

FFERM CLARKE, CWMDUAD, CARMARTHEN: GEOPHYSICAL SURVEY



Prepared by Dyfed Archaeological Trust
For: Mr Jeff Clarke.



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**FFERM CLARKE, CWMDUAD,
CARMARTHEN: GEOPHYSICAL
SURVEY**

By

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FFERM CLARKE, CWMDUD, CARMARTHEN: GEOPHYSICAL SURVEY

EXECUTIVE SUMMARY

DAT Archaeological Services were commissioned to undertake a geophysical survey on land at Fferm Clarke, Cwmdud, Carmarthen; land proposed for use as a One planet development.

The purpose of the survey was to provide a better indication of the archaeological potential of the site and if required, enable targeting of any further archaeological mitigation requirements before or during the development.

The survey recorded modern features, features potentially related to World War II activity, one linear feature of uncertain origin and tentative evidence of a known Bronze Age ring cairn.

CRYNODEB GWEITHREDOL

Comisiynwyd Gwasanaethau Archaeolegol YAD i gynnal arolwg geoffisegol ar dir Fferm Clarke, Cwmdud, Caerfyrddin; tir y cynigir ei ddefnyddio fel datblygiad One Planet.

Pwrpas yr arolwg oedd rhoi gwell syniad o botensial archeolegol y safle ac os oedd angen, galluogi targedu unrhyw ofynion lliniaru archeolegol pellach cyn neu yn ystod y datblygiad.

Cofnododd yr arolwg nodweddion modern, nodweddion a allai fod yn gysylltiedig â gweithgarwch yr Ail Ryfel Byd, un nodwedd linellol o darddiad ansicr a thystiolaeth betrus o garnedd gylchog o'r Oes Efydd hysbys.

1. INTRODUCTION

1.1 Project Commission

- 1.1.1 DAT Archaeological Services were commissioned by Mr Jeff Clarke to undertake a geophysical survey within an area proposed for a One Planet development, at Fferm Clarke, Cwmdud, centred on NGR SN 35885 34529 (Figures 1 and 2).
- 1.1.2 The development proposals cover a 12-hectare plot in total (Figure 3), within which lies a Bronze Age ring cairn (PRN 114895) with several further Bronze Age round barrows in a field to south, one of which is a Scheduled Monument (CM104/PRN 2303, PRN 2305 and PRN 49213). In addition, a Bronze Age stone row (PRN 42512) is located in a field to the west of the development and several World War II monuments including a stop line (PRN 33901) and mine field (PRN 49212) are located to the east.
- 1.1.3 An archaeological desk-based assessment has been undertaken by Trysor in association with the proposed One Planet development (Trysor Report no. 2021/767). The assessment highlighted the archaeological potential of the area and identified a potential impact on the surviving section of the World War II stop line (PRN 33,901) and the Bronze Age ring cairn (PRN 114895). As a result the development scheme was redesigned to avoid any direct impacts upon the ring cairn PRN 114895. Due to the archaeological potential of the surrounding area however Dyfed Archaeological Trust - Development Management (DAT-DM), in their capacity as archaeological advisors to the local planning authority, recommended that a geophysical survey be undertaken to provide information on the likely presence/absence of buried archaeological remains within the development area.
- 1.1.4 DAT Archaeological Services produced a Written Scheme of Investigation (WSI) for a geophysical survey of the site prior to the commencement of the survey. This was approved by DAT-DM in their capacity as archaeological advisors to the local planning authority.
- 1.1.5 The geophysical survey was undertaken using a fluxgate gradiometer which detects subtle variations in the earth's magnetic field, which can indicate the presence of buried features such as ditches, pits, walls or postholes that are not visible on the ground surface. The purpose of the geophysical survey was to provide a better indication of the archaeological potential of the site through the identification of subsurface features which could be indicative of archaeology. This would allow for an informed decision on whether any further archaeological mitigation is required or not in this area before or during the development programme.

1.2. Scope of the Project

- 1.2.1 The aim of the project was:
 - To identify the presence/absence of any potential archaeological deposits through an initial gradiometer survey;
 - To establish the character and extent of any potential archaeological remains within the site area that could be affected by the proposed works;
 - To prepare a report and archive on the results of the geophysical survey.

1.3 Report Outline

- 1.3.1 This report provides a summary and discussion of the geophysical survey and its results and puts those results within their regional and national context.

1.4 Abbreviations

- 1.4.1 Sites recorded on the regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). Sites recorded on the National Monument Record (NMR) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are identified by their National Primary Record Number (NPRN). Altitude is expressed to Ordnance Datum (OD). References to cartographic and documentary evidence and published sources will be given in brackets throughout the text, with full details listed in the sources section at the rear of the report.

1.5 Illustrations

- 1.5.1 Printed map extracts are not necessarily produced to their original scale.

1.6 Timeline

- 1.6.1 The following timeline (Table 1) is used within this report to give date ranges for the various archaeological periods that may be mentioned within the text.

