



Land West of Southwater, West Sussex

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land west of Southwater, West Sussex (centred on NGR 515540, 127640). The project was commissioned by RPS Consulting Services Ltd with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for development of the site.

The site comprises 125.8 ha of land, located immediately west of the town of Southwater, 5.7 km south of Horsham, West Sussex. The geophysical survey was undertaken over two separate periods between the 16 – 27 May and 6 – 9 June 2022. The detailed gradiometer survey has demonstrated the presence of multiple anomalies of possible archaeological interest across the site.

The survey has identified square enclosure in the west of the site, and this is the only anomaly that can confidently be interpreted as archaeology; however its date is not clear from the survey data alone. There are similar examples in the east of the site, but they are weaker and less well defined, so are interpreted as possible archaeology.

There is weak evidence for prehistoric activity in the form of two circular anomalies. These could represent Iron Age/Romano-British round houses, consistent with similar features in the surrounding area. Both appear to have internal features that could represent hearths or pits.

There are several possible enclosures across the site that cannot be attributed a date. They may relate to the prehistoric – medieval activity recorded in the surrounding area but could equally relate to modern or geological features.

There is evidence across the site pertaining to the area's agricultural past. Several former field boundaries and footpaths have been identified that correlate with 19th and 20th century mapping. However there are also some possible boundaries that cannot be seen on any available mapping. It is known that the area has been in agricultural use since the prehistoric period, so there is potential for these to relate to this activity, but a confident date cannot be attributed from the geophysical data alone. Ridge and furrow ploughing is also evident in several areas of the site.

The remaining anomalies are thought to be modern or natural. The modern anomalies include services, drains, and areas of made ground.

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The fieldwork was undertaken by Andrés Pérez Arana, Davor Cakanic, Jake Bishop, Steven Heer, Jack Trueman and Callum Jervis. The geophysical data was processed, interpreted and reported on by Alastair Trace. The geophysical work was quality controlled by Tom Richardson. The project was managed on behalf of Wessex Archaeology by Tom Richardson.



Land West of Southwater, West Sussex

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by RPS Consulting Services Ltd to carry out a geophysical survey at Land West of Southwater, West Sussex (centred on NGR 515540 127640) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for development of the site.

1.2 Scope of document

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

1.3 The site

1.3.1 The site is located immediately west of the town of Southwater and 5.7 km south of Horsham, in the county of West Sussex.

1.3.2 The survey comprises 125.8 ha of agricultural land, currently utilised for a mixture of pasture silage. The site is bounded by the A24 to the north, Worthing Road and associated residential housing to the east, Bonfire Hill to the south, and Marlpost Road and Two Mile Ash Road to the west. The site is divided in two by a disused railway line, which is now part of the Downs Link.

1.3.3 The site is on a slight incline sloping from 40 m above Ordnance Datum (aOD) at the southern edge to 57 m aOD at the northern edge.

1.3.4 The bedrock geology comprises Sandstone of the Horsham Stone Member across the majority of the site, with areas Mudstone of the Weal Clay Formation in the north-west and south-east. No overlying superficial geological deposits have been recorded (BGS 2022).

1.3.5 The underlying soils consist of stagnogley soils of the 711i (Wickham 5) association (SSEW SE Sheet 6 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

2 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a prior desk-based assessment (DBA) (RPS 2022), which considered the recorded historic environment resource within a 1 km study area of the proposed development. The DBA used information from the West Sussex Historic Environment Record (HER) and the National Heritage List for England (NHLE). The following background is not exhaustive but is summarised from aspects of the DBA that are considered relevant to the interpretation of the geophysical survey data.



2.2 Summary of the archaeological resource

- 2.2.1 There are no scheduled monuments, World Heritage Sites, Registered Parks and Gardens, Conservation Areas or Historic Battlefields within the immediate proximity of the site.

Prehistoric

- 2.2.2 Although no finds of Palaeolithic material are found within the study area scatters of Mesolithic material have been recovered at multiple sites in close proximity to the site. These include those found at Southwater Street 350 m to the east of the site and Swabey's Yard 150 m to the east of the site, where a Mesolithic flint core, some worked flint, and burnt flint were found.
- 2.2.3 Mesolithic worked flint was recovered during a surface artefact collection exercise around Parthing's Cottage, 1 km to the north-west of the site, thought to be associated with activity on the higher ground to the south (ASE 2009). The exercise also recovered fire-cracked flint, similar to that found during archaeological investigations in the area around the south-east corner of the site. Early Mesolithic to late Neolithic flint was recorded from the same area at Highwood, Broadbridge Heath, west of Horsham.
- 2.2.4 Further evidence of Mesolithic activity was recorded at Wickham Green, 1 km north-west of the site. The area comprised probable short-stay or hunting camps represented by concentrations of flintwork within features. Other concentrations of Mesolithic flints have also been found along the River Arun, as well as a general 'background scatter' of flintwork within the site, demonstrating transient activity along the valley and its various streams and tributaries during this period.
- 2.2.5 The Wickham Green site also yielded evidence of Neolithic flintwork and sherds of pottery, which suggest a background level of activity within the Arun valley during the Neolithic period. The site also recorded extensive occupation from the middle to late Iron Age, with some transient activity during the early Iron Age. The middle Iron Age occupation comprised roundhouses within four distinct locations in the central and eastern areas of the site.
- 2.2.6 Multiple chance finds were also recovered in the surrounding area. Such as a Neolithic plano-convex knife found to the north of Christ's Hospital (Grade II* Listed – NHLE 1027034), 650 m to the north-west of the site, and a Bronze Age barbed and tanged arrowhead at Jackrell's Lane to the east of the site, where there was a concentration of mainly Mesolithic flints.

Romano-British

- 2.2.7 A small quantity of Romano-British and probably residual Iron Age pottery has been recovered to the north of Christ's Hospital, and recent large scale archaeological investigations have produced some evidence of late Iron Age and or Romano-British activity.
- 2.2.8 During the Romano-British period the Wickham Green site saw the modification of earlier landscape features and field systems, with continued agricultural settlement of the area, although to a lesser extent than during the preceding Iron Age. A new enclosure was laid out, as well as a track or hollow way, with the land mainly utilised for organised pastoral and arable activity into the late 4th century.



Anglo-Saxon/ Early Medieval

- 2.2.9 Many of the north-south aligned roads, tracks, and footpaths in the region originated at this time as drove ways to link the coastal manors with their detached counterparts, including Two Mile Ash/Marlpost Road and Worthing Road.
- 2.2.10 During the Anglo-Saxon period, the site comprised lands which were owned as detached parts of manors located further afield: there is a roughly north – south boundary bank and hedge subdividing the site, which dates to this period, remaining largely extant throughout the length of the site and forming the eastern edge of Courtland Wood.

Medieval

- 2.2.11 The site itself was enclosed in a piecemeal fashion from at least the 12th century onwards, some woodland cleared in small parcels, which in turn created shaws (wooded field boundaries). Some 'lost' hedgerow boundaries in the site are 'preserved' by way of surviving mature trees which stand as a reminder of a former land divisions, particularly in the southern portion of the site.
- 2.2.12 The name 'Southwater', apparently mentioned from 1346, originally seems to have described not a single settlement but the whole of the parish south of the River Arun, although it was the town of Horsham itself which became a medieval borough of some significance, established by 1235
- 2.2.13 Great House Farm (Grade II* listed – NHLE 1286023) was built on a site occupied by Sele Priory and was tenanted until its early dissolution, after which it was part of the wider Priory lands granted to Magdalen College, Oxford in 1480. Other farmsteads were also established during the later medieval period as ribbon development along Two Mile Ash/Marlpost Road and Worthing Road, including Lanaways, Sayers, Swains, Tower Hill Farm and Pond Farm.

Post-Medieval

- 2.2.14 A cluster of post-medieval houses were developed along Southwater Street and at Tower Hill, with development along the Worthing Road increasing particularly after it was turnpiked in 1764. An alehouse was recorded at Southwater in 1542 and Old May Day was still kept as a festival in Southwater in 1774, with dancing and a maypole. By 1800 there was a wheelwright in the hamlet, and other tradesmen followed as the population increased during the 19th and 20th centuries.
- 2.2.15 There are a series of historic footpaths which criss-cross the landscape and which remain legible as public rights of way through the site. They fossilise the earlier medieval routeways which crossed the site from east to west to link together the two ancient north-south drove ways which today comprise Two Mile Ash/Marlpost Road and Worthing Road.
- 2.2.16 Although a more modern feature, the disused railway line which crosses the southern part of the site is also of historic landscape interest.

2.3 Recent investigations in the area

- 2.3.1 Excavations at Mill Straight, Southwater, 2 km south-east of the survey area, undertaken by Cotswold Archaeology (2019) uncovered features dating from the middle Iron Age to the later Roman period, consisting of pits and post-holes, evidence of a post-built roundhouse, a curvilinear ditch to the south-east later replaced by a Roman rectangular enclosure, and field boundaries. A late Bronze Age cremation urn was also uncovered.



2.4 Recent investigations in the immediate vicinity

2.4.1 A DBA was undertaken by Archaeology South East (ASE) in 2008 for an area including the majority of the present site excepting its northern extent and including the recently investigated areas to the south-east. It formed the baseline data for a subsequent Environmental Statement chapter produced by WSP in 2014, as part of an outline application for the residential development at Broadacres. This DBA was later updated in 2017 to cover an additional area to the south-east of the current site and again in 2019.

2.4.2 A surface artefact collection survey (fieldwalking) was carried out by ASE (2011) across two fields south of the site. A general scatter of prehistoric flint was found across both fields, particularly fire-cracked flint, but no significant concentrations of prehistoric material were identified. Romano-British and medieval material was limited, and generally reflective of manuring episodes within arable fields rather than specific evidence for settlement/occupation. This comprised one sherd of Roman pottery together with approximately 20 sherds of post-Roman pottery. Ceramic building material dating from the medieval and post-medieval periods was present – the later period represented by a significant concentration in the central eastern part of the site which corresponds to the location of 'College Barn', a structure which first appears on the Ordnance Survey (OS) Old Series 1-inch map of c.1800.

Geophysics

2.4.3 A magnetic gradiometer survey was carried out across the south-eastern corner of the site and adjacent phase areas by Stratascan (2011). The survey identified anomalies of possible archaeological origin. Most anomalies relate to former field boundaries and ditches, although a number of rectangular enclosures are also evident and clusters of possible pit alignments. Thermoremanent anomalies were also recorded that may relate to former kilns or hearths.

2.4.4 An 8 ha fluxgate gradiometer survey was conducted by ASE (2014) on land centred on NGR 515040, 126090. Not many features were uncovered prior to the later evaluation excavation conducted by the same company.

Excavation

2.4.5 In 2015 ASE conducted an evaluation excavation, consisting of 23 30 m trenches in land west of Southwater centred on NGR 515336 126731. Evidence of Iron Age activity, represented by ditches and an occupation later was identified. Post-medieval activity was represented by a small collection of 19th and 20th century pottery. More excavations in the same area were conducted in 2019 but did not add any significant new information previously identified from the previous excavation.

2.4.6 ASE was also commissioned to undertake an archaeological watching brief in 2016 during groundworks following trial trenching on land west of Worthing Road, Southwater, West Sussex (centred on NGR 515407 126559). No archaeological features, deposits or finds were identified (ASE 2016)

2.4.7 An archaeological evaluation was conducted by ASE (2019) on land lying to the north of Church Lane. 18 trenches in total were excavated. The archaeological horizon appeared intact, but the results do not appear to correspond with those of the geophysical survey. Two features of archaeological interest were encountered in two separate trenches. Neither feature producing finds nor datable material.



3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team over two separate periods between the 16 – 27 May and 6 – 9 June 2022. Field conditions at the time of the survey were a mixture of sunny and overcast throughout the period of survey. An overall coverage of 67.7 ha of the 125.8 ha site was achieved (See **Figure 1**). The remaining areas were unsuitable at the time of survey due to areas of buildings, woodland, long vegetation, and crops. The areas where vegetation and crops restricted survey are summarised below.

Table 1 Remaining unsurveyable areas and reason why the survey was not possible

Field Name	Reason for no survey	Ha remaining
LP_3	Barley	14 ha
LP_12	Long grass	1.2 ha
LP_22	Barley	1.4 ha
LP_25	Long grass	5.6 ha
LP_27	Long grass	3.7 ha
LP_34	Long grass	2.9 ha
LP_35	Long grass	1 ha
Total remaining		29.8 ha

3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex archaeology 2022), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

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

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

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

3.3 Fieldwork methodology

- 3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the OS and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).
- 3.3.2 The detailed gradiometer survey was undertaken using four SenSys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of 0.03 nT at a rate of 10 Hz, producing intervals of 0.15 m along transects spaced 4 m apart.

