



Galileo 03 Ltd.

Mynydd Ty-talwyn Energy Park - Environmental Statement Volume III

Appendix 7.4: Geophysical Survey Report (Solar Panels &
Substation)

Project Reference: 663870

Note: This document was produced to report the findings of the geophysical survey undertaken in line with the Written Scheme of Investigation agreed with Heneb. The scope of the survey reflects the design of the Proposed Development at that point in time. Whilst the design has since evolved the results of the survey remain relevant.

NOVEMBER 2025

RSK

TALW24



MYNYDD TY-TALWYN ENERGY PARK - SOLAR PANELS AND SUBSTATION

GEOPHYSICAL SURVEY REPORT

PEDW ref. DNS CAS-03018-G7G6H7

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Commissioned by RSK Environment Ltd. On behalf of Galileo Empower Wales Ltd

19/11/2025

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Note: It should be noted that since the geophysical survey was undertaken design iterations have led to alterations in design, including the removal of the BESS area and the relocation of the substation. This geophysical survey is now relevant to the solar and substation areas of the Proposed Development and there are areas included that are no longer proposed for built development (field parcels 4,5,6,17, 31,32 and 33).

PROJECT SUMMARY

Headland Archaeology (UK) Ltd was commissioned by RSK Environment Ltd (the Client), on behalf of Galileo 03 Ltd (part of Galileo Empower UK Ltd), to undertake a geophysical (magnetometer) survey on land south-east of Margam and north-west of Tondy in South Wales where it is proposed to construct an energy park generating electricity from both solar and wind. This survey covers those parts of the wider site area that will be impacted by the solar element of the scheme being focussed where blocks of solar panels and their associated infrastructure will be sited, an area of approximately 119 hectares. The results of the geophysical survey will be submitted in support of the application for the future development of the site and will also inform future archaeological strategy.

Survey has been completed across all the selected areas except in one field where a mature barley crop prohibited survey; this field has subsequently been descope from the survey. Magnetic anomalies of non-archaeological origin have been recorded against a moderately variable magnetic background including a small number of clear archaeological features, among them three enclosures. Numerous linear, curvilinear and sinuous trend anomalies of varying strengths and alignments have also been identified, and these anomalies remain difficult to confidently interpret. Former boundaries, the location of a former structure recorded on historic mapping, field drains, and several buried services have also been recorded.

Two sub-rectangular enclosures situated on prominent topographic locations on high ground at Mynydd Baeden have been recorded, with one in the general area of archaeological activity recorded on the local historic environment record. Neighbouring anomalies, possibly associated with these two enclosures, are also recorded but are too ephemeral or faint to interpret with more confidence. The third large circular enclosure is recorded east of Maescadlawr Farm.

The survey has also recorded a cluster of pit-like anomalies on the plateau of Mynydd Baeden, as well as various linear, curvilinear and sinuous trends all of which have been classified as of uncertain origin but that could in some cases be of anthropogenic origin. Map regression shows that some of these anomalies broadly correlate with earthworks the origin of which are also uncertain. Some of these uncertain anomalies are likely to be geological or caused by topographic variation. Other possible causes include former mineral extraction or other industrial activity.

The survey data also indicates that five fields in the south-east of the site have been spread with 'green waste', a soil improver (this has been confirmed by the landowner) which is not conducive for clear survey results. The strength and density of the magnetic 'noise' resulting from the spreading of this material in two of the five fields precludes the identification of any features of possible archaeological origin, if present, and therefore the archaeological potential of these fields remains undetermined. In the three other fields the level of magnetic contamination is not as great allowing for the detection of anomalies of uncertain origin.

With the identification of a wide range of anomalies, including those of clear archaeological potential, the survey results are deemed to provide a reasonable indication of the archaeological potential of the site, notwithstanding the limitations of magnetometer survey to identify the types, sizes, and period of archaeological features and keeping in mind the variability of response over sandstone bedrock.

Therefore, based on the results of the survey the archaeological potential of most of the site is assessed as low, except in and around the clearly defined enclosures, where it is assessed as high. In the fields affected by green waste the potential is undetermined and uncertain in those areas where anomalies of no clear (uncertain) origin are recorded.

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MYNYDD TY-TALWYN ENERGY PARK – SOLAR PANELS AND SUBSTATION

GEOPHYSICAL SURVEY REPORT

1. INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by RSK Environment Ltd (the Client) on behalf of Galileo 03 Ltd (part of Galileo Empower UK Ltd), to undertake a geophysical (magnetometer) survey on land south-east of Margam and north-west of Tondy in South Wales (Illus 1) where an energy park generating electricity from both solar and wind is being proposed. This survey covers those parts of the wider site area that will be impacted by the solar element of the scheme being focussed where blocks of solar panels and their associated infrastructure and battery energy storage system (BESS) will be sited. The results of the geophysical survey will be submitted in support of the application for the future development of the site and will also inform future archaeological strategy, if required.

This report has been prepared by Headland Archaeology on behalf of Galileo 03 Ltd (part of Galileo Empower UK Ltd) (hereinafter referred to as 'Galileo' or the 'Applicant').

The survey was undertaken in accordance with the requirements of Planning Policy Wales 2024 (Edition 12, Ch.6 The Historic Environment), and with the Written Scheme of Investigation for Geophysical Survey (WSI) (Headland Archaeology 2024).

The WSI, which was approved by Heneb (GGAT) prior to commencement, was produced to the standards laid down in the European Archaeological Council's guideline publication,

EAC Guidelines for the Use of Geophysics in Archaeology (Europae Archaeologia Consilium 2016) and the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2020). The survey was also carried out in line with the same best practice guidelines.

The survey was carried out over two mobilisations between August 13th and September 4th, 2024.

1.1. SITE LOCATION, TOPOGRAPHY AND LAND-USE

The overall site boundary (Illus 1) comprises an irregular shaped block of land located to the north-west of Tondy, Bridgend, centred at NGR SS 286521, 186102. The geophysical survey areas (GSAs) comprised eight discrete parcels encompassing 33 fields (F1 to F33) and covering 119 hectares.

It should be noted that the site boundary was amended post-survey such that F33 is now outwith the site boundary.

Three parcels of land, encompassing fields F1 to F7 are located at the western (F1 to F3) and north-western edges (F4 to F6) of the RSB surrounding the wooded slopes west of Mynydd Ty-talwyn. Here the topography slopes steeply up to the north across fields F1-F3 from approximately 206m Above Ordnance Datum (AOD) at the southern boundary of F3 to 206m AOD at the north-western corner of F1. The topography varies less across fields F4-F6 and F7 ranging from 230m to

248m AOD. These three parcels cover a combined area of approximately 39.4 hectares.

Another 7.7-hectare parcel containing fields F8 to F12 inclusive (Sector 5) lies east of Maescadlawr Farm. The land within this parcel slopes down to the north-west from approximately 156m AOD to 120m AOD.

The four remaining survey parcels (F13 to F33, Sectors 6-11) are located approximately 2km west of Tondy to the immediate north, east and west of the hamlet of Ffordd-y-Gyfraith, predominantly on the plateau and south-facing slopes of Mynydd Baeden at between 160 metres AOD and 240 metres AOD; together, these parcels cover 79.6 hectares.

At the time of survey most of the GSA land was upland grazing pasture (Illus 2 to Illus 6 inclusive). F28, located east of the farm buildings at Baeden, contained a barley crop (Illus 7) and the south-west corner of F31 was in use by a dog kennel and both were unsuitable for survey.

1.2. GEOLOGY AND SOILS

The bedrock underlying the whole site are sedimentary in nature, formed in the Carboniferous period.

Two different formations of sandstone bedrock underlay the survey parcels containing fields F1 to F30 inclusive. The majority of these are underlain by sandstone of the Rhondda Member. The three most northerly survey parcels, containing fields F4 to F12, are underlain by Brithdir Member sandstone. A narrow band of Llynfi Member mudstone, siltstone and sandstone runs from east to west across fields F29 and F30.

In the two most southerly survey areas (F31 to F33) the bedrock geology is recorded as mudstone, siltstone and sandstone of the South Wales Middle Coal Measures Formation, formed between 318 and 309.5 million years ago. No overlying superficial deposits are recorded in any of the survey areas (UKRI 2024).

The soils are classified in Soilscape 13 and described as freely draining acid loams over rock

across all the upland areas within the RSB. On the two small lowland areas (on the Coal Measures geology), the soils are slowly permeable wet very acid soils with a peaty surface and are classified in Soilscape 19 (Cranfield University 2024).

2. ARCHAEOLOGICAL BACKGROUND

The following is an abridged version of the archaeology baseline presented in the draft Heritage Desk-Based Assessment (Pegasus Group forthcoming). The baseline incorporates data within a 3km-radius study area measured from the wider site boundary.

Mesolithic and Neolithic

Prehistoric lithics ranging in date from the Mesolithic to the Early Bronze Age have been found at the south-eastern edge of the woodland covering the slopes of Mynydd Margam, approximately 1.9km north-west of the site (02102w, 05028w, 05029w). There is also record of a Neolithic axe having been found at Gelli Lenor in Maesteg (01277m).

Bronze Age

Near Maescadlawr in the northern part of the site, is a trapezoidal block of sandstone that has been interpreted as a possible Bronze Age standing stone (00165m). It is unclear whether historic environment record (HER) 00990m, described as a standing stone marked on the 1918 Ordnance Survey (OS) map, is a duplicate record or is a separate monument.

On either side of the lane to the north of Baeden Farm, on the high ground below Mynydd Baeden in the southern-central part of the site, are recorded two earthwork mounds and nine cropmark ring ditches believed to indicate Bronze Age round barrows and/or ring cairns (04586m, 04587m; 02617m, 04578m–04585m). The findspot of an Early Bronze Age knife fragment is also recorded in the vicinity (06127m).

Known and possible Bronze Age ring cairns are also recorded at Moel Ton-mawr and on the south-east facing slopes of Mynydd Margam in the north-western part of the study area (00755w, 00117m, 00115m, 00753w, 00754w, 00752w, 00751w, 00750w). An Early Bronze Age flint scatter is also recorded to the west of Ton-mawr Farm, approximately 2.5km west of the Site (02209w).

Iron Age

Also, between Mynydd Margam and Moel Ton-mawr in the north-west of the study area are the earthworks of fortified enclosures of probable Iron Age date:

- Y Bwlwarcau Hillfort, 1.3km north-west of the site (00116m, 01155m);
- Caer Blaen-y-cwm Enclosure, 1.5km west of the site (00759w);
- Caer Cwmphilip (or Moel Ton-mawr) Earthwork and Cwm Philip West (or Danish Camp), 1.8km and 2.3km west of the site respectively (00774w, 00758w); and
- Ton-mawr Enclosure, 1.1km west of the site (00776w).

Linear earthworks in the vicinity of Caer Cwmphilip (or Moel Ton-mawr) Earthwork and Ton-mawr Enclosure may be associated with these monuments, either serving as additional defensive installations, strategic hollow-ways controlling the approach to these monuments, or territorial boundary markers.

Roman

The Roman road between Cardiff and Neath (RR60) ran south-east to north-west, passing approximately 200m west and 1.2km south of the study area. The HER states that the road is defined as a cropmark 3.8km south-west of the site (01016.8w, 01016.10w). Roman milestones were formerly located here (01016.11w), and further north near Margam (00790W, 01016.15w).

Another Roman road is thought to be traced by the modern road from Laleston to Cefn Cross to Ffordd-y-Gyfraith through the site. An embanked

Iron Age to Romano-British settlement and findspots of Roman coins are recorded on the west side of the road at Laleston, 3.7km south of the site (00188m, 00179m).

Another possible Roman road is recorded at Bryncethin at the eastern edge of the study area (05019m); and other Roman coins have been found at Aberkenfig and Pen-y-Fai, 1.1km, 1.5km and 2.6km from the site (00180m, 00181m, 01404m).

Early medieval (410 AD – 1066)

The landscape around Mynydd Baeden has been suggested as the location for the Battle of Mons Badonicus, or Battle of Mount Badon. Proponents argue that earthworks found within the site near Gilfach Uchaf, to the north and east of Mynydd Ty-talwyn, and on the east side of Mynydd Baeden represent 'entrenchments' associated with the battle.

However, the RCAHMW interprets the 'entrenchments' at Mynydd Baeden as hollow-ways (424515). The summary in the HER record states: "A series of parallel trenches, or banks and ditches. They may be the remains of quarrying or other industrial endeavours or part of a medieval road or trail." (04450m).

The 1899 edition OS map identifies an old quarry at the head of the earthworks at Gilfach Uchaf, and the 1918 and 1924 editions identify rises, springs, and old coal levels on the east side of the earthworks at Mynydd Baeden. It is therefore possible that some of the earthworks could be associated with historic coal working and/or quarrying. Recent literature has also suggested that some of the earthworks derive from recent farming or forestry work.

Carved stones believed to be of early medieval date have been discovered at Bettws (Carreg Fedyddiol Sculptured Stone), 2.2km east of the Site (00368m); Sychbant Farm, 2.7km north-west of the site (01616m); and a short distance upslope from Y Bwlwarcau hillfort, 2.3km north-west of the site (00809w).

Medieval (1066 – 1539)

Near Maescadlawr in the northern part of the site is a complex of earthworks representing the remains of a medieval settlement (00126m / 15245). It is designated as a Scheduled Monument under the name 'British Fortified Residence' (GM086). Three medieval wells are recorded 110m to its north (01142m, 01143m, 01144m).

The 'British Fortified Residence' was excavated in the 1930s by Cyril and Aileen Fox, and again in 2011 by volunteers from the Llynfi Valley Historical Society. Fox and Fox originally considered the site, and other nearby house platforms (see below), to be early medieval but later revised their dating to medieval. The recent excavations recovered 14th-century pottery.

Across the central swathe of the site are numerous earthworks recorded by the HER and the RCAHMW as medieval house platforms (00127m–00133m, 06013m, 06129m 06320m – west side of lane; 01712m, 01713m, 01714m, 04228m, 04225m, 00135m – east side of lane) and associated enclosures (00134m, 01731m / 24328) and trackways or droeways (08074m, 08075m, 06128m – west side of lane). A medieval well is recorded among the house platforms at Mynydd ty-Talwyn (01145m).

Also recorded within the site is an enclosure within the north-western boundary near Gilfach (15408); the former location of the Chapel of St Thomas of Creitic, c.295m north-west of Baeden Farm (00138m); a medieval well at Cefn Ydfa Farm (07946m); and the holy well of Ffynnon Gilfach Isaf at the northern boundary of the site roughly halfway between Gilfach and Bryn Cynan (07946m).

The route of a medieval trackway Ffordd y Gyfraith ('Road of the Law'), allegedly used by officials travelling from the lowlands into the wild hill country, traces the modern road through the site and branches off to the 'British Fortified Residence' and Mynydd Baeden (03111.0m).

Post-medieval (1540 – 1750), Early Modern (1750 – 1901) and Modern (1901 – present)

The vast majority of HER 'monuments' recorded within the 3km study area (totalling 662) are post-medieval and modern in date. There are 48 such records within the site, comprising the ruins of farmsteads, houses, field boundaries, sheepfolds, sandstone quarries and bell pit/prospection hollows.

Data from the Coal Authority, available through the British Geological Survey's Interactive Map Viewer, indicates that historic coal mining activity within the site may have been more widespread than recorded by the HER. Mine adits are identified within Craig yr Aber to the south-west; at Cefn Parc/Ton Philip in the south; at Cwmrisga to the south-east; to the south-east and east of Mynydd Baeden; and at Maescadlawr to the north.

The earliest available historic mapping of the site is the 1839 tithe map for the parish of Llangynwyd. This shows a patchwork of small rectilinear fields in the north-western, northern, eastern and southern parts of the site. There is little correlation with extant field systems. There is some survival of the tithe field boundaries in the north and east, but there are considerably fewer fields in the east and south and a plantation has replaced the fields to the north-west.

3. AIMS, METHODOLOGY & PRESENTATION

3.1. AIMS AND OBJECTIVES

The principal objectives of the geophysical survey are to gather information to establish the presence/absence, character, and extent of any archaeological remains within the GSAs, and to inform the planning application and any further evaluation or mitigation strategies.

The aims of the survey are:

- to provide information about the possible interpretation of any magnetic anomalies,

- to therefore determine the likely presence/absence and extent of any buried archaeological features, and
- to prepare a comprehensive site archive and report.

3.2. METHODOLOGY

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. A feature such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the earth's magnetic field. In mapping these slight variations detailed plans of sites can be obtained, as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

Magnetometry is the most widely used geophysical survey technique in archaeology as it can quickly evaluate large areas and, under favourable conditions, identify a wide range of archaeological features including infilled cut features such as large pits, gullies and ditches, hearths, and areas of burning, and kilns and brick structures. It is therefore good at locating settlements of all periods, prehistoric field systems and enclosures, and areas of industrial or modern activity, amongst others. It is less successful in identifying smaller features such as post-holes and small pits (except when using a non-standard sampling interval), unenclosed (prehistoric) settlement sites and graves and burial grounds. However, magnetometry is by far the single most useful technique and was assessed as the best non-intrusive methodology for this site.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10-15cm sample interval) on roaming traverses spaced 4m apart to secure

comprehensive coverage. The magnetometer system was linked to a Trimble R12 Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy of each data point; +/- 1cm for each reading.

At the start of each day the magnetometer was left idle whilst switched on for approximately 30 minutes to allow the instrument to acclimatise to the site conditions. The instrument was thereafter re-balanced when necessary to compensate for instrument drift.

The data was stored on an external weatherproof laptop and later downloaded for processing and interpretation. Anomaly GeoSurvey v1.12.3 (Lichenstone Geoscience) and QGIS v.3.28.5 software was used to process and present the data respectively.

3.3. DATA PRESENTATION AND TECHNICAL DETAIL

A general site location plan detailing the site boundary and the GSAs is shown in Illus 1 at a scale of 1:40,000. Illus 2 to Illus 7 inclusive are site condition photographs. Illus 8 shows the location and direction of the site condition photographs and areas unsuitable for survey at 1:15,000. Illus 9 and Illus 10 are overall plans of the processed magnetometer data and interpretation respectively, also at a scale of 1:15,000. These overall plans also show the sector boundary locations for the detailed 1:2,500 illustrations. Overview plans showing the processed magnetometer data and interpretation are included in Illus 11 to Illus 16 inclusive at a scale of 1:7,500. Fully processed (greyscale) data, minimally processed (XY trace plot) data and interpretative plans are presented by Sector, at 1:2,500, in Illus 17 to Illus 49 inclusive.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and

location of the site archive. Data processing details are presented in Appendix 4.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Headland Archaeology 2024), guidelines outlined by Europae Archaeologia Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2020).

All illustrations from Ordnance Survey (OS) base mapping are reproduced with the permission of the controller of His Majesty's Stationery Office (© Crown copyright).

The Illustrations in this report have been produced following analysis of the data in 'raw' (minimally processed) and processed formats and over a range of different display levels. All illustrations are presented to display and interpret the data to best effect. The interpretations are based on the experience and knowledge of Headland management and reporting staff.

4. RESULTS & DISCUSSION

4.1. SITE CONDITIONS

Magnetometer survey is generally recommended over any sedimentary bedrock but the average response over sandstone geologies can be poor and often variable depending on the presence of overlying superficial deposits (English Heritage 2008; Table 4). Nevertheless, magnetometry was still the most appropriate non-intrusive geophysical technique for evaluating the GSAs, taking account of the limitations noted in Section 3.2 and above.

Surface conditions were generally good (Illus 2 to Illus 6 inclusive) although the topography was steep in places. Data quality was also good with only minimal post-processing required. No problems were encountered during the fieldwork although F28 was still under a barley crop at the end of the second mobilisation and was not surveyed, being subsequently descoped from the survey.

Given the geographic extent of the site and dynamic topography across the GSAs it is not unexpected that the magnetic background should vary across the site. Generally, the magnetic background is somewhat variable often containing randomly dispersed, low magnitude discrete anomalies. Particularly homogenous areas exhibiting little magnetic variation are recorded in the north of F2, F31 and F33, the latter field now outside the site boundary.

Against this magnetic background, anomalies of various non-archaeological origins as well as a few with clear archaeological potential have been recorded (Illus 9 and Illus 10), although some of the responses are low magnitude and not easy to discern. By far the most conspicuous and numerous anomalies recorded by the survey are linear, curvilinear and sinuous trend anomalies on varying alignments and of differing magnitude which remain difficult to interpret with any certainty (discussed below).

The survey results also indicate that five of the fields have likely been spread with 'green waste', a soil improver which is not conducive for clear survey results. The strength and density of the magnetic 'noise' resulting from the spreading of this material across two fields (F29 and F30) has all but precluded the identification of any sub-surface archaeological features, if present, and therefore the archaeological potential of these fields remains undetermined. In three other fields (F25, F26, and F27) the level of magnetic contamination was not as high and consequently in F25 multiple linear and sinuous anomalies of uncertain origin and a former boundary are clearly mapped.

The mapping of a range of magnetic anomalies confirms that there was sufficient magnetic contrast for the detection of potentially archaeological features, notwithstanding the limitations of magnetometer survey to identify the types, sizes, and period of archaeological features as described in Section 3.2 and keeping in mind the variability over sandstone bedrock geologies. The results of the survey are therefore determined likely to provide a reasonable indication of the

extent of sub-surface archaeological features within the GSAs.

The anomalies are discussed below according to their interpreted origin.

4.2. ANOMALIES OF FERROUS AND MODERN ORIGIN

Ferrous anomalies, characterised as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris is common on most sites, often being introduced into the topsoil during manuring or tipping/infilling.

Six very high magnitude linear anomalies (Illus 9 - SP1 to SP6 inclusive) identify buried services in F1, F13, F14, F16, F23 and F32 respectively.

A spread of magnetic disturbance at the boundary between F13 and F14 (Illus 33 - FB1) records the location of a former building recorded on historic mapping at Cefn-y-gelli.

A curvilinear band of magnetic disturbance in F33 (Illus 36 - MD1) records the route of a modern trackway across the field and is of no archaeological interest.

A small band of interference is recorded in the data underneath overhead lines crossing F6 (Illus 22 to Illus 24).

4.3. ANOMALIES OF AGRICULTURAL ORIGIN

As previously stated, it remains difficult to differentiate between many of the linear trends recorded across the site. Many of the more regular anomalies are considered likely to be indicative of agricultural activity, including traces of possible ridge and furrow in F31 (Illus 46 to Illus 48) and patterns of field drains.

A former field boundary recorded on historic OS mapping is identified in F14 (Illus 33).

4.4. ANOMALIES OF GEOLOGICAL ORIGIN

Extensive patterns of faint, irregular but broadly parallel sinuous low magnitude anomalies evident across the GSAs are assessed as natural in origin being caused by accumulations of topsoil along the base of, or breaks in, slope.

4.5. ANOMALIES OF UNCERTAIN ORIGIN

Anomalies which cannot be confidently interpreted in any of the other categories are classed as of uncertain origin. On this site it has been difficult to interpret the cause of multiple linear, curvilinear and sinuous anomalies with varying magnetic signatures. These anomalies do not align with topographic variation or extant field boundaries. In such instances these anomalies are interpreted as of uncertain origin. Examples are recorded in F2 and F3 (Illus 16 to Illus 18 - L1, L2 and L3), F4 and F5 (Illus 22 to Illus 24 - L4), F9 (Illus 28 to Illus 30 - L5) F17 (Illus 37 to Illus 39 - L6), F19 (Illus 37 to Illus 39 - L7), F23 (Illus 37 to Illus 42 - L9) and F24 (Illus 43 to Illus 45 - L10 and L11). On balance many of these anomalies are considered more likely to be natural landscape features; however, the more strongly enhanced anomalies at L6 could relate to 'entrenchments' marked in the same location on the OS Six Inch map 1830s-1880s.

A distinction is made between the more pronounced linear, sinuous anomalies which stretch across multiple fields described above and smaller, more discrete anomalies that also remain of uncertain origin (Illus 9 - U1 to U6 inclusive). These anomalies are identified almost exclusively due to their form, suggestive of small enclosures or ring ditches; however, their weak magnetic response restricts a more confident interpretation and could equally plausibly identify coincidental variations in the magnetic background.

Several discrete high magnitude anomalies with a magnetic signature indicative of an anthropogenic cause are also interpreted as of uncertain origin (ME1 to ME9 inclusive). The often-isolated nature

of these anomalies restricts a more confident interpretation, and their archaeological potential remains undetermined.

4.6. ANOMALIES OF POSSIBLE OR PROBABLE ARCHAEOLOGICAL ORIGIN

A circular enclosure measuring approximately 46m in diameter is recorded as a low magnitude anomaly at the centre of F8 (Illus 9, Illus 13 and Illus 30 - E1). Faint responses within the enclosure possibly hints at an internal feature and higher magnitude anomalies at the edge of the enclosure are also considered of likely archaeological origin. It remains unclear whether neighbouring trend anomalies (L5) and a discrete high magnitude anomaly (ME3) are associated with the enclosure.