Period	Approximate date	
Palaeolithic –	c.450,000 – 10,000 BC	Prehistoric
Mesolithic –	c. 10,000 – 4400 BC	
Neolithic –	c.4400 – 2300 BC	
Bronze Age –	c.2300 – 700 BC	
Iron Age –	c.700 BC – AD 43	
Roman (Romano-British) Period –	AD 43 – c. AD 410	Historic
Post-Roman / Early Medieval Period –	c. AD 410 – AD 1086	
Medieval Period –	1086 – 1536	
Post-Medieval Period ¹ –	1536 – 1750	
Industrial Period –	1750 – 1899	
Modern –	20 th century onwards	

Table 1: Archaeological and Historical Timeline for Wales

¹ The post-medieval and industrial periods are combined as the post-medieval period on the Regional Historic Environment Record as held by Dyfed Archaeological Trust

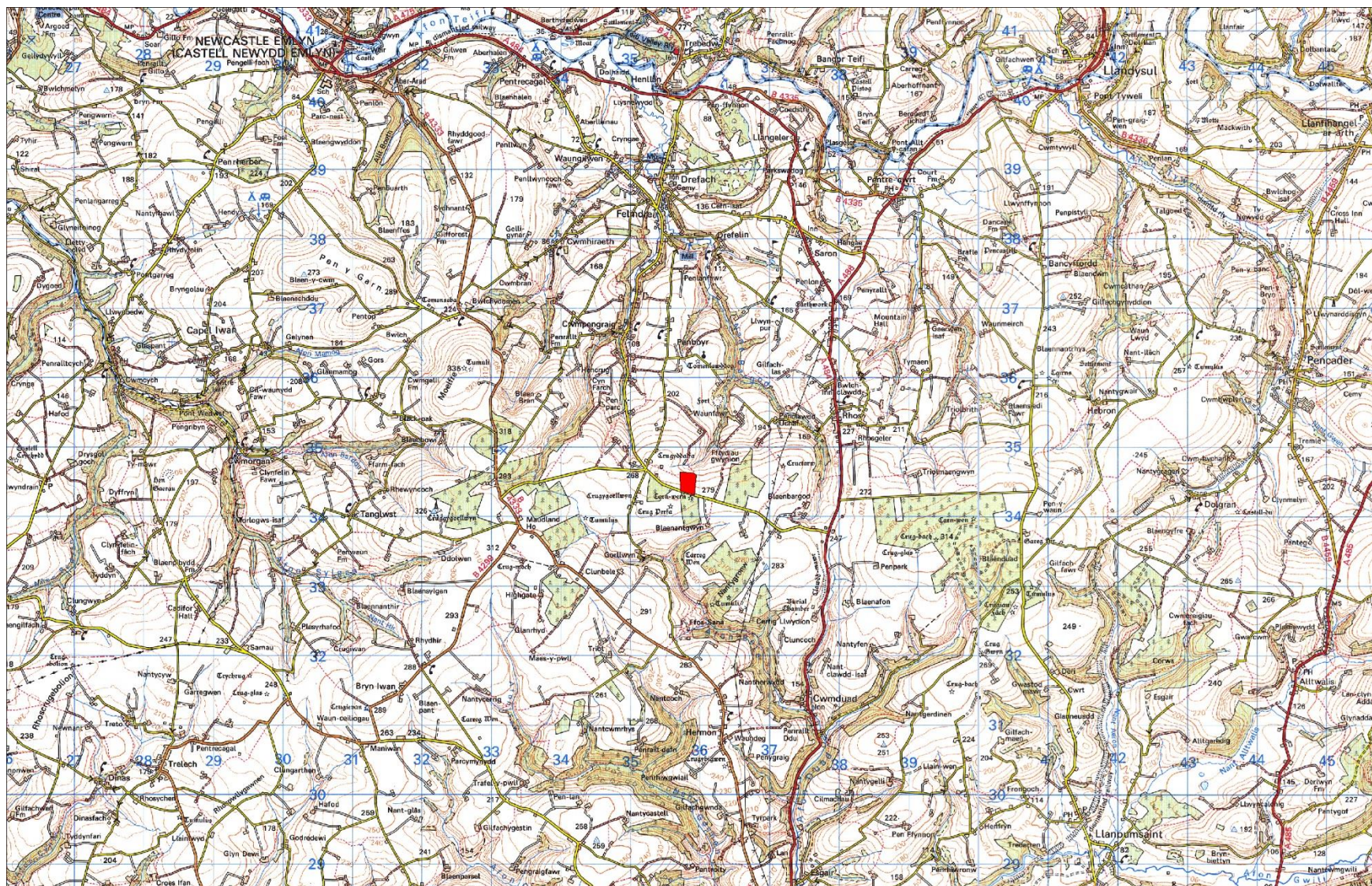


Figure 1: Location map showing the proposed development area as a red rectangle.

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Figure 2: Proposed development area (outlined in red)

