for archaeological geophysical survey. Reading, CIfA

⁹ Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A and Fassbinder, J. 2015 Guidelines for the use of geophysics in archaeology: questions to ask and points to consider. EAC Guidelines 2, Belgium: European Archaeological Council.

and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt et al. 2015).

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 logged on a laptop mounted to the cart using Geomar MLGrad601 software. A total of 16.1ha were surveyed using the Bartington cart.

Care was also taken to attempt to avoid metal obstacles present within the survey area, such as metal objects within and adjacent to the survey area as gradiometer survey is affected by 'above-ground ferrous disturbance' and avoiding these improves the overall data quality and results obtained. 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 v64. The details of these processes can be found in Appendices 2 and 3.

The gradiometer survey south of Ollerton Road was carried out using a Sensys MAGNETO® MXPDA ATV towed magnetometer cart system. The cart utilises 16 FGM650/3 fluxgate gradiometer sensors mounted upon a frame, 0.25m apart, along with data logging equipment (see Appendix 1). Batteries were located upon the ATV. Data was collected using zig-zag traverses alongside a constant stream of GPS data collected through a Carlson BRx7 GPS, enabling the collected data to be spatially georeferenced without the need for a pre-determined grid system. The data and measured tracks were collected through the data acquisition unit MXPDA and visualised through SENSYS MonMX on a tablet PC mounted to the ATV.

The data was exported from SENSYS MonMX in ASCII file format, uploaded to the project folder, before being processed in TerraSurveyor v64. The details of these processes can be found in Appendices 2 and 3.

Interpretations of the data were created in ArcGIS Pro 3.0 and the technical terminology used to describe the identified features can be found in Appendix 4.

Digital photographs of every survey parcel were taken before, during and after geophysical survey to show any changes to field conditions following the programme of works.

5.4 Data processing

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

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

6 DATA PRESENTATION

The processed data are exported as georeferenced TIFF files. The interpretation layers are digitised as ESRI shapefiles. The images and interpretation shapefiles are then used to produce the final figures in a GIS.

The gradiometer data are displayed at -1nT (white) to +2nT (black) for the greyscale image. Minimally processed gradiometer data is also plotted as XY traces at 40nT/cm at A3.

7 PARCEL I: EAST OF EAKRING FIELDS 205 - 209

7.1 Site details

A detailed gradiometer survey was carried out over Fields 205 - 209, immediately east of the village of Eakring (centred on NGR 468376 362195) (**Figure 2**).

This survey comprises five arable fields surrounded by further agricultural fields to the north, east and south. Newark Road runs along the northern boundary of Fields 206 and 208, and the southern boundaries of Fields 205 and 209. Overhead power cables run south-southeast to north-northeast across the east of Field 206 and the southwest corner of Field 205 with pylon masts located along the cable's route in each of these fields.

The survey area slopes downhill towards Newark Road southwest to northeast in Fields 206-208, and northwest to southeast in Fields 205 and 209, from a high of c. 75 m aOD to a low of c. 50 m aOD.

The underlying geology across the survey area is recorded as primarily siltstone, mudstone and sandstone of the Tarporley siltstone formation, with mudstone of the Mercia mudstone group in the south of Fields 206 and 207¹⁰. Alluvial clay, silt, sand and gravel run along the northern, western and eastern boundaries of Field 205, and the western boundary of Field 208.

The soils underlying this survey area are likely to comprise slightly acid loamy and clayey soils with loams and clays with a naturally high groundwater of floodplain soils along the northern, western and eastern boundaries of Field 205¹¹. Soils in such geological settings are identified as producing a poor to average magnetic contrasts with magnetic gradiometer survey, with archaeological features often exhibiting a weak magnetic enhancement against a subtle background magnetic variation that can mask weak magnetic anomalies¹²s. Survey results though can be variable and the soils and geology do not preclude magnetic survey as a technique.

7.2 Archaeological background

All archaeological assets outlined in chapter 4, lie over 1km away from the survey area.

7.3 Detailed gradiometer survey results

The detailed gradiometer survey was carried out on between the dates specified and the area covered by the survey equates to 80.3 ha. The survey has identified possible archaeology, historical agricultural practice, drainage and unknown features.

Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (**Figures 5.1 – 5.5** and **6.1 – 6.5**). XY trace plots of the data, at a scale of 1:2000 can be seen in **Figures 7.1 – 7.5**.

7.3.1 Interpretation: Possible Archaeology

- **Possible archaeology** – Linear and curvilinear anomalies with weak magnetic signals are located in the south, centre, and near the western edge of Field 207, and the north of Field 208 [**207a, 207b, 207c, 208a**]. Despite the ephemeral form, the anomalies are consistent with infilled cut features such as ditches. The anomalies do not align with field systems record on historical OS maps. Anomalies associated with ridge and

¹⁰ Geology of Britain viewer. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed on 01/04/2022)

¹¹ Cranfield UK soil observatory Soilscales, 2024. <http://www.landis.org.uk/soilscales2> (last accessed 13/03/2024)

¹² David, A. Linford, N. Linford, P., 2008, English Heritage (Historic England): *Geophysical Survey in Archaeological Field Evaluation*, Swindon

furrow cultivation cross over them: these factors and the weak magnetic signal suggest the anomalies relate to field boundaries that predate those identifiable in the historical OS maps.

7.3.2 Interpretation: Historical Agriculture

Historic cultivation – Several series of linear and curvilinear anomalies in Fields 205, 206, 207, 208 and 209, with spacings of c. 5m are consistent with past ridge and furrow cultivation. In Fields 205 and 207 anomalies associated with ridge and furrow cultivations respect the alignment of former field divisions depicted on an OS map from 1884.

Former field boundary - Several linear and curvilinear anomalies in Fields 205 and 207 align with former field boundaries and footpaths identifiable on a historical OS map from 1884.

Historic landscape features - A concentrated area of magnetic dipoles consistent with debris, falls within the outline of a former field located towards the centre of Field 207 [**207d**].

7.3.3 Interpretation: Modern Agriculture

Ploughing - Linear magnetic trends running across all the field are consistent with modern ploughing activity.

7.3.4 Interpretation: Modern

Drain – Linear anomalies running parallel to each other in a formation consistent with drainage activity are identifiable across the north and northwest of Field 207, the centre and east of Field 208, and east of Field 209.

Linear alignments of magnetic dipoles consistent with the presence of ceramic drainpipes are identifiable near the western boundary of Field 205, across Field 207, and near the eastern boundary of Field 208.

Ferrous – Strong magnetic dipoles consistent with the presence of ferrous objects in the topsoil are distributed throughout the survey area. Concentrations of strong magnetic dipoles near the southeast corner of Field 205 are consistent with presence of debris, while strong ferrous anomaly also coincides with the location of a gate in the southwest corner of Field 205. Another band of strong magnetic dipoles along the western edge of Field 209, coincides with the presence of a metal track.

Increased magnetic response - Magnetic disturbance is located near the southern boundary, around the base of a pylons for overhead power cables bisecting area 205 and the southwest corner of 206.

Modern service - Magnetic disturbance associated with underlying services have been identified within Fields 205, 206, 207 and 209.

7.3.5 Interpretation: Unknown

Unknown feature – Two linear anomalies with weakly negative magnetic signals are located near to the centre of Field 207 [**207e**]. The negative magnetic signal suggests the presence of material less magnetic, such as lime rich stone, than the surrounding soil matrix; however, it is not possible to give a more specific interpretation of these anomalies.

7.4 Preliminary Conclusions

The magnetic gradiometer survey area has been successfully carried out over four arable fields, with the magnetic anomalies typically having weak but discernible contrast with background variation. Anomalies of possible archaeological origins have been interpreted from the magnetic data, along with several other anomalies of unclear origins.

Weak linear and curvilinear anomalies in the west and the south of the survey area, are indicative of infilled ditches not identifiable on historical OS maps. These anomalies may predate those identifiable in the historical OS maps, however, it is not possible to be more specific than this.

Anomalies of unclear origins, include two parallel negative anomalies indicative of possible banks of less magnetic material, and several discrete dipolar anomalies, which may relate to areas of in-situ burning. It is not possible though be certain of either of these interpretations.

Linear trends and anomalies consistent with debris, highlight the presence of former field boundaries, a footpath and debris lying within the bounds of a former field. All these features are identifiable on historical maps of the survey area. Regimes of ridge and furrow cultivation have also been interpreted from the data of all fields, and they appear to respect the outline of former field demarked on historical OS maps.

Other anomalies reflect ploughing throughout the survey area, drainage activity, modern services, ferrous debris, a metaled track and ferrous objects in the topsoil.

8 PARCEL II: MAPLEBECK ESTATE - FIELDS 185 – 187, 191-197, AND 200-202

8.1 Site details

A detailed gradiometer survey was carried out over Fields 185 – 187, 189, 191-197, and 200-202 of the Maplebeck estate, encompassing the village of Maplebeck (centred on NGR 471033 360876) (**Figure 2**).

This survey comprises 10 arable fields and three pasture fields (Fields 191 and 194-195) predominantly surrounded by further agricultural fields. Caunton Road runs along the northern boundaries of Fields 187, 196 and 197, and the southern boundaries of 194 and 195, while a stream entitled 'the Beck' runs along the northern boundaries of Fields 194 and 195. Winkburn Road runs between Field 202 and 193. Overhead power cables run through the centres of Fields 193, 201 and 201 northwest to southeast with pylon masts located along the cable's route in each of these fields. Due to wet and muddy ground conditions it was only possible to survey 27 ha of c.40ha in Field 201.

The survey area is slopes downhill south-southwest to north-northeast and west-southwest to east-northeast, from c. 83 m aOD in the southwest corner of Field 201 to c. 37-39m aOD in Fields 194-195 and the northeast corner of Field 187.

The underlying geology across the survey area is recorded as mudstone of the Mercia mudstone group, with curvilinear bands of dolomitic siltstone of the Mercia mudstone group running across all fields¹³. No superficial geology has been recorded for theses survey areas, except for alluvial clay, silt, sand and gravel across the north and centres of Fields 194 and 195.

The soils underlying this survey area are likely to comprise slowly permeable seasonally wet slightly acid but base rich loam and clay soil across Fields 185, 193, 202, 201 and 200.

¹³ Geology of Britain viewer. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed on 01/04/2022)

Slightly acid loamy and clayey soils are recorded across Fields 191, 192, 194-197 and Field 186, and the north of Fields 185, 193, 202 and 201¹⁴. Along the northern boundary of Fields 194 and 195 are loams and clays with a naturally high groundwater of floodplain soils. In such geological settings are identified as producing a poor to average magnetic contrasts with magnetic gradiometer survey, with archaeological features often exhibiting a weak magnetic enhancement against a subtle background magnetic variation that can mask weak magnetic anomalies¹⁵. Survey results though can be variable and the soils and geology do not preclude magnetic survey as a technique.

8.2 Archaeological background

The survey area is c.600m north and c.400m west respectively of the post medieval estates of Winkburn Park (**MNT26694**) and Beesthorpe Hall (**MNT26658**; see Section 4.3.5.). All other archaeological assets outlined in chapter 4 lie over 1km away from the survey area.

8.3 Detailed gradiometer survey results

The detailed gradiometer survey was carried out on the dates previously specified and covered 246.6 ha of the survey area. The survey has identified archaeology, possible archaeology, historical agricultural practice, drainage and unknown features.

Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (**Figures 5.6 – 5.19** and **6.6 - 6.19**). XY trace plot of minimally processed data can be seen in Figures 7.6 – 7.19, at a scale of 1:2000.

8.3.1 Interpretation: Archaeology and Possible Archaeology

Archaeology - Located towards the centre of Field 187 are several linear anomalies consistent with infilled cut features such as ditches. The anomalies loosely enclose an area of c. 65m × 55m [**187a**], with a ring-shaped anomaly, diameter c. 15m, located towards the southwest corner [**187b**]. Within and around the possible enclosure are several discrete anomalies with a strong magnetic signal, consistent with cut features, such as pits, with a magnetically enhanced infilling. The ring shaped anomaly and enclosure are indicative of a later prehistoric and/or Romano-British rural settlement.

Located near the southwest edge of Field 196 are linear anomalies, consistent with infilled cut features such as ditches, demarking a possible rectangular enclosure along a northwest to southeast axis [**196a**]. The rectangular enclosure is c. 150m × 60m and is subdivided into three smaller areas. Two parallel linear anomalies suggest there is a track connected to the northern corner of the enclosure [**196b**], while curvilinear anomalies suggest the presence of a sub-enclosure, in the northern corner of the southernmost subdivision [**196c**]. As with the enclosure in Field 187, this enclosure and the features associated with it are consistent with later prehistoric and Romano-British rural settlement.

Located in the northwest of Field 202 are several linear and curvilinear anomalies, consistent with infilled cut features such as ditches, in a sub-rectangular form [**202a**]. The anomalies appear to reflect a small sub-rectangular enclosure of c. 42m × 25m, with the northern anomaly continuing southeast.

Possible archaeology - Located in the southwest corner of Field 185, is a sub-square shaped anomaly consistent with an infilled cut feature such as a ditch [**185a**]. This could be interpreted as a possible enclosure of unknown date, enclosing an area c.

¹⁴Cranfield UK soil observatory Soilscales, 2024. <http://www.landis.org.uk/soilscales2> (last accessed 13/03/2024)

¹⁵ David, A. Linford, N. Linford, P., 2008, English Heritage (Historic England): *Geophysical Survey in Archaeological Field Evaluation*, Swindon

20m × 20m. Immediately east of the possible enclosure is a curvilinear anomaly with a weak magnetic signal consistent with an infilled cut feature such as a ditch [**185b**], and there are several discrete anomalies within and around the possible enclosure which may reflect infilled cut features such as pits [**185c**].

Within and around the enclosure in Field 187 are several small discrete anomalies with a weak and diffuse magnetic signal [**187c**]. These are tentatively interpreted as reflecting infilled cut features as pits, as the anomalies have a weaker more ill-defined magnetic signal than other discrete anomalies interpreted as reflecting infilled pits. Just north of the enclosure are several linear and curvilinear anomalies with a weak and diffuse magnetic signal [**187d**], these are tentatively interpreted as reflecting infilled cut features as ditches of possible archaeological origins, as they are weaker and more ill-defined than those interpreted as reflecting infilled ditches associated with the enclosure.

Located near the centre of Field 192 are linear anomalies with a strong magnetic enhancement consistent with cut features such ditches with a magnetically enhanced infilling. The anomalies partially enclose an area c.15m × 15m [**192a**], with a discrete anomaly consistent with an infilled cut feature such as pit at the centre [**192b**]. Weak ephemeral anomalies, possibly reflecting infilled cut features such as ditches, extend northwest, northeast and southeast from this partial sub-square enclosure [**192c**]. The stronger magnetic anomalies around the partial enclosure suggest a concentration of activity in its vicinity.

Located near to the north-eastern edge of Field 195 is a concentration of increased magnetism, with a diameter of c.20m [**195a**]. Though not definitive, there are several linear and discrete anomalies within this area, which could relate to possible infilled cut features such ditches and pits, respectively. Though speculative these anomalies and the surrounding area of increased magnetism, could relate to a concentrated area of habitation.

Discrete anomalies within the enclosure located in southern part of Field 196 [**196a**], are consistent with the presence of several infilled cut features such as pits [**196d**]. Weak and ephemeral linear and curvilinear anomalies of possible archaeological origins [**196e**], overlap with the south-western edge of the enclosure, which though not as well defined do suggest the presence of another overlapping enclosure. Several linear anomalies to the north and east of the enclosure are consistent with the presence of infilled cut features such as ditches, which do not align with any field boundaries identifiable in historical maps [**196f**].

Located in the southern half of Field 197 are curvilinear anomalies in a sub-D-shaped form [**197a**], with a weak and diffuse magnetic signal. The anomalies may relate to infilled cut features such as ditches, however, they may also reflect background variation of the mudstone geology.

Several other linear anomalies are c.30m southeast of this enclosure [**196a**] and may also reflect infilled cut features such as ditches [**202b**]. The anomalies are more ephemeral than those associated with the enclosure, and at least some of anomalies align with the outline of a former field identifiable in the OS map or 1884.

Four large discrete anomalies with very strongly enhanced magnetic signals are near the northern edge of Field 193, southwest corner of Field 194 along the western edge of Field 202 and along the eastern edge of Field 201 [**193a**, **194a**, **201a**, **202c**]. These anomalies may reflect infilled cut features such as pits, however, the strength and size of anomalies are stronger and larger than would typically be associated with

such features. The strength, size and locations of the anomalies could be consistent with possible lime kilns.

Located towards the northwest corner of Field 185 [**185d**], the northwest corner and the southern boundary of Field 186 [**186a, 186b**], the centre of the northern edge of Field 200 [**200a**], and in Field 193 near the northwest corner and just north of the overhead power cables are several intersecting linear anomalies with a weak magnetic signal [**193b, 193c**], consistent with infilled cut features such as ditches. The anomalies may reflect pre-19th century field boundaries, as they do not appear on historical OS maps dating back to 1884.

8.3.2 Interpretation: Historical Agriculture

Historic cultivation – Linear and curvilinear anomalies consistent with remains of ridge and furrow cultivation regimes are located in the southwest corner of Field 185, centre and south of Field 186, south of the Field 187, east of Field 193 and across most of Field 196. In Field 196 a stronger anomaly is consistent with a cut feature such as a ditch that runs parallel to the ridge and furrow cultivation.

Linear and curvilinear anomalies in the east of Field 185, southeast of Field 186, north of Field 185, south of Field 187 and west of Field 194, and across Fields 193, 200, 201 and 202 and appear to reflect historical cultivation that respects the outline of these historical fields. Linear alignments of magnetic dipoles along several of these anomalies also suggest the presence of ceramic drainpipes.

Former field boundary -Several linear and curvilinear anomalies in Fields 185, 186, 193, 187, 202, 200, 194 and 195 align with former field boundaries identifiable on an OS map from 1884. In Field 186 several of the anomalies are marked by strong bipolar anomalies along their lengths, suggesting the accumulation of debris along the length of the field boundaries [**186c**].

Historic landscape features - Located along the northern boundary of Field 185 is a concentration of strong bipolar anomalies consistent with an area debris [**185e**], encompassing a roofed building on the historical OS map of 1884.

A band of strong magnetic dipoles near centre of area 193 coincides with a former field boundary identifiable on the historical OS map of 1884 [**193d**]; this is likely to reflect a former bank or track, constructed with magnetically enhanced material, running along the edge of the former field. Near the north-western boundary of area 193 is a concentration of strong magnetic dipoles consistent with an area debris [**193e**], which encompasses an unroofed building on the historical OS map of 1884.

Two parallel curvilinear anomalies near the centre of the northern edge of Field 202 [**202d**], appear to run parallel to a footpath the historical OS map of 1884. These anomalies are likely to reflect infilled ditches flanking this former footpath.

8.3.3 Interpretation: Modern Agriculture

Ploughing - Linear magnetic trends running across Fields 185 and 192 are consistent with ploughing activity.

8.3.4 Interpretation: Natural

Geology - Curvilinear trends running southeast to northwest across Field 187 and into Field 191, appear to reflect variation due to the band of dolomitic siltstone, which the anomalies run approximately parallel to these bands. Areas of mottling in the magnetic

data in Fields 187, 191, south of Field 197 and southwest corner of Field 196 are consistent with the weak magnetic variation sometimes encountered over mudstone geologies. It is possible variation due to extraction activity is intermingled amongst these background variations, but at present it is difficult to distinguish it.

Geomorphology - Weak curvilinear anomalies, consistent with palaeo-channels, run across the survey area 194 southwest to northeast, and south to north across area 195.

8.3.5 Interpretation: Modern

Drain - Several linear anomalies with a strong magnetic signal in Fields 185 and 200, run parallel to each other in a formation consistent with drainage features. In Field 200 the drainage systems also appear to respect the outline of a former field identified on a historical OS map from 1884.

Linear alignments of magnetic dipoles across Fields 195 and 202 in the southeast corner of Field 192, northwest and south of Field 193, and the centre of area 187 are consistent with the presence of a ceramic drainpipes. Several anomalies in Fields 195 and 202, also occur in herringbone formations consistent with drainage activity.

Ferrous - Strong magnetic dipoles consistent with the presence of ferrous objects in the topsoil are distributed throughout the survey area.

Dipolar anomalies consistent with the presence of debris run along the western and southern boundaries of area 187, near the northern end of the western boundary of the Field 197, centre and along the western boundary of Field 200, and along the southern boundary of Field 201. Near the eastern boundary of Field 202 is a concentration of strong magnetic dipoles consistent with a former pond that has been infilled with debris, though no such feature has been recorded in this location in any historical OS maps.

Large ferrous anomalies are located near the northern and southern boundaries of Field 193 and are near the western boundary of Field 202 and are likely to relate to buried ferrous structures.

Increased magnetic response - Magnetic disturbance is identifiable around base of pylons of the overhead power cables that bisect Fields 193, 201 and 202 southeast to northwest.

Modern service - Magnetic disturbance along the southern and eastern boundaries of Field 193, the northern boundary of Field 187, and the southern and eastern boundaries of Field 202 are consistent with the presence of services running along these field boundaries.

8.3.6 Interpretation: Unknown

Unknown feature - Several discrete anomalies of uncertain origins have also been identified across Field 185. Four strong discrete anomalies have been identified near the southern boundary of Field 200 in a rough alignment [**200b**]. Three further strong discrete anomalies are located near the southwest corner of Field 194 [**194b**].

Several ephemeral linear anomalies with a weak diffuse magnetic signal have been identified in Fields 186, 187, 192 and 193 [**186d, 187d, 192d, 193f**]. The anomalies interpreted as being of unclear origins as the magnetic signal of the anomalies is more diffuse than those interpreted as reflecting infilled cut features such as ditches. A short

linear magnetic anomaly has also been identified just south of the enclosure in area 202 [202e].

8.4 Preliminary Conclusions

The magnetic gradiometer survey area has been successfully carried out over twelve agricultural fields and partially across one more agricultural field. Anomalies from the magnetic data have a good contrast against background magnetic variation, while their magnetic signals vary in strength from weak to strong. Anomalies of probable archaeological origins have been identified in three foci across the survey area. Anomalies of possible archaeological origins have also been identified across the survey area, along with several other anomalies of unclear origins.

The first focus of archaeological activity is a sub-rectangular enclosure, running along a ridge near the southern boundary of Field 196. Internally the enclosure is sub-divided into three smaller areas, and discrete anomalies suggest the presence of pits within the enclosure. Ephemeral anomalies suggest the presence of another enclosure, overlapping with the southern edge of the enclosure, while linear anomalies to the north and east suggest the presence of unmapped field boundaries, and a third possible smaller enclosure in Field 197.

The second focus is a small sub-rectangular enclosure, located near the centre of Field 187, which has a ring-shaped anomaly positioned near its southwest corner. Discrete anomalies suggest the presence of pits within and in the immediate vicinity of the enclosure, and linear anomalies extend north and west of the enclosure. The anomalies of the first and second foci are suggestive of possible later prehistoric or Romano-British rural settlement.

The third focus is towards the north of Field 202 and consists of small sub-rectangular enclosure and several other linear anomalies southeast of this enclosure and may also reflect infilled cut features such as ditches. The anomalies are more ephemeral than those associated with the enclosure, and at least some of anomalies run align with the outline of a former field identifiable in the OS map of 1884.

Possible archaeology is highlighted by a possible partial enclosure in Field 192, with weaker anomalies suggesting the complex extends southeast and northwards. In Field 195 a concentrated area of enhanced magnetism and strong linear and discrete anomalies may reflect a concentrated area of habitation, while three strongly enhanced anomalies in Fields 193 and 202 may reflect large pits or limekilns.

Linear and curvilinear anomalies in Fields 185, 186, 193 and 200 are indicative of infilled ditches not identifiable on historical OS maps but they may predate them. The anomalies may relate to former field boundaries which predate those identifiable in the historical OS maps, however, it is not possible to be more specific than this.

Anomalies of an unclear origin, include several discrete dipolar anomalies, which may relate to areas of in-situ burning, a rough alignment of discrete anomalies in Field 200, discrete anomalies distributed across Field 185, and several ephemeral linear anomalies across the survey area.

Multiple linear anomalies across most fields of the survey area align with former field boundaries and footpaths identifiable on historical OS maps. Regimes of ridge and furrow cultivation have also been interpreted from the data in multiple fields, while several anomalies consistent with cultivation have been noted to respect the outline of former field boundaries demarked on historical OS maps. Strongly magnetic dipoles have also highlighted a former bank or track running along the edge of the former field, and two former buildings identified on historical OS maps.

Magnetic variation relating to the underlying geology include linear trends, which correlate with a band of dolomitic siltstone, and mottling reflecting variation in the mudstone

geology. Weak curvilinear anomalies reflect the presence of palaeochannels along Fields 194 and 195.

Other anomalies reflect ploughing throughout the survey area, drainage activity, modern services, ferrous debris, and ferrous objects in the topsoil.

9 PARCEL III: SOUTH OF OLLERTON ROAD - FIELDS 171 – 175 AND 264-265

9.1 Site details

A detailed gradiometer survey was carried out over Fields 171 – 174 and 264- 265, c. 1.5 km south-southeast of Caunton (centred on NGR 475056 357737) (**Figure 2**).

This survey comprises four arable fields (Fields 171, 172, 264 and 265) and three pasture fields (173 -175). The survey area is bounded along the east by Cold Harbour Lane and agricultural fields to the west, north and south. A farm and residential properties are surrounded to the north, east and south by the surveyed fields, with a track running along the northern edges of Fields 171 and 172. Overhead power cables bisect Fields 171, 173, 264 and 175 south to north, with pylon mast near the northeast corner of Field 171, the eastern boundary of Field 264 and the northwest corner of Field 175.

The survey area predominantly slopes downhill south to north from c. 70 m aOD in the southeast corner of Field 171 to c. 57 m and c. 54m along the northern boundaries of Fields 265 and 175 respectively.

The underlying geology across the survey area is recorded as mudstone of the Mercia mudstone group, with curvilinear bands of dolomitic siltstone of the Mercia mudstone group running across the centre and west of Fields 171 and 264, southeast corner of Field 172, centre and southeast corner of Field 173, southwest corner of Field 174 and east of Field 265¹⁶. No superficial geology has been recorded for these survey areas, though alluvial clay, silt, sand and gravel, and sand and gravel of the Holme Pierrepont member have been recorded east of the survey area towards South Muskham

The soils underlying this survey area are likely to comprise slowly permeable seasonally wet slightly acid but base rich loam and clay soil in the south and centre of Fields 265 and 264, south of Field 173, and across Fields 171 and 172. Slightly acid loamy and clayey soils are recorded across the north of Fields 265, 264 and 173, and across Fields 175 and 174.¹⁷ Soils in such geological settings are identified as producing a poor to average magnetic contrasts with magnetic gradiometer survey, with archaeological features often exhibiting a weak magnetic enhancement against a subtle background magnet variation that can mask weak magnetic anomalies¹⁸. Survey results though can be variable and the soils and geology do not preclude magnetic survey as a technique.

9.2 Archaeological background

The survey area is c.450m north of the post medieval estate of Averham Park (**MNT26653**; see Section 4.3.5.). All other archaeological assets outlined in chapter 4 lie over 1km away from the survey area.

¹⁶ Geology of Britain viewer. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed on 01/04/2022)

¹⁷ Cranfield UK soil observatory Soilscales, 2024. <http://www.landis.org.uk/soilscales2> (last accessed 13/03/2024)

¹⁸ David, A. Linford, N. Linford, P., 2008, English Heritage (Historic England): *Geophysical Survey in Archaeological Field Evaluation*, Swindon

9.3 Detailed gradiometer survey results

The detailed gradiometer survey was carried out on the dates specified previously and covered 70.7ha of the survey area. The survey has identified possible archaeology, historical agricultural practice, drainage and unknown features.

