St Newlyn East Woodland Creation

St Newlyn East

Truro

Cornwall

Archaeological Assessment and Geophysical Survey

South West Archaeology Ltd. report no. 220527

ARCHAEOLOGICAL SERVICES & HISTORIC BUILDING RECORDING
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St Newlyn East Woodland Creation, St Newlyn East, Truro, Cornwall

Archaeological Assessment and Geophysical Survey

By P. Webb
Report Version: FINAL
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Report Finalised: 01st August 2022

Work undertaken by SWARCH for Trewithen Estate (The Client)

SUMMARY

South West Archaeology Ltd. (SWARCH) was commissioned to undertake an archaeological assessment and geophysical survey on land south of St Newlyn East, Truro, Cornwall. The survey area is located across agricultural land to the south of Parknoweth and north of Penhallow House, on south facing slopes of a valley bottom. The Cornwall HLC describes the site as 'Medieval Farmland'. Prehistoric activity in the landscape is suggested by earthwork mounds interpreted as possible Bronze Age barrows and cropmarks interpreted as prehistoric settlement enclosures; though much of the evidence reflects historic medieval and post-medieval field-systems.

The geophysical survey identified 37 groups of anomalies. These were predominantly linear anomalies likely associated with phases of historic boundaries, land drainage, and agricultural activity, but also included features indicative of prehistoric settlement. The identified anomaly groups include: historic field boundaries; ditch features; ring-ditch/drip-gullies; ceramic or stone drains; and agricultural activity. Evidence of ploughing and metallic debris and other modern ground disturbance was also identified.

The majority of the features represent undated phases of enclosures and field-systems, tentatively suggested as being largely prehistoric in date, but with medieval and post-medieval elements. The ring-ditch/drip-gully features are likely to be prehistoric in date and it could be inferred that some of the surrounding ditch features may have formed part of a contemporary field-system.

The results of the geophysical survey would suggest that the archaeological potential for the site is high, with many of the identified features considered likely to reflect phases of substantial prehistoric (Iron Age?) settlement and associated activity, as well as earlier phases of the existing medieval to post-medieval field-system.

It is recommended that should the land subject to survey (and surrounding fields) be considered for any disturbance, that in the first instance, targeted evaluation trenching would form the first stage of archaeological mitigation, in order to validate the results of the geophysical survey, and overlying soil depths.

August 2022

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ACKNOWLEDGEMENTS

TREWITHEN ESTATE (THE CLIENT)
THE LANDOWNER (FOR ACCESS)

PROJECT CREDITS

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1.0 INTRODUCTION

LOCATION: LAND AT PARKNOWETH AND PENHALLOW HOUSE
PARISH: ST NEWLYN EAST
COUNTY: CORNWALL
CENTROID NGR: SW 18255 55500
PLANNING REF: N/A
SWARCH REF: NEW22
OASIS REF: SOUTHWES1-506895

1.1 PROJECT BACKGROUND

South West Archaeology Ltd. (SWARCH) was commissioned to undertake an archaeological assessment and geophysical survey on behalf of Trewithen Estate (The Client) on land at Parknoweth and Penhallow House, St Newlyn East, Truro, Cornwall as part of wider considerations associated with proposed woodland creation. This work was undertaken in accordance with a brief set out by the Forestry Commission (Forestry Commission 2021), Written Scheme of Investigation (WSI; Boyd 2022), best practice and CIfA guidelines (2014).

1.2 TOPOGRAPHICAL AND GEOLOGICAL BACKGROUND

The full proposal site is located *c.*500m to the west and south of St Newlyn East and *c.*4.5km south-east of Newquay, spread across an area of *c.*30ha from Cargoll Farm in the north-west to Wheal Rose in the east. It covers largely agricultural fields along the sloping sides of a valley bottom, at a height of between *c.*65m and *c.*80m AOD (Figure 1). Only two of the fields, one south of Parknoweth and one north of Penhallow House, were subject to geophysical survey.

The soils of this area are the well-drained fine loamy soils over slate or slate rubble of the Denbigh 2 Association (SSEW 1983), which overlie the mudstone and siltstones of the Trendrean Formation, with superficial head deposits of clay, silt, sand and gravel (BGS 2022).

1.3 HISTORICAL BACKGROUND

The parish of St Newlyn East lies in the Deanery and Hundred of Pyder, with settlement at the eponymous town first recorded in 1311, though the church has earlier Norman origins and may have been built on the site of an early medieval church and settlement site. During the 14th century the manor of Newlyn belonged to the Arundells of Lanherne and passed in the early 19th century from Lord Arundell to Lady Clifford.

Much of the surrounding landscape to the villages of St Newlyn East, Mitchell and Zelah belongs to the estates of Trewithen, within the parish of Probus. Settlement here was first recorded in 1201; the present house constructed during the early 18th century to replace an earlier mansion by Philip Hawkins, the estate remaining within lines of the family ever since.

Historic mapping shows a relative continuity in the field-system surrounding the site since *c.*1840, with only a relatively few boundary removals in the following period. The tithe apportionment indicates that parts of the site formed land associated with Parknoweth (owned by the Dean and Chapter of Exeter with Christopher Henry Thomas Hawkins esq. and occupied by William Glanville) and Penhallow (owned by Christopher Henry Thomas Hawkins esq. with William Tremain and occupied by Thomas Francis) and was largely under arable cultivation.

1.4 ARCHAEOLOGICAL BACKGROUND

The survey area lies within land recorded on the Cornwall Historic Landscape Characterisation (HLC) as 'Medieval Farmland'; *the agricultural heartland, with farming settlements documented before the 17th century and whose field patterns are morphologically distinct from the generally straight-sided fields of later enclosure. Either medieval or prehistoric origins*.

The Cornwall and Scilly Historic Environment Record (HER) identifies the site as being within a prehistoric funerary and settlement landscape, with enclosure sites situated within the survey area believed to date to the Iron Age or Romano-British period. Many of the surrounding villages and farmsteads have medieval and post-medieval origins.

1.5 METHODOLOGY

This work was undertaken in accordance with best practice and CIfA guidelines. The desk-based assessment aspect of this report follows the guidance as outlined in: *Standard and Guidance for Archaeological Desk-Based Assessment* (CIfA 2014a) and *Understanding Place: Historic Area Assessments in a Planning and Development Context* (English Heritage 2012). The geophysical (gradiometer) survey follows the guidance outlined in *Geophysical Survey in Archaeological Field Evaluation* (English Heritage 2008); *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2014b); *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016).

'Archaeological geophysical survey uses non-intrusive and non-destructive techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures or deposits, as far as reasonably possible, within a specified area or site on land, in the inter-tidal zone or underwater. Geophysical survey determines the presence of anomalies of archaeological potential through measurement of one or more physical properties of the subsurface.' (Standard and Guidance for Archaeological Geophysical Survey 2014).

The results of the survey will as far as possible inform on the presence or absence, character, extent and in some cases, apparent relative phasing of buried archaeology to inform a strategy to mitigate any threat to the archaeological resource.

FIGURE 1: SITE LOCATION; SHOWING THE WIDER AREA OF CONSIDERATION (BLUE) AND AREAS OF GEOPHYSICAL SURVEY (RED).

2.0 DESK-BASED ASSESSMENT

2.1 DOCUMENTARY HISTORY

The parish of St Newlyn East lies in the Deanery and Hundred of Pyder. The settlement of St Newlyn East is first recorded in 1311 as *Villa de Sancta Newelina*. The settlement takes its name from the Church of St Newlyn, dedicated to St Newlina, which was originally built in the Norman period and may be on a site of early medieval origin. It is likely that there has always been a settlement associated with the church (Cornwall Council HER; Gillard et al 2004). Early maps of St Newlyn East suggest that the present churchyard is not original and that the earlier churchyard had a small sub-rectangular form. This, together with the upland location and the name element **eglos* suggest that Newlyn East may have originated in the later part of the early medieval period. It is also possible that the roughly circular churchyard set in an elevated position was once the site of an Iron Age camp (Cornwall & Scilly HER).

The manor of Newlyn was not recorded in the Domesday survey, being first recorded in the 14th century, when it belonged to the Arundells of Lanherne and passed in the early 19th century from Lord Arundell to Lady Clifford. Eleven manors that now fall within the parish were listed in the Domesday survey and the site was on land belonging to the manor of Cargoll. The manor of Cargoll (*Cargau*) was the dominant of the eleven manors at this time and was originally held by Robert, Count of Mortain from St Petroc church, Bodmin and then taken by the Bishop of Exeter, who procured a grant to fair and market in 1312 (based on Lysons 1814; Gillard et al 2004).

Settlement at Trewithen, in the parish of Probus, was first recorded in 1201 as *Trewithin* (Cornwall & Scilly HER; Gover 1948), though the present house dates to the early 18th century when it was built on the site of an earlier mansion by Philip Hawkins. The estate has remained within various lines of the family ever since (Trewithen Estate 2022). Whilst some of the estate surrounds the house and gardens, the majority is centred around the villages of St Newlyn East, Mitchell and Zelah and forms part of the agricultural landscape of Cornwall.

2.2 CARTOGRAPHIC DEVELOPMENT

2.2.1 OS SURVEYOR'S DRAFT MAP 1810

The earliest large-scale mapping of any value is the 1806 Ordnance Survey surveyor's draft map of the area (Figure 2), though earlier estate maps are likely within the records held by both the Trewithen estate and within the Cornwall Record Office (Reference: *J – Hawkins and Johnstone family of Trewithen, Probus*). The only detail of note is that several of the current boundaries, or the boundaries from the Tithe and later Ordinance Survey mapping, appear to match those present on the surveyors draft map, and whilst the draft is not usually reliable in regard to the field boundaries, the immediate landscape appears to have not yet undergone as much enclosure as that evident on the 1840 tithe map.

FIGURE 2: EXTRACT FROM THE ORDINANCE SURVEY SURVEYORS DRAFT 1810. THE APPROXIMATE LOCATION OF THE SURVEYED FIELDS ARE INDICATED (BL).

2.2.2 ST NEWLYN EAST TITHE MAP AND APPORTIONMENT 1840

The St Newlyn Tithe map of 1840 (Figure 3) and accompanying apportionment (Table 1) shows the survey areas as within three plots divided between two landholdings: those of Parknoweth, owned by the Dean and Chapter of Exeter with Christopher Henry Thomas Hawkins esq. and occupied by William Glanville; and Penhallow, owned by Christopher Henry Thomas Hawkins esq. with William Tremain and occupied by Thomas Francis. The survey areas are currently divided into two fields, the western field (F1) comprising single plot (no. 1259, *Peock and Lew*?) as part of Parknoweth; the eastern field (F2) comprising parts of two plots (nos. 1133, *Pepper Park* & 1135, *Lower Field*) as part of Penhallow. All plots within the survey area are listed as arable. Much of the surrounding land appears to be in the ownership of Christopher Hawkins, with various co-owners, with many of the surrounding fields recorded as under arable cultivation, though there is also common land (plot no. 1269) and gardens (plot no. 1125) associated with the homestead at Penhallow.

2.2.3 ORDNANCE SURVEY AND 20TH CENTURY MAPPING

The 1880 First Edition Ordnance Survey map (Figure 4) shows some (limited) changes to the field boundaries of the surrounding landscape, mostly associated with the enclosure of some of the larger fields, including the sub-division of plot no. 1037 into two. The common land of plot no. 1269 *Barn Close Moor* is also now clearly depicted as moorland; whilst a pair of 'ponds' are now depicted flanking Station Road at the south-eastern corner of plot no. 1259. Within the survey area, the only alteration appears to be the addition of a small agricultural structure at the southern end of the boundary between plot nos. 1133 and 1135.

By the early 20th century, the 1907 Second Edition Ordnance Survey map (Figure 5), shows very little development within the landscape with only a small number of additional field divisions being created. Within the survey area, the late 19th century agricultural structure depicted on the earlier Ordnance Survey map appears to have only been short-lived, and is no longer depicted.

Subsequent Ordnance Survey mapping (not depicted), again only shows minor alterations to the region, with limited development of St Newlyn East, small-scale development of individual farmsteads, including at Penhallow with a small building depicted opposite the farmstead within plot no. 1133,

though this may be a result of an alteration in the line of the access road/track to the farm. It is not until the late 20th century, post-1964 that the boundary between plot nos. 1133 and 1135 is removed.

FIGURE 3: EXTRACT FROM THE ST NEWLYN EAST TITHE SURVEY OF 1840 (CRO); THE EXTENT OF THE SURVEY AREA IS INDICATED.

TABLE 1: EXTRACT FROM THE 1840 ST NEWLYN EAST TITHE APPORTIONMENT; THE SITE IS HIGHLIGHTED IN GREEN (TNA).

Plot No.	Owner	Occupier	Field Name	Field Use
Tophams Tenement				
1037	Christopher Henry Thomas esq. & Maria Hoblyn	William Veale	Lower Caweths Brake	Furze
1038		Samuel Daws	Butts Meadow	Arable
Penhallow				
1124	Christopher Henry Hawkins Thomas esq. & William Tremain	Thomas Francis	Higher Field	Arable
1125			Gardens	Gardens
1126			Well Meadow	Arable
1127			Church Close	Arable
1132			Caweths	Arable
1133			Pepper Park	Arable
1134			Higher Field	Arable
1135			Lower Field	Arable
1140			Lanes	Waste
Parknoweth				
1257	Dean and Chapter of Exeter & Christopher Henry Thomas Hawkins esq.	William Glanville	Higher Middle Ground	Arable
1258			Lower Middle Ground	Arable
1259			Peock (?) and Lew (?)	Arable
1261			Little Chatown	Arable
1262			Middle Chatown	Arable
1263			Three Cornered Chatown	Arable
1267			Great Close	Arable
1268			Dovelly	Arable

1269			Barn Close Moor	Common
1270			Barn Close	Arable

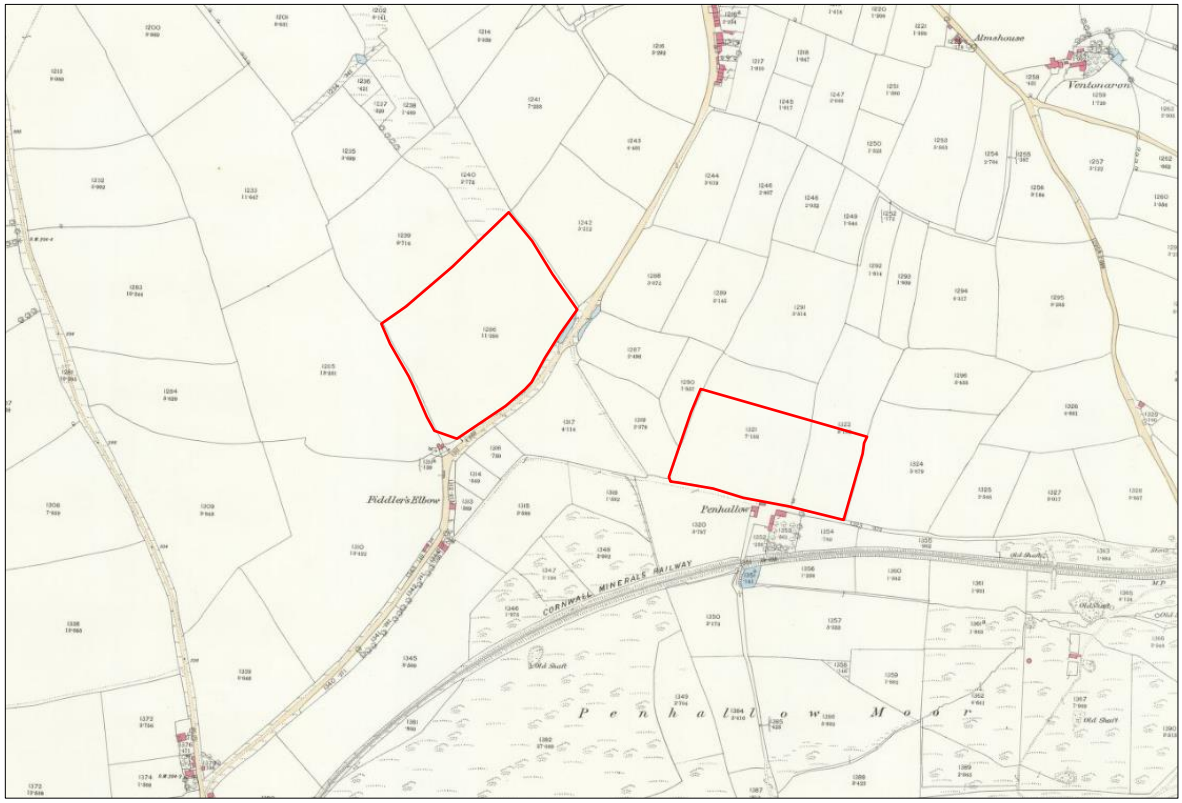


FIGURE 4: EXTRACT FROM THE ORDNANCE SURVEY FIRST EDITION 25 INCH MAP OF 1880, SURVEYED 1878 (NLS). THE EXTENT OF THE SURVEY AREA IS INDICATED.