A sub-rectangular enclosure measuring approximately 80m by 60m (Illus 9, Illus 15 and Illus 33 - E2) is identified as a low magnitude anomaly on high ground below Mynydd Baeden at Cefn-y-Gelli. A series of faint linear and curvilinear responses surrounding E2 possibly identify further enclosures and/or ditches (Illus 9, Illus 15 and Illus 33 - E3, E?4 and E?5;) but the responses are very faint and/or bisected by field boundaries or service pipe SP2 restricting a more confident interpretation. The anomalies are recorded in the general location of two earthwork mounds and nine cropmark ring ditches believed to indicate Bronze Age round barrows and/or ring cairns (04586m, 04587m; 02617m, 04578m–04585m) and the findspot of an Early Bronze Age knife fragment (06127m), attesting to an area of archaeological activity despite none of the magnetic responses correlating precisely with the previously recorded monuments or finds.

A third partial sub-rectangular enclosure measuring roughly 70m x 40m (Illus 9, Illus 15 and Illus 39 - E6) is recorded in F22 on the plateau summit of Mynydd Baeden approximately 800m north-west of the activity recorded in F13. The only other anomalies of note in proximity to this enclosure are identified to the south and south-west recording a curving ditch anomaly (L8), four discrete magnetically enhanced anomalies (ME6)

and a cluster of pit-like responses (P?1) 200m to the east, all of which are assessed as being likely anthropogenic in origin.

5. CONCLUSION

Survey has been completed across all the selected GSAs except in one field where a mature barley crop prohibited survey; this field has subsequently been descoped from the survey.

Magnetic anomalies of non-archaeological origin have been recorded against a moderately variable magnetic background as well as a small number of clear archaeological features, among them three enclosures. Several linear, curvilinear and sinuous trend anomalies of varying strengths and alignments have also been identified, and these anomalies remain difficult to confidently interpret. Former boundaries, the location of a former structure recorded on historic mapping, field drains, and several buried services have also been recorded.

Two sub-rectangular enclosures situated on prominent topographic locations on high ground at Mynydd Baeden have been recorded, with one in the general area of archaeological activity recorded on the local historic environment record. Neighbouring anomalies, possibly associated with these two enclosures, are also recorded but are too ephemeral or faint to interpret with more confidence. The third large circular enclosure is recorded east of Maescadlawr Farm.

The survey has also recorded a cluster of pit-like anomalies on the plateau of Mynydd Baeden, as well as various linear, curvilinear and sinuous trends all of which have been classified as of uncertain origin but that could in some cases be of anthropogenic origin. Map regression shows that some of these anomalies broadly correlate with earthworks the origin of which are also uncertain. Some of these uncertain anomalies are likely to be geological or caused by topographic variation. Other possible causes include former mineral extraction or other industrial activity.

The survey data also indicates that five fields in the south-east of the site have been spread with 'green waste', a soil improver (this has been confirmed by the landowner) which is not conducive for clear survey results. The strength and density of the magnetic 'noise' resulting from the spreading of this material in two of the five fields precludes the identification of any features of possible archaeological origin, if present, and therefore the archaeological potential of these fields remains undetermined. In the three other fields the level of magnetic contamination is not as great allowing for the detection of anomalies of uncertain origin.

With the identification of a wide range of anomalies, including those of clear archaeological potential, the survey results are deemed to provide a reasonable indication of the archaeological potential of the site, notwithstanding the limitations of magnetometer survey to identify the types, sizes, and period of archaeological features and keeping in mind the variability of response over sandstone bedrock.

Therefore, based on the results of the survey the archaeological potential of most of the site is assessed as low, except in and around the clearly defined enclosures, where it is assessed as high. In the fields affected by 'green waste' the potential is undetermined and uncertain in those areas where anomalies of no clear (uncertain) origin are recorded.

6. REFERENCES

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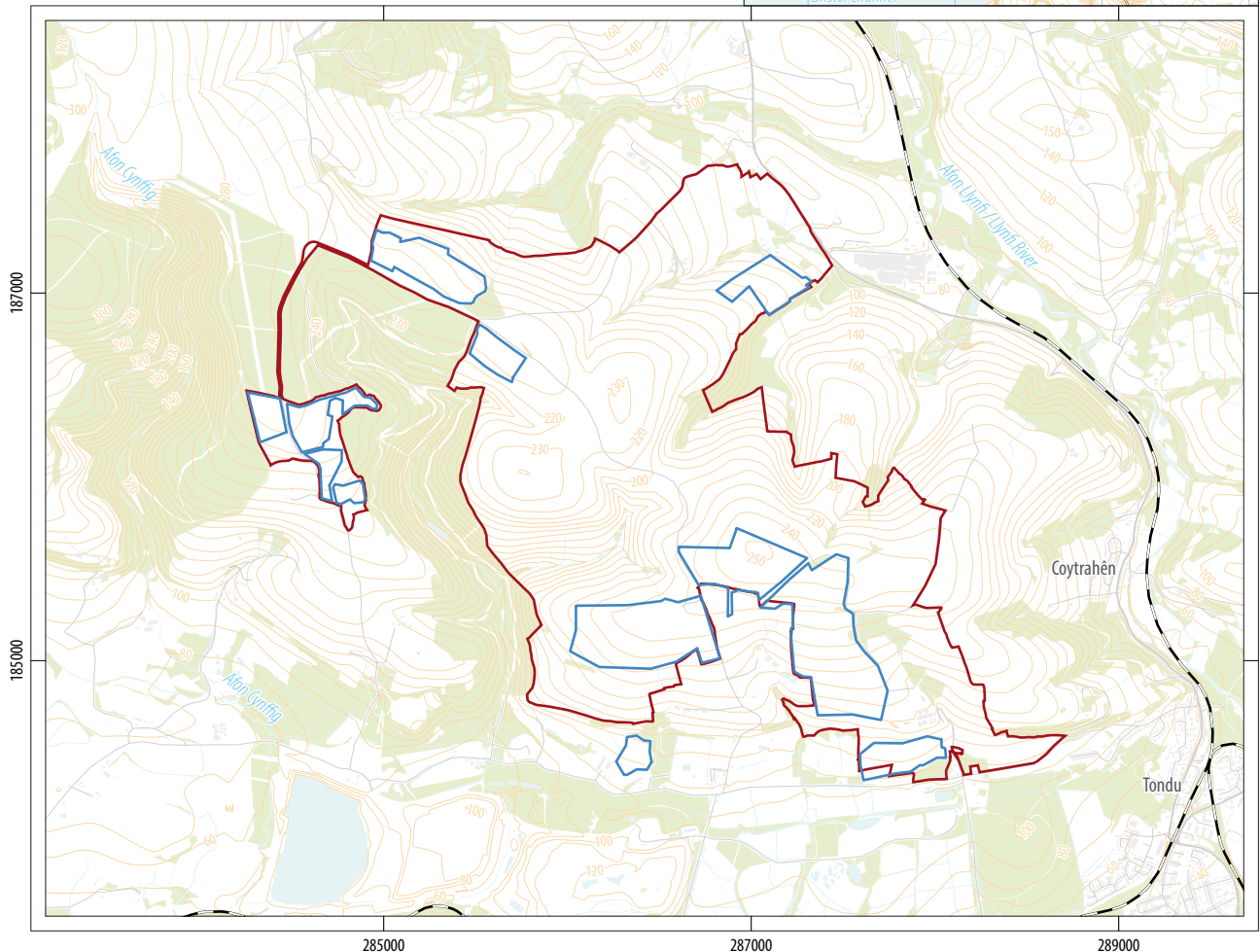
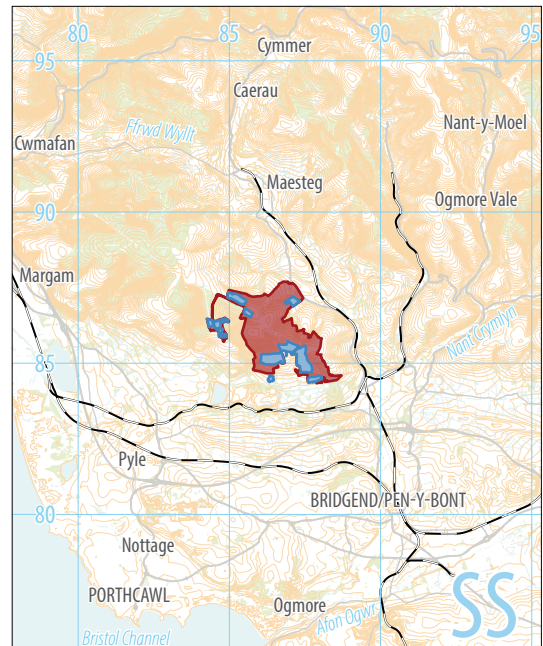
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Mynydd Ty-talwyn Energy Park Solar Panels and BESS

0 200km
1:12,500,000 @ A4



0 1km
1:40,000 @ A4

site boundary
geophysical survey area

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w www.headlandarchaeology.com



Illus 2 F2, looking south-east



Illus 3 F4, looking north-west



Illus 4 F8, looking south-southwest



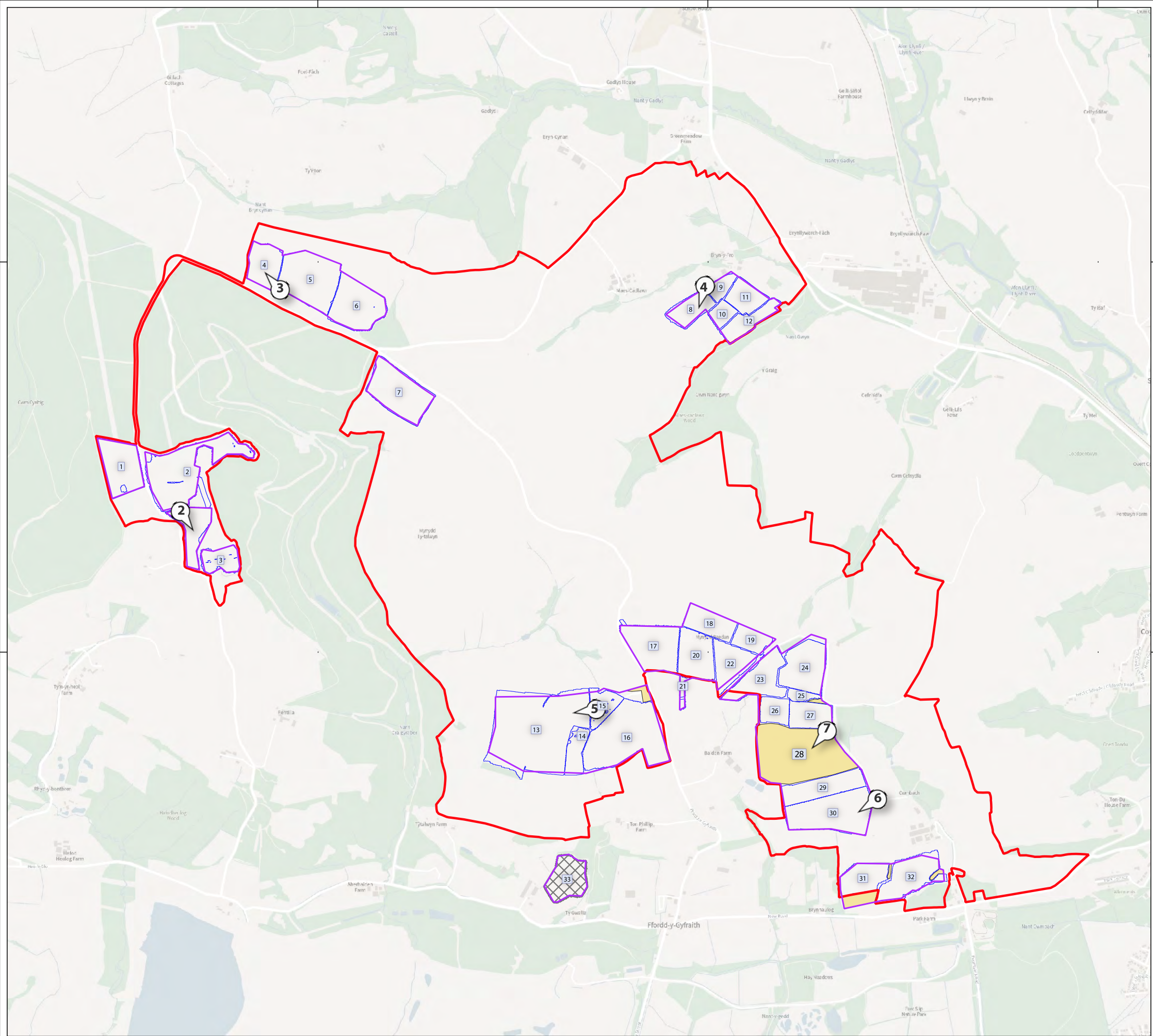
Illus 5 F13, looking west

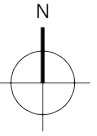


Illus 6 F30, looking west-southwest



Illus 7 F28, unsuitable for survey looking south-west

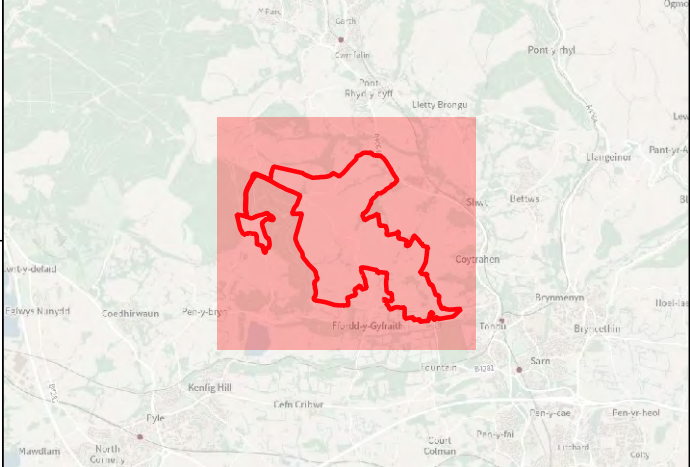






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Key

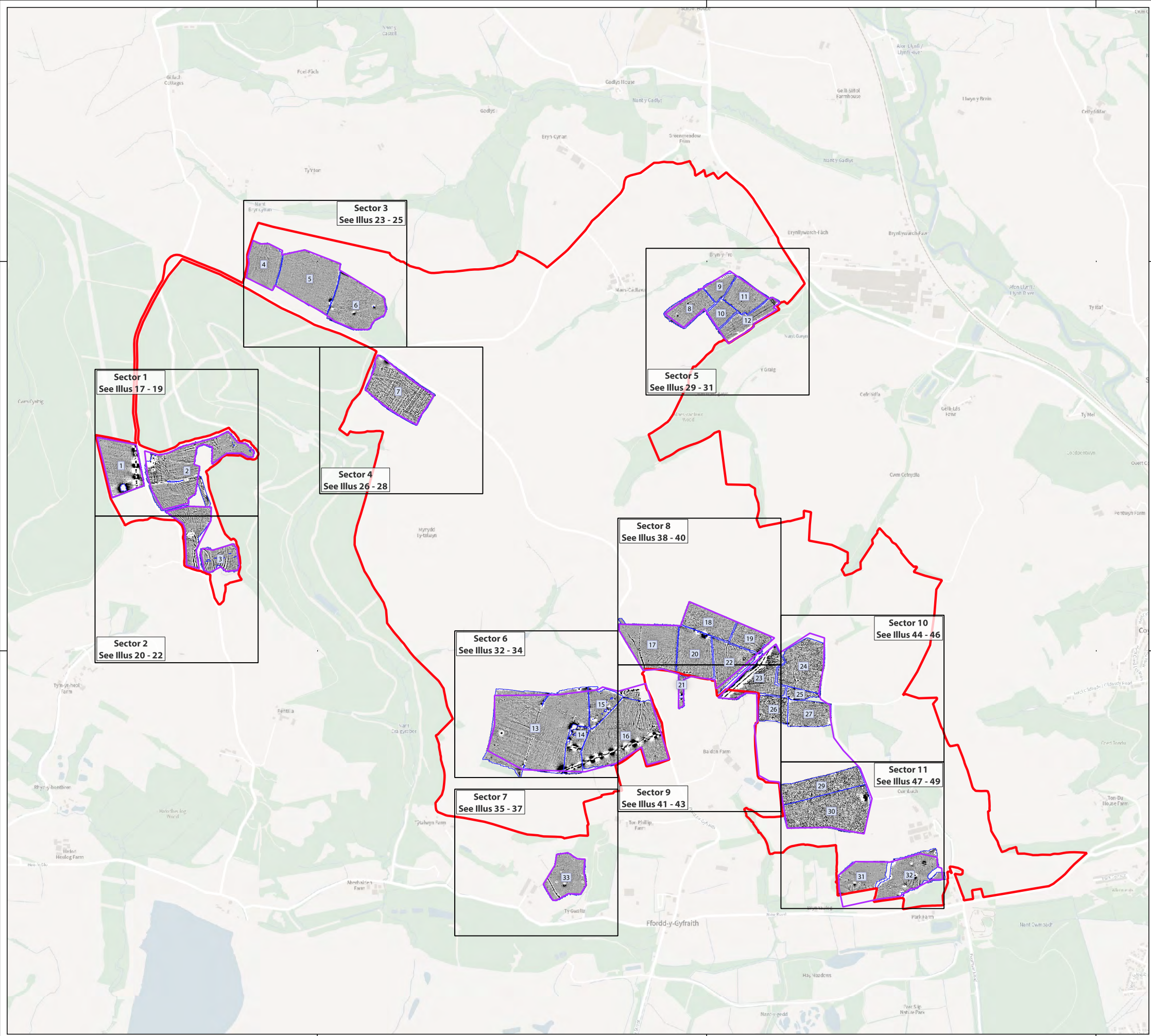
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-  Survey Extent
-  Area de-scoped post-survey
-  Unsuitable Survey Area
-  Location and Direction for Illus 2 to 7

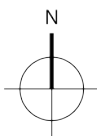
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Illus 08 - Survey location showing photograph locations and unsuitable survey area

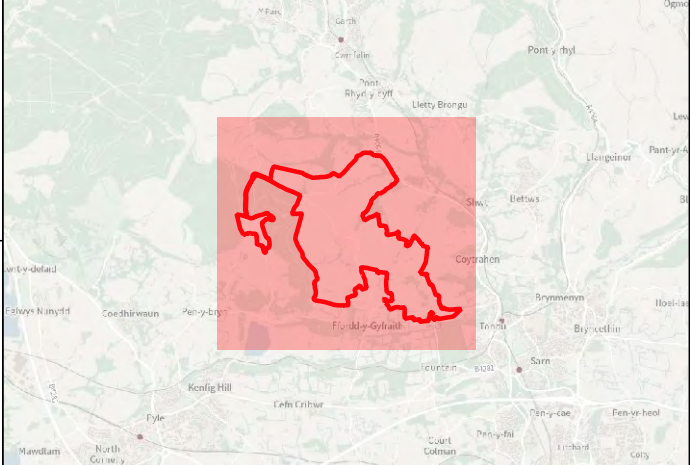






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Key

-  Site Boundary
-  Geophysical Survey Area
-  Survey Extent
-  Area for Illus 17 to 49

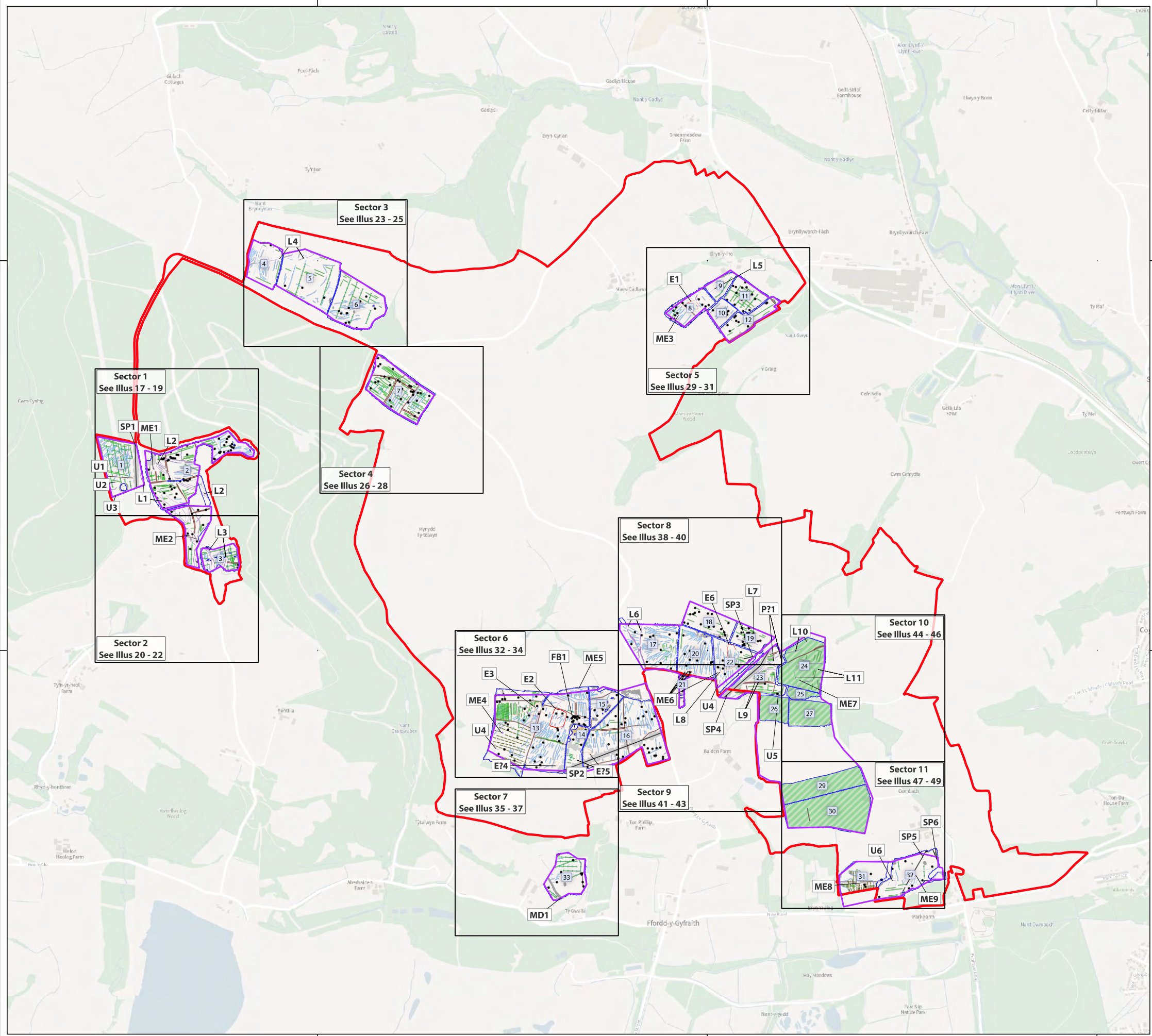


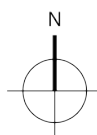
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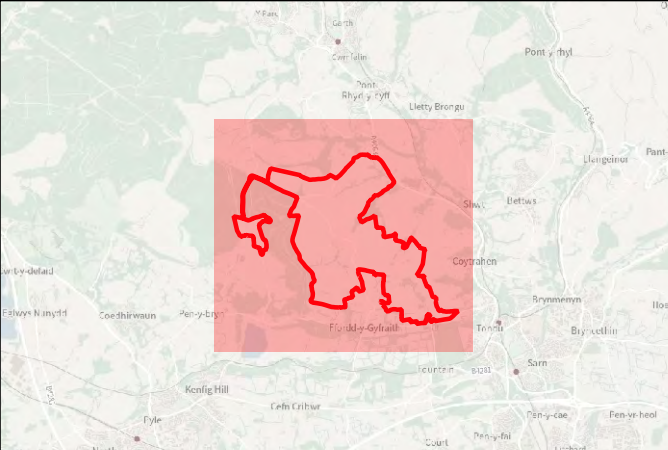
Illus 09 - Overall greyscale plot of processed magnetometer data







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Key

- Site Boundary
- Geophysical Survey Area
- Survey Extent
- Area for Illus 17 to 49
 - Ferrous Objects
- Possible Archaeology
- Agriculture
- Field Boundary
- Possible Field Boundary
- Field Drain
- Natural
- Service
- Uncertain
- Ridge and Furrow
- Archaeology
- Magnetic Disturbance (Above Ground)
- Magnetic Disturbance (Below Ground)
- Natural
- Overhead Cable
- Possible Archaeology
- Uncertain
- Former Building
- Green Waste