3.4 Data processing

- 3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'Destripe' function (± 5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.
- 3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

- 4.1.1 Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:13,000 (**Figures 2 and 3**) and 1:2,000 (**Figures 4 to 23**). The data are displayed at -3 nT (white) to +2 nT (black) for the greyscale images.
- 4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figure 3**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.
- 4.1.5 Gradiometer survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

4.2 Gradiometer survey results and interpretation

- 4.2.1 The geophysical survey has identified a number of features that are likely to be archaeological or possibly archaeological in origin.
- 4.2.2 The most coherent of these areas is in LP_30 (**Figure 17**) at **4000**, and has produced a positive, rectilinear anomaly. Although being partially disturbed and fragmented in the north – east, the grouping produces a 15 m x 15 m square anomaly. This likely indicates an enclosure system of unknown date. Weakly positive linear and curvilinear anomalies identified as surrounding the enclosure, may relate to additional settlement activity.

Likewise, the isolated ferrous anomalies internally identified may also be linked to the enclosure.

- 4.2.3 In the east of the site, additional possible archaeological anomalies have been identified. In the south – western portion of LP_36 (**Figure 19**) there are two positive parallel anomalies (**4001**). These are 30 m long, oriented east – west, with a gap of 3 m between them. There is a weakly negative response between the two positive anomalies. This is indicative of two ditches with weak evidence for upcast material or a compacted surface between them, which may relate to a trackway. However, the weak and relatively small nature of the anomaly makes confident interpretation difficult. To the south of the possible trackway are four discrete positive anomalies at **4002**. These are 1 – 2 m in diameter and indicative of pit features. While these may be archaeological and associated with the trackway, they could equally be natural.
- 4.2.4 Directly east of **4001**, further evidence of possible archaeology has been highlighted in the form of a weakly positive rectilinear anomaly at **4003**. Although relatively faint an 8 m x 9 m square anomaly, similar to that at **4000**, has been identified. This is indicative of a ditch feature and may relate to a small enclosure; however, the weak nature of the anomaly within an area of natural variation means further investigation would be required to confirm the origin of this anomaly.
- 4.2.5 Located centrally within the site in, a positive linear anomaly has been identified bisecting east – west across the southern half of LP_29 at **4004 (Figure 17)**. The linear transects almost the entire width of LP_29 at 131 m long, terminating just before reaching the eastern edge of the field. The anomaly does not correlate with any known former field boundaries or footpaths in the area and has been highlighted as possibly archaeological in origin as a result. It may represent the remains of a boundary ditch predating any available mapping, but it is not possible to comment on the date from the geophysical data alone.
- 4.2.6 In the east of the site in LP_26, a weakly positive penannular anomaly has been identified at **4005 (Figure 15)**. This is 15 m in diameter with an opening in its northern side. Although very faint and slightly fragmented, it could relate to an Iron Age or Romano-British round house, or possibly a Bronze Age round barrow. At its centre a magnetically discrete positive anomaly has been identified. This is indicative of a pit feature and could represent funerary or settlement activity. There is a slight associated negative response, which provides weak evidence for this to be a hearth associated with a round house. A similar positive curvilinear positive anomaly with possibly associated pit feature has been identified in the west of the site in LP_16 at **4006**. This is seen as a 10 m diameter crescent with a 2 m possible pit feature. While this has potential to be further evidence of Iron Age or Bronze Age activity, it is not well enough defined in the data to offer a confident interpretation.
- 4.2.7 In the northern-most part of the site (LP_1), two mirroring ‘L-shaped’ anomalies have been identified at **4007**. Combining for a length of 30 m, these anomalies are orientated west-north-west to east-south-east. Both anomalies have generated a strong positive magnetic response differing from all other anomalies in the immediate vicinity. Given the small size of the field however, little context can be drawn to form an accurate interpretation of these anomalies hence the possible archaeological characterisation. The anomalies are indicative of ditch features of an unknown date; however they may also be geological in origin or highlight an area of intense agricultural activity.
- 4.2.8 A set of weaker anomalies have been identified in the northern portion of site (**4008 – 4016**) in LP_13, LP_14, LP_19, and LP_20 (**Figure 9**). Within LP_13, several weakly positive curvilinear anomalies have been identified at **4008 – 4010**. Those at **4008** and **4009** may show the fragmented remains of a larger feature but are seen as a group of 25 m long rectilinear anomalies. The anomaly at **4010** is more removed and forms an 11 m crescent. These anomalies are all indicative of ditch features, but their weak and fragmented nature



makes interpretation difficult. They could relate to archaeological features, such as enclosures, but could equally relate to modern agricultural activity or natural features.

- 4.2.9 To the east of the small possible archaeological anomalies in LP_13 is a longer positive linear anomaly at **4011**. This is 76 m long north-east to south-west and widens from 1.5 m at the north-eastern end to 9 m in the south-west. The origin of this is not clear, but it appears to form a ditch terminating in a pit-like feature. It is possible this is a track leading to an area of extraction or a land division.
- 4.2.10 In the west of LP_14 are two weakly positive curvilinear anomalies at **4012** and **4013**. Both are orientated east – west with **4012** being 26 m long and **4013** 8 m long. Both of these anomalies are indicative of ditch features and could relate to enclosures. However, they are very weak and could equally relate to modern agricultural activity.
- 4.2.11 Within LP_19 and LP_20 are three weakly positive curvilinear anomalies at **4014** – **4016**. Those at **4014** and **4015** are smaller at 10 m long, while **4016** is 72 m long north – south. As with the anomalies at **4008** – **4013** these are indicative of ditch features, but their weak and relatively isolated nature makes confident interpretation difficult. The anomaly at **4016** provides the strongest evidence for an archaeological enclosure, but it is not clear whether the entirety of the feature is seen in the data or whether it would have once formed a larger enclosed area.
- 4.2.12 In the southern half of site, two linear anomalies have been identified orientated east – west at **4017** in LP_30 (**Figure 17**) and north – east to south – west at **4018** in LP_32 (**Figure 15**). They are 120 m and 130 m long respectively. These both relate to former field boundaries present on 1885 OS mapping (NLS 2022) and are still visible in 1971. By satellite mapping, dated in 2001 (Google Earth 2022) however, the boundaries have been removed. A similar linear anomaly has been recorded in the southern portion of LP_36 at **4019** (**Figure 19**). The anomaly is first recorded on the 1844 Tithe Map and is last visible on the 1887 OS map.
- 4.2.13 Across the centre and south of the site are multiple areas of weak, positive, parallel, linear anomalies (**4020** – **4023**); The average distance between lines is 9 m, and they are often of a curved form. These anomalies have been interpreted as areas of ridge and furrow and are thought to be medieval due to their curved form and spacing.
- 4.2.14 Several weakly dipolar linear anomalies have been identified across the site. This response is indicative of a fired material, such as clay, and given their arrangement it is likely they relate to land drains. Examples are present at **4024** – **4029**.
- 4.2.15 Multiple stronger dipolar linear anomalies have also been recorded across the site at **4030** – **4034**. These anomalies are all indicative of modern services, such as pipes or cables.
- 4.2.16 There are several weakly positive linear and curvilinear anomalies across the site at **4035** – **4041**. These relate to former footpaths visible on historical mapping and satellite imagery of the site.
- 4.2.17 Several areas of magnetically strong dipolar anomalies have been identified across the site. The most prominent of these are at **4042** in LP_18 and **4043** in LP_28. These areas are consistent with made ground or agricultural spreads. It is likely the more linear areas at **4042** and **4043** represent former access tracks, but there is no evidence for this from mapping or satellite imagery.
- 4.2.18 The survey has also detected multiple isolated clusters of low magnitude amorphous anomalies. The lack of shape or coherent pattern is consistent with natural geological variation.



5 DISCUSSION

- 5.1.1 The gradiometer survey has been successful in detecting anomalies of archaeological and possible archaeological origin across the site. A square enclosure in the west of the site is the only anomaly that can confidently be interpreted as archaeology; however its date is not clear from the survey data alone. There are similar examples in the east of the site, but they are weaker and less well defined, so are interpreted as possible archaeology.
- 5.1.2 There is weak evidence for prehistoric activity in the form of two circular anomalies. These could represent Iron Age/Romano-British round houses, consistent with similar features in the surrounding area. Both appear to have internal features that could represent hearths or pits. However, both of these anomalies are relatively isolated, and one is very weak while the other is seen in an area of magnetic interference, which makes confident interpretation difficult.
- 5.1.3 There are several possible enclosures across the site that cannot be attributed a date. They may relate to the prehistoric – medieval activity recorded in the surrounding area but could equally relate to modern or geological features.
- 5.1.4 There is evidence across the site pertaining to the area's agricultural past. Several former field boundaries and footpaths have been identified that correlate with 19th and 20th century mapping. However there are also some possible boundaries that cannot be seen on any available mapping. It is known that the area has been in agricultural use since the prehistoric period, so there is potential for these to relate to this activity, but a confident date cannot be attributed from the geophysical data alone. Ridge and furrow ploughing is also evident in several areas of the site. Due to the curved form and wider spacing of the lines, it is likely that these are medieval in date.
- 5.1.5 The remaining anomalies are thought to be modern or natural. The modern anomalies include services, drains, and areas of made ground.

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APPENDICES

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

The magnetic data for this project were acquired using a non-magnetic cart fitted with four SenSys FGM650/3 magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 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 CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 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 Leica Captivate system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.01 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 in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

Typical data and image processing steps may include:

- GPS DeStripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect 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 (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 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.



Appendix 2: Geophysical Interpretation

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

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

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

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

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

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

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

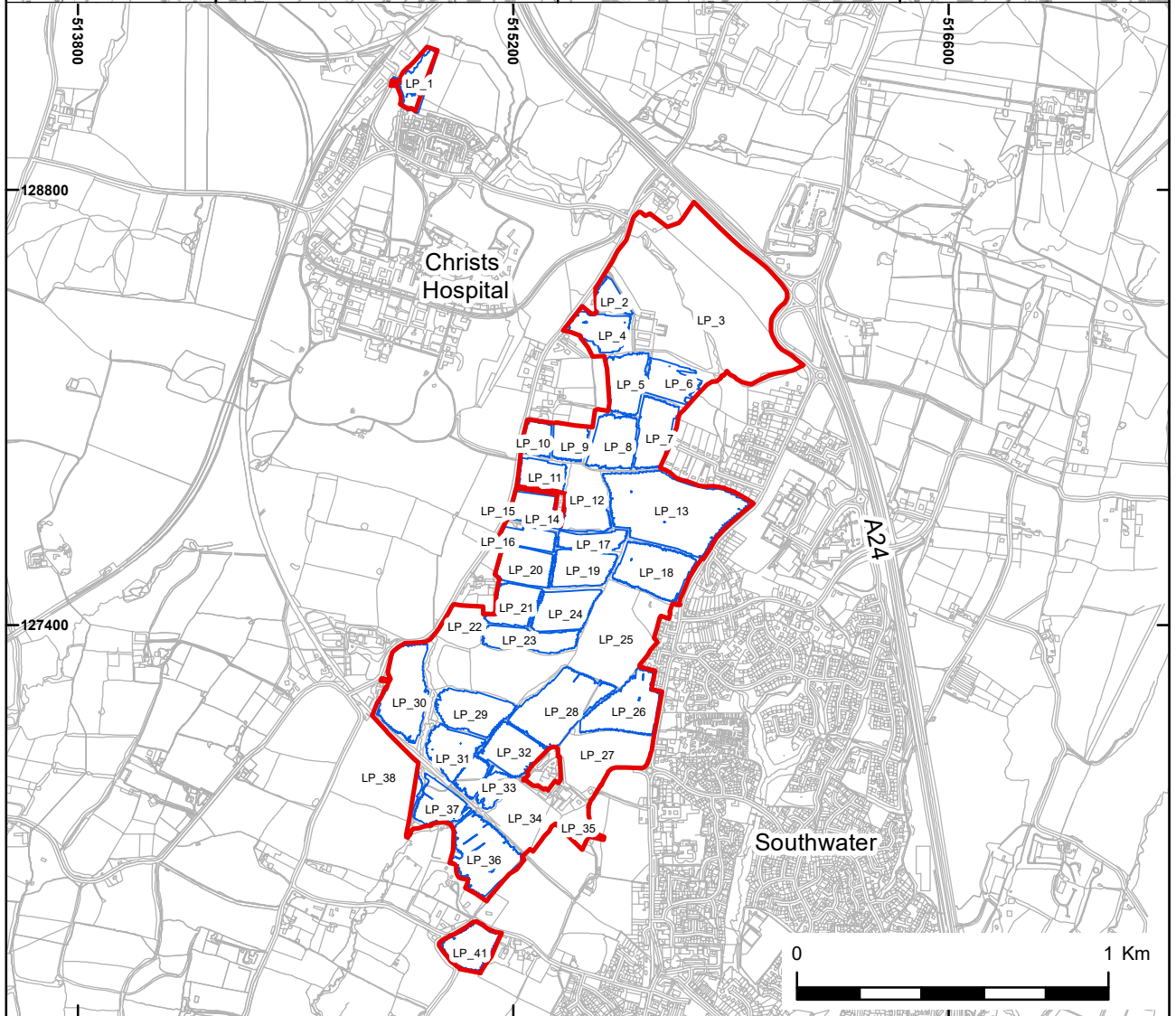
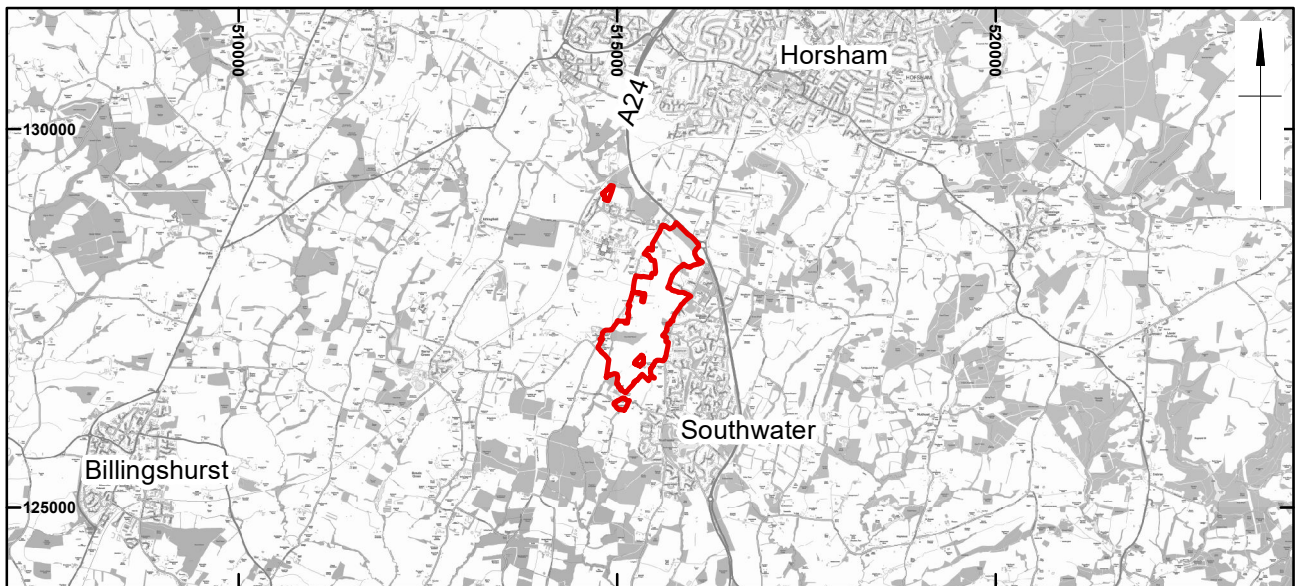
- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.