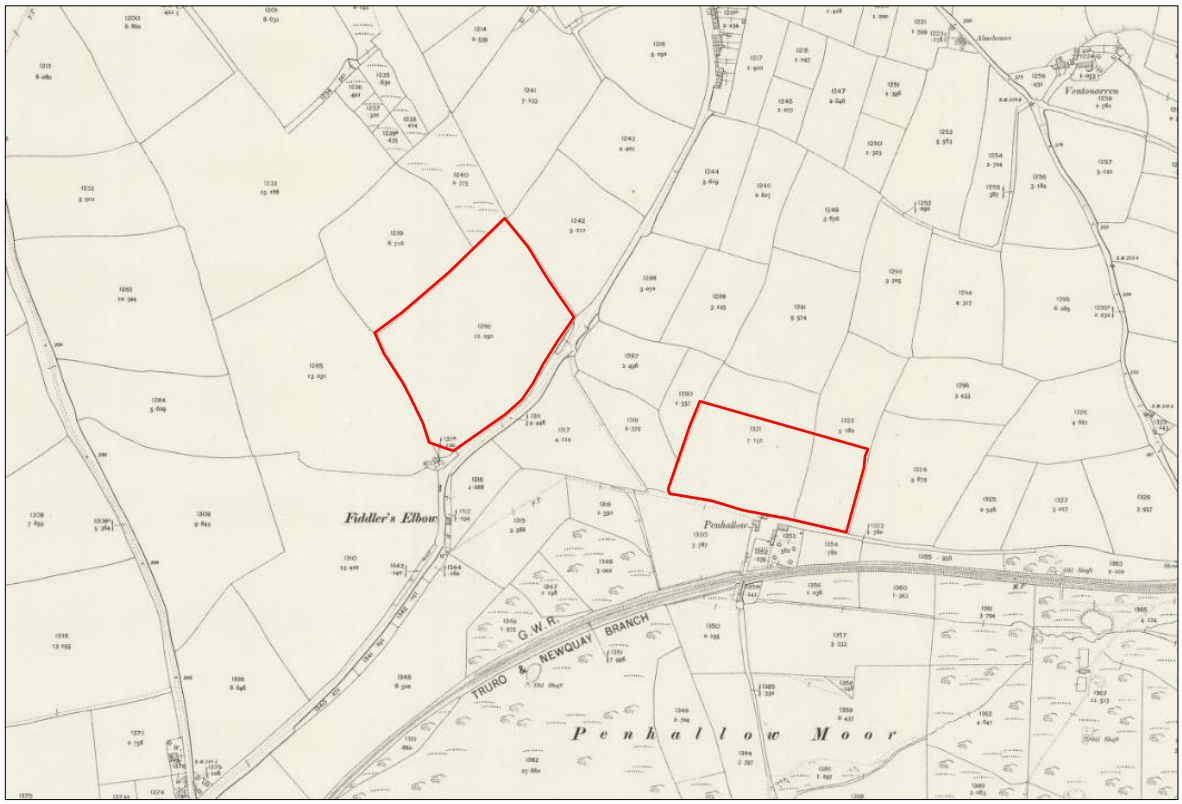


FIGURE 5: EXTRACT FROM THE ORDNANCE SURVEY SECOND EDITION 25 INCH MAP OF 1907, REVISED 1906 (NLS). THE EXTENT OF THE SURVEY AREA IS INDICATED.

2.3 AERIAL PHOTOGRAPHY AND LIDAR

2.3.1 AERIAL PHOTOGRAPHY

Study of Royal Air Force aerial photographs (ref: RAF_3G_TUD_UK_222_Vp2_5135; not depicted) held by Historic England reveals a sub-circular crop-mark feature which corresponds to one of the two mapped on the Cornwall Council HER within plot no.1259, along with a linear feature; whilst further linear and curvilinear features can also be seen within plot nos. 1133 and 1135.

A review of readily available commercial aerial photographs (Figure 6) shows no discernible change within the survey areas within the last 20 years, though the field boundary between plot nos. 1133 and 1135 can be seen to have been removed by 2001. A sub-circular crop-mark feature is also faintly visible, corresponding with the example identified on the 1946 aerial photograph, though the other features are not identifiable.

FIGURE 6: AERIAL PHOTOGRAPH FROM 2005 SHOWING REMOVAL OF FIELD BOUNDARIES. THE EXTENT OF THE SURVEY AREA IS INDICATED (RED) ALONG WITH POSSIBLE EARTHWORK FEATURES (YELLOW) ©GOOGLE MAPS.

2.3.2 LIDAR DATA

The images below are derived from LiDAR data freely available from the Environment Agency. Digital terrain (i.e., bare earth, DTM) data was processed. The highest sampling interval available for the site was a 1m interval.

The LiDAR data for the site (Figure 7) gives an impression of a generally level ground surface, particularly within field F1, with higher ground surrounding the site, but including a steeper slope across field F2. A series of linear and curvilinear features can also be identified within the survey areas, including those identified as possible prehistoric and undated enclosures on the Cornwall & Scilly HER. Of these, those in field F1 are more convincing as enclosure features; that in field F2 possibly being a natural feature associated with the change in topography in the area. A series of linear features can also be seen across both fields, which may relate to elements of the historic field system, particularly within field F2 which correspond to the position of a field boundary depicted on historic mapping. Several of the fields within the wider landscape similarly show evidence of removed field boundaries

as well as ridge and furrow type agricultural features.

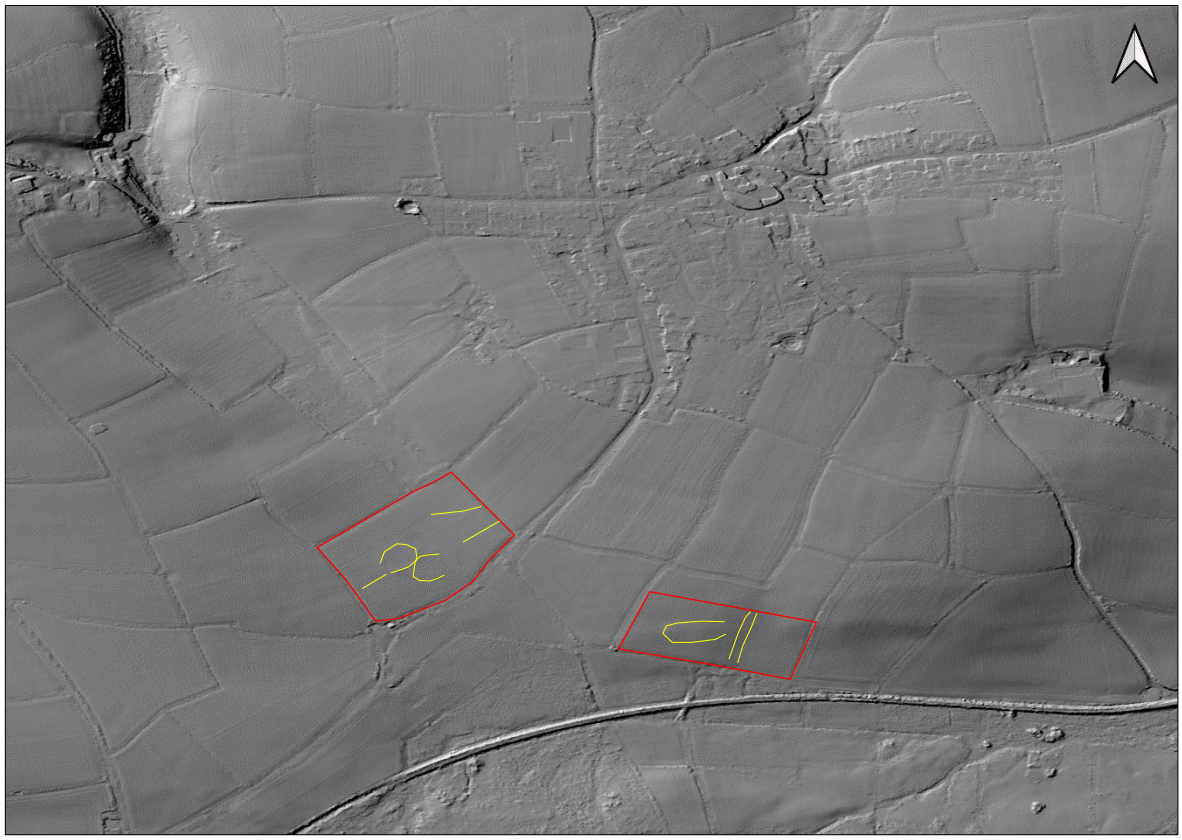


FIGURE 7: LIDAR 1M DTM DATA PROCESSED USING QGIS 3.10 MULTIHILLSHADE 315_35_Z2. THE APPROXIMATE SITE (RED) AND POSSIBLE ARCHAEOLOGICAL FEATURES (YELLOW) ARE INDICATED. CONTAINS PUBLIC SECTOR INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE.

2.4 ARCHAEOLOGICAL BACKGROUND

The survey area lies in an area where little formal archaeological investigation has been undertaken but one where prehistoric activity is recorded in the wider landscape. The Cornwall & Scilly Historic Environment Record (HER) identifies relatively few archaeological investigations in this area (Figure 8; Table 2), those that have primarily associated with improvements to the A30, including: assessment (ECO3911; ECO3916; ECO3919; ECO4511), evaluation and watching brief (ECO3918; ECO4963; ECO5716; Smith 2018); and the Carland Cross windfarm, including: assessment (ECO2190), geophysical survey (ECO4298), test-pitting (ECO2203; Parkes 2008), watching brief (ECO4064; ECO4077), identifying post-medieval and modern agricultural features along with prehistoric finds. Other works in the area have included: assessment geophysical and excavation within St Newlyn East (Bampton 2014; Bonvoisin 2018; ECO4469; ECO4470; ECO5016; ECO5346; Webb 2015; Webb 2019), identifying evidence of Romano-British and later settlement and landscape use. A watching brief has also been carried out at Cargoll Farm (Cole 2003; ECO750).

The historic landscape in this area is characterized by the Cornwall & Scilly Historic Landscape Characterization (HLC) as 'Medieval Farmland'; *the agricultural heartland, with farming settlements documented before the 17th century and whose field patterns are morphologically distinct from the generally straight-sided fields of later enclosure. Either medieval or prehistoric origins*.

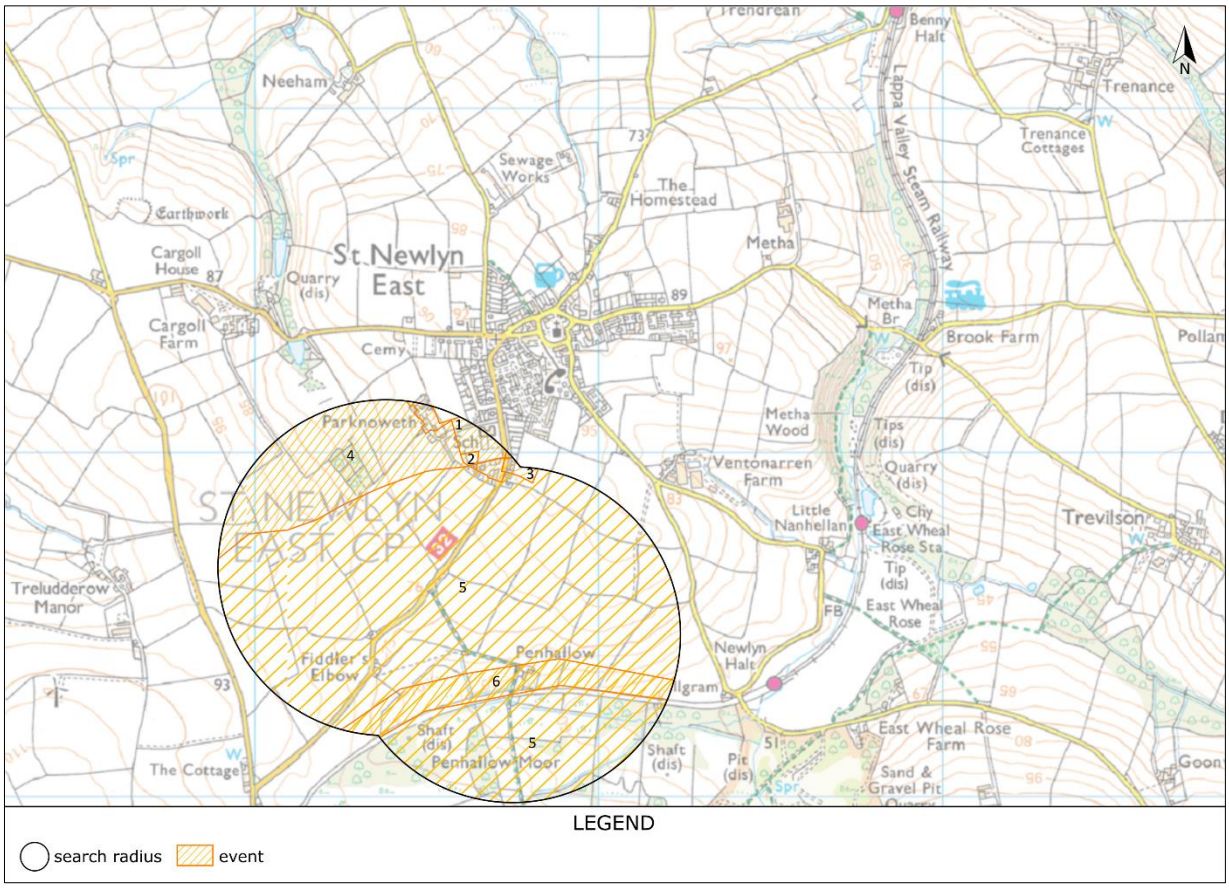


FIGURE 8: EVENT RECORDS WITHIN 1KM OF THE SURVEY AREA (SOURCE: CORNWALL AND SCILLY HER). CONTAINS ORDNANCE SURVEY DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2022.

TABLE 2: TABLE OF NEARBY ARCHAEOLOGICAL EVENTS (SOURCE: CORNWALL & SCILLY HER).

	Reference	Name	Summary
1	ECO1438	Industrial settlement: St Newlyn East	Management recommendations.
2	ECO3035	St Newlyn East, Parknoweth	Watching brief
3	ECO5016	Land at Halt Road	Assessment, geophysical survey.
4	ECO4942 ECO4943 ECO4944 ECO4945 ECO4946	Lowland Cornwall: the Hidden Landscape	Landscape characterization.
	ECO5449	Cornish Killas	Survey
5	ECO2190	Carland Cross Windfarm	Assessment
6	ECO5383	Perranporth to Newquay Multi-use Trail	Assessment

2.4.1 PREHISTORIC AND ROMANO-BRITISH 4000BC – AD410

Evidence for prehistoric activity in this landscape is relatively common. The earliest evidence dates to the Bronze Age and is largely restricted to funerary barrows identified across the landscape, including to the south across Newlyn Downs (MCO3181-MCO3187; MCO32365). Settlement activity for the period is much scarcer, and it is not until the Iron Age that there is structural evidence, with a hillfort (MCO7731) and enclosures (MCO33607) identified north-west of Cargoll Farm, north of St Newlyn East (MCO44214; MCO52875-MCO52876), and a round enclosure to the south-west at Fiddlers Green (MCO7945); whilst two curvilinear banked enclosures (MCO33597; MCO33599) are recorded within the survey area. Prehistoric findspots recorded in the area suggest further potential prehistoric settlement and activity sites.

2.4.2 ROMANO-BRITISH AD43 – AD409

The evidence for Romano-British activity is sparse, but it is possible that many of the Iron Age settlements continued to be occupied.

2.4.3 EARLY MEDIEVAL AD410 – AD1065

The archaeology of the early medieval period is poorly represented, but several of the nearby settlements are recorded in Domesday, including Cargoll (MCO11124) with an associated mill (MCO26442); whilst place-name evidence suggests that settlement at Newlyn East originated during this period (MCO6395). Despite this the basic framework of the tenurial and ecclesiastical landscape was established during this period, as were many of the farming settlements.