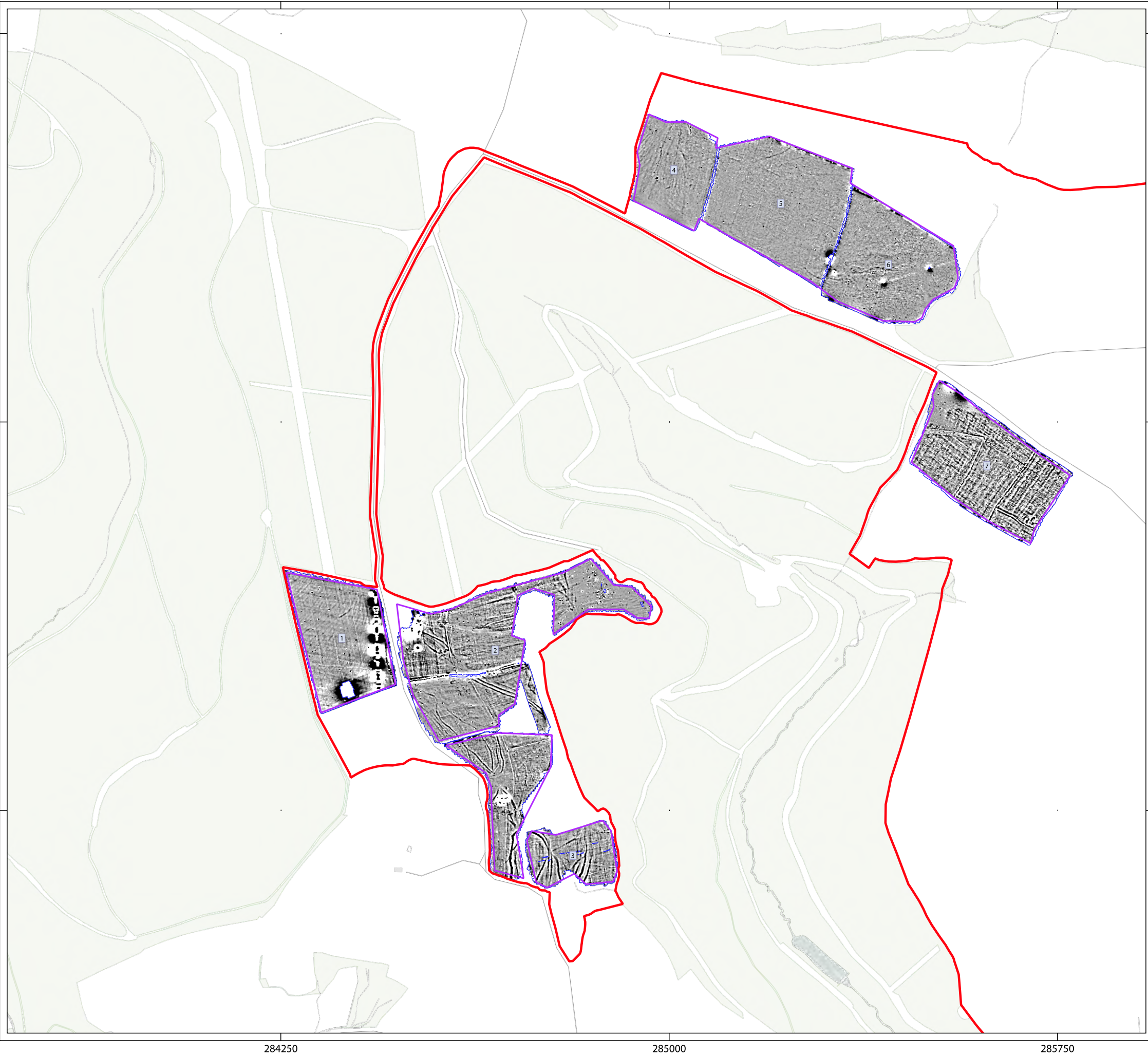
Abbreviation	
E	Enclosure
E?	Enclosure?
FB	Former Boundary
L	Linear
MD	Magnetic Disturbance
ME	Magnetic Enhancement
P?	Pipe
SP	Service Pipe
U	Uncertain

0 300 600 m

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Illus 10 - Overall interpretation of magnetometer data



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Key

Site Boundary

Geophysical Survey Area

Survey Extent

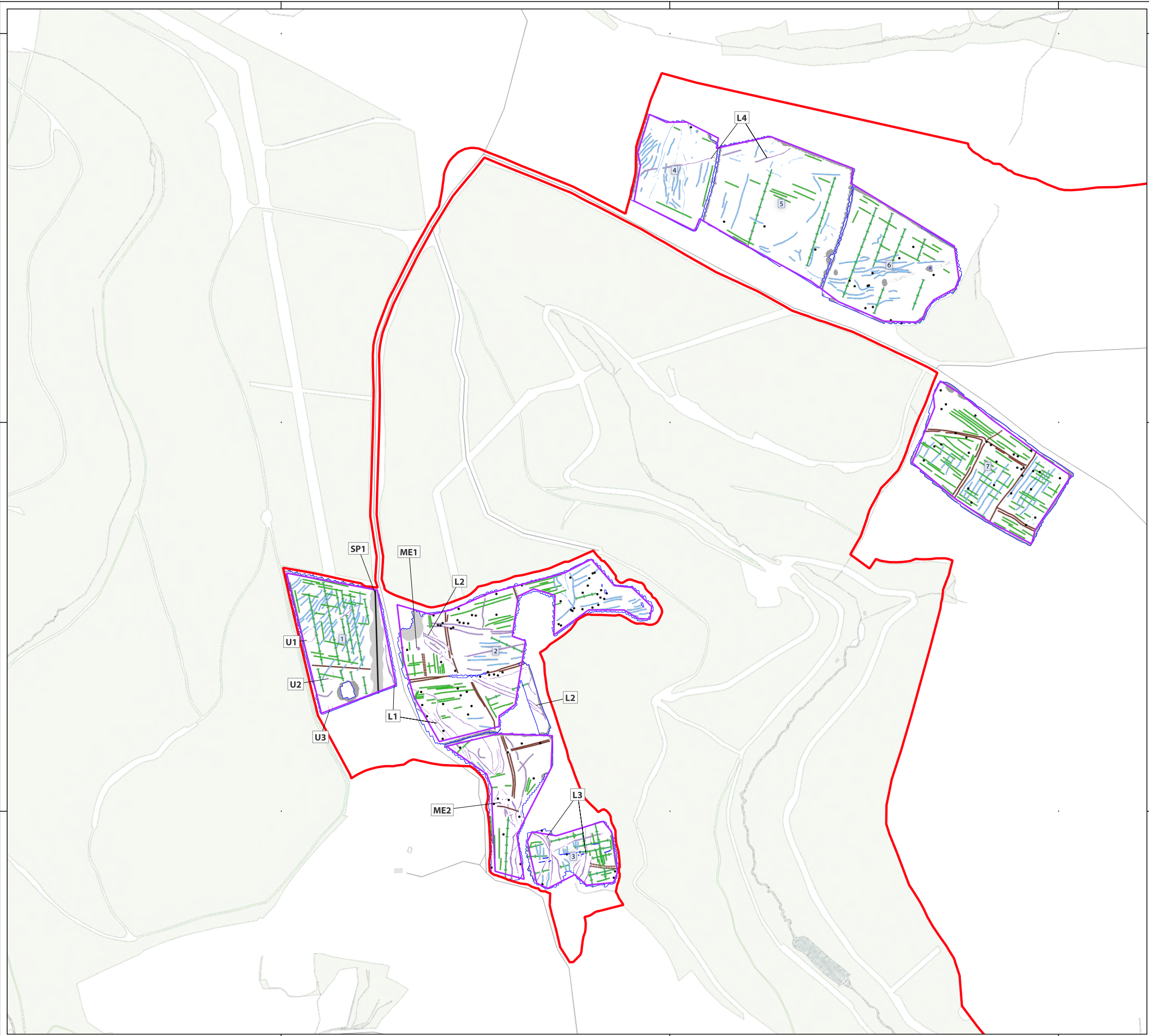
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Key

Site Boundary

Geophysical Survey Area

Survey Extent

•

Ferrous Objects

Agriculture

Field Boundary

Possible Field Boundary

Field Drain

Natural

Service

Uncertain

Magnetic Disturbance (Above Ground)

Magnetic Disturbance (Below Ground)

Natural

Overhead Cable

Uncertain

Abbreviation

L

Linear

ME

Magnetic Enhancement

SP

Service Pipe

U

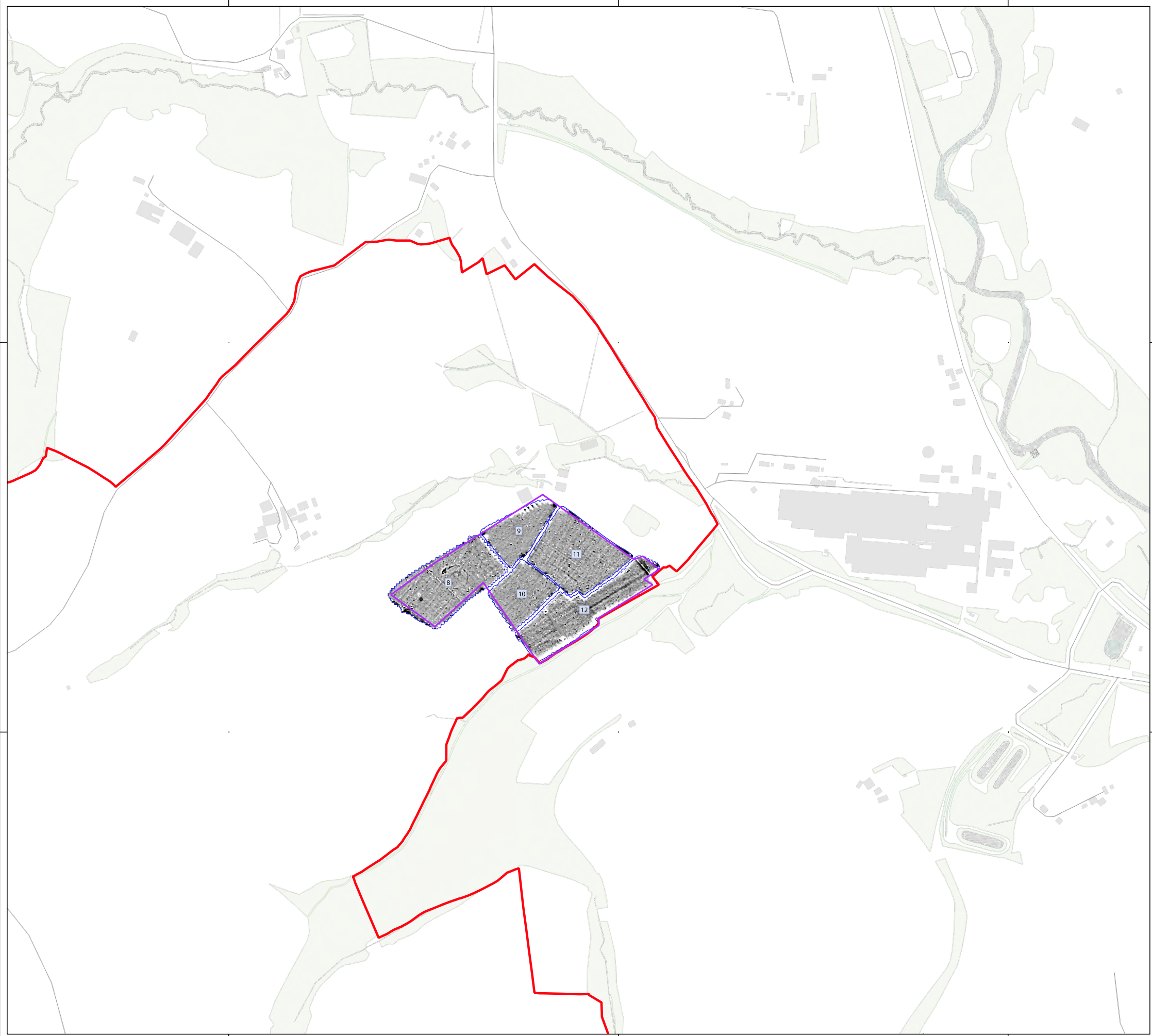
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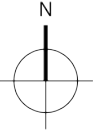
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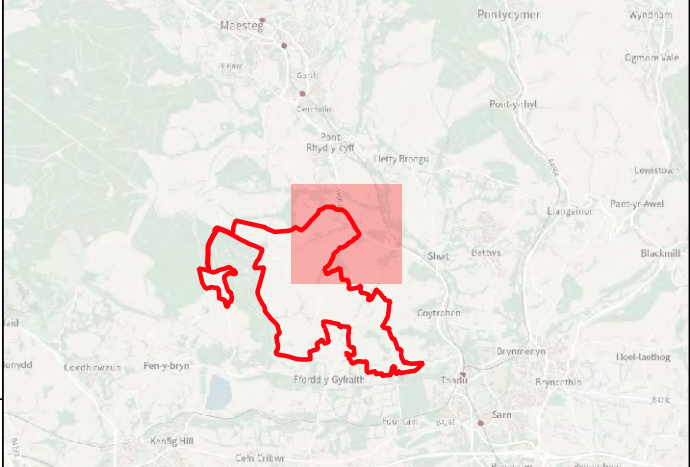






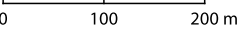
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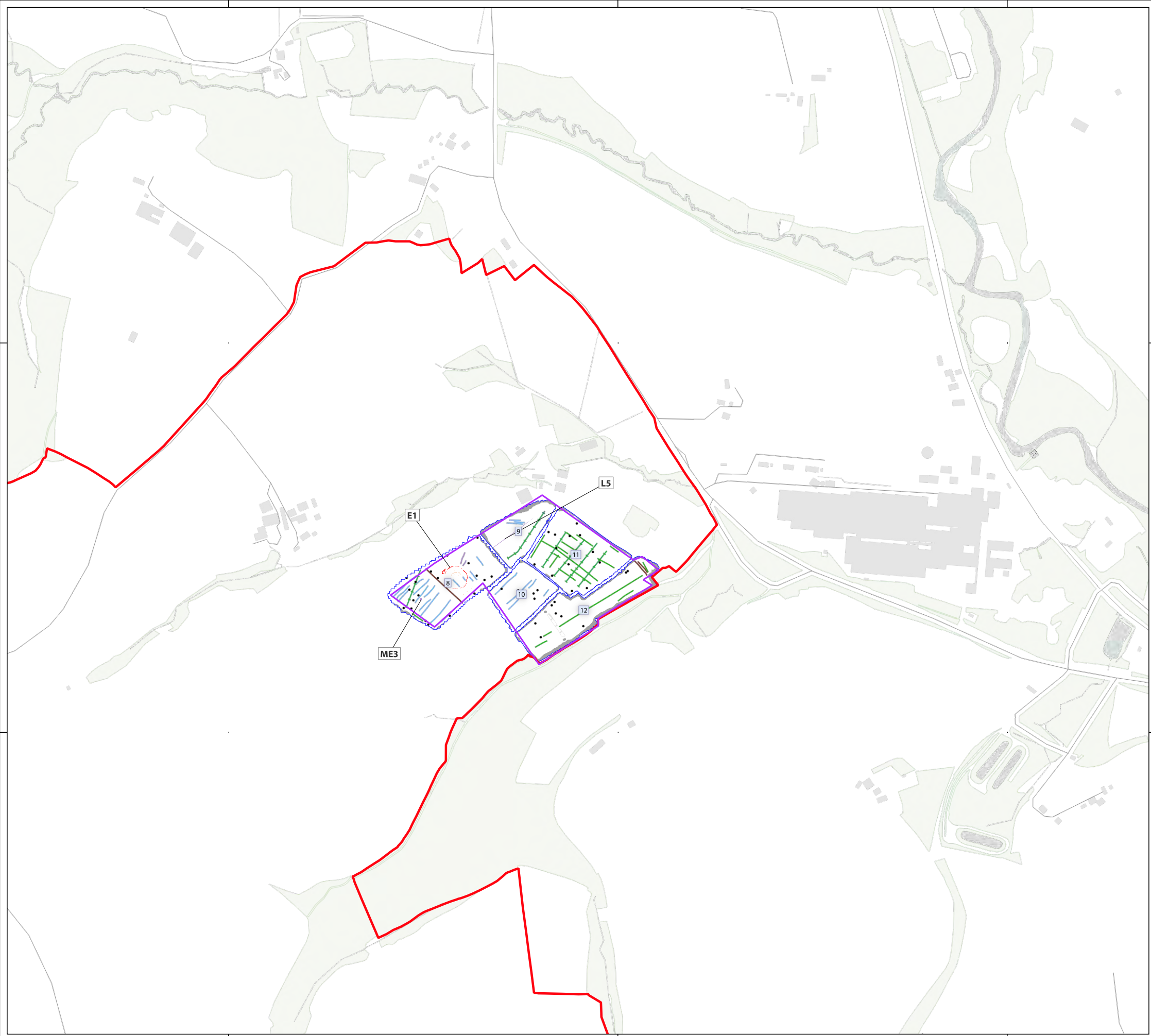
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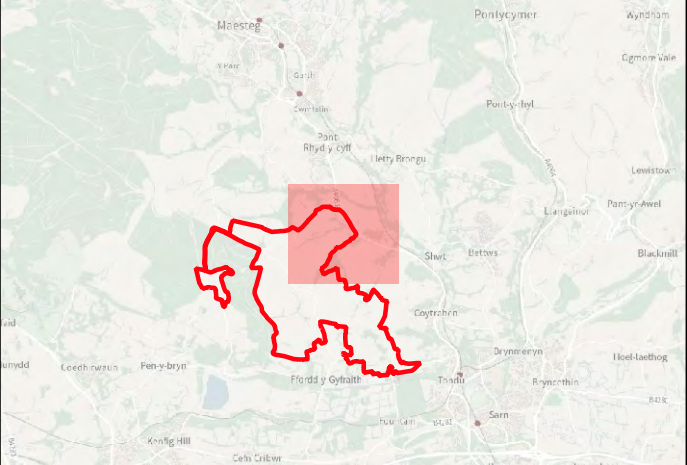
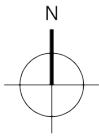
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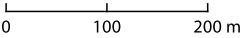
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Key

- Site Boundary
- Geophysical Survey Area
- Ferrous Objects
- Agriculture
- Field Boundary
- Field Drain
- Natural
- Uncertain
- Archaeology
- Magnetic Disturbance (Above Ground)
- Overhead Cable
- Possible Archaeology
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Abbreviation	
E	Enclosure
L	Linear
ME	Magnetic Enhancement



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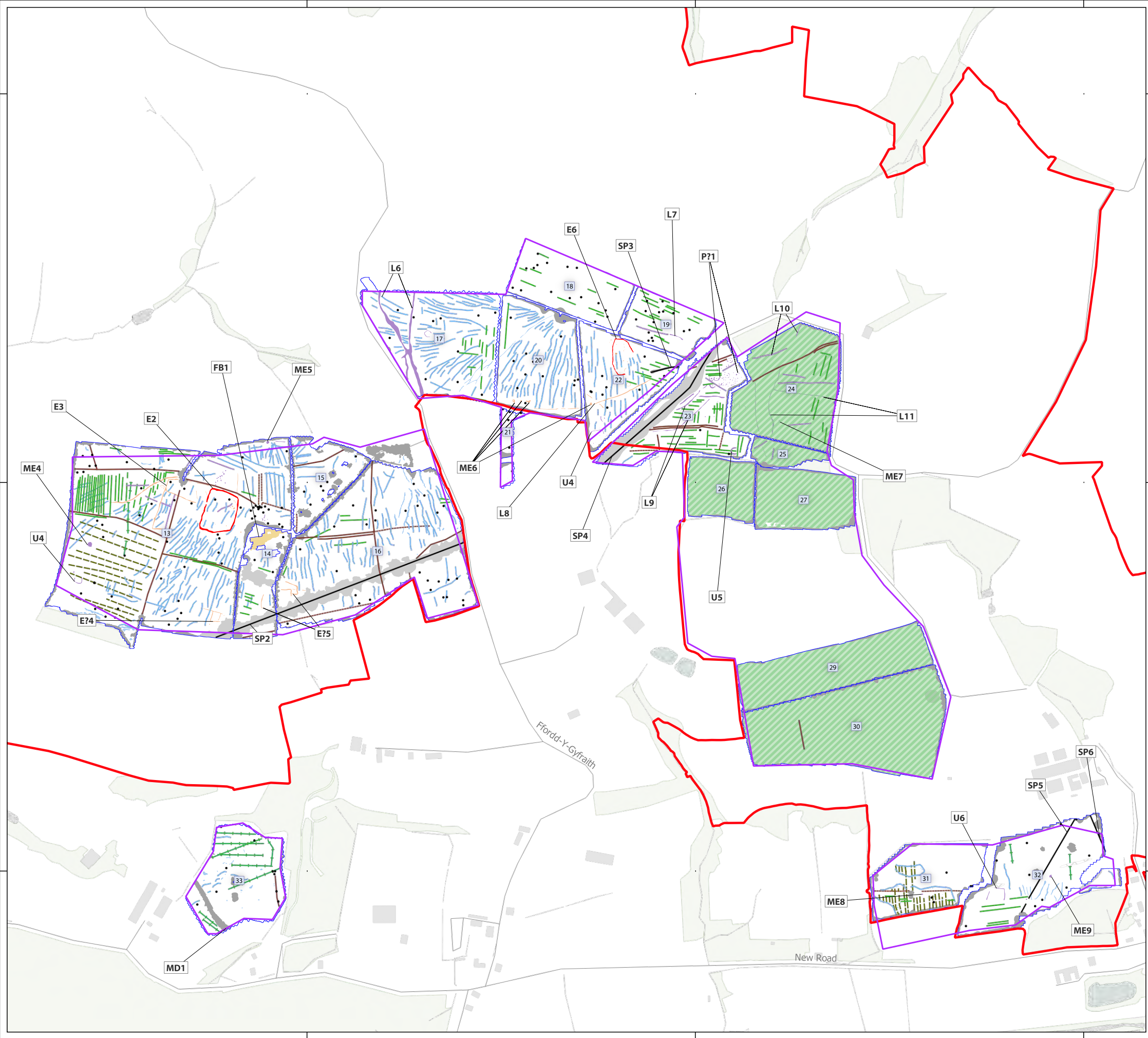
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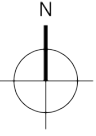
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- Survey Extent

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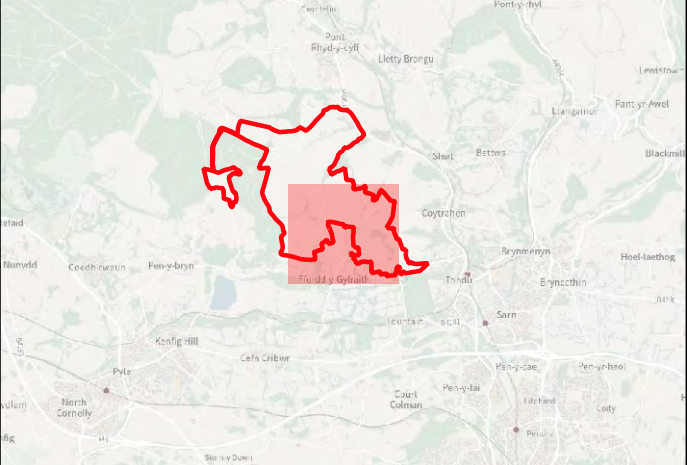






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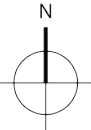
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Illus - 16 Interpretation of magnetimeter data; Overview 03

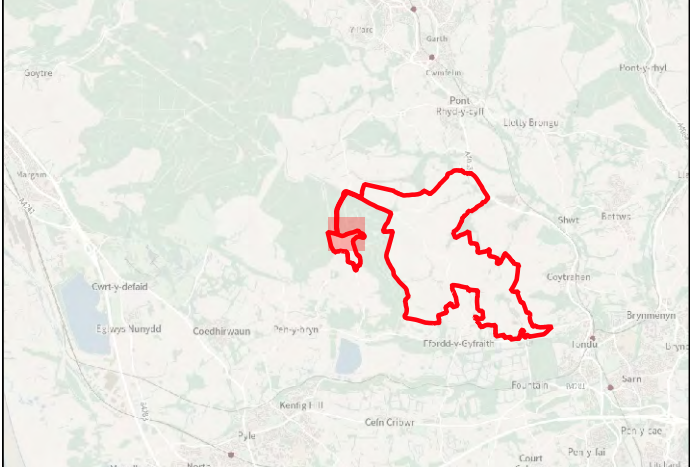






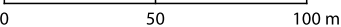
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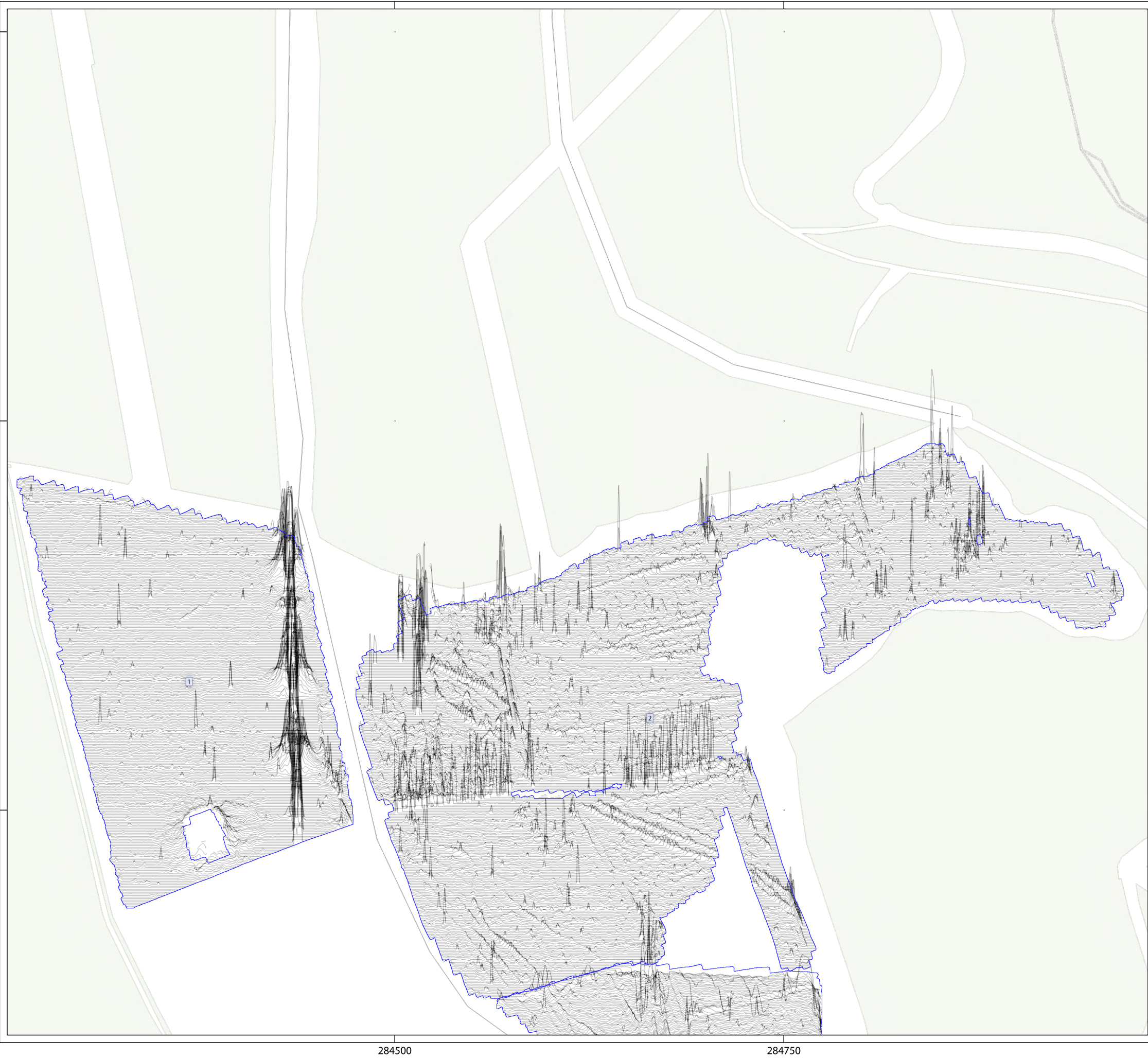
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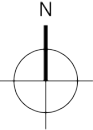
 Survey Extent