Results are presented as a series of greyscale plots and archaeological interpretations, at a scale of 1:2000 (**Figures 5.20– 5.23** and **6.20 – 6.23**). XY trace plots of minimally processed data can be viewed in Figures 7.20 – 7.23, at a scale of 1:2000.

9.3.1 Interpretation: Archaeology and Possible Archaeology

Archaeology - Located towards the south of Field 264 are several weak linear anomalies consistent with infilled cut features such as ditches. The anomalies loosely enclose a sub-D-shaped area of c. 80m × 60m [**264a**], though the eastern and southern edges of the enclosure are less clearly defined. Curvilinear anomalies along the northern anomaly of the enclosure suggest the presence of a sub-enclosure [**264b**].

Located in the northwest corner of Field 265 are linear and curvilinear anomalies [**265a**], consistent with infilled cut features such as ditches, in a sub-rectangular form. The anomalies appear to reflect a small sub-rectangular enclosure of c. 30 m × 25m.

Possible archaeology – Trends close to the northern anomaly of the enclosure in Field 265, ephemeral linear and curvilinear anomalies suggest the location a second sub-enclosure [**264c**]. Two linear anomalies near to the eastern edge of Field 264 and one located in the northwest corner of Field 265 are consistent with infilled cut features such as ditches [**264d, 265b**]. These anomalies do not correlate with features mapped in historical OS map, suggesting they predate 19th century.

9.3.2 Interpretation: Historical Agriculture

- **Historic cultivation** - Repetitive linear anomalies with an intermittent weak magnetic signal, run west to east across Fields 264, 265 and 175 are consistent with the presence of former ridge and furrow cultivation.
- **Former field boundary** - A weakly diffuse negative anomaly runs north to south across the centre of Field 171 [**171a**], appearing to demark a change from the magnetically noisier east to the magnetically quieter west. The negative anomaly aligns with a former field boundary identifiable on an OS map from 1884, the diffuse negative magnetic signal suggests the anomaly relates to a ploughed-out bank running along the former field boundary. Other linear anomalies in Fields 172 and 173, also align with former field boundaries identifiable on the OS map from 1884 [**172a, 173a**]. In Field 264 a loose alignment of magnetic dipoles aligns with a former field boundary identifiable on an OS map from 1884 [**264e**].

9.3.3 Interpretation: Natural

- **Geomorphology** – Across centre and south of Field 264 is an area of broad and weak background magnetic variation which coincides with a change from slowly permeable seasonally wets soils in the south and soils impeded drainage in the north. This change in soil also coincides with intrusions of Dolomitic siltstone geology.

9.3.4 Interpretation: Modern

Drain - Strong positive linear anomalies in the east of Field 171 run towards the eastern boundary; it is likely these anomalies relate to the agricultural use of the field and their

heading towards the eastern boundary suggest they may relate to drainage features. Linear alignments of magnetic dipoles located in the western half of Field 171 are consistent with the presence of ceramic drainpipes.

In Field 172 a curvilinear anomaly runs approximately southwest to northwest from near the centre of the southern boundary to near the northeast corner along the eastern boundary; linear anomalies intersect with this anomaly from the north and south in a form, which could loosely be interpreted as a herringbone formation associated with drainage systems.

Strong positive linear anomalies in Field 174 run west-southwest to east-northeast across centre and north, and west-northwest to east-southeast near the southwest corner of the survey area. Linear alignments of magnetic dipoles located in east of areas 174 are consistent with the presence of ceramic drainpipes/

Several linear alignments of magnetic dipoles in Field 265, and north of Field 264 are consistent with the presence of ceramic drainpipes.

Ferrous – Strong magnetic dipoles consistent with the presence of ferrous objects in the topsoil are distributed throughout the survey area.

Increased magnetic response - Strong magnetic disturbance is recorded around a pylon mast located near the northeast corner of area 171, east of area 264, and northwest corner of area 175

Modern service - Magnetic disturbance consistent with the presence of a service runs along the southern and eastern boundaries of Field 174, north to south across the western half area 173 and along the western boundary of Field 172. Similar magnetic disturbance runs southeast from centre of Field 265 towards the southeast corner of the survey area.

9.3.5 Interpretation: Unknown

- **Trend** – Ephemeral intersecting linear, anomalies intermittently traverse Fields 172, 173 and 174 and may relate to sand and gravel deposits [**172b 173b, 174a**]; however, an archaeological possibility such as the presence of unmapped field systems cannot be discounted.

9.4 Preliminary Conclusions

The magnetic gradiometer survey area has been successfully carried out over seven agricultural fields, with the magnetic anomalies typically having weak enhancement. Persistent and in some places strong background magnetic variation across the survey may mask some weaker anomalies, however, it has been possible to discern multiple anomalies with a weak to strong magnetic signal. Anomalies of probable archaeological origins include two enclosures in two different locations, while anomalies of possible archaeological origins and several of uncertain origins have also been identified.

Two enclosures interpreted from the magnetic data are located towards the south of Field 264 and in the northwest corner of Field 265. The enclosure in Field 264 is a sub-D-shaped, though the eastern and southern edges are less clearly defined. Anomalies within the enclosure suggest the presence of sub-enclosures along the northern edge of the enclosure. The enclosure in Field 265 is sub-rectangular in form and a linear anomaly to just north of the enclosure suggests the presence of a nearby ditch. Two linear anomalies in the east of Field 264 are consistent with infilled ditches, which may predate the 19th century as they do not correlate with features identifiable on historical OS map.

Anomalies of unclear origins, include several discrete dipolar anomalies, which may relate to areas of in-situ burning, sets of intersecting linear anomalies, which may relate to either sand and gravel deposits or possible unmapped field systems.

Several linear anomalies, highlight presence of former field boundaries identified on historical OS maps. All these features are identifiable on historical maps of the survey area. Regimes of ridge and furrow cultivation have also been interpreted from the data, while other anomalies consistent with cultivation appear to respect the outline of former fields demarked on historical OS maps.

Other anomalies reflect ploughing throughout the survey area, drainage activity, modern services, pylons ferrous debris, a metaled track and ferrous objects in the topsoil.

10 APPENDICES

10.1 Appendix 1: Gradiometer Survey Equipment and Data Processing (Sensys)

Bartington Cart -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 along with three 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

SENSYS - AOC Archaeology's ATV- towed surveys are carried out using a using a non-magnetic cart fitted with sixteen SENSYS FGM650/3 magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 0.25m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 0.6 m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of $\pm 8 \mu\text{T}$ over $\pm 1000 \text{ nT}$ range. All of the data are then relayed to a Panasonic tablet, running the MONMX program, which is used to record the survey data from the array of FGM650/3 probes at a rate of 20 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Carlsen BRx7 system with a rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Carlsen BRx7, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt et al. 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.01 m intervals along traverses spaced up to 0.25m apart.

Post-processing

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

Typical data and image processing steps may include:

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

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

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

Typical displays of the data used during processing and analysis:

Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during the analysis of the data.

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

10.2 Appendix 2: Geophysical Interpretation

The following categories have been used for interpretation of the data throughout the report.

Archaeology

Used when the form, nature, and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation.

Possible Archaeology

Used for anomalies that conform to the Archaeology category but have a lower level of confidence due to lack of form, pattern, or nature.

Historic Landscape Feature

Used for anomalies that correspond with features other than historic field boundaries on available mapping. This can include, but is not limited to, park and garden features, areas of woodland, ponds, and extraction pits.

Historic Cultivation

Used to denote historic cultivation regimes that differ from existing modern cultivation. They may differ due to size, orientation, or distribution in the landscape. If possible, LiDAR, aerial, and HER data should be consulted to corroborate results.

Former Field Boundary

Used anomalies that correspond to the position of boundaries marked on available mapping, visible on aerial photographs, or form clear extensions of existing boundaries.

Modern Agricultural feature

Used to identify any anomalies that are representative of modern ploughing or agricultural activity.

Geology

Used to denote natural variations in soils, superficial geology, or bedrock.

Geomorphology

Used to identify anomalies associated with more coherent geomorphological features. This may include, but is not limited to, paleochannels, solution hollows, and former high ground.

Increased Magnetic Response

Used for areas dominated by indistinct anomalies with increased magnetic values. While these may have some archaeological potential they may also relate to natural or modern features.

Modern Service

Used for anomalies indicative of services or service trenches. These are usually magnetically strong linear anomalies but can also be seen as weak anomalies in the case of plastic services where only disturbance associated with the trench is visible.

Drain

Used for anomalies thought to relate to drainage features either due to their nature or corresponding with features on available mapping.

Ferrous

Used for anomalies caused by ferrous material. These anomalies are likely to be of modern origin.

Unknown Feature

Used for anomalies that, due to their nature, pattern, or form, cannot be confidently interpreted. These may have some archaeological potential.

Trend

Used for low amplitude or indistinct linear anomalies that cannot be confidently interpreted. These may have some archaeological potential.

LAND TO THE WEST OF THE A1, NORTH OF STAYTHORPE, NOTTINGHAMSHIRE:
DETAILED GRADIOMETER SURVEY

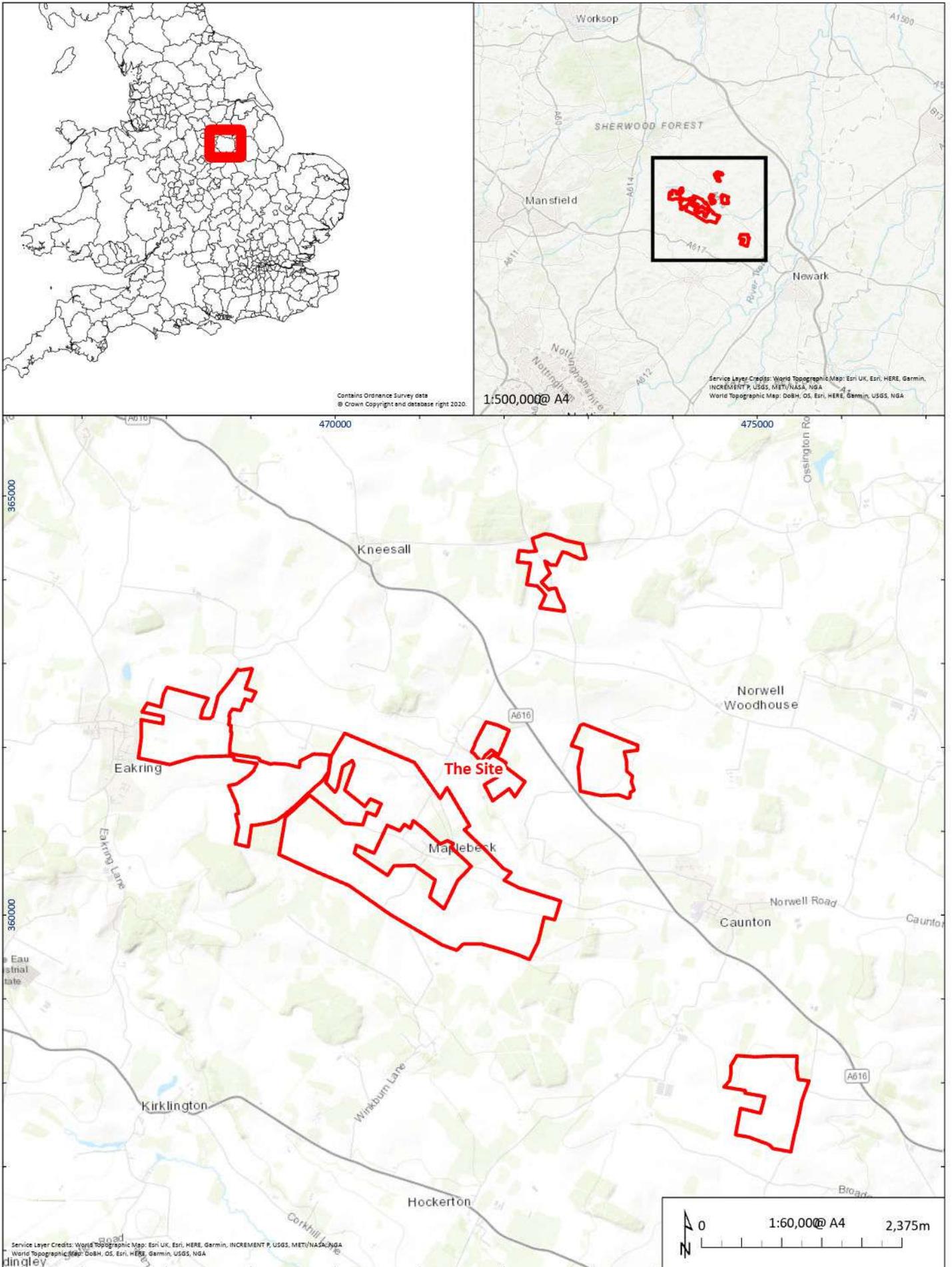


Figure 1: Site Location

03//GEO/01/01

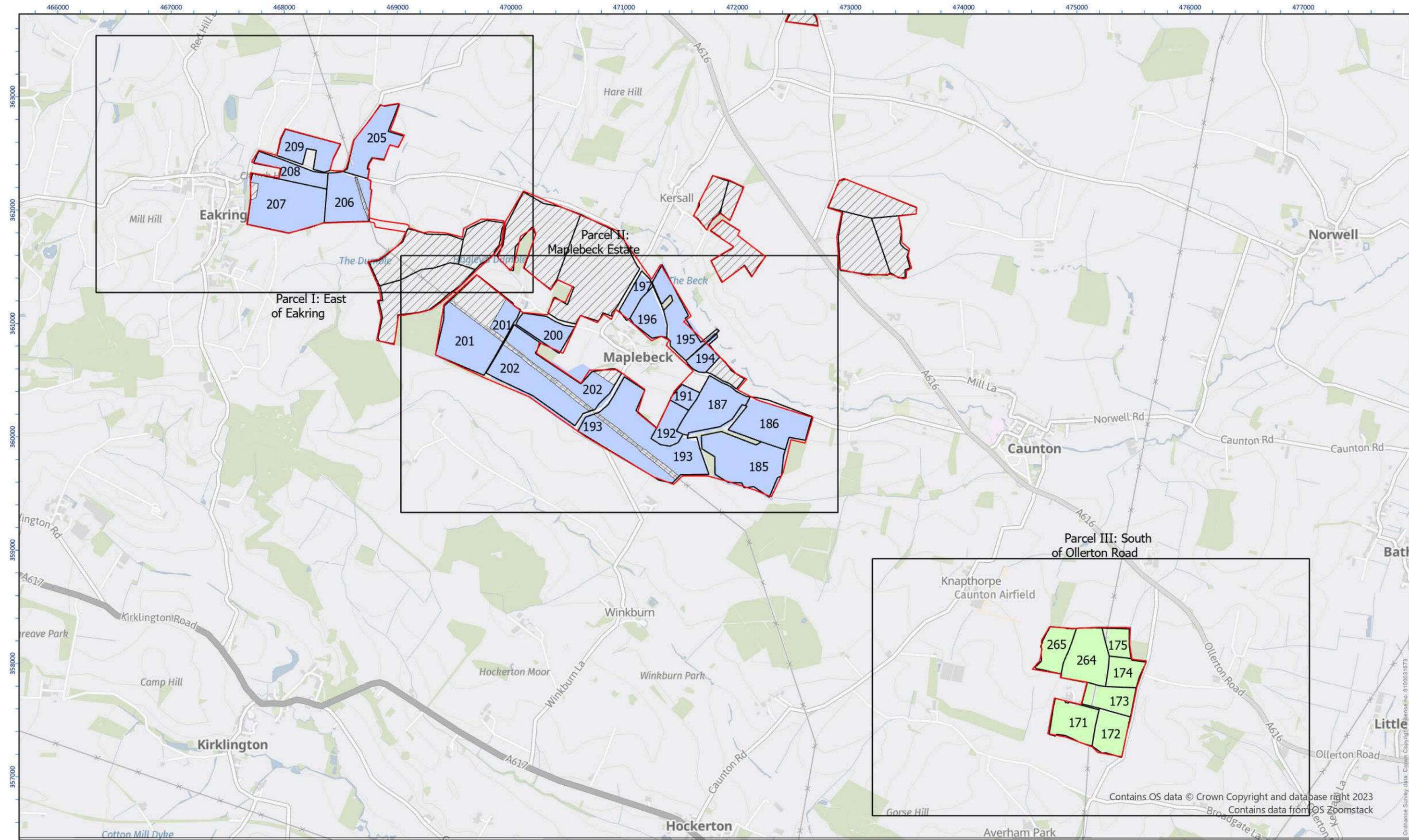
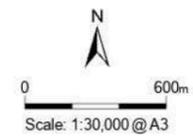


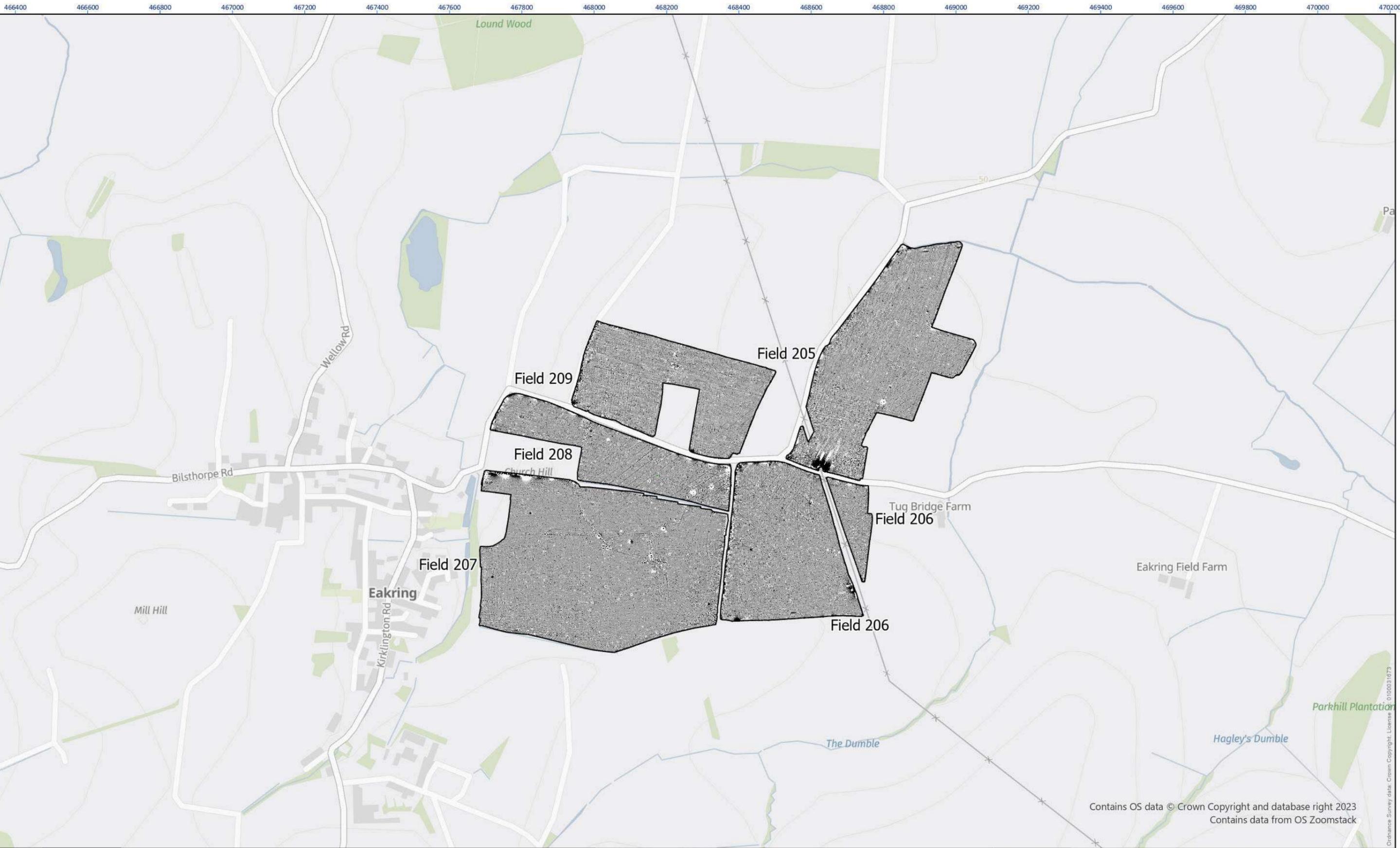
Figure 2

- Red Line Boundary
- Outstanding
- Sensys Cart
- Bartington Cart



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Checked by: AC	Date: 17/06/2024
Approved by: JL	Date: 17/06/2024





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Processed Gradiometer Data – Greyscale Plot - Overview - Parcel I: East of Eakring

Figure 3.1

Scale: 1:9,500 @ A3

Drawing Number: 05/40439/GEO/3.1	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024





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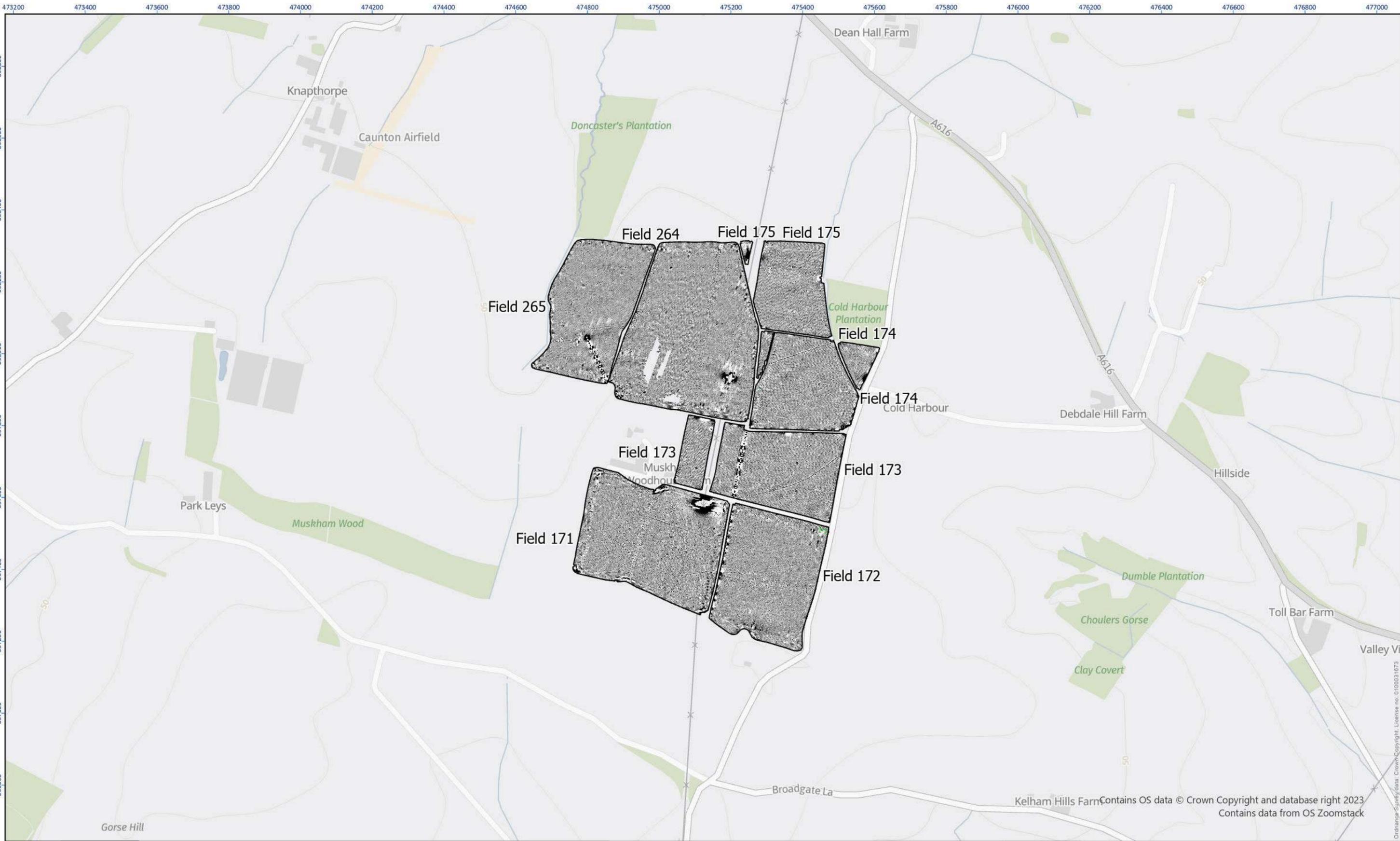
Processed Gradiometer Data – Greyscale Plot - Overview - Parcel II: Maplebeck Estate

Figure 3.2

Scale: 1:9,500 @ A3

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Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



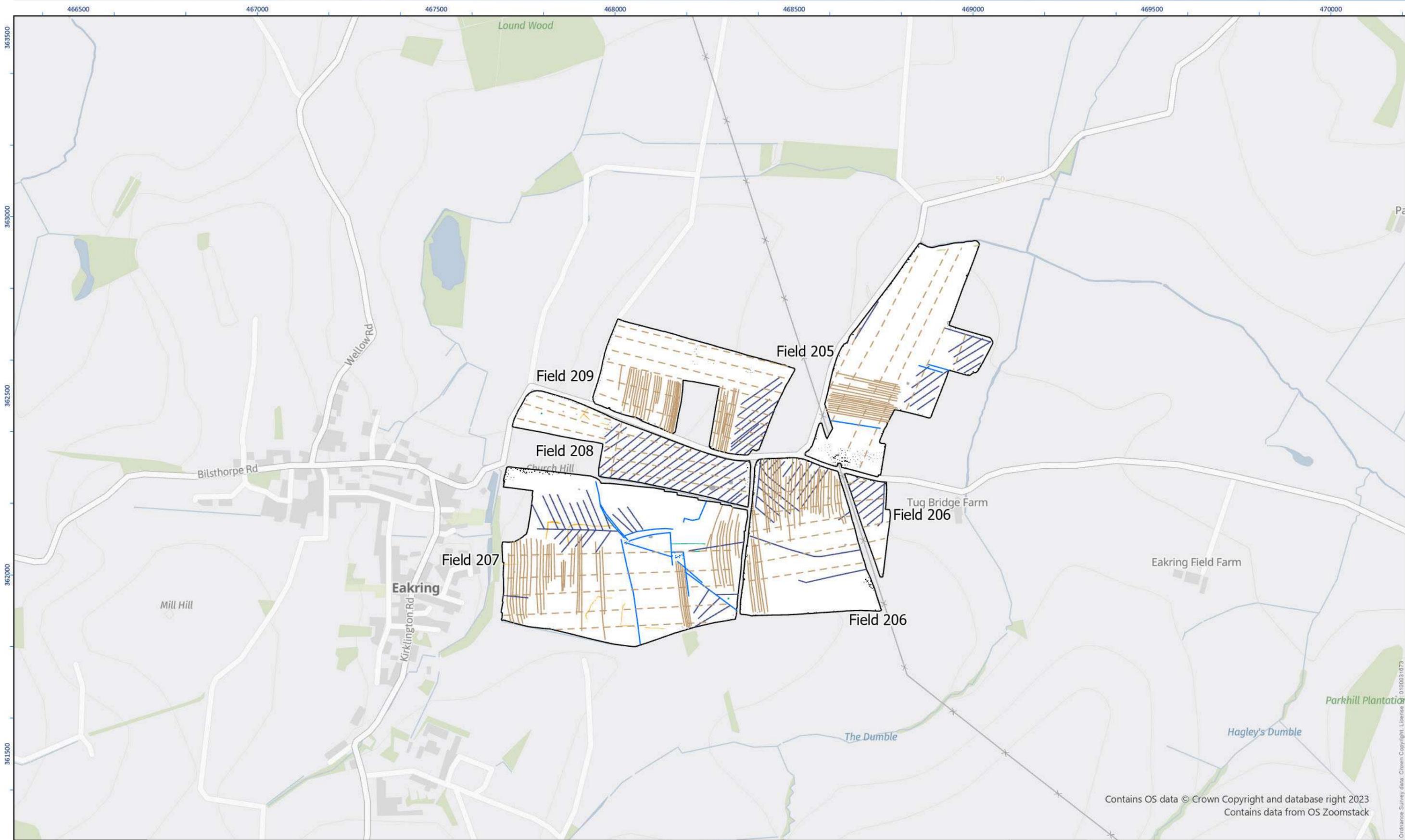


Processed Gradiometer Data – Greyscale Plot - Overview - Parcel III: South of Ollerton Road