Appendix 3: OASIS form

Project Details:

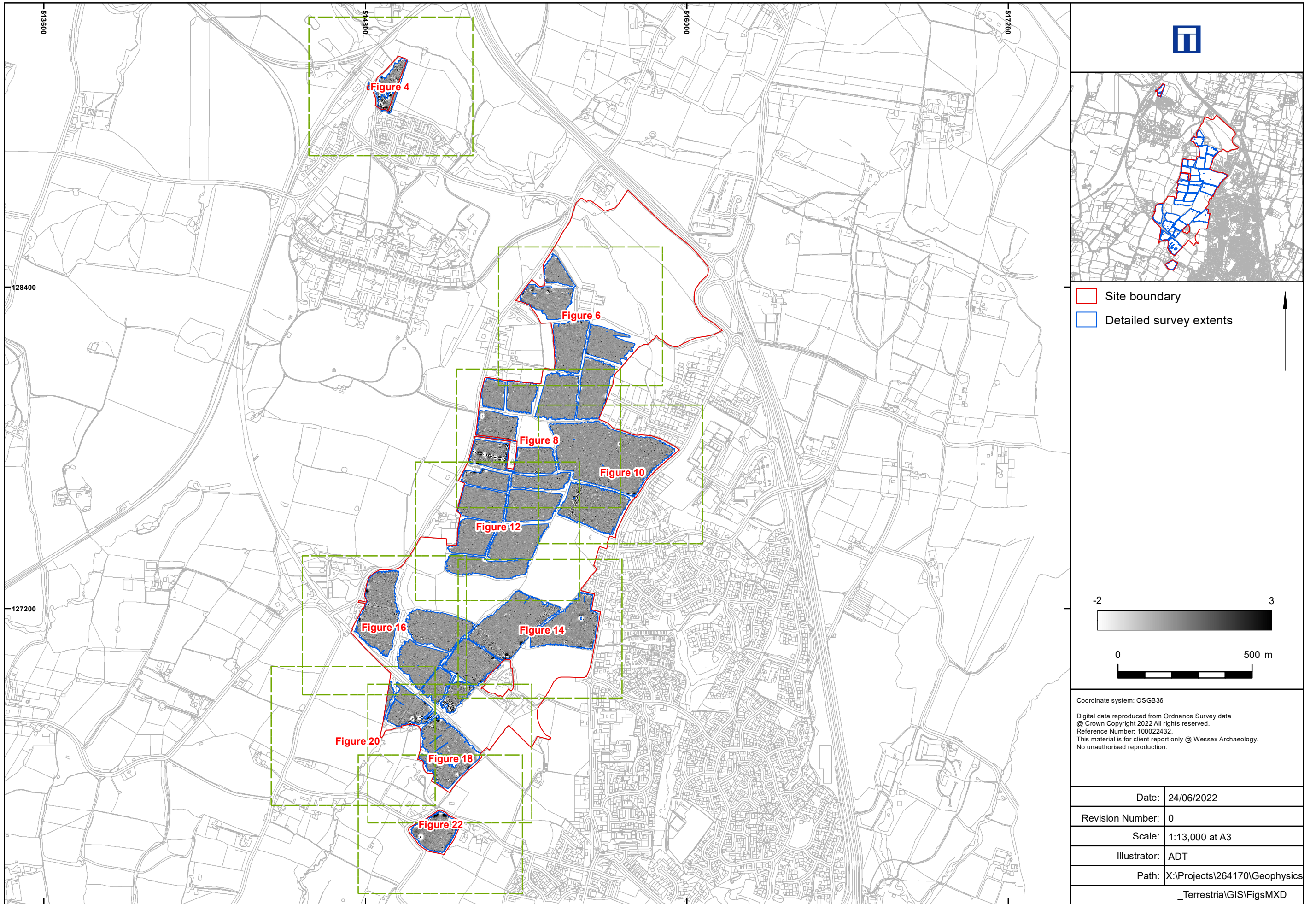
Project name		Land West of Southwater, West Sussex			
Type of project		Detailed gradiometer survey (Field evaluation)			
Project description		<p>A detailed gradiometer survey was conducted over Land West of Southwater, West Sussex (centred on NGR 515540, 127640). The project was commissioned by RPS Consulting Services Ltd (Abingdon) with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features.</p> <p>The site comprises 121.7 ha of land, located immediately west of the town of Southwater, 5.7 km south of Horsham, West Sussex. The geophysical survey was undertaken over two separate periods between the 16 – 27 May and 6 – 9 June. The detailed gradiometer survey has demonstrated the presence of anomalies of possible archaeological interest across the site.</p> <p>The most prominent archaeological anomalies have been identified in the east and western fields LP_30 and LP_36 as possible ditched enclosures. The eastern enclosure specifically has linear features directly west, which may form a possible supporting throughway. This likely represents settlement activity dating to the Iron Age or Romano-British period, in keeping with recorded activity in the surrounding area.</p> <p>In the northern portion of the site, multiple discreet curvilinear features have been recorded that may relate to small ditch and pit-like structures. The purpose of this area of activity is less clear than that in the east and west of the site based on the geophysical data alone. It could date anywhere from the Bronze Age through to the medieval period.</p> <p>Medieval ridge and furrow ploughing is evident in multiple areas of the site. In addition to evidence of modern agricultural practises and several modern services.</p>			
Project dates		Start: 16/05/2022		End: 9-06-2022	
Previous work		DBA and partial geophysical survey			
Future work		Nor known			
Project Code:	264170	HER event no.	N/A	OASIS form ID:	wessexar1-507588
		NMR no.	N/A		
		SM no.	N/A		
Planning Application Ref.		EIA/22/0002			
Site Status		None			
Land use		Agricultural			
Monument type		N/A	Period	N/A	
Project Location:					
Site Address	Two Mile Ash Road, Horsham			Postcode	RH13 9AW
County	West Sussex	District	Horsham	Parish	Southwater
Study Area	121.7 ha	Height OD	40 – 57 m aOD	NGR	515540 127640
Project Creators:					
Name of Organisation		Wessex Archaeology			
Project brief originator		RPS Group	Project design originator		RPS Group
Project Manager		Tom Richardson	Project Supervisor		Andrés Pérez Arana
Sponsor or funding body		RPS Group	Type of Sponsor		N/A
Project Archive and Bibliography:					
Physical archive	N/A	Digital Archive	Geophysical survey and report	Paper Archive	N/A
Report title	Land West of Southwater, West Sussex			Date	2022
Author	Wessex Archaeology	Description	Unpublished report	Report ref.	264170.04



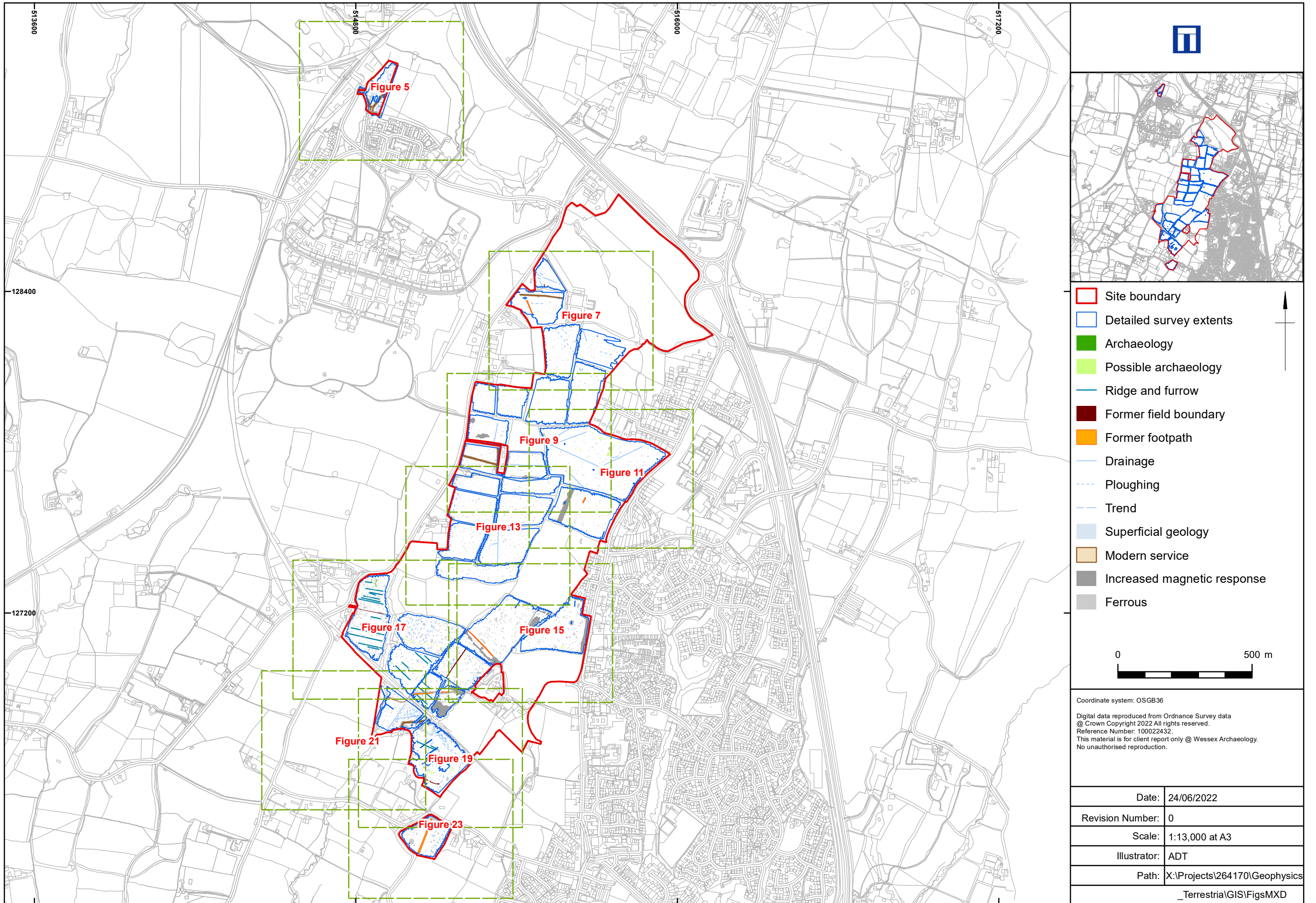
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Site location and survey extent