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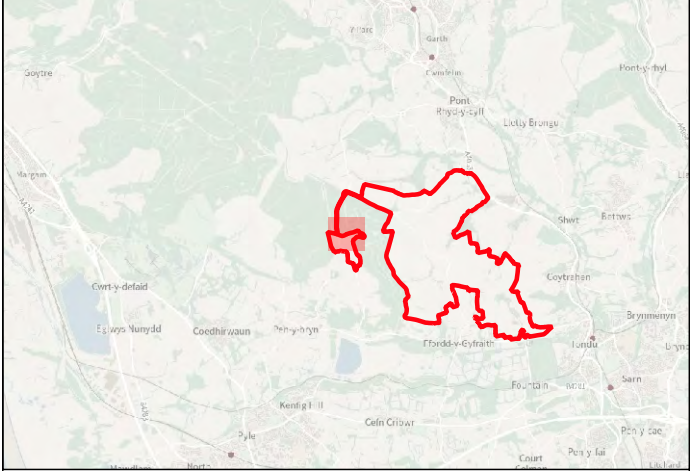






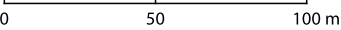
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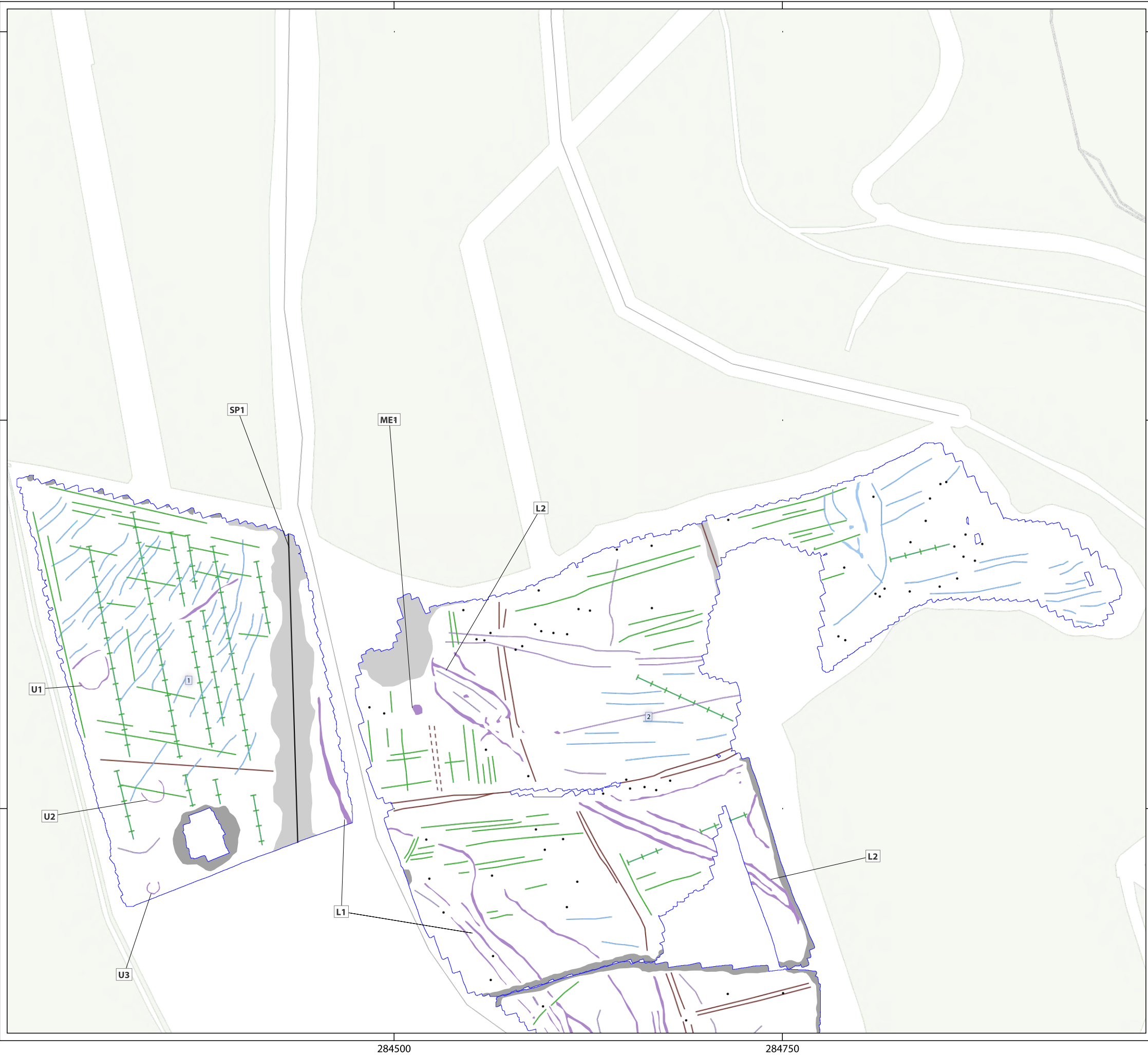
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Key

Survey Extent

Ferrous Objects

Agriculture

Field Boundary

Possible Field Boundary

Field Drain

Natural

Service

Uncertain

Magnetic Disturbance (Above Ground)

Magnetic Disturbance (Below Ground)

Natural

Uncertain

Abbreviation

L

Linear

ME

Magnetic Enhancement

SP

Service Pipe

U

Uncertain

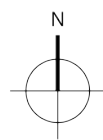
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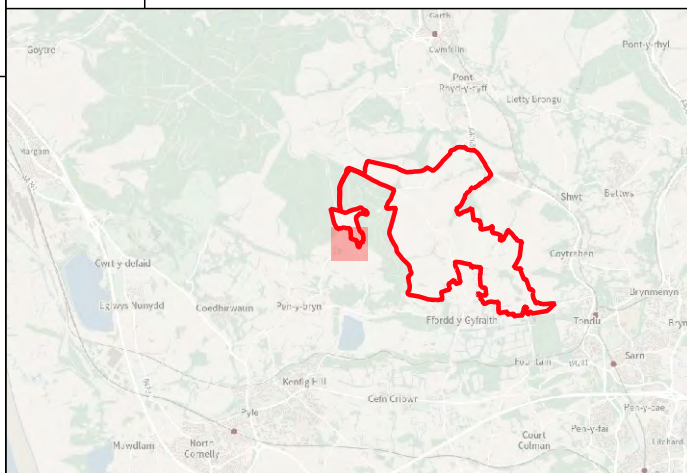
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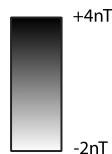


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Key

Survey Extent



A horizontal number line with tick marks at 0, 50, and 100 m.

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N

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Key

Survey Extent

XY Trace (25nT/cm)

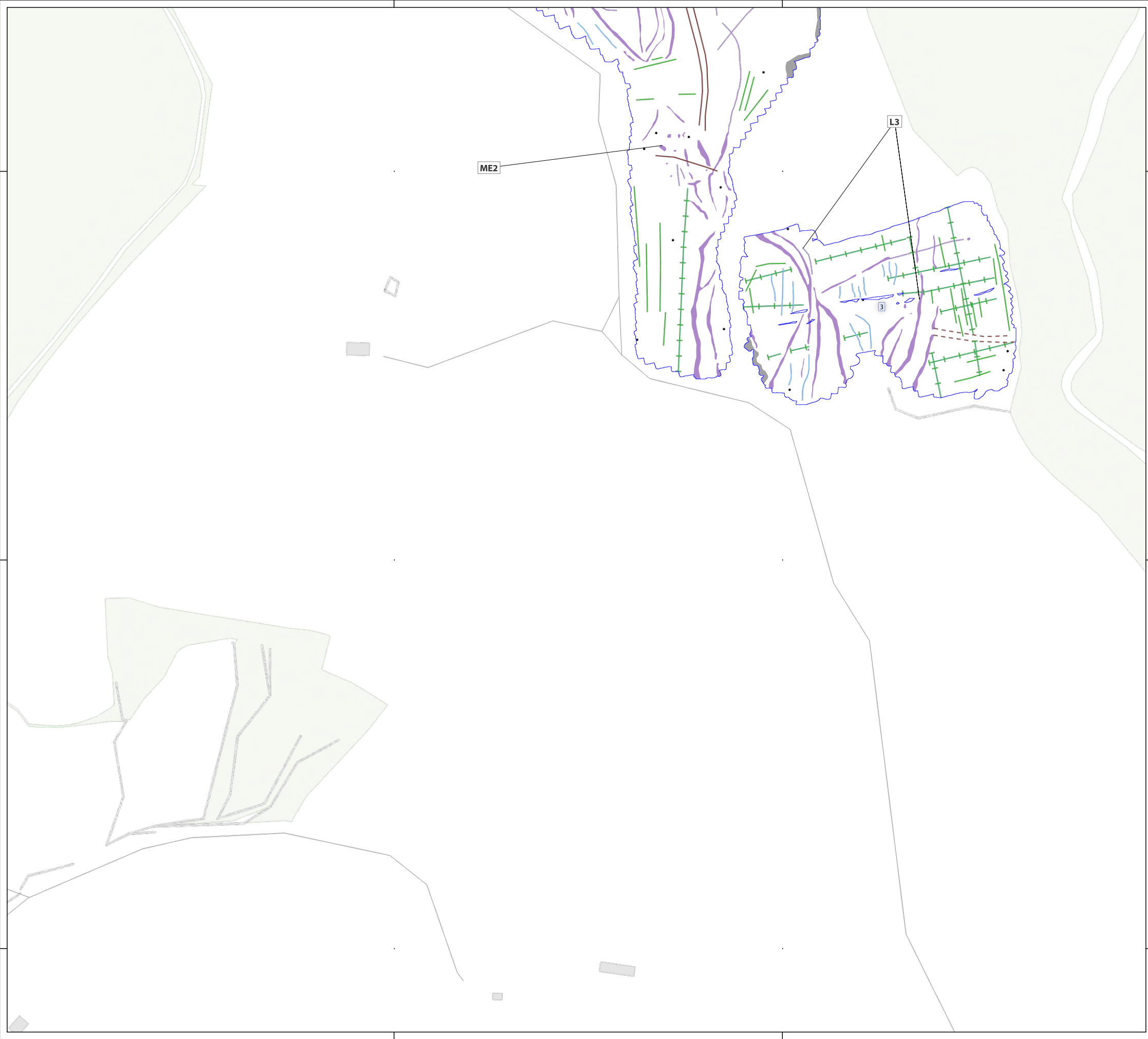
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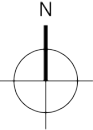
m

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Checked by:	AW
Version:	v3.0
Date:	11/03/2025
Scale:	1:2,500 @ A3

Illus - 21 XY trace plot of minimally processed magnetometer data; Sector 2

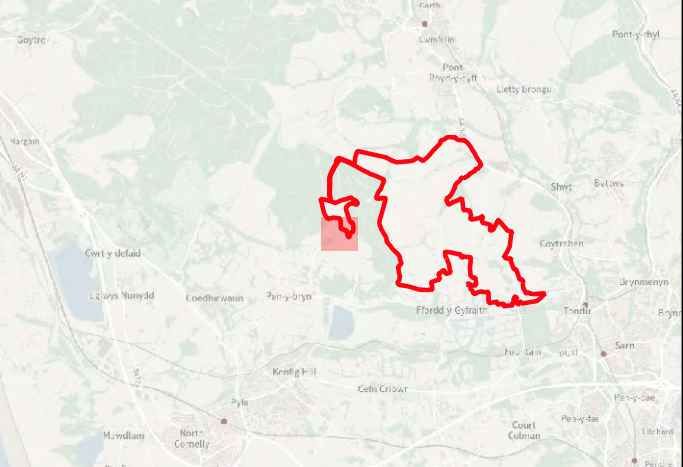






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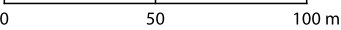
part of the **RSK** Group



Key

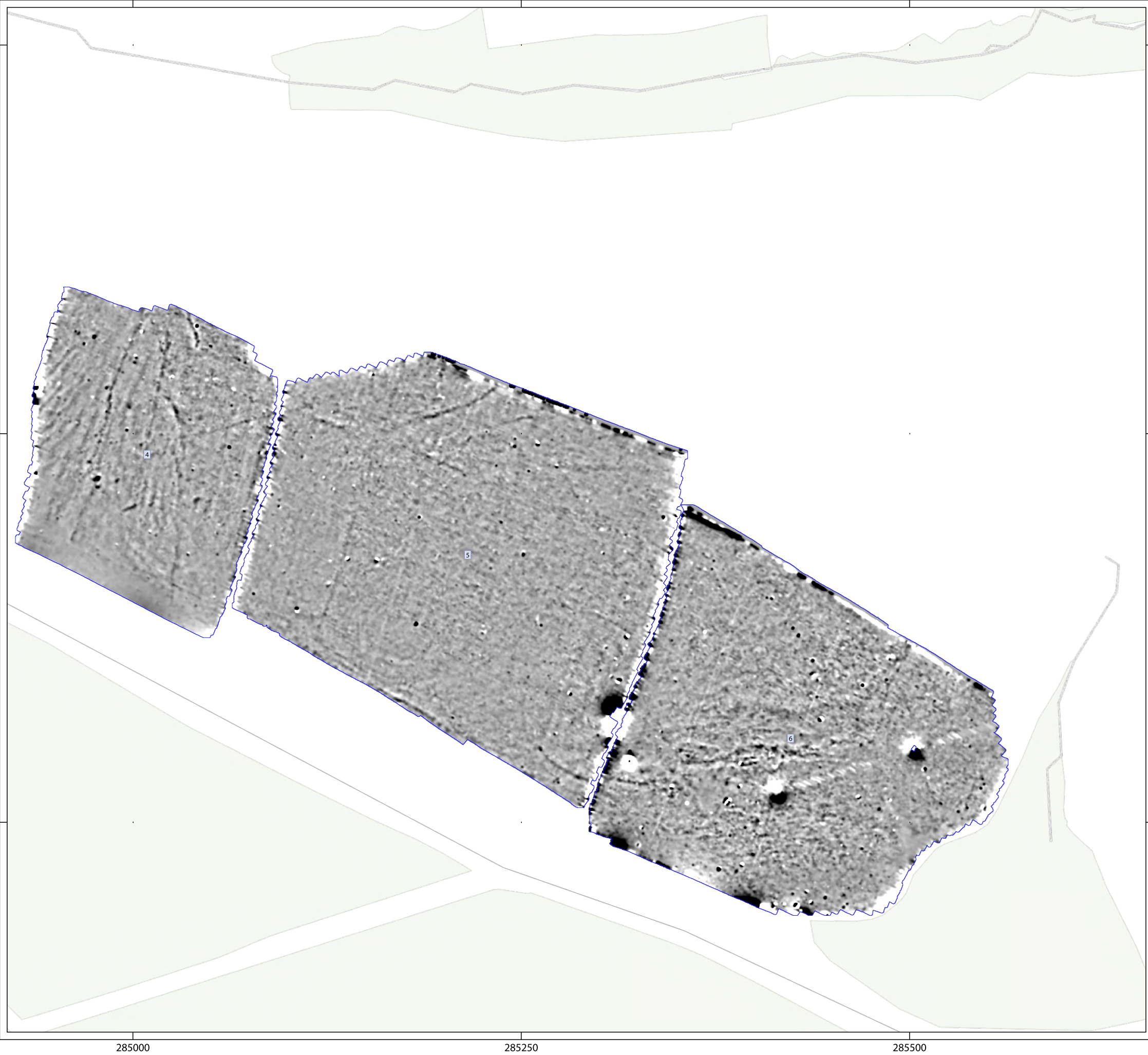
- Survey Extent
- Ferrous Objects
- Agriculture
- Field Boundary
- Possible Field Boundary
- Field Drain
- Natural
- Uncertain
- Magnetic Disturbance (Above Ground)
- Uncertain

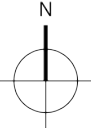
Abbreviation	
L	Linear
ME	Magnetic Enhancement



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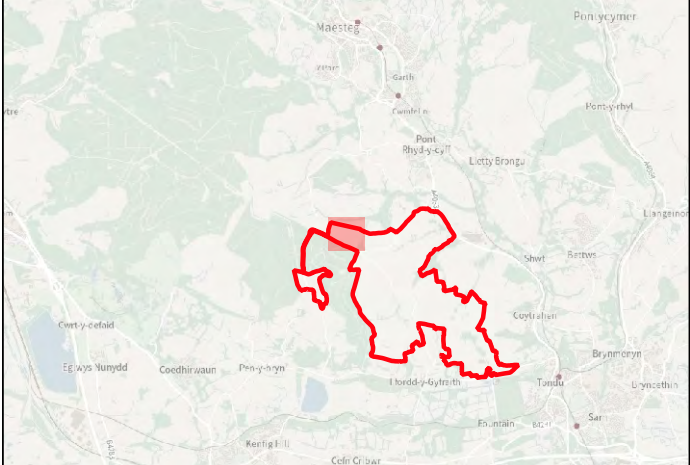






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Key

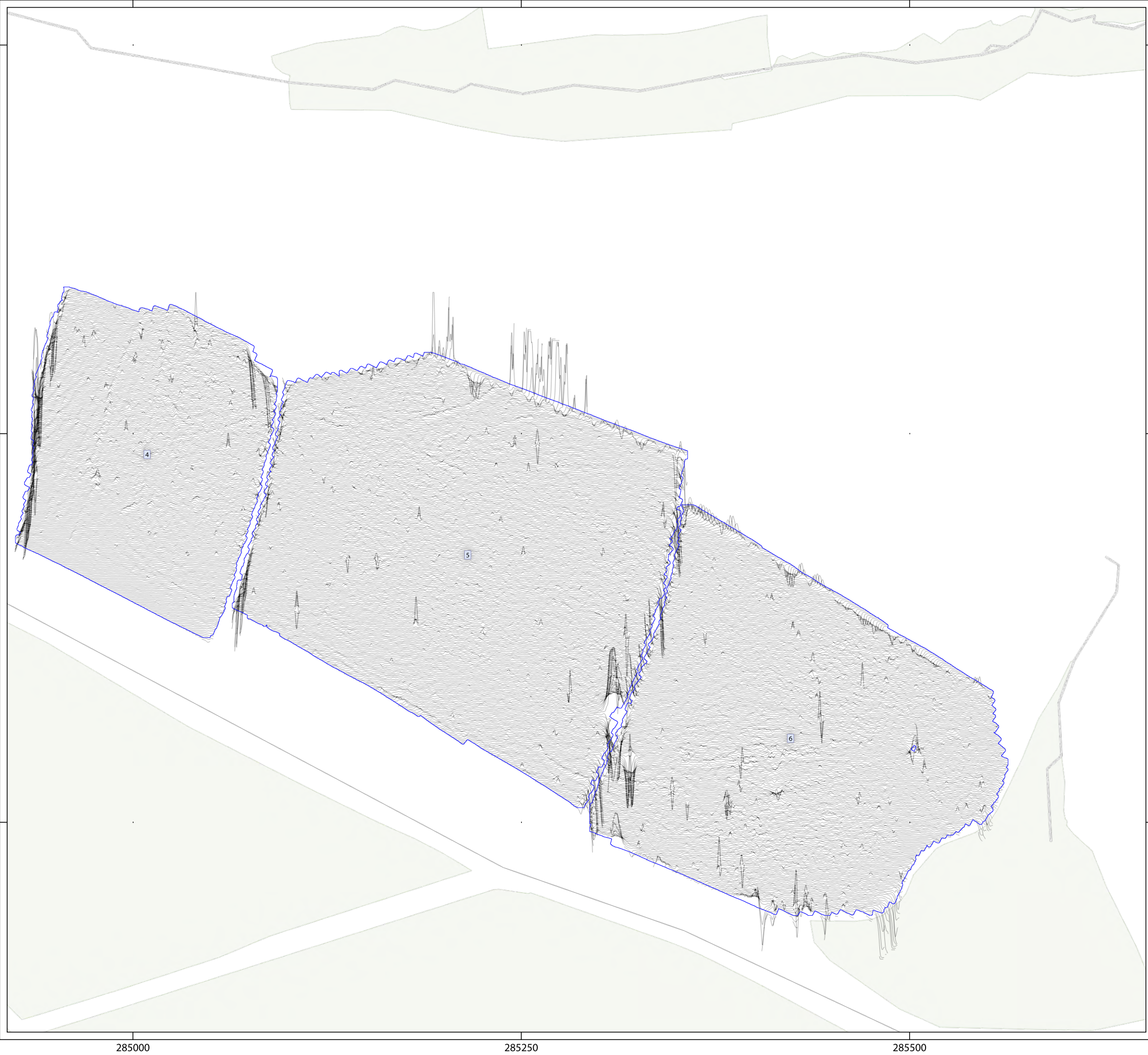


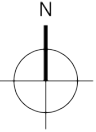
+4nT
-2nT

050100 m

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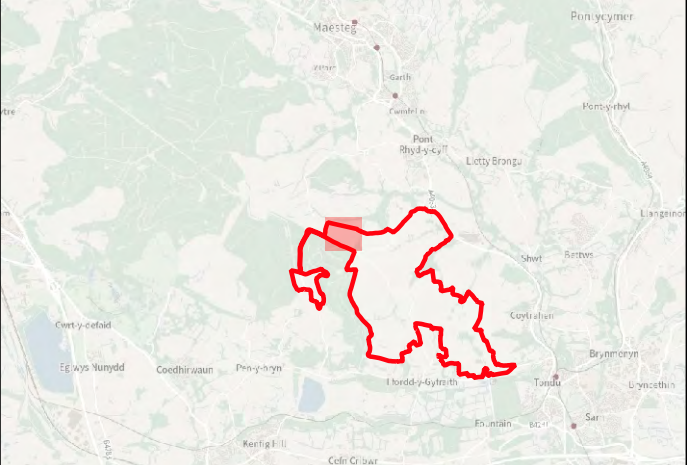