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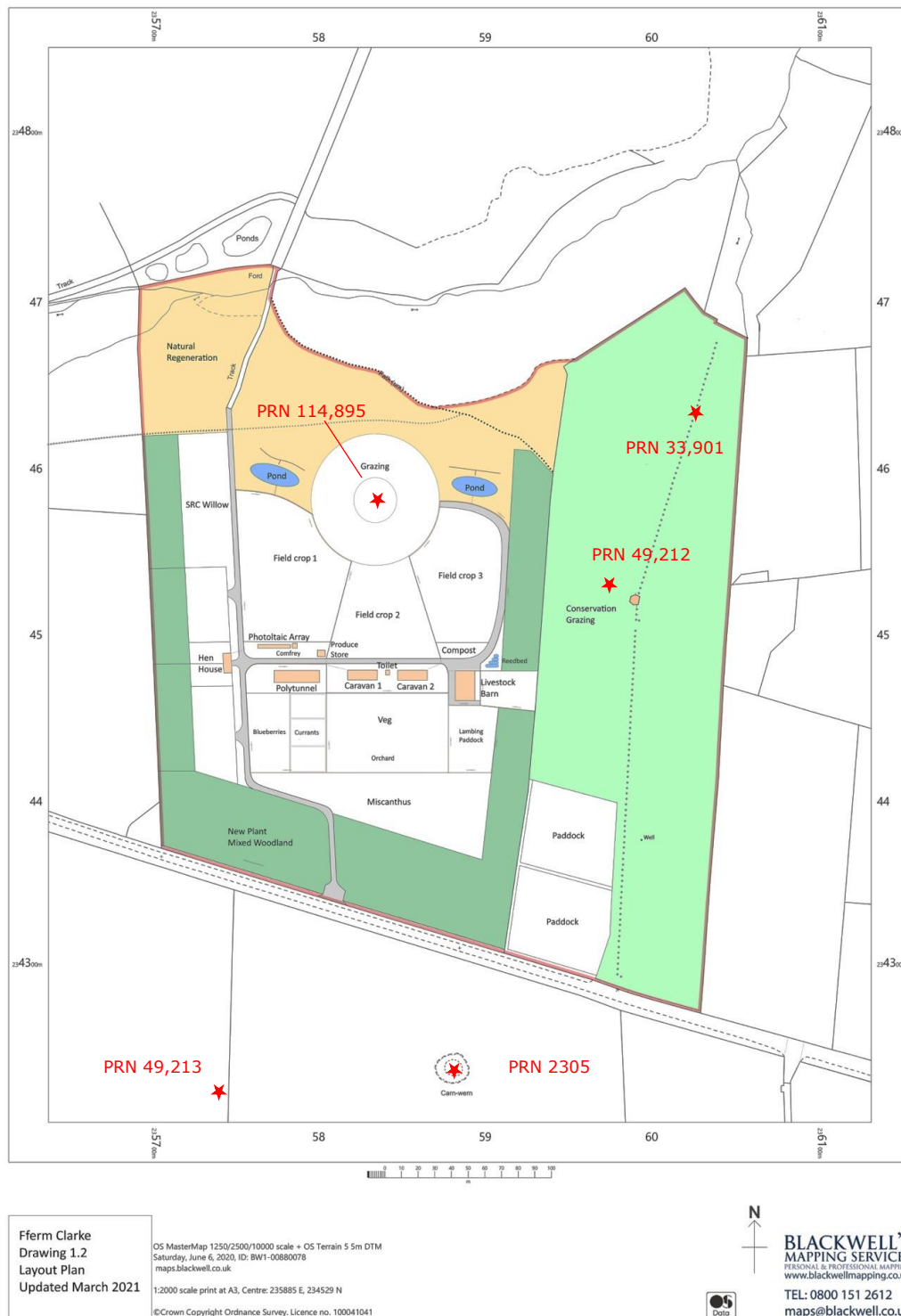


Figure 3: Fferm Clarke One Planet development proposals, with known archaeological sites highlighted in red.

2. THE SITE

2.1 Site Location and Topography

- 2.1.1 The proposed development area lies just to the south of the Carmarthenshire/Ceredigion border at Fferm Clarke, just over 3km to the northwest of Cwmdud, Carmarthenshire (Figure 2).
- 2.1.2 The site lies in a rural area, occupying a moderate north-facing slope overlooking the upper Nant Bargod valley. The development area was contained within a single field, which comprises mainly upland pasture with an entrance trackway leading from its southern boundary to a pairing of static caravans situated within the mid-eastern end of the field. The trackway formed an L-shape when viewed in plan. The northern end of the site descended into an area of boggy scrub-covered ground with a band of woodland along the stream edge to the north.
- 2.1.3 The British Geological Survey records the bedrock beneath the development area as comprising silty mudstone of the Yr Allt Formation, a sedimentary bedrock formed approximately 449 to 443.8 million years ago during the Ordovician period (BGS online).



Photo 1: View northeast of the proposed development area.



Photo 2: View north showing the static caravans within the development area. from the north-western corner of the small paddock field (Field B).



Photo 3: View north across the site of the Bronze Age ring cairn PRN 114895. The cairn is represented by a low rise of ground to the rear of the upright post.