2.4.4 MEDIEVAL AD1066 – AD1540

Despite suggestion of the origins of St Newlyn East dating towards the end of the early medieval period, the present church dates to the 12th century (List1137190), the origins of the settlement likely dating to the foundation of the church, though the first clear reference to St Newlyn East is in the early 14th century (1311; MCO15903). Many of the farms and other settlements in the area are also at least medieval in origin, with documentary evidence for sites at Nanhellan (1376; MCO15817), Ventonarren (*c.*1500; MCO18209) and Parknoweth (1538; MCO16010). A medieval palace is also recorded for the Bishopric of Exeter at Cargoll in the late 13th century (List1141453). Open or strip fields are likely to have been laid out in association with these farms, with field systems identified at Fiddlers Elbow (MCO33592); Fiddlers Green (MCO32366; MCO33636); and within the survey area at Penhallow (MCO26446) forming the basis of the modern fieldscape.

2.4.5 POST-MEDIEVAL AD1540 – AD1899

Population and settlement expanded during the post-medieval period and much of the development and remaining historically significant features associated with St Newlyn East date from this period, including the construction of almshouses (MCO61567), a blacksmith's (MCO9205), non-conformist chapels (MCO32351, MCO32353) and a school (MCO53083). The main developments, however, were associated with the industrial activity of the area with the Cornwall Minerals Railway (MCO55883) linking mining and extraction sites such as at Fiddlers Green (MCO33595), Metha (MCO12263), Penhallow Moor (MCO12395) and Wheal Rose (MCO12330; MCO52661). The current house at Penhallow was also first constructed as a farmhouse during the 18th or early 19th centuries.

2.4.6 MODERN AD1900 – PRESENT AND UNKNOWN

There are few features of modern date in the surrounding landscape, though a World War II bombing range/decoy is located to the south (MCO32368) and St Newlyn East has continued to expand. A number of monuments of unknown date are also recorded on the HER, predominantly cropmark enclosure features and ditches (MCO33603; MCO33629) and including one within the survey area (MCO33310).

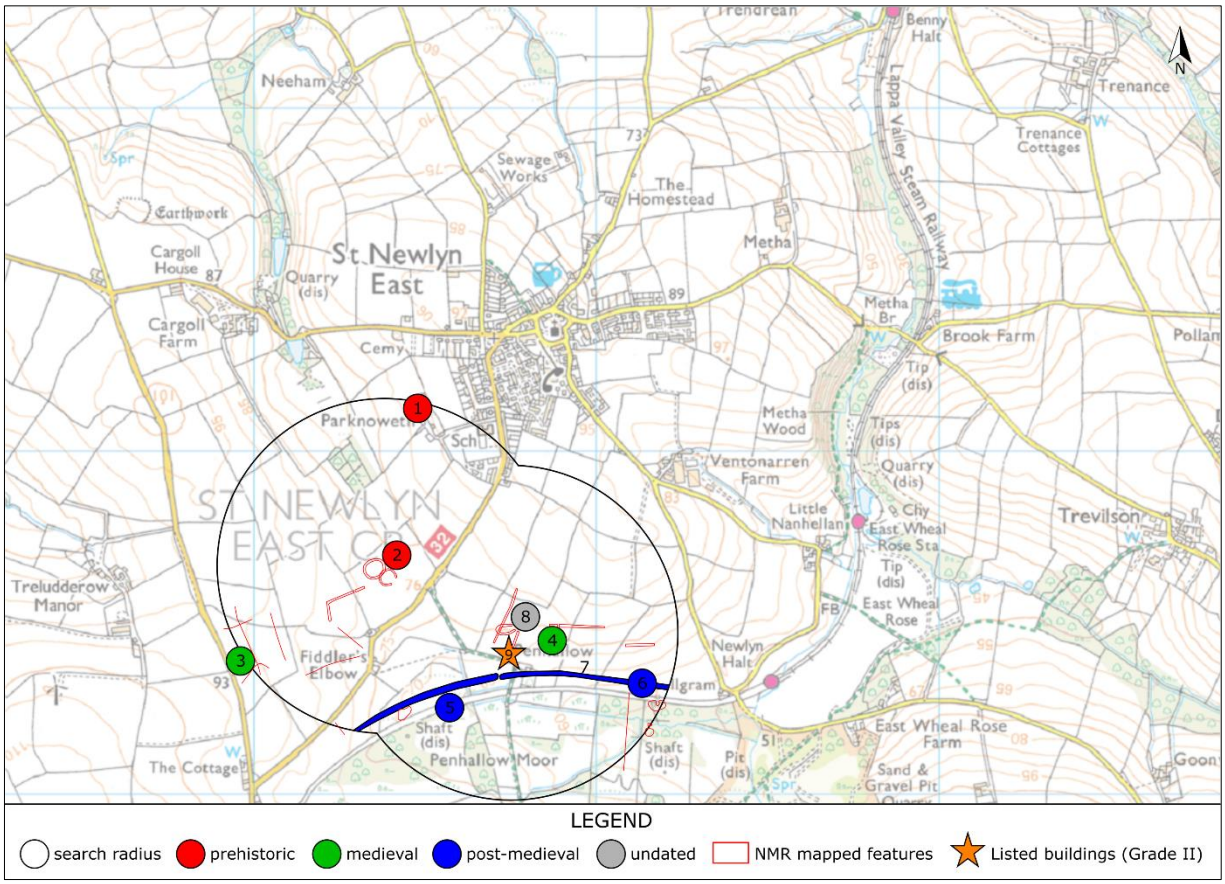


FIGURE 9: DESIGNATED AND NON-DESIGNATED HERITAGE ASSETS WITHIN 1KM OF THE SURVEY AREA (SOURCE: CORNWALL & SCILLY HER). CONTAINS ORDNANCE SURVEY DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2022.

TABLE 3: TABLE OF NEARBY DESIGNATED AND NON-DESIGNATED HERITAGE ASSETS (SOURCE: CORNWALL & SCILLY HER).

Reference		Name	Form	Summary
1	MCO1082	Parknoweth – prehistoric find spot	Find spot	Several flints, including some worked examples have been found in the vicinity.
2	MCO33597	Fiddlers Elbow – Iron Age round	Cropmark	A curvilinear banked enclosure is visible as cropmarks on aerial photographs.
	MCO33599	Fiddlers Elbow – prehistoric enclosure	Cropmark	Faint traces of a banked curvilinear enclosure are visible as cropmarks on aerial photographs.
3	MCO33592	Fiddlers Elbow – medieval field-system	Cropmark	Linear field ditches and banks are visible as cropmarks on aerial photographs.
4	MCO26446	Ventonarran – medieval field-system	Cropmark	The remains of enclosed strips of a medieval open field system are visible as cropmarks on aerial photographs.
5	MCO12395	Penhallow Moor – post-medieval mine	Structure	A lead mine was in operation in the early- to mid-1840s and re-worked in the 1860s.
6	MCO5398	Penhallow – post-medieval accommodation bridge	Structure	A bridge carrying the line of the Cornwall Minerals Railway crosses farm access.
7	MCO55883	CMR Newquay to Shepherds – post-medieval railway	Structure	The line of the Newquay to Shepherds branch of the Cornwall Mineral Railway.
8	MCO33310	Penhallow – undated enclosure	Cropmark	A curvilinear banked enclosure is visible as a faint soil mark on aerial photographs.
9	List1312549	Penhallow House	Listed building	Grade II Listed 18th century farmhouse.

3.0 GEOPHYSICAL SURVEY

3.1 INTRODUCTION

An area of *c.*9.6ha (*c.*7ha surveyed) was the subject of a magnetometry (gradiometer) survey. The purpose of this survey was to identify and record magnetic anomalies within the proposed site. Identified anomalies may relate to archaeological deposits and structures but the dimensions of recorded anomalies may not correspond directly with associated features. The following discussion attempts to clarify and characterize the identified anomalies. The survey was undertaken during May 2022 by P. Webb; the survey data was processed, and the report written by P. Webb.

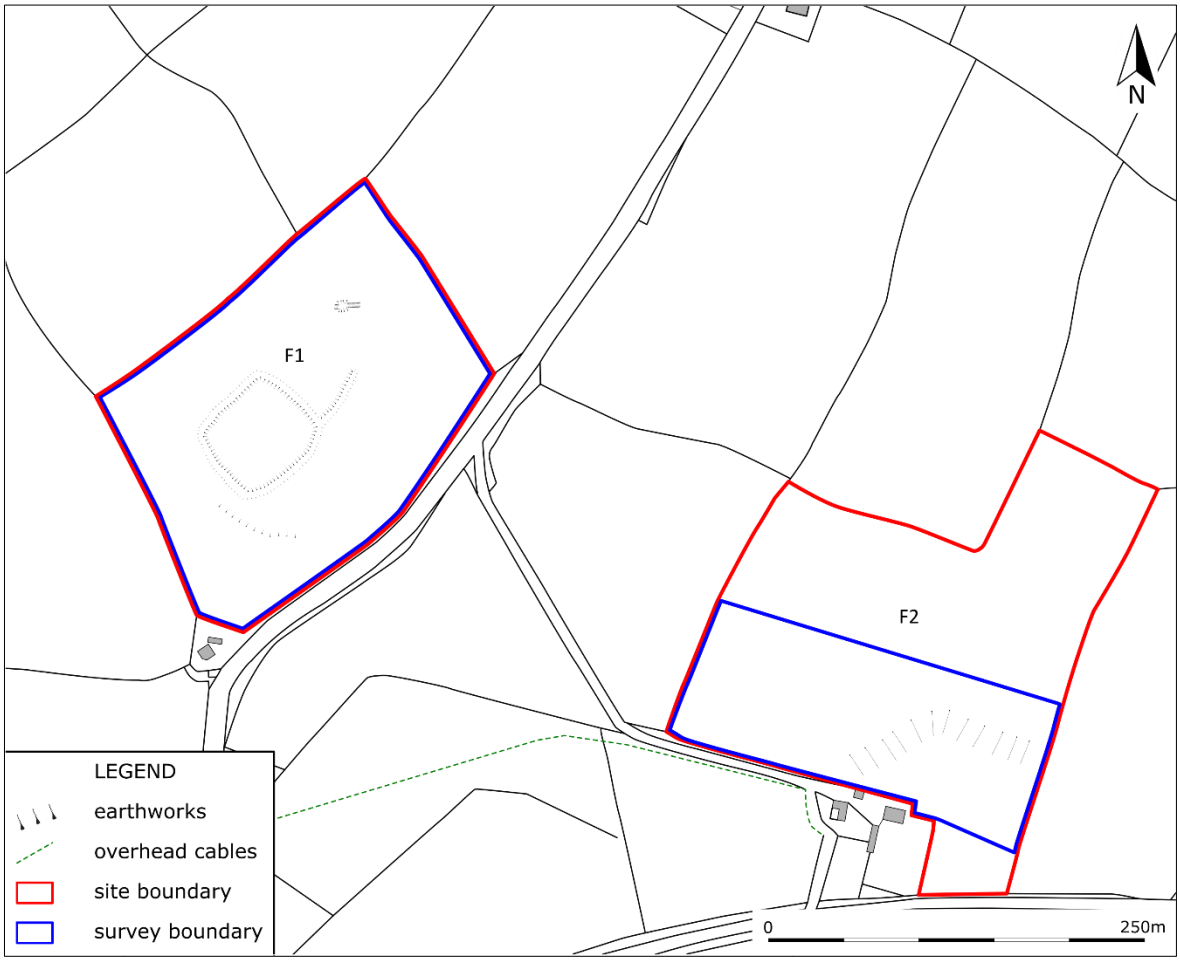


FIGURE 10: SITE LAYOUT, SHOWING LOCATION OF AREAS SURVEYED AND EARTHWORK FEATURES.

3.2 SITE INSPECTION

The survey area comprises two sub-rectangular and irregular fields or parts of fields forming part of the Trewithen estate (Figure 10), to the south of Parknoweth Farm (field F1) and to the north of Penhallow House (F2), separated by Station Road and agricultural fields.

The state of cultivation differed between the fields, field F1 being under pasture, with moderate length grass; and field F2 having been ploughed/tilled, both of which influence the visibility of features and earthworks if present. However, historic and current agricultural use of the land since at least the medieval period is likely to limit the survival of earthworks.

A complete photographic record of the site inspection can be found in Appendix 1.

3.2.1 SUMMARY

The surviving field boundaries consist of overgrown high earthen or stone-faced banks with hedge shrubs and young to mature broadleaf trees (including oak), with some internal ditches and traces of internal fences present. The hedges are invariably hawthorn and bramble scrub. Tree coverage was limited, with only a small number of the boundaries incorporating dispersed tree species. Working drainage ditches were not present, though infilled internal ditches were identified along some of the boundaries. No upstanding fences were identified, though collapsed and removed fencing was. Overhead cables were present along access routes to the site.

3.2.2 FIELD F1

A sub-rectangular field (4.5ha) of moderate length wild grass pasture, orientated approximately north-east to south-west. The ground rises gently to the north-west. It is bordered by agricultural fields to the north-east, north-west and south-west; and by Station Road to the south-east. A residential property and garden are situated to the south-western corner. The field boundaries consist of high (*c.*1.50-2m) earth banks with surviving patches of stone facing and overgrown with hawthorn and brambles; mature trees are present along the south-eastern roadside boundary. Infilled internal ditches and a partially collapsed electric fence are present along all boundaries, whilst a partially removed metal post and wire fence creating a former access route to an adjacent field is present along the north-eastern boundary; and a wooden post and wire fence divides the field from the adjacent property. Access to the field is through metal and wooden gates in the south-eastern and -western corners and along the north-eastern and -western boundaries, whilst the bank had been breached at two locations towards the north-eastern corner (for removed water troughs?), and a stone water trough is present in the south-western boundary.

A large sub-rectangular to sub-circular low earthwork bank and depression (Figure 11) was identified towards the south-western edge of the field, with faint traces of an additional similar linear earthwork extending from the south-eastern corner. These correspond with the positions of the prehistoric (Iron Age or Romano-British) enclosures mapped on the HER and visible on the LiDAR data. A linear depression, orientated approximately north-west to south-east, and also visible on the LiDAR data, was identified towards the north-eastern corner of the field, a pit-like element towards its middle suggesting that it may be a modern drainage feature. Reed growth in the north-western corner of the field indicates that this part of the field is subject to waterlogging.

3.2.3 FIELD F2

A recently ploughed and tilled irregular field (5.1ha; *c.*2.5ha subject to survey) forming an inverted 'L', orientated approximately north-east to south-west. The ground rises moderately steeply towards the north-east, with a steeper ridge towards the southern end. It is bordered by agricultural fields to the north-east, north-west and south-east; and by the access track to Penhallow House (and the house itself) and woodland to the south-west. The majority of the field boundaries consist of overgrown high (*c.*1.50-2m) earth banks, though lower in front of Penhallow House, where there is also mature tree growth. The south-eastern end of the south-western boundary is open to an overgrown area and woodland. Wooden posts identified intermittently along the boundaries suggest the former presence of internal fences. Access to the field is through metal gates towards the south-western and north-eastern corners, with a further overgrown gate in the south-eastern corner. A plastic water trough with a possible recently excavated pipe trench runs along the north-eastern boundary. Overhead cables run along the access track to the south of the field.

No earthwork features were identified within this field, though the ground sloped more steeply towards the south-eastern corner. Common post-medieval pottery was present across the field.

FIGURE 11: F1, VIEW OF THE SUB-RECTANGULAR EARTHWORK BANK FEATURE; VIEWED FROM THE SOUTH-EAST (1M SCALE).

3.3 METHODOLOGY

The gradiometer survey follows the general guidance as outlined in: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016) and *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2014b).

The survey was carried out using two twin-sensor fluxgate gradiometers (Bartington Grad601). These machines are sensitive to depths of up to 1.50m. The survey parameters were: sample intervals of 0.25m, traverse intervals of 1m, a zigzag traverse pattern, traverse orientation was circumstantial, grid squares of 30×30m. The gradiometer was adjusted ('zeroed') every 0.5-1ha. The survey grid was tied into the Ordnance Survey National Grid- and set out using a Leica CS15 GNSS Rover GPS. The data was downloaded onto *Grad601 Version 3.16* and processed using *TerraSurveyor Version 3.0.36.0.* The primary data plots and analytical tools used in this analysis were *Shade* and *Metadata*. The details of the data processing are as follows:

Processes:
Clip +/- 1SD; removes extreme data point values.
DeStripe all traverses, median; used to equalise underlying differences between grids (potentially caused by instrument drift or orientation, directional effects inherent in magnetic instrument, or differences in instrument set up during survey e.g. using two gradiometers).
DeStagger grids a1-a29, b1-b33 out- and inbound by 0.25m; reduces staggering effects within data derived from zig-zag collection method.

