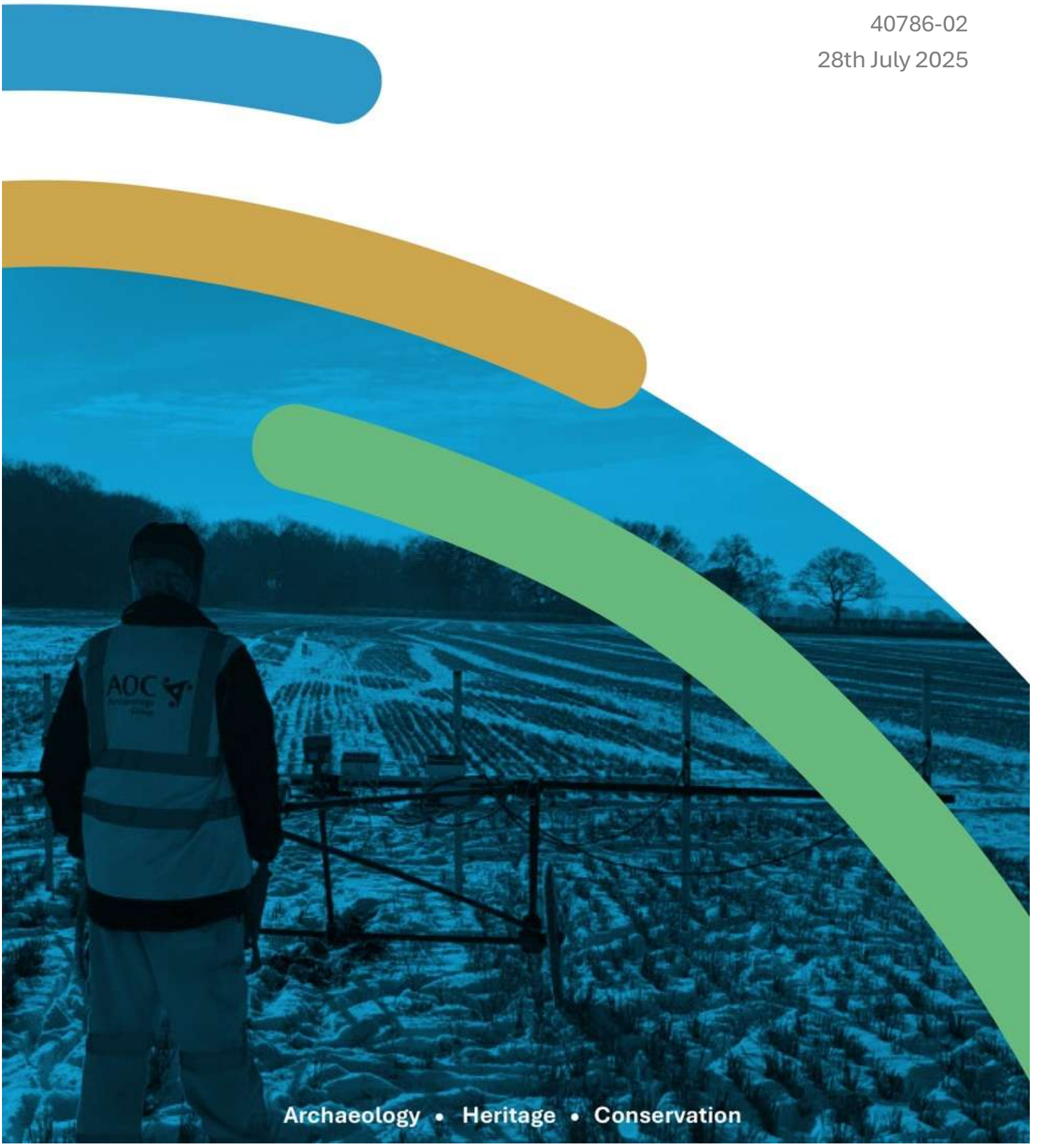
LYNE, SCOTTISH BORDERS

ARCHAEOLOGICAL GEOPHYSICS

SURVEY REPORT

40786-02

28th July 2025



Archaeology • Heritage • Conservation

On Behalf of: *Destination Tweed*
Old Melrose Dairy Steading
Melrose
TD6 9DF

National Grid Reference: *NT 18791 40556*

Author: *Robert Legg*

Illustration by: *Robert Legg*

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Non-Technical Summary

AOC Archaeology was commissioned by Destination Tweed Project to carry out an archaeological geophysical survey using magnetic gradiometry and earth resistance methods to investigate the extent of archaeological remains at Lyne Roman as a part of a research project. The survey was over a known Roman fort at the site previously excavated in 1901. The objectives of the survey were to provide information on the layout and development of the site, and current state of preservation of the site following decades of cultivation.

The survey area comprises 3.6 ha of pasture located at NGR NT 18791 40556.

Many of the anomalies from both techniques relate to the ramparts of the fort and a column of previously excavated buildings. Other features that were identified in previous excavations and are identifiable in the survey results include barracks in the southwest quarter of the fort, a sewer, a street and a tank. In the northwest quarter of the fort, survey results appear to relate to possible buildings or features that contradict the layout of the buildings in this quarter as indicated by previous fieldwork. Other anomalies appear to highlight possible features and extraction activity not previously identified.

Several anomalies of unclear origins were also identified from the survey data.

Other interpreted anomalies reflect ridge and furrow cultivation, and historical features recorded on historical OS maps and anomalies of uncertain origins. Also identified are anomalies consistent with drainage features and natural drainage.

Acknowledgements

We are grateful to the landowner of the forts at Lyne and Easter Happrew for their assistance with the survey. AOC would also like to thank all the participants for their effort and assistance during the survey.

The Destination Tweed project is a multi-partner collaboration led by the Tweed Forum. As part of the wider Destination Tweed which has over thirty funders, the Uncovering the Tweed project is funded by National Lottery Heritage Fund Scotland, Historic Environment Scotland, and the Fallago Environment Fund.

1 Introduction

1.1.1 This report of a geophysical survey over land at Lyne has been prepared by AOC Archaeology for Destination Tweed Project for submission to Scottish Border Council.

1.1.2 AOC Archaeology were commissioned to carry out a geophysical survey of approximately 6ha using magnetic gradiometry and earth resistance. The survey took place between the 17th and 21st February 2025 as part of wider archaeological research with the Uncovering the Tweed research project.

1.1.3 This survey was carried out to provide information on the presence, character and extent of potential buried archaeological remains within the survey area. The significance of any such remains can only be determined with reference to further information as such this report may form part of an assessment of significance but cannot stand alone as such.

2 Background to Wider Project and Survey Rational

2.1.1 The Destination Tweed project is a multi-partner collaboration led by the Tweed Forum. The River Tweed is one of the UK's most important river corridors with a rich natural and cultural heritage. A five-year partnership led investment, will deliver a 113-mile trail running from Moffat, past the source of the River Tweed and on to Berwick Upon Tweed where the river meets the sea.

2.1.2 Uncovering the Tweed (UtT) is a participatory archaeology and community heritage programme and one of the thirteen Destination Tweed projects. The UtT project is maximising the value of LiDAR technology for the investigation of the historic landscape. The UtT is delivering a legacy for future generations by protecting and conserving the landscape, supporting connections between heritage groups and community organisations along the route and building a core of empowered volunteers, confident in identifying, investigating, and conserving the heritage of the project area into the future.

2.1.3 There are several sub projects and themes, and geophysical survey is being carried out at different phases of several sub-projects and themes. These are being conducted by AOC either alone or in conjunction with volunteer participants. Geophysical survey methods being used include magnetometry, earth resistance, and ground-penetrating radar. Participants are learning how to operate these tools and interpret the resulting data to identify potential archaeological features. Geophysical surveys are being undertaken at key sites throughout the Tweed basin, focusing on those sites closest to the proposed trail and those closest to areas typically accessed by walkers, cyclists and other visitors to the area.

2.1.4 The geophysical survey results will feed into the archaeology map compiled by the Mapping the Tweed sub-project. Geophysical surveys will provide a useful comparative to sites identified through LiDAR and will be particularly useful in areas where LiDAR is less successful as in more cultivated land where sites have undergone more ploughing. Survey in the vicinity of known sites will be targeted to enhance our interpretation of these sites. At the same time, it is anticipated that new sites will be revealed as a result of geophysical survey either standalone or in tandem with LiDAR or other desk-based research. The results of the surveys

will feed into the wider Tweed Project and enable better presentation and appreciation of these sites.

2.1.5 Two sites have been selected for initial surveys and fall under the Roman River Frontier theme, which seeks to explore the evidence for Roman activity across the area. Several significant Roman sites are found along the Tweed such as Trimontium Fort and lesser-known Roman sites such as that at Lyne. An

2.1.6 While most of the ramparts at Lyne survive as an earthwork little is known about the survival of below ground structural remains. It is known from excavations in the 1900's that stone structures survived including a granary, commandants house and other buildings. A range of wooden buildings also existed, in addition to annexes to the north and south. The survey will provide a better understanding of the layout and survival of the fort. The ditches which have been levelled by cultivation may still be detectable by gradiometer survey. The resistance survey will hopefully map remnants of stone structures, while the gradiometer survey may identify postholes associated with wooden structures and help confirm areas of burning indicating hearths and other activity. As a result, these non-invasive surveys will hopefully provide important information on the layout and development of the site, but also on its current state of preservation following decades of cultivation.

2.1.7 It is proposed that the full survey area would be subject to magnetic gradiometer survey, with earth resistance survey subsequently targeted the known locations of buildings within the fort and the findings of the magnetic survey, providing complementary data based on the.

3 Parcel Location and Description

3.1.1 The survey area is located on land adjacent to the A72, approximately 300m west of Lyne Kirk and 6.1km west of Peebles (NT 18791 40556) (see Figure 1).

3.1.2 The proposed survey area totals approximately 8 ha within a single field of pasture and is situated at c. 212m above Ordnance Datum (aOD), on the top of a knoll within a meander of the Lyne Water; the ground falls steeply down to the river to the west and south. At present only 3.6 ha has been covered by gradiometer survey due to the adverse weather conditions and in places steeply sloping ground conditions. Earth Resistance survey has covered 1.4 ha over the centre of the fort.

3.1.3 The recorded solid geology underlying the survey area consists of the Portpatrick Formation, which comprises a turbidite succession of wacke and siltstones. This is overlain by superficial glaciofluvial deposits of sand and gravel (BGS, 2026). The soils within the survey area are recorded as brown earths (Scotland's Soils, 2026)

3.1.4 Magnetic gradiometry can provide variable results over sandstones and siltstones and can show a high degree of local variation over drift deposits, dependent on the magnetic mineralogy of the parent material; however, magnetometer survey can generally be recommended over any sedimentary geology (David et. al. 2008, 15). Earth resistance can be affected by the season and proximal weather conditions, depending on how saturated the ground conditions are and if water pooling has occurred against buried surfaces or foundations. In this instance, the soil and geological environment has not overly hindered the

collection and interpretation of gradiometer survey data with a strong magnetic contrast between anomalies associable with the fort and the magnetic background. With the earth resistance survey data the environmental setting has not restricted the survey with a good contrast between, both high and low electrical resistance responses.