Figure 3.3

Drawing Number: 05/40439/GEO/3.3	
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Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



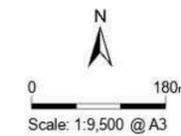


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Interpretation of Processed Gradiometer Data - Overview - Parcel I: East of Eakring

Figure 4.1

- | | | |
|---------------------------------|---------------------------------------|--|
| Anomaly (Possible Archaeology) | Spread (Increased magnetic response) | Linear Trend (Agricultural, Ploughing) |
| Spread (Historical Agriculture) | Anomaly (Ferrous) | Linear Trend (Historic cultivation) |
| Anomaly (Unknow Origin) | Spread (Ferrous) | Linear Trend (Drain) |
| Anomaly (Natural) | Linear Trend (Historical Agriculture) | |



Drawing Number: 05/40439/GEO/4.1	
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Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



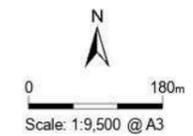
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Interpretation of Processed Gradiometer Data - Overview - Parcel II: Maplebeck Estate

- | | | | | |
|--------------------------------|---------------------------------|--------------------------------------|---------------------------------------|--|
| Anomaly (Archaeology) | Spread (Historical Agriculture) | Spread (Natural) | Linear Trend (Archaeology) | Linear Trend (Agricultural, Ploughing) |
| Anomaly (Possible Archaeology) | Anomaly (Unknow Origin) | Spread (Increased magnetic response) | Linear Trend (Possible Archaeology) | Linear Trend (Historic cultivation) |
| Spread (Possible Archaeology) | Anomaly (Agricultural) | Anomaly (Ferrous) | Linear Trend (Historical Agriculture) | Linear Trend (Drain) |
| Spread (Burned Area) | Anomaly (Natural) | Spread (Ferrous) | Linear Trend (Unknown Origin) | Linear Trend (Natural) |



Drawing Number: 05/40439/GEO/4.2
Created by: RL Date: 20/03/2024
Checked by: CS Date: 20/03/2024
Approved by: JL Date: 20/03/2024



Figure 4.2



Interpretation of Processed Gradiometer Data - Overview - Parcel III: South of Ollerton Road

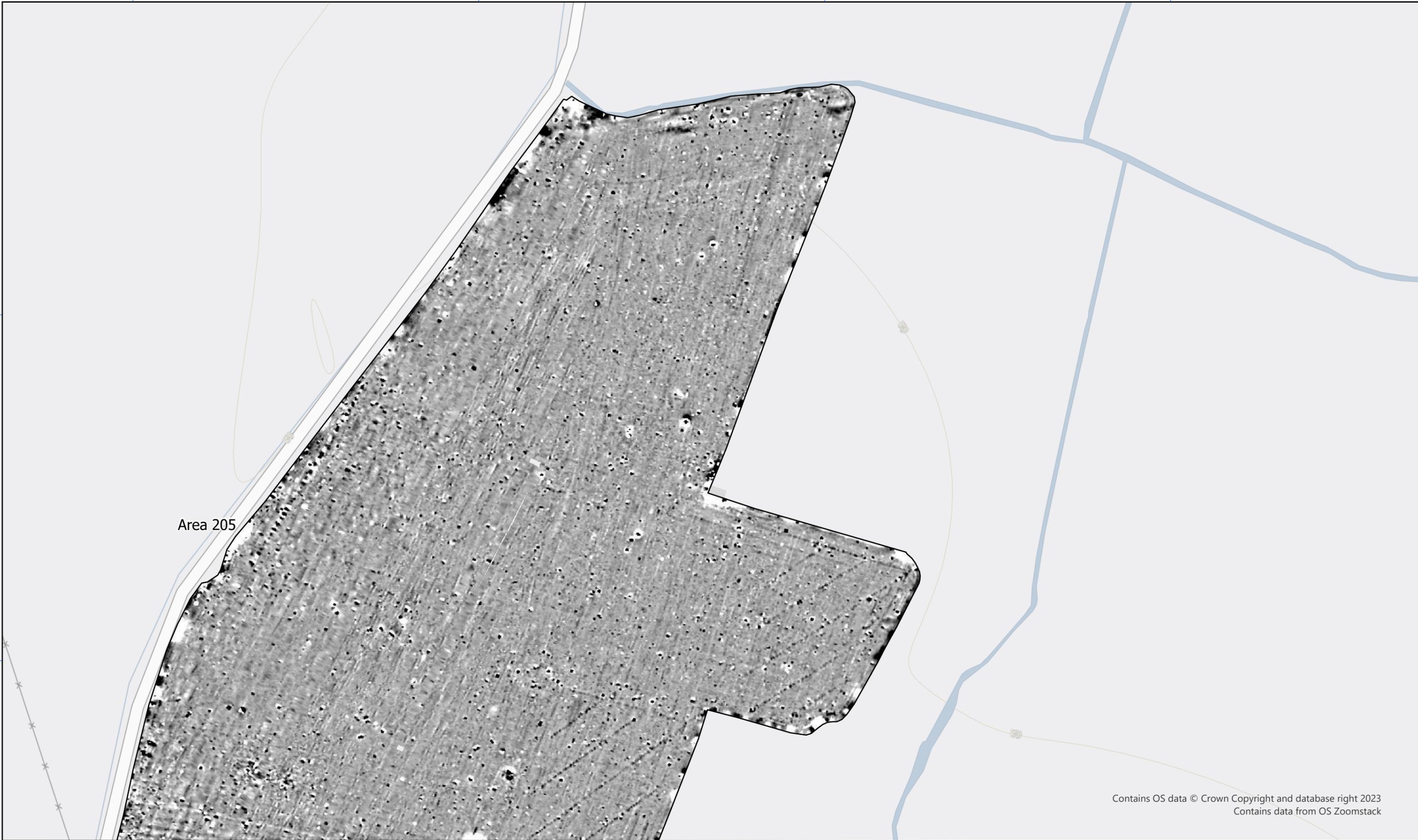
<p>Figure 4.3</p>	<p>■ Anomaly (Archaeology)</p> <p>■ Anomaly (Possible Archaeology)</p> <p>■ Spread (Historical Agriculture)</p> <p>■ Anomaly (Unknow Origin)</p>	<p> Spread (Natural)</p> <p> Spread (Increased magnetic response)</p> <p> Anomaly (Ferrous)</p> <p> Spread (Ferrous)</p>	<p>— Linear Trend (Archaeology)</p> <p>— Linear Trend (Historical Agriculture)</p> <p>— Linear Trend (Unknown Origin)</p> <p>— Linear Trend (Agricultural, Ploughing)</p>	<p>— Linear Trend (Historic cultivation)</p> <p>— Linear Trend (Drain)</p> <p>— Linear Trend (Service)</p>	<p>N</p> <p>Scale: 1:9,500 @ A3</p>	<p>Drawing Number: 05/40439/GEO/4.3</p> <p>Created by: RL Date: 20/03/2024</p> <p>Checked by: CS Date: 20/03/2024</p> <p>Approved by: JL Date: 20/03/2024</p>	
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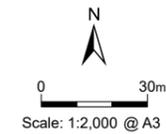
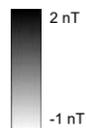


Area 205

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Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel I: East of Eakring

Figure 5.1



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Checked by: JL	Date: 20/03/2024
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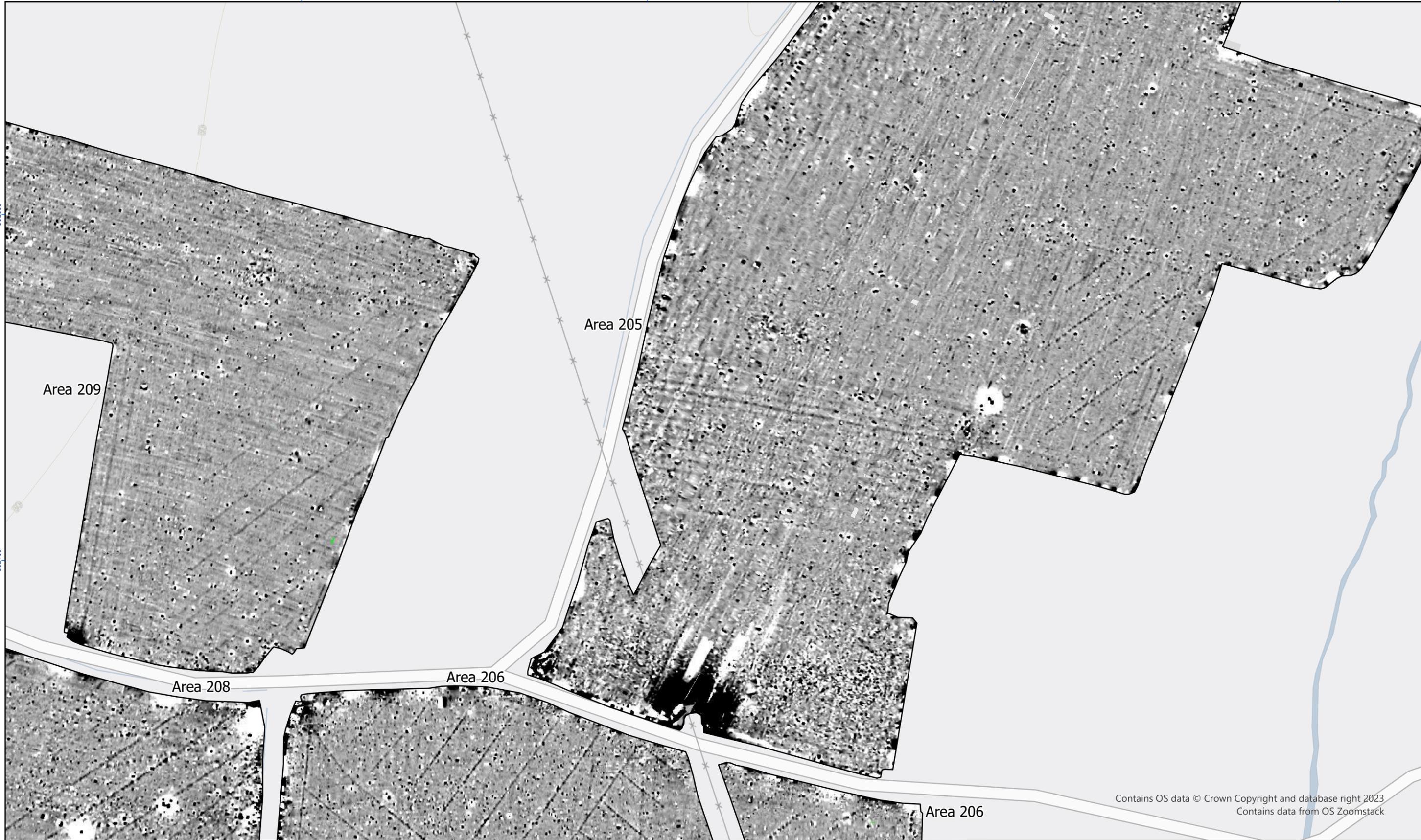


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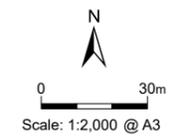
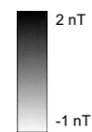
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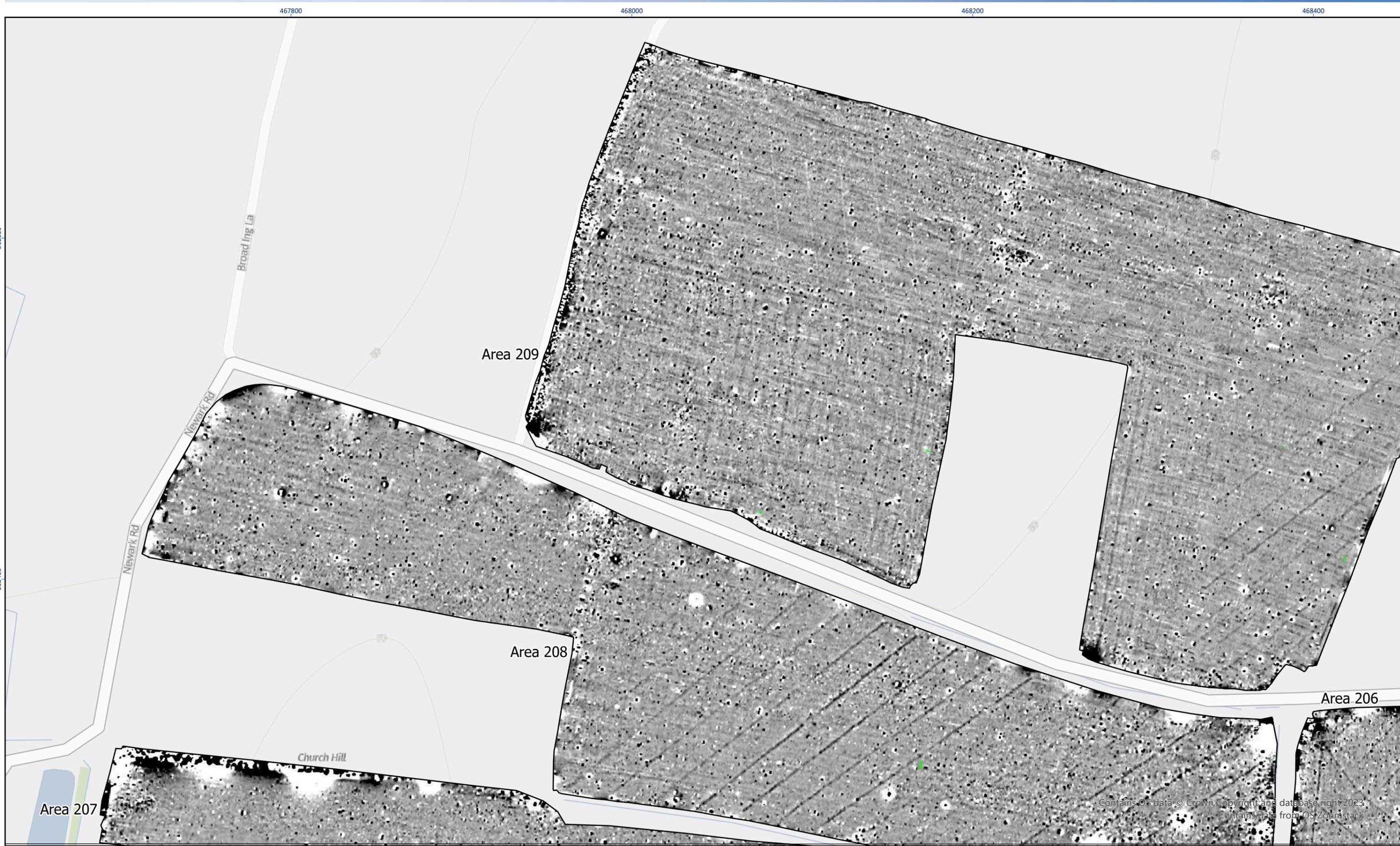
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Figure 5.2



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Approved by: JL	Date: 20/03/2024





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468000

468200

468400

Area 208

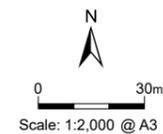
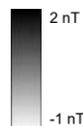
Area 207

Area 206

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Figure 5.4



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Approved by: JL	Date: 20/03/2024



468400

468600

468800

469000

Area 206

Tug Bridge Farm

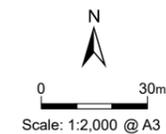
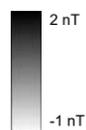
Area 206

Area 207

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Figure 5.5



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Approved by: JL Date: 20/03/2024



469400

469600

469800

470000



Area 201

Area 201

Area 200

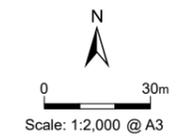
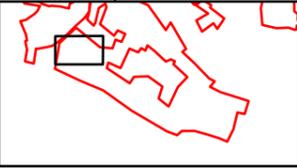
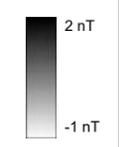
Area 202

Area 202

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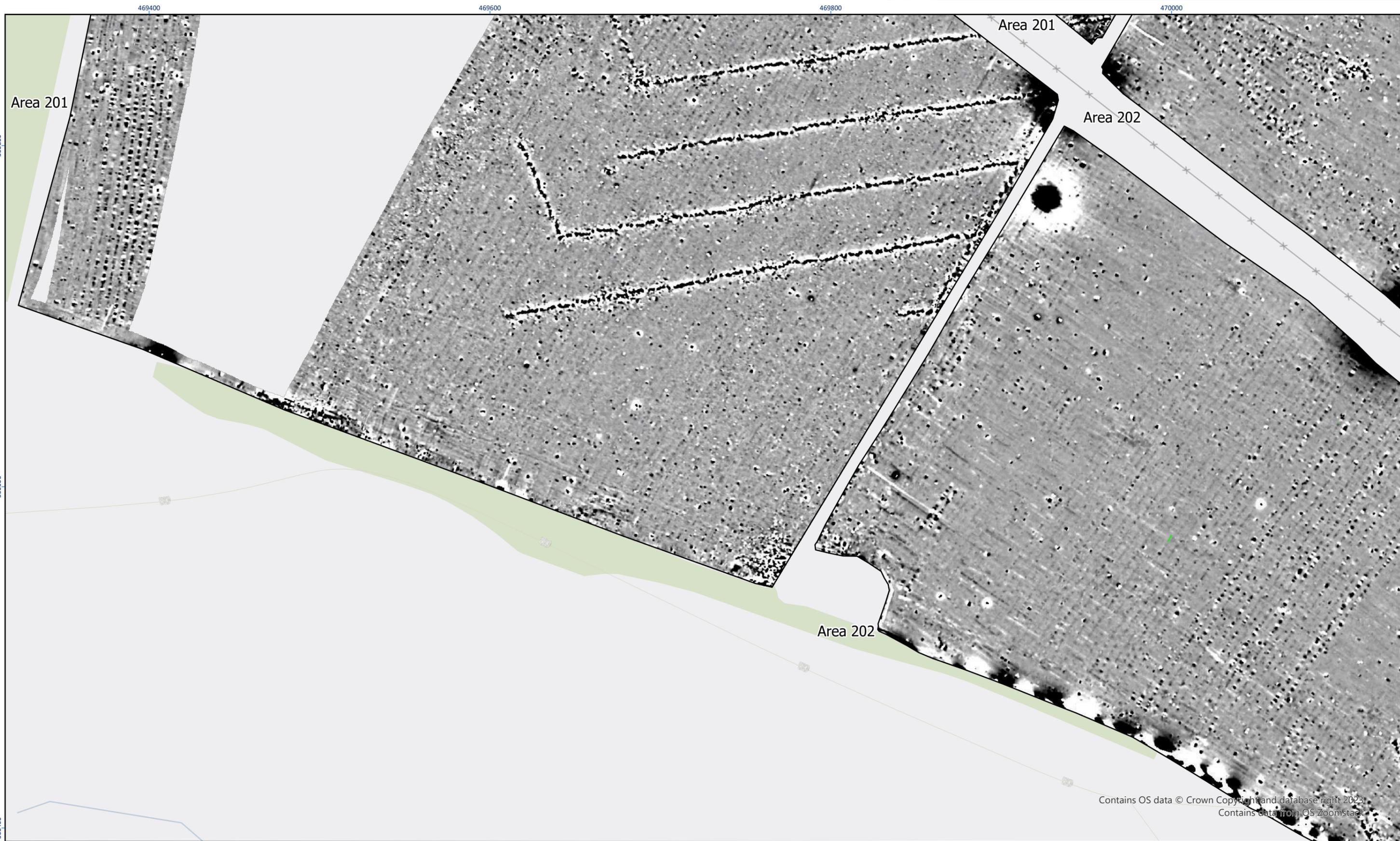
Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel II: Maplebeck Estate

Figure 5.6



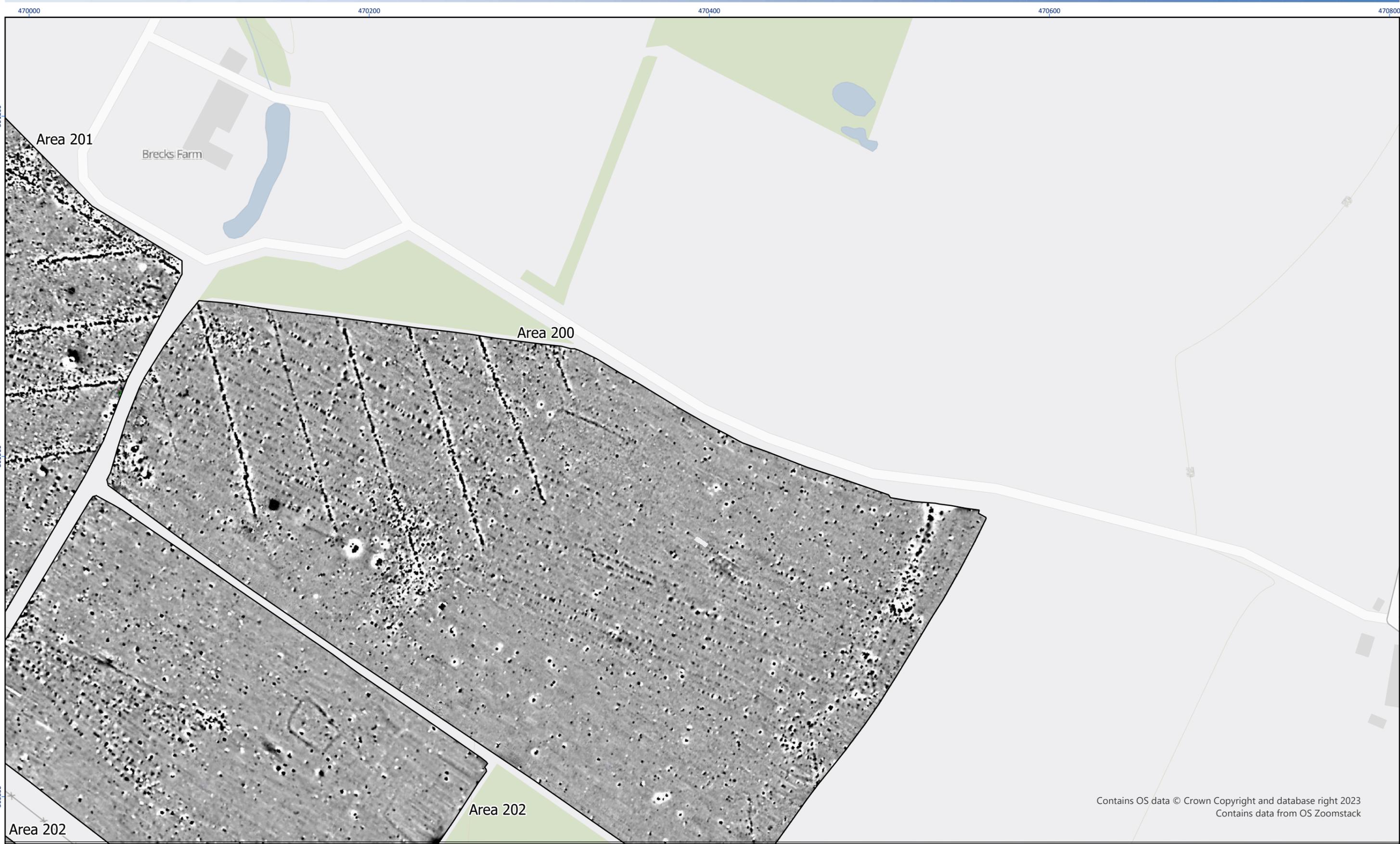
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Approved by: JL	Date: 20/03/2024





Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel II: Maplebeck Estate

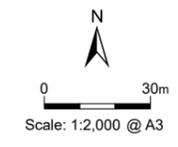
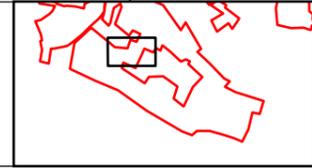
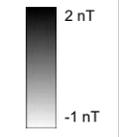
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			Checked by: JL Date: 20/03/2024	
Approved by: JL Date: 20/03/2024				



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Figure
5.8



Drawing Number: 05/40439/GEO/5.8	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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470200

470400

470600

Area 200

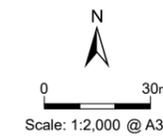
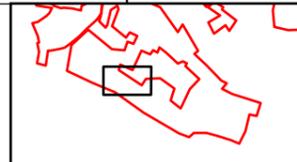
Area 202

Area 202

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Figure 5.9



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Approved by: JL	Date: 20/03/2024

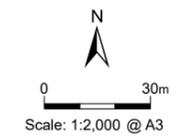
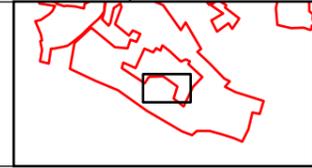
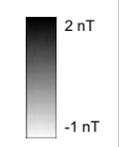




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Figure 5.10



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Approved by: JL	Date: 20/03/2024



470200

470400

470600

470800

Area 202

Area 202

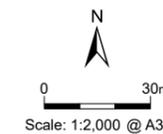
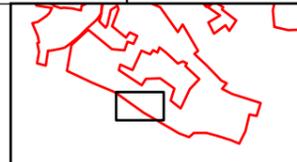
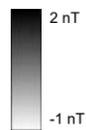
Area 193

Area 193

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Figure 5.12



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Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



471400

471600

471800

472000

Area 194

Area 187

Area 191

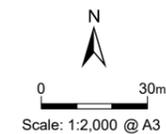
Area 186

Area 192

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Figure 5.13



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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



471000

471200

471400

471600

360200

360000

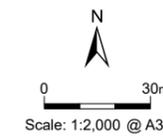
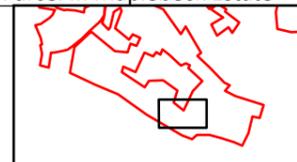
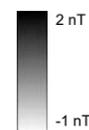
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Figure 5.14



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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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472200

472400

472600

Area 187

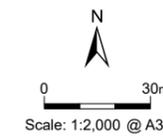
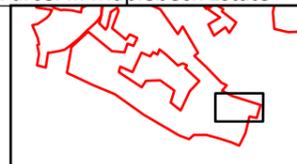
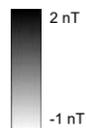
Area 186

Area 185

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Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel II: Maplebeck Estate

Figure 5.15



Drawing Number: 05/40439/GEO/5.15	
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Approved by: JL	Date: 20/03/2024