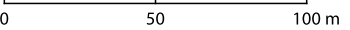


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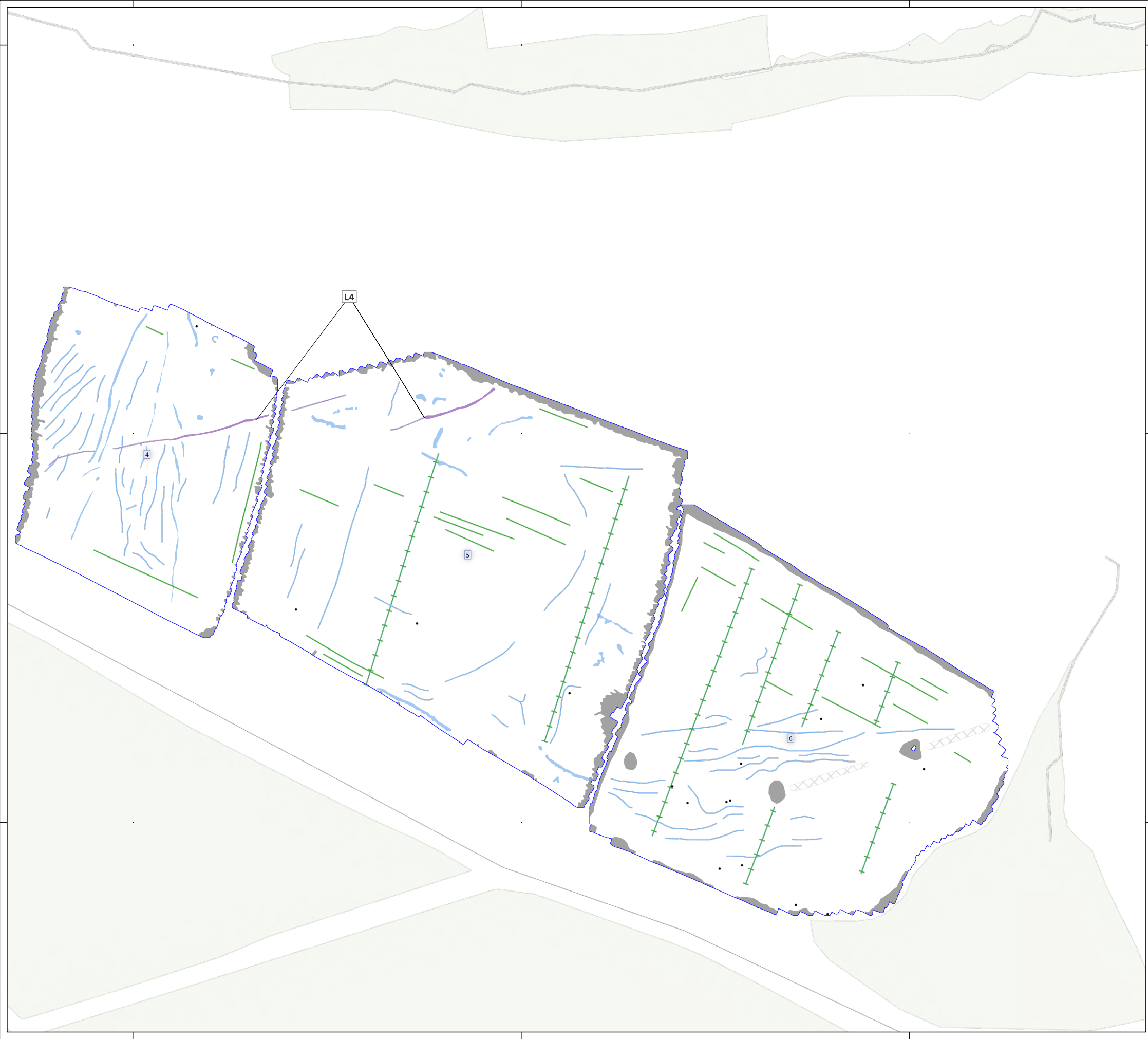


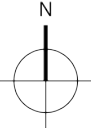
Key
— XY Trace (25nT/cm)



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Version:	v3.0
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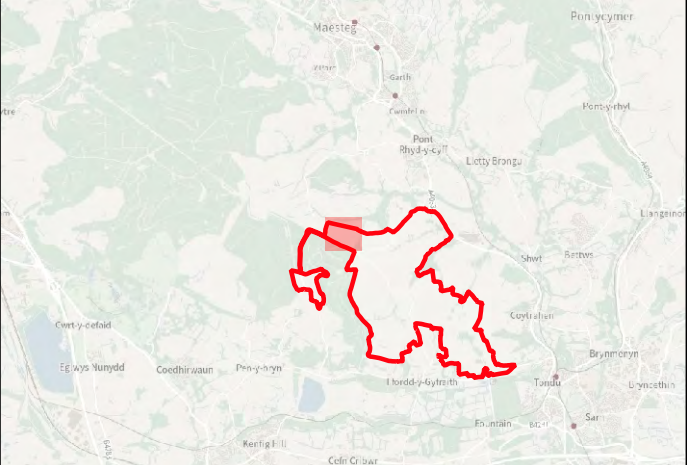




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Key

- Ferrous Objects
- Agriculture
- Field Drain
- Natural
- Uncertain
- Magnetic Disturbance (Above Ground)
- Natural
- ⊗ Overhead Cable
- Uncertain

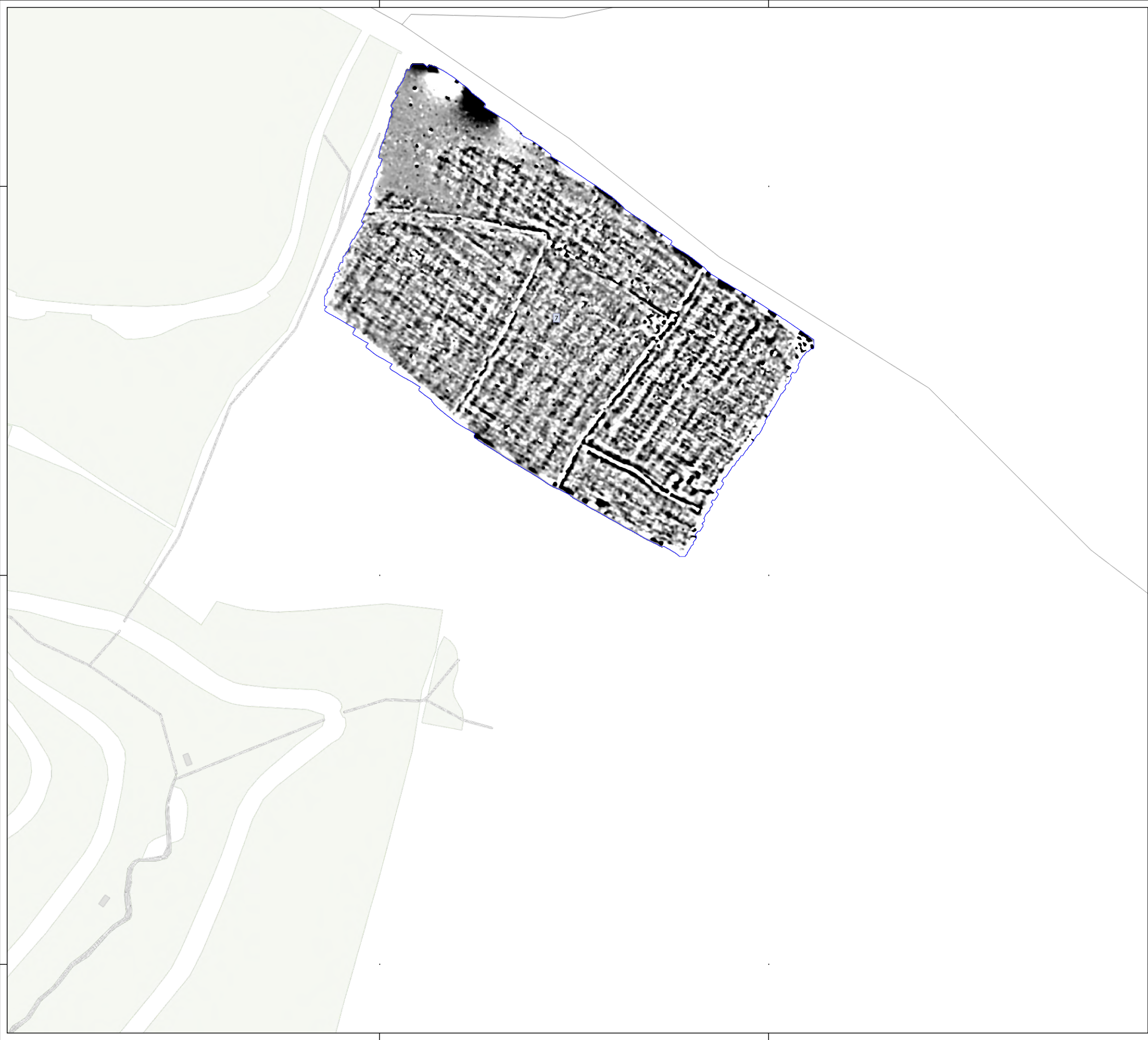
Abbreviation

L	Linear
---	--------

050100 m

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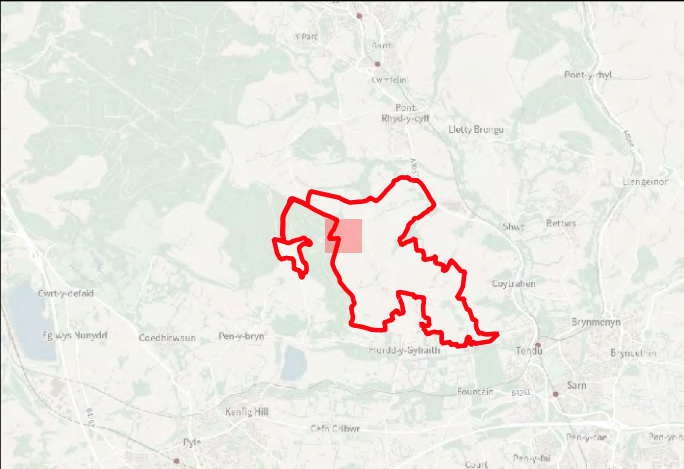
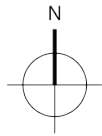
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186500

186250

285500

285750



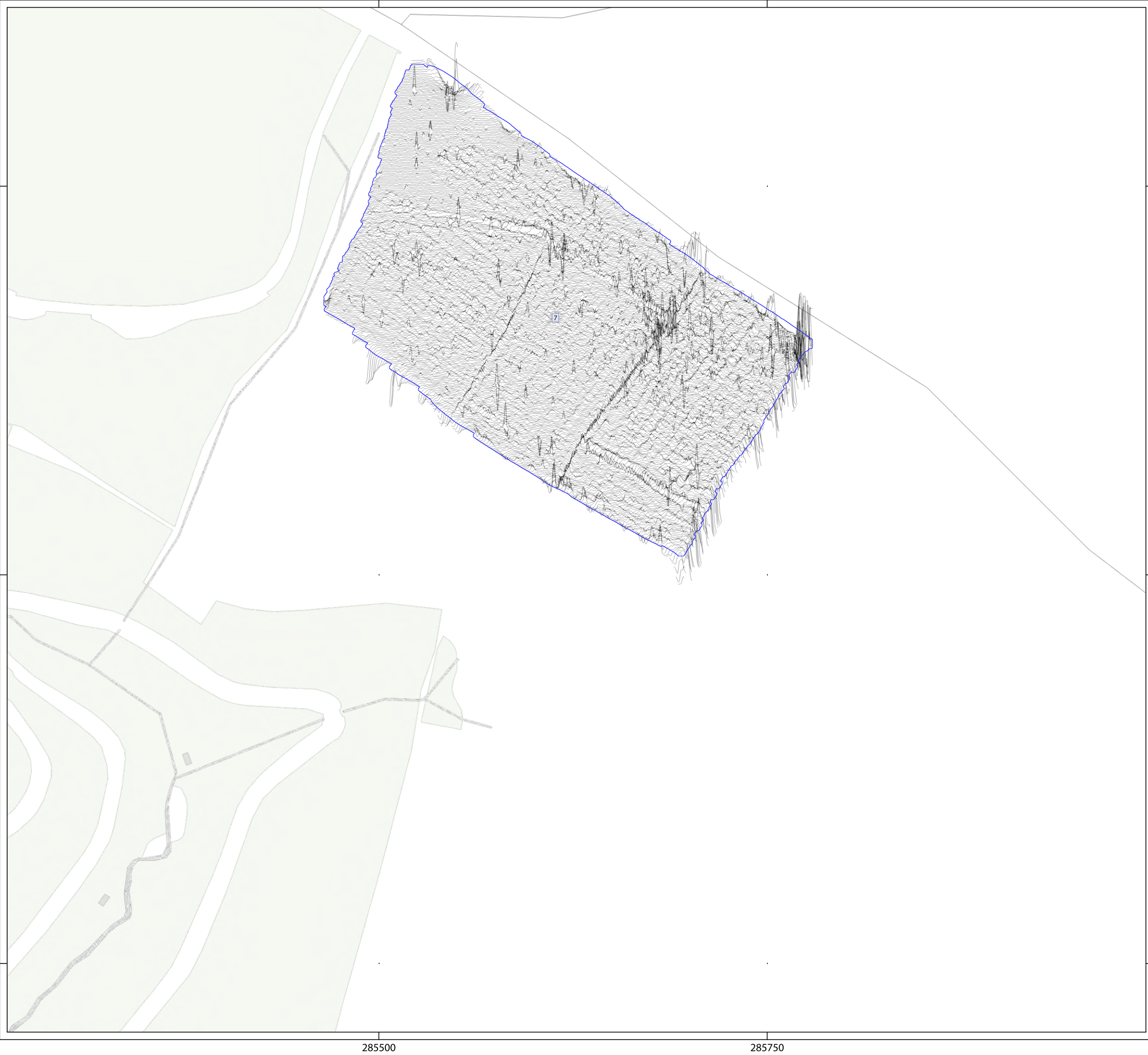
Key



0 50 100 m

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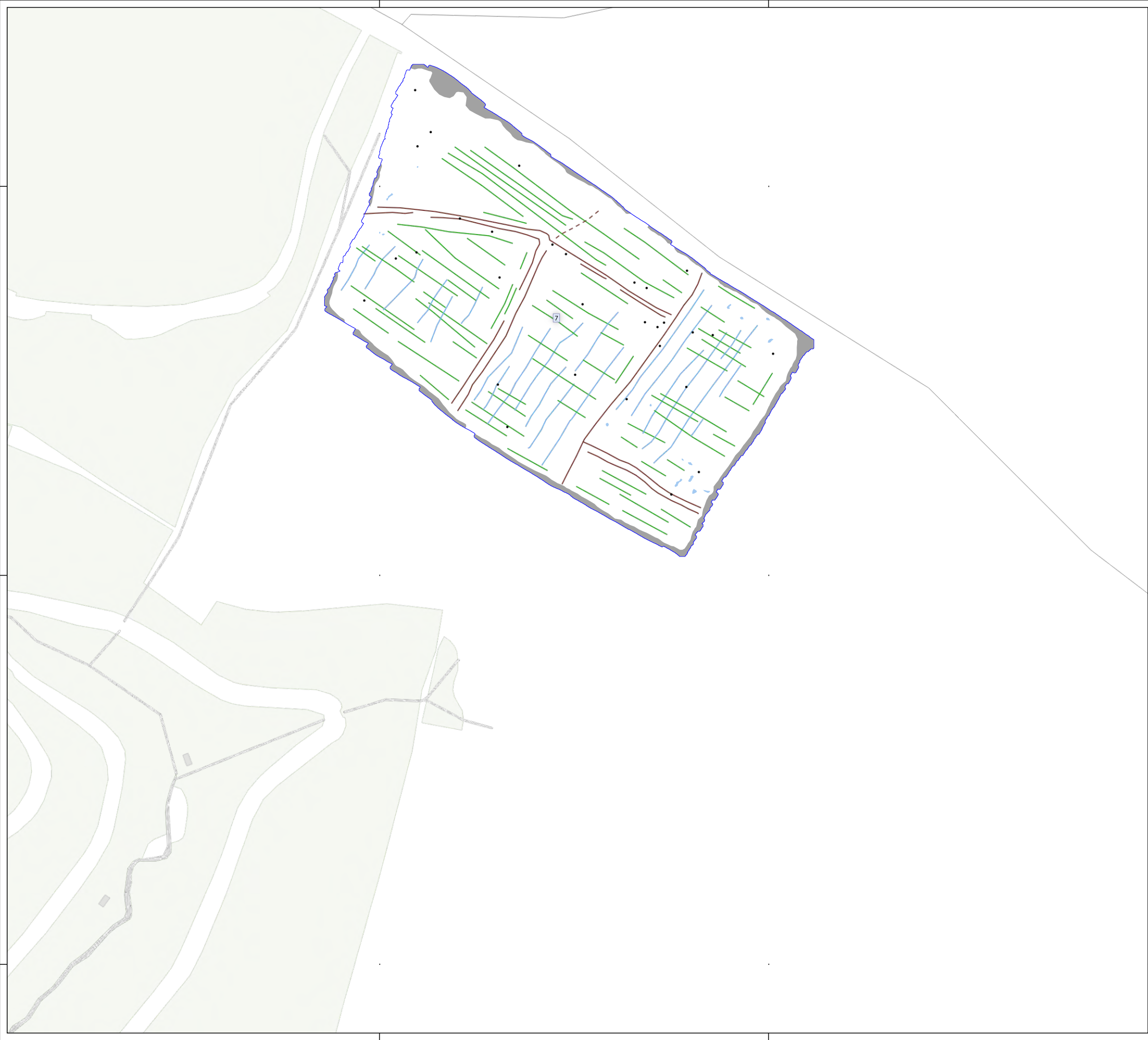
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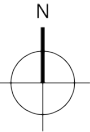
XY Trace (25nT/cm)

050100 m

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Version:	v3.0
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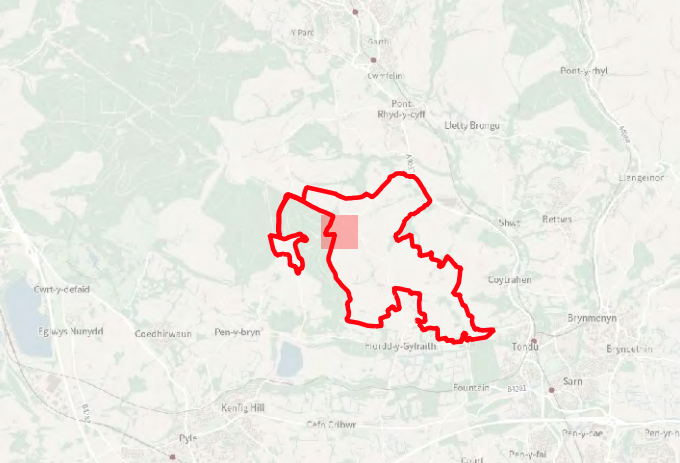






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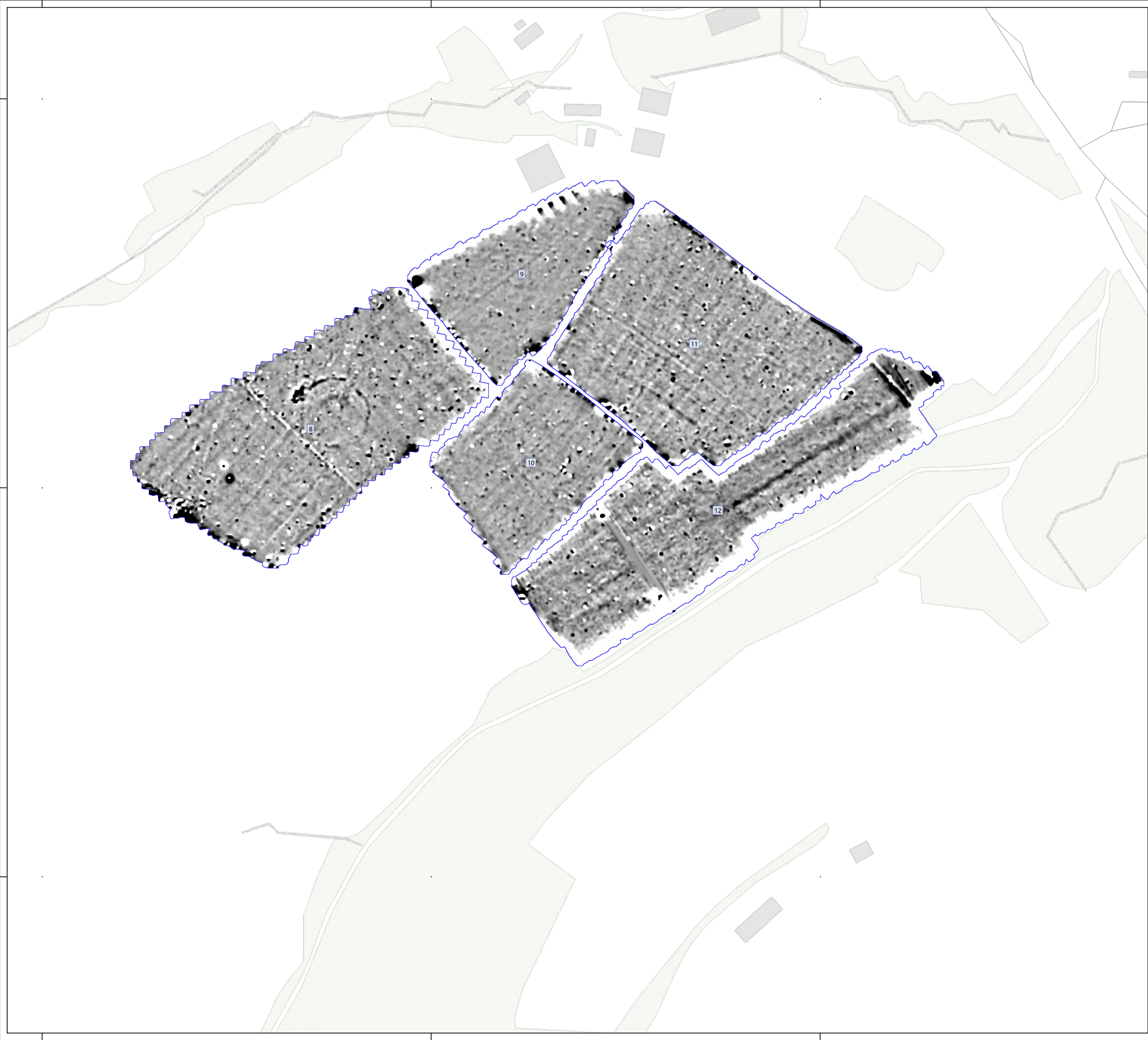
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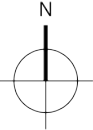
- Ferrous Objects
- Agriculture
- Field Boundary
- - - Possible Field Boundary
- Natural
- Magnetic Disturbance (Above Ground)
- Natural

050100 m

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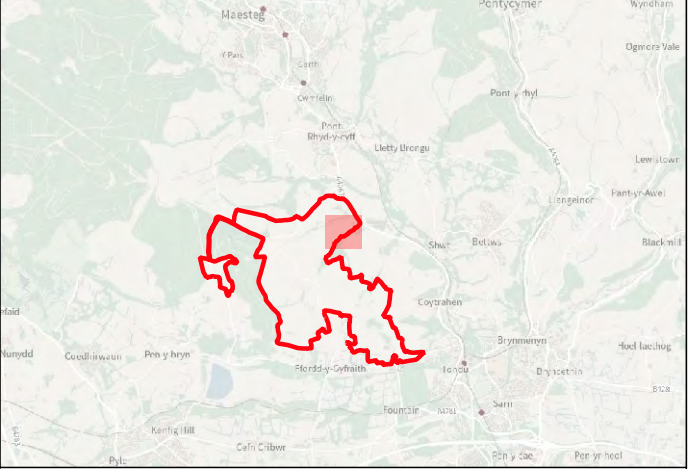






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Key



+4nT
-2nT

0

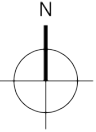
50

100 m

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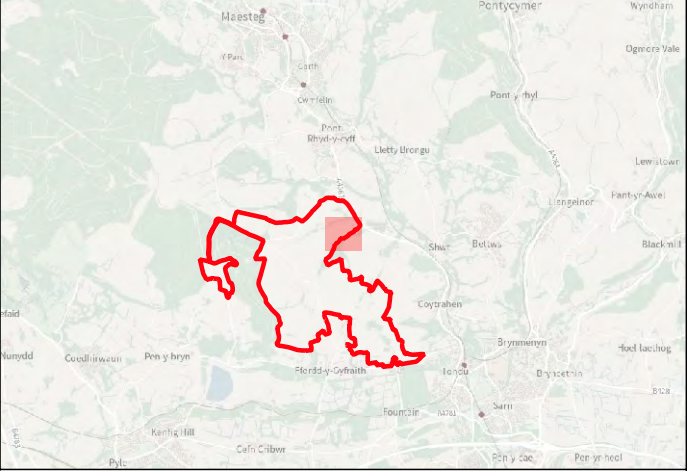