4 Archaeological Background

4.1.1 The archaeological background below is a summary of information available from Trove and Pastmap, within 1km of the survey area (Historic Environment Scotland 2025a, 2025b), outlined in the Written Scheme of Investigation.

4.1.2 The survey area lies within the scheduled area associated with Lyne Roman fort (SM1492). The outline of the fort ramparts and perimeter ditches are partially traceable on the ground, although they are now considerably denuded by agricultural activity. Excavation in 1901 and early 1960s determined that the central buildings, including the *principia*, granary, commandant's house (ranged around a courtyard) and a probable workshop, were constructed of red sandstone, with additional wooden buildings including barracks, a possible stable and structures of unknown function. It is thought that the fort was built in the late Antonine period but only occupied for a short period. The fort has annexes to the north and south sides, with a separate fortlet (Trove ID 50034) located to the north.

4.1.3 A Roman road of compacted gravel (50036; 71557) runs SE-NW to the north of the fort, with a branch running to the eastern gate of the fort itself. Further west, its route is less certain, and it has been suggested that ran along the western bank of the Lyne Water, with a river crossing at Five Mile Bridge; the extant 18th-century bridge, c. 100m northwest of the survey area, is Category B Listed (LB19742). A Roman fort 270m NNE of Happrew Cottages (SM1493; c. 700m southeast of the survey area) and a Roman temporary camp site at Lyne (SM1494; c. 950m ENE of the survey area) are also scheduled.

4.1.4 The possibility that the plateau occupied by the Roman fort was already a significant location in the landscape during prehistory was raised by the recovery (prior to 1959) of a broken sandstone slab with cup and ring marks (50046) during ploughing of the field northeast of the fort. A series of prehistoric hillforts occupy the summits of surrounding hills and knolls, the closest of which to the survey area is at Tor Hill (SM3027), c.1.2km to the west. To the south of the Lyne Water, a Middle Iron Age scooped settlement (166715) has been identified to the northwest of Easter Happrew (c. 560m south of the survey area), with a prehistoric burnt mound (166715) recorded c. 700m south of the survey area).

4.1.5 Approximately 130m east of the survey area, several burial cists (50049), potentially part of a larger cemetery of presumed early medieval date, have been recovered by rescue excavations on the glacial knoll of Abbey Knowe

4.1.6 The Historic Environment Record refers to a tradition that in the late-13th or early-14th century, Sir Thomas Randolph (nephew of Robert I and, later, Earl of Moray), built a church at Lyne and a house on the site of the Roman fort (50047; recorded within the southwestern quadrant of the survey area), although this cannot be substantiated by earthwork remains or documentary evidence.

4.1.7 The extant parish church (LB15357; Category B Listed), located c. 280m east of the survey area, was constructed around 1645 (and renovated in 1830 and 1889). Hallyne House (LB13896; Category B Listed), was built c. 1830 and stands c. 70m ENE of the church; various post-medieval carved stones (342885) built into the walls of the house and the cottage to its rear suggest the presence of other buildings in the 18th-century.

5 Aims and Objectives

5.1.1 The primary aim of the archaeological geophysical survey is to identify and record potential geophysical anomalies indicative of archaeological remains through the production and interpretation of geophysical data which will aid in informing the development of subsequent phases of the archaeological evaluation strategy.

5.1.2 The results of the geophysical survey will be assessed and interpreted to gain a clear understanding of potential buried remains within the survey areas.

5.1.3 As a result, these non-invasive surveys will hopefully provide important information on the layout and development of the site, but also on its current state of preservation following decades of cultivation.

5.1.4 Specifically, the aims of the gradiometer survey are:

- To locate, record and characterize any potential surviving sub-surface archaeological remains within the survey area,
- To help in determining the next stage of investigations at Lyne by providing evidence that remains of archaeological, possible archaeological, historical and uncertain origins are likely present on site, which can form targets for further investigation at the site.
- To produce a comprehensive site archive and report.

5.1.5 Additional site objectives are to:

- Provide important information on the layout and development of the site.
- Provide important information on the current state of preservation of the site following decades of cultivation.

6 Methodology

6.1.1 The geophysical survey was undertaken between 17/02/2025 and 21/02/2025.

6.1.2 All geophysical survey work was carried out in accordance with current good practice specified in the EAC guidelines document (Schmidt et al. 2015), as recommended by Historic England, and in the Chartered Institute for Archaeologists' Standard and Guidance for Archaeological Geophysical Survey (2014, updated 2020).

6.1.3 The gradiometer survey was carried out using Sensys MAGNETO® MXPDA hand pushed magnetometer cart system utilising eleven FGM650/3 fluxgate gradiometer sensors mounted 0.5m apart upon a frame along with data logging equipment and batteries. 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 a tablet PC.

6.1.4 Care was also be 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 them improves the overall data quality and results obtained.

6.1.5 The data was exported in ASCII file before being processed along with the GPS data in TerraSurveyor v3.0.34.10. Data processing, storage and documentation was carried out in accordance with the good practice specifications detailed in the guidelines issued by the Archaeology Data Service (Schmidt and Ernenwein, 2009).

6.1.6 At present an area of 3.4 ha has been covered by gradiometer survey using the Sensys cart

6.1.7 The earth resistance survey was carried out using a Geoscan Research RM85 resistance meter. The survey was conducted within a system of grids measuring 30m by 30m each, which were marked out using temporary markers at each grid node.

6.1.8 Grid nodes were set out and recorded using a Trimble R8 / R10 dGPS with an error no greater than +/- 0.05m. The GPS system uses the Trimble "VRS Now" service to provide instant access to real-time kinematic (RTK) corrections enabling an accuracy of < 2cm. It was connected via a SIM card run on the Vodafone network with good cellular signal in the survey areas, meaning a repeater will not be required.

6.1.9 Data was collected using zig-zag traverses, with a sample interval of 0.5m and a traverse interval of 0.5m.

6.1.10 A total of 1.4 ha surveyed by the earth resistance survey, over 15 complete grids.

6.1.11 The data will be downloaded and processed using Geoscan Geoplot v4.0.

6.1.12 Interpretations of all the geophysical data were created as shapefile layers in ArcGIS Pro. In the GIS environment all survey data is also compared against historical OS maps of the area (NLS, 2025), LiDAR data from an ongoing assessment as part of the 'Uncovering the Tweed Project' (AOC Archaeology, forthcoming), and aerial photographs of the site.

7 Results and Interpretation

7.1.1 The processed gradiometer cart data has been visualised as a greyscale plot, plotted between -2 to 3nT as seen in Figure 3. An interpretation plot of the processed gradiometer cart data is presented in Figure 4. Processed earth resistance data is visualised as a greyscale plot in Figure 5 with data plotted at 200 ohms to 285ohms, while a high pass filtered plot of the data is visualised in a greyscale plot with data plotted at ±1. in Figure 6. Interpretation of the processed earth resistance data is presented in Figure 8. Comparative side by side data plots of the processed gradiometer cart r and earth resistance data are shown in Figure 8, while comparative sided by side plots of the processed gradiometer and earth resistance data is shown in Figure 9. Combined plots of both the gradiometer and earth resistance data are

depicted over LiDAR digital terrain model of slope in Figures 10. Figure 11 show minimally processed gradiometer cart data plotted as XY traces at 20nT/cm at A3.

7.1.2 Appendix 4 contains a guide to the interpretation categories employed and the logic used to assign anomalies to specific classes, as well as a short discussion of how past human activity results in these anomalies, however some important points are noted below:

7.1.3 The classes have three sub-types (generally); anomalies (typically indicated by a solid colour polygon), spreads (a stippled polygon) and trends (a line with a colour matching the polygon colour). Anomalies refer to distinct changes in the survey data which suggest an abrupt boundary between materials below ground, such as a cut feature with a magnetically contrasting fill. Spreads of enhanced material refer to diffuse areas of altered magnetic contrast which suggest a localised spread of material with a magnetic contrast within the topsoil or ploughzone. Linear trends are less distinct and are typically visible as linear patterning in the overall texture of the data. A common example of these is the striping effect caused by recent ploughing.

7.1.4 Anomalies placed in the 'uncertain' class may have an archaeological origin, but other explanations are equally likely. Where any particular interpretation is more likely than others, the anomaly is assigned to that class.

7.1.5 The definite 'Archaeology' class is only used for anomalies with no other possible explanation, either due to their diagnostic characteristics or because they are corroborated by other sources such as previous interventions within the Parcel. Anomalies with magnetic characteristics or morphologies that suggest an archaeological origin with generally be assigned to the 'Possible Archaeology' class.

7.1.6 The anomaly type 'ferrous spike' is assigned to strong dipolar anomalies which cover a small spatial area and have a characteristic appearance in the XY traces of the survey data. These are strongly likely to be of recent origin in the form of magnetic or ferrous debris within the topsoil; 'spikes' of other origin will be assigned to their appropriate classification.

7.1.7 A distinction is made between modern disturbance from strongly ferrous materials within or adjacent to the survey area, such as the strong dipolar 'halos' produced by services like gas mains, and spreads of material within the topsoil causing noise which is assumed to have a recent origin. Generally speaking, 'modern disturbance' occurs at a distance from magnetic source, whereas modern magnetic spreads/debris are related to material directly at that location.

7.1.8 Generally, only anomalies (or groups thereof) of a likely archaeological or historical origin have been assigned an anomaly number on the interpretation figures. However, anomalies interpreted as resulting from other processes that are integral to the discussion of the results have also been assigned anomaly numbers.

7.1.9 Magnetic gradiometer survey data exhibits a strong background magnetic enhancement, which was beneficial to plot at wider plotting range of -2 nT a 3nT. Strong background magnetic variation is identifiable throughout most of the gradiometer survey data, which is likely to result from glaciofluvial deposits. Though it is often difficult to identify anomalies

against this background, several anomalies of archaeological, possible archaeological, uncertain, historical and agricultural origins have been interpreted from the gradiometer survey data. Anomalies relating to the ramparts of the fort are prominent withing the gradiometer data, along with several other anomalies relating to buildings identified near the centre of the fort.

7.1.10 Earth Resistance survey data exhibits a strong contrast between high and low earth resistance measurements with several anomalies of both high and low earth resistance identified from the survey data. Many of the anomalies appear to be possibly of archaeological origins, which is perhaps not surprising given that the survey grids were deliberately located over the central range of buildings identified at the site. Several of the wall foundations as is noted below appear to be related to low resistance responses, which is likely to result from the saturation of the sandstone foundations with groundwater (see Section 4.2)

Archaeology

7.1.11 In the fluxgate gradiometer data, there are three magnetically negative parallel linear anomalies, which relate to the ramparts along the southern edge of the fort [m1]. The anomalies seem to collocate with at least the projected locations of banks highlighted in LiDAR data of the site. Just within the northernmost of the three parallel anomalies is a magnetically positive linear anomaly indicative of an infilled feature such as a ditch. In the earth resistance anomalies appear to relate of possible ditches lying between the banks indicated by the magnetically negative anomalies [r1].

7.1.12 Along the northern edge of the fort, most anomalies within the fluxgate gradiometer data appear to be magnetically positive linear anomalies, which appear to relate to infilling of the ditches of the ramparts [m2]. Though some negative anomalies are present the banks along the northern edge are not so present in the geophysical or LiDAR data. Near the centre of the eastern edge of the fort curvilinear anomalies appear to relate to infilled ditches around an earthwork interpreted as representing the entrance to the fort, whilst the earthwork is marked with a grouping dipolar magnetic anomalies consistent with a concentration of ferrous and fire material [m3].