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360200

360000

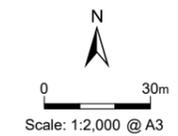
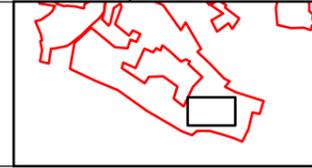
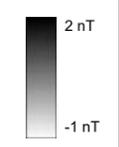
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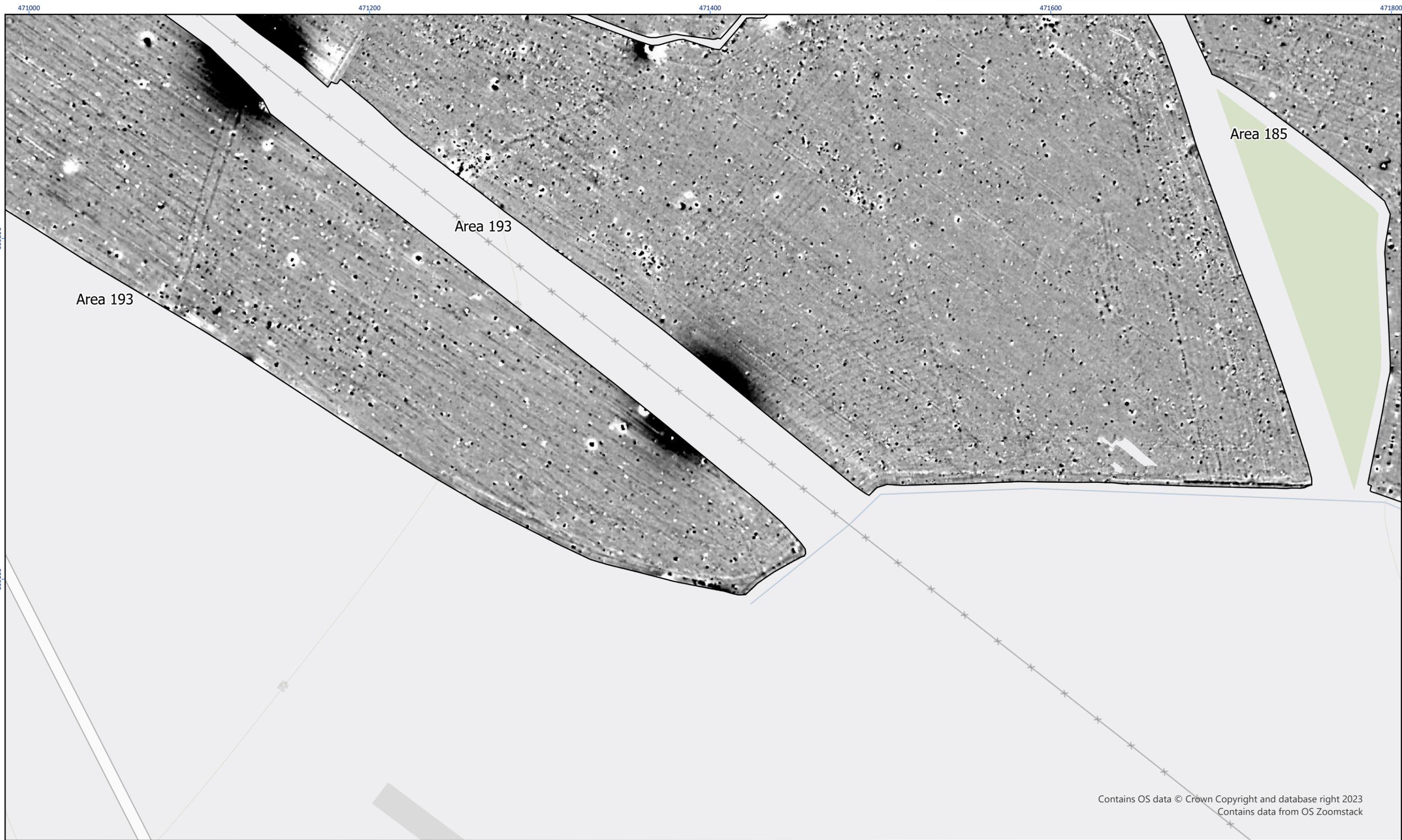
Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel II: Maplebeck Estate

Figure 5.16



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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024

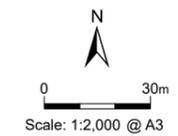
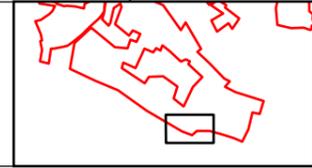
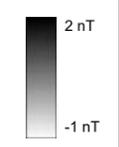




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Figure 5.16



Drawing Number: 05/40439/GEO/5.16	
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Approved by: JL	Date: 20/03/2024

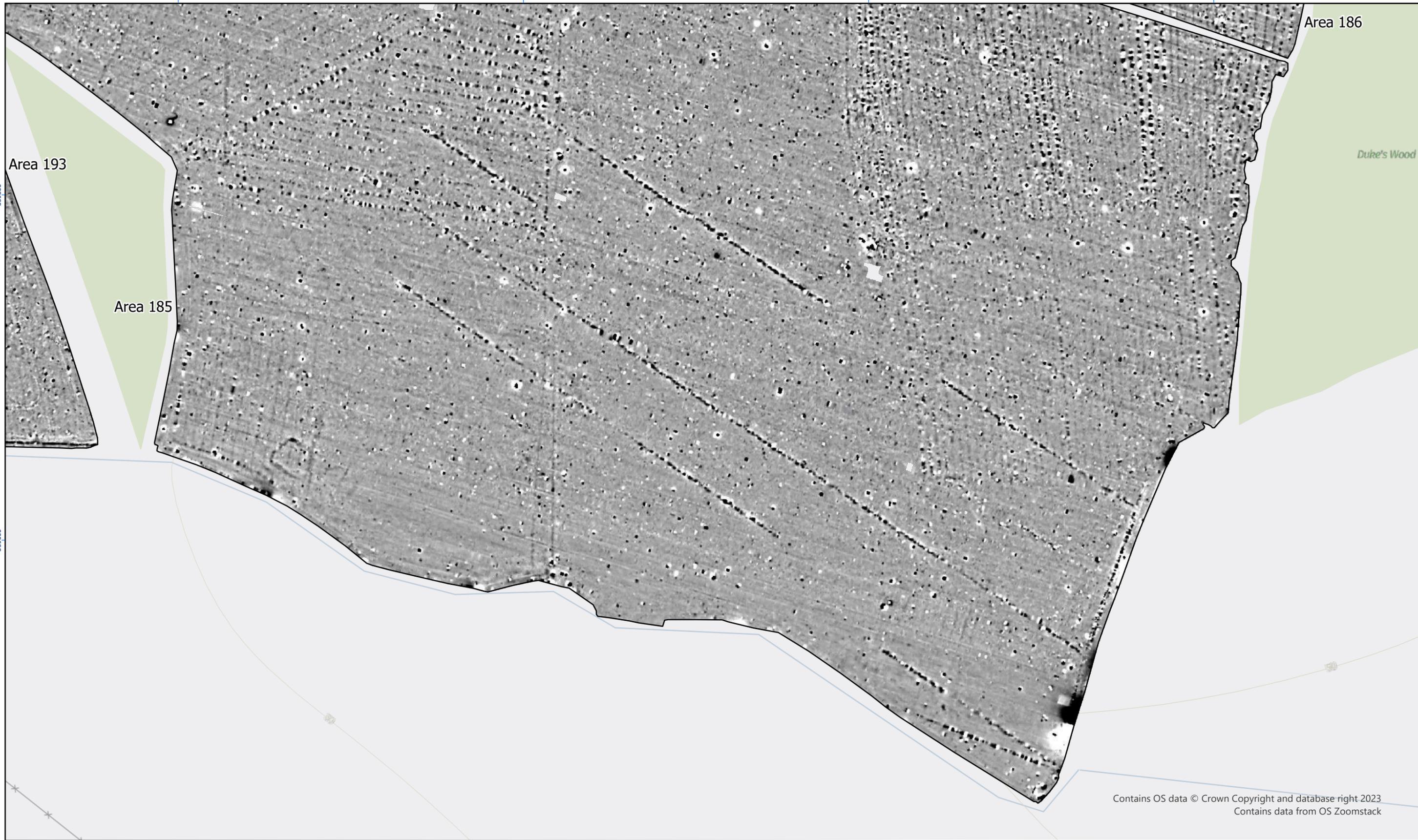


471800

472000

472200

472400



Area 193

Area 185

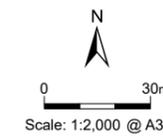
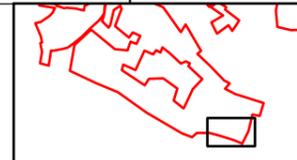
Area 186

Duke's Wood

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Figure 5.17



Drawing Number: 05/40439/GEO/5.17	
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Approved by: JL	Date: 20/03/2024



471000

471200

471400

471600

361400

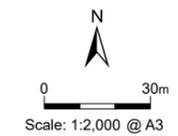
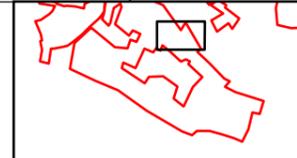
361200



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Figure 5.18



Drawing Number: 05/40439/GEO/5.18	
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Approved by: JL	Date: 20/03/2024



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471400

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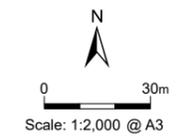
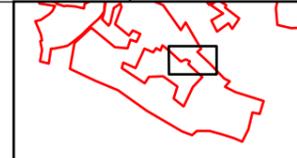
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Figure 5.19



Drawing Number: 05/40439/GEO/5.19	
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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



474800

475000

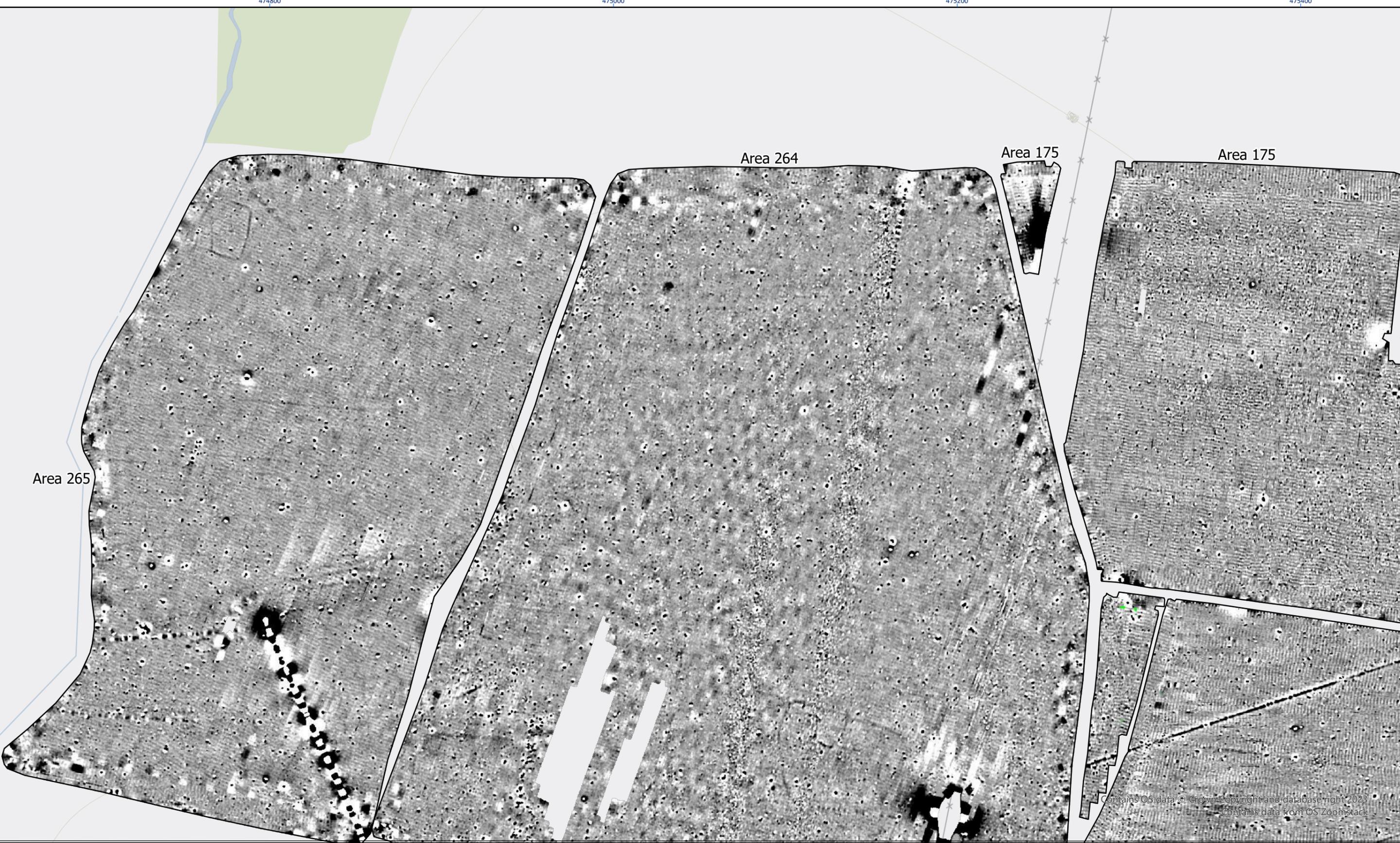
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475400

358400

358200

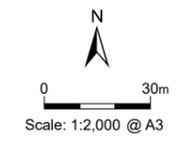
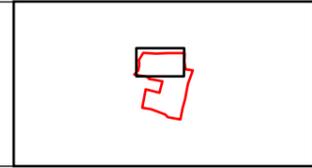
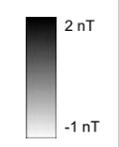
358000



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Figure 5.20



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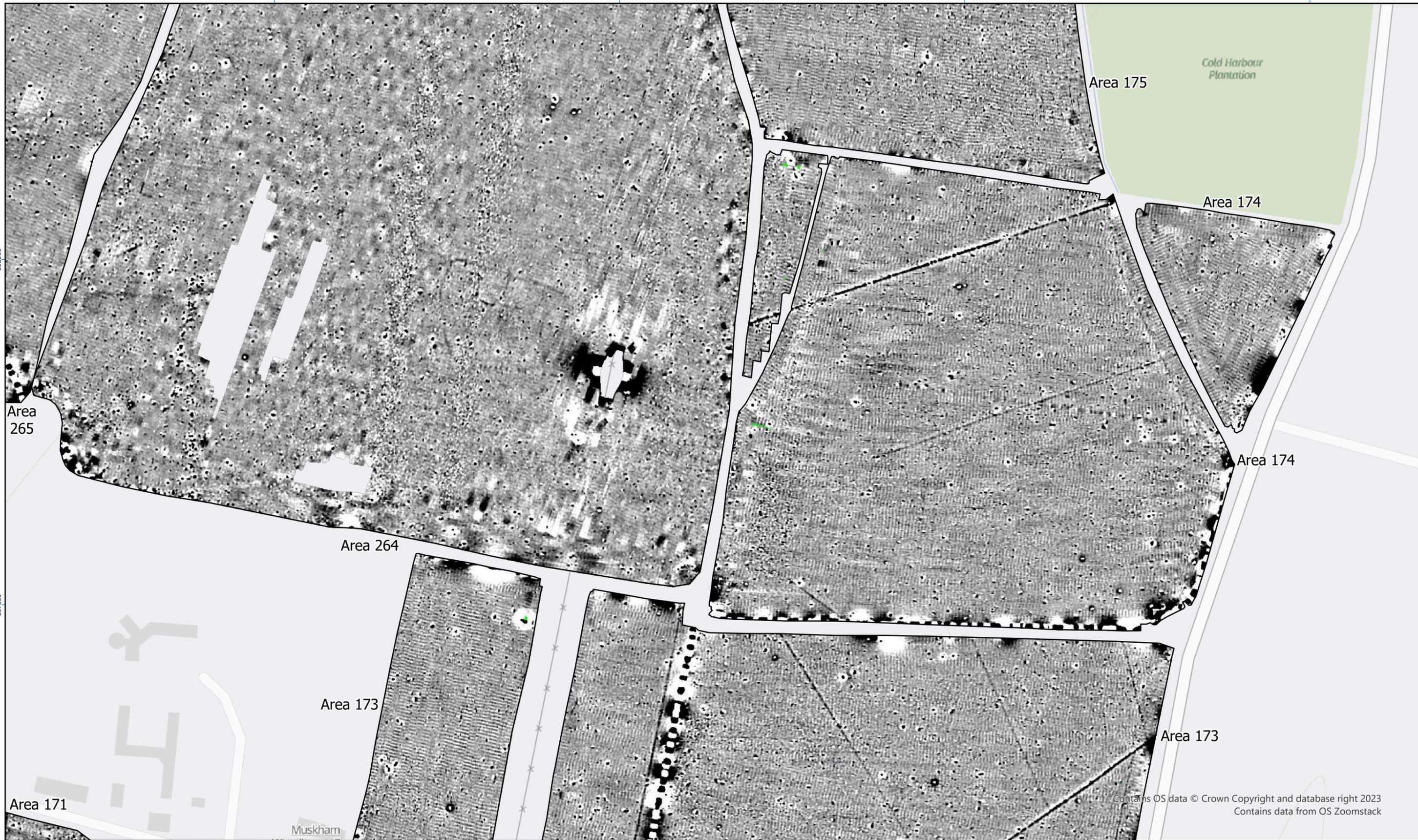


475000

475200

475400

475600



Area 265

Area 175

Cold Harbour Plantation

Area 174

Area 174

Area 264

Area 173

Area 173

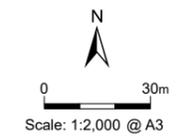
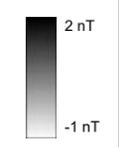
Area 171

Muskham

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Figure 5.21



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Approved by: JL	Date: 20/03/2024



474800

475000

475200

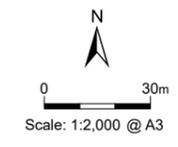
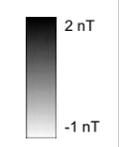
475400

357600
357400



Processed Gradiometer Data – Greyscale Plot - Detailed - Parcel III: South of Ollerton Road

Figure 5.22



Drawing Number: 05/40439/GEO/5.22	
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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



475000

475200

475400

475600

Area 173

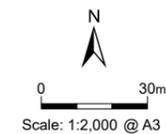
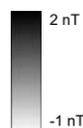
Area 172

Area 171

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Figure 5.23



Drawing Number: 05/40439/GEO/5.23	
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Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



468600

468800

469000

469200



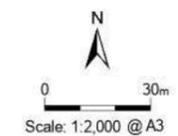
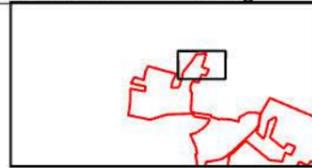
Field 205

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Interpretation of Processed Gradiometer Data - Detailed - Parcel I: East of Eakring

Figure 6.1

- Anomaly (Geology/Natural)
- Anomaly (Ferrous/Iron Spike)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Historical Agriculture)
- Linear Trend (Drain)
- Spread (Magnetic Disturbance)



Drawing Number: 05/40439/GEO/6.1	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



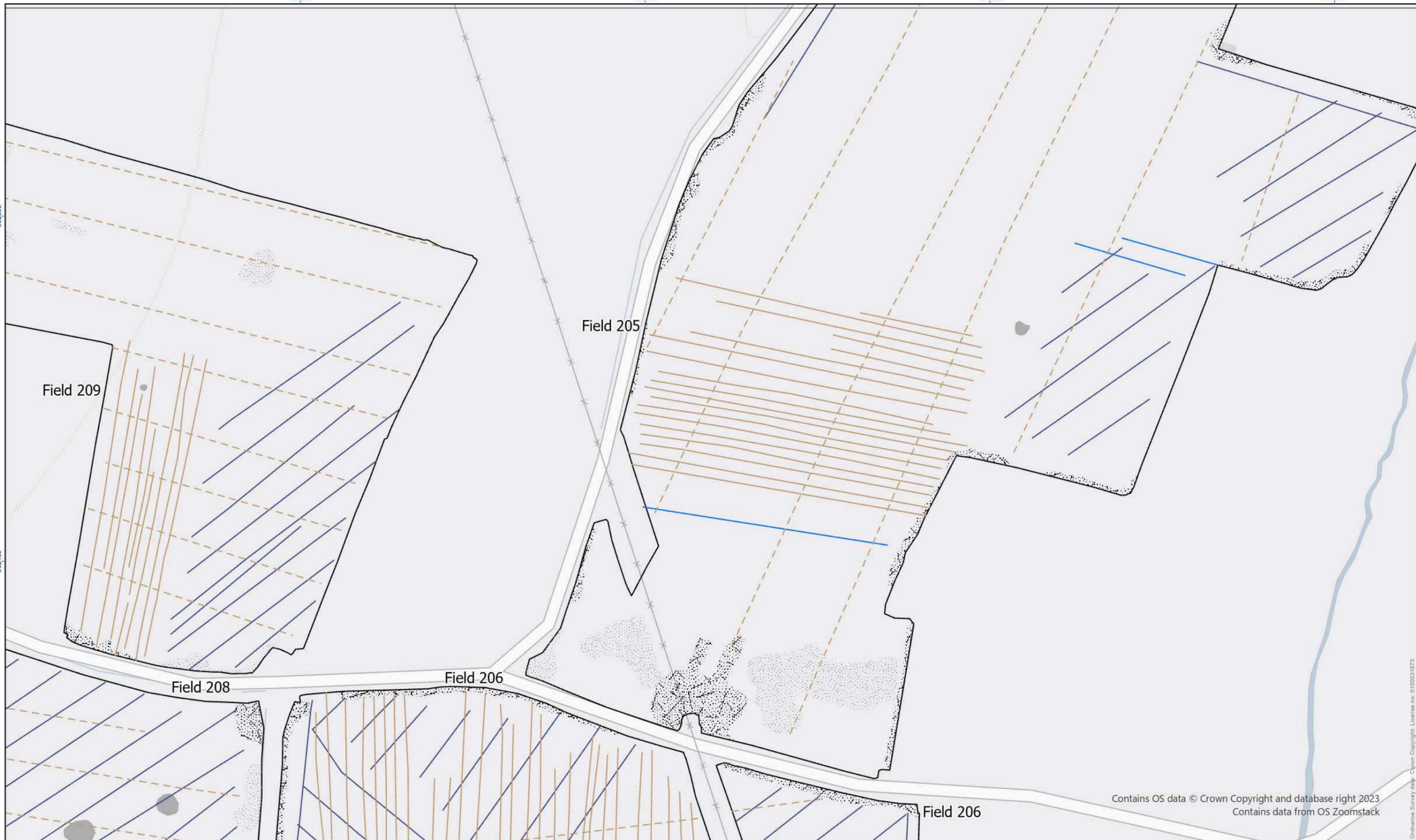
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468400

468600

468800

469000

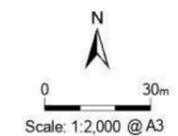
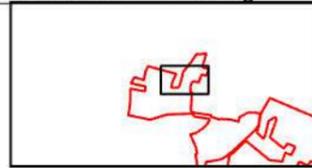


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Interpretation of Processed Gradiometer Data - Detailed - Parcel I: East of Eakring

Figure 6.2

- Spread (Magnetic Disturbance)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)



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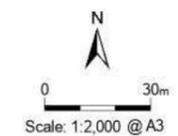
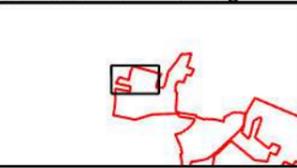


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Interpretation of Processed Gradiometer Data - Detailed - Parcel I: East of Eakring

Figure 6.3

- Anomaly (Possible Archaeology)
- Anomaly (Unknown Origin)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Spread (Magnetic Disturbance)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Historical Agriculture)
- Linear Trend (Drain)



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Approved by: JL	Date: 20/03/2024



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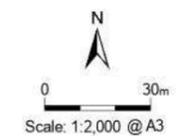
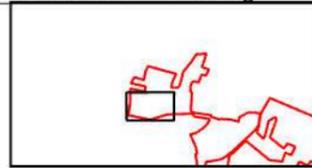


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Figure 6.4

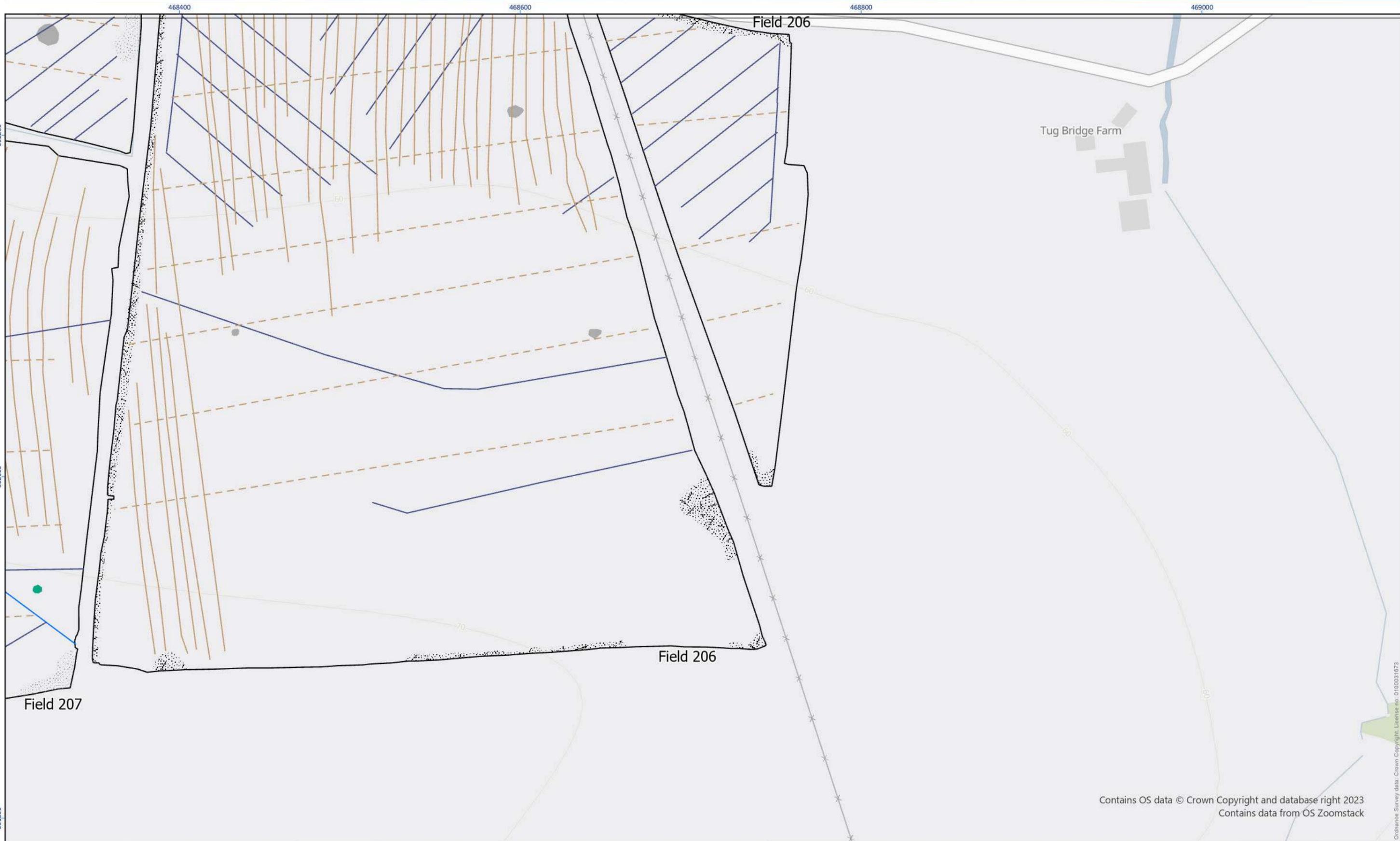
- Anomaly (Possible Archaeology)
- Anomaly (Ferrous/Iron Spike)
- Spread (Historical Agriculture)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)
- Anomaly (Unknown Origin)
- Linear Trend (Historical Agriculture)
- Spread (Magnetic Disturbance)
- Linear Trend (Agricultural, Ploughing)



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Approved by: JL	Date: 20/03/2024



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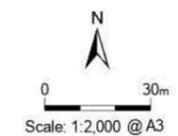
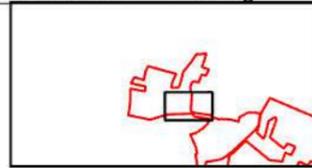