2.2 Archaeological Potential

- 2.2.1 The archaeological potential of the development area was evaluated in a historic environment desk-based assessment undertaken by Trysor (Hall & Sambrook 2021) and the following detail has been summarised from that report. The surrounding landscape is relatively rich in archaeological remains, and the development area lies within the Registered Historic Landscape, Drefach & Felindre (HLW (D) 10). As stated in the introduction, within the development area itself lie the remains of a Bronze Age round cairn (PRN 114895), located within the mid northern area of the development. This site is visible on aerial photographs (Photo 4) although at ground level it has become somewhat denuded (Photo 3). In addition, a later mine field (PRN 49212) and a stop line (PRN 33901), both dating to World War II, are present within and along the eastern boundary of the development area. Also situated near to the development are numerous sites which range in date from the Bronze Age through to the Post Medieval period.
- 2.2.2 The earliest example of archaeological remains recorded within a 1km of the development area comprises of a series of Bronze Age round barrows present in a field to the south, one of which is a Scheduled Monument (CM104/PRN 2303, PRN 2305 and PRN 49213). In addition, a Bronze Age stone row (PRN 42,512) lies in a field to the west of the development the area. Such a grouping of site types suggests the development area may lie within a rich prehistoric funerary and ritual landscape.
- 2.2.3 Around 1km to the northeast lies Caer Blaen Minog (CM377/PRN 2280), an Iron Age promontory fort. A similar site also lies around 1km to the southeast at Panthir (CM386). This suggests some degree of settlement and activity in the locality during the later Iron Age, with the use of such sites possibly extending into the early Romano-British period. There are no further Romano-British sites recorded in close proximity, although it is possible further evidence of activity during this period has yet to come to light.
- 2.2.4 Around 1km to the southeast of the site stands the remains of Clawdd Mawr (CM110/PRN 2313), considered to be the remains of an Early Medieval dyke. The bank and ditch continue for around 1.3km and would have acted as a land division during this period.
- 2.2.5 During the medieval period a motte and bailey castle, known locally as Tomen Llawddog (CM022/PRN 2281), was constructed 1.5km to the north. This may date to the early 12th century, a period of conflict as Anglo-Norman invaders attempted to establish themselves in the area. The medieval church of Penboyr (PRN 5265) would also have been well established during this period, its dedication to St Llawddog may even suggest it predated the Anglo-Norman invasions. The possibility of encountering remains dating to the medieval period within the development area should not be discounted.
- 2.2.6 During much of the post medieval period the site lay on the edge of an area of extensive upland common, with the lower slopes to the north dotted with farmsteads and small rural villages. The common was enclosed and the current field boundary pattern established in the mid to late 19th century, with this area typically used for pasture.
- 2.2.7 More recently, during World War II a stop line defence (PRN 33901) was established in the eastern end of the development area and comprised of concrete pillboxes, concrete tank traps and a series of barb wire fences. In conjunction with this a mine field (PRN 49212) was placed immediately in front and to the west of the stop line. Collectively this defensive system is considered to be one of the best preserved of its type in Wales.

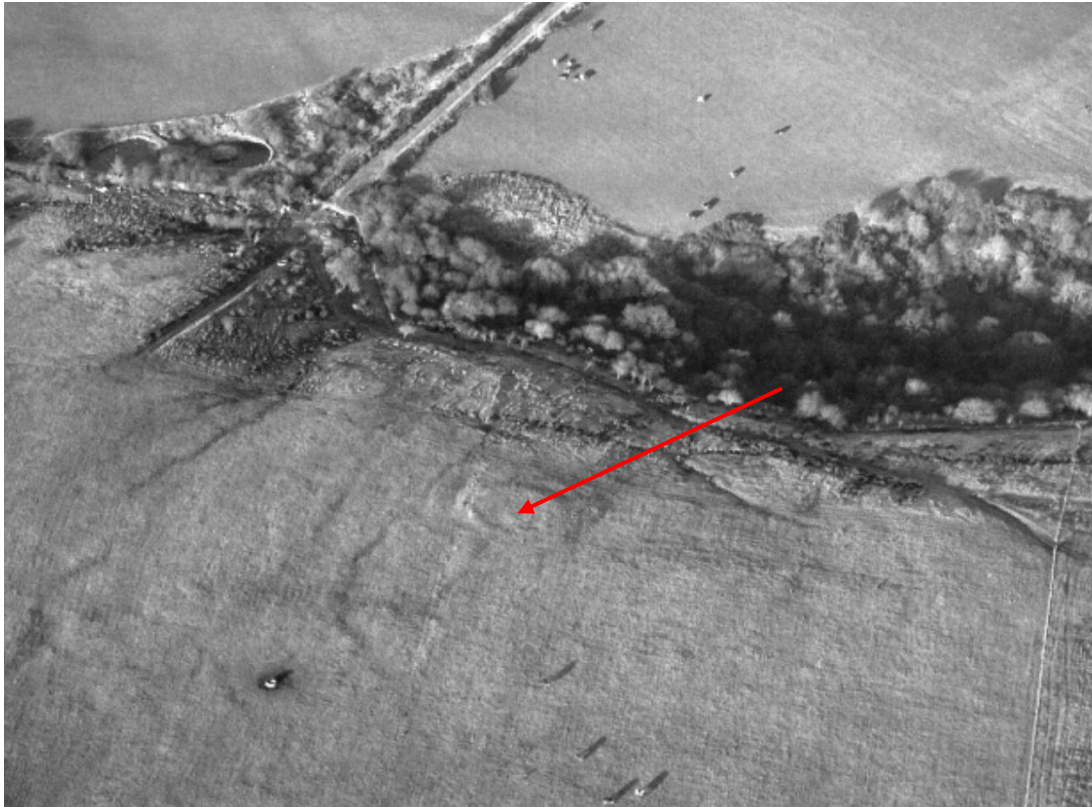


Photo 4: Aerial photograph taken in 1991, showing the remains of Bronze Age ring cairn PRN 114895 (highlighted). © DAT AP91-19.20