7.1.13 Across the centre of the fort there is a concentration of anomalies within the gradiometer and earth resistance data, which appear to relate to a range of buildings built of red sandstone, and excavated in 1901 (see Section 4.2). These anomalies incorporate magnetically negative linear anomalies orientated east to west and a combination of low and high electrical resistance data. Several of the high resistance anomalies collocate with the magnetically negative anomalies would appear to relate to possible wall foundations. In other locations though the magnetically negative anomalies align with low resistance anomalies, which suggests that at least some of the low resistance anomalies relate to sandstone walls, though not common in wet ground conditions walling of materials such as sandstone can absorb water from the surroundings and becomes associable with low earth resistance measurements.

7.1.14 Located near the centre of the fort in the earth resistance survey is a grouping of low resistance anomalies demarking a rectilinear form, which as mentioned above appears to

relate to the sandstone building remains of the *principia* [r2] (see Sections 4.2 and 7.10.3). Within and immediately outside this rectangular area are several strongly magnetic anomalies, and concentrations of dipolar anomalies indicative of the presence of burnt material [m4, m5]. The eastern half of the *principia* is also marked by areas of higher earth resistance measurements [r3], which may relate to areas of gravel within the *principia*. Crossing the *principia* southeast to northwest is a weak negative magnetic anomaly, which appears to relate to the location of a sewer on a projected plan of remains at the fort [m6].

7.1.15 Located just to the south of the *principia* is a broad low resistance anomaly that appears to relate to the location of the granary also excavated in 1901 [r4]. Further south of the granary are several L-shaped high and low earth resistance anomalies that appear to relate to location layout of the commandant's house [r5].

7.1.16 Located just north of the *principia* is a series of five magnetically negative anomalies orientated west to east [m7], the southern three correspond with low earth resistance anomalies and the north two align with high earth resistance anomalies [r6, r7]. All these anomalies appear to relate to the sandstone building remains of a possible store or workshop. Differences in the electrical response of the different walls of this building are likely to relate to variation of ground water saturation in the vicinity of the walls, with the two northern walls being on higher ground, and therefore possibly less saturated ground.

7.1.17 High earth resistance anomalies running along the western edge of the central column of buildings and in between the buildings [r8], appear to relate to streets identified on the projected plan of the remains at the fort. It is possible these streets are composed of gravel, which in this instance is more freely draining than the sandstone buildings, which in this instance absorbed moisture. Located just west of the *principia* is a low resistance anomaly, which correlates with the location of a tank identified on the plan of the fort [r9].

7.1.18 In the southeast quarter of the fort are three linear high earth resistance anomalies [r10], which appear to align with the barracks previously identified by excavation; however there appear to be additional features indicated by the earth resistance data than are depicted in the plans of the fort remains. Amongst these features are several fragmentary magnetic anomalies, which may indicate the presence of deposits in between these features [m8].

Possible Archaeology

7.1.19 Surrounding the anomalies associated with the central column of buildings crossing the fort is a broad area of enhanced magnetism in the gradiometer survey data. This magnetic enhancement could relate to the use of these buildings, though it is possibly more likely that it relates to back filling of the excavation trenches.

7.1.20 Across the northwest corner of the fort are several high and low earth resistance anomalies spread out over a predominantly east to west orientation [r11]. A couple of weakly magnetic anomalies are identifiable running along similar orientations in the vicinity of the earth resistance anomalies [m9]. The geophysical anomalies seem likely to relate to features and structures in this quarter of the fort. Plans of remains of the fort suggest that barracks running in a similar alignment as those in the southwest quarter were present in the northwest quarter; the geophysical anomalies do not appear to fit with this depiction of the northwest

quarter, with most anomalies running almost perpendicular to these projected barracks. The geophysics results bring into question how much the plans of the barracks are based upon excavation or projected from knowledge of other Roman forts.

7.1.21 Running approximately west to east across the northeast quarter of the fort in the gradiometer survey data are a couple of ephemeral linear magnetic anomalies [m10]. These anomalies are similar to those interpreted from the gradiometer data in the northwest corner of the fort; however, possibly due to the earth resistance survey not extending this far, there are no comparable earth resistance anomalies in this quarter.

7.1.22 Within the gradiometer survey data there are several ephemeral linear and curvilinear anomalies, which may relate to features associated with the use of the fort. A weak linear magnetic anomaly runs north to south just within the western ramparts of the fort [m11], which may relate to a curb or roadway indicated upon the plan of remains at the fort. Two weakly negative magnetic anomalies run southwest from the *principia* in the centre of the fort and appear to relate to an earthwork identifiable in the LIDAR data [m12]. The magnetic signals of these anomalies appear similar to the anomaly associated with sewer crossing the *principia* (see Section 7.10.4).

7.1.23 Located just within the ramparts of the fort, along the eastern and western edges of the fort are four groupings of strongly magnetic anomalies within areas of enhanced magnetism [m13]. These could relate to either small scale industrial or extraction activity just within the rampart of the fort.

Unclear Anomalies

7.1.24 Located in the northwest corner of the gradiometer survey area are two concentrations of strong dipolar magnetic anomalies, which are consistent with deposits of ferrous or fired material [m14] It is uncertain whether these deposits are modern or archaeological in origin.

7.1.25 From the fluxgate gradiometer survey data there are two concentrations of strong magnetic anomalies surrounded by strong negative magnetic haloes located near the centre of the fort and towards the southeast corner of the fort [m15, m16]. These anomalies are not consistent with ferrous structures or debris; however, it is uncertain whether the anomalies result natural activity such as lightning strikes, or areas of burning activity of uncertain origins. A strong dipolar anomaly is also located in the southeast corner of the fort's ramparts, which could either relate to a large ferrous object or area of burning [m17].

7.1.26 In the gradiometer survey data discrete anomalies with a strong magnetic signal are identifiable near the south of the fort and along the northern ramparts of the fort [m18, m19]. It is uncertain whether these relate to either infilled pits or features of natural origins.

7.1.27 In the northwest corner of the fort are four linear striations in the gradiometer survey data, whose origins are uncertain [m20].

7.1.28 Located in the southwest corner of the earth resistance survey data is a low resistance anomaly and a high resistance anomaly, whose origins are unclear [r12, r13].

Historic Feature

7.1.29 Transecting the northeast corner of the fort are two parallel linear negative magnetic anomalies which runs parallel to the field boundary in the north of the of the survey area [m21]. The southern most of the two anomalies runs just north of the location of the field boundary on historical OS maps, which is located further to the south than is in the present landscape. Two parallel anomalies such as these two are often indicative of a feature such as a track. Running parallel to this possible track are several repeating linear magnetic trends indicative of cultivation.

Non-archaeological anomalies

7.1.30 Several strong dipolar anomalies are located in several locations across the gradiometer survey data, which are consistent with the presence of near surface ferrous objects.

8 Conclusions

8.1.1 A magnetic gradiometer survey and an Earth Resistance has been carried out over the Roman fort at Lyne by AOC Archaeology. The earth resistance survey was targeted over a range of previously known about building remains at the centre of the Roman fort, basis of the gradiometer survey results. The gradiometer data exhibits a strong background magnetic variation, which is consistent to magnetic variation associated with glaciofluvial deposits; weaker and discrete magnetic anomalies can often be difficult to identify and interpret against such background. Despite this though several anomalies relating to the uses of the fort and later historical features have been interpreted from gradiometer survey data. With the earth resistance data there is a good contrast between high and low resistant areas and anomalies. Much of the earth resistance data appears to relate to probable and possible archaeological features. Several of the walls associated with the previously known buildings appear to relate to low resistance anomalies withing the earth resistance data, which is likely to reflect a saturation of the sandstone remains due to high groundwater levels.

8.1.2 Prominent within gradiometer survey data are anomalies relating to the outline of the fort's ramparts, which for the most part along the southern edge of the fort may related to the banks of the ramparts, though anomalies relating to infilled ditches have also been identified. Along the northern edge of the fort most of the gradiometer anomalies are weaker and appear to relate to infilled ditches. Low resistance anomalies within the earth resistance data appear to relate to infilled ditches between the banks identified in the gradiometer data and LiDAR DTM. Other magnetic anomalies collocate with the earthworks of the possible eastern entrance to the fort.

8.1.3 Prominent in both the gradiometer and earth resistance data are anomalies that relate to a range buildings previously excavated in 1901. Near the centre of the fort are anomalies in both the earth resistance and gradiometer survey data demarking a rectilinear form previously identified as the pricipia of the fort, with some anomalies suggesting the presence of gravel deposits and fired material. To the north of the *principia*, anomalies from both survey techniques appear to relate to the outline of the previously identified store or workshop. South

of the *principia*, anomalies from the earth resistance data relate to the outline of the granary and commandant's house identified from the earth resistance survey data.

8.1.4 Other anomalies appear to relate to a sewer crossing the *principia*, streets around the central range of buildings and a tank. High resistance anomalies in the southwest quarter of the fort appear to align with previously depicted barracks, though the geophysical anomalies appear more numerous than the barracks depicted in plans of the fort.

8.1.5 In the northwest quarter of the fort earth resistance and gradiometer survey anomalies appear to relate to features and buildings orientated east to west. This orientation is perpendicular to the depiction of the buildings in this quarter in the 1901 plan of the fort, which does bring into question the degree to which the plan of the fort is depicted from excavations, or hypothesized from other fort sites. Anomalies orientated east to west also transect the northeast quarter of the fort in the gradiometer data.

8.1.6 Several ephemeral anomalies could relate to features such as a curb of roadway running along the western boundary of the fort and two linear anomalies similar in magnetic signal to the sewer crossing the principia. Four groupings of strong magnetic anomalies and areas of magnetic enhancement in the gradiometer data could relate to either small scale industrial or extraction activity just within the rampart of the fort.

8.1.7 In the northwest corner of the survey area are two concentrations of strongly magnetic anomalies which could relate to deposits of ferrous or fired material of uncertain origins. In the fort two concentrations of strong magnetic with negative magnetic haloes could relate to either a natural process or area of burning, while a dipolar anomaly in the southeast corner could relate to a large ferrous object or area of burning. Discrete magnetic anomalies in the south of the fort could either relate to infilled pits or features of natural origins, and high and low resistance anomalies similarly have uncertain origins. Four linear striations in the northwest corner of the gradiometer survey data are also of uncertain origins.

8.1.8 A possible track running parallel to field boundary is indicated in the north of the survey area by two parallel negative magnetic anomalies within the gradiometer survey data. Running parallel to this possible track are several repeating linear magnetic and earth resistance trends indicative of cultivation, which may relate to historical cultivation.

8.1.9 In addressing the site-specific objective of providing information on the layout and development of the site, the survey has highlighted the outline of the fort along with several possible features within it. Most of these anomalies appear to relate to a plan of the remains of the fort based upon excavations in 1901. Some of the anomalies though appear to contradict this plan, the northwest corner of the fort, bringing into question the true extent of these excavations in 1901. Some anomalies of possible archaeological origins, highlight potential features and extraction activity not noticeable on the plan from 1901.