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Figure 6.5

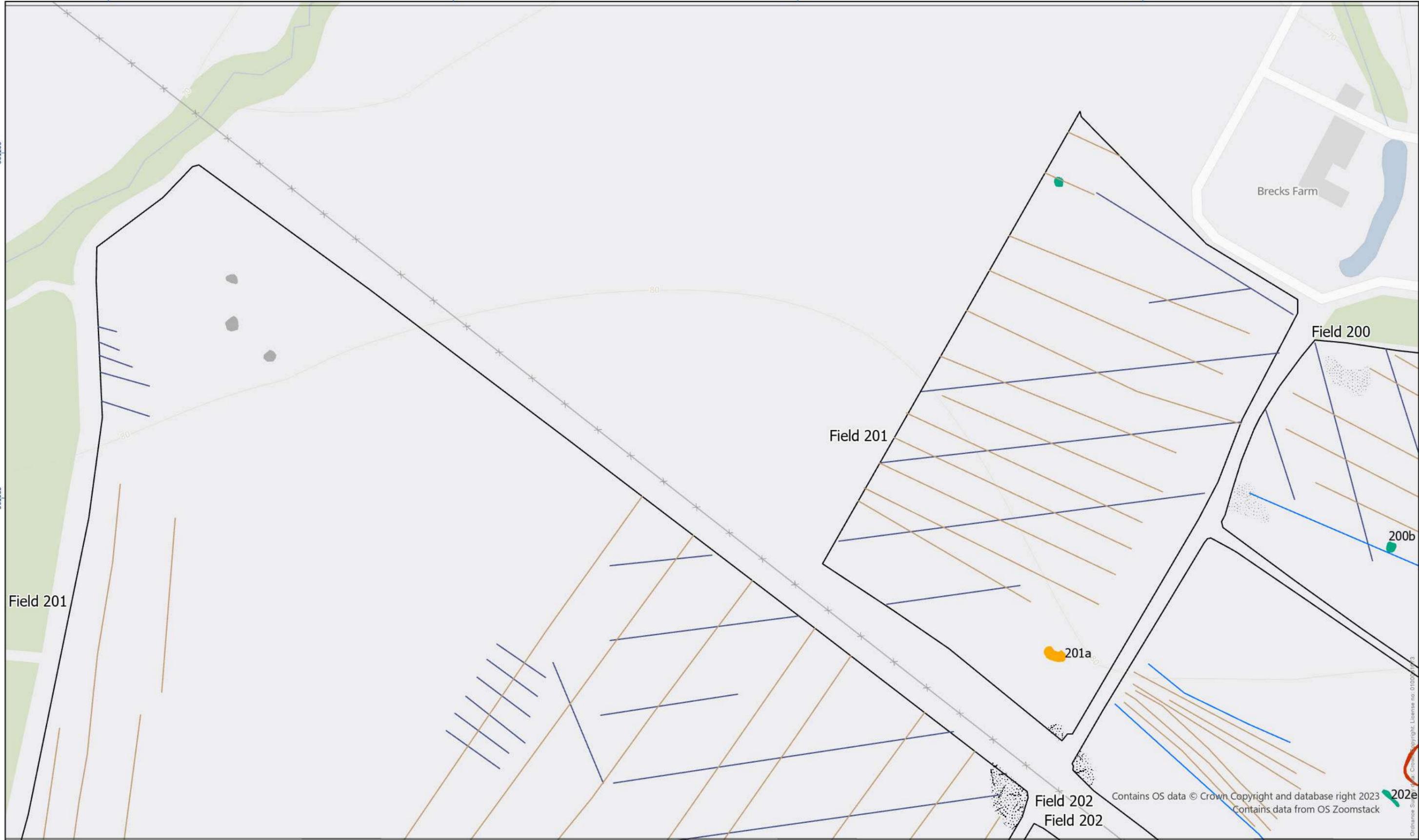
- Anomaly (Unknown Origin)
- Anomaly (Ferrous/Iron Spike)
- Spread (Magnetic Disturbance)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Drain)
- Linear Trend (Historical cultivation)



Drawing Number: 05/40439/GEO/6.5	
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Approved by: JL	Date: 20/03/2024



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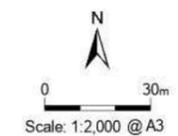
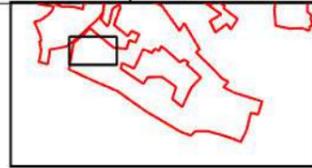


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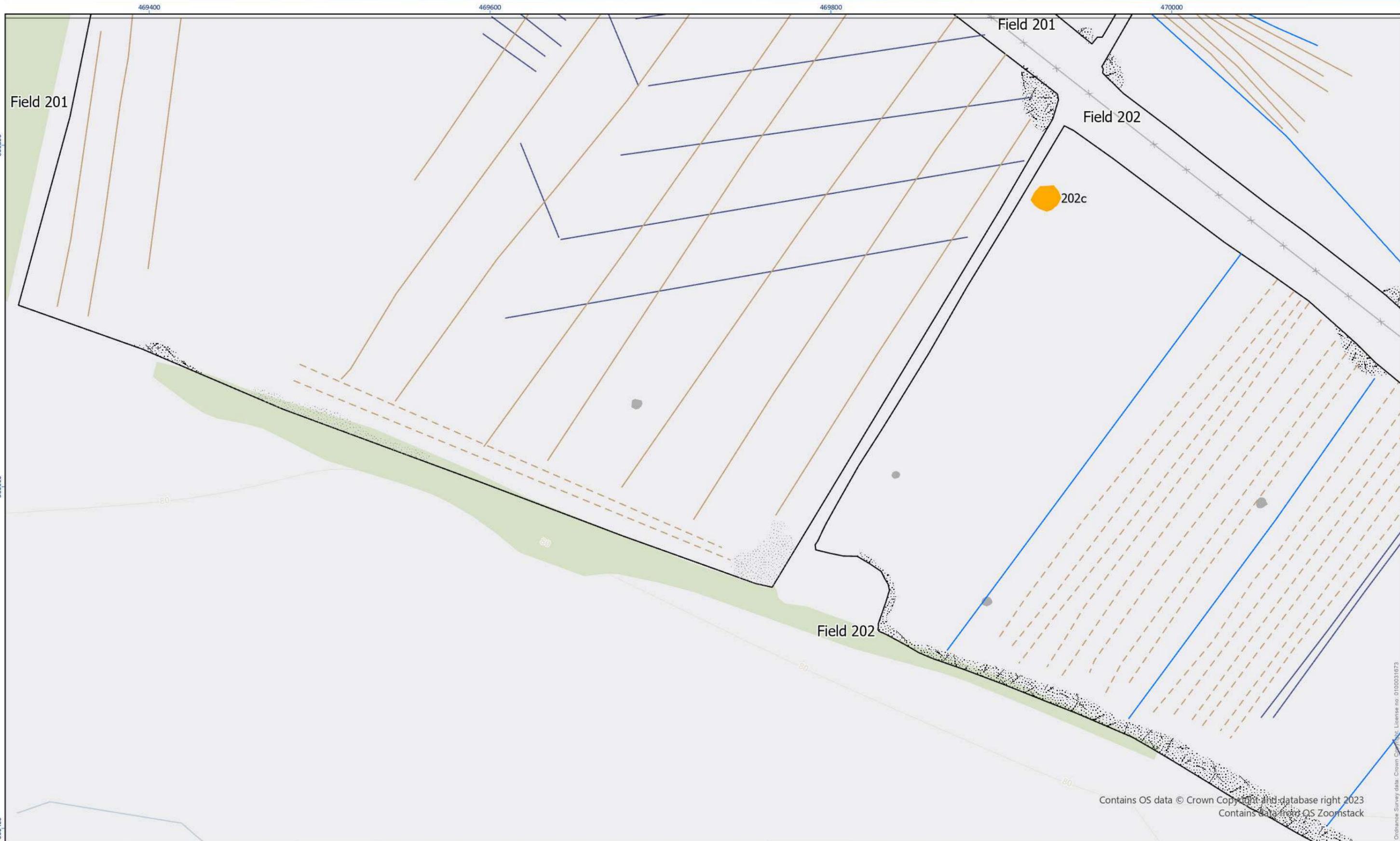
Figure 6.6

- | | | |
|--|-------------------------------|---------------------------------------|
| ■ Anomaly (Archaeology) | Spread (Magnetic Disturbance) | Linear Trend (Historical Agriculture) |
| ■ Anomaly (Possible Archaeology) | Anomaly (Ferrous/Iron Spike) | Linear Trend (Historical cultivation) |
| ■ Anomaly (Unknown Origin) | Spread (Ferrous/Iron Spike) | Linear Trend (Drain) |



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Created by: NH	Date: 20/03/2024
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Approved by: JL	Date: 20/03/2024



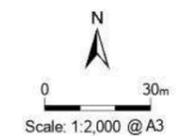
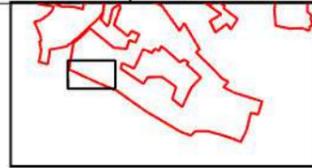


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Figure 6.7

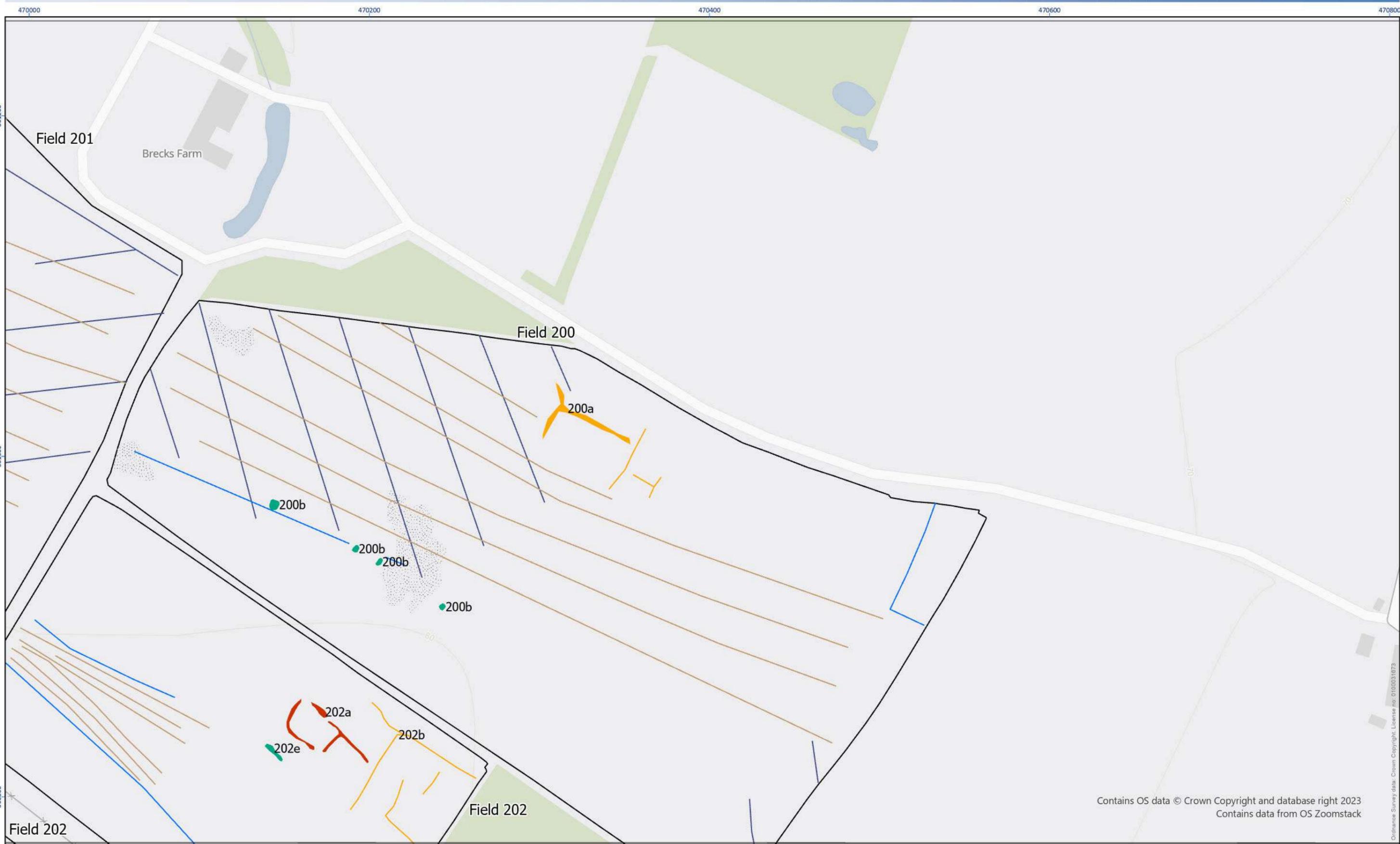
- Anomaly (Possible Archaeology)
- Anomaly (Ferrous/Iron Spike)
- Spread (Magnetic Disturbance)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)



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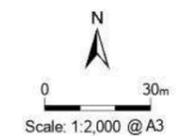
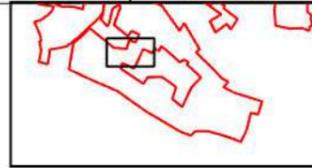


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Figure 6.8

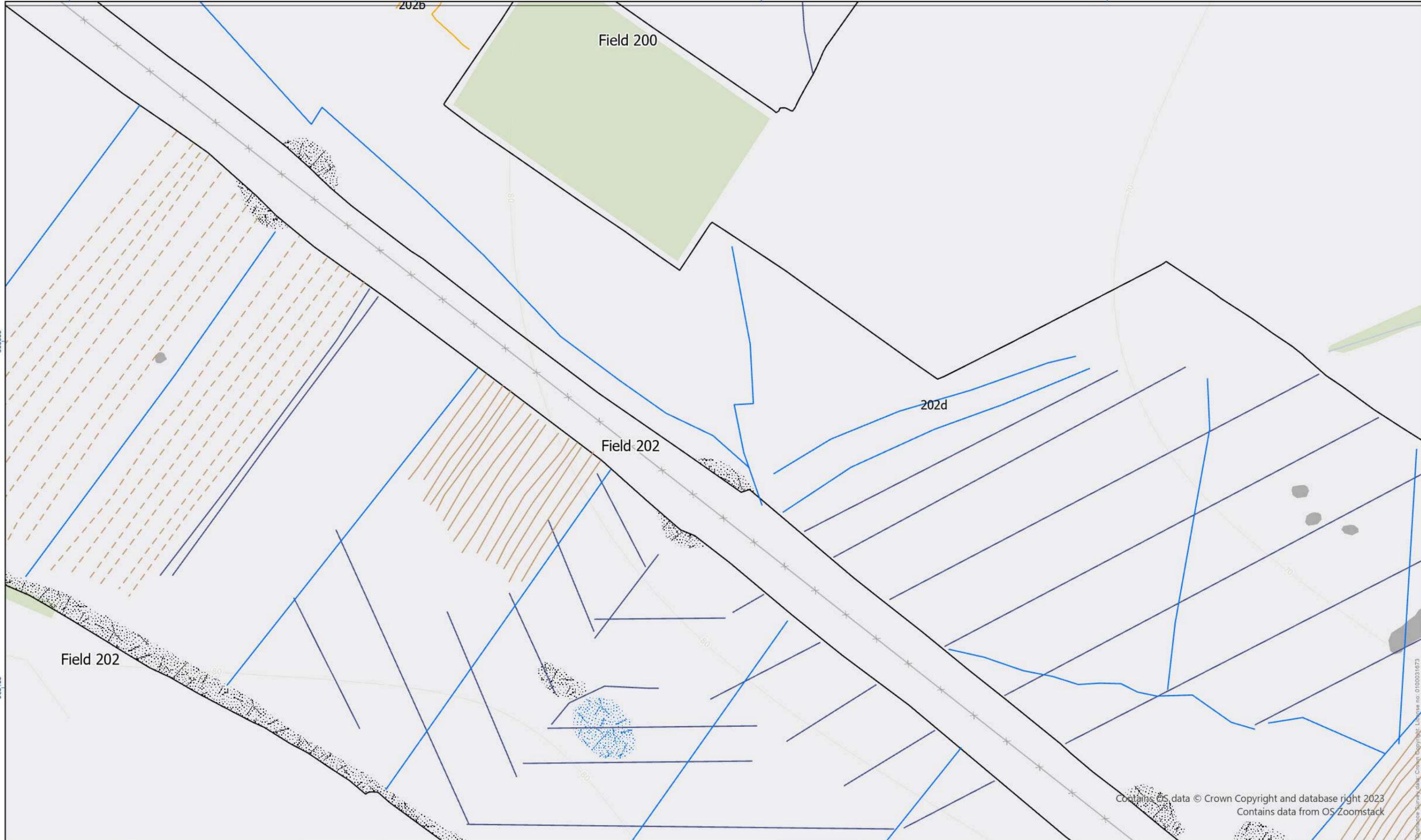
- Anomaly (Archaeology)
- Anomaly (Possible Archaeology)
- Anomaly (Unknown Origin)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Possible Archaeology)
- Linear Trend (Historical Agriculture)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)



Drawing Number: 05/40439/GEO/6.8	
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Approved by: JL	Date: 20/03/2024



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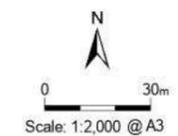
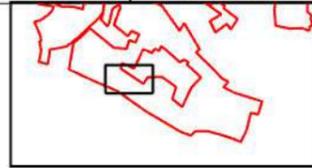


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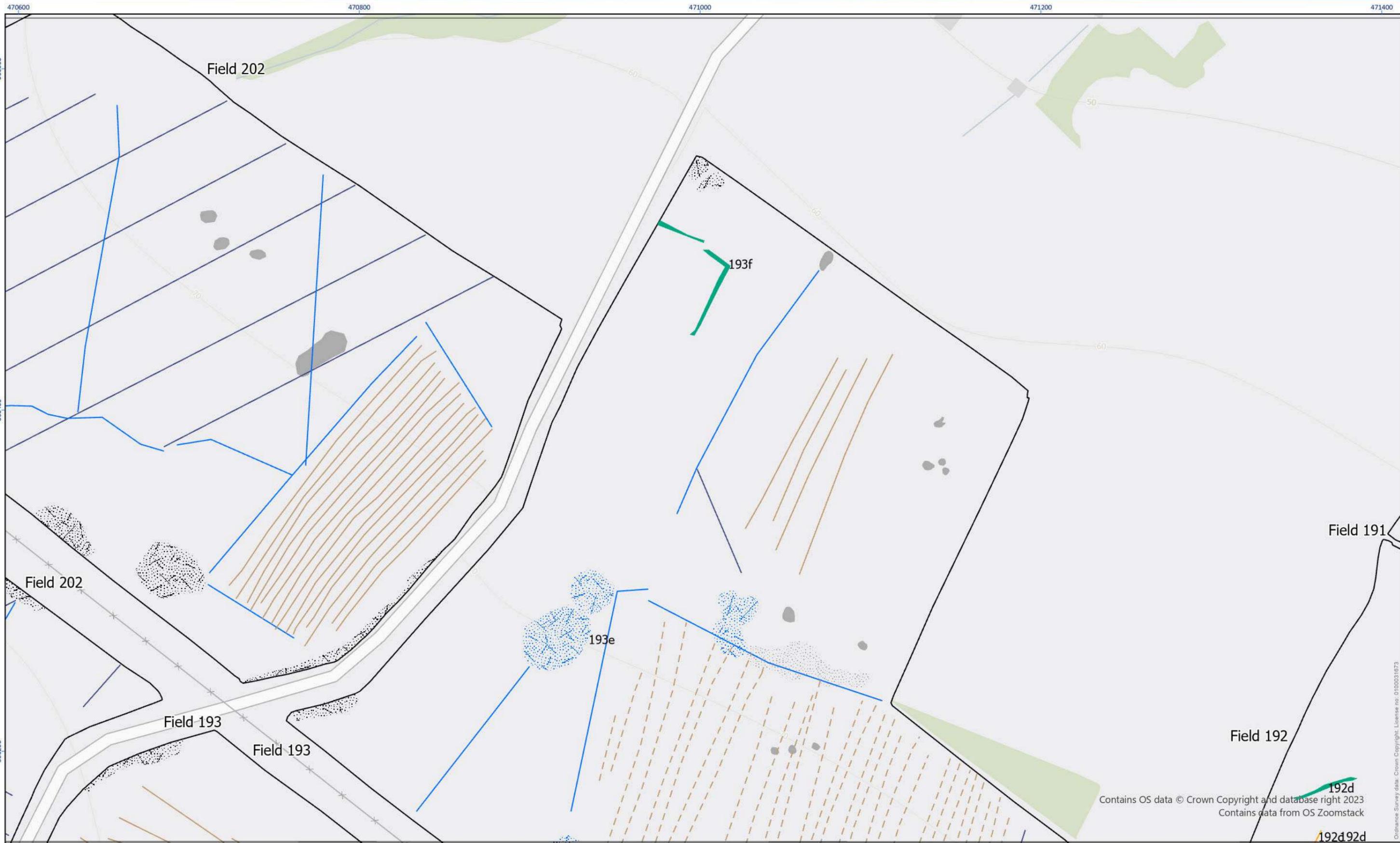
Figure 6.9

- Spread (Historical Agriculture)
- Linear Trend (Possible Archaeology)
- Linear Trend (Historical cultivation)
- Spread (Magnetic Disturbance)
- Linear Trend (Historical Agriculture)
- Linear Trend (Drain)
- Anomaly (Ferrous/Iron Spike)
- Linear Trend (Agricultural, Ploughing)



Drawing Number: 05/40439/GEO/6.9	
Created by: NH	Date: 20/03/2024
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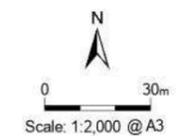
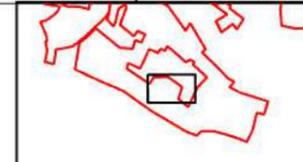


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Figure 6.10

- Spread (Historical Agriculture)
- Anomaly (Unknown Origin)
- Spread (Magnetic Disturbance)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Possible Archaeology)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)



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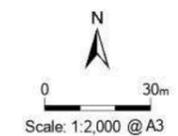
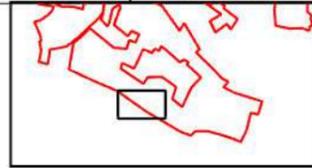


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.12

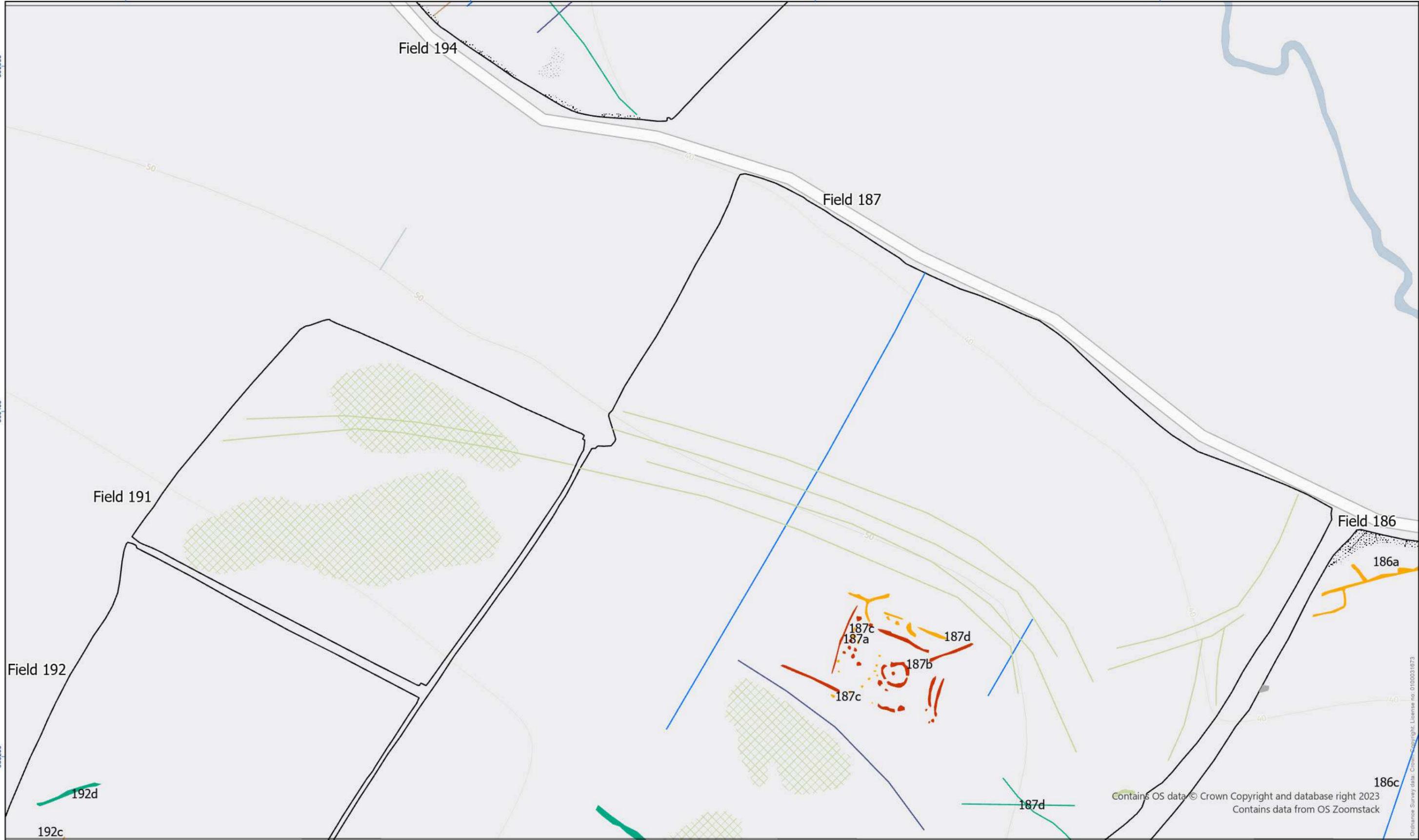
-  Spread (Historical Agriculture)
-  Spread (Ferrous/Iron Spike)
-  Linear Trend (Historical cultivation)
-  Linear Trend (Historical Agriculture)
-  Linear Trend (Drain)
-  Anomaly (Ferrous/Iron Spike)
-  Linear Trend (Agricultural, Ploughing)



Drawing Number: 05/40439/GEO/6.12	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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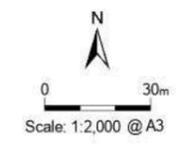
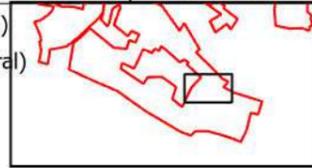


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.13

Anomaly (Archaeology)	Spread (Geology/Natural)	Linear Trend (Possible Archaeology)	Linear Trend (Drain)
Anomaly (Possible Archaeology)	Spread (Magnetic Disturbance)	Linear Trend (Historical Agriculture)	Linear Trend (Natural)
Anomaly (Unknown Origin)	Anomaly (Ferrous/Iron Spike)	Linear Trend (Unknown Origin)	
Anomaly (Geology/Natural)	Spread (Ferrous/Iron Spike)	Linear Trend (Historical cultivation)	



Drawing Number: 05/40439/GEO/6.13	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024