TABLE 4: SURVEY DETAILS (UNADJUSTED).

Field	Area Surveyed (ha)	Max (nT)	Min (nT)	Standard Deviation (nT)	Mean (nT)	Median (nT)
F1	4.1843	98.65	-100.00	11.33	4.75	5.34
F2	2.2129	98.68	-100.00	12.40	8.33	7.82

3.4 RESULTS

Table 5 with the accompanying Figures 12-15 show the analyses and interpretation of the geophysical survey data. Additional graphic images of the survey data and numbered grid locations can be found in Appendix 2.

TABLE 5: INTERPRETATION OF GRADIOMETER SURVEY DATA.

Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
F1				
1	Strong positive with associated negative, probable	Linear, rectilinear	Ditch, double & bank – enclosure	Indicative of cut and infilled features such as ditches with associated banked material forming a rectilinear enclosure. Visible as earthworks. Responses of between -33.68nT and +39.92nT.
2	Weak, possible	Penannular	Ring-ditch / drip-gully	Indicative of a cut and infilled feature such as a ring-ditch/drip-gully indicating possible prehistoric settlement activity within enclosure group 1. Weak responses may suggest only shallow survival. Responses of between +0.06nT and +4.60nT.
3	Weak to moderate positive, probable	Discrete, ovoid	Pits	Indicative of cut and infilled features such as pits. Weaker responses may indicate natural features such as tree-throws Possible internal features within enclosure group 1. Responses of between +2.13nT and +17.68nT.
4	Weak positive, probable	Linear	Ditch	Indicative of a cut and infilled feature such as a ditch. Orientated approximately north-west to south-east, turning at northern end to north-east. Responses of between +2.17nT and +6.50nT.
5	Weak to moderate positive with associated negative, possible	Linear	Ditch & bank, agricultural	Indicative of cut and infilled features such as ditches with associated banked/compacted material. Orientated approximately north-east to south-west parallel with agricultural activity. May be deeper cut examples. Responses of between -11.46nT and +14.13nT.
6	Strong positive with associated negative, probable	Linear, rectilinear to curvilinear	Ditch, single & double & bank	Indicative of cut and infilled features such as ditches with associated compacted/banked material. Some sections appear to be double ditches. Aligned approximately north-west to south-east with southern end forming a semi-circle. Appears to respect enclosure Group 1. Possible track/entrance to southern corner. Responses of between -16.95nT and +28.41nT.
7	Weak positive, possible	Discrete, ovoid	Pits / post-holes	Indicative of cut and infilled features such as pits or large post-holes. Weaker responses may indicate natural features such as tree-throws or elements of agricultural activity. May for a sub-circular possible round-house. Responses of between +2.82nT and +8.22nT.
8	Strong positive with associated negative, probable	Curvilinear	Ditch & bank	Indicative of cut and infilled features such as ditches with associated banked/compacted material. Curvilinear features forming sub-circular enclosures. Responses of between -17.78nT and +30.62nT.
9	Strong positive with associated negative	Discrete, irregular	Pits?	Indicative of cut and infilled features such as pits with surrounding banked spoil. Possible internal features to enclosure group 7. Responses of between -18.81nT and +41.85nT.
10	Moderate to strong positive with associated negative, probable	Linear, rectilinear	Ditch & bank	Indicative of cut and infilled features such as ditches with associated banked/compacted material. Orientated approximately north-west to south-east and north-east to south-west. Responses of between -15.46nT and +29.07nT.
11	Moderate positive with associated negative	Linear	Ditch & bank	Indicative of cut and infilled features such as ditches with associated compacted/banked material. Orientated approximately north-west to south-east. Appears as triple ditch and double bank. May be single ditch and bank associated with Group 10 alongside double ditch and bank associated with Group 15. Responses of between -15.94nT and +16.33nT.
12	Moderate to strong positive, probable	Penannular	Ring-ditch / drip-gully	Indicative of cut and infilled features such as ring-ditches/drip-gullies indicating possible prehistoric settlement. Intermittent responses may indicate areas of poor survival. Responses of between +0.02nT and +31.48nT.

Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
13	Weak to strong positive, probable	Discrete, ovoid to irregular	Pits / post-holes	Indicative of cut and infilled features such as pits or large post-holes. Weaker examples may indicate natural features such as tree-throws. Possible internal features to ring-ditch structures. Responses of between +0.02nT and +20.02nT.
14	Moderate to strong positive, probable	Discrete, ovoid	Pits / post-holes	Indicative of cut and infilled features such as pits or large post-holes. Weaker examples may indicate natural features such as tree-throws. Appear in alignments orientated approximately north to south and east to west. Responses of between +1.41nT and 38.88nT.
15	Weak to moderate positive with associated negative, probable	Linear	Ditch, double & bank	Indicative of cut and infilled features such as ditches flanking a central bank/compacted material. Orientated approximately north-west to south-east. May be associated with elements of Group 11. Responses of between -13.07nT and +10.47nT.
16	Weak to moderate negative with associated positive, probable	Linear	Drainage?	Indicative of a cut and infilled feature such as a ditch with a ceramic/stone feature such as a drain. Aligned approximately north-west to south-east, turning at southern end to the east to gate access. Visible in part as linear and sub-rectangular earthwork depression. Responses of between -11.38nT and +5.82nT.
17	Weak to moderate positive with associated negative, probable	Linear	Ditch, double & bank	Indicative of cut and infilled features such as ditches flanking a central bank/compacted material. Orientated approximately north-west to south-east along line of existing field boundary. Responses of between -8.96nT and +11.59nT.
18	Moderate to strong positive with associated negative	Linear	Drainage?	Indicative of cut and infilled features such as ditches with ceramic/stone features such as drains. Aligned approximately north-west to south-east and south-west to north-east in a possible herringbone pattern. Responses of between -16.44nT and +34.63nT.
19	Very strong positive with associated negative & dipolar	Linear	Modern service	Indicative of modern service trenching with metallic elements. Responses of between -77.30nT and +96.42nT.
20	Weak to strong positive, possible	Discrete, ovoid	Pits	Indicative of cut and infilled features such as pits. Weaker examples may indicate natural features such as tree-throws. Responses of between +6.15nT and +29.02nT.
21	Strong to very strong dipolar (mixed response)	Discrete	Ferrous anomaly	Indicative of metallic objects. Responses between -107.54nT and +93.95nT.
22	Strong to very strong bipolar (mixed response)	Irregular	Modern disturbance	Indicative of disturbed ground and disturbance caused by proximity to metallic fences and debris. Responses of between -198.39nT and +124.27nT.
23	Weak positive & negative, possible	Linear	Agricultural activity	Linear striations covering the field with regularity. Indicative of ploughing. Weak mixed positive and negative responses suggest shallow ploughing. Responses of between +/-5nT.
F2				
24	Moderate to strong positive with associated negative, probable	Linear, rectilinear	Ditch	Indicative of a cut and infilled feature such as a ditch with associated banked/compacted material forming a rectilinear enclosure. Orientated approximately north-east to south-west, with curvilinear southern end. Responses of between -28.74nT and +50.31nT.
25	Moderate to strong positive, probable	Penannular	Ditch, ring-ditch/drip-gully	Indicative of cut and infilled features such as ditches. May form part of an incomplete ring-ditch/drip-gully indicating possible prehistoric settlement. Responses of between +0.06nT and +30.35nT.
26	Moderate to strong positive with associated negative, probable	Linear	Ditch	Indicative of cut and infilled features such as ditches with associated banked/compacted material. Orientated approximately north to south and east to west. Responses of between -27.52nT and +26.20nT.
27	Moderate to strong positive, probable	Discrete, ovoid	Pits	Indicative of cut and infilled features such as pits. Weaker responses may indicate natural features such as tree-throws. Responses of between +2.16nT and +43.30nT.
28	Moderate to strong positive with associated negative, probable	Linear	Ditch	Indicative of a cut and infilled feature such as a ditch with associated banked/compacted material. Some elements appear a double ditch. Orientated approximately north-east to south-west. May be associated with Group 24. Responses of between -24.88nT and +37.29nT.
29	Moderate to strong positive with associated negative, probable	Linear, rectilinear	Ditch	Indicative of cut and infilled features such as ditches with associated banked/compacted material. Orientated approximately north-east to south-west and north-west to south-east. Responses of between -29.76nT and +43.18nT.
30	Moderate to very strong positive with associated	Linear, sinuous	Ditch	Indicative of a cut and infilled feature such as a ditch with associated banked/compacted material. Orientated approximately

Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
	negative, probable			north-west to south-east. Responses of between -37.25nT and +50.68nT.
31	Moderate to strong positive, probable	Linear	Ditch	Indicative of cut and infilled features such as ditches. Orientated approximately north-west to south-east and north-east to south-west. Responses of between +1.46nT and +32.53nT.
32	Moderate to strong positive with associated negative, probable	Linear	Ditch, double & bank – historic boundary	Indicative of cut and infilled features such as ditches flanking a central bank/compacted material. Orientated approximately north to south. Depicted on 19th and 20th century historic mapping. Responses of between -40.18nT and +30.46nT.
33	Very strong bipolar, probable	Linear	Modern service	Indicative of a metallic service. Responses of between -113.87nT and +87.58nT.
34	Moderate to strong positive, probable	Discrete, ovoid	Pits	Indicative of cut and infilled features such as pits. Weaker responses may indicate natural features such as tree-throws. Responses of between +3.08nT and +45.85nT.
35	Strong to very strong dipolar (mixed response)	Discrete	Ferrous anomaly	Indicative of metallic objects. Responses of between -108.36nT and +100.26nT.
36	Strong to very strong bipolar (mixed)	Irregular	Modern disturbance	Indicative of disturbed ground and disturbance caused by proximity to metallic fences and debris. Responses of between -90.45nT and +91.84nT.
37	Weak to moderate positive & negative, possible	Linear	Agricultural activity	Linear striations covering the field with regularity. Indicative of ploughing. Weaker positive and negative responses suggest shallow ploughing whilst stronger responses indicate ploughing visible on the surface. Responses of between +/-10nT (up to +/-20nT).

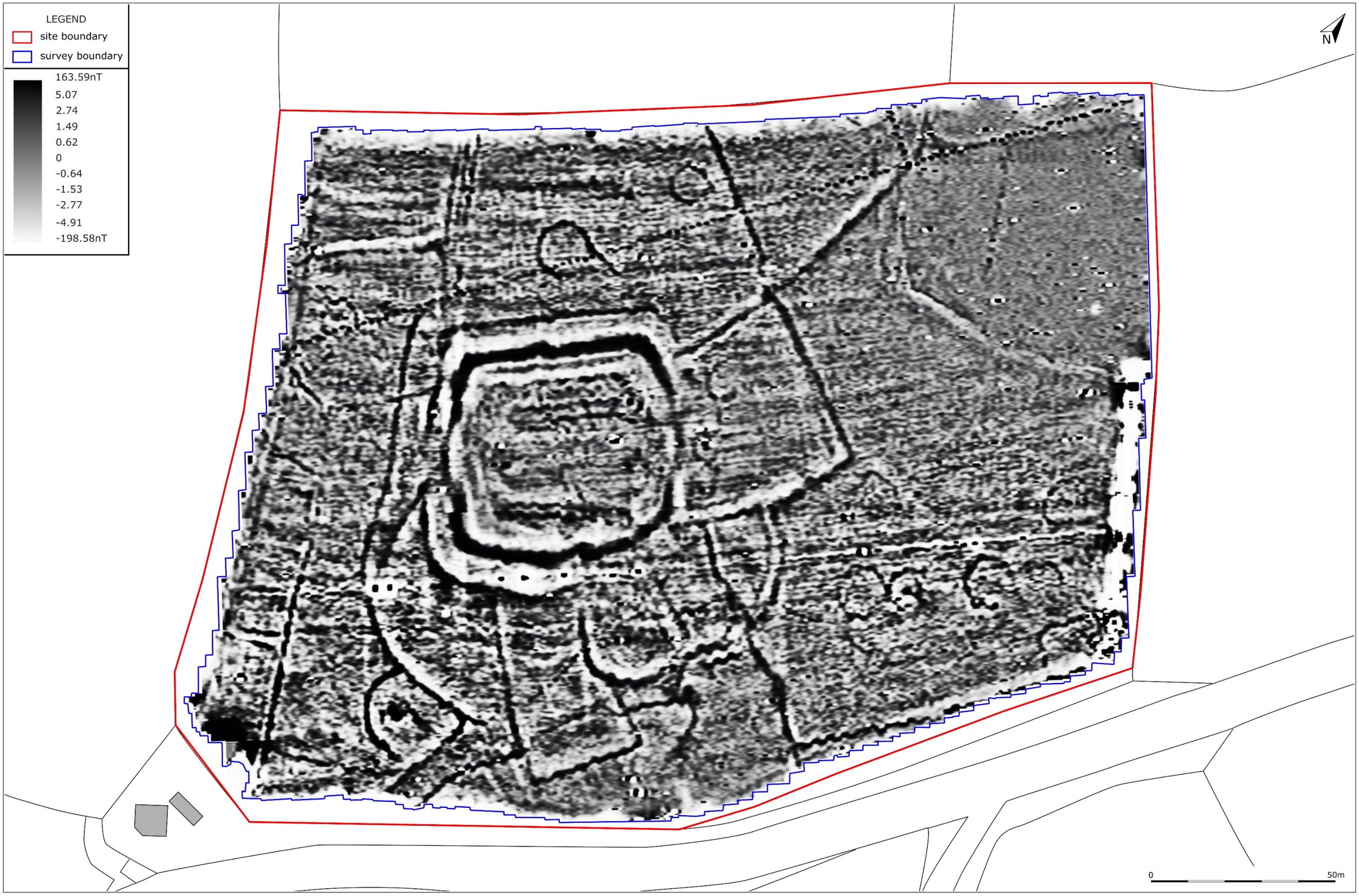


Figure 12: F1, shade plot of the gradiometer survey data; band weight equalized, gradiated shading.

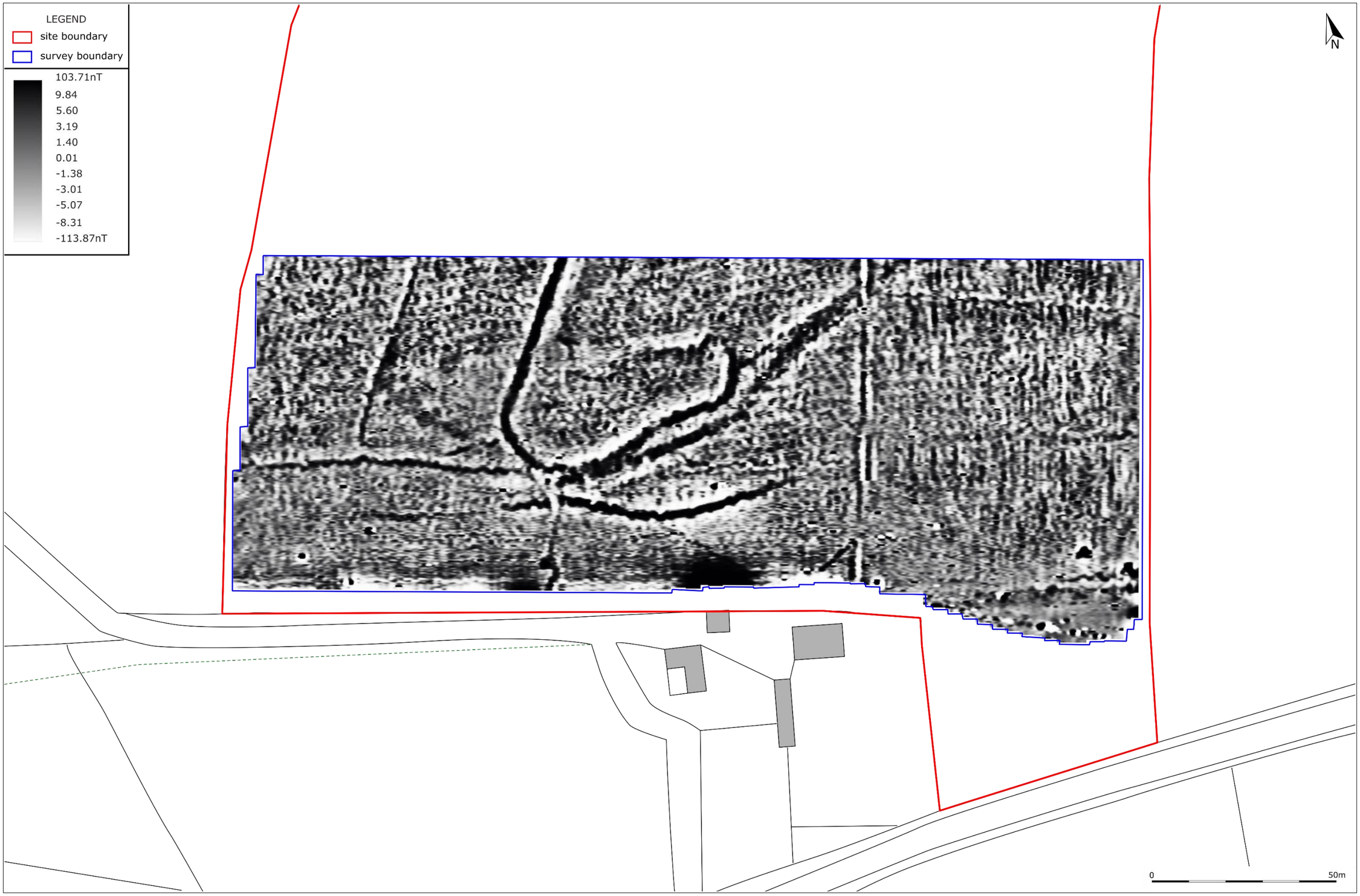


Figure 13: F2, shade plot of the gradiometer survey data; band weight equalized, gradiated shading.