8.1.10 In addressing the site-specific objective of providing information regarding the current state of preservation of the site following decades of cultivation, the survey has identified a number of anomalies relating to buildings and features identified upon the1901 plan from of the fort. This appears to suggest many of buildings and features appear to survive within the fort. The survey data also suggest the presence of a several features that appear to either suggest the

presence of features or buildings that either not present on the plan from 1901, or contradict it; these anomalies appear to the presence, and therefore survival, of several features and buildings which have not been excavated.

8.1.11 In assessing the results of the geophysical survey against the specific aims set out in Section 4:

- The survey has succeeded in locating, recording and characterising surviving sub-surface remains within the Site, though more remains may be presposent that are not suitable for detection using magnetic gradiometry.
- The survey will help in determining the nature of any future archaeological investigations at Lyne as it has provided evidence that remains of archaeological, possible archaeological, historical and uncertain origin are most likely present on site, and has provided a number of targets for further investigation though no further work is currently planned;
- The survey has resulted in a comprehensive report and archive

8.1.12 Also, in addressing the additional specific site objectives the survey provided:

- important information on the layout and development of the site;
- important information the current state of preservation of the site following decades of cultivation.

Statement of Indemnity

8.1.13 The survey has resulted in a comprehensive report and archive. Although the results and interpretation detailed in this report have been produced as accurately as possible, it should be noted that the conclusions offered are a subjective assessment of collected data sets.

8.1.14 The success of a geophysical survey in identifying archaeological remains can be heavily influenced by several factors, including geology, seasonality, Area conditions and the properties of the features being detected. Therefore, the geophysical interpretation may only provide an indication of the nature and extent of buried archaeological remains and should be considered in conjunction with other sources of archaeological evidence and, where appropriate, intrusive investigation.

9 Archive Deposition

9.1.1 In accordance with professional standard practice an ‘Online Access to the Index of Archaeological Investigations’ (‘OASIS’) record will be completed for submission to the HER and Archaeological Data Service (ADS) (Appendix 2).

9.1.2 One digital and hard copy of the report and data will be submitted to the relevant Historic Environment Record (HER) at the Client’s discretion.

9.1.3 A digital copy of the report and data will also be submitted to the ADS at the Client’s discretion.

10 Bibliography

AOC Archaeology. Forth coming. *Uncovering the Tweed - Mapping the Tweed: Survey of Roman Forts at Easter Happrew and Lyne, Peeblesshire'*

Aspinall,A., Gaffney, C. Schmidt,A. 2008. Magnetometry for Archaeologists (Geophysical Methods for Archaeology).*

British Geological Survey, Geology of Britain Viewer. http://www.bgs.ac.uk/data/mapViewers/home (last accessed 09/06/2025)

Brown, H. and Ovenden, S. 2024. *Archaeological Geophysical Survey Lyne, Scottish Borders Written Scheme of Investigation*. (AOC Archaeology)

CIfA, 2020. Standards and Guidance for Archaeological Geophysical Survey.

Clark, A., 1996. Seeing Beneath the Soil: Prospecting Methods in Archaeology. Second Edition, London.*

Excavation of the Roman Camp at Lyne, Peeblesshire, undertaken by the Society of Antiquaries of Scotland in 1901: With Notes on the Relics. (1901). *Proceedings of the Society of Antiquaries of Scotland*, *35*, 154-186. https://doi.org/10.9750/PSAS.035.154.186

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

Gaffney, C. and Gater, K., 2003. *Revealing the Buried Past: Geophysics for Archaeologists*. Stroud: Tempus Publishing Ltd.

Heritage Gateway, 2025. https://www.heritagegateway.org.uk/gateway/advanced_search.aspx (last accessed 09/06/2025)

Heron, C and Gaffney, C., 1987. 'Archaeogeophysics and the site: ohm sweet ohm?' in C.Gaffney and V. Gaffney (eds.) *Pragmatic Archaeology: Theory in Crisis?* British Archaeological Report, British Series 167:71-81.*

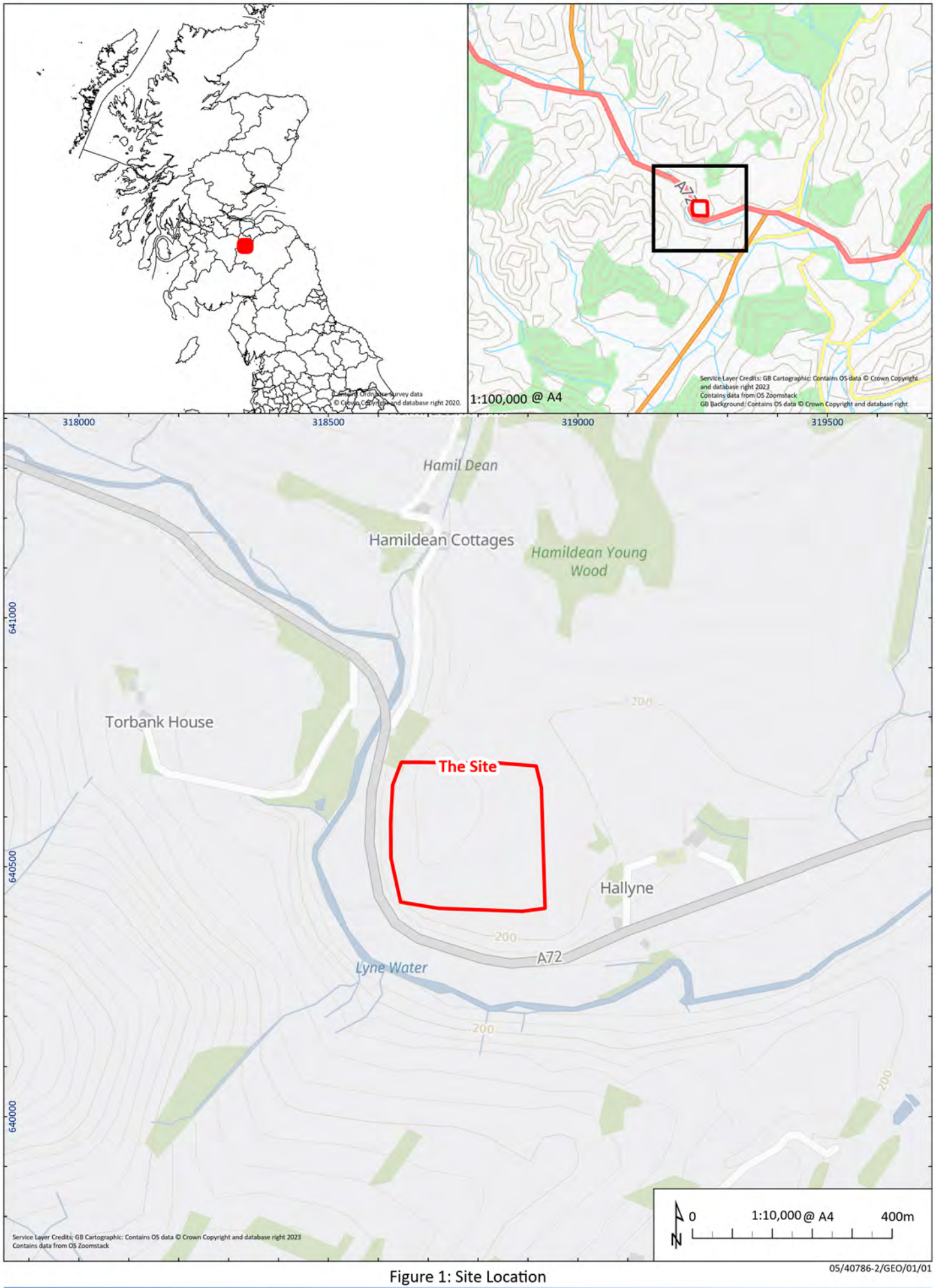
Lowe, K., Fogel, A., 2010. Understanding Northeastern Plains Village site trough archaeological geophysics. Archaeological Prospection 24.*

Schmidt, A. and Ernenwein, E., 2009. Archaeology Data Service: Geophysical Data in Archaeology: A Guide to Good Practice.

Schmidt, A. Linford, P. Linford, N. David, A. Gaffney, C. Sarris A. and Fassbinder, J. 2015. *EAC Guidelines of the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*. EAC Guidelines 2, Archaeolingua, Belgium.

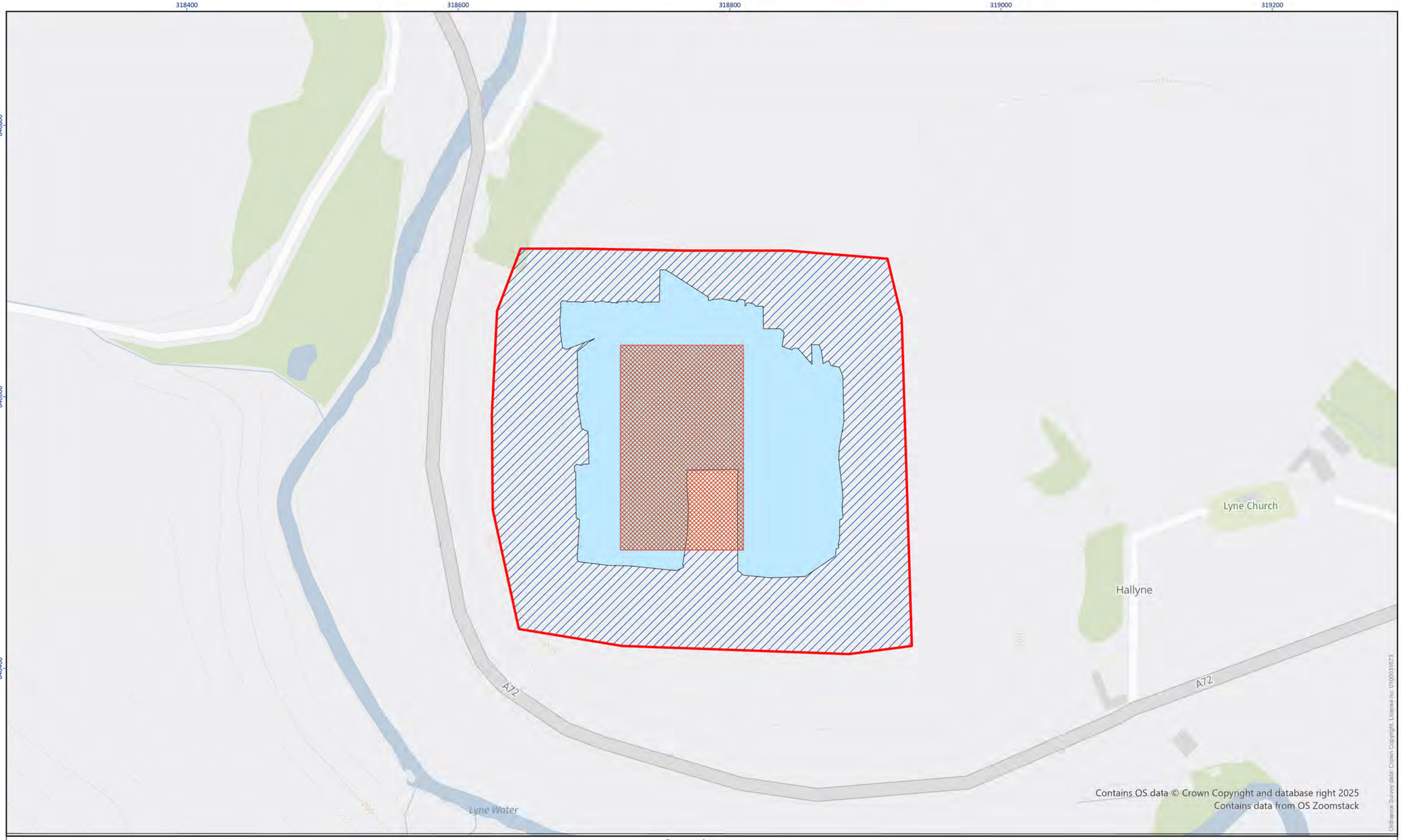
Sharma, P.V. 1997. Environmental and Engineering Geophysics*