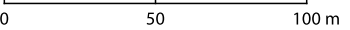
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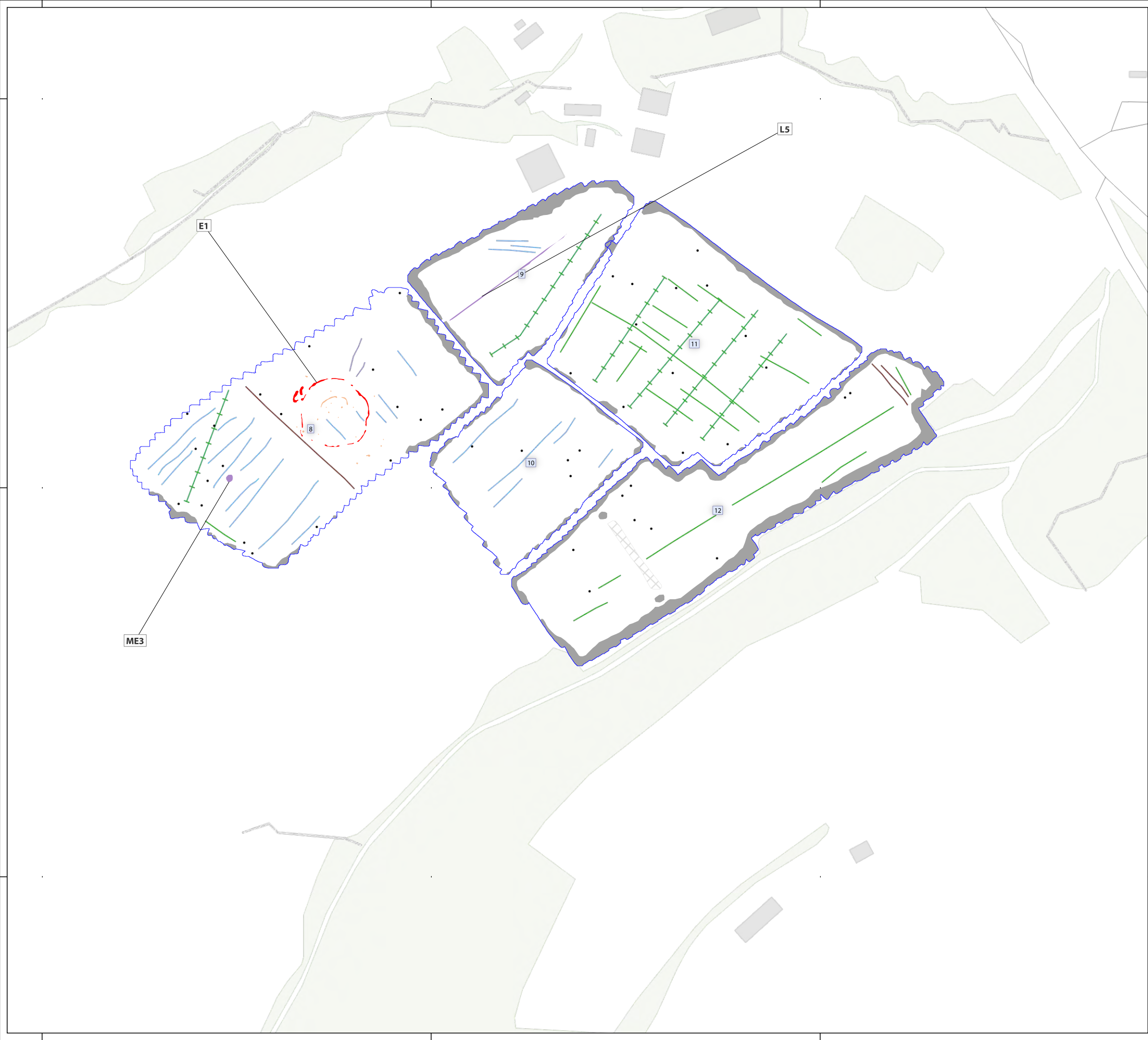
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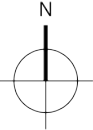
— XY Trace (25nT/cm)



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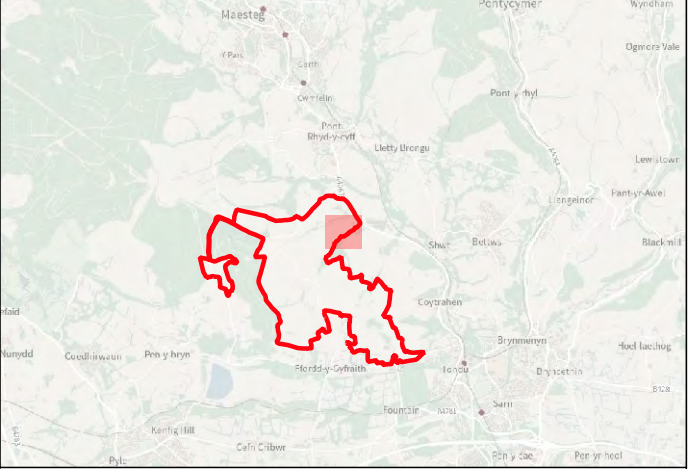






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Key

- Ferrous Objects
- Agriculture
- Field Boundary
- Field Drain
- Natural
- Uncertain
- Archaeology
- Magnetic Disturbance (Above Ground)
- ⊗ Overhead Cable
- Possible Archaeology
- Uncertain

Abbreviation	
E	Enclosure
L	Linear
ME	Magnetic Enhancement

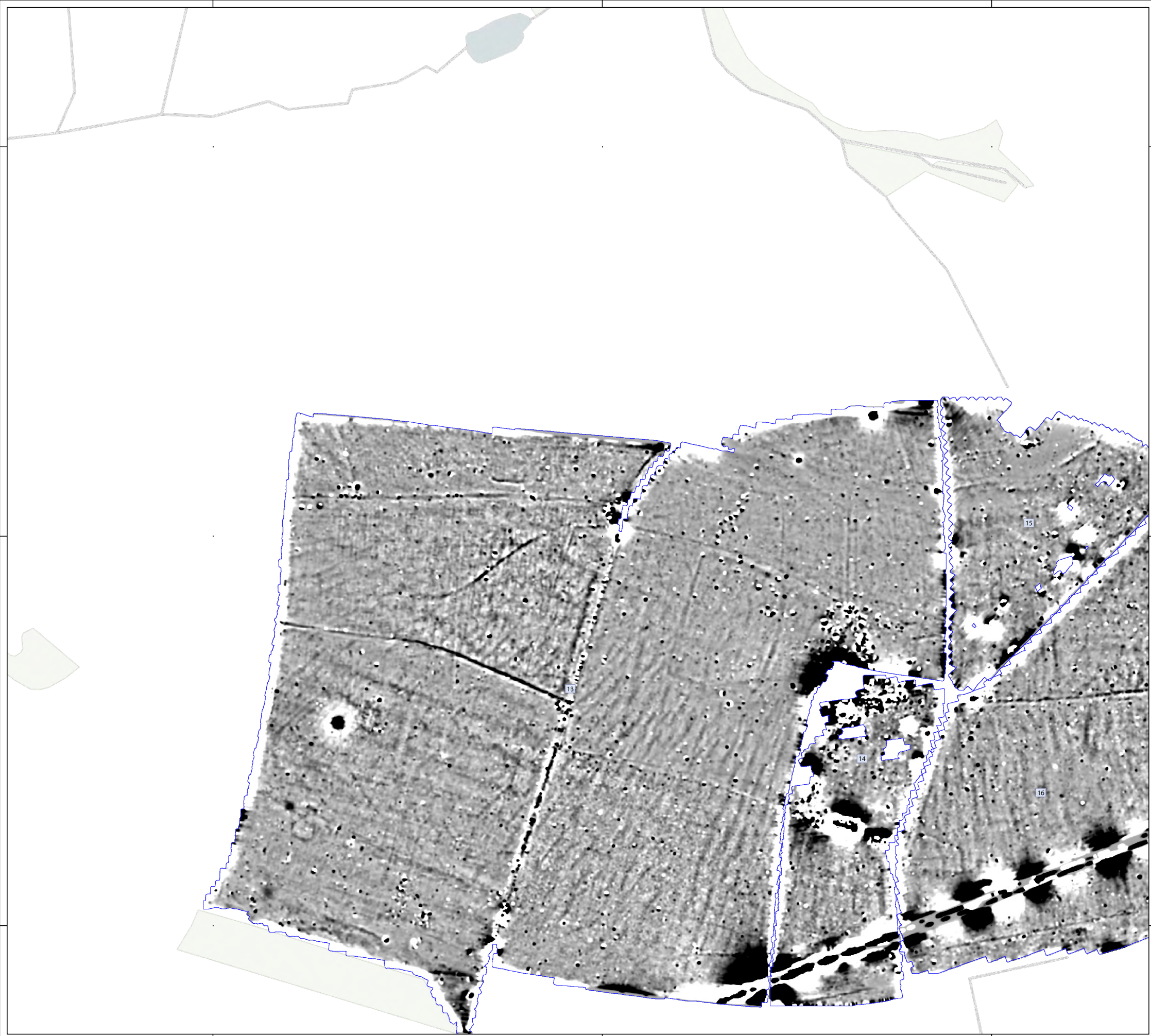
050100

m

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Version:	v3.0
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Scale:	1:2,500 @ A3

Illus - 31 Interpretation of magnetometer data; Sector 5



185500

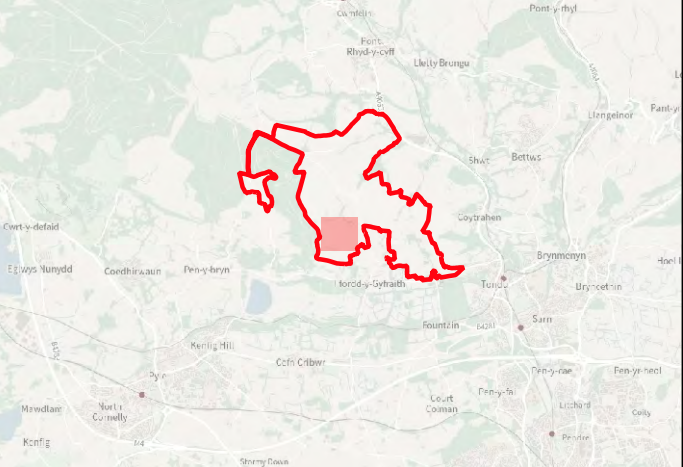
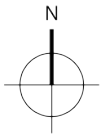
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185000

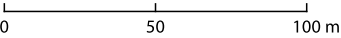
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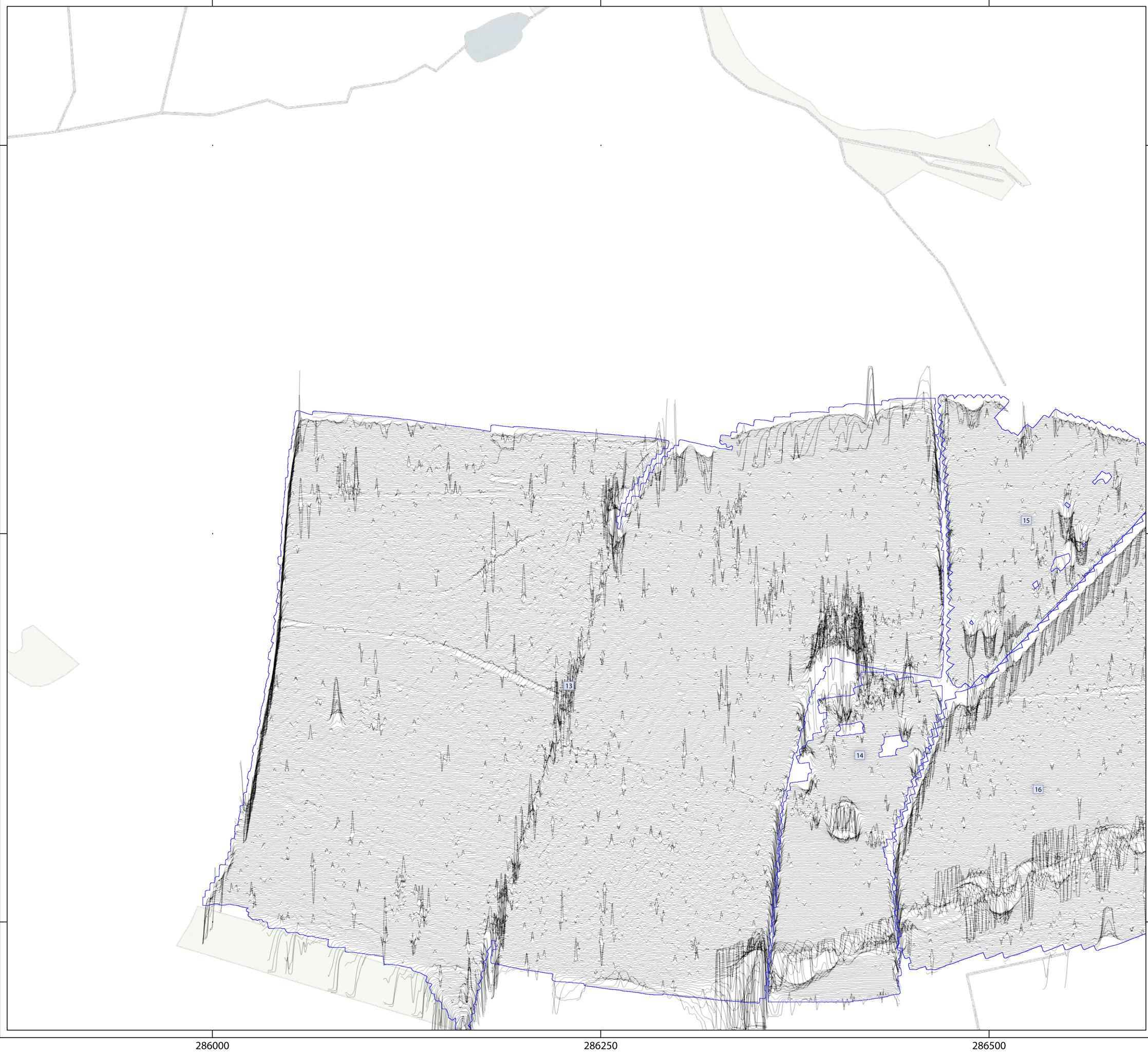


Key



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Key

XY Trace (25nT/cm)

050100

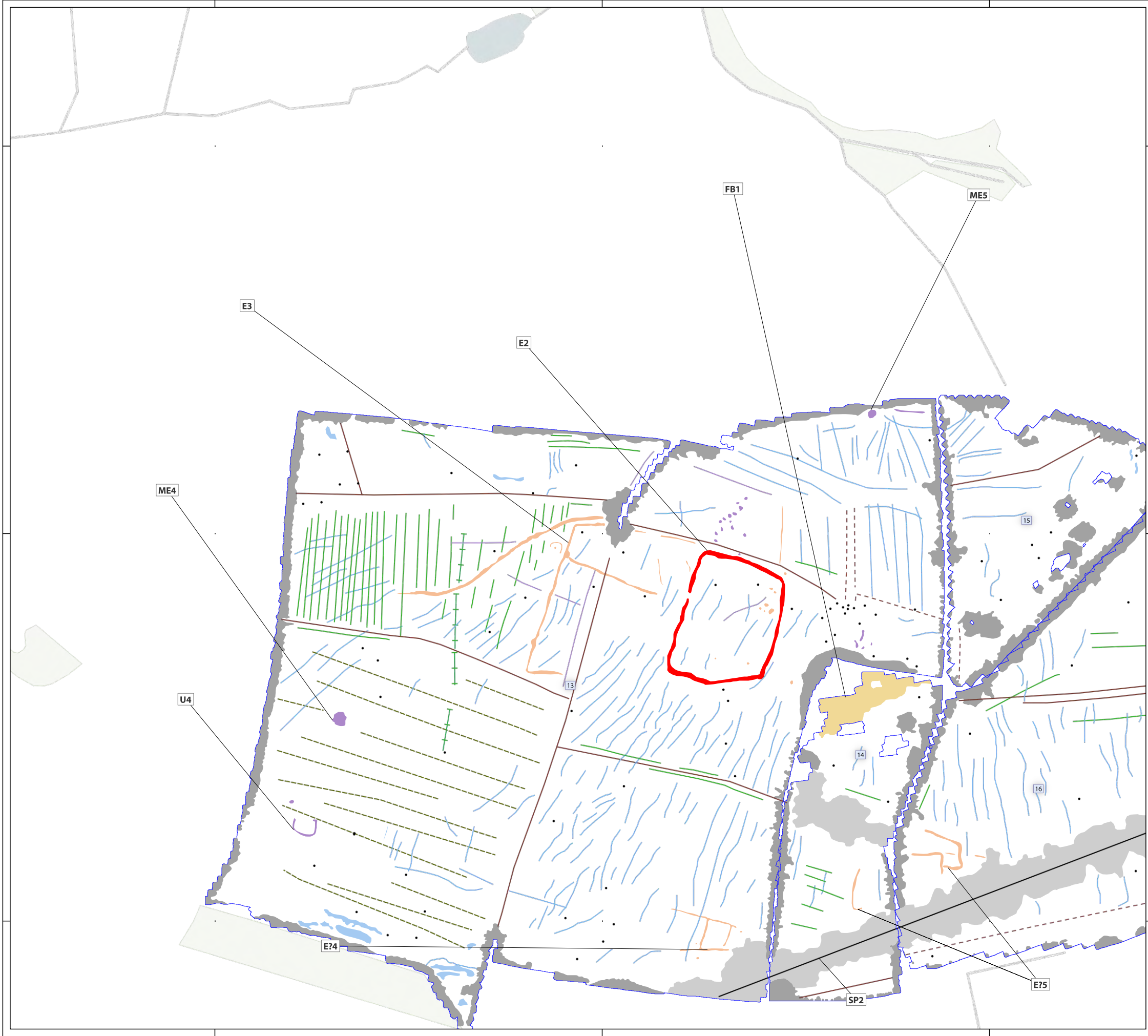
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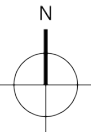
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Illus - 33 XY trace plot of minimally processed magnetometer data; Sector 6

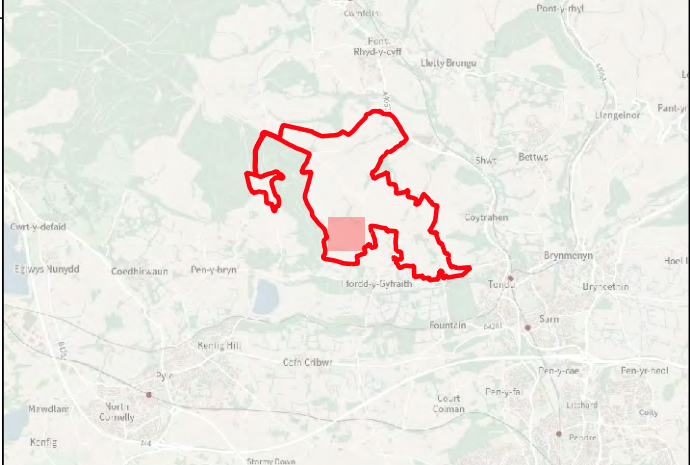






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Key

- Ferrous Objects
- Agriculture
- Field Boundary
- - - Possible Field Boundary
- + Field Drain
- Natural
- Service
- Uncertain
- - - Ridge and Furrow
- Archaeology
- Magnetic Disturbance (Above Ground)
- Magnetic Disturbance (Below Ground)
- Natural
- Possible Archaeology
- Uncertain
- Former Building

Abbreviation	
E	Enclosure
E?	Enclosure?
FB	Former Boundary
ME	Magnetic Enhancement
SP	Service Pipe
U	Uncertain

050100

050

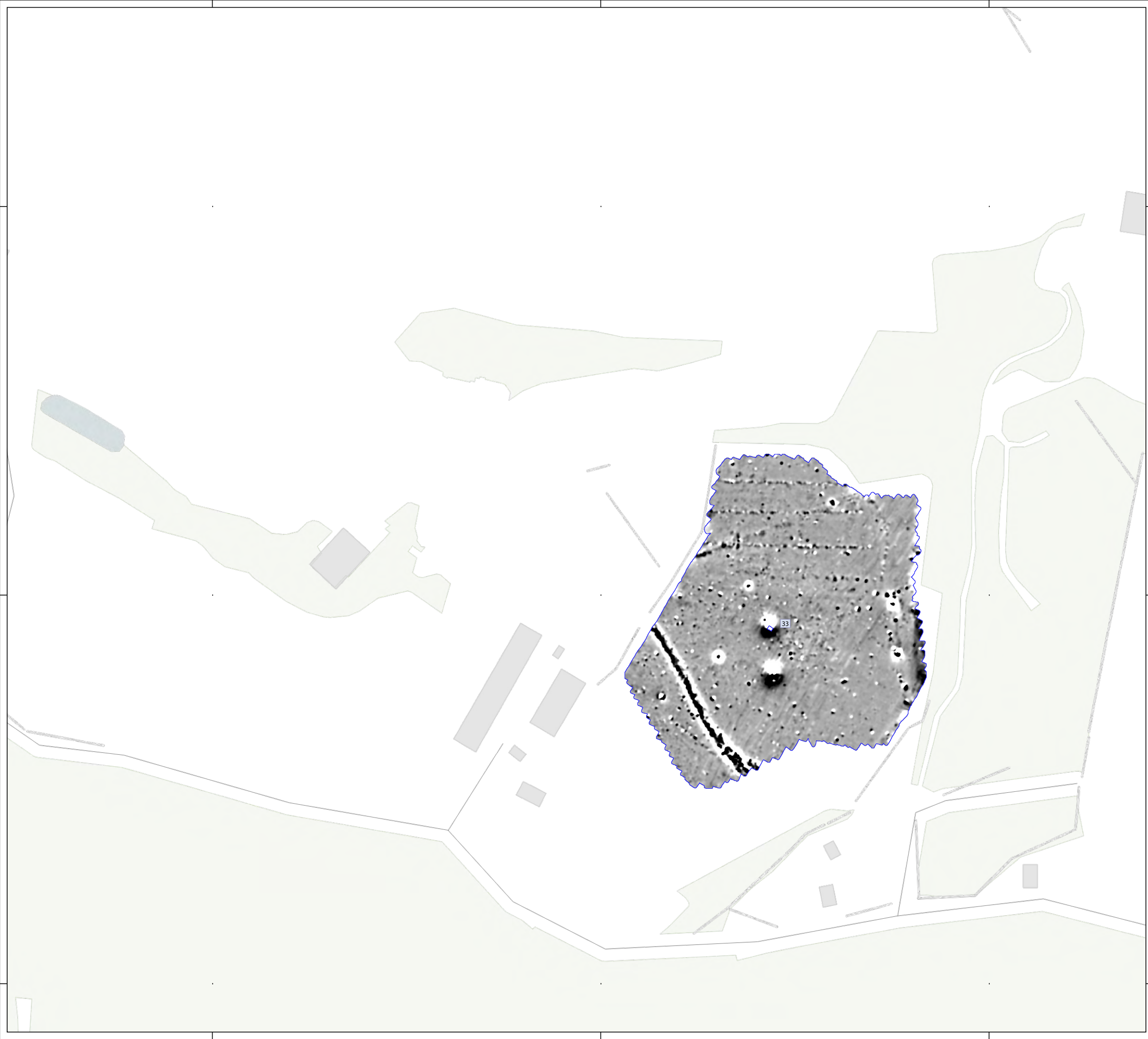
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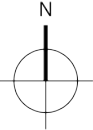
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Version:	v3.0
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Illus - 34 Interpretation of magnetometer data; Sector 6

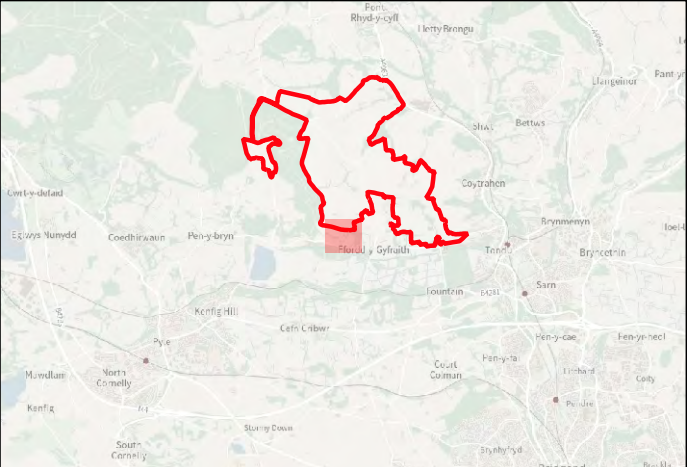




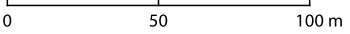


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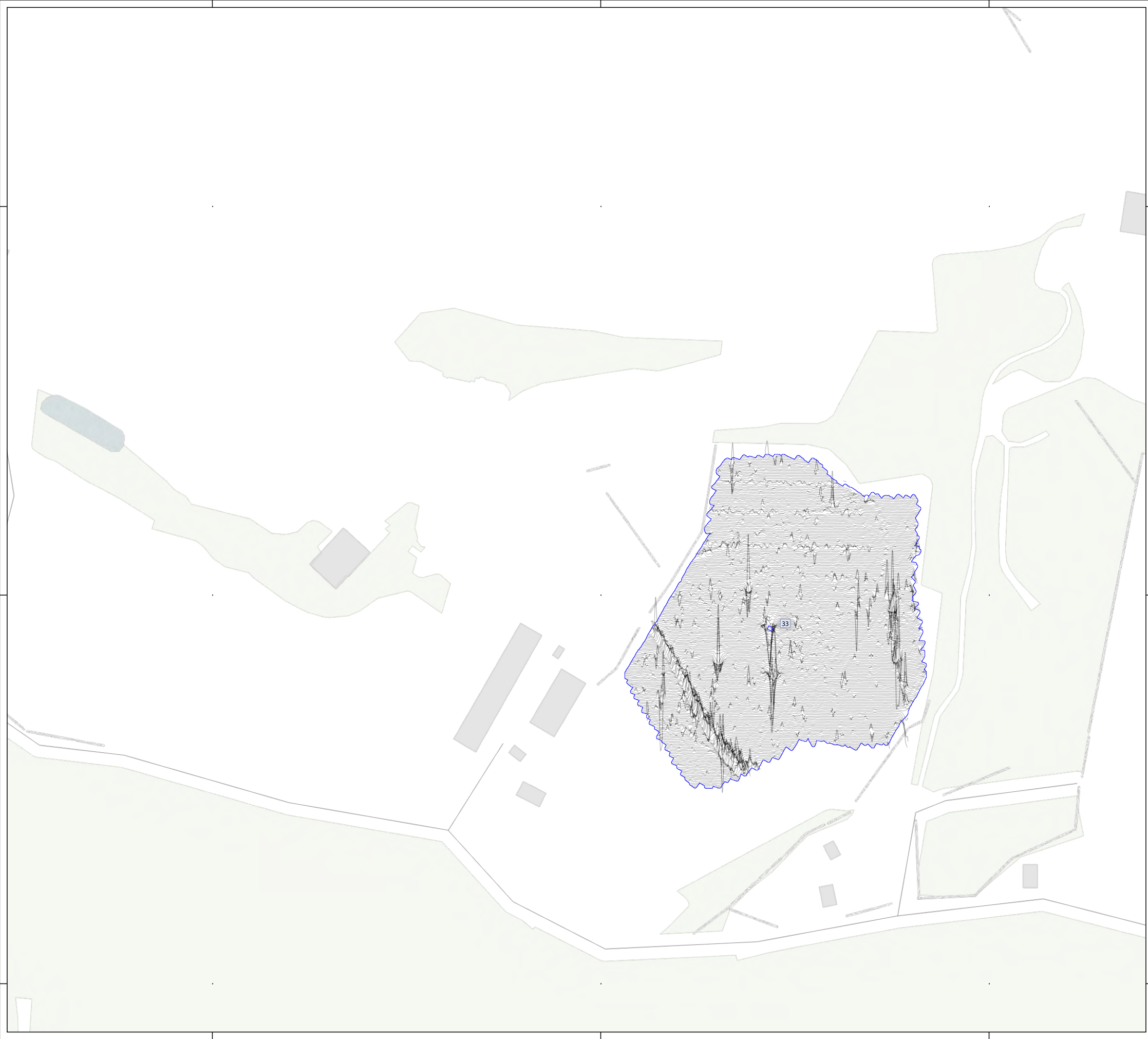