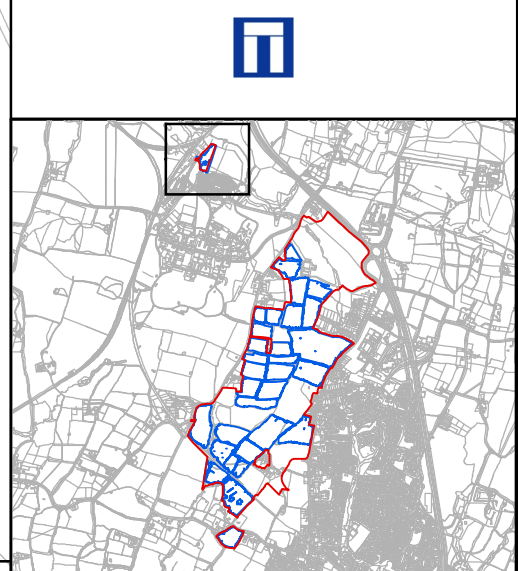
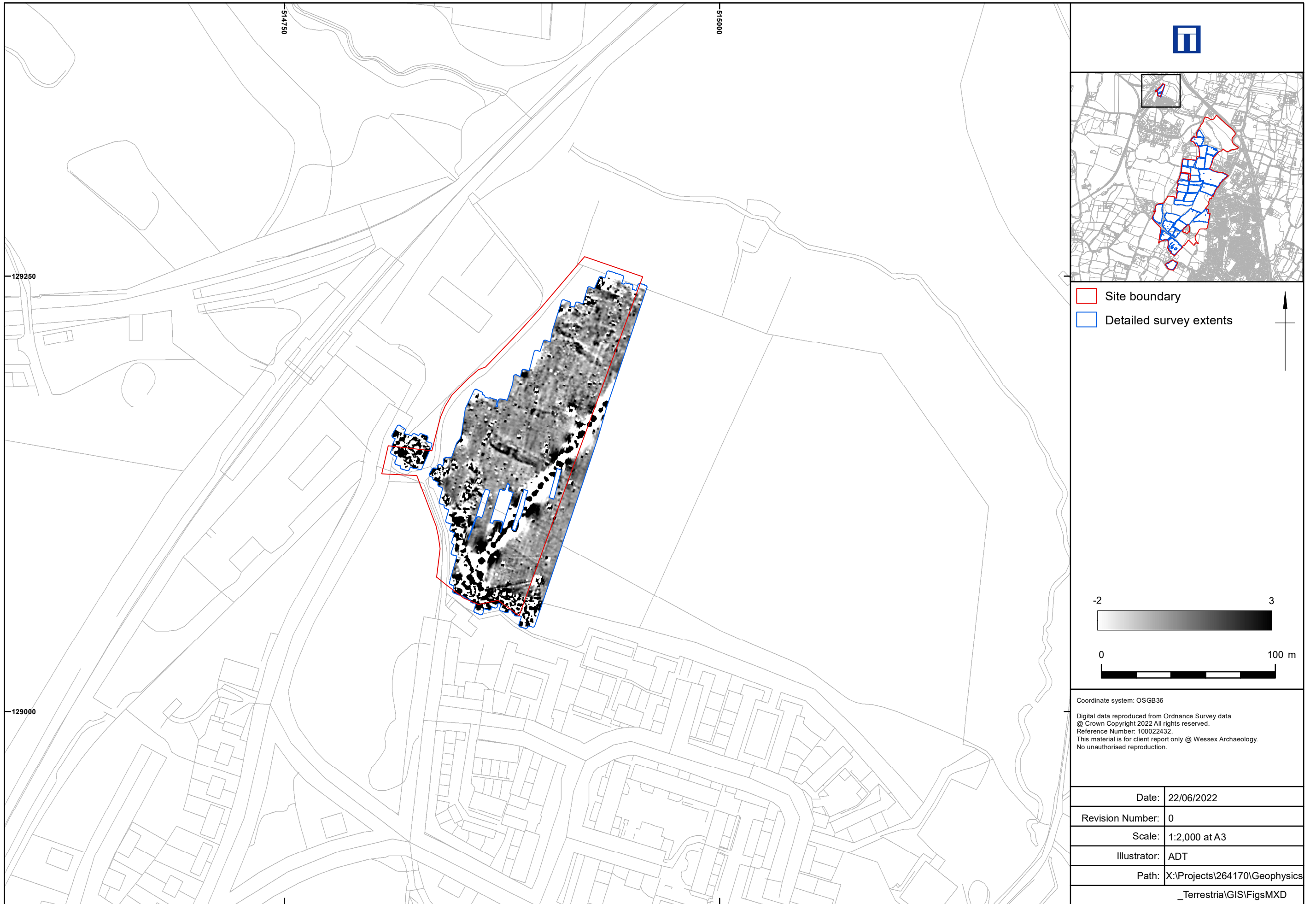
Figure 1



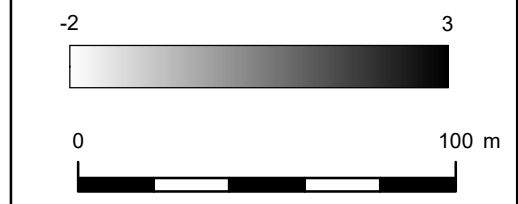
Detailed gradiometer survey results: greyscale plots LP_1 - LP_38 and LP_41



Detailed gradiometer survey results: overall interpretations LP_1 - LP_38 and LP_41



Site boundary
 Detailed survey extents

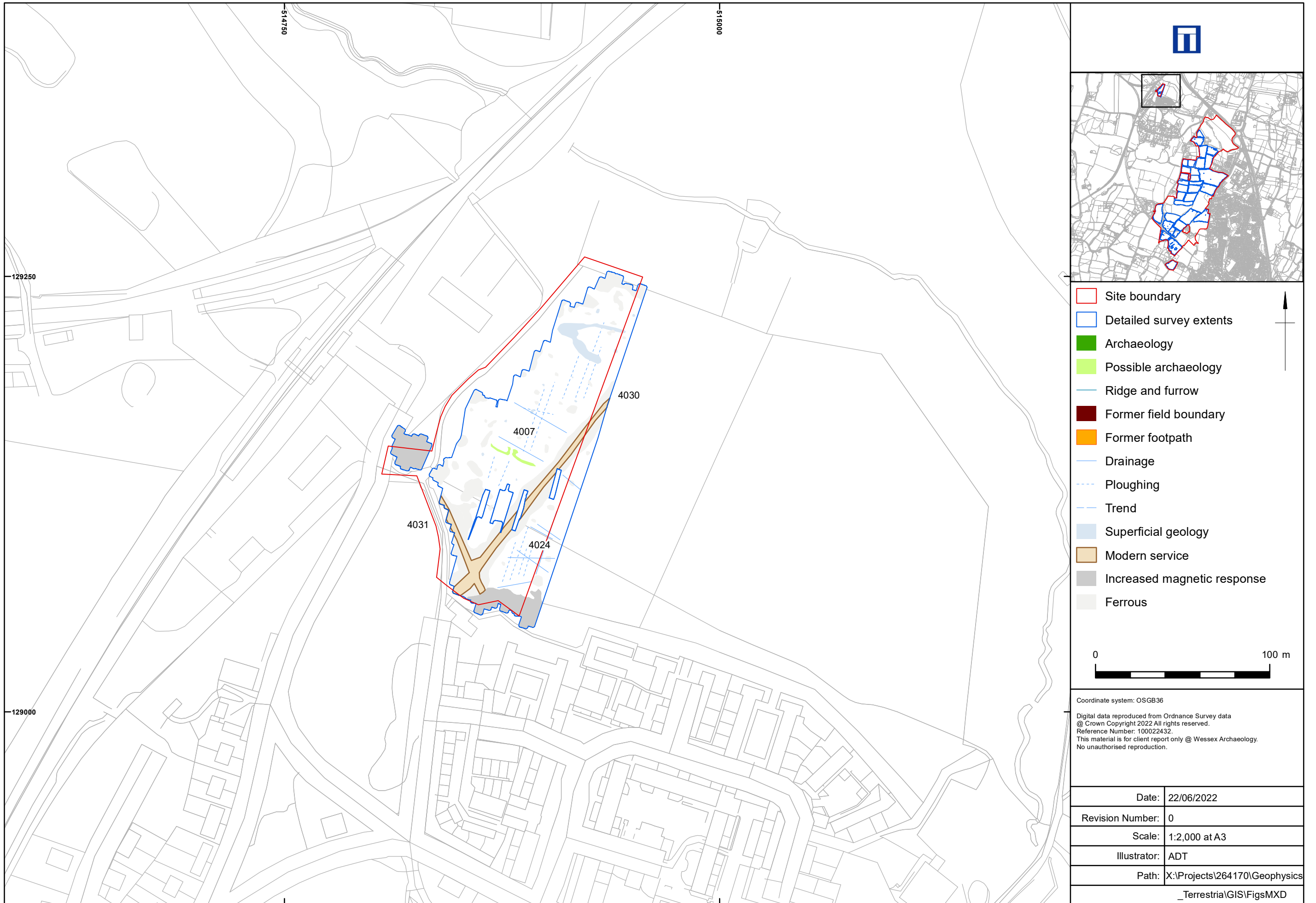


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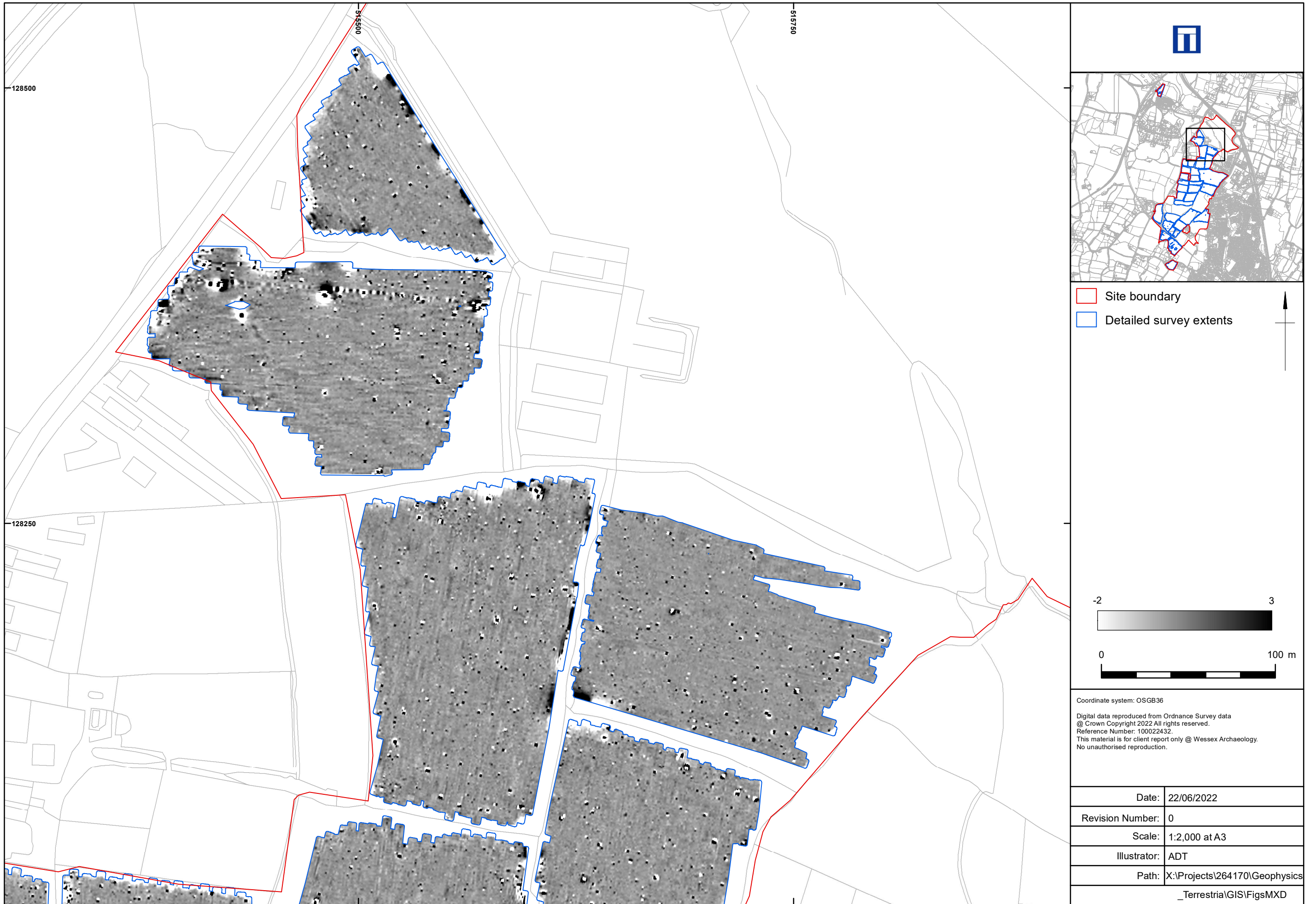
Detailed gradiometer survey results: greyscale plot LP_1