Soilscapes. *http://www.landis.org.uk/soilscapes2 (last accessed 09/06/2025)*



05/40786-2/GEO/01/01

Figure 1: Site Location



Survey Areas

Figure 2

Red Line Boundary
Outstanding
Gradiometer survey area
Earth Resistance survey area

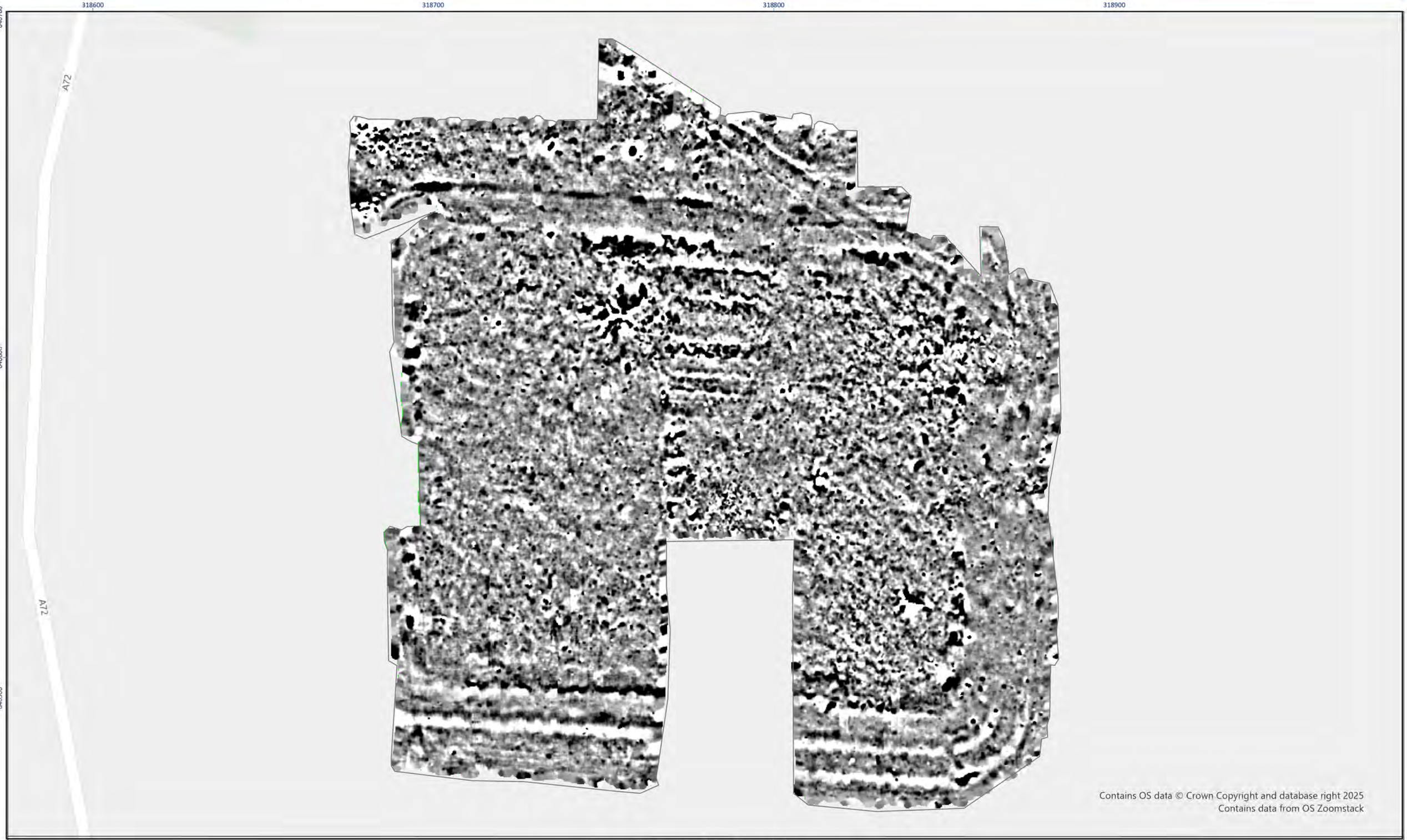
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Created by: RL	Date: 28/07/2025
Checked by: AC	Date: 28/07/2025
Approved by: SO	Date: 28/07/2025

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Processed Gradiometer Data - Greyscale Image

Figure 3

3nT
-2nT

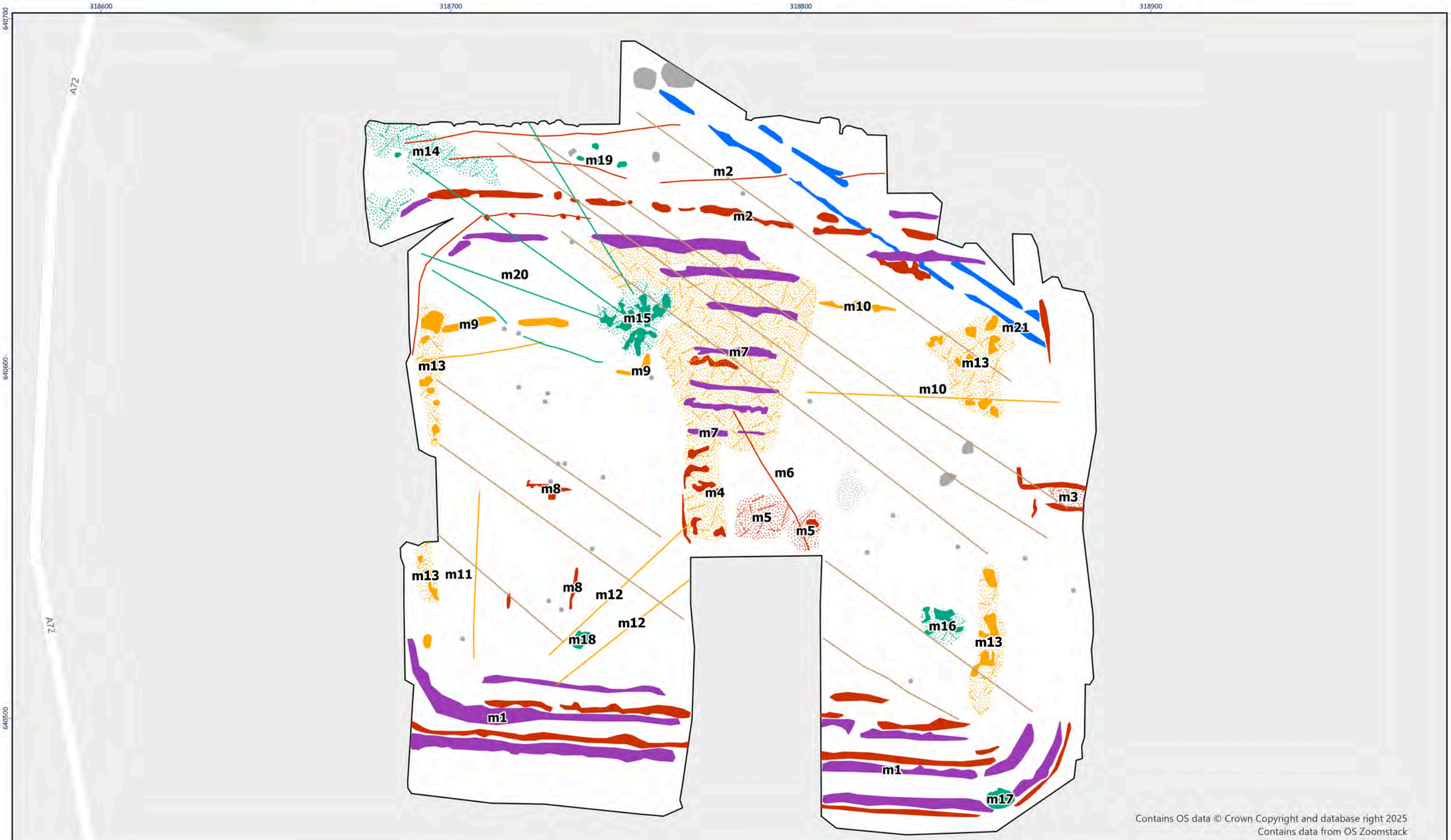
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Approved by: SO	Date: 28/07/2025

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Interpretation of Processed Gradiometer Data

Figure 4

- Anomaly (Probable Archaeology)
- Anomaly (Probable Archeology Negative)
- Spread (Probable Archaeology)
- Anomaly (Possible Archaeology)
- Spread (Possible Archaeology)
- Anomaly (Historic Feature)
- Anomaly (Unclear Origin)
- Spread (Unclear Origin)
- Anomaly (Ferrous/Iron Spike)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Probable Archaeology)
- Linear Trend (Possible Archaeology)
- Linear Trend (Unclear Origin)
- Linear Trend (Agricultural, Ridge and Furrow)