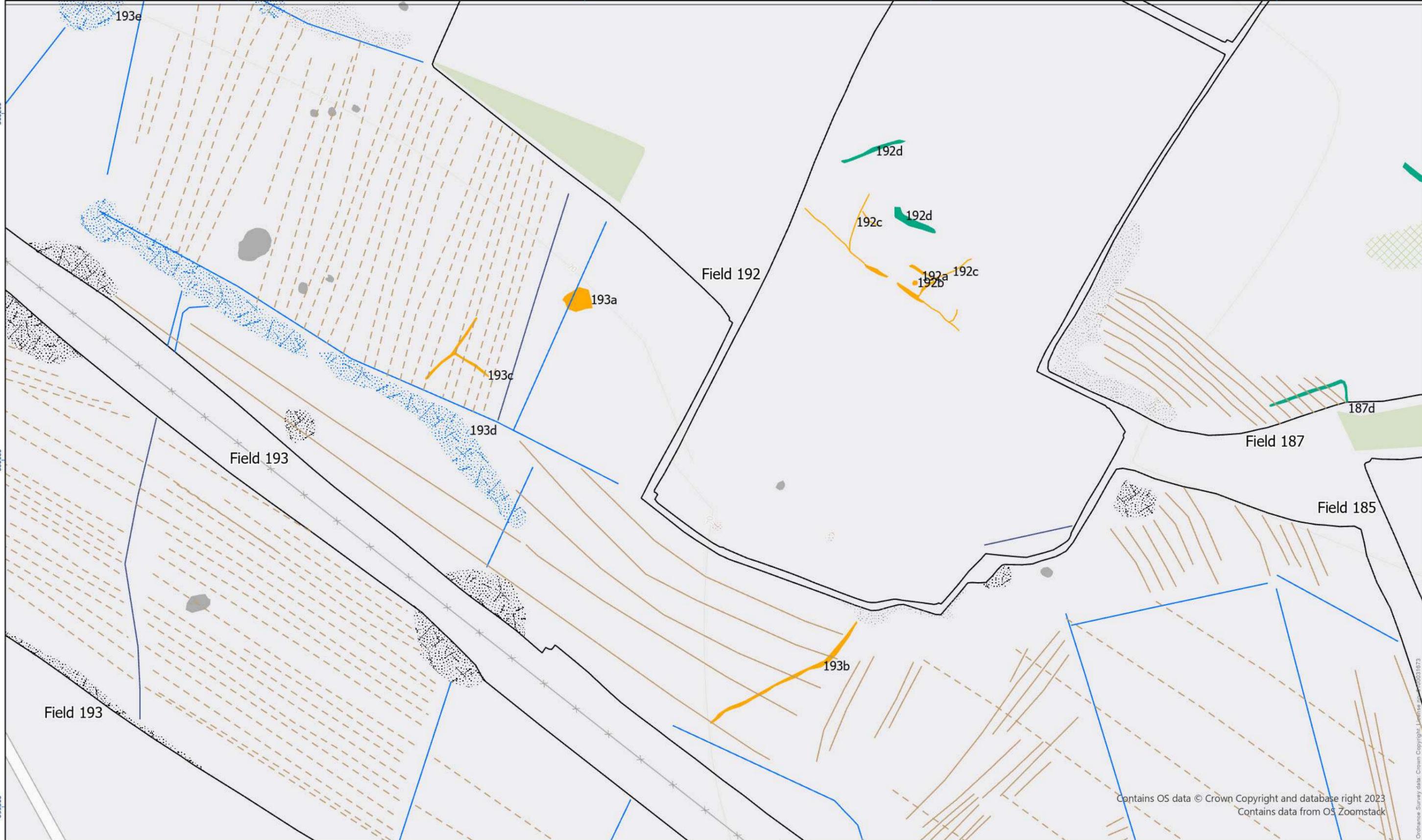


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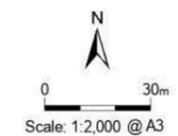
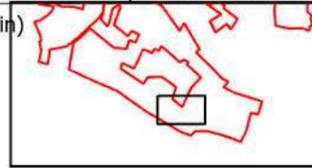


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.14

- Anomaly (Possible Archaeology)
- Spread (Geology/Natural)
- Linear Trend (Possible Archaeology)
- Linear Trend (Drain)
- Spread (Burned Area)
- Spread (Magnetic Disturbance)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical cultivation)
- Anomaly (Unknown Origin)



Drawing Number: 05/40439/GEO/6.14	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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Field 187

186a

187d

186c

186d

186d

Field 186

Field 185

186b

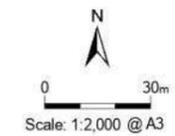
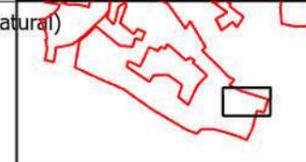
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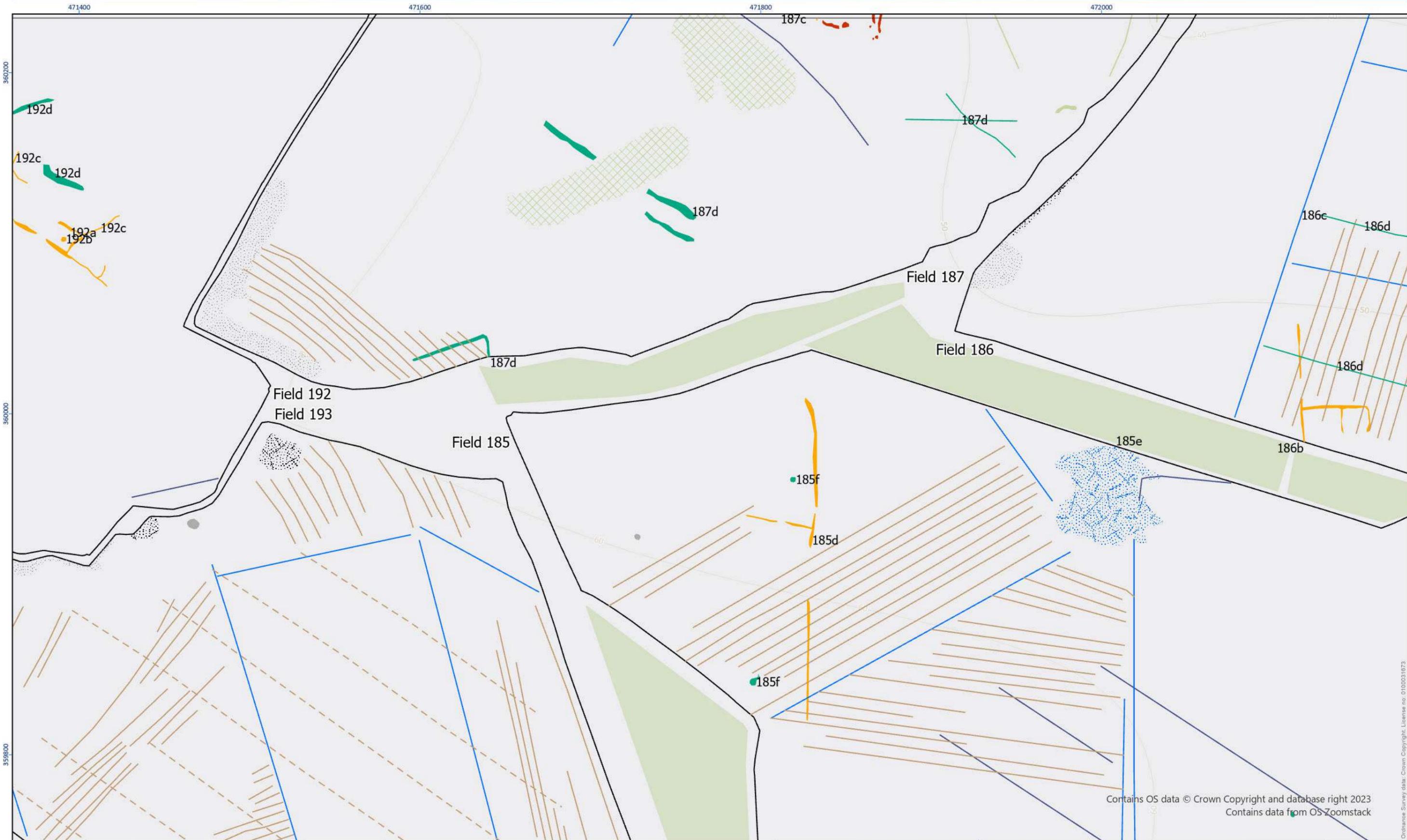
Figure 6.15

- | | | | |
|---------------------------------|---------------------------------------|--|------------------------|
| Anomaly (Archaeology) | Spread (Magnetic Disturbance) | Linear Trend (Unknown Origin) | Linear Trend (Natural) |
| Anomaly (Possible Archaeology) | Anomaly (Ferrous/Iron Spike) | Linear Trend (Agricultural, Ploughing) | |
| Spread (Historical Agriculture) | Spread (Ferrous/Iron Spike) | Linear Trend (Historical cultivation) | |
| Anomaly (Geology/Natural) | Linear Trend (Historical Agriculture) | Linear Trend (Drain) | |



Drawing Number: 05/40439/GEO/6.15	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



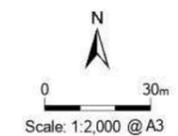


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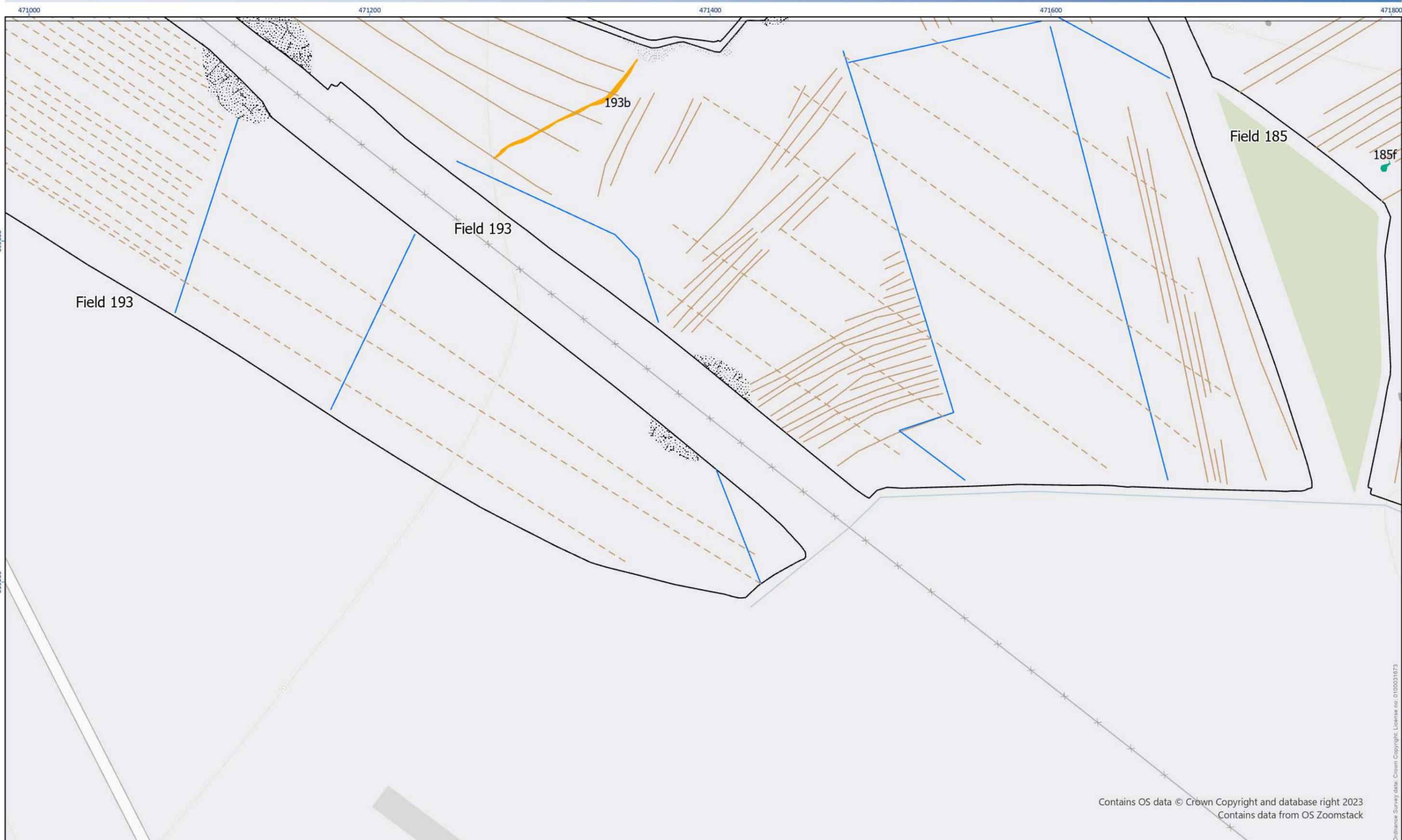
Figure 6.16

Anomaly (Archaeology)	Anomaly (Geology/Natural)	Spread (Ferrous/Iron Spike)	Linear Trend (Agricultural, Ploughing)
Anomaly (Possible Archaeology)	Spread (Geology/Natural)	Linear Trend (Possible Archaeology)	Linear Trend (Historical cultivation)
Spread (Historical Agriculture)	Spread (Magnetic Disturbance)	Linear Trend (Historical Agriculture)	Linear Trend (Drain)
Anomaly (Unknown Origin)	Anomaly (Ferrous/Iron Spike)	Linear Trend (Unknown Origin)	Linear Trend (Natural)



Drawing Number: 05/40439/GEO/6.16	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



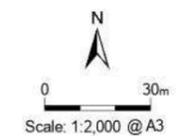
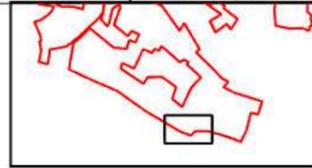


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.16

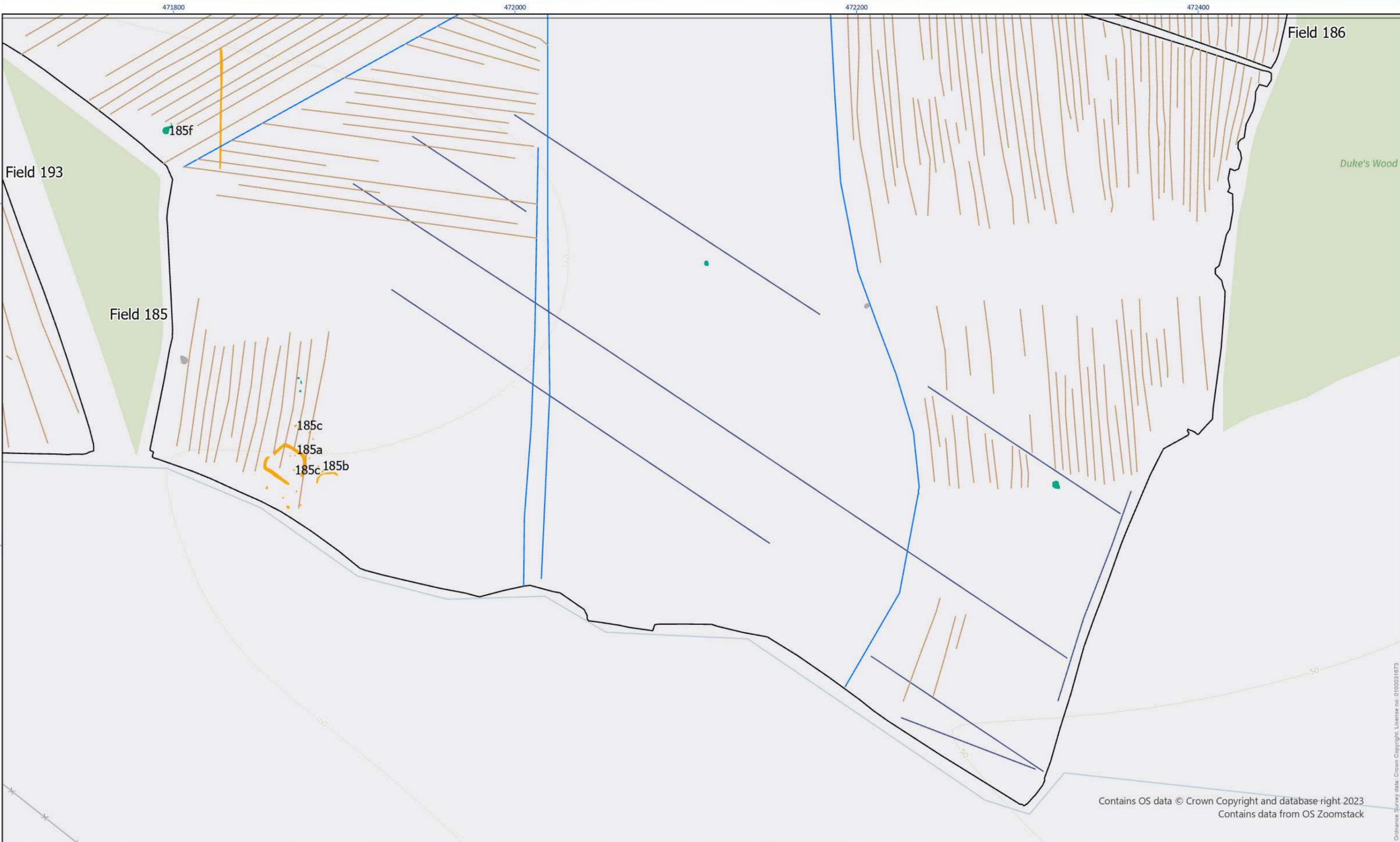
- Anomaly (Possible Archaeology)
- Anomaly (Ferrous/Iron Spike)
- Linear Trend (Agricultural, Ploughing)
- Anomaly (Unknown Origin)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical cultivation)
- Spread (Magnetic Disturbance)
- Linear Trend (Historical Agriculture)



Drawing Number: 05/40439/GEO/6.16	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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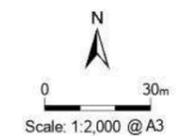
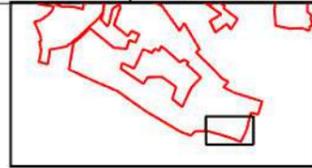


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.17

- Anomaly (Possible Archaeology)
- Anomaly (Unknown Origin)
- Anomaly (Ferrous/Iron Spike)
- Linear Trend (Historical Agriculture)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)



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Approved by: JL	Date: 20/03/2024



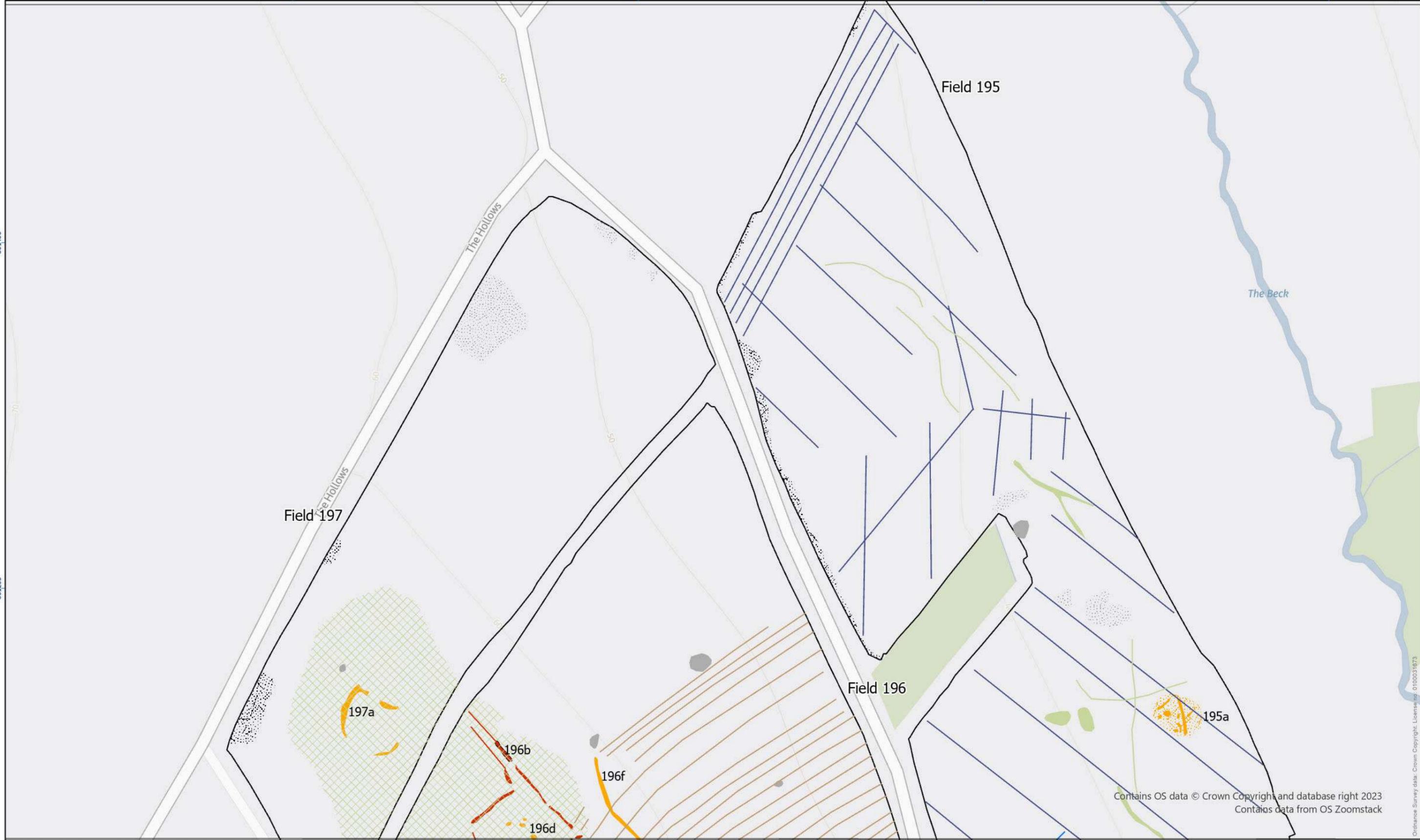
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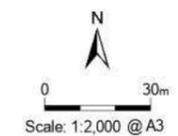
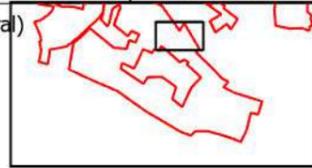


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Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.18

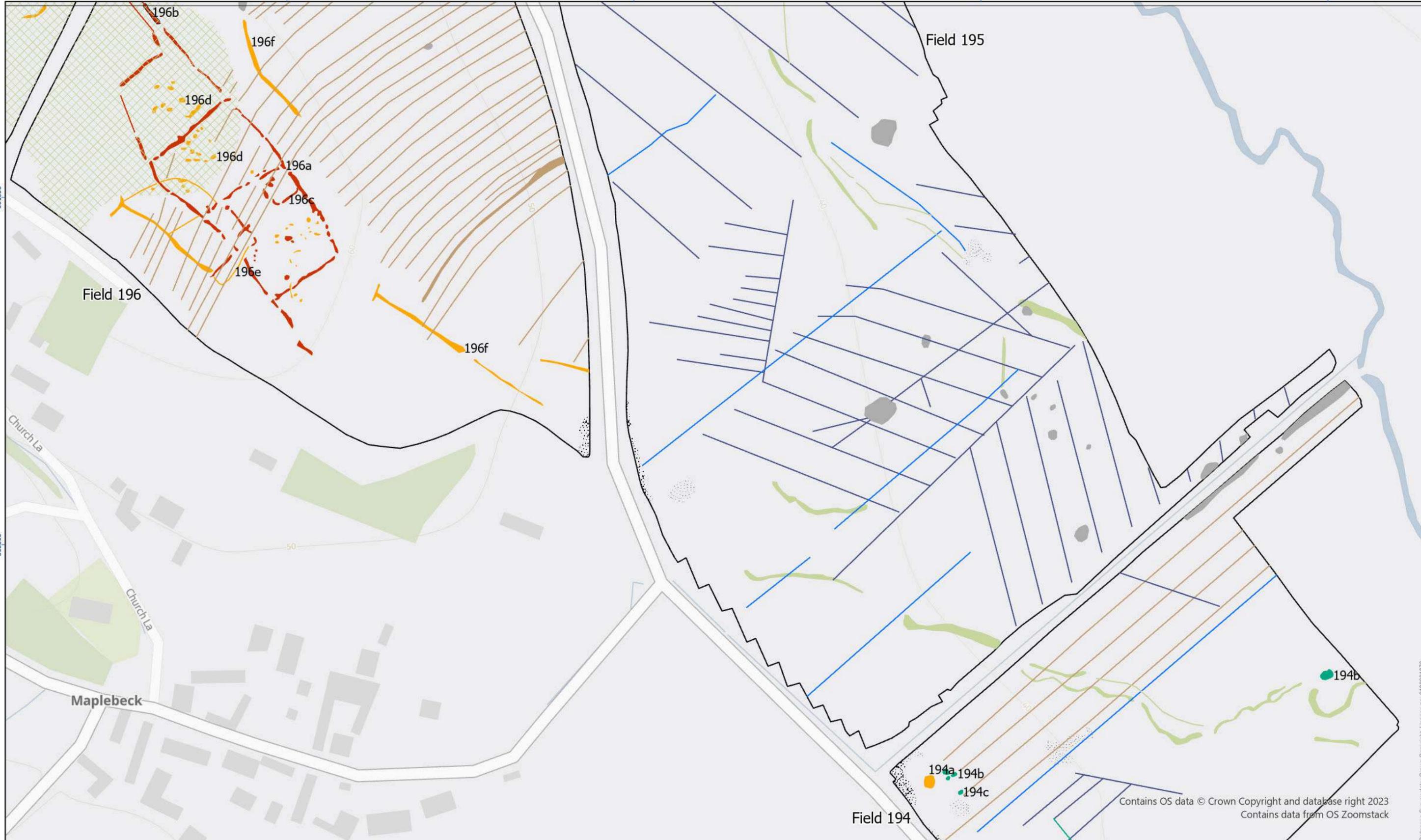
- | | | | |
|--------------------------------|-------------------------------|---------------------------------------|------------------------|
| Anomaly (Archaeology) | Spread (Geology/Natural) | Linear Trend (Archaeology) | Linear Trend (Natural) |
| Anomaly (Possible Archaeology) | Spread (Magnetic Disturbance) | Linear Trend (Historical Agriculture) | |
| Spread (Possible Archaeology) | Anomaly (Ferrous/Iron Spike) | Linear Trend (Historical cultivation) | |
| Anomaly (Geology/Natural) | Spread (Ferrous/Iron Spike) | Linear Trend (Drain) | |



Drawing Number: 05/40439/GEO/6.18	
Created by: NH	Date: 20/03/2024
Checked by: JL	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



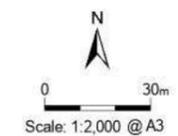
471200 471400 471600 471800



Interpretation of Processed Gradiometer Data - Detailed - Parcel II: Maplebeck Estate

Figure 6.19

Anomaly (Archaeology)	Anomaly (Geology/Natural)	Spread (Ferrous/Iron Spike)	Linear Trend (Unknown Origin)
Anomaly (Possible Archaeology)	Spread (Geology/Natural)	Linear Trend (Archaeology)	Linear Trend (Historical cultivation)
Anomaly (Unknown Origin)	Spread (Magnetic Disturbance)	Linear Trend (Possible Archaeology)	Linear Trend (Drain)
Anomaly (Agricultural)	Anomaly (Ferrous/Iron Spike)	Linear Trend (Historical Agriculture)	Linear Trend (Natural)