3. METHODOLOGY

- 3.1 A fluxgate gradiometer with a DL601 data logger was used to conduct the detailed geophysical survey, which detects variations in the earth's magnetic field. A sample interval of 0.25m (four readings per metre) was used with 1m wide traverses across 30m x 30m grids using the zigzag traverse method of collecting data. The gradiometers sensitivity was set to detect a magnetic variation in the order of 0.1 nanoTesla.
- 3.2 The survey grid was tied into the local Ordnance Survey grid using a Trimble R8s integrated GNSS with TSC3 controller.
- 3.3 The data was processed using *Terrasurveyor 3.0.35.10* and is presented with a minimum of processing. The presence of high values caused by ferrous objects, which tend to hide fine details and obscure archaeological features, have been 'clipped' to remove the extreme values allowing the finer details to show through.
- 3.4 The processed data has been presented as a trace plot and a grey-scale plot, overlaid on local topographical features. The main magnetic anomalies have been identified and an interpretation of those results is also given where appropriate.
- 3.5 The resulting survey results and interpretation diagrams should not be seen as a definitive model of what lies beneath the ground surface, not all buried features will provide a magnetic response that can be identified by the gradiometer. In interpreting those features that are recorded the shape is the principal diagnostic tool, along with a comparison with known features from other surveys. The intensity of the magnetic response could provide further information, a strong response, for example, indicates burning, high ferric content or thermoremnancy in geology. The context may provide

further clues but the interpretation of many of these features is still largely subjective.

- 3.6 All measurements given will be approximate as accurate measurements are difficult to determine from fluxgate gradiometer surveys. The width and length of the identified features can be affected by its relative depth and magnetic strength.
- 3.7 As much of the development area as possible was subjected to geophysical survey. There were however several constraints to surveying the entirety of the development area. At the southern end of the site lay areas of redundant barbed wire livestock enclosure which were avoided due to the likely magnetic interference from the fencing. Similarly the area around two static caravans on the eastern side of the site was avoided to prevent a distortion in the results. At the northern end of the site the land became boggy with reed and heavy scrub, preventing the safe and consistent surveying in this area.

4. RESULTS

- 4.1 The geophysical survey results have been 'clipped' to +/- 15nT and presented as a trace plot (Figure 4), and further processed and presented as a greyscale plot (Figure 5), which has also been overlaid on a topographical map (Figure 6). In total an area of 2.3ha was surveyed.
- 4.2 In general the quality of the survey data was good with little interference from external sources. Magnetic disturbance can occur where the survey encroaches near a field boundary, such as wire-fencing, that contains a ferrous material. The strength of the response from such features can overshadow less distinct readings and thereby obscure potential archaeological features within the survey area. However, during the survey sufficient distance was maintained between the survey area and surrounding livestock fences and static caravans which helped to keep magnetic interference to a minimal, except for a metallic water trough within the survey area.
- 4.3 A variety of potential features were identified in the survey results. The presence of ferrous items within the soil produced some strong responses, whereas anticipated archaeological remains were less clear. Figure 7 shows an interpretation of the survey results, which are discussed by category below:

Potential archaeological remains (red)

- 4.4 Surface traces of the ring cairn PRN 114895 were identified within the northern part of the survey area. It was anticipated that subsurface features would also be visible in the geophysical survey results, these results however are very tentative and at best inconclusive.
- 4.5 A slight curvilinear anomaly extends into the survey area from the north, running for approximately 25m. The variation in the readings however are minimal, varying by around 0.5nT, which is very similar to the general background variations caused by the underlying geology and subsoil and typically would not have been identified as a possible feature without the presence of surface earthworks. Within this area are discrete dipoles, but these too match a general spread of such readings throughout the survey area, discussed below.

Ferrous material (Dipoles) (Blue)

- 4.6 In gradiometer surveys dipole anomalies are commonly seen across a range of sites, particularly agricultural land, presented on the greyscale plot as small discrete points of strong dark and light responses together. Generally, unless they form a pattern or part of a larger feature, they are not thought to be archaeologically significant. They are usually the result of miscellaneous modern ferrous-rich debris, often agricultural in nature such as machinery parts, horseshoes, ploughshares, or highly fired material such as brick and tile fragments, which lie within the topsoil. In rare instances, isolated dipole anomalies may reflect features of archaeological interest, but only further intrusive investigation can verify this. A general spread of such responses is visible across the survey area, although there are linear groupings suggesting buried features.
- 4.7 Seven individual linear groupings of relatively small but strong responses are visible in the survey results. These features are aligned north – south, seemingly around 30m to 60m in length, within the central and eastern end of the survey area. Such responses are likely metallic in nature and may represent lines of fenceposts of wire fencing.

Linear feature / subsoil change (Yellow)

- 4.8 Within the north-western corner of the survey area two northeast/southwest aligned linear anomalies are visible, although the magnetic responses from them are relatively minimal. There is however a distinct lack of typical discrete dipole and magnetically negative responses in this area, suggesting a change in subsurface deposits and the possibility that this may represent a ploughed-out bank or trackway and a change in agricultural ploughing.

Trackway

- 4.9 A linear arrangement of strong dipolar responses is clearly visible running east – west across the centre of the site. Such responses are likely the result of ferrous material, but in this instance it is clearly picking up responses from material used in a trackway that crosses the site at this point.

Possible Pits

- 4.10 Numerous discrete anomalies were recorded across the survey area, presented as small dark points and areas, which could represent the remains of individual pits cut into the subsoil. Alternatively, such anomalies could also be natural in origin and the result of geological changes, tree throws or animal burrowing. No discernible pattern to these potential were identified that would suggest a distinct archaeological feature or area.

Metallic water trough

- 4.11 Within the centre of the survey area a high reading anomaly, visible as a large dark area, was recorded. This was caused by a metallic livestock water trough on the surface of the field.