N

0 20m

Scale: 1:1,000 @ A3

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318800

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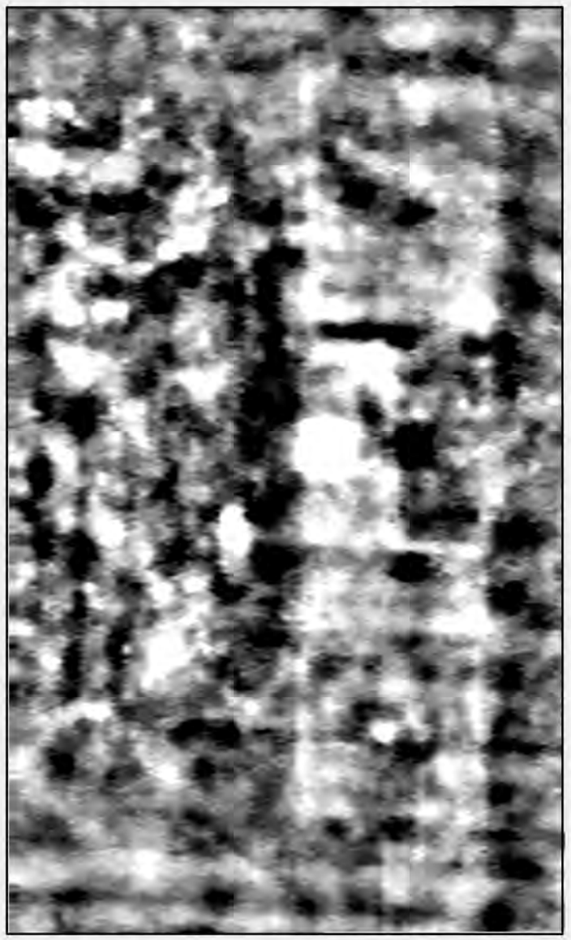
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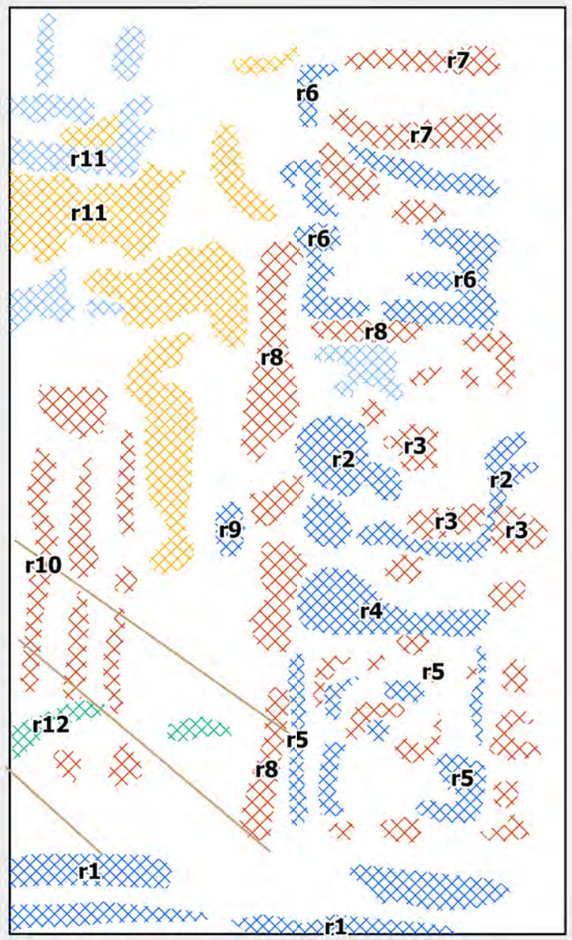
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c



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Earth Resistance Survey: a) Processed Data, b) High Pass Filtered Data, & c) Interpretation

Figure 5

a: 285Ω – 200Ω

b: 1SD – -1SD

- High Resistance (Archaeology)
- High Resistance (Possible Archaeology)
- High Resistance (Unclear origin)
- Low Resistance (Archaeology)
- Low Resistance (Possible Archaeology)
- Linear Trend (Agricultural, Ridge and Furrow)

N

0 20m

Scale: 1:1,000 @ A3

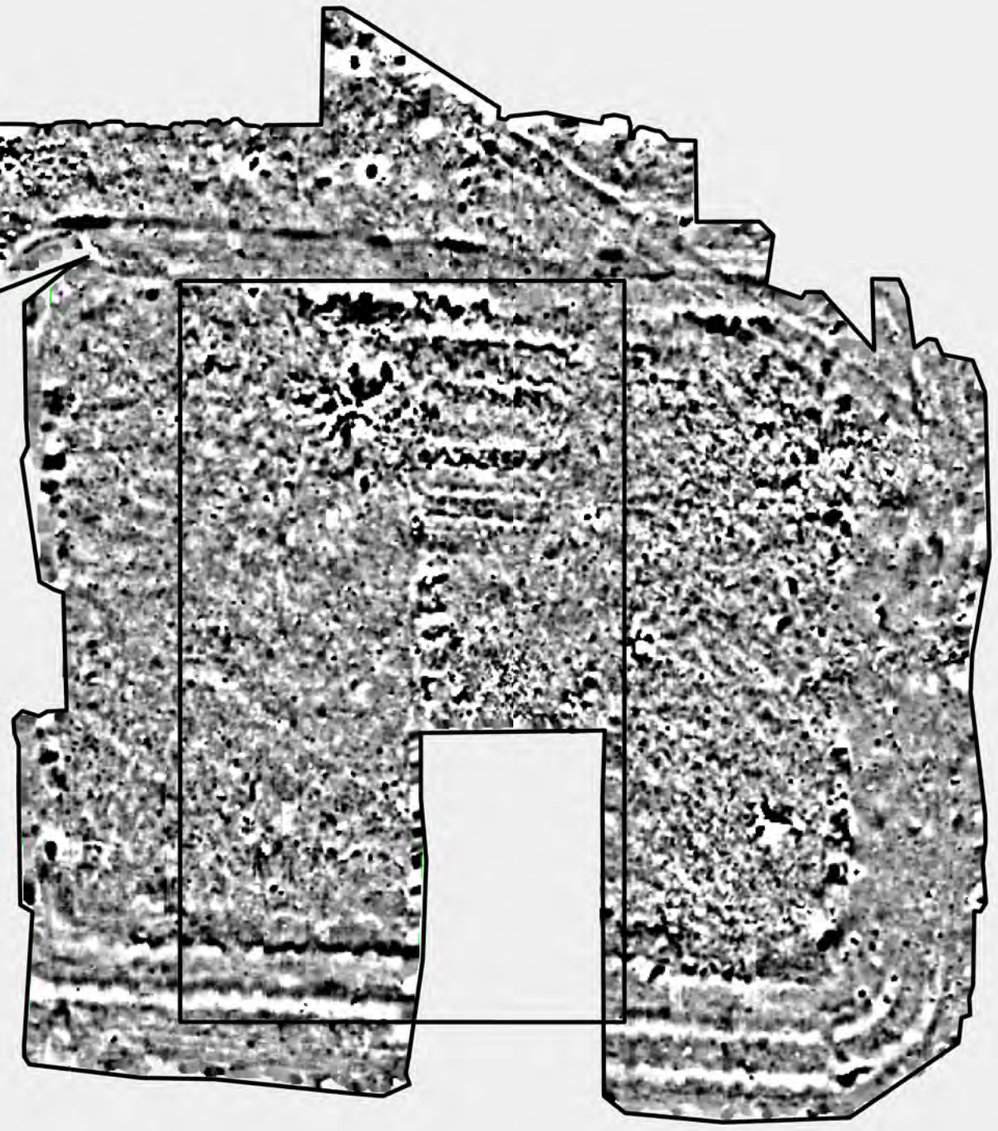
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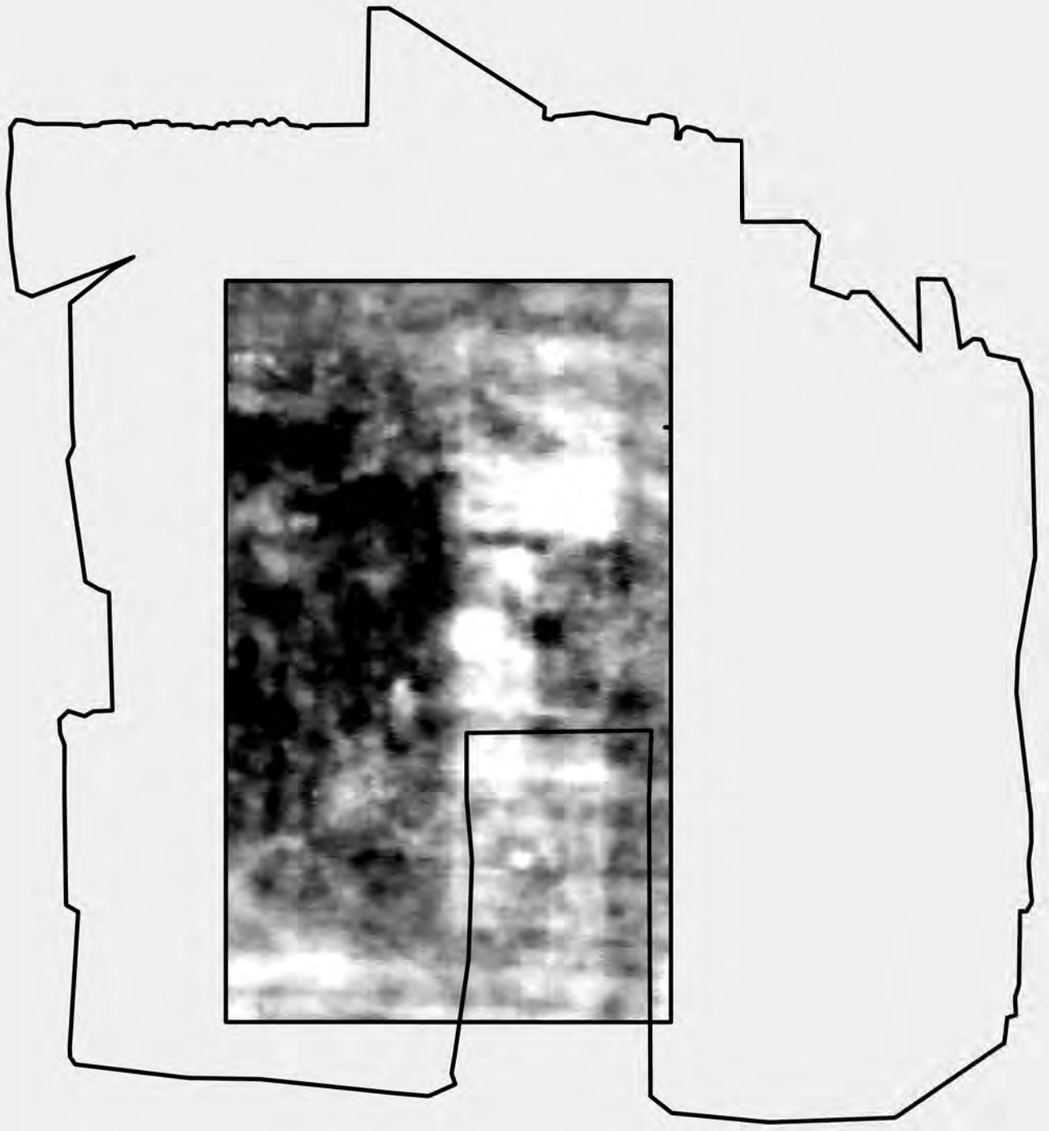
a



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b



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Comparative Side by Side Greyscale Plots of Processed a) Gradiometer & b) Earth Resistance Data