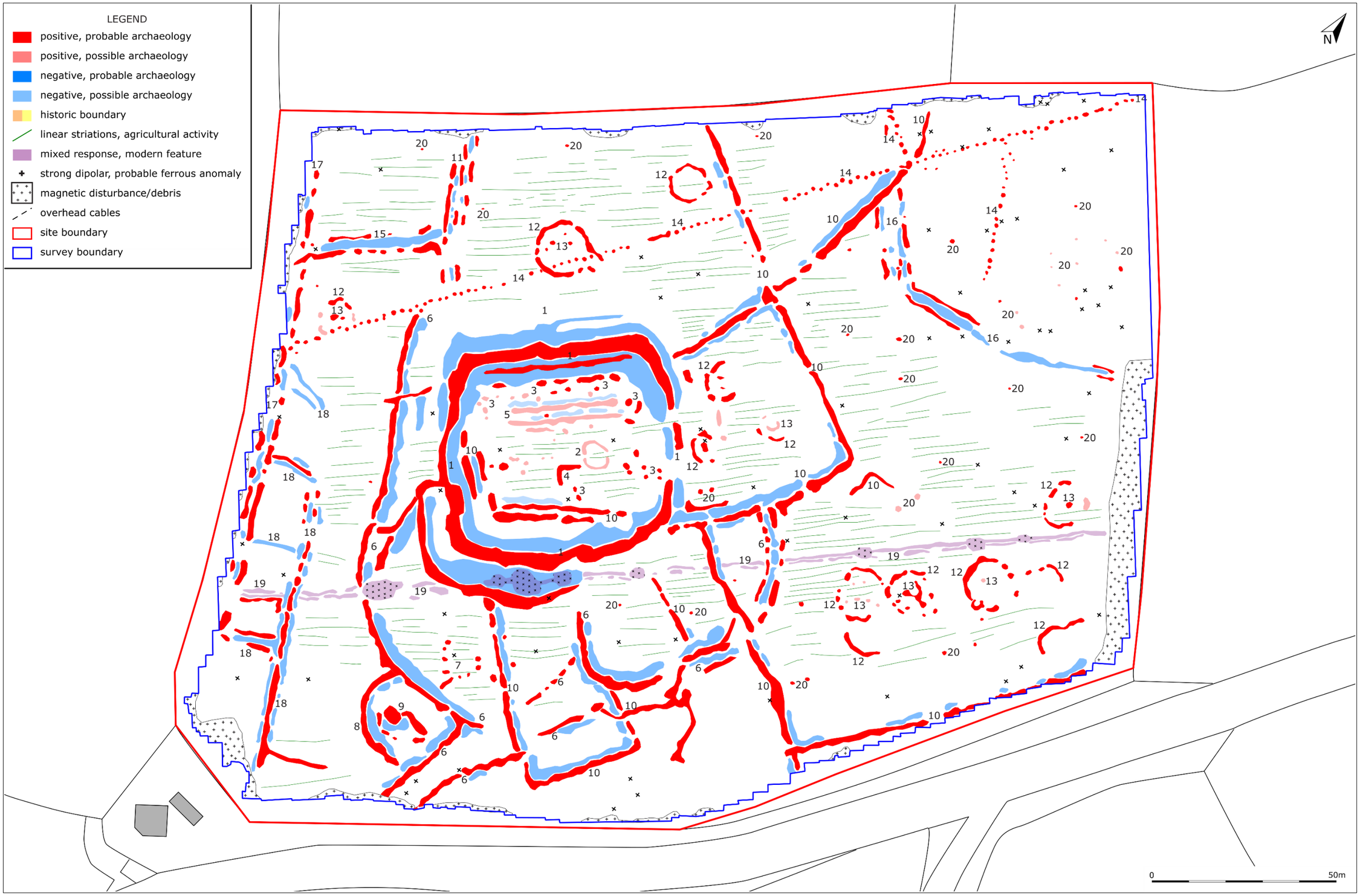


Figure 14: F1, interpretation of the gradiometer survey data.

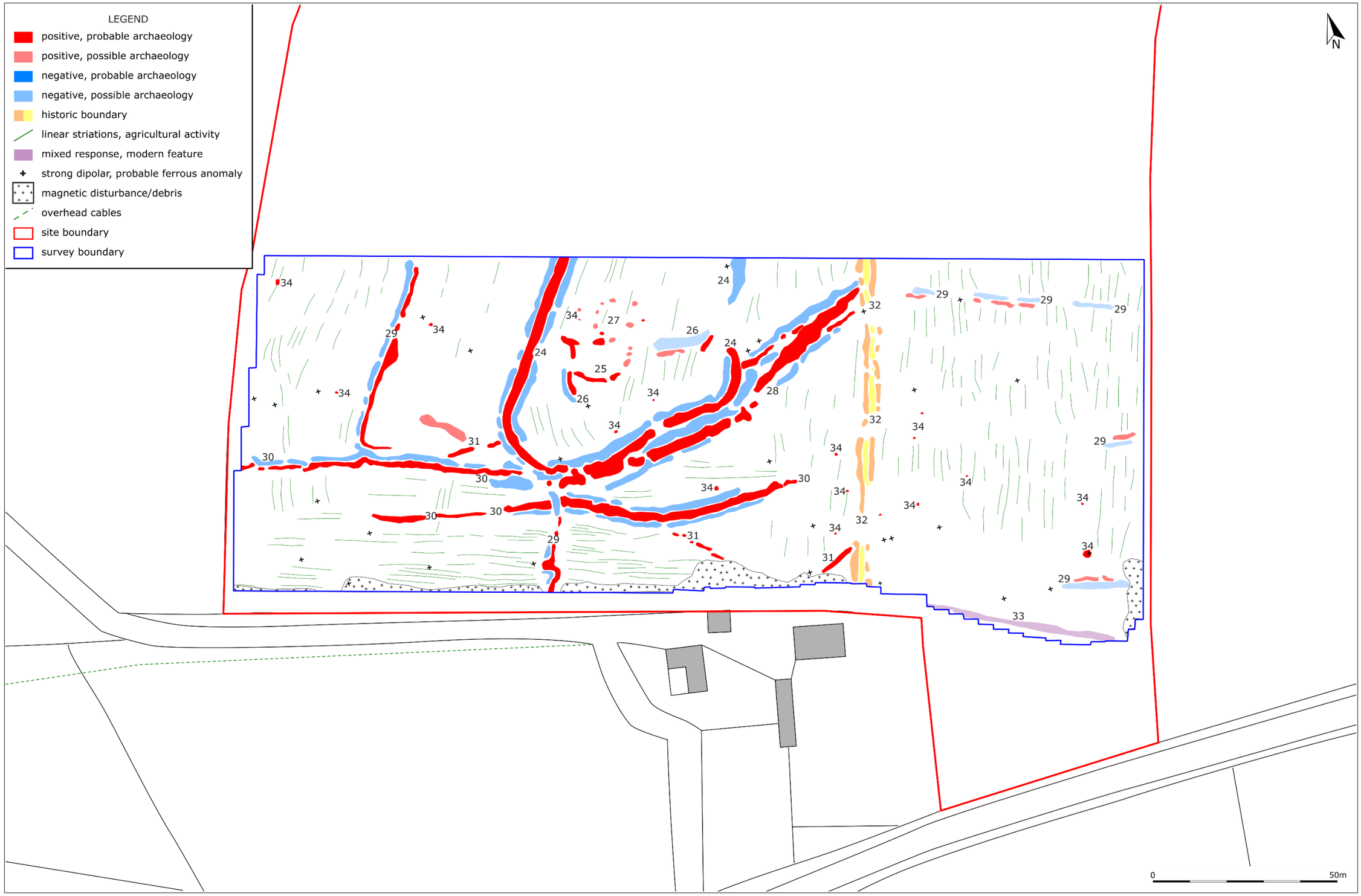


Figure 15: F2, interpretation of the gradiometer survey data.

3.5 DISCUSSION

The survey identified 37 groups of anomalies. These were predominantly linear anomalies likely to be associated with phases of historic boundaries, land drainage, and agricultural activity, but they also include features indicative of prehistoric settlement. The identified anomaly groups include: ditched features; a double-ditched enclosure, historic field boundaries; ring-ditches/drip-gullies; ceramic or stone drains; and agricultural activity. Evidence of ploughing, metallic debris and ground disturbance was also identified.

The general response variation across the site was between +/-5nT with occasional clear background geological variation up to +/-10nT. The response strength of probable archaeological activity was fairly moderate (typically between +/-25nT). The weak responses of several of the anomalies, however, may indicate that these are only likely to survive to a shallow depth.

The anomaly groups identified include: one double-ditched enclosure (Group 1); one other enclosure (Group 24); 36 probable ditch and ditch and/or bank features (Groups 4, 6, 8, 10, 11, 15, 17, 26, and 28-31); 18 circular and penannular ring-ditch, ring-gully (Groups 2, 12 and 25) or post-built (Groups 7 and 27) structures with possible internal pit/post-hole features (Group 13); one removed historic field boundary (Group 32) removed during the 20th century; three pit/post-hole alignments (Group 14); 84 possible pits or tree-throws (Groups 3, 9, 20 and 34); eight possible drainage features (Groups 16 and 18); two modern services (Groups 19 and 33). Agricultural activity in the form of ploughing (either plough scarring or traces of former ridge and furrow type) was also identified (Groups 5, 23 and 37).

Field 1

Anomaly Group 1 consists of a pair of strong positive (+0.01nT to +39.92nT) linear anomalies flanking associated negative (-33.68nT to -0.62nT) responses indicative of cut and infilled features such as ditches flanking banked material. These features form a double-ditched sub-rectangular enclosure orientated approximately north-west to south-east measuring *c.*80m × 70m in size and was visible as an upstanding earthwork feature. Within, and likely associated with the enclosure, anomaly Group 2 consists of a pair of a weak positive (+0.06nT to +4.60nT) penannular anomaly indicative of a cut and infilled feature such as a ditch. The form of the anomaly is indicative of a ring-ditch or drip-gully feature *c.*7m in diameter and is typical of prehistoric settlement. The weak nature of the responses may indicate only shallow survival, although its slightly deformed shape especially in comparison to the Group 12 anomalies (see below) may suggest that it is not a 'real' feature. A number of discrete ovoid weak to moderate positive (+2.13nT to +17.68nT) anomalies (Group 3) indicative of cut and infilled features such as pits were also identified within the enclosure, some of the weaker responses possible indicating natural features such as tree-throws.

A further weak positive (+2.17nT to +6.50nT) linear anomaly indicative of a cut and infilled feature such as a ditch forms a right-angle orientated approximately north-west to south-east, turning at its northern end to the north-east, and may also be associated with the enclosure.

Anomaly Group 5 consists of a series of weak to moderate positive (+0.04nT to +14.13nT) linear anomalies with associated negative (-11.46nT to -1.15nT) responses indicative of cut and infilled features such as ditches with associated banked/compacted material. They are orientated approximately north-east to south-west and are tightly spaced, matching with the linear striations of agricultural activity (Group 23) identified across the site, and may be deeper cut examples.

Anomaly Group 6 consists of a series of strong positive (+0.05nT to +28.41nT) linear to curvilinear anomalies with associated negative (-16.95nT to -0.06nT) anomalies indicative of cut and infilled features such as ditches with associated banked/compacted material. They are orientated between north-west to south-east and north-east to south-west forming a sub-rectangular enclosure orientated approximately north-west to south-east with a semi-circular south-eastern end measuring

*c.*112+m × 115m; a pair of ditches extending south from the southern corner forming an entrance. The position and alignment of this anomaly group appears to respect the enclosure of anomaly Group 1 and it is possible (and indeed, likely) that the two are associated. Within the enclosure anomaly Group 7 comprises a series of weak positive (+2.82nT to +8.22nT) discrete anomalies indicative of cut and infilled features such as pits. Their arrangement appears to form a penannular feature *c.*10m in diameter and they may form part of a post-built structure typical of prehistoric round-house settlement, though some of the weaker responses may indicate natural features such as tree-throws.

Anomaly Group 8 comprises a strong positive (+2.38nT to +30.62nT) curvilinear anomaly with associated negative (-17.78nT to -0.15nT) responses indicative of a cut and infilled feature such as a ditch with associated banked/compacted material. It measures *c.*25m in diameter and is situated in the external crook of the anomaly Group 6 entrance. Within this enclosure anomaly Group 9 comprises a series of strong positive (+0.28nT to +41.85nT) discrete anomalies with associated negative (-18.81nT to -1.17nT) responses indicative of cut and infilled features such as pits with associated banked/compacted material.

Anomaly Group 10 comprises a series of moderate to strong positive (+0.08nT to +29.07nT) linear anomalies with associated negative (-15.46nT to -0.23nT) responses indicative of cut and infilled features such as ditches with associated banked/compacted material. They form a series of sub-rectangular enclosures and their sub-divisions orientated approximately west-north-west to east-south-east, with some sections appearing to be double ditched. Elements of these features, particularly in proximity to anomaly Group 1, were visible as upstanding earthworks. To the north-western corner of the largest of these enclosures anomaly Group 11 comprises a series of moderate positive (+0.11nT to +16.33nT) linear anomalies with associated negative (-15.94nT to -0.53) responses indicative of cut and infilled features such as ditches with associated banked/compacted material. They appear as a short section of a triple-ditch alignment orientated approximately west-north-west to east-south-east, and whilst they may have been laid out as such, it is perhaps more likely that they form continuations of two disparate anomaly groups, 10 and 15 (see below). Within these enclosures are a series of moderate to strong positive (+0.02nT to +31.48nT) penannular anomalies (Group 12) indicative of cut and infilled features such as ditches. The forms of these 15 features are indicative of ring-ditch or drip-gully features typical of prehistoric settlement and range in size from *c.*5+m to 15m in diameter, though several of the examples do not show complete survival and others overlap each other. Within these anomaly Group 13 comprises of series of weak to strong positive (+0.02nT to +20.02nT) discrete anomalies indicative of cut and infilled features such as pits, and may represent internal pits or large post-holes to the round-house structures.

Anomaly Group 14 comprises a series of moderate to strong positive (+1.41nT to +38.88nT) discrete anomalies indicative of cut and infilled features such as pits. They form three tightly spaced pit or large post-hole alignments aligned approximately north-north-east to south-south-west, west-north-west to east-south-east and north-west to south-east.

Anomaly Group 15 comprises a pair of weak to moderate positive (+0.60nTto +10.47nT) linear anomalies with associated negative (-13.07nT to -0.12nT) responses indicative of cut and infilled features such as ditches flanking a central bank/compacted material. They are orientated approximately north-east to south-west and may form the corner of a field with elements of anomaly Group 11 (see above).