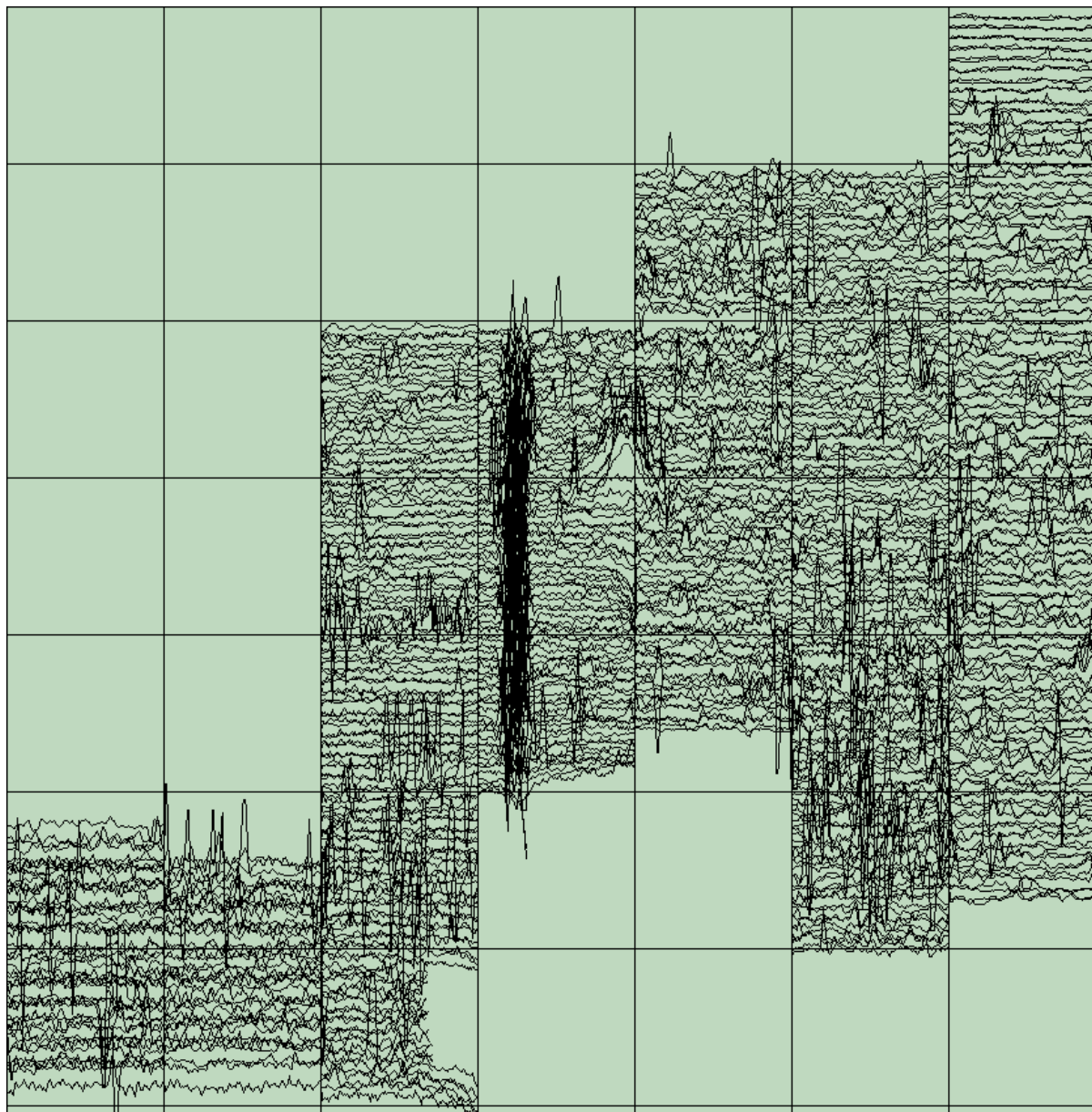


Figure 4: Geophysical survey presented as a trace plot giving an indication of the strength of responses. Each square is represented a 30m² grid, north is to the right.