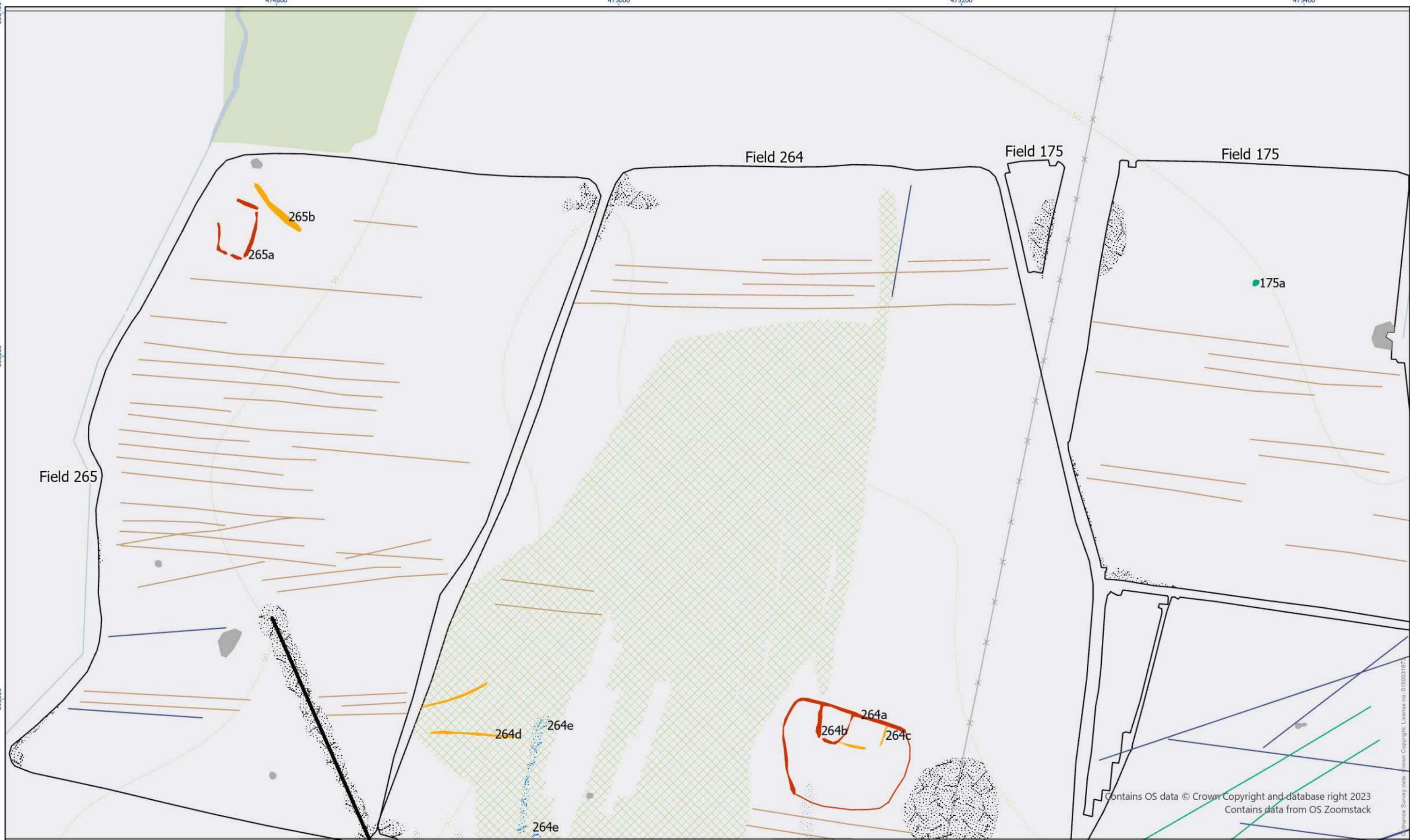


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Created by: NH	Date: 20/03/2024
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Approved by: JL	Date: 20/03/2024



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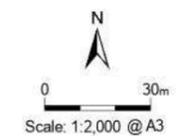
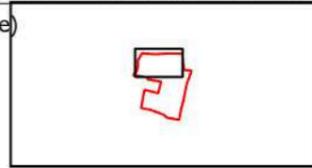


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Interpretation of Processed Gradiometer Data - Detailed - Parcel III: South of Ollerton Road

Figure 6.20

- | | | | |
|---------------------------------|-------------------------------|---------------------------------------|------------------------|
| Anomaly (Archaeology) | Spread (Geology/Natural) | Linear Trend (Archaeology) | Linear Trend (Service) |
| Anomaly (Possible Archaeology) | Spread (Magnetic Disturbance) | Linear Trend (Unknown Origin) | |
| Spread (Historical Agriculture) | Anomaly (Ferrous/Iron Spike) | Linear Trend (Historical cultivation) | |
| Anomaly (Unknown Origin) | Spread (Ferrous/Iron Spike) | Linear Trend (Drain) | |



Drawing Number: 05/40439/GEO/6.20	
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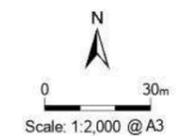
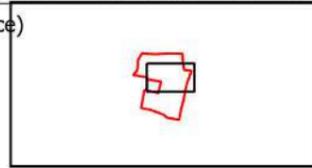


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Interpretation of Processed Gradiometer Data - Detailed - Parcel III: South of Ollerton Road

Figure 6.21

- | | | | |
|---------------------------------|-------------------------------|---------------------------------------|------------------------|
| Anomaly (Archaeology) | Spread (Magnetic Disturbance) | Linear Trend (Historical Agriculture) | Linear Trend (Service) |
| Anomaly (Possible Archaeology) | Anomaly (Ferrous/Iron Spike) | Linear Trend (Unknown Origin) | |
| Spread (Historical Agriculture) | Spread (Ferrous/Iron Spike) | Linear Trend (Historical cultivation) | |
| Spread (Geology/Natural) | Linear Trend (Archaeology) | Linear Trend (Drain) | |



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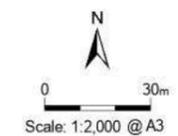
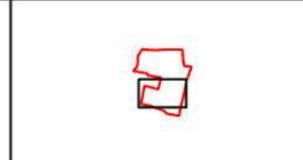
475400



Interpretation of Processed Gradiometer Data - Detailed - Parcel III: South of Ollerton Road

Figure 6.22

- Spread (Magnetic Disturbance)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Historical Agriculture)
- Linear Trend (Unknown Origin)
- Linear Trend (Agricultural, Ploughing)
- Linear Trend (Historical cultivation)
- Linear Trend (Drain)
- Linear Trend (Service)



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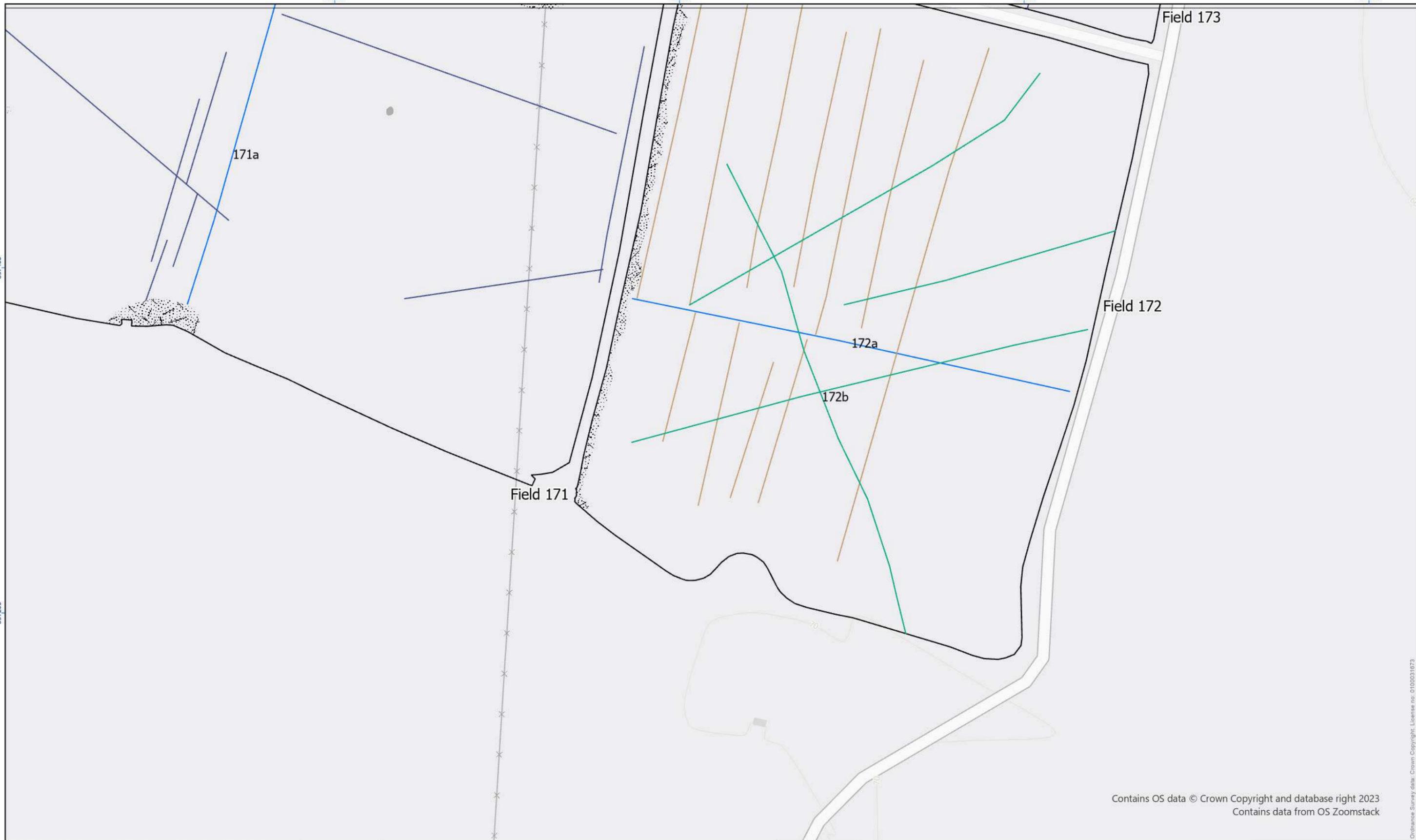
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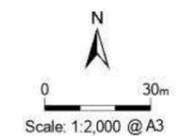
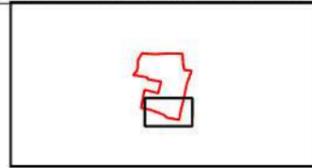


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Interpretation of Processed Gradiometer Data - Detailed - Parcel III: South of Ollerton Road

Figure 6.23

- Spread (Magnetic Disturbance)
- Linear Trend (Historical Agriculture)
- Linear Trend (Drain)
- Anomaly (Ferrous/Iron Spike)
- Linear Trend (Unknown Origin)
- Linear Trend (Historical cultivation)
- Spread (Ferrous/Iron Spike)



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468600

468800

469000

469200



Field 205

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Minimally Processed Gradiometer Data – XY Trace- Parcel I: East of Eakring

<p>Figure 7.1</p>			<p>Drawing Number: 05/40439/GEO/7.1</p>	
			<p>Created by: RL Date: 20/03/2024</p>	
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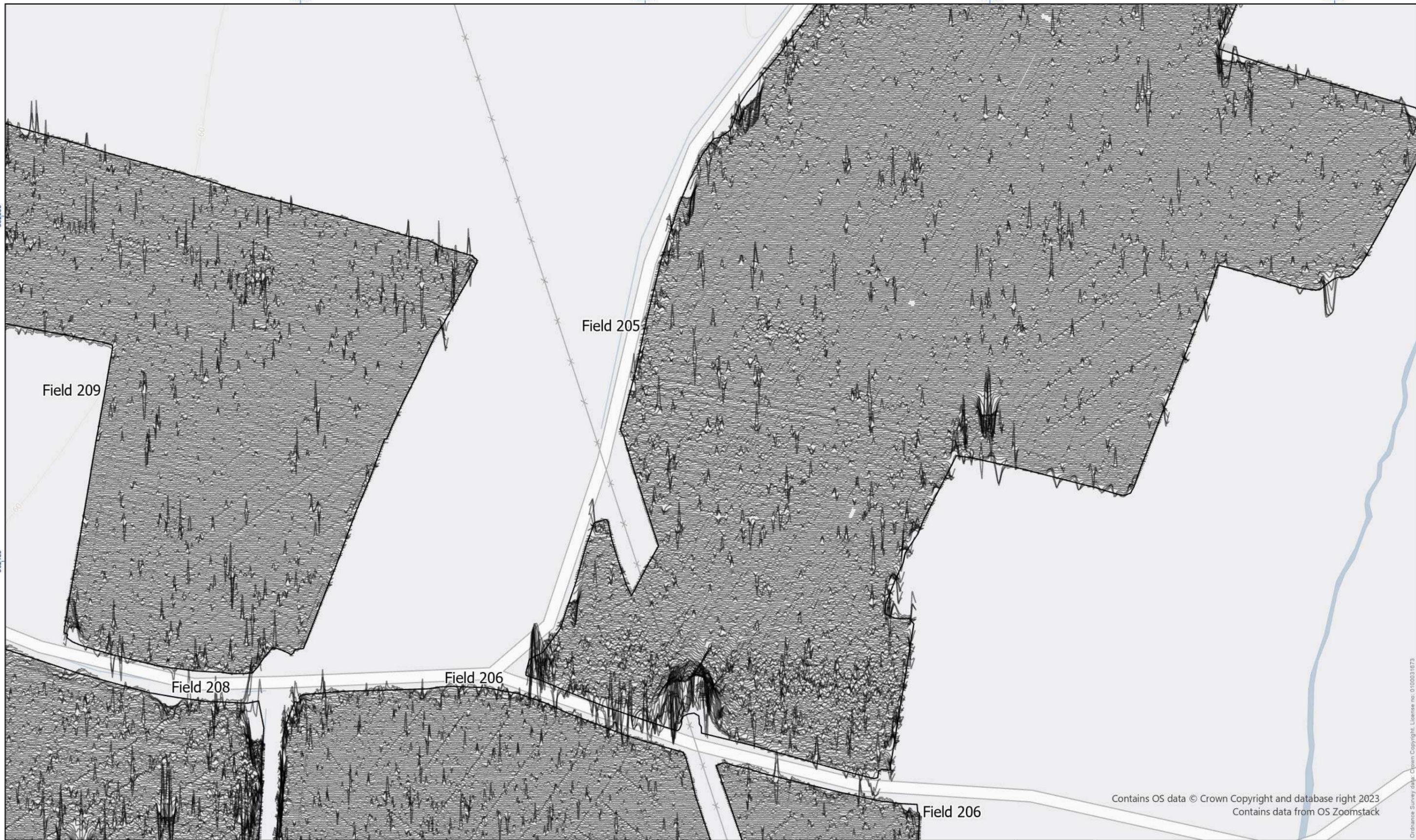
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Minimally Processed Gradiometer Data – XY Trace - Parcel I: East of Eakring

<p>Figure 7.2</p>			Drawing Number: 05/40439/GEO/7.2	
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			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	

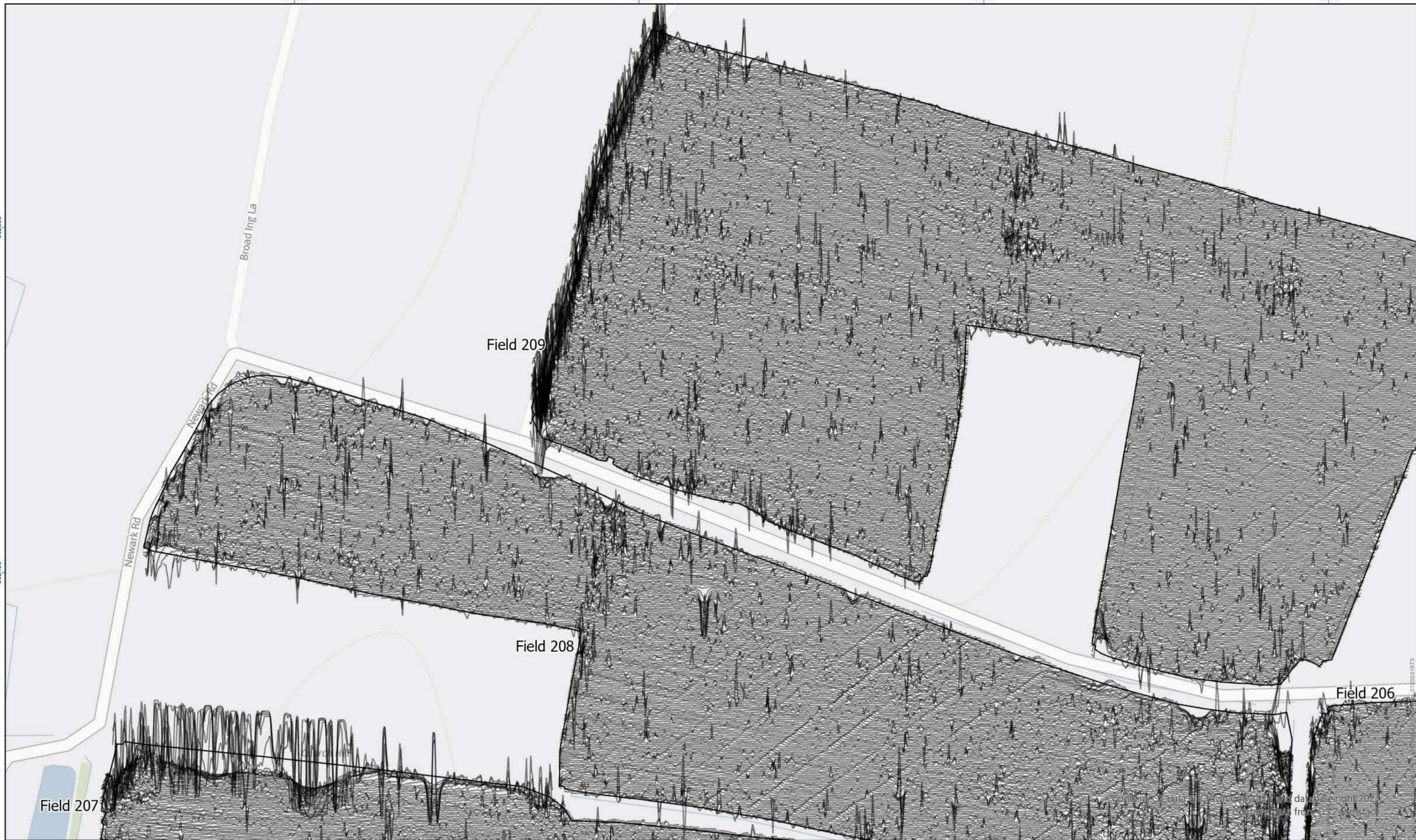
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467800

468000

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Field 207

Field 209

Field 208

Field 206

Minimally Processed Gradiometer Data – XY Trace - Parcel I: East of Eakring

<p>Figure 7.3</p>			Drawing Number: 05/40439/GEO/7.3	
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			Approved by: JL Date: 20/03/2024	

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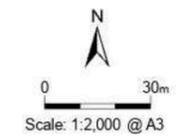
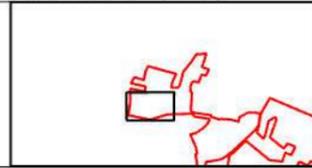
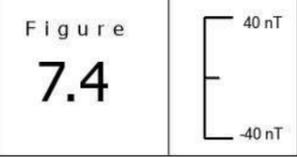
Field 208

Field 207

Field 206

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Approved by: JL	Date: 20/03/2024



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362000

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Field 206

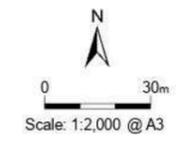
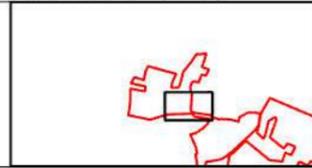
Tug Bridge Farm

Field 206

Field 207

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Minimally Processed Gradiometer Data – XY Trace - Parcel I: East of Eakring



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Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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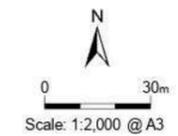
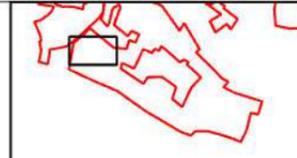
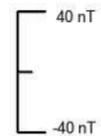
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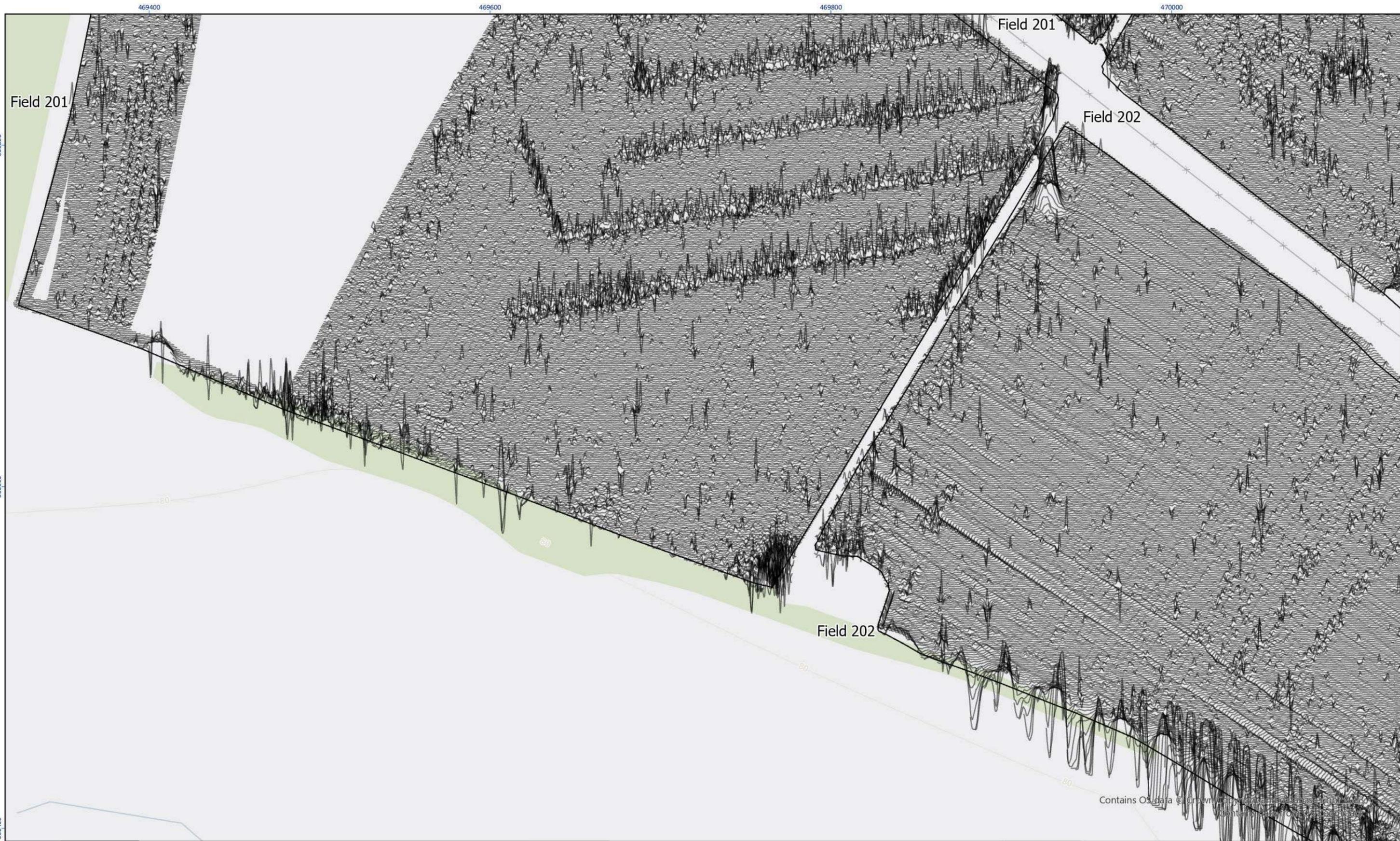
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Figure 7.6



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Approved by: JL	Date: 20/03/2024





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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

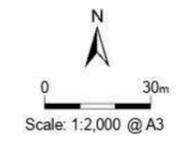
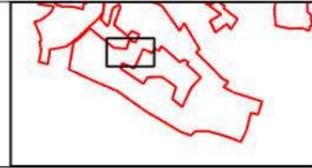
<p>Figure 7.7</p>			<p>Drawing Number: 05/40439/GEO/7.7</p>	
			<p>Created by: RL Date: 20/03/2024</p>	
			<p>Checked by: CS Date: 20/03/2024</p>	
			<p>Approved by: JL Date: 20/03/2024</p>	



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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

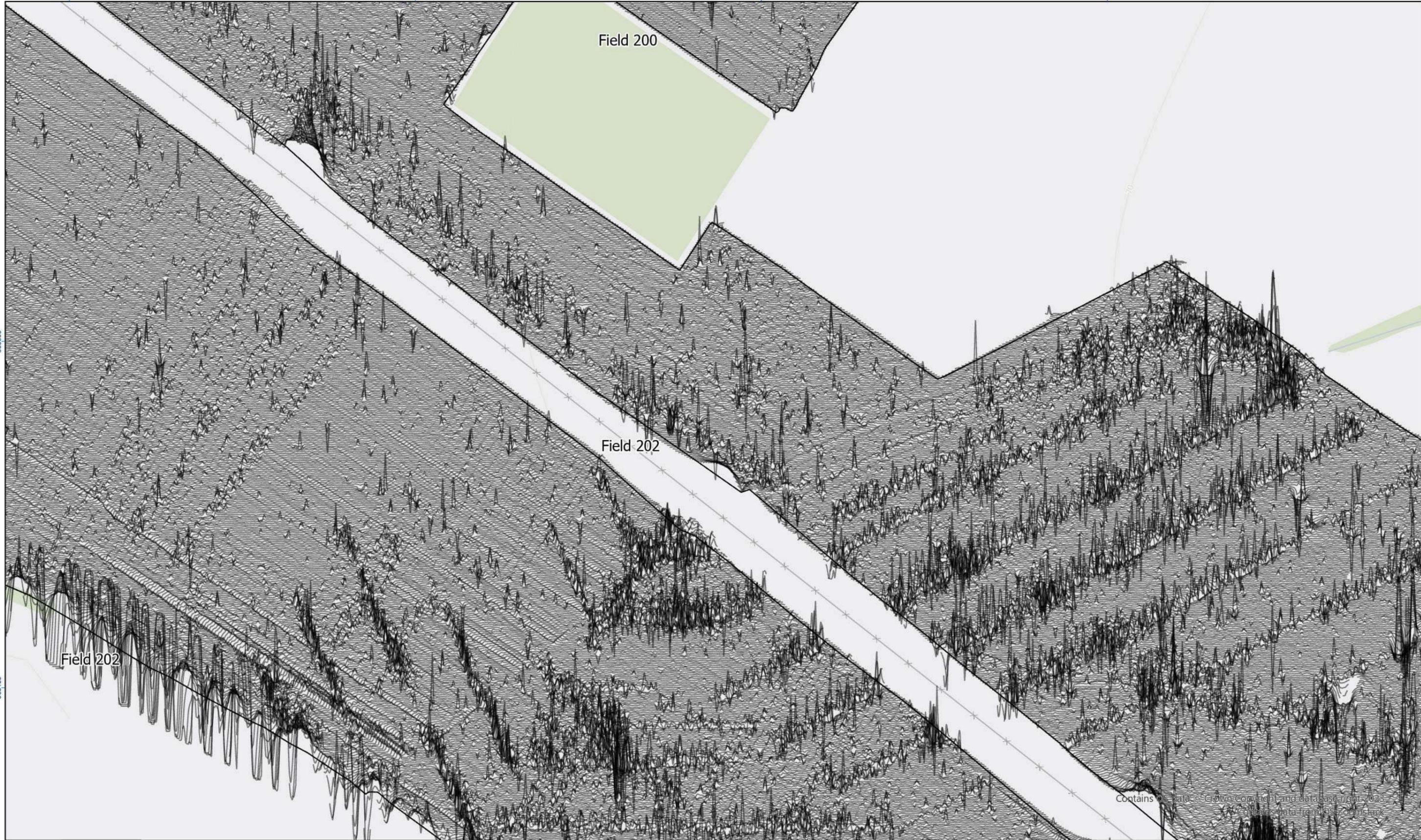
Figure
7.8



Drawing Number: 05/40439/GEO/7.8	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



470000 470200 470400 470600



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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

<p>Figure 7.9</p>			Drawing Number: 05/40439/GEO/7.9	
			Created by: RL Date: 20/03/2024	
			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	