Figure 4



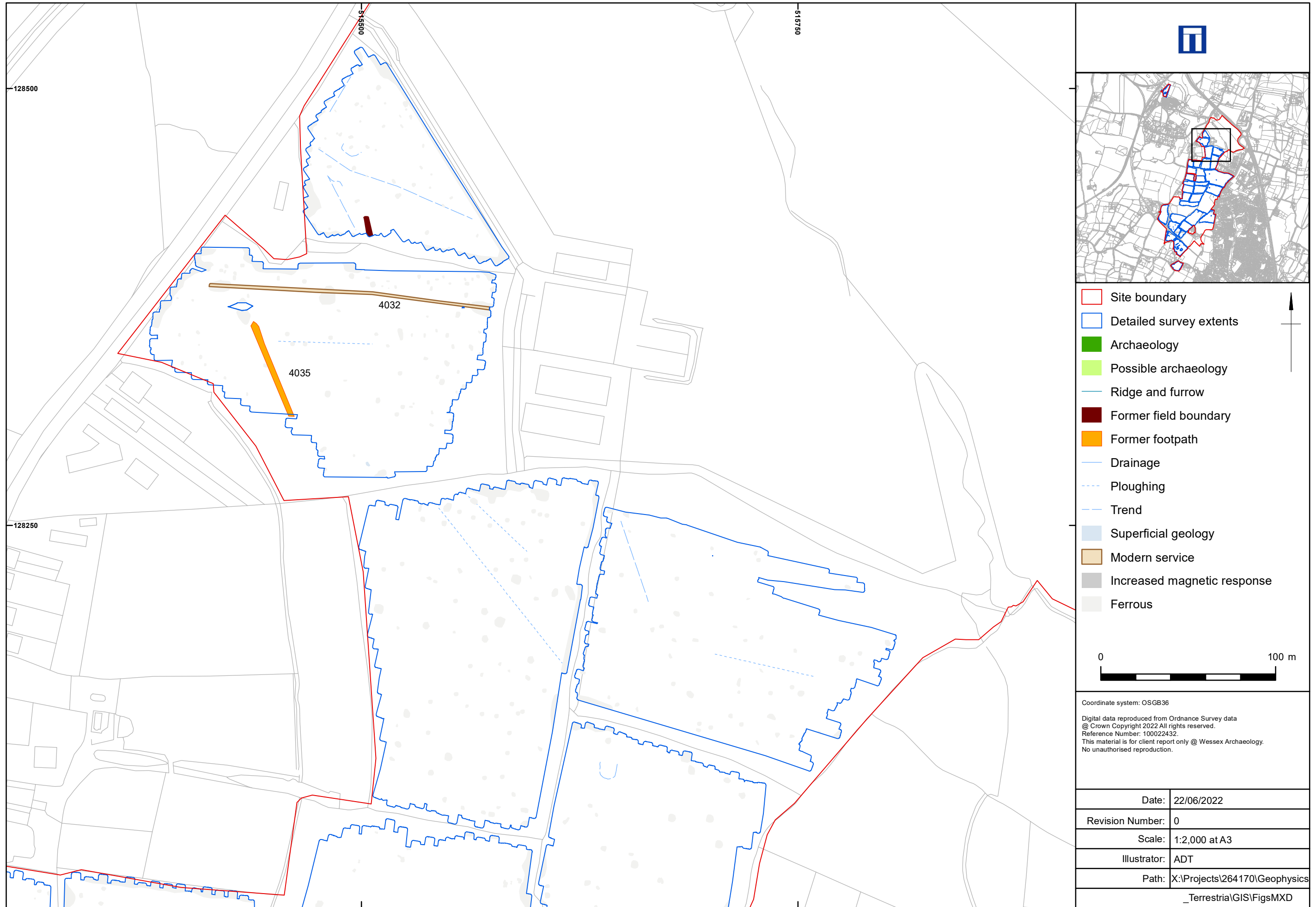
Detailed gradiometer survey results: interpretation LP_1

Figure 5



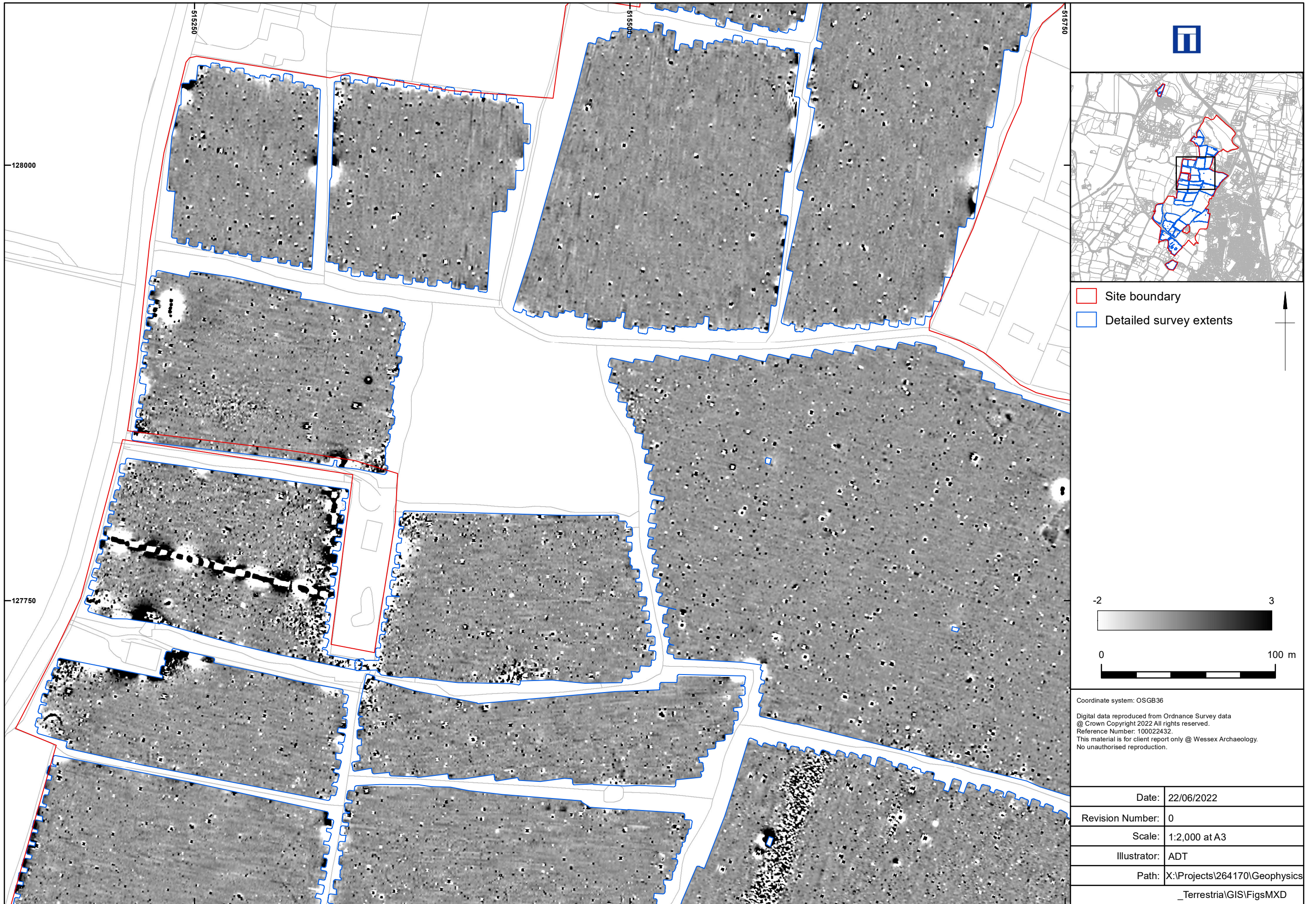
Detailed gradiometer survey results: greyscale plot LP_2 - LP_6

Figure 6



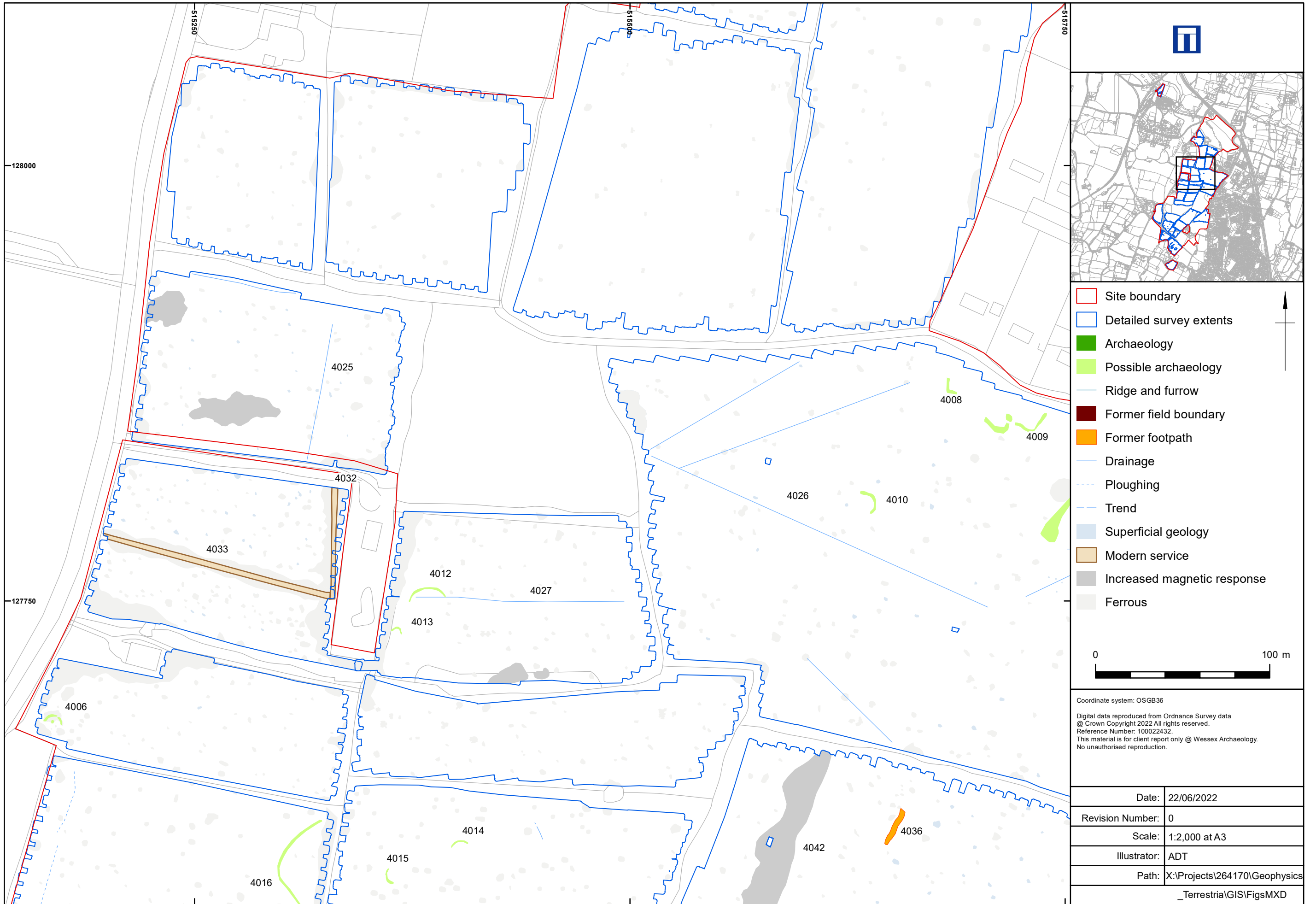
Detailed gradiometer survey results: interpretation LP_2 - LP_6

Figure 7



Detailed gradiometer survey results: greyscale plot LP_7 - LP_20

Figure 8



- ▭ Site boundary
- ▭ Detailed survey extents
- ▭ Archaeology
- ▭ Possible archaeology
- Ridge and furrow
- ▭ Former field boundary
- ▭ Former footpath
- Drainage
- - - Ploughing
- Trend
- ▭ Superficial geology
- ▭ Modern service
- ▭ Increased magnetic response
- ▭ Ferrous