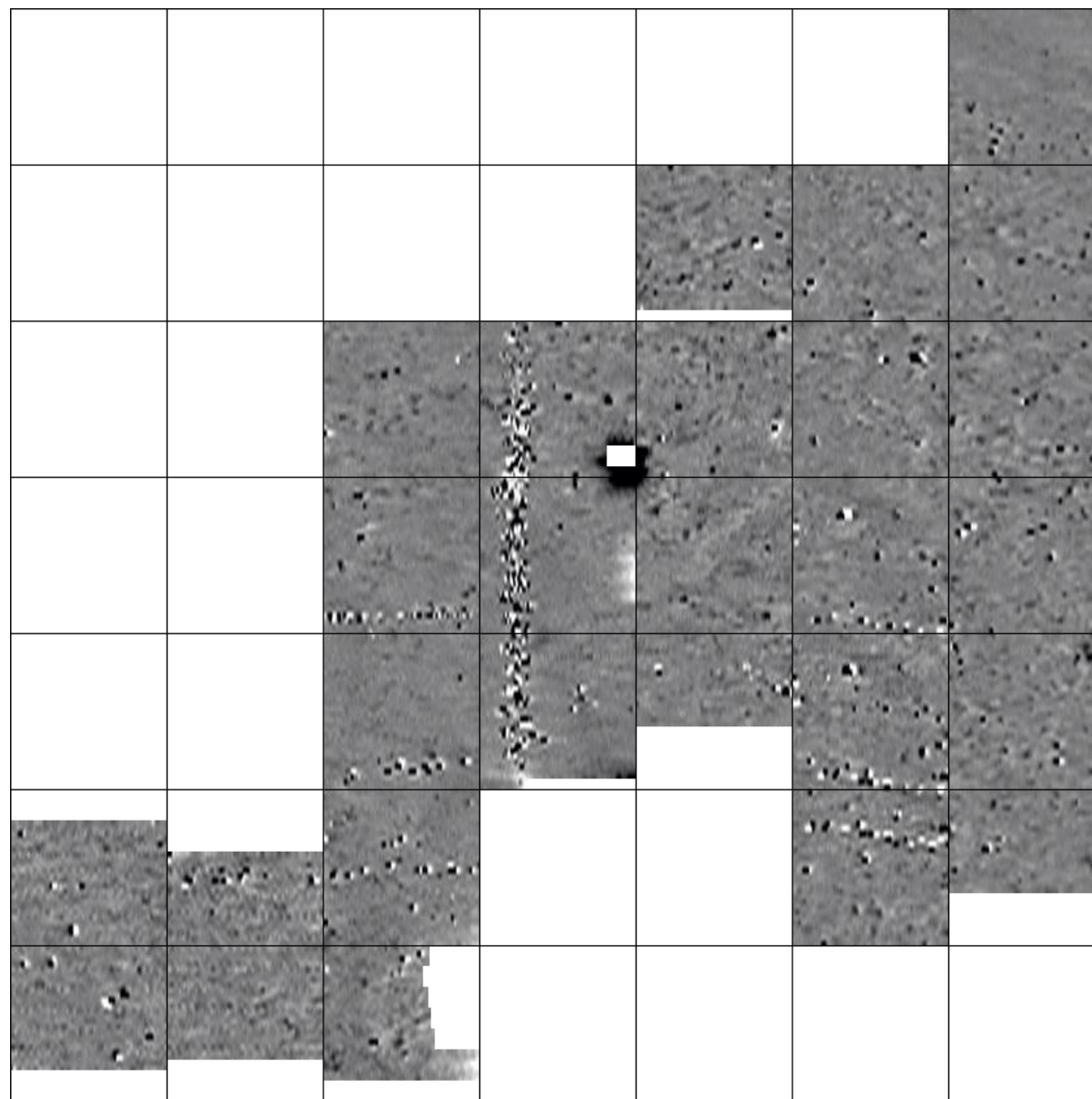


Figure 5: Geophysical survey results presented as a greyscale plot.
Each square is represented a 30m² grid, north is to the right.



Figure 6: Geophysical survey greyscale plot overlaid on Google Earth imagery (Map data ©2021 Google).