Anomaly Group 16 comprises a sinuous to curvilinear weak to moderate negative (-11.38nT to -0.06nT) anomaly with associated positive (+0.13nT to +5.82nT) responses indicative of a ceramic or stone feature within an excavated trench, and likely to be a drainage feature. A short section of this was visible as a linear and pit earthwork depression.

Anomaly Group 17 comprises a pair of weak to moderate positive (+0.09nT to +11.59nT) anomalies

with associated negative (-8.96nT to -0.24nT) responses indicative of cut and infilled features such as ditches flanking a central bank, typical of Cornish field boundaries. They are orientated approximately north-west to south-east, congruent with and alongside an existing field boundary and may represent a slightly shifting boundary or be associated as now defunct drainage ditches.

Anomaly Group 18 comprises a series of moderate to strong positive (+0.58nT to +34.63nT) linear responses with associated negative (-16.44nT to -0.02nT) responses indicative of cut and infilled features such as ditches with ceramic/stone elements. They are orientated approximately north-west to south-east and east-north-east to west-south-west forming a possible herringbone pattern indicative of drainage features.

Anomaly Group 19 comprises a very strong positive (+0.13nT to +96.42nT) linear anomaly with associated negative (-77.30nT to -1.14nT) and intermittent dipolar responses indicative of a buried modern service. It is orientated approximately north-east to south-west.

Across the site was a series of weak to strong positive (+6.15nT to +29.02nT) discrete anomalies (Group 20) indicative of cut and infilled features such as pits or in the cases of weaker responses, tree-throws. Several of these features are in proximity to some of the putative prehistoric structures and may be associated as settlement activity.

Discrete strong to very strong dipolar (-107.54nT to -0.24nT and +12.00nT to +93.95nT) responses indicative of ferrous objects (anomaly Group 21); irregular areas of strong to very strong mixed bipolar (-198.39nT to -0.67nT and +0.24nT to +124.27nT) responses indicative of disturbed ground and proximity to metallic fencing and debris (Group 22); and linear striations (anomaly Group 23) of weak negative and positive (+/-5nT) orientated approximately north-east to south-west are present across the field. The regularity of the Group 23 responses suggests that they represent episodes of ploughing.

Field 2

Anomaly Group 24 consists of a moderate to strong positive (+0.33nT to +50.31nT) linear to curvilinear anomaly with associated negative (-28.74nT to -0.54nT) responses indicative of a cut and infilled feature such as a ditch with associated banked/compacted material. It forms the southern end of a sub-rectangular enclosure orientated approximately north-north-east to south-south-west and measuring *c.*60+m × 65m. A series of moderate to strong positive (+0.21nT to +26.20nT) linear to curvilinear anomalies with associated negative (-27.52nT to -1.41nT) responses indicative of cut and infilled features such as ditches with associated with banked/compacted material may form sub-divisions of this enclosure. Within, and likely associated with the enclosure, anomaly Group 25 comprises a series of moderate to strong positive (+0.06nT to +30.35nT) curvilinear anomalies indicative of cut and infilled features such as ditches. Together these form sections of the southern end of a penannular feature measuring *c.*17m in diameter, indicative of the ring-ditch or drip-gully of a prehistoric round-house structure. A further series of moderate to strong positive (+2.16nT to +43.30nT) discrete anomalies indicative of cut and infilled features such as pits or large post-holes (Group 27) similarly form a circular arrangement measuring *c.*13m in diameter and may reflect a post-built round-house structure.

Anomaly Group 28 comprises a moderate to strong positive (+0.29nT to +37.29nT) linear anomaly with associated negative (-24.88nT to -0.23nT) responses indicative of a cut and infilled feature such as a ditch with associated banked/compacted material. It is orientated approximately north-east to south-west, partially running alongside the southern end of enclosure Group 24 suggesting that the two may be associated, and may in places be a double ditch.

Anomaly Group 29 comprises a series of moderate to strong positive (+0.04nT to +43.18nT) linear anomalies with associated negative (-29.76nT to -0.12nT) responses indicative of cut and infilled features such as ditches with associated banked/compacted material. They are orientated

approximately north-east to south-west and north-west to south-east, congruent with elements of enclosure Group 24 and may be associated. Anomaly Group 30 comprises two moderate to very strong positive (+0.02nT to +50.68nT) sinuous linear anomalies with associated negative (-37.25nT to -0.38nT) responses indicative of cut and infilled features such as ditches with associated banked/compacted material. They are orientated approximately north-west to south-east, parallel with elements of Groups 24 and 29, and whilst they do not create the same broadly straight sided boundaries, they may be associated as a different phase of the same field-system.

Anomaly Group 31 comprises a series of moderate to strong positive (+1.46nT to +32.53) linear anomalies indicative of cut and infilled features such as ditches. They are orientated approximately north to south and east to west and do not correspond with any of the other anomaly groups, suggesting that they form part of a different field-system.

Anomaly Group 32 comprises a pair of moderate to strong positive (+0.34nT to +30.46nT) linear anomalies with associated negative (-40.18nT to -0.42nT) indicative of cut and infilled features such as ditches flanking a central bank, typical of Cornish field boundaries. It is orientated approximately north-east to south-west, congruent with the existing field-system and corresponds to a boundary depicted on 19th century and later historic mapping.

Anomaly Group 33 comprises a very strong bipolar (-113.87nT to -1.24nT and +3.65nT to +87.58nT) linear anomaly indicative of a buried modern service. It is orientated approximately north-east to south-west.

Across the site was a series of weak to strong positive (+3.08nT to +45.85nT) discrete anomalies (Group 34) indicative of cut and infilled features such as pits or in the cases of weaker responses, tree-throws. Several of these features are in proximity to some of the putative prehistoric structures and may be associated as settlement activity.

Discrete strong to very strong dipolar (-108.36nT to -0.70nT and +4.13nT to +100.26nT) responses indicative of ferrous objects (anomaly Group 35); irregular areas of strong to very strong mixed bipolar (-90.45nT to -2.47nT and +0.00nT to +91.84nT) responses indicative of disturbed ground and proximity to metallic fencing and debris (Group 36); and linear striations (anomaly Group 37) of weak negative and positive (+/-5nT and up to +/-20nT) orientated approximately north-north-west to south-south-east and west-north-west to east-south-east are present across the field. The regularity of the Group 37 responses suggests that they represent episodes of ploughing.

3.6 ARCHAEOLOGICAL POTENTIAL

The survey identified 37 groups of anomalies across the two fields. These were predominantly linear ditch and possible bank features associated with phases of field-systems (Groups 4, 6, 8, 10-11, 15, 17, 26 and 28-31), including a later removed historic boundary depicted on 19th century mapping (Group 32); two rectangular enclosures (Groups 1 and 24); 16 circular and penannular ring-ditch or drip-gully (Groups 2, 12 and 25) and two pit/post-hole (Groups 7 and 27) features with internal pit/post-hole features (Group 13); three pit/post-hole alignments (Group 14); 84 possible pits or tree-throws (Groups 3, 9, 20 and 34); eight possible drainage features (Groups 16 and 18) and two modern services (Groups 19 and 33). Agricultural activity in the form of ploughing (either plough scarring or traces of former ridge and furrow type) was also identified (Groups 5, 23 and 37).

Whilst none of the identified features can at this stage be dated, the 18 penannular/circular features across the site (Groups 2, 12 and 25) are likely to be the ring-ditch or drip-gullies of roundhouses of prehistoric (Iron Age?) date, Groups 7 and 27 forming possible post-built roundhouse structures of similar date. These would have been situated within an associated contemporary field-system, and can be seen in groupings within enclosures (Groups 1, 6, 10 and 24) to which some of the identified

linear features may have belonged.

Both fields are fairly densely packed with potential archaeological features associated with two main enclosures (Groups 1 and 2) with a series of surrounding sub-rectangular (Groups 6, 10-11,15, 17 and 28-31) and sub-circular (Group 8) field enclosures with numerous internal divisions. Some of these, such as enclosure Groups 1, 6 and 8; and enclosure Groups 24, and 28-30 may be associated as different phases of the same field-systems with many of the features respecting each other; whilst others, including enclosure Groups 10 and 31 appear to be on slightly different alignments and may reflect different field-systems.

The surrounding historic field pattern is characterized (Cornwall HLC) as 'Medieval Farmland', represented by the gently curving elements that survive within the existing field-system, but which may have prehistoric origins. Other than the current curving boundaries to both fields, the only element which continued in use into the 20th century was historic boundary Group 32, whilst the position and alignment of the Group 17 features strongly suggest that it may have formed an earlier phase of the same boundary it runs alongside. Whilst elements of the remaining field-system features appear congruent with these, they are largely slightly offset suggesting that they may form phases of a different field-system, only some of which survived as visible features when the current system was begun to be laid out and were therefore respected.

Most probably associated with the post-medieval and later agricultural use of the land were a number of drainage features, either ceramic- or stone-built drains. Many of these may be later 19th to early 20th century in date, though the tithe apportionment indicates much of the site was under arable cultivation in the mid-19th century.

A number of possible pit features were identified across the site. In three instances (Group 14) these were arranged in alignments, the clarity and extent of the responses indicating that these were deliberately dug pits. They are clearly of a different phase of activity to the settlement features within field enclosure Group 10, the main alignment crossing one of the structures. However, two of the three alignments run parallel and perpendicular to elements of Group 10 and there may be an association.

The remaining features identified across the site reflect historic episodes of ploughing, either plough scarring or perhaps the furrows of historic ridge and furrow.

4.0 CONCLUSION

The site is located south of St Newlyn East, across single fields to the south of Parknoweth Farm, a farmstead with medieval origins; and north of Penhallow House, an 18th-19th century farmstead, on the south and south-east facing slopes of a valley bottom. The Cornwall HLC describes the site as within 'Medieval Farmland'. Prehistoric activity in the landscape is suggested by cropmark evidence on aerial photographs (including within the survey areas) interpreted as a mix of Bronze Age barrows and Iron Age to Romano-British settlement sites; though much of the surrounding evidence reflects historic medieval and post-medieval field-systems.

The geophysical survey identified 37 groups of anomalies. These were predominantly linear anomalies likely associated with phases of historic boundaries, land drainage, and agricultural activity, but also included features indicative of prehistoric settlement. The identified anomaly groups include: historic field boundaries; ditch features; ring-ditch/drip-gullies; ceramic or stone drains; and agricultural activity. Evidence of ploughing and metallic debris and ground disturbance was also identified.

The anomaly groups identified include: one double-ditched enclosure (Group 1); one other enclosure (Group 24); 36 probable ditch and ditch and/or bank features (Groups 4, 6, 8, 10, 11, 15, 17, 26, and 28-31); 18 circular and penannular ring-ditch, ring-gully (Groups 2, 12 and 25) or post-built (Groups 7 and 27) structures with possible internal pit/post-hole features (Group 13); one removed historic field boundary (Group 32) removed during the 20th century; three pit/post-hole alignments (Group 14); 84 possible pits or tree-throws (Groups 3, 9, 20 and 34); eight possible drainage features (Groups 16 and 18); two modern services (Groups 19 and 33). Agricultural activity in the form of ploughing (either plough scarring or traces of former ridge and furrow type) was also identified (Groups 5, 23 and 37).

The majority of the features represent undated phases of enclosures and field-systems, tentatively suggested as being largely prehistoric in date, but with medieval and post-medieval elements. The ring-ditch/drip-gully features are likely to be prehistoric in date and it could be inferred that some of the surrounding ditch features may have formed part of a contemporary field-system.

The results of the geophysical survey would suggest that the archaeological potential for the site is *high,* with many of the identified features considered likely to reflect phases of substantial prehistoric (Iron Age?) settlement and associated activity, as well as earlier phases of the existing medieval to post-medieval field-system.

It is recommended that should the land subject to survey (and surrounding fields) be considered for any disturbance, that in the first instance, targeted evaluation trenching would form the first stage of archaeological mitigation, in order to validate the results of the geophysical survey, prior to more substantial excavation.

5.0 BIBLIOGRAPHY

Published Sources:

Chartered Institute of Field Archaeologists 2014a (revised 2017 and 2020): *Standard and Guidance for Historic Environment Desk-based Assessment*.

Chartered Institute for Archaeologists 2014b (revised 2017): *Standard and Guidance for Archaeological Geophysical Survey.*

DW Consulting 2016: *TerraSurveyor User Manual.*

English Heritage 2008: *Geophysical Survey in Archaeological Field Evaluation.*

Europae Archaeologiae Consilium 2016: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider, EAC guidelines 2*.

Gover, J. 1948: *The Place-Names of Cornwall.*

Lysons, D. & Lysons, S. 1814: *Magna Britannia, volume 3: Cornwall*. London.

Schmidt, A. 2002: *Geophysical Data in Archaeology: A Guide to Good Practice.* ADS series of Guides to Good Practice. Oxbow Books, Oxford.

Soil Survey of England and Wales 1983: *Legend for the 1:250,000 Soil Map of England and Wales (a brief explanation of the constituent soil associations)*.

Unpublished Sources:

Bampton, J. 2014: *Land at Halt Road, St Newlyn East, Cornwall: Results of a Desk-Based Assessment and Archaeological Monitoring & Recording.* SWARCH Report no. 140523.

Bonvoisin, P. 2018: *Land at Halt Road, St Newlyn East, Cornwall: Results of a Heritage Impact Assessment & Geophysical Survey.* SWARCH Report no. 180206.

Boyd, N. 2022: *Proposed Woodland Creation, Trewithen Estate, St Newlyn East, Cornwall: Written Scheme of Investigation.* SWARCH Report no. NEW22WSIv1.

Cole, R. 2003: *Cargoll Farm, Newlyn East, Cornwall: Archaeological Watching Brief.* CAU Report No. 2003R012.

Forestry Commission 2021: *Brief for Archaeological Geophysical Survey Ahead of Woodland Creation in England.* Forestry Commission.

Gillard, B. (HES) & The Cahill Partnership 2004: *Cornwall Industrial Settlements Initiative, Newlyn East (St Agnes Area).* Conservation Area Partnership, CCHES Report No. 2004R098.

Parkes, C. 2008: *Carland Cross Wind Farm: Geotechnical Pits Watching Brief.* CAU Report No. 2008R077.

Smith, R. 2018: *A30 Carland Cross to Chiverton Cross: Test Pits Phase II - Archaeological Watching Brief.* CAU Report No.2018R011.

Webb, P. 2015: *Land at Halt Road, St Newlyn East, Cornwall: Results of Archaeological Monitoring & Recording.* SWARCH Report no. 150115.

Webb, P. 2019: *Land Adjacent to Tinners Croft and Halt Road, St Newlyn East: Archaeological Monitoring and Recording.* SWARCH HER submission.

Websites:

British Geological Survey 2022: *Geology of Britain Viewer*.
http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html

British Library 2022: *Historic Mapping*
http://www.bl.uk

Cornwall Council Historic Environment Record (HER) and HLC 2022: *Cornwall Council Interactive Map*
http://map.cornwall.gov.uk/website/ccmap

National Library of Scotland 2022: *Ordnance Survey maps*
http://maps.nls.uk

Trewithen Estate 2022: *The History of Trewithen: One of the most elegant examples of 18th century architecture in Cornwall*
https://trewithengardens.co.uk/

APPENDIX 1: SUPPORTING PHOTOGRAPHS

1. F1, VIEW ACROSS THE FIELD; VIEWED FROM THE NORTH (NO SCALE).

2. F1, VIEW ACROSS THE FIELD; VIEWED FROM THE NORTH-WEST (NO SCALE).

3. F1, VIEW ALONG THE NORTH-EASTERN HEDGEBANK BOUNDARY; VIEWED FROM THE NORTH-WEST (NO SCALE).

4. F1, DETAIL OF THE PARTIAL STONE FACING TO THE NORTH-EASTERN HEDGEBANK BOUNDARY; VIEWED FROM THE SOUTH-WEST (1M SCALE).

5. F1, DETAIL OF THE GATED ACCESS AND STONE FACING TO THE NORTH-EASTERN HEDGEBANK BOUNDARY; VIEWED FROM THE SOUTH (1M SCALE).

6. F1, DETAIL OF THE BREACH AT THE NORTH-WESTERN END OF THE NORTH-EASTERN HEDGEBANK BOUNDARY. NOTE THE REED GROWTH IN THIS AREA; VIEWED FROM THE SOUTH-WEST (1M SCALE).

7. F1, VIEW ALONG THE NORTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE EAST-NORTH-EAST (NO SCALE).

8. F1, DETAIL OF THE BREACH AT THE NORTH-EASTERN END OF THE NORTH-WESTERN HEDGEBANK BOUNDARY. NOTE THE REED GROWTH IN THIS AREA; VIEWED FROM THE SOUTH-SOUTH-EAST (1M SCALE).