Figure 6

a 3 nT -2 nT

b 285Ω 200Ω

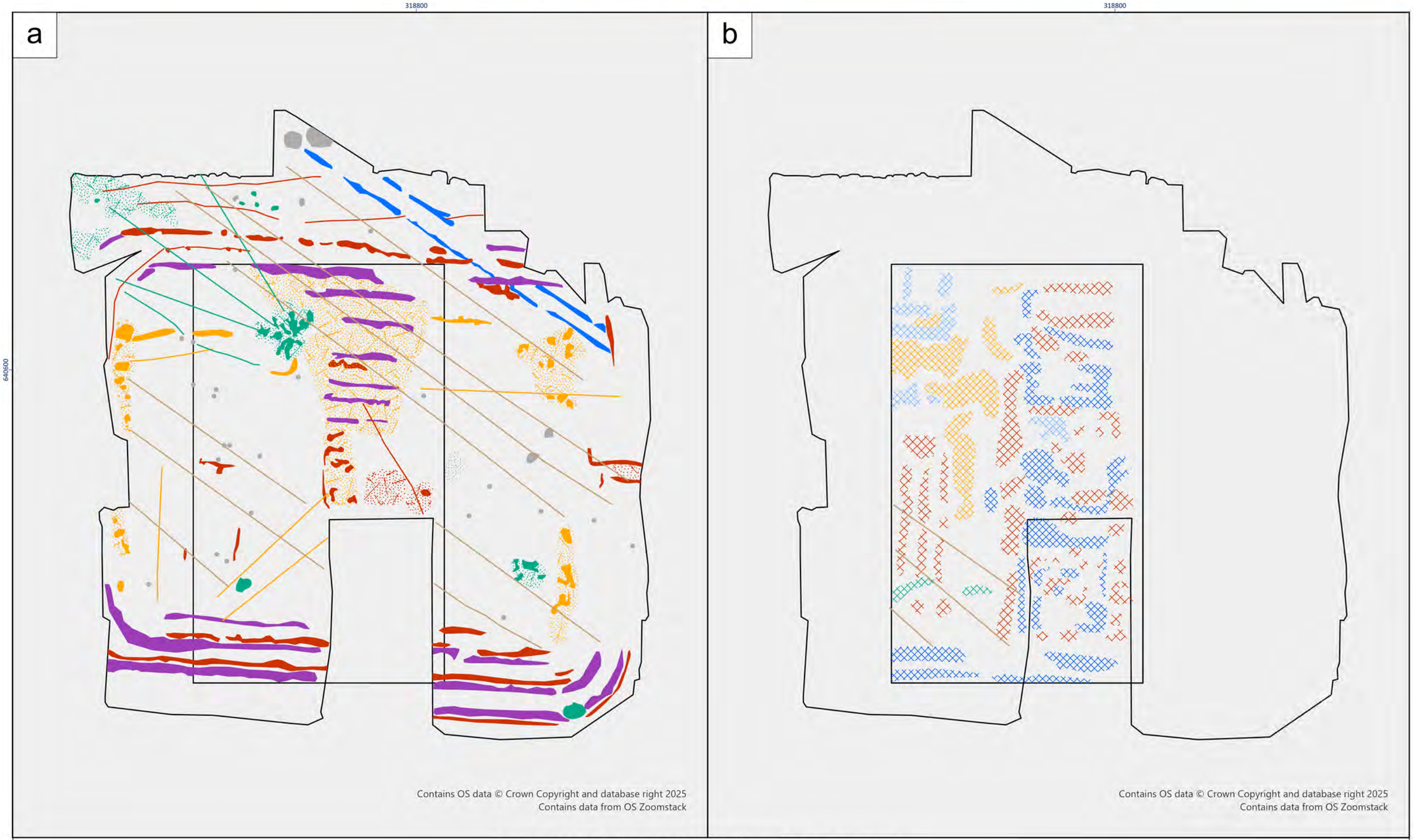
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Created by: RL	Date: 28/07/2025
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Comparative Side by Side Interpretation of a) Gradiometer & b) Earth Resistance Data

Figure 6

a 3 nT -2 nT

b ohms ohms

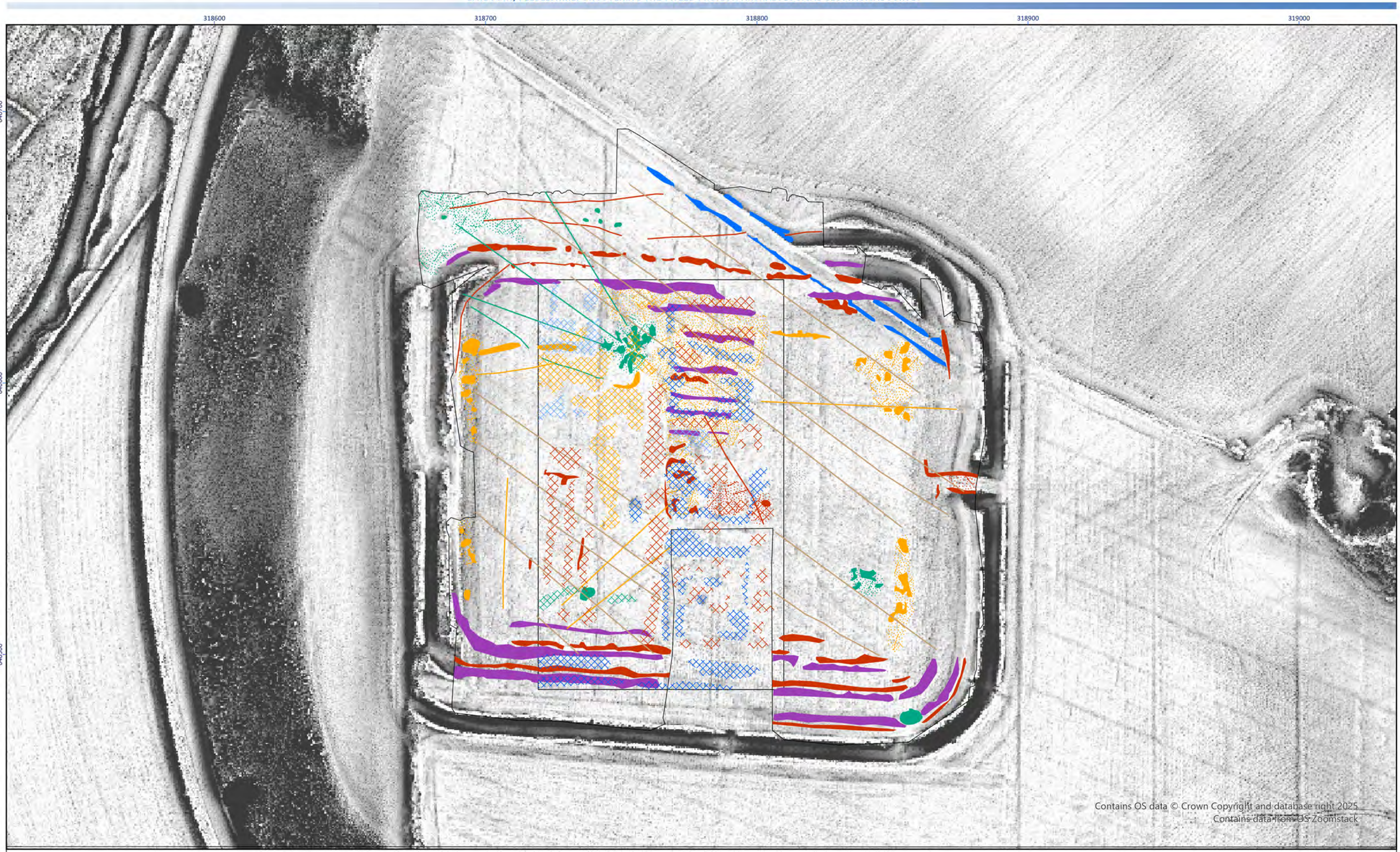
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0 30m

Scale: 1:1,250 @ A3

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Combined Interpretation Plotted Over LiDAR Digital Terrain Model for Visualisation of Archaeological Topography

Figure 8

- Anomaly (Probable Archaeology)
- Anomaly (Probable Archeology Negative)
- Spread (Probable Archaeology)
- Anomaly (Possible Archaeology)
- Spread (Possible Archaeology)
- Anomaly (Historic Feature)
- Anomaly (Unclear Origin)
- Spread (Unclear Origin)
- Spread (Ferrous/Iron Spike)
- Linear Trend (Probable Archaeology)
- Linear Trend (Possible Archaeology)
- Linear Trend (Unclear Origin)
- Linear Trend (Agricultural, Ridge and Furrow)
- High Resistance (Archaeology)
- High Resistance (Possible Archaeology)
- High Resistance (Unclear origin)
- Low Resistance (Archaeology)
- Low Resistance (Possible Archaeology)
- Linear Trend (Agricultural, Ridge and Furrow)

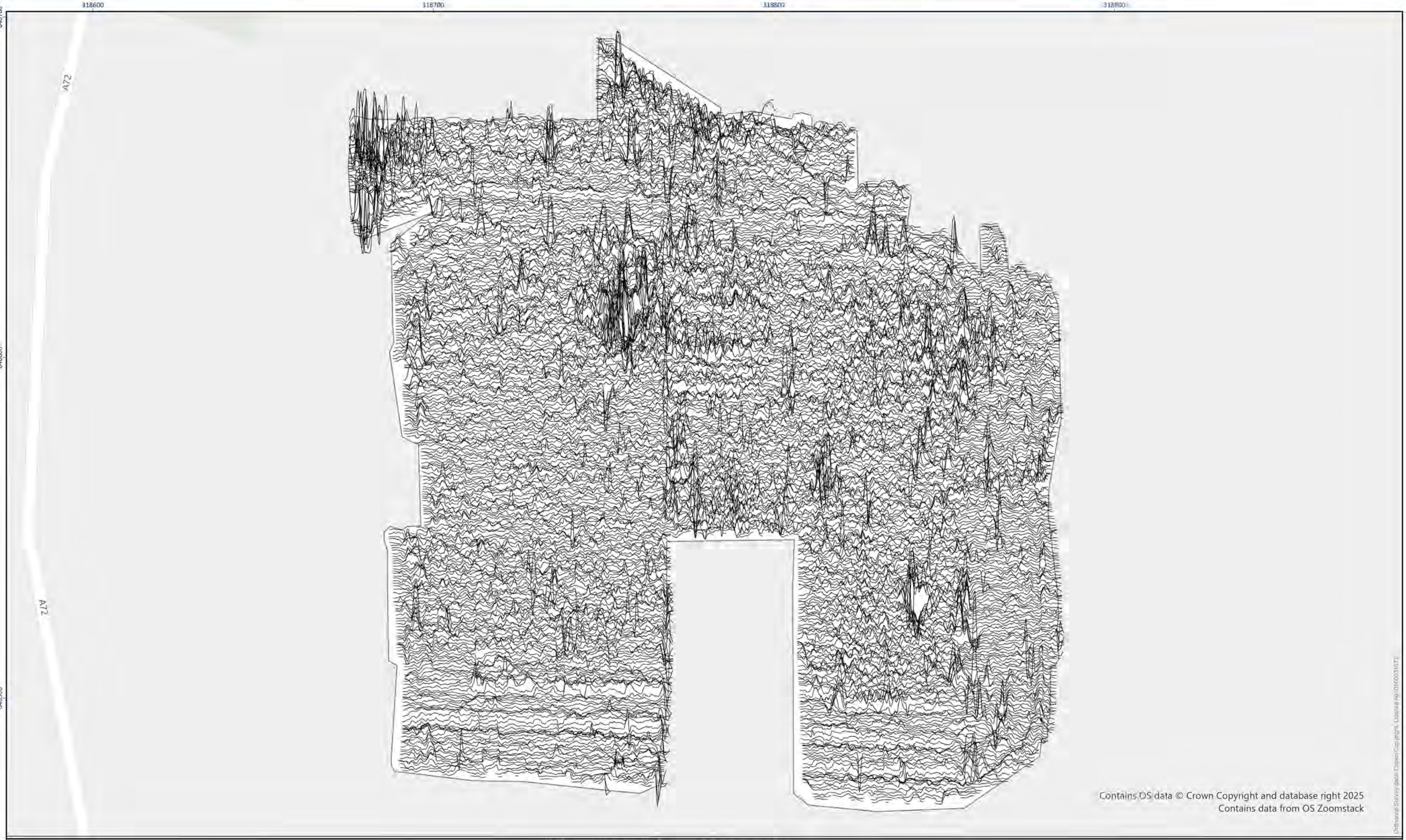
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XY Traces of Minimally Processed Gradiometer Data