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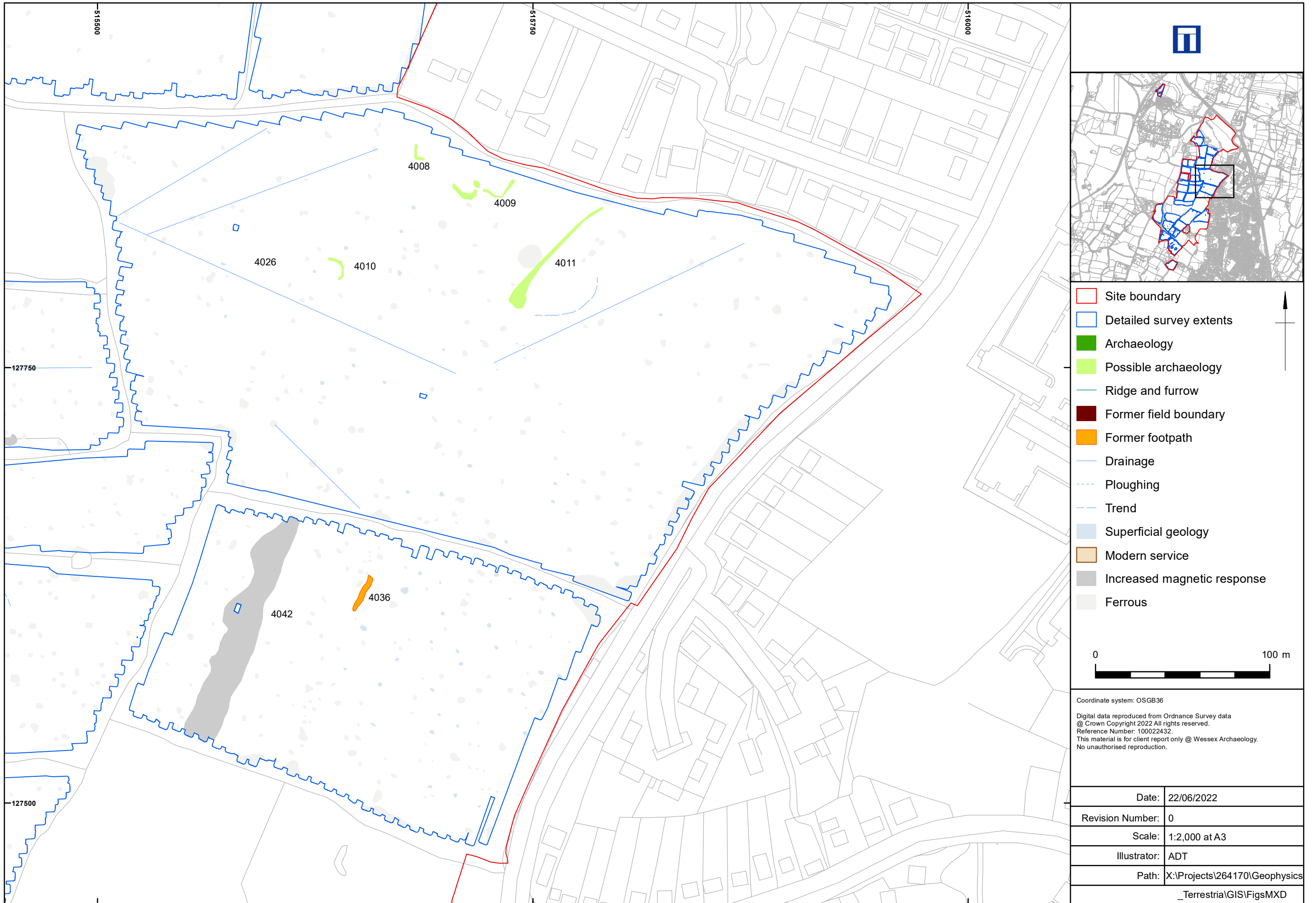
Detailed gradiometer survey results: interpretation LP_7 - LP_20

Figure 9



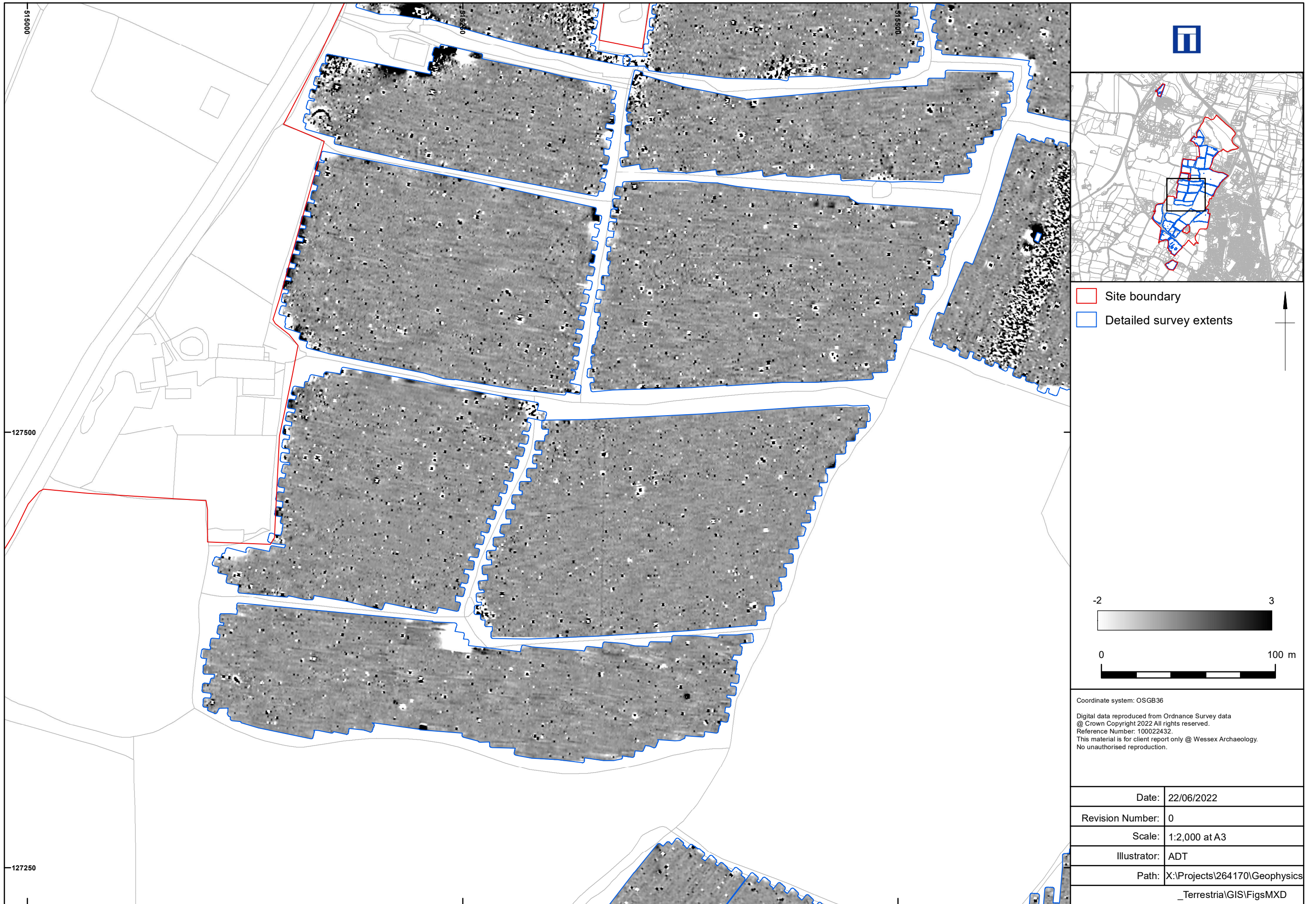
Detailed gradiometer survey results: greyscale plot LP_13 & LP_18

Figure 10



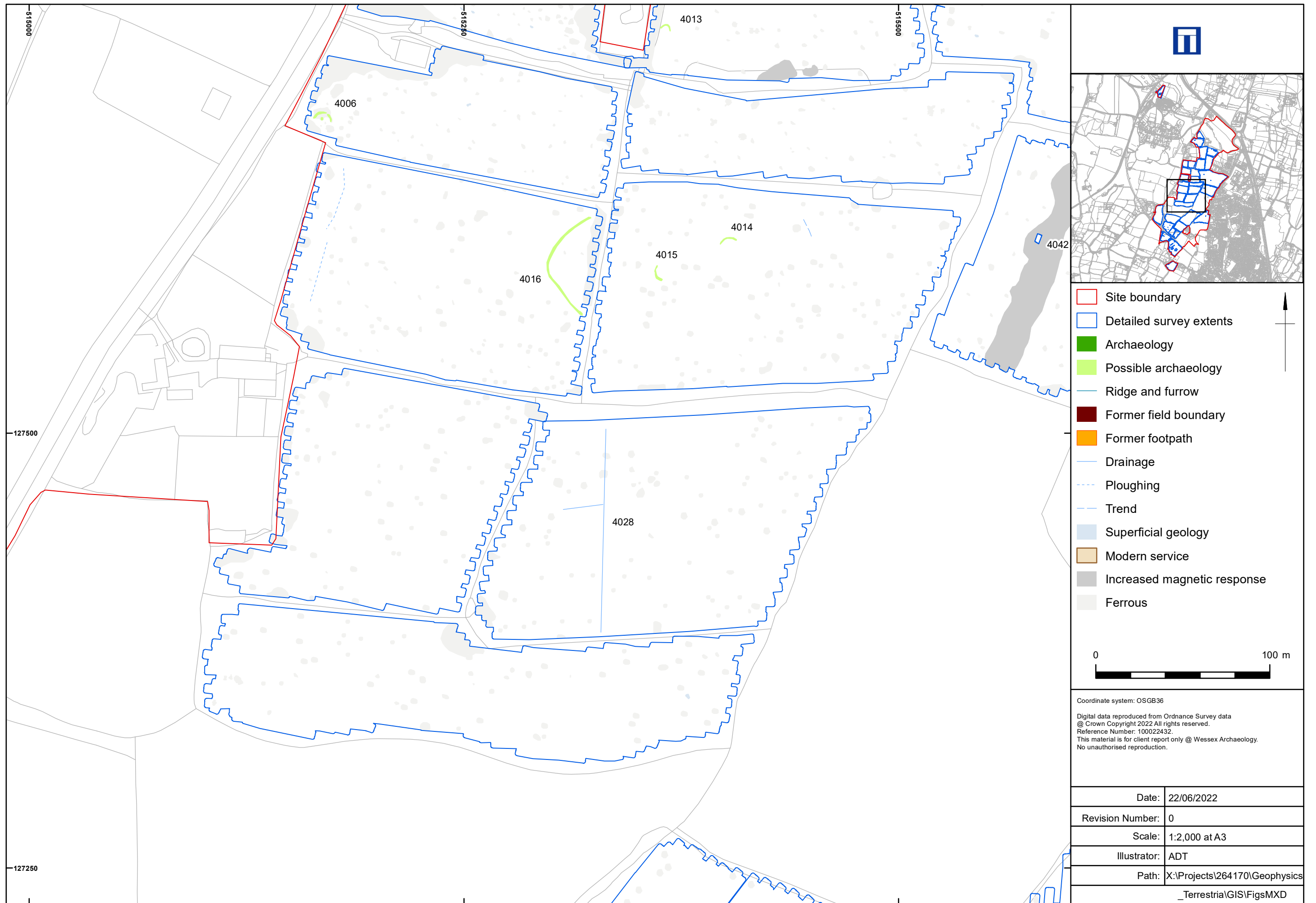
Detailed gradiometer survey results: interpretation LP_13 & LP_18