9. F1, F1, DETAIL OF THE GATED ACCESS AND STONE FACING TOWARDS THE NORTH-EASTERN END OF THE NORTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE EAST (1M SCALE).

10. F1, DETAIL OF THE GATED ACCESS TOWARDS THE SOUTH-WESTERN END OF THE NORTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE SOUTH (1M SCALE).

11. F1, VIEW ALONG THE SOUTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE NORTH (NO SCALE).

12. F1, DETAIL OF THE STONE TROUGH IN THE BREACH MID-WAY ALONG THE SOUTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE NORTH-EAST (1M SCALE).

13. F1, DETAIL OF THE GATED ACCESS AND STONE FACING AT THE SOUTHERN END OF THE SOUTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE SOUTH-EAST (1M SCALE).

14. F1, VIEW OF THE ADJACENT RESIDENTIAL PROPERTY AND GARDEN WITH FENCE-LINE BOUNDARY; VIEWED FROM THE NORTH-EAST (NO SCALE).

15. F1, VIEW ALONG THE SOUTH-EASTERN HEDGEBANK BOUNDARY; VIEWED FROM THE SOUTH-WEST (1M SCALE).

16. F1, DETAIL OF THE SURVIVING STONE FACING TO THE SOUTH-EASTERN HEDGEBANK BOUNDARY; VIEWED FROM THE NORTH-WEST (1M SCALE).

17. F1, DETAIL OF MOUND (GEOTECHNICAL SURVEY PIT?) IN SOUTH-EASTERN CORNER; VIEWED FROM THE SOUTH-EAST (1M SCALE).

18. F1, VIEW ALONG THE REMAINS OF THE METAL POST FENCE CREATING AN ACCESS ROUTE ALONG THE NORTH-EASTERN BOUNDARY; VIEWED FROM THE SOUTH-EAST (1M SCALE).

19. F1, DETAIL OF THE LINEAR AND PIT HOLLOWS LOCATED TOWARDS THE NORTH-EASTERN CORNER; VIEWED FROM THE SOUTH-EAST (1M SCALE).

20. F1, VIEW OF THE SUB-RECTANGULAR EARTHWORK BANK TOWARDS THE SOUTH-WESTERN EDGE OF THE FIELD; VIEWED FROM THE NORTH-EAST (1M SCALE).

21. F1, VIEW OF THE SUB-RECTANGULAR EARTHWORK BANK TOWARDS THE SOUTH-WESTERN EDGE OF THE FIELD; VIEWED FROM THE SOUTH-EAST (1M SCALE).

22. F1, VIEW OF THE LINEAR EARTHWORK BANK EXTENDING FROM THE SOUTH-EASTERN CORNER OF THE SUB-RECTANGULAR EARTHWORK BANK; VIEWED FROM THE SOUTH-SOUTH-WEST (1M SCALE).

23. F2, VIEW ACROSS THE FIELD; VIEWED FROM THE NORTH-EAST (NO SCALE).

24. F2, VIEW ACROSS THE SURVEY AREA; VIEWED FROM THE SOUTH-EAST (NO SCALE).

25. F2, VIEW ALONG THE NORTH-WESTERN BANK BOUNDARY; VIEWED FROM THE SOUTH-WEST (NO SCALE).

26. F2, VIEW ALONG THE SOUTH-WESTERN BANK BOUNDARY; VIEWED FROM THE NORTH-WEST (NO SCALE).

27. F2, VIEW ALONG THE LOWER HALF OF THE NORTH-EASTERN BOUNDARY; VIEWED FROM THE NORTH-WEST (1M SCALE).

28. F2, VIEW ALONG THE UPPER HALF OF THE NORTH-EASTERN BOUNDARY; VIEWED FROM THE SOUTH-EAST (1M SCALE).

29. F2, DETAIL OF THE WATER TROUGH IN THE NORTHERN CORNER; VIEWED FROM THE SOUTH-SOUTH-WEST (1M SCALE).

30. F2, DETAIL OF THE GATED ACCESS AT THE SOUTH-EASTERN END OF THE NORTH-EASTERN BANK BOUNDARY; VIEWED FROM THE SOUTH-WEST (1M SCALE).

31. F2, VIEW ALONG THE SOUTH-EASTERN BANK BOUNDARY; VIEWED FROM THE NORTH (1M SCALE).

32. F2, DETAIL OF THE GATED ACCESS AT THE SOUTH-WESTERN END OF THE SOUTH-EASTERN BANK BOUNDARY; VIEWED FROM THE NORTH-WEST (1M SCALE).

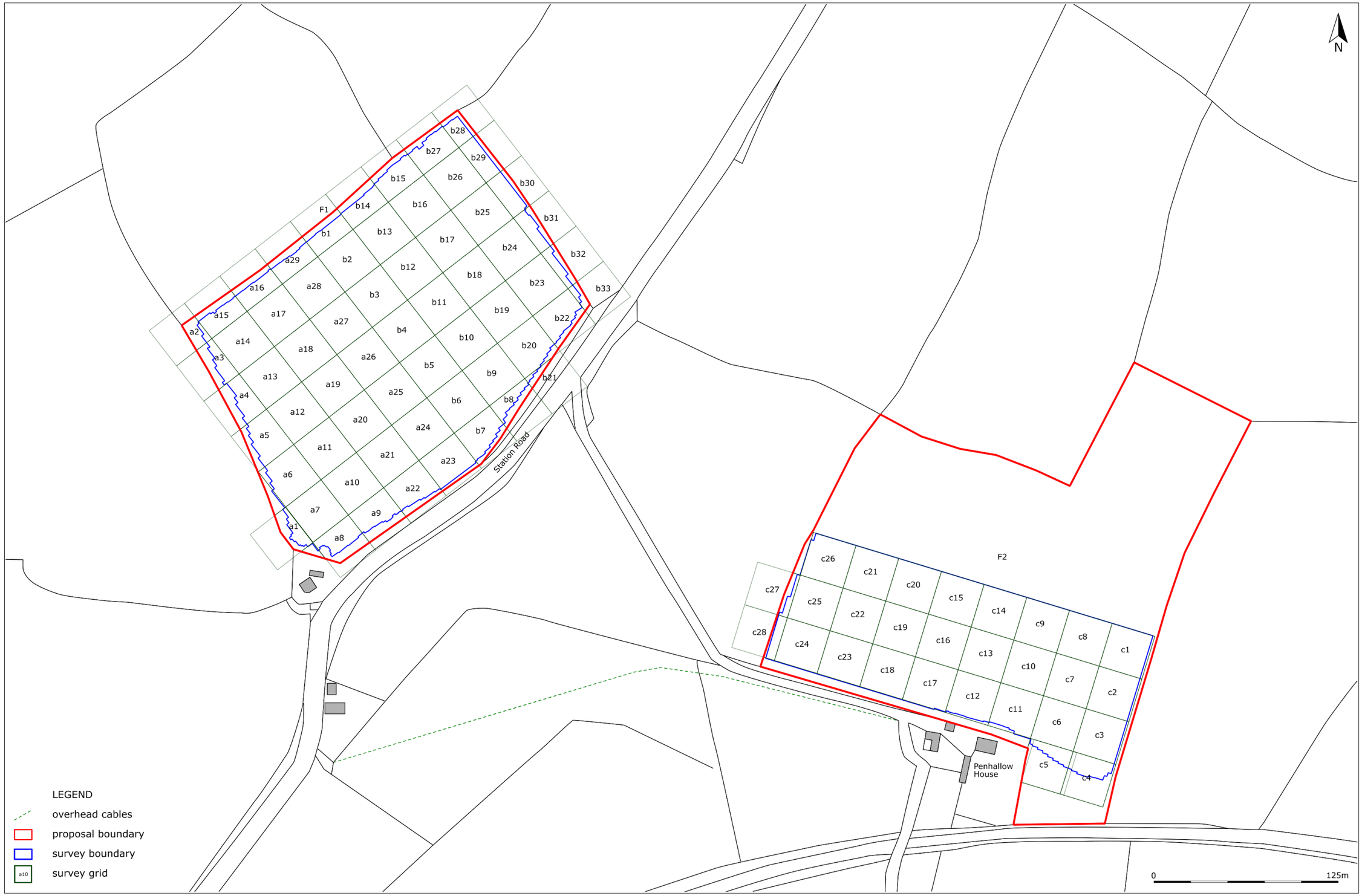
33. F2, DETAIL OF THE OVERGROWN AND WOODED AREA IN THE SOUTH-EASTERN CORNER; VIEWED FROM THE NORTH-EAST (NO SCALE).

34. F2, VIEW ALONG THE SOUTH-WESTERN OVERGROWN BOUNDARY (NO BANK); VIEWED FROM THE EAST (NO SCALE).

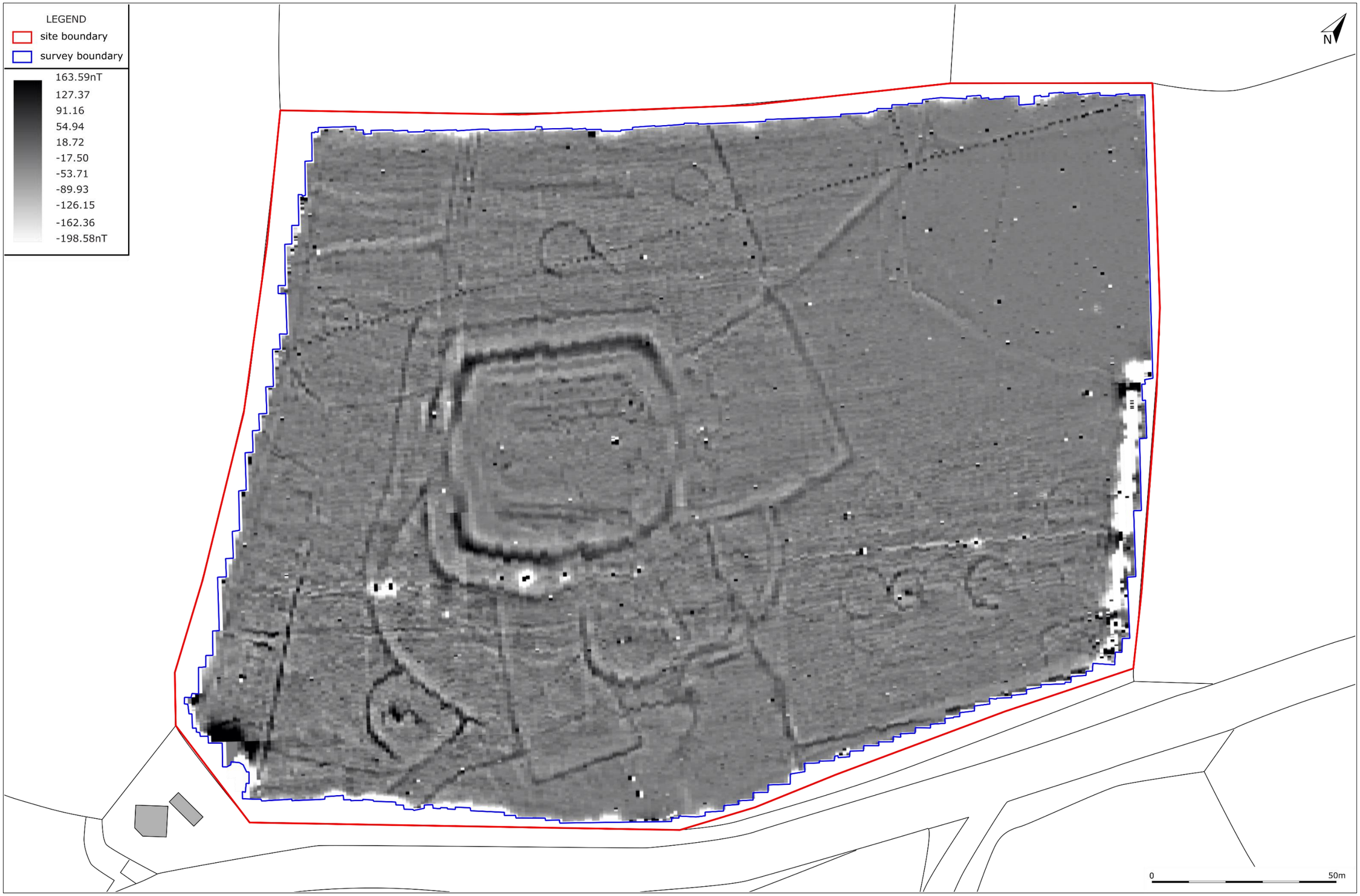
35. F2, DETAIL OF THE SOUTH-WESTERN HEDGEBANK BOUNDARY NORTH OF PENHALLOW HOUSE; VIEWED FROM THE EAST (1M SCALE).

36. F2, DETAIL OF THE GATED ACCESS AND STONE FACING AT THE NORTH-WESTERN END OF THE SOUTH-WESTERN HEDGEBANK BOUNDARY; VIEWED FROM THE NORTH-WEST (1M SCALE).

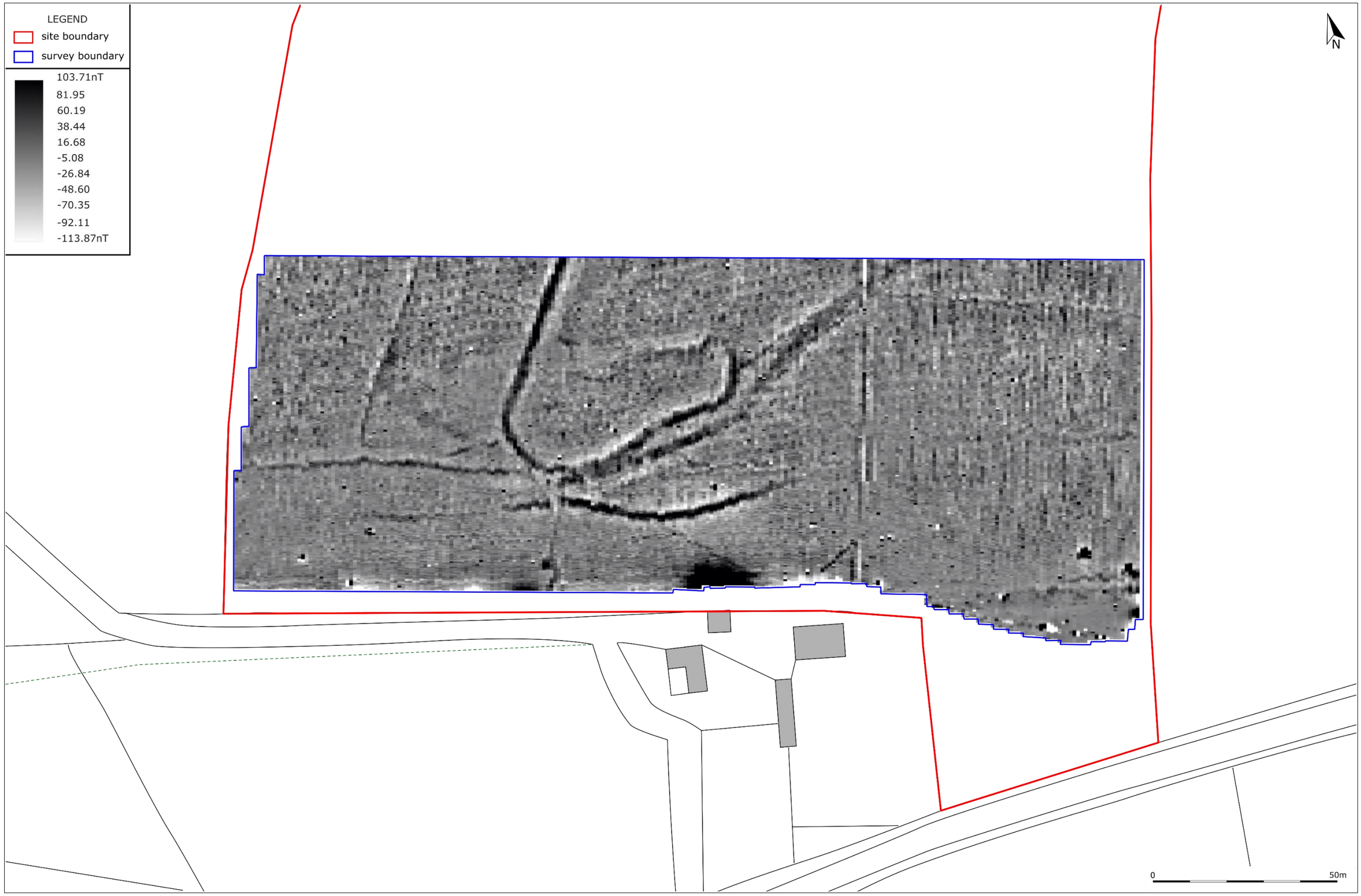
Appendix 2: Additional graphical images of the gradiometer survey