Key



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Key

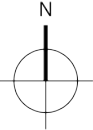
— XYTrace (25nT/cm)

050100 m

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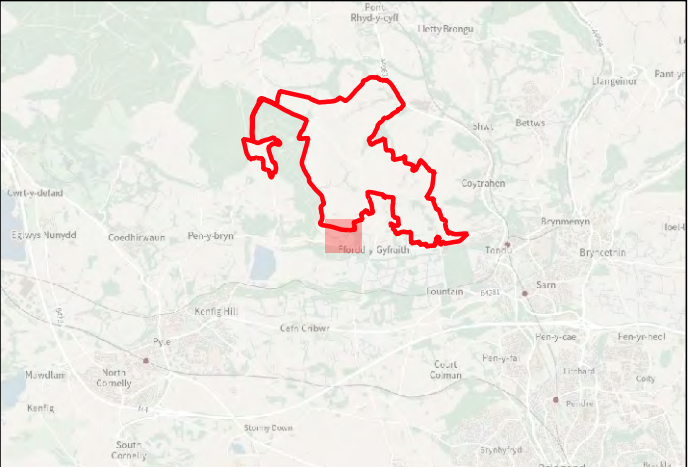






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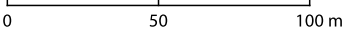
part of the **RSK** Group



Key

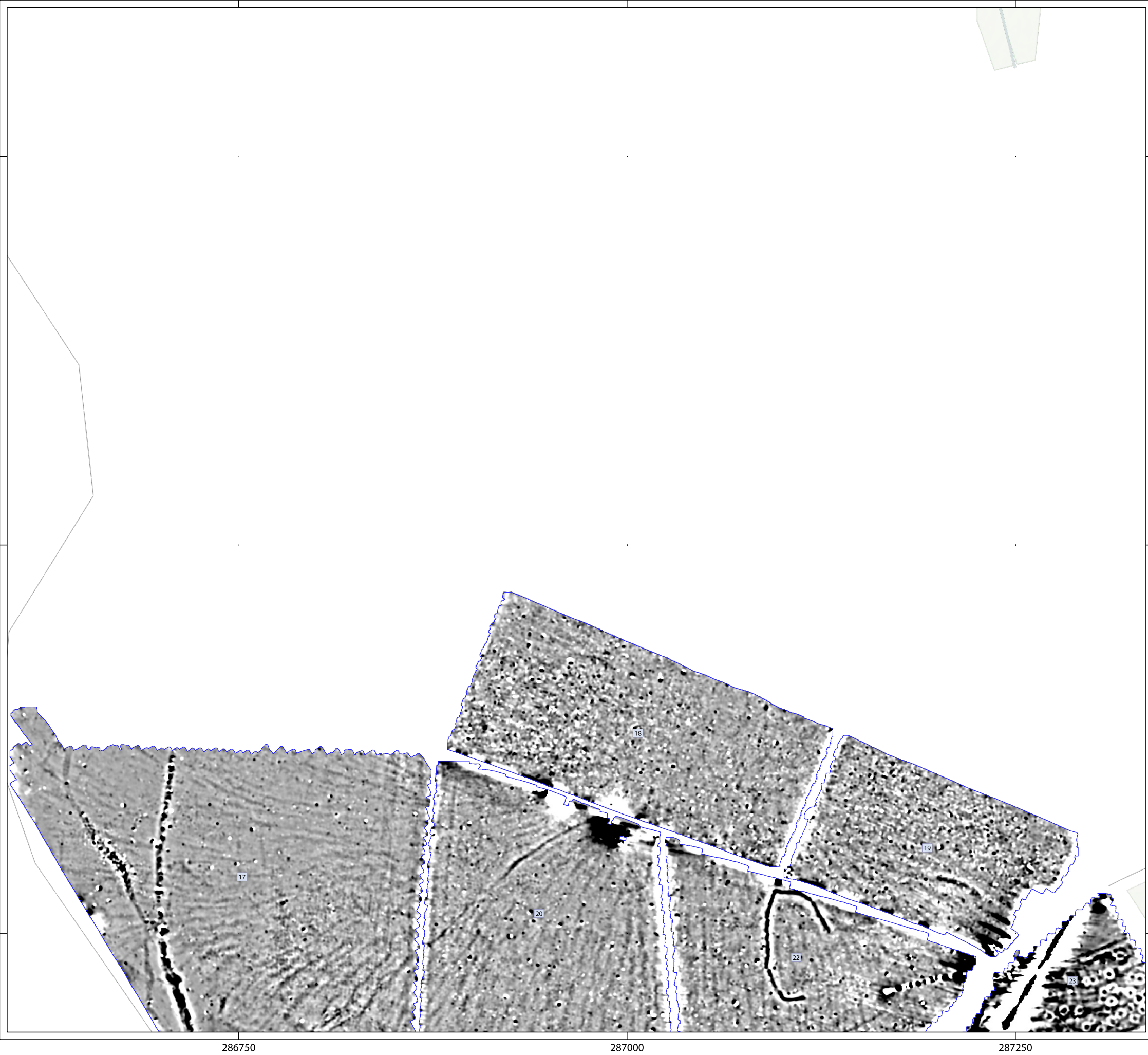
- Ferrous Objects
- Field Boundary
- Field Drain
- Natural
- Magnetic Disturbance (Above Ground)
- Natural

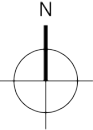
Abbreviation	
MD	Magnetic Disturbance



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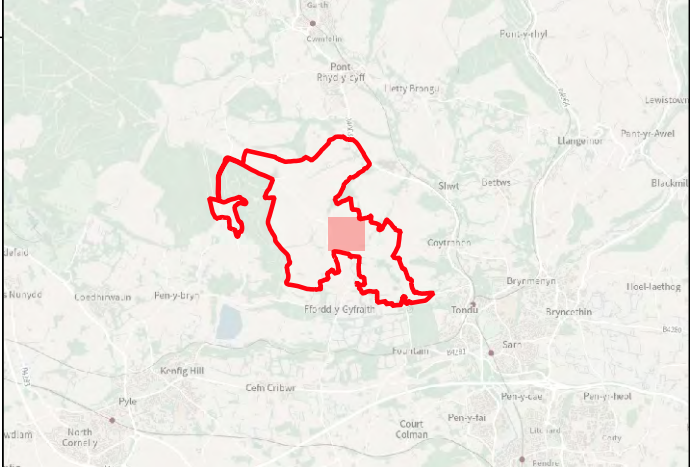




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Key



+4nT

-2nT

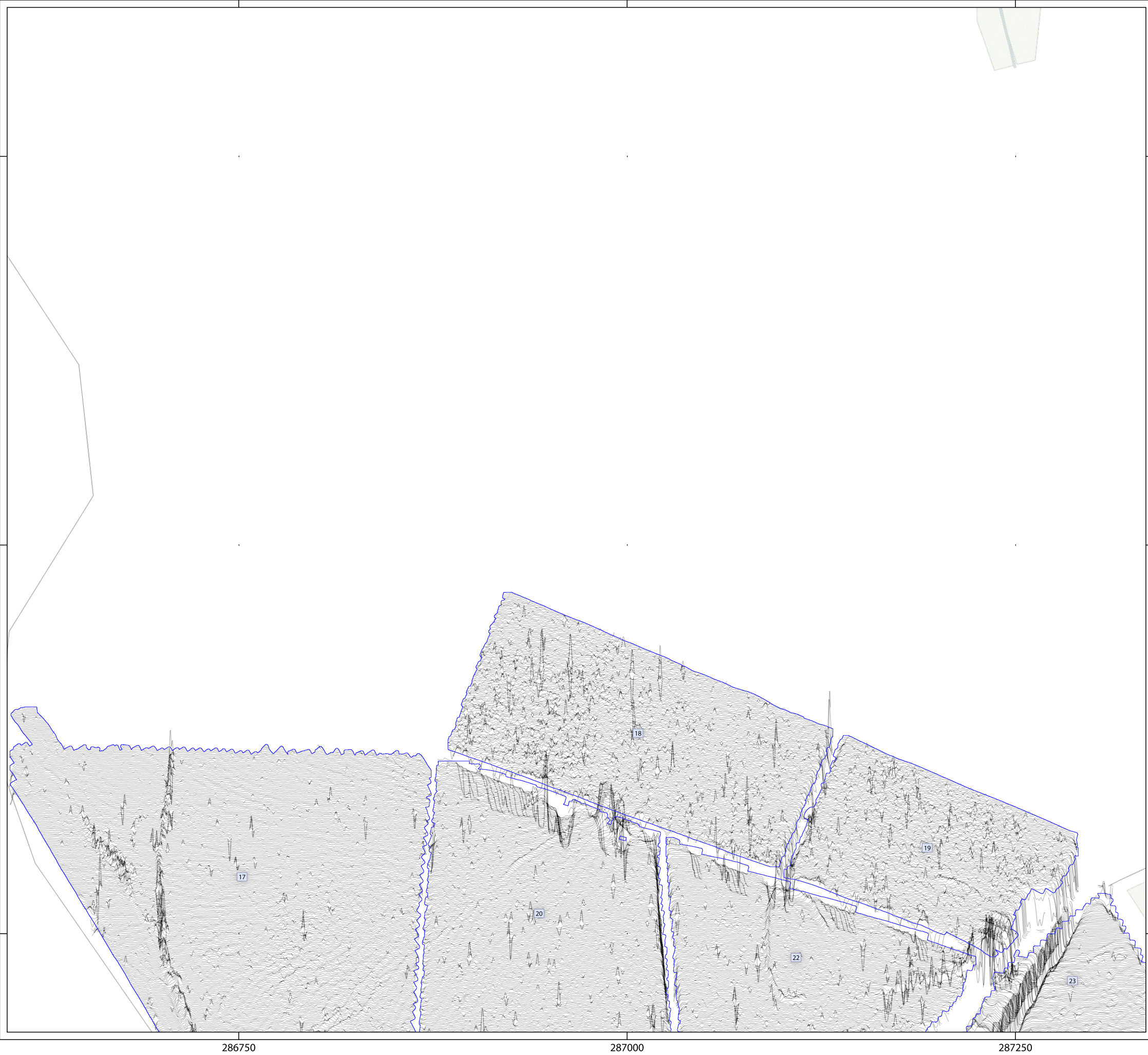
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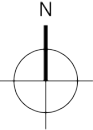
50

100 m

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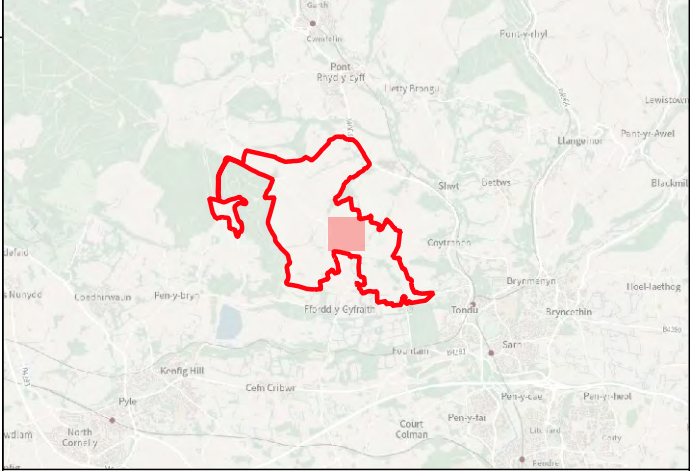




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Key

— XY Trace (25nT/cm)

0

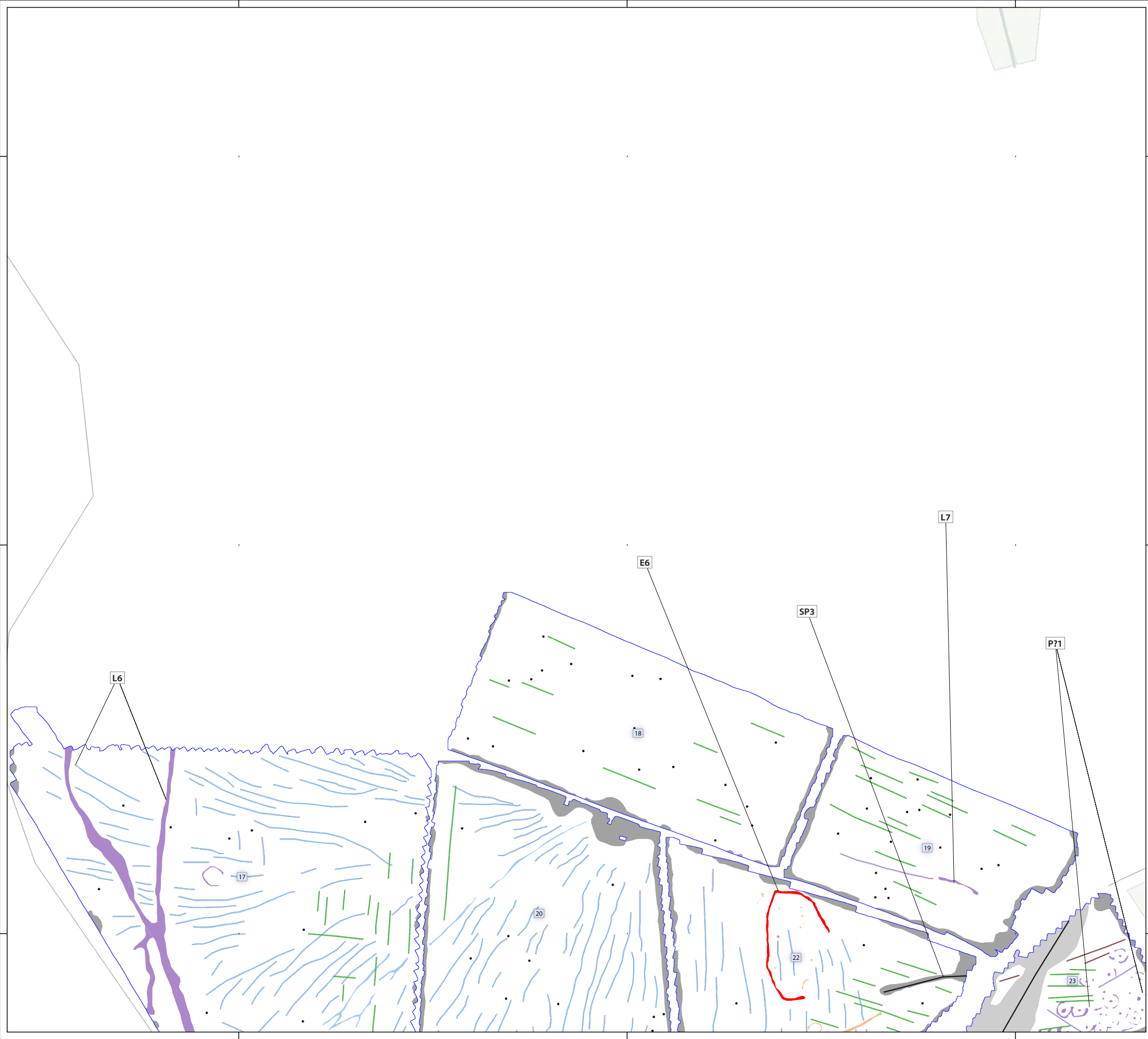
50

100 m

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Illus - 39 XY trace plot of minimally processed magnetometer data; Sector 8



N

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ARCHAEOLOGY

part of the **RSK** Group

Key

- Ferrous Objects
- Possible Archaeology
- Agriculture
- Field Boundary
- Natural
- Service
- Uncertain
- Archaeology
- Magnetic Disturbance (Above Ground)
- Magnetic Disturbance (Below Ground)
- Natural
- Possible Archaeology
- Uncertain

Abbreviation	
E	Enclosure
L	Linear
P?	Pipe
SP	Service Pipe

0

50

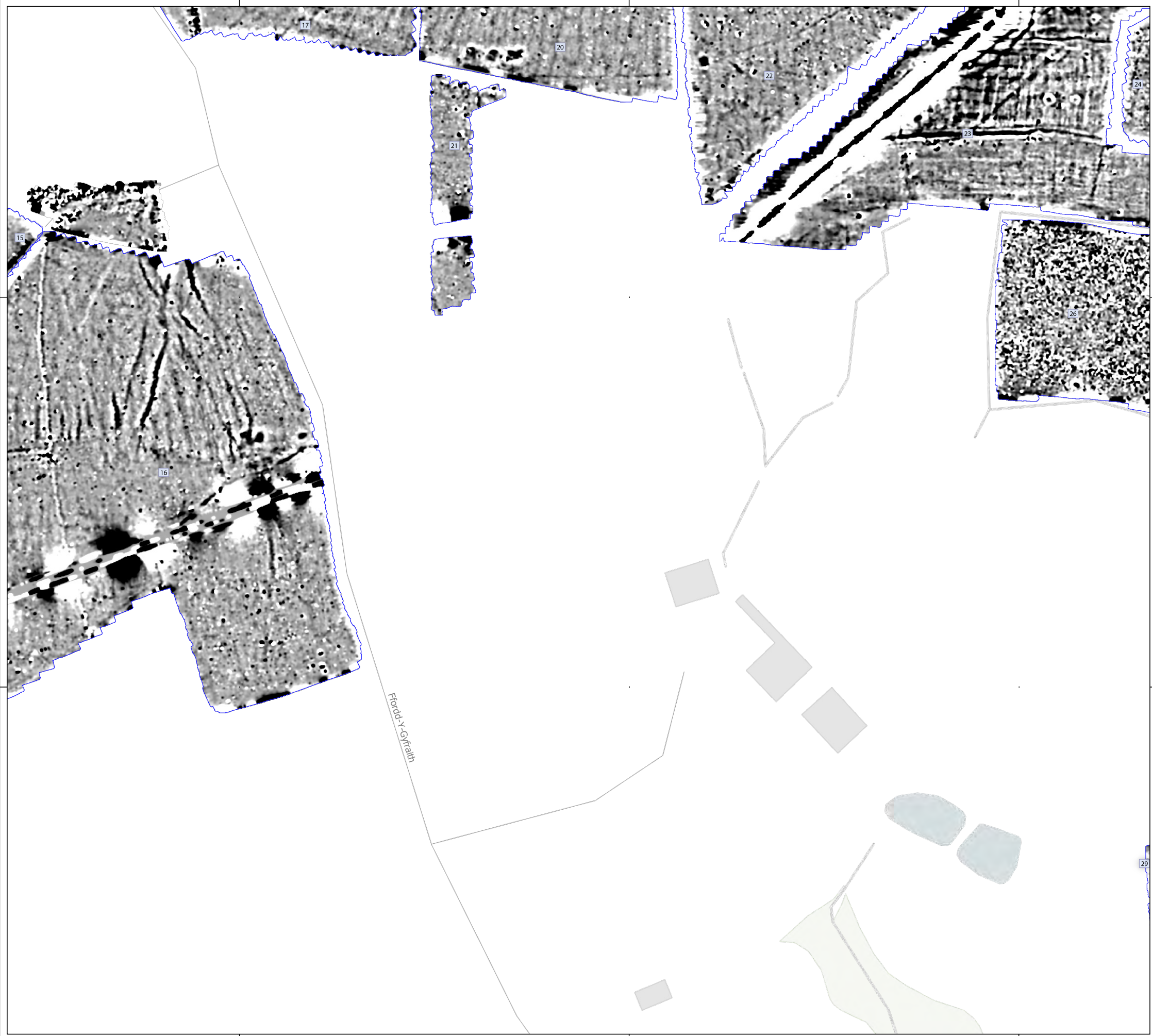
100 m

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Date:	11/03/2025
Scale:	1:2,500 @ A3

Illus - 40 Interpretation of magnetometer data; Sector 8



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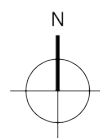
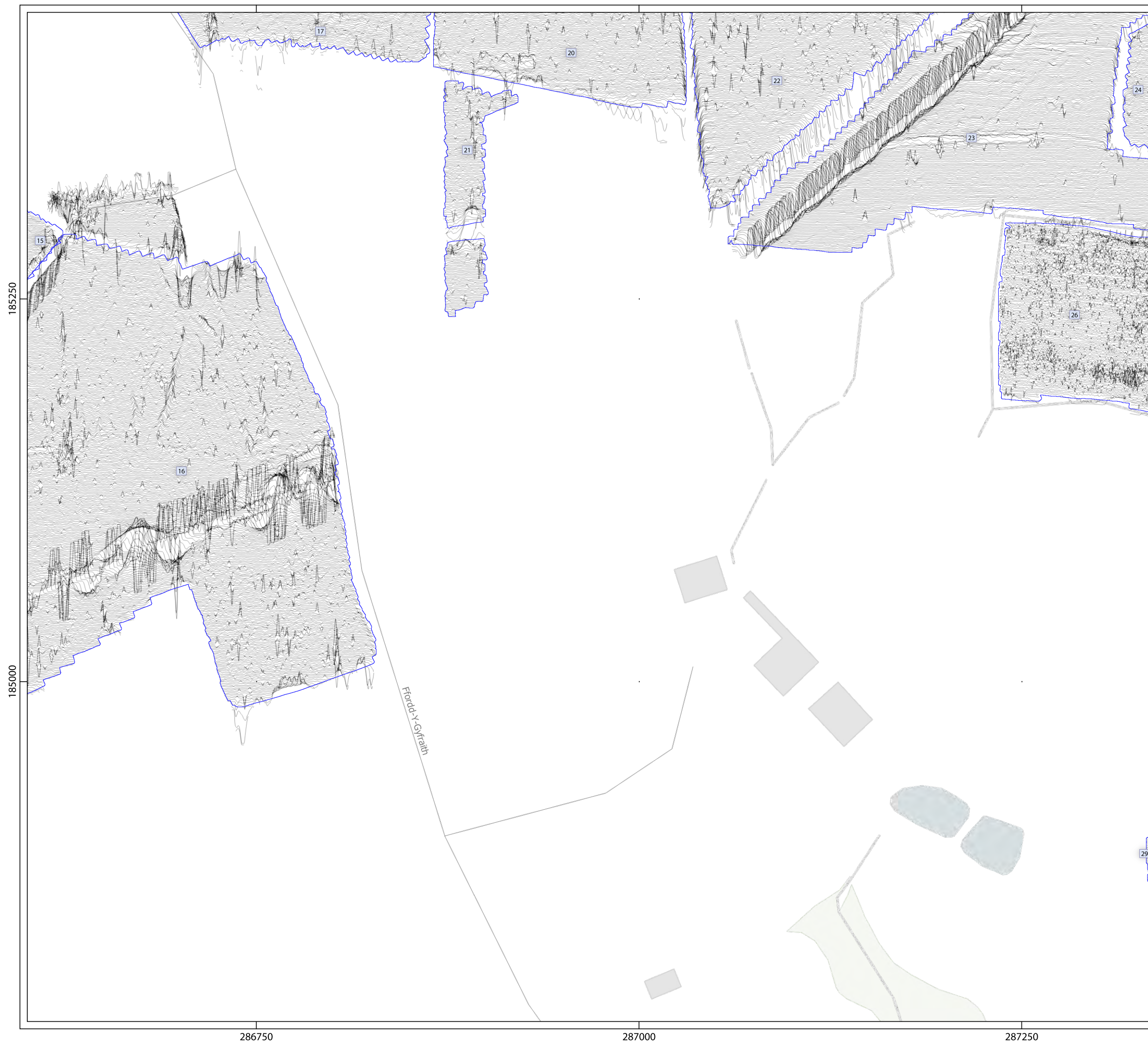
part of the **RSK** Group