Figure 11



Detailed gradiometer survey results: greyscale plot LP_16- LP_24

Figure 12



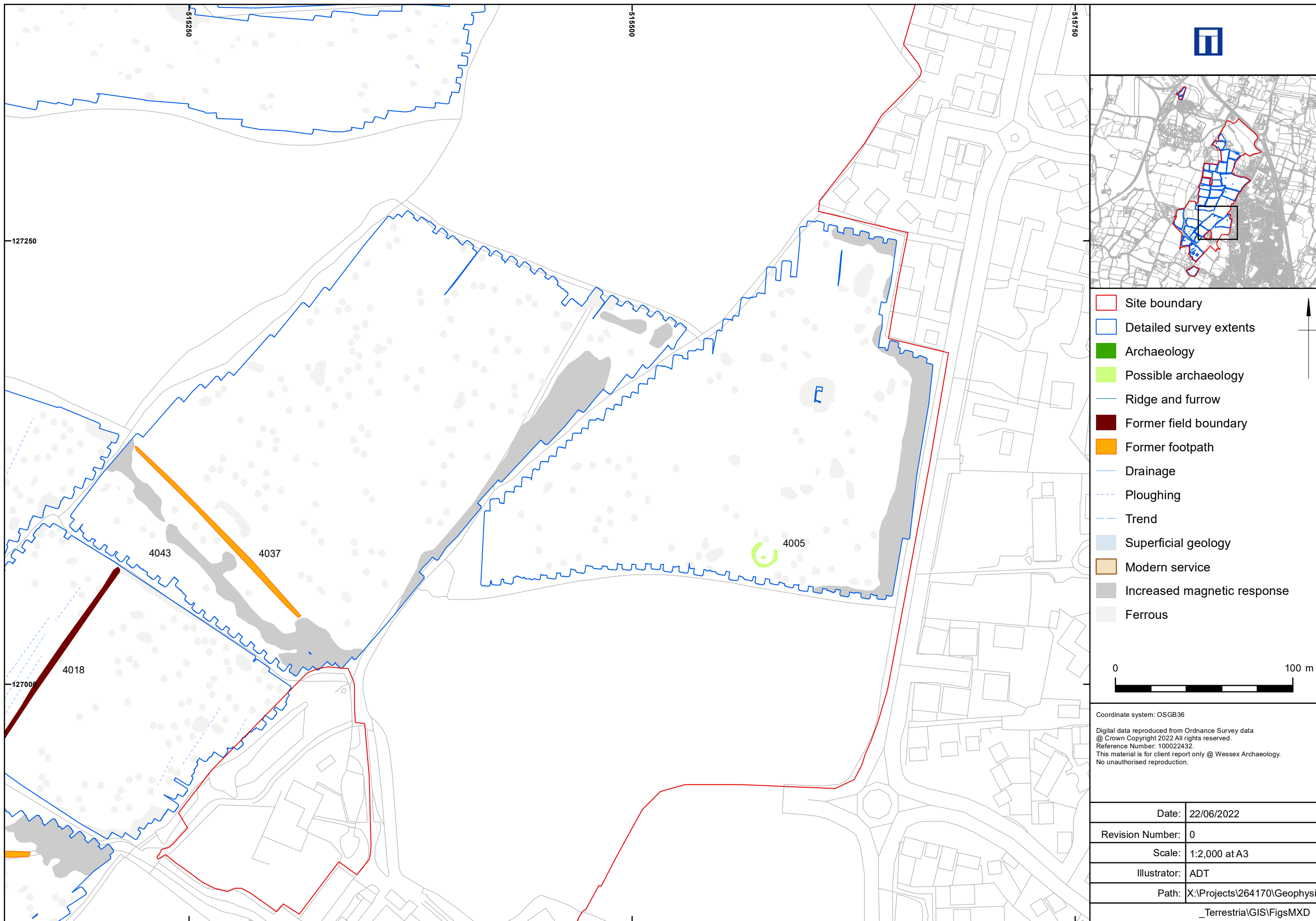
Detailed gradiometer survey results: interpretation LP_16 - LP_24

Figure 13



Detailed gradiometer survey results: greyscale plot LP_26 - LP_28

Figure 14



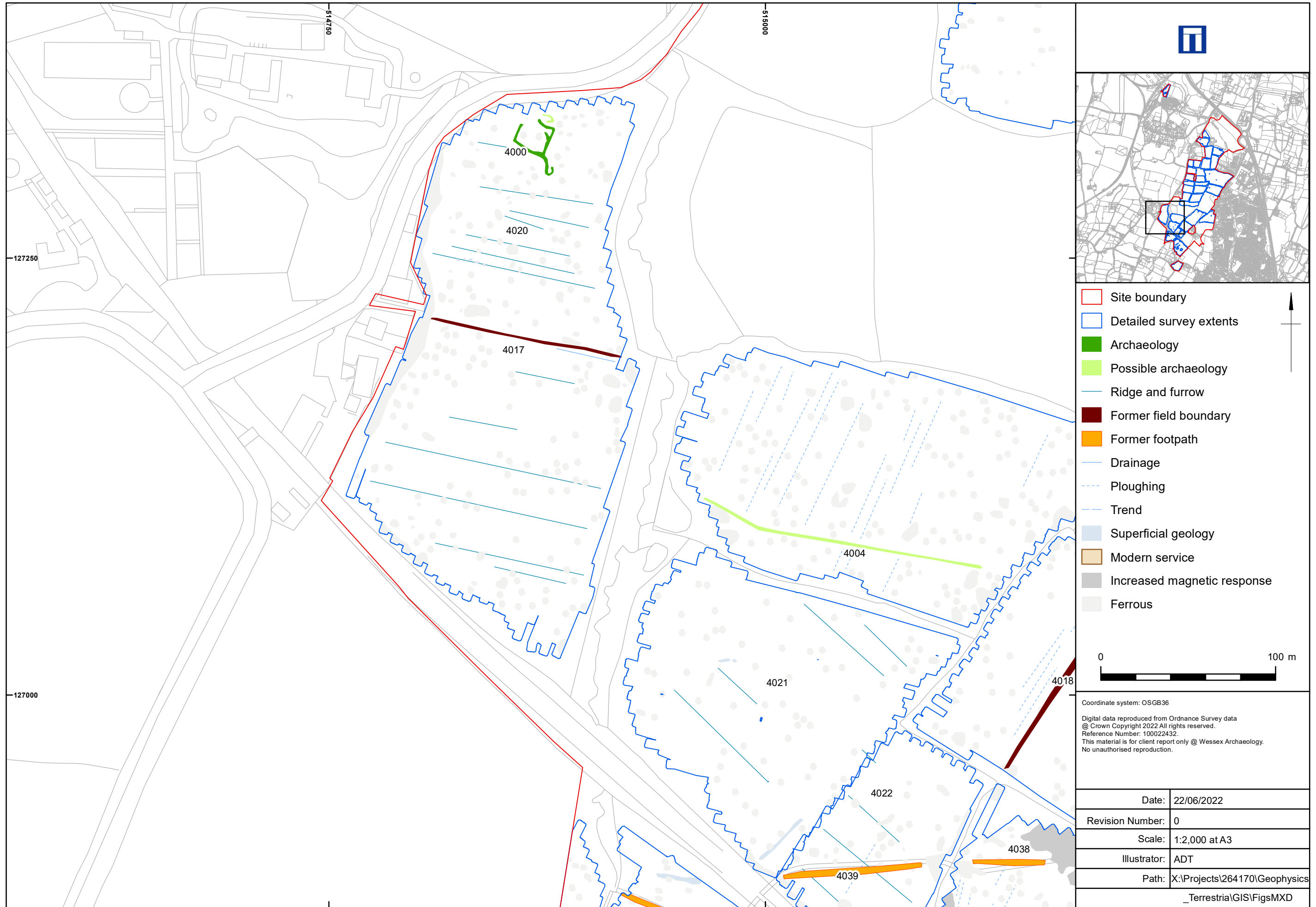
Detailed gradiometer survey results: interpretation LP_26 - LP_28

Figure 15



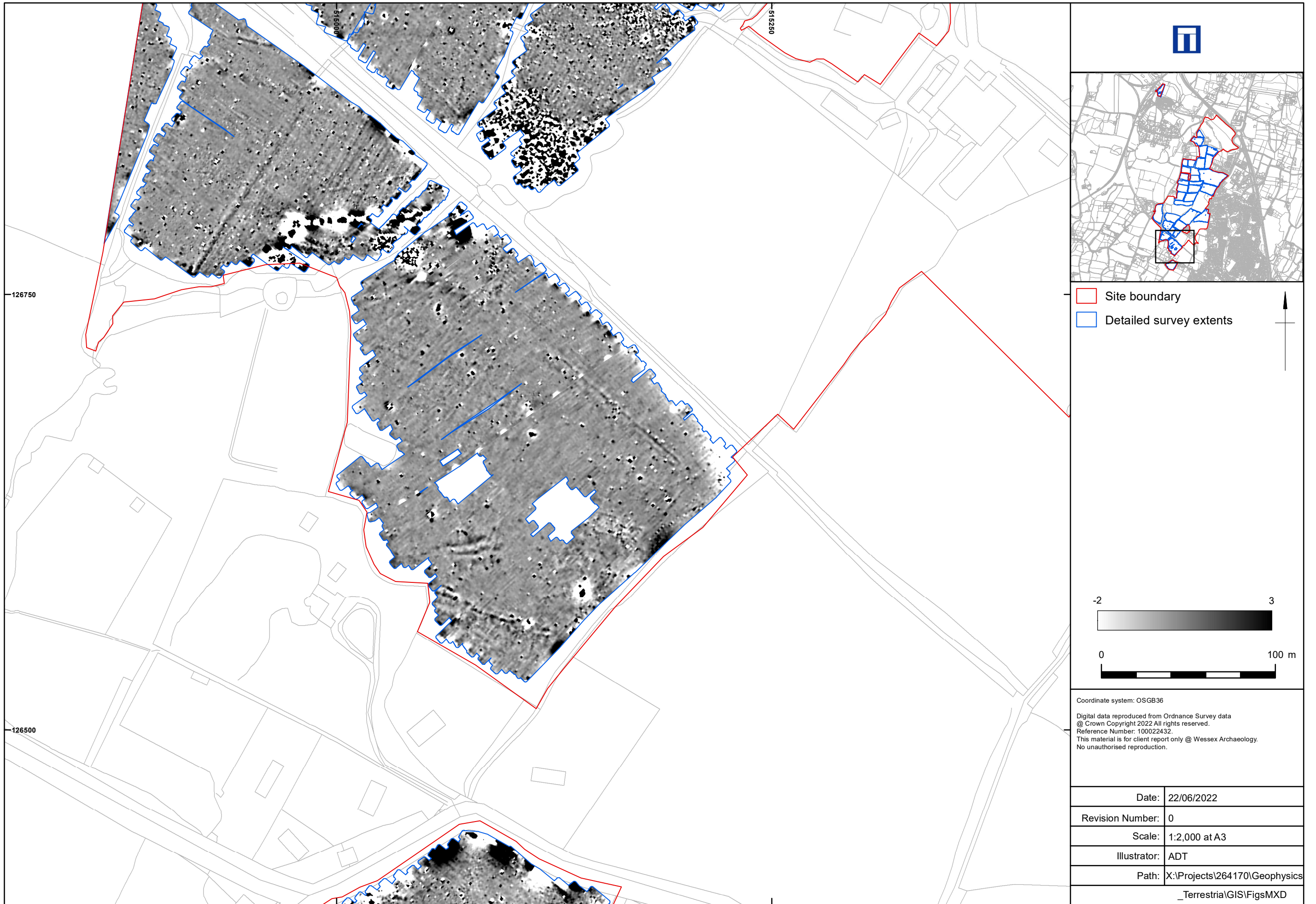
Detailed gradiometer survey results: greyscale plot LP_29 - LP_33

Figure 16



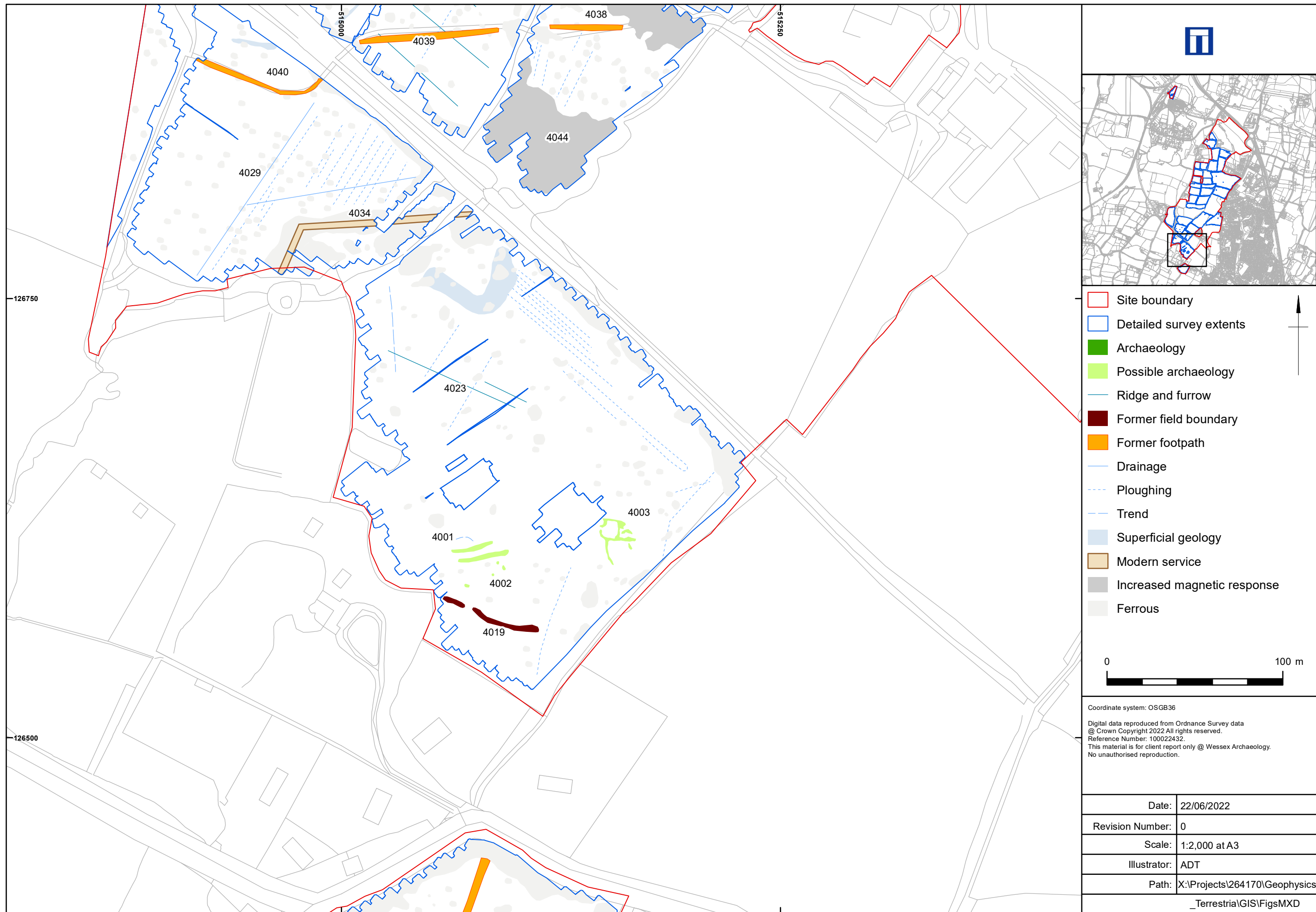
Detailed gradiometer survey results: interpretation LP_29 - LP_33