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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

<p>Figure 7.10</p>			Drawing Number: 05/40439/GEO/7.10	
			Created by: RL Date: 20/03/2024	
			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	

470200

470400

470600

470800

Field 202

Field 202

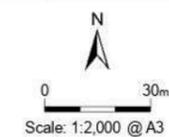
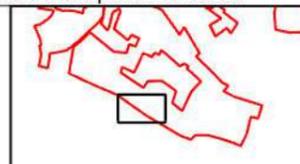
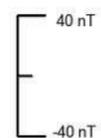
Field 193

Field 193

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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

Figure 7.12



Drawing Number: 05/40439/GEO/7.12	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



471400

471600

471800

472000

Field 194

Field 187

Field 191

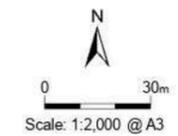
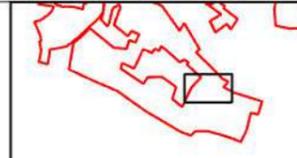
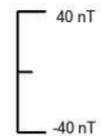
Field 186

Field 192

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Contains data from OS OpenMap

Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

Figure
7.13



Drawing Number: 05/40439/GEO/7.13	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024

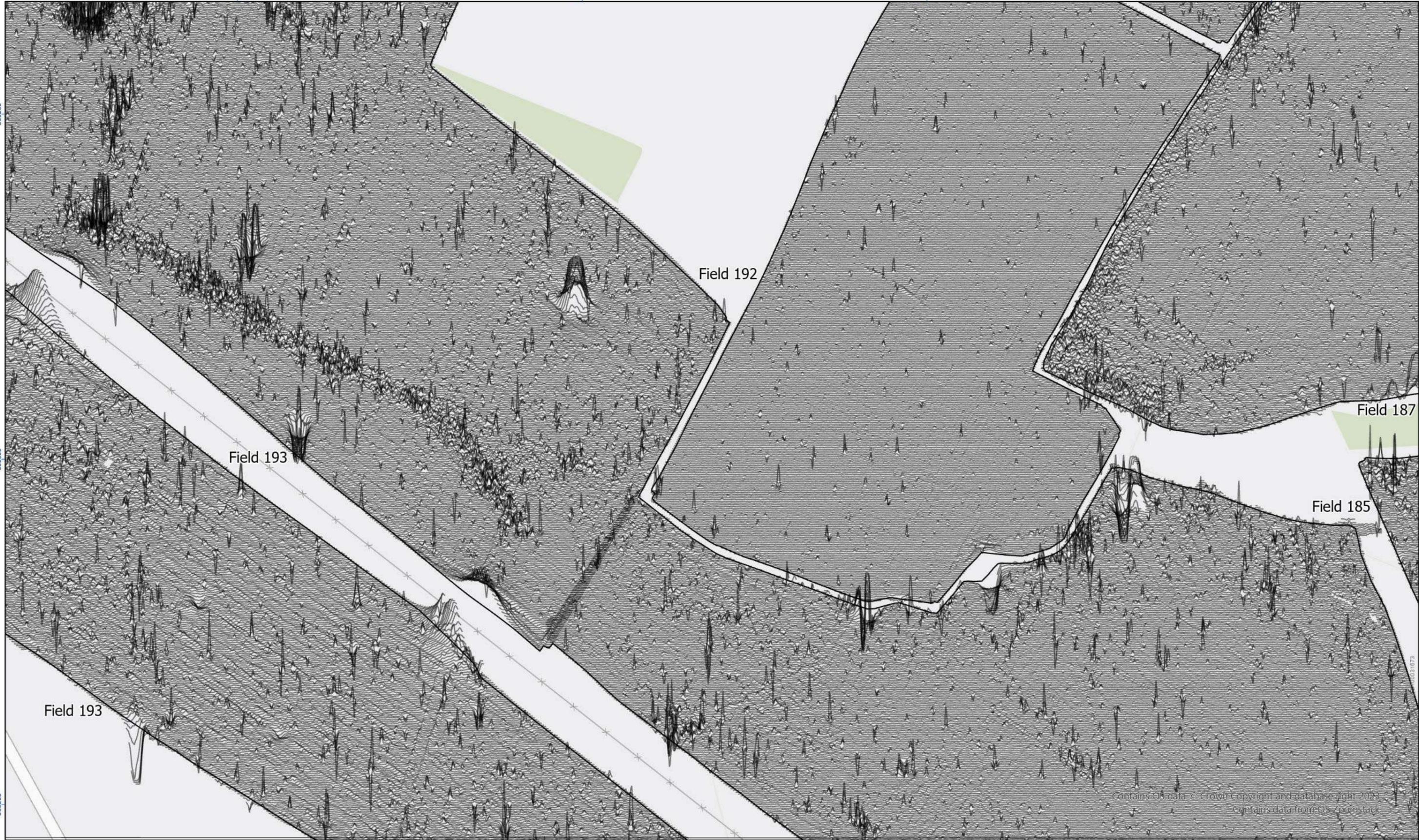


471000

471200

471400

471600



Field 187

Field 192

Field 193

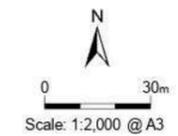
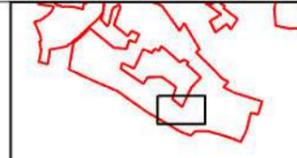
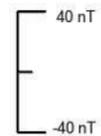
Field 185

Field 193

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Contains data from OS Zoomstack

Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

Figure 7.14



Drawing Number: 05/40439/GEO/7.14	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



472000

472200

472400

472600

Field 187

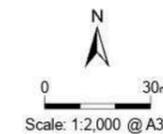
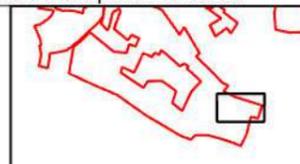
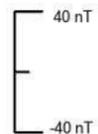
Field 186

Field 185

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Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

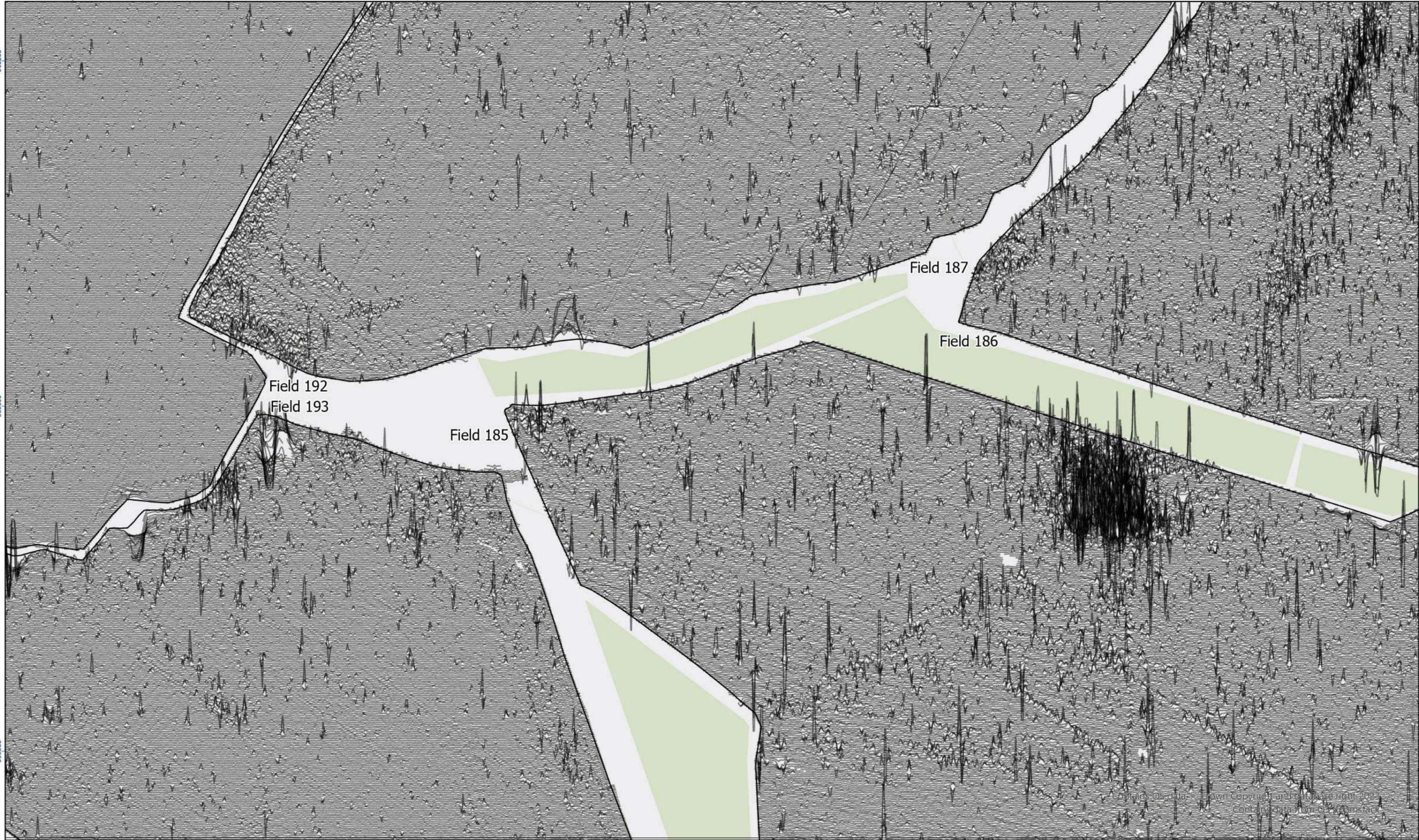
Figure
7.15



Drawing Number: 05/40439/GEO/7.15	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024

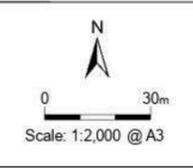
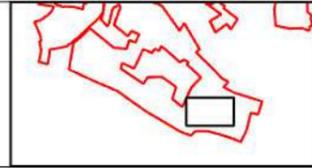
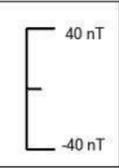


471400 471600 471800 472000



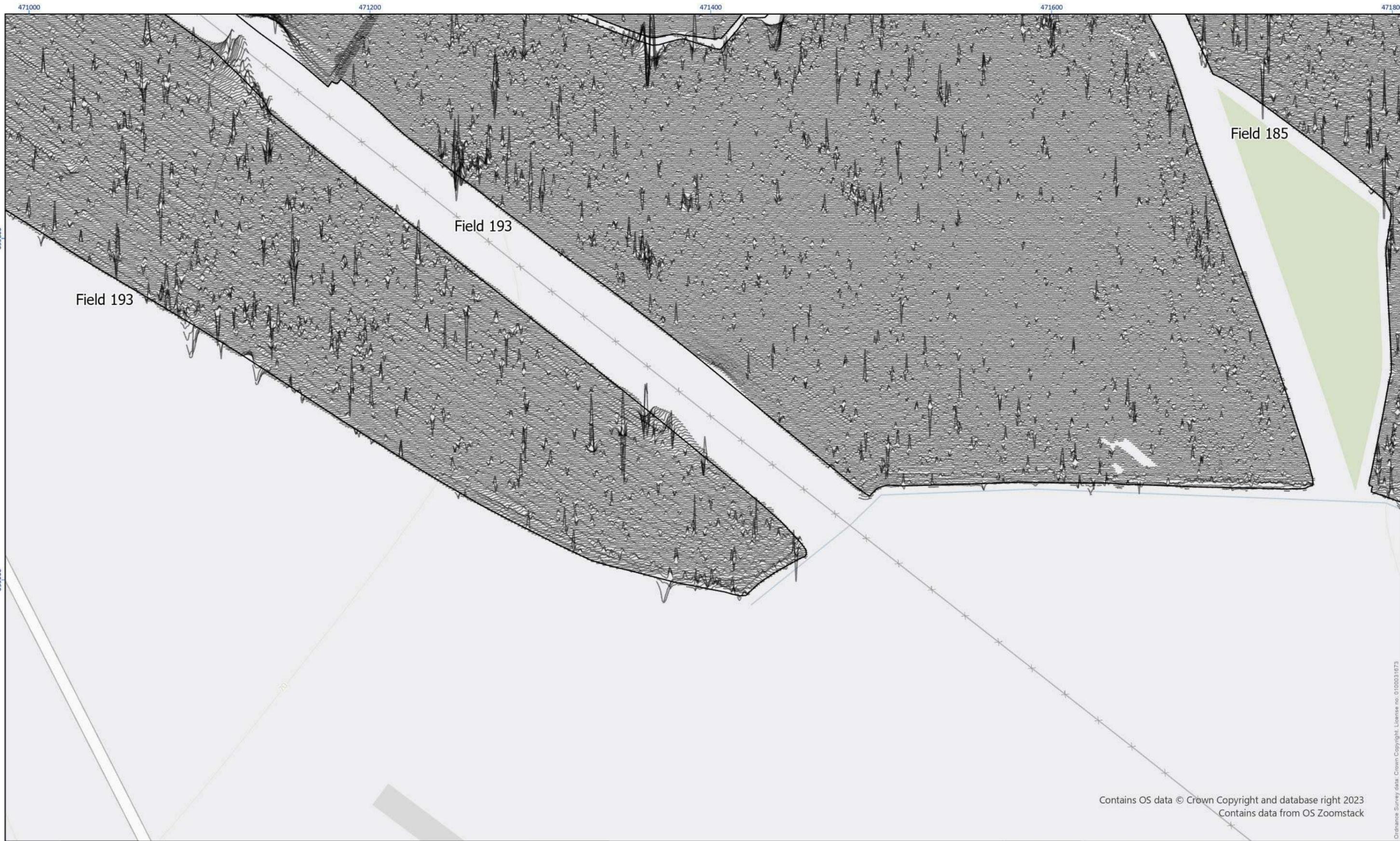
Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

Figure
7.16



Drawing Number: 05/40439/GEO/7.16	
Created by: RL	Date: 20/03/2024
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<p>Figure 7.16</p>			<p>Drawing Number: 05/40439/GEO/7.16</p>	
			<p>Created by: RL Date: 20/03/2024</p>	
			<p>Checked by: CS Date: 20/03/2024</p>	
			<p>Approved by: JL Date: 20/03/2024</p>	

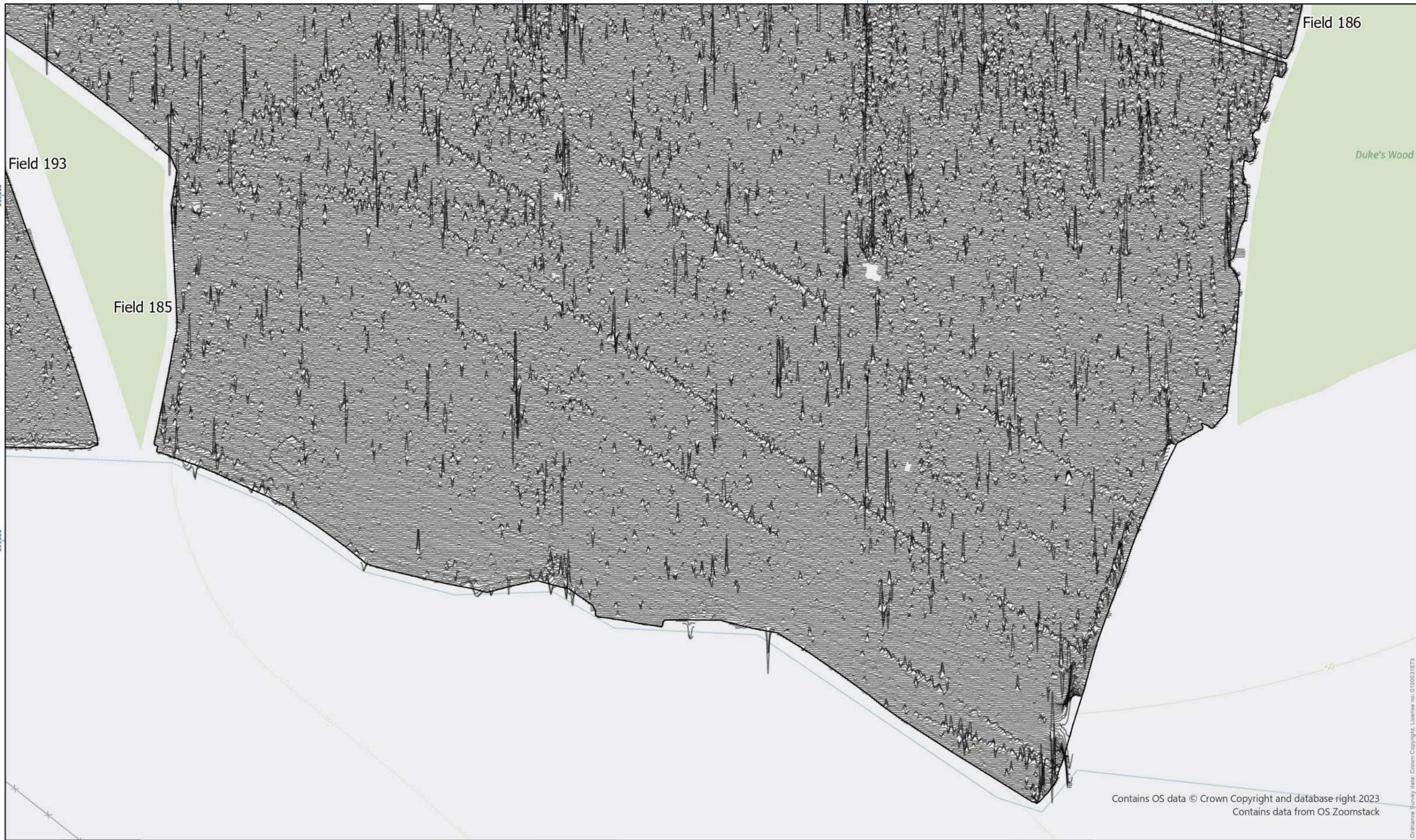
Ordnance Survey data - Crown Copyright. License no. 0100031673

471800

472000

472200

472400



Field 186

Field 193

Field 185

Duke's Wood

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<p>Figure 7.17</p>			Drawing Number: 05/40439/GEO/7.17	
			Created by: RL Date: 20/03/2024	
			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	

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471000

471200

471400

471600



Field 197

Field 195

Field 196

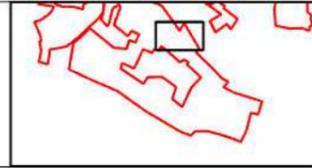
The Beck

The Hollows

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Figure 7.18



Scale: 1:2,000 @ A3

Drawing Number: 05/40439/GEO/7.18	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



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471200

471400

471600

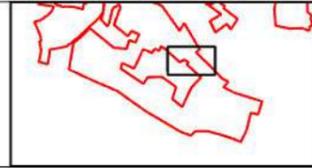
471800



Minimally Processed Gradiometer Data – XY Trace - Parcel II: Maplebeck Estate

Figure
7.19

40 nT
-40 nT



N
0 30m
Scale: 1:2,000 @ A3

Drawing Number: 05/40439/GEO/7.19	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024

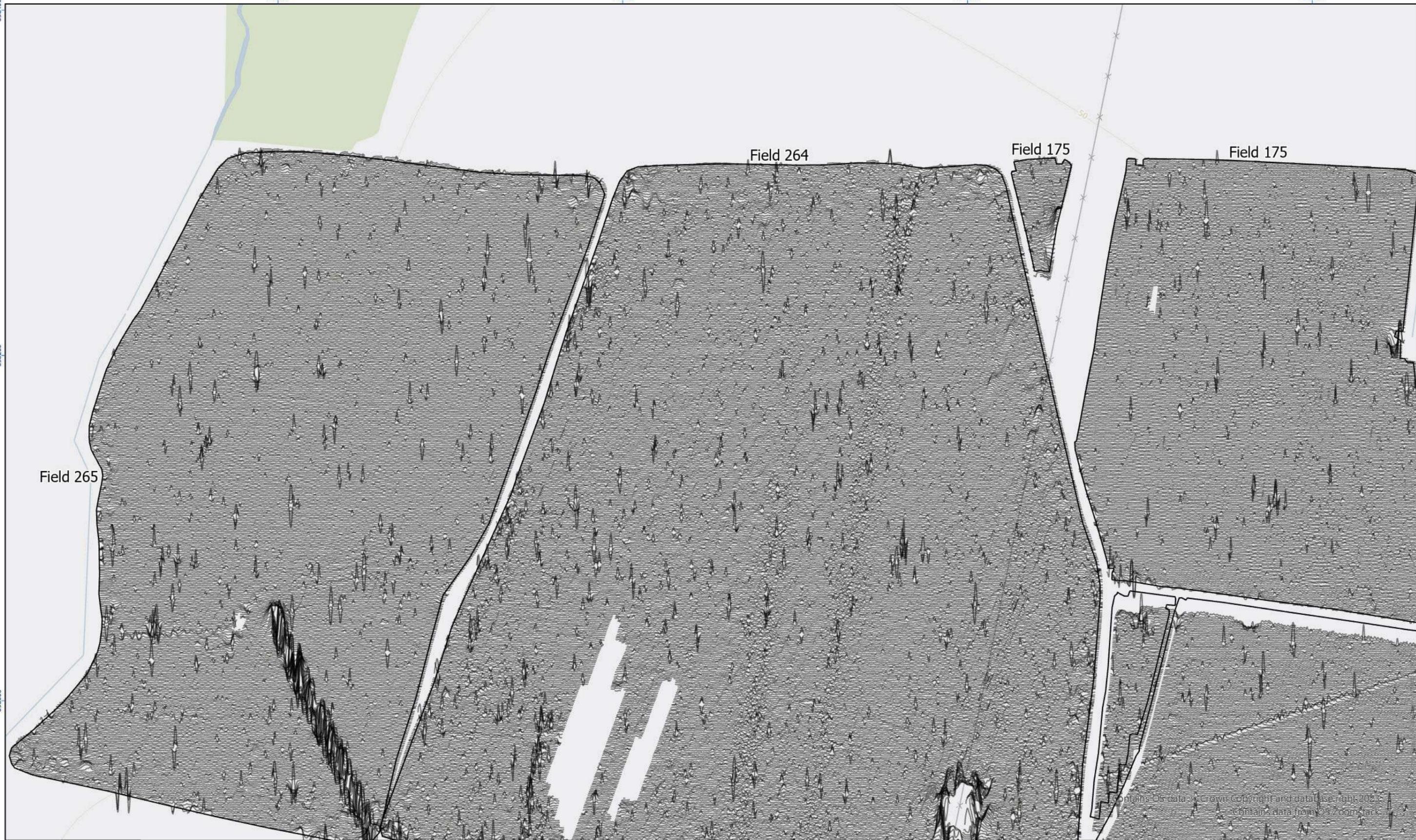


474800

475000

475200

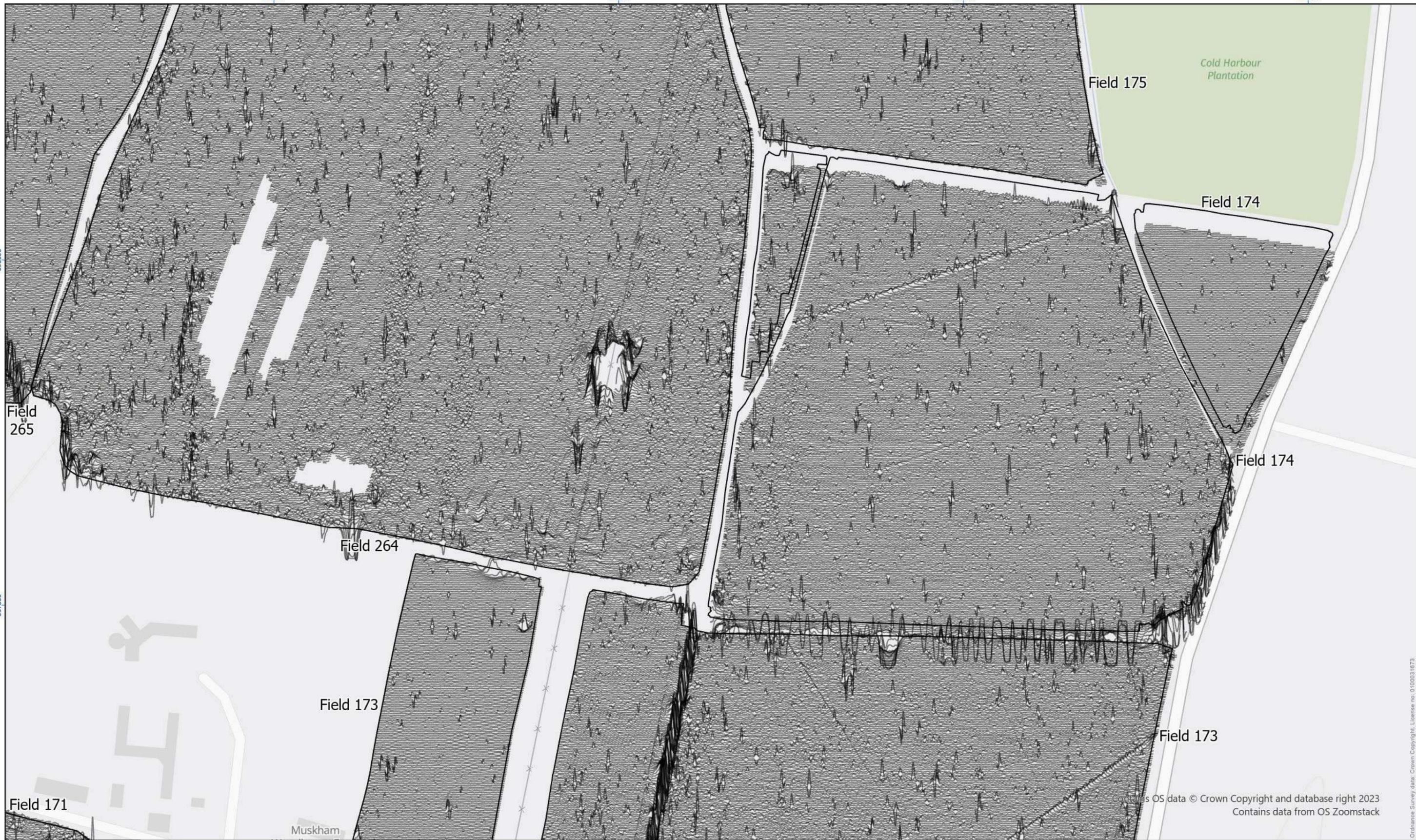
475400



Minimally Processed Gradiometer Data – XY Trace - Parcel III: South of Ollerton Road

<p>Figure 7.20</p>			Drawing Number: 05/40439/GEO/7.20	
			Created by: RL Date: 20/03/2024	
			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	

475000 475200 475400 475600



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Minimally Processed Gradiometer Data – XY Trace - Parcel III: South of Ollerton Road

<p>Figure 7.21</p>			Drawing Number: 05/40439/GEO/7.21	
			Created by: RL Date: 20/03/2024	
			Checked by: CS Date: 20/03/2024	
			Approved by: JL Date: 20/03/2024	

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474800

475000

475200

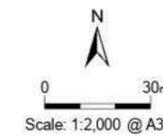
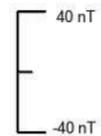
475400

357800
357600
357400



Minimally Processed Gradiometer Data – XY Trace - Parcel III: South of Ollerton Road

Figure 7.22



Drawing Number: 05/40439/GEO/7.22	
Created by: RL	Date: 20/03/2024
Checked by: CS	Date: 20/03/2024
Approved by: JL	Date: 20/03/2024



475000

475200

475400

475600

Field 173

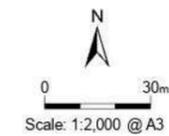
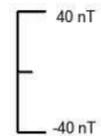
Field 172

Field 171

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Figure
7.23



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Approved by: JL	Date: 20/03/2024