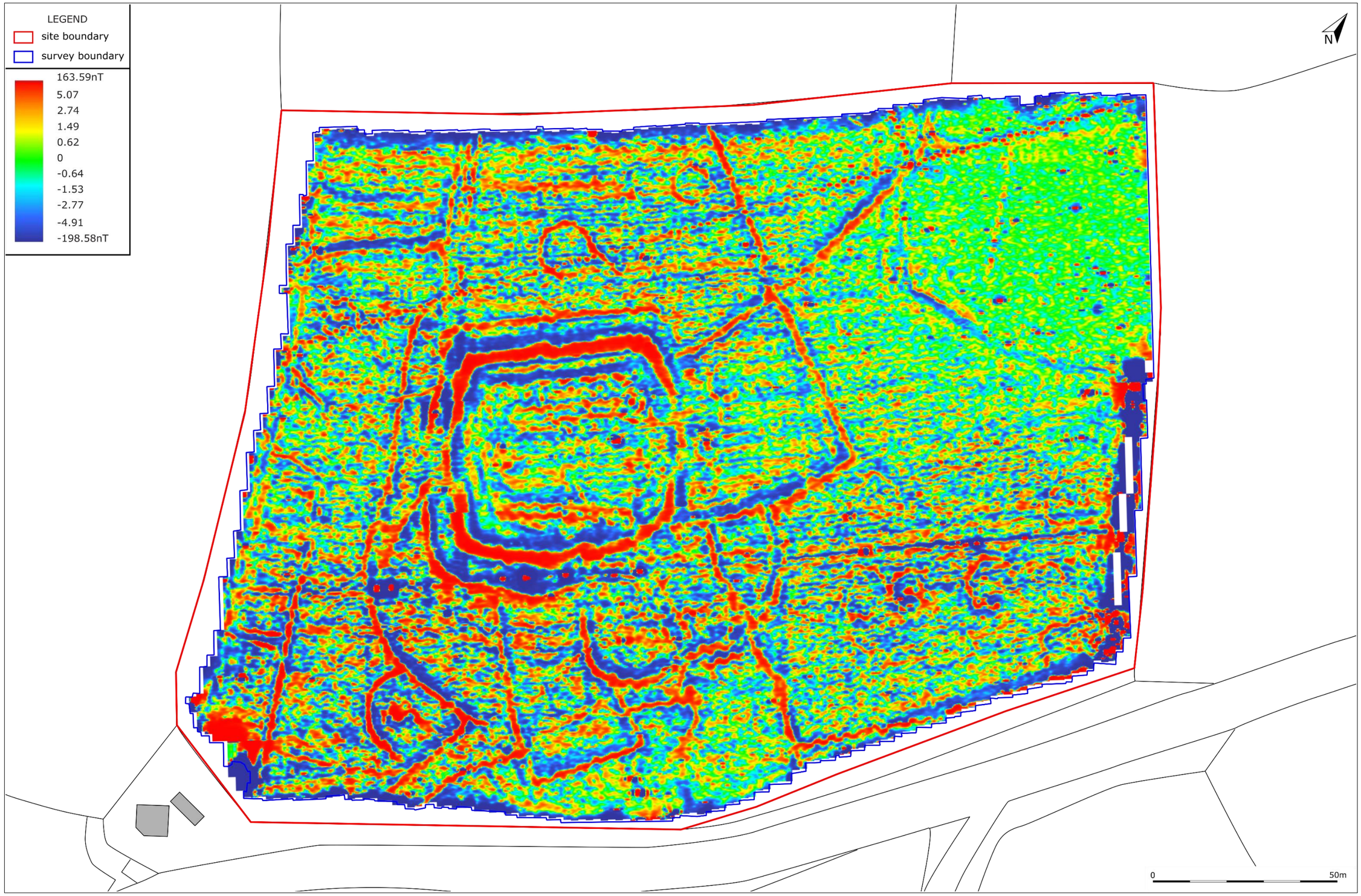
1. Geophysical survey grid location and numbering.



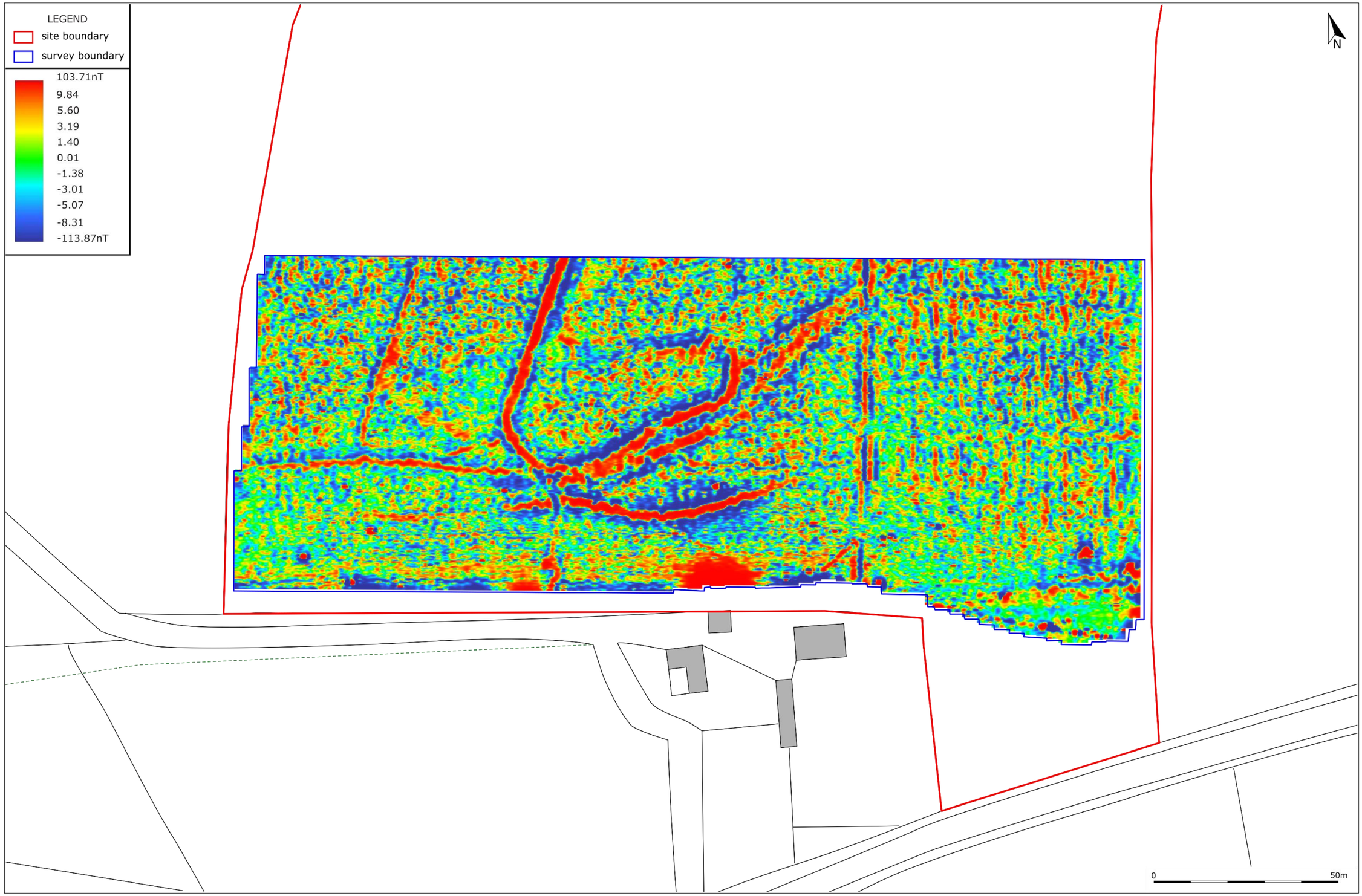
2. F1, SHADE PLOT OF THE GRADIOMETER SURVEY DATA; MINIMAL PROCESSING.



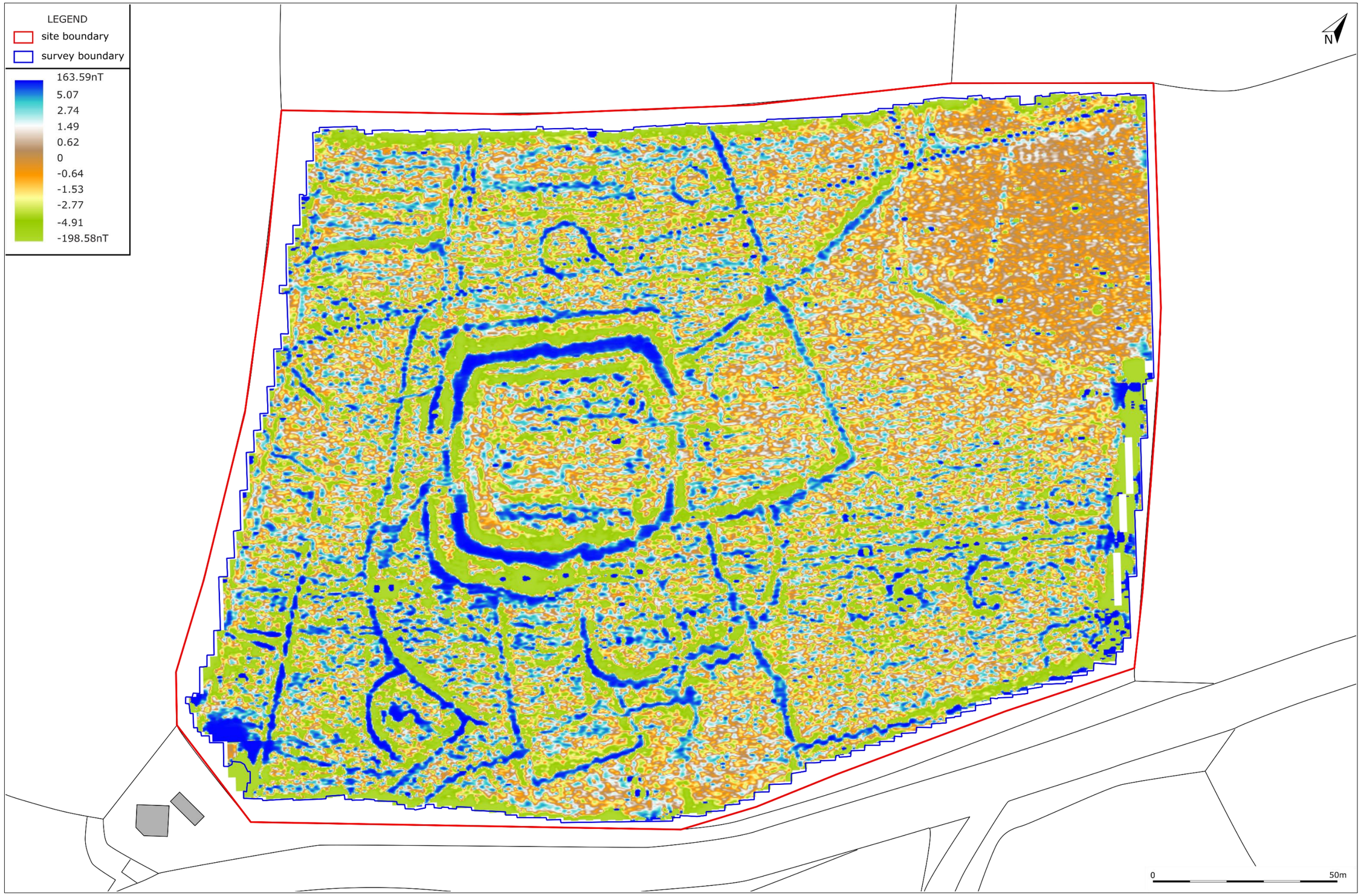
3. F2, SHADE PLOT OF THE GRADIOMETER SURVEY DATA; MINIMAL PROCESSING.



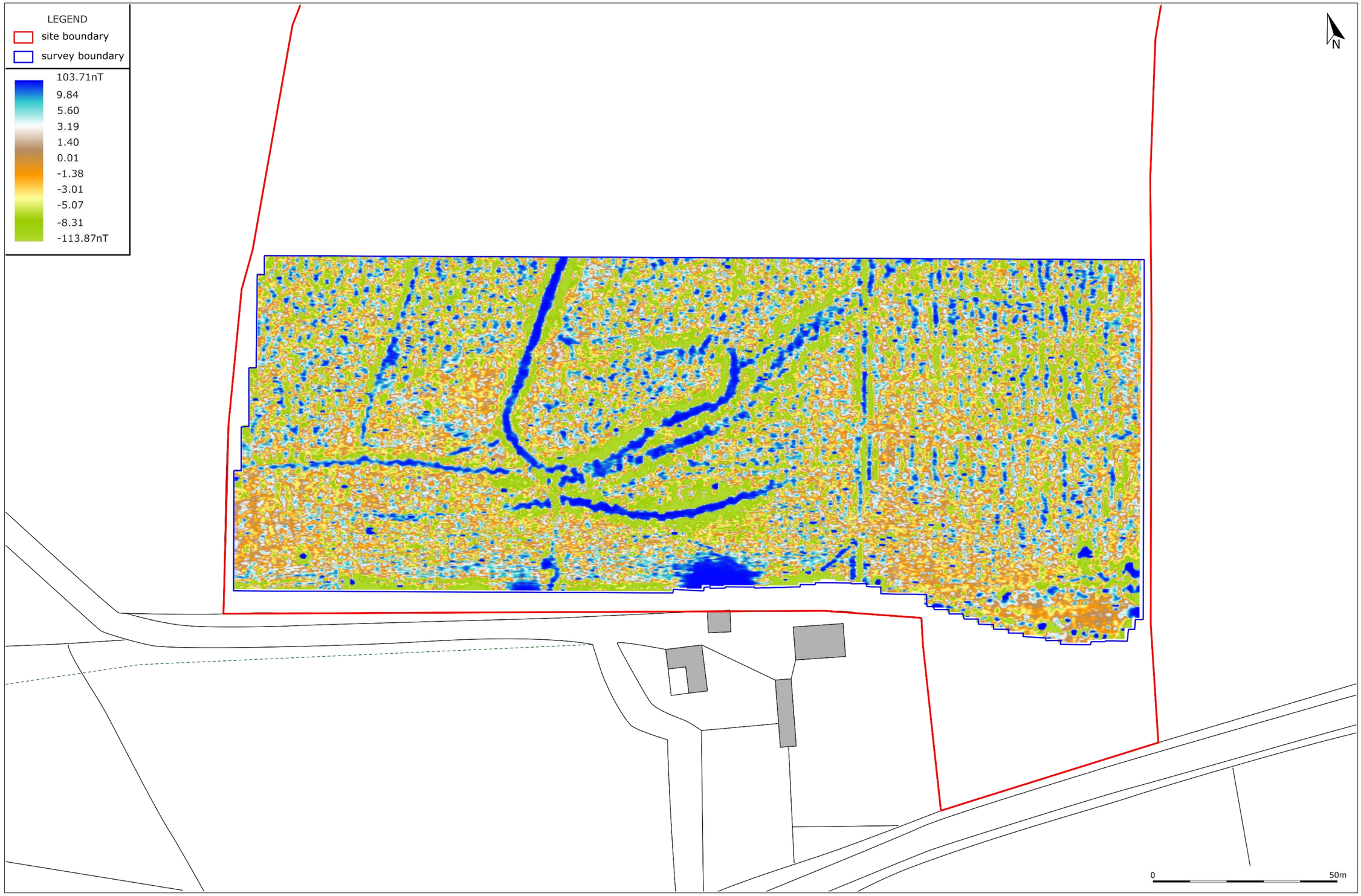
4. F1, Red-green-blue 2 shade plot of the gradiometer survey data; band weight equalized; gradiated shading.



5. F2, Red-green-blue 2 shade plot of the gradiometer survey data; band weight equalized; gradiated shading.



6. F1, Terrain shade plot of the gradiometer survey data; band weight equalized; gradiated shading.



7. F2, Terrain shade plot of the gradiometer survey data; band weight equalized; gradiated shading.

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