Figure 17



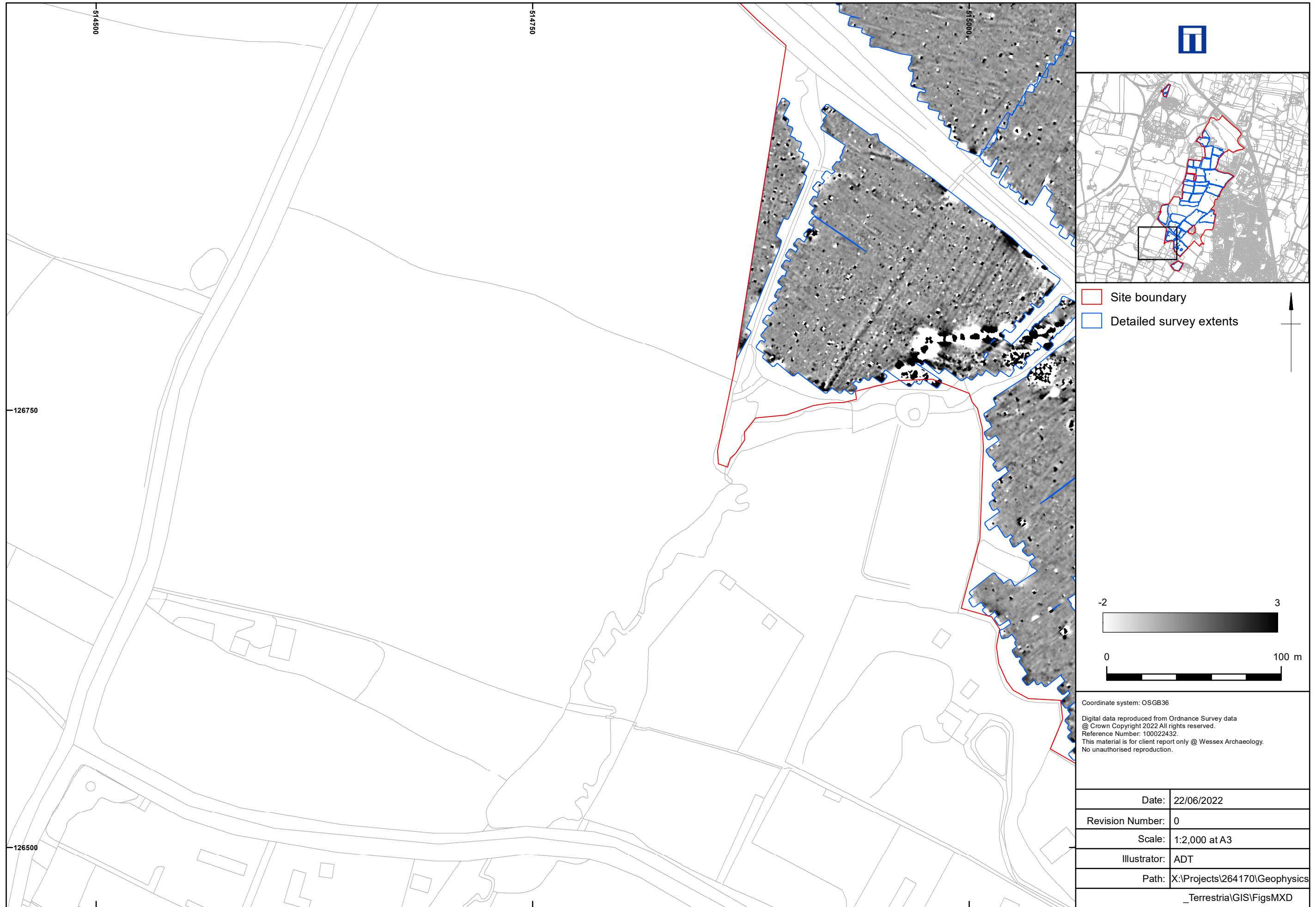
Detailed gradiometer survey results: greyscale plot LP_33 - LP_37

Figure 18



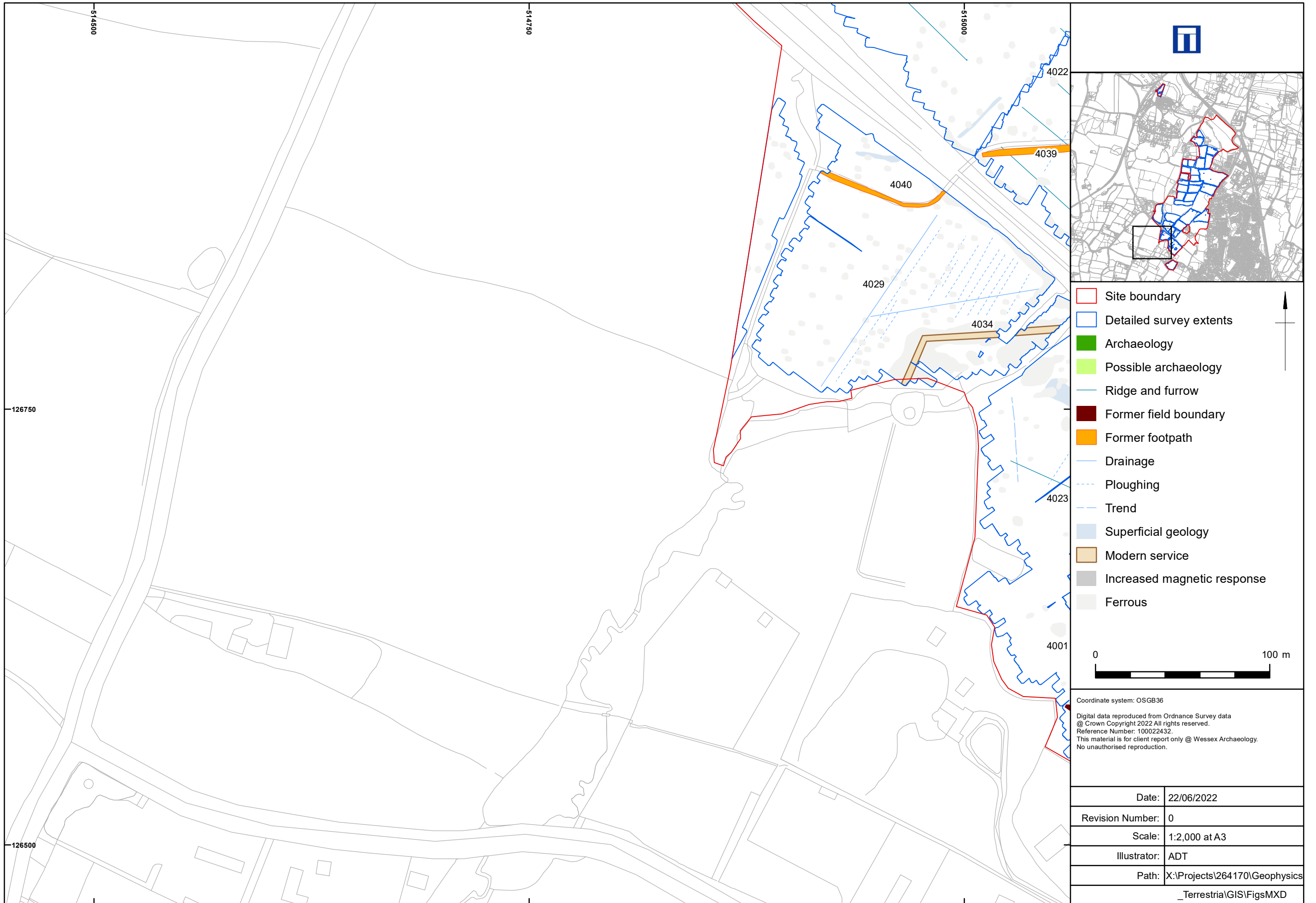
Detailed gradiometer survey results: interpretation LP_33 - LP_37

Figure 19



Detailed gradiometer survey results: greyscale plot LP_37 - LP_38

Figure 20



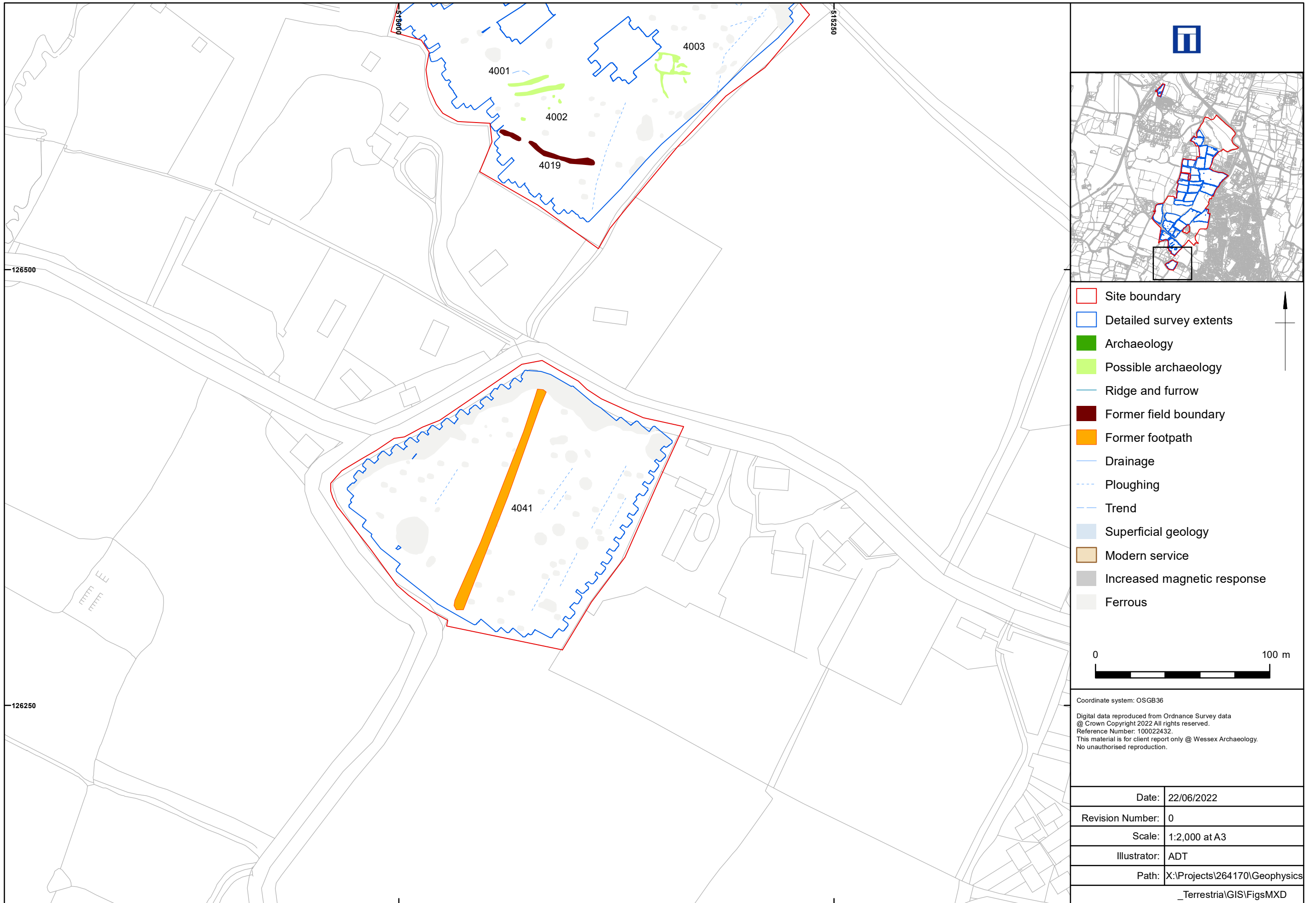
Detailed gradiometer survey results: interpretation LP_37 - LP_38

Figure 21



Detailed gradiometer survey results: greyscale plot LP_41

Figure 22



Detailed gradiometer survey results: interpretation LP_41

Figure 23



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