Figure 9

20 nT
-20 nT

N

0 20m

Scale: 1:1,000 @ A3

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Approved by: SO	Date: 28/07/2025

AOC Archaeology Group

Appendix 1. Survey Metadata

OASIS ID: aocarcha1-

Appendix 1 Table 1 – Survey Metadata

Area	Description
Surveying Company	AOC Archaeology Group
Data collection staff	Anna Chmielowska, Daniel Shiel, Robert Legg
Client	Destination Tweed Project
Site name	Lyne
County	Peebleshire
NGR	NT 18791 40556
Land use/ Area condition	Agricultural
Duration	17th – 21st February 2025
Weather	Rain and clouds
Survey type	Gradiometer and Earth Resistance survey
Instrumentation	Gradiometert survey: Sensys cart, FGM650/3 fluxgate gradiometer sensors, Carlson BrX7 Earth Resistance survey: Trimble R8 system, RM85
Area covered	3.6 ha gradiometer survey, 1.4h Earth Resistance suvey
Download software	MXPDA, Geoserver v1.00-02
Processing software	TerraSurveyor
Visualisation software	ArcGIS Pro
Geology	Bedrock: Turbidite succession of wacke and siltstones of Portpatrick Formation. Superficial: glaciofluvial sand and gravel deposits.
Soils	Slowly permeable seasonally wet and slightly acid loamy and clayey soils (Soilscapes, 2025)
Scheduled Ancient Monument	Yes
Known archaeology on site	Yes
Historical documentation/ mapping on site	Yes (NLS 2024)
Report title	Lyne, Scottish Borders: Archaeological Geophysical survey report
Project number	40786 -2
Report Authors	Robert Legg
Quality Checked by	Susan Ovenden

Appendix 2. Archaeological Prospection Techniques

Instrumentation and Software Used

Gradiometer Survey

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

Ditches and pits can be easily detected through gradiometer survey as the topsoil within and around settlements generally has a greater magnetisation than the subsoil; caused by human activity. This enhanced material accumulates in cut features such as ditches and pits. Areas of burning or materials which have been subjected to heat commonly also have high magnetic signatures, such as hearths, kilns, fired clay and mudbricks (Clark 1996, 65; Lowe and Fogel 2010, 24).

It should be noted that negative anomalies can also be useful for characterising archaeological features. If the buried remains are composed of a material with a lower magnetisation compared to the surrounding soil, the feature in question displaying a negative signature. For example, stone- built structures that are composed of sedimentary rocks are frequently non-magnetic and so will appear as negative features within the dataset if the local soils and sediments are at all magnetised.

Ferrous objects – i.e. iron and its alloys - are strongly magnetic and are typically detected as high-value peaks in gradiometer survey data; small (in spatial terms) spikes are generally assumed to derive from ferrous material of recent origin (e.g. stray bits of farm equipment) in the topsoil, though archaeological sources cannot be ruled out. Broader dipolar anomalies and those with diagnostic characteristics of form will be assigned to other classifications based on their character, which might include archaeology, burning, modern ferrous or uncertain.

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

Earth Resistance Survey Instrumentation and Software

AOC Archaeology's Earth Resistance Surveys are conducted using a Geoscan Research RM15 resistance meter, with a set number of probes and remote probes depending on the chosen

survey methodology. Typically, either two or four probes are used, in conjunction with an MPX15 multiplexor attachment if required, to allow more than one measurement to be collected at each measurement point. This might be to allow a greater density of measurements, or to allow measurements using different mobile probe separations, which in theory allows a greater depth of investigation.

Data is typically collected on an east-west alignment using zig-zag traverses, with a set sample interval depending on the degree of resolution required. The gain is set appropriate to ground conditions and the local geology, and the same background readings are maintained when moving the location of the remote probes to ensure consistency between the grids of collected data.

Following completion of the survey, the earth resistance data is downloaded directly from the instrument using Geoscan Geoplot v4.0. The survey grids are then assembled into composites and enhanced using a range of processing techniques using Geoscan Geoplot v4.0 (see Appendix 3 for a summary of the processes used in Geoplot to create final data plots).

Appendix 3. Summary of Data Processing

Appendix 3 Table 1 – Summary of Data Processing

Process	Effect
Clip	Limits data values to within a specified range
Interpolate	Increases the resolution of a survey by interpolating new values between surveyed data points, creating a smoother overall effect.
Low Pass filter	Uses a Gaussian filter to remove high-frequency, small spatial scale variance, typically for smoothing the data.
Periodic Filter	Used to either remove or reduce the appearance of constant and reoccurring features that distort other anomalies, such as recent plough lines.
Remove Turns (TerraSurveyor)	Uses analysis of the direction of travel derived from the GNSS data to break continuous streams of data into individual traverses.
Zero Mean Traverse	Resets the mean value of each traverse to zero, in order to address the effect of striping in the data and counteract edge effects.

Appendix 3 Table 2 – SENSYS Non-Magnetic Cart

Process	Extent
Destripe	Zero Median Traverse – no clipping applied
Clip	-30/30nT
Interpolate	X=0.13 metres, Y = 0.13metres

Appendix 3 Table 3 – Earth Resistance Survey

Process	Extent
Despike	X=1 Y=1 Thr = 3 Repl = Mean
Clip	Min = -5 Max = 5
High Pass filter	HPF x=10 y=10 wt =u
Interpolate	X, Expand – sin x/x Y, Expand – sin x/x
Palette Scale	Grey08 Min= -100.09 ohm Max= 94.64 ohm

Appendix 4. Technical Terminology

Appendix 4 Table 1 – Types of Anomaly

Type of Anomalies	Extent
Anomaly	Usually linear / curvilinear / rectilinear / discrete anomalies characterised by a sharp-edged increase or decrease in values compared to the magnetic background. Some interpretation classes may have more gradual transitions in magnetic character- this is used as part of the classification process.
Spread	Spreads of enhanced material refer to diffuse areas of altered magnetic character, which suggest a localised spread of material with a magnetic contrast within the topsoil or ploughzone or a generalised enhancement of the magnetic properties over a specific area. These anomalies do not have the high dipolar response characteristic of ferrous material anomaly unless specifically classified as a spread of ferrous debris.
Linear Trend	Linear trends are less distinct and are typically visible as linear patterning in the overall texture of the data. A common example of these is the striping effect caused by recent ploughing.

Appendix 4 Table 1 – Classes of Anomaly

Type of Anomalies	Extent
Probable Archaeology	Interpretation is supported by the presence of known archaeological remains or by other forms of evidence such as HER records, LiDAR data or cropmarks identified through aerial photography. OR the data contains diagnostic anomalies in terms of character or morphology which allow a secure interpretation. Anomalies typically have well defined edges with abrupt transitions indicative of cut features with magnetically enhanced fills, such as ditches. Discrete anomalies will be checked on XY traces for their magnetic character; discrete anomalies in this class likely to be cut features such as pits; anomalies indicating high temperature processes will alternatively be classified as 'burned area' - see below. Ferrous material creates distinct 'spikes' and is classified as such.
Possible Archaeology	Anomalies are interpreted as likely to have an archaeological origin, though other explanations are also possible, but less likely. Anomalies typically have well defined edges with abrupt transitions indicative of cut features with magnetically enhanced fills, such as ditches. Discrete anomalies checked on XY traces; discrete anomalies in this class likely to be cut features such as pits; anomalies indicating high temperature processes classified as 'burned area' - see below.
Burned Area	An anomaly with a form on the XY trace plot that is characteristic of high temperature activity such as a kiln or hearth. Should be considered as possible archaeology and should be assigned an anomaly number if a more specific interpretation is possible based on the anomaly characteristics (for example, a clear kiln) so that this can be discussed in text.
Historical Features	Features observed on historical mapping that correspond with anomalies in the data. Linear anomalies caused by removed Area boundaries often exhibit distinct characteristics related to the removal process. Areas of enhanced magnetism in this class could relate to former buildings, trackways, quarries or ponds and their nature should be clarified with the use of anomaly numbers and discussion in the results section.
Unclear Origin	These anomalies are (often) magnetically weak and discontinuous or isolated making their context difficult to ascertain. OR they are indistinct for other reasons such as magnetic disturbance in their vicinity. Anomalies in this category have no more likely explanation than another, so whilst an archaeological origin is possible, an agricultural, geological, or modern origin is also equally likely.
Agricultural	Anomalies associated with agricultural activity, either historical (unless shown on a map, then classed as a historical feature) or modern. Usually, this interpretation is arrived at due to on the ground observations of (for example) ploughing, access tracks and the like, or from observation of recent aerial images of the Parcel. Recent ploughing is shown as a dashed line and Ridge and Furrow ploughing is shown as a solid line.
Ridge and Furrow / Rig and Furrow	A series of regular linear or slightly curvilinear anomalies which are broad and usually have diffuse edges, either composed of an increased or decreased magnetic response compared to background values. Wide regular spacing between the anomalies is consistent with that of a ridge and furrow / rig and furrow ploughing regime, and the regime may also have a degree of sinuosity characteristic of certain types of ridge and furrow cultivation. Often, multiple directions will be present, with distinct headlands in between. The pattern might follow the general landscape organisation, or it may radically differ from it, depending on the local sequence of inclosure. The anomalies often present as a positive 'ridge' anomaly adjacent to a negative 'furrow' anomaly.
Ploughing Trends	A series of regular linear anomalies or changes in the texture of the survey data, either composed of an increased or decreased magnetic response compared to background values. Anomalies seen parallel to Area edges are representative of headlands caused by ploughing.
Drains	A series of magnetic linear anomalies (often with a characteristic alternating positive-negative pattern, which indicates a ceramic drain) of an indeterminate date, usually with a regular dendritic or herringbone patterning which reflects the topography of the Parcel.
Geology / Natural	An area of enhanced magnetism that is composed of irregular (usually) weak increases or decreases in magnetic values, frequently with gradual transitions in character, compared with background readings. These are likely to indicate natural variations in soil composition or reflect variations in the bedrock or superficial geology. In areas where former water courses were present, paleochannels may present as distinct curving and banded or braided linear anomalies.
Service	Strong linear anomalies often composed of contrasting high positive and negative dipolar values, with a halo of magnetic disturbance extending from the causative body. Such anomalies are characteristic of below-ground services.
Magnetic Disturbance	A zone of strong magnetic response (usually alternating between positive and negative with abrupt transitions) that has been caused by modern infrastructure or ferrous material within or adjacent to the Parcel, such as metallic boundary fencing, gateways. The magnetic haloes around services and changes in the background texture of the data resulting from overhead power lines also fall into this class. These haloes are strong enough to obscure other anomalies (including those of possible archaeological interest) in the area they affect.
Ferrous Anomalies / Ferrous (iron spikes) and ferrous or debris spreads	A response caused by ferrous materials on the ground surface or within the subsoil, which causes a strong but localised dipolar response in the data. These generally represent modern material often re-deposited during manuring, rubbish at Area edges and spreads of debris or building material used to surface tracks or left behind following demolition. Distinct from magnetic disturbance, these anomalies relate to material at their spatial location, rather than an effect occurring at a distance from the material responsible.
Free Category for custom use	A category which may be employed to denote specifically identified anomalies related to known past activity within the area, for example those definitely associated with a former Area, or mapped former mineral extraction.

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