Key

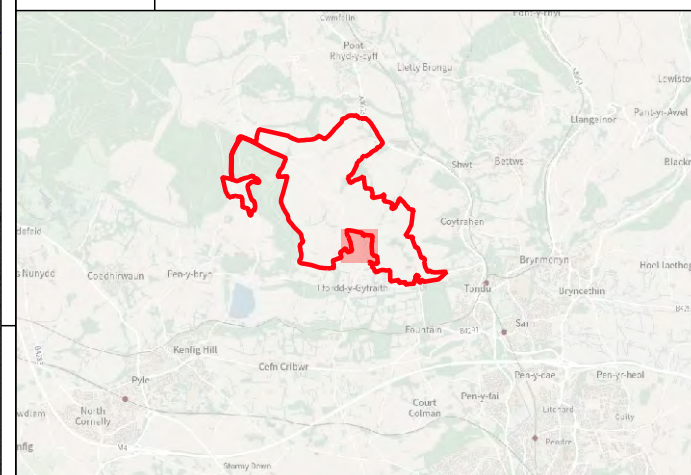
Survey Extent

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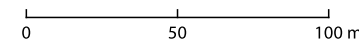


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Key

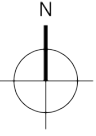
-  Survey Extent
 XY Trace (25nT/cm)



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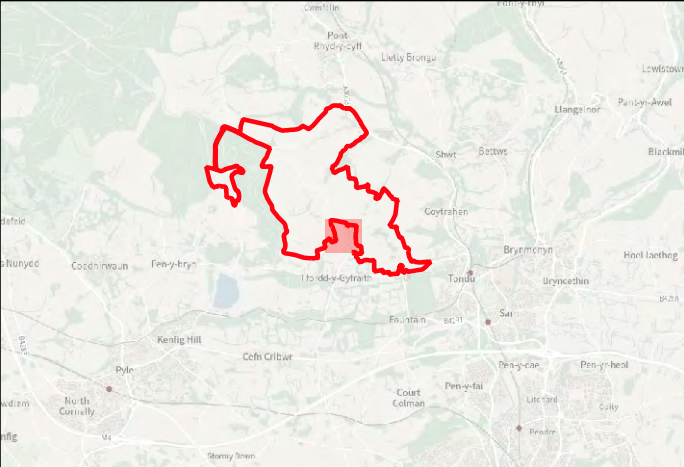






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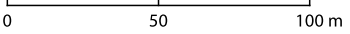
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Key

- Survey Extent
- Ferrous Objects
- Agriculture
- Field Boundary
- Possible Field Boundary
- Natural
- Service
- Uncertain
- Magnetic Disturbance (Above Ground)
- Magnetic Disturbance (Below Ground)
- Natural
- Possible Archaeology
- Uncertain
- Green Waste

Abbreviation	
L	Linear
ME	Magnetic Enhancement
SP	Service Pipe
U	Uncertain

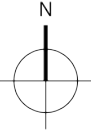


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Illus - 43 Interpretation of magnetometer data; Sector 9

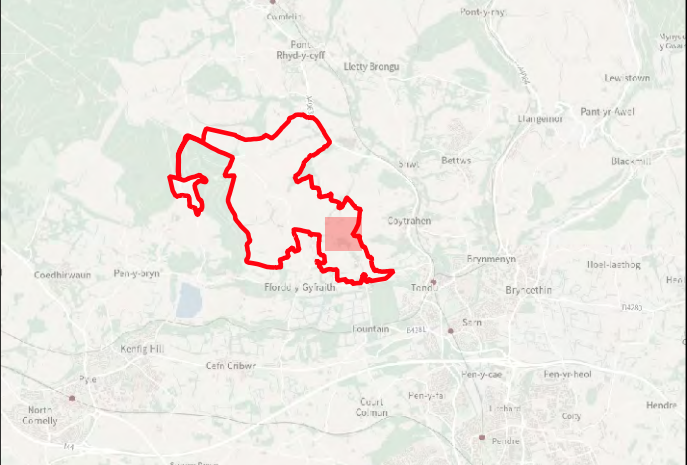




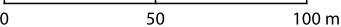


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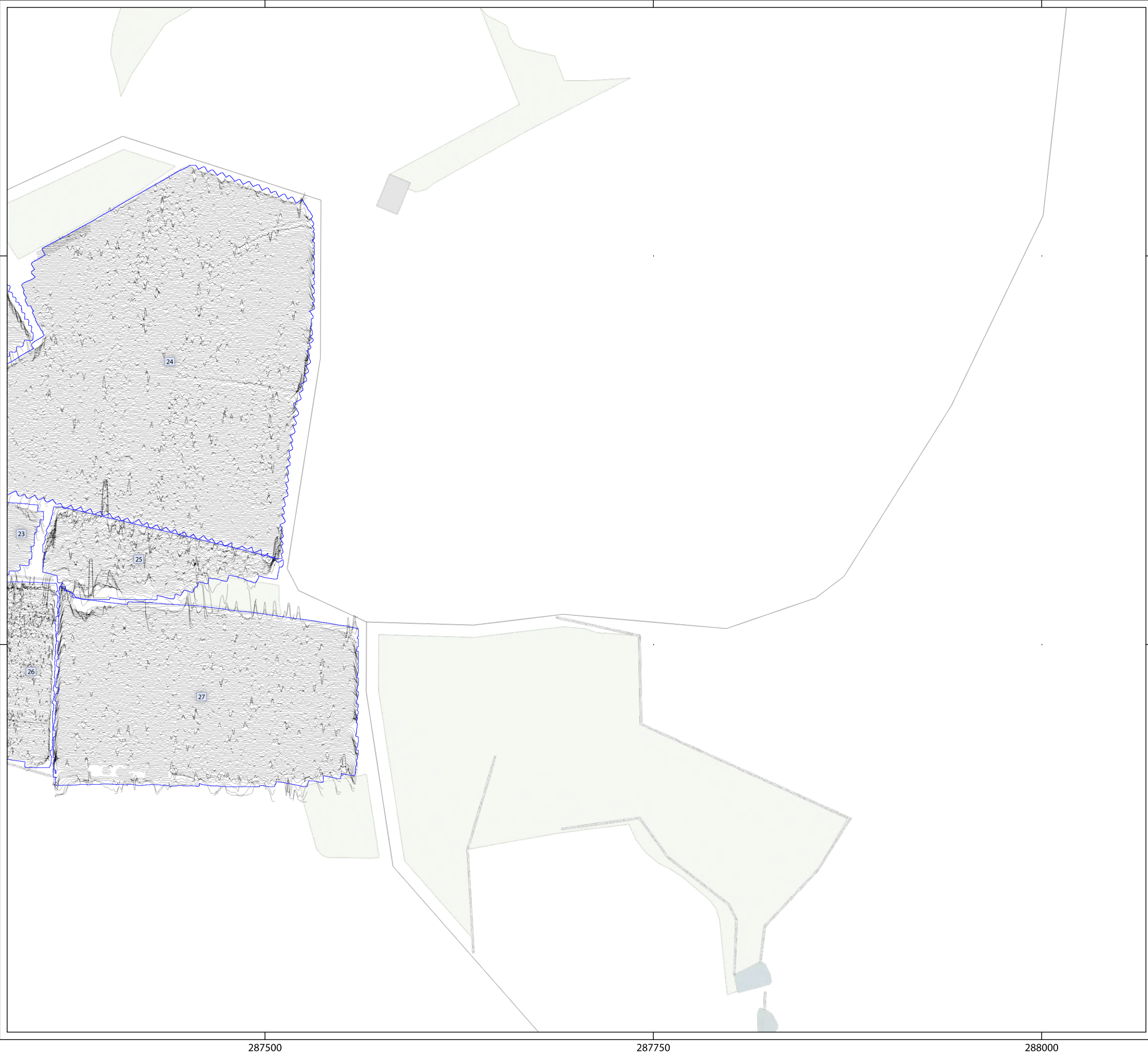
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Version:	v3.0
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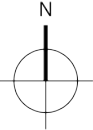
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287750

288000

Illus - 44 Processed greyscale magnetometer data; Sector 10

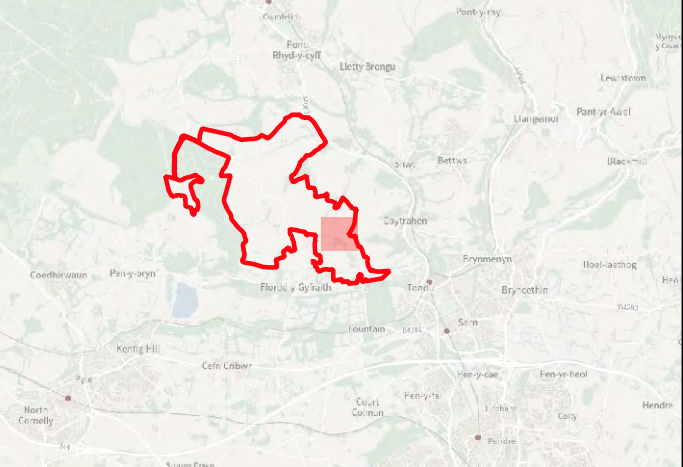




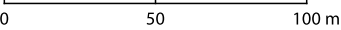


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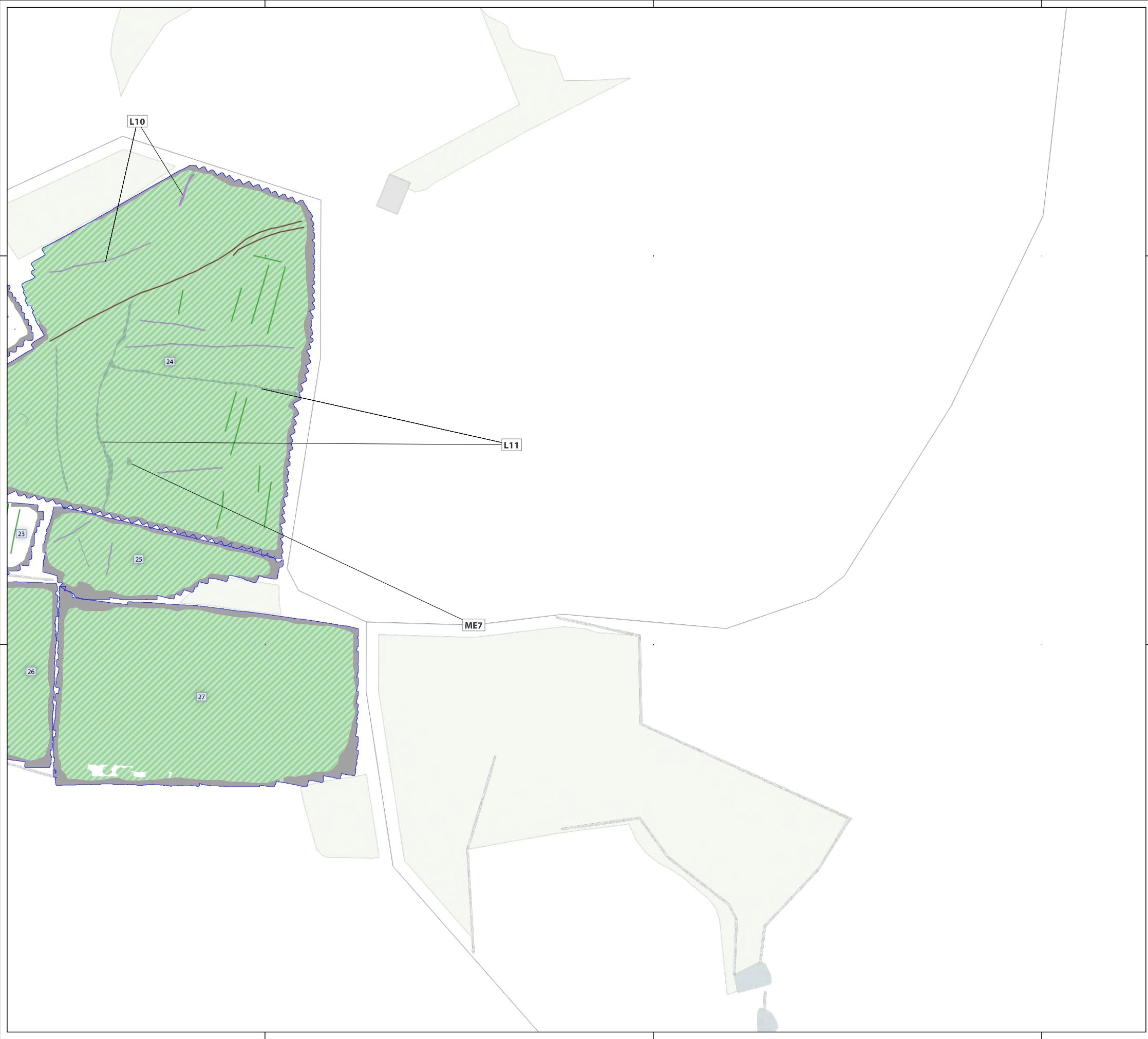
Key
— XY Trace (25nT/cm)

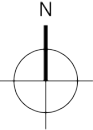


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Illus - 45 XY trace plot of minimally processed magnetometer data; Sector 10

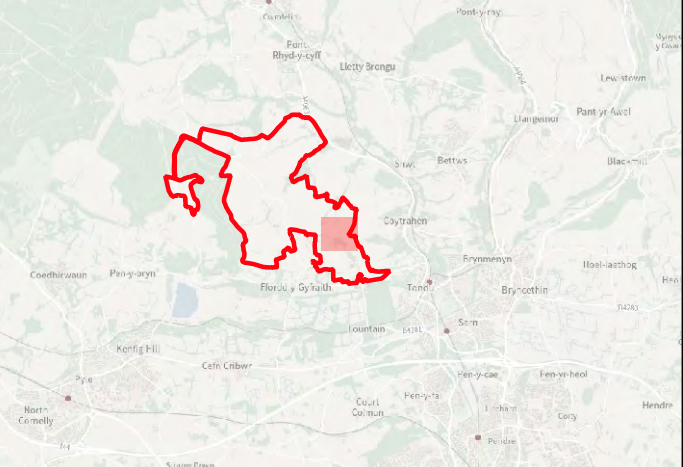






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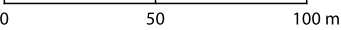
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Key

- Agriculture
- Field Boundary
- Uncertain
- Magnetic Disturbance (Above Ground)
- Uncertain
- Green Waste

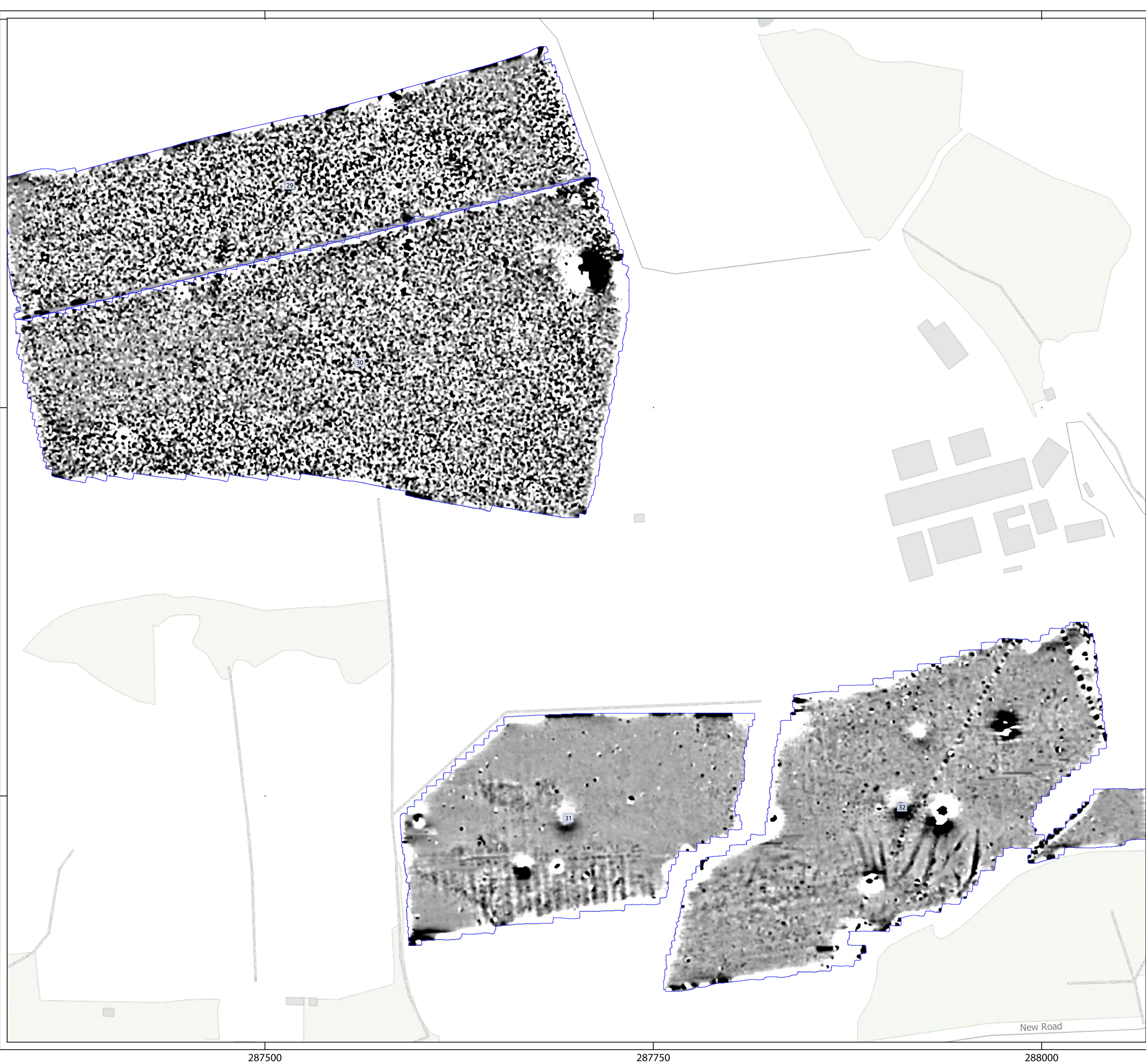
Abbreviation	
L	Linear
ME	Magnetic Enhancement

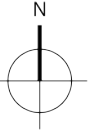


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Illus - 46 Interpretation of magnetometer data; Sector 10

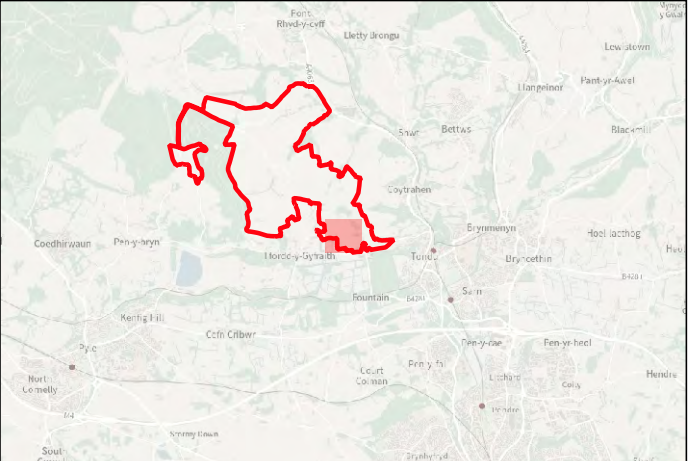




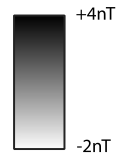
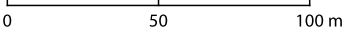


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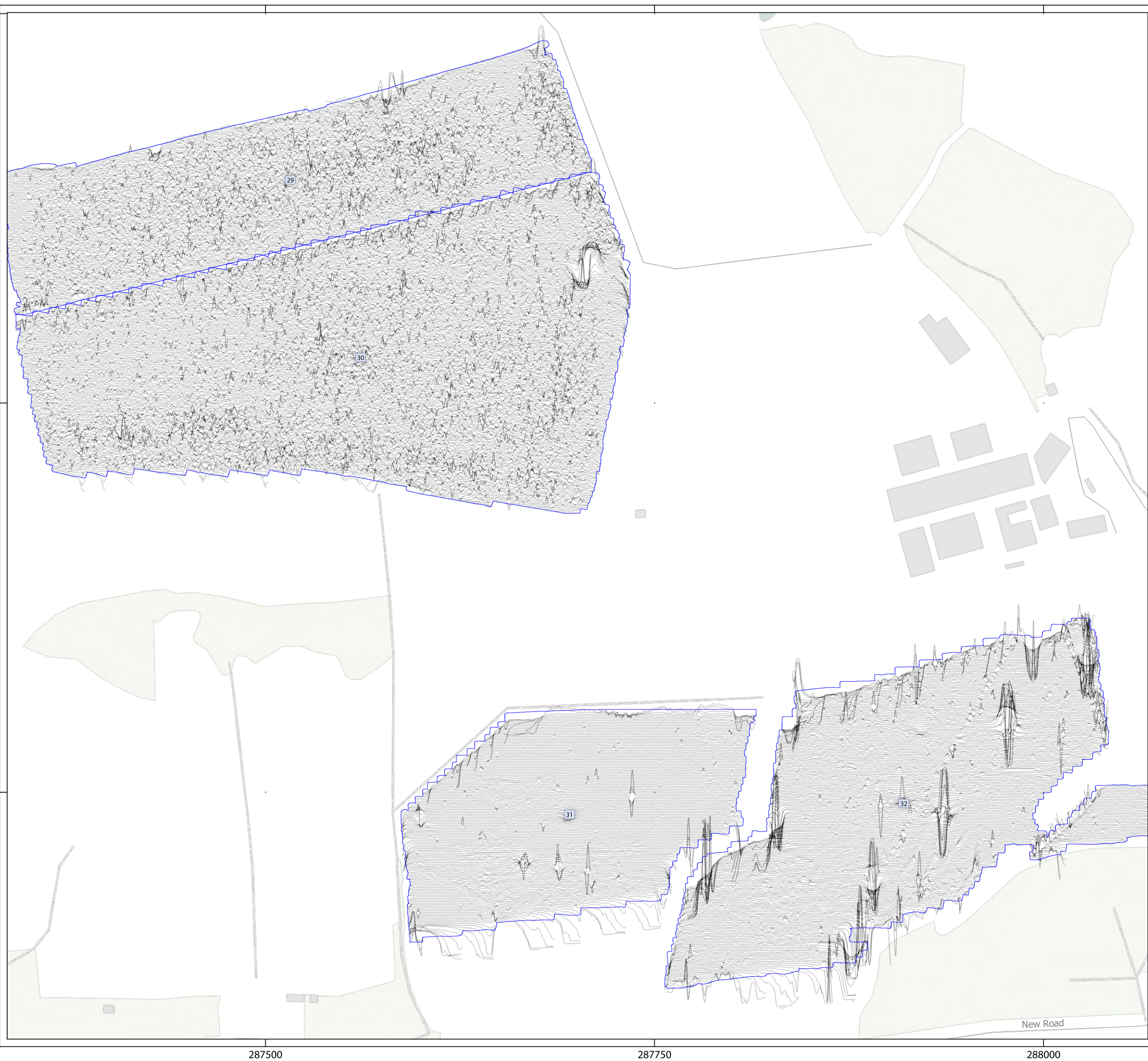


Key



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N

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Key

XY Trace (25nT/cm)

050100 m

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Illus - 48 XY trace plot of minimally processed magnetometer data; Sector 11

185000

184750

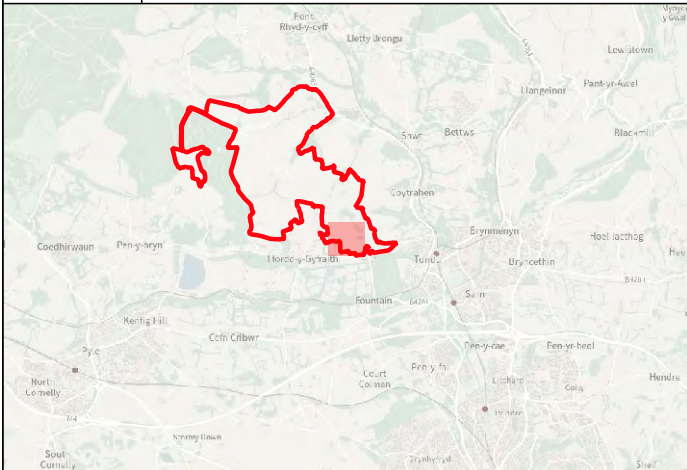
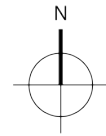
184500



287500

287750

288000



Key

- Ferrous Objects
- Agriculture
- Field Boundary
- - - Possible Field Boundary
- + + + Field Drain
- Natural
- Service
- - - Ridge and Furrow
- Magnetic Disturbance (Above Ground)
- Magnetic Disturbance (Below Ground)
- Natural
- × × × Overhead Cable
- Uncertain
- Green Waste

Abbreviation

ME	Magnetic Enhancement
SP	Service Pipe
U	Uncertain

0 50 100 m

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7. APPENDICES

APPENDIX 1 MAGNETOMETER SURVEY

Magnetic susceptibility and soil magnetism

Iron makes up about 6% of the earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of the topsoil, subsoil, and rock, into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns, or areas of burning.

Types of magnetic anomaly

In most instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However, some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being introduced into the topsoil during manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Lightning-induced remnant magnetisation (LIRM)

LIRM anomalies are thought to be caused in the near surface soil horizons by the flow of an electrical current associated with lightning strikes. These observed anomalies have a strong bipolar signal which decreases with distance from the spike point and often appear as linear or radial in shape.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

APPENDIX 2 SURVEY LOCATION INFORMATION

The magnetometer data was georeferenced using a Trimble RTK differential Global Positioning

System (Trimble R12 model). The accuracy of this dGPS equipment is better than 0.01m.

The survey data were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associated world file, and a PDF of the report.

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

Data collected using RTK GPS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features)

to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.