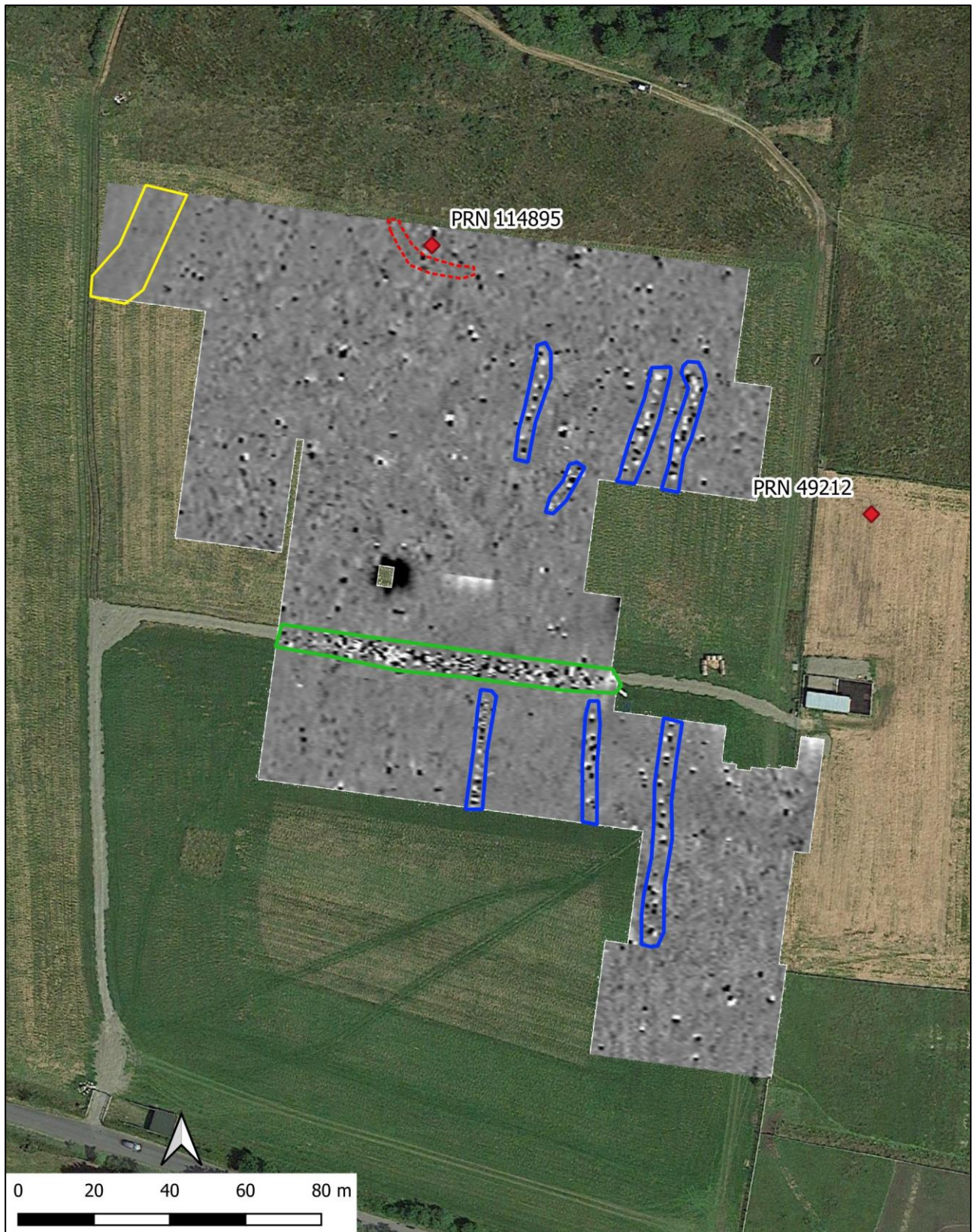


Figure 7: Geophysical survey greyscale plot overlaid with an interpretive layer as discussed in section 4 (Map data ©2021 Google).

5. CONCLUSIONS

- 5.1 Generally the quality of the survey data was good, with little interference from external influences and underlying geological layers appeared conducive to gradiometer surveying. Metallic objects on the field surface did restrict the ability to survey the entire proposed development area but the main focus of potential development and areas of archaeological interest were surveyed.
- 5.2 There was a general archaeological potential for the development site, with a particular focus on two periods given the presence of a Bronze Age ring cairn PRN 114895 at the northern end of the survey area and other similar sites in the locality, and the World War II stop line (PRN 49211) and minefield (PRN 49212) immediately to the east.
- 5.3 There was tentative evidence for the ring cairn PRN 114895 within the survey results, in the form of an ephemeral curvilinear feature and discrete dipoles. However, without the addition of visible surface features, it is unlikely that these readings would have been picked out as representative of archaeological remains, and therefore this interpretation should be treated with caution. It may be of note that although earthworks are visible from aerial photography, cropmarks representative of buried ditches, as would be anticipated around such Bronze Age features, have not been identified and buried archaeological remains associated with the site may therefore be minimal. Nevertheless, it is generally unusual for such a feature not to be more readily identifiable from these survey results.
- 5.4 A series of linear features identified across the site appear to be the result of metallic items, all aligned roughly north – south. It is suggested that these may represent buried fence posts or wire fencing, which given the similarity in alignment may be associated with the nearby World War II stop line defense arrangements which is present immediately to the east and outside the survey area.
- 5.5 A linear feature and change in underlying readings is visible in the northwest corner of the surveyed area. It is possible this may mark part of the transition to wetter boggy ground to the north, although this is not particularly evident at surface level. The linear feature may represent plough marks, although would be an unusually isolated survival of such features. It may represent a former bank, or possibly a trackway. Neither feature is visible on historic mapping, which could suggest it predates the 19th century enclosure of the field or may even be related to the World War II activity prevalent at this location.
- 5.6 Two features that show clearly on the survey results are also readily identifiable at surface level, these comprise the trackway that crosses the site from west to east, and the nearby water trough, both modern features.
- 5.7 A general spread of discrete readings are noted throughout the survey area, but such a spread of responses are often typical of such survey results and are not in themselves indicative of archaeological features. No further clear features of potential archaeological interest were noted within the survey results.

6. SOURCES

Published

CIfA, 2014 *Chartered Institute of Field Archaeologists Standards and Guidance for Archaeological Geophysical Survey*

Hall, J & Sambrook, P, 2021. *Historic Environment Desk-Based Assessment for a One Planet Development at Fferm Clarke, SN3588534524529, on Land Approximately 2 Km South of Cwmpengraig, Carmarthenshire. Trysor. Trysor Project no. 2021/767*

National Standard and Guidance for Collecting and Depositing Archaeological Archives in Wales 2017.

<http://www.welshmuseumsfederation.org/en/news-archive/resources-landing/Collections/national-standard-and-guidance-for-collecting-and-depositing-archaeological-archives-in-wales-2017.html>

Online resources

British Geological Survey [online] Date Accessed 10th January, 2023. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>.

7. GLOSSARY

Fluxgate Gradiometer

An instrument used to measure magnetism to search for areas of disturbed ground that may be associated with subsurface archaeological features.

nanoTesla (nT)

A unit of measurement of a magnetic field.

Ferrous object

Metals and alloys that contain iron.

Dipole

An anomaly consisting of a single positive response with an associated negative response forming a 'halo effect'. The negative and positive response is of equal magnitude but opposite polarity and are caused by the same feature. Dipole anomalies are very commonly observed across a range of sites, particularly agricultural land. Generally, unless the dipoles form part of a larger pattern or feature they are regarded as not significant. They are usually the result of modern ferrous rich debris such as brick and tile fragments as well as objects such as horseshoes or broken ploughshares, which lie within the topsoil.

