ARCHAEOLOGY WALES

Geophysical Survey Report:

On Land at Rhostyllen, Wrexham.

May 2023

Report No. 2195

By

Jennifer Muller

REGISTERED ORGANISATION CIfA

Geophysical Survey Report:

On Land at Rhostyllen, Wrexham.

May 2023

Prepared for Novus Renewable Services Ltd

By

Jennifer Muller MA

Report No.2195

Version	Date	Sections Revised	Prepared/Revised by	Checked & Authorised by
1	15/05/2023	Original	Jennifer Muller MA	John Davey PhD MCIfA
2	13/11/2023	Minor Alterations to text	Dan Moore MA	John Davey PhD MCIfA

Archaeology Wales Limited
Main Office, Unit D11.6 Treforest Industrial Estate
Pontypridd - CF37 5UR
Tel: +44 (0) 1686 440371
Email: admin@arch-wales.co.uk
Web: arch-wales.co.uk

Contents

List of Figures

List of Plates

Appendices

Summary

This report results from work carried out by Archaeology Wales Ltd (AW) for Novus Renewable Services Ltd. following a consultation with Clwyd-Powys Archaeological Trust Archaeological Planning Management (CPAT-APM) in their capacity as archaeological advisors to Wrexham County Borough Council (WCBC). It draws on the results of an investigative geophysical survey undertaken in association with the proposed development for the construction of a new Energy Storage System and substation, and a buried 400kV cable on land north of Bronwylfa Road, to the west of Wrexham, centred on SJ 29470 48398 (Figure 2).

The aim of the geophysical survey was to determine the nature and extent of any buried archaeological features within the proposed future potential development areas. The work was undertaken using a Bartington Grad601 dual fluxgate gradiometer.

The survey identified anomalies characteristic of archaeological features in Fields 1, 2, 3 and 4. Some of these relate to field boundaries visible on historic 19th century mapping. However, the majority in Fields 1, 2 and 3, are interpreted as representing ditched boundaries of former fields or enclosures that pre-date the 1839 Tithe map. The results also suggest that one or more pits may also be present in their vicinity. Field 3 also contained four possible larger circular or elliptical anomalies. The geology of this field indicates the possibility that these may represent former open caste coal (bell) pits. Only targeted archaeological excavation would be able to confirm these interpretations.

The work was carried out to the Standard and Guidance set out by the Chartered Institute for Archaeologists for archaeological geophysical survey (CIfA 2020) and *completed in accordance with* EAC Guidelines for the Use of Geophysics in Archaeology *(Schmidt A. et al 2016).*

Crynodeb

Mae'r adroddiad hwn yn ganlyniad i waith a wnaed gan Archaeology Wales Cyf (AW) ar gyfer Novus Renewable Services Cyf yn dilyn ymgynghoriad gydag Ymddiriedolaeth Archeolegol Clwyd-Powys – Rheoli Cynlluniau Archeolegol (CPAT-APM) yn ei chapasiti fel cynghorwr archeolegol i Gyngor Bwrdeistref Sirol Wrecsam (WCBC). Mae'n tynnu ar ganlyniadau arolwg geoffisegol archwiliol mewn cysylltiad â'r gwaith datblygu arfaethedig ar gyfer adeiladu cyfleuster ac system storio ynni newydd, a chebl 400kV o dan y tir i'r gogledd o Iôn Bronwylfa, i'r gorllewin o Wrecsam, y mae ei ganolbwynt wedi'i leoli yn SJ 29470 48398.

Amcan yr arolwg geoffisegol oedd pennu natur a hyd a lled unrhyw nodweddion archeolegol sydd wedi'u claddu o fewn yr ardaloedd datblygu posibl arfaethedig yn y dyfodol. Gwnaed y gwaith gan ddefnyddio gradiomedr deuol Bartington Grad601.

Nododd yr arolwg anomaleddau sy'n nodweddiadol o nodweddion archeolegol yng Nghaeau 1, 2, 3 a 4. Mae rhai o'r rhain yn gysylltiedig â ffiniau caeau sydd i'w gweld ar fapiau hanesyddol o'r 19^{eg} ganrif. Fodd bynnag, mae mwyafrif y rheiny yng Nghaeau 1, 2 a 3 wedi'u dadansoddi fel rhai sy'n cynrychioli ffiniau caeëdig cyn gaeau neu glostiroedd sy'n dyddio o'r cyfnod cyn map Tithe 1839. Mae'r canlyniadau hefyd yn awgrymu y gallai mwy nag un pwll fod yn bresennol hefyd gerllaw. Roedd cae 3 hefyd yn cynnwys pedwar anomaledd crwn neu eliptigol mwy o bosibl. Mae daeareg y cae hwn yn nodi'r posibilrwydd y gallai'r rhain gynrychioli pyllau glo cast agored (cloch) blaenorol. Dim ond gwaith cloddio archeolegol wedi'i dargedu a fyddai'n gallu cadarnhau'r dadansoddiadau hyn.

Gwnaed y gwaith yn unol â'r Safonau a'r Canllawiau a bennwyd gan Sefydliad Siartredig yr Archeolegwyr ar gyfer arolwg geoffisegol archeolegol (Sefydliad Siartredig yr Archeolegwyr 2020) a chafodd ei gwblhau yn unol â Chanllawiau Cyngor Archeolegol Ewrop ar gyfer Defnyddio Geoffiseg mewn Archeoleg (Schmidt A. et al 2016).

1. Introduction

1.1 Location and scope of work

1.1.1 From 20 to 30 March 2023, Archaeology Wales Ltd (AW) carried out a geophysical survey, for Innova Renewables Developments, on land north of Bronwylfa Road, to the west of Wrexham, centred on SJ 29470 48398 (Figures 1 and 2) (henceforth "the site").

1.1.2 The survey was undertaken in advance of a proposed development that comprises plans for the construction of a new Energy Storage System and substation and a buried 400kV cable, and following consultation with Clwyd-Powys Archaeological Trust Archaeological Planning Management (CPAT-APM) in their capacity as archaeological advisors to Wrexham County Borough Council (WCBC).

1.1.3 A Written Scheme of Investigation (WSI) was prepared by John Davey, Project Manager, Archaeology Wales Ltd (henceforth - AW), at the request at CPAT-APM. It provided information on the methodology to be employed during a geophysical survey of the site. The WSI was submitted to, and approved, by CPAT-APM prior to the survey being undertaken.

1.1.4 The work was managed by John Davey (PhD MCIfA), AW Project Manager, and the site work was undertaken by Jennifer Muller MA, Daniel Morgan MA, Jessica Woolley MA, and Rachel Willmot of Archaeology Wales.

1.2 Site Description and Geology

1.2.1 The main development site is broadly triangular in shape, comprising a single agricultural field parcel and extends to approximately 5.5 ha in area. The site's boundaries feature a broad tree belt to the north and east, with hedgerows to the south and west. A former railway line runs along the northern boundary (set at a higher level and bounded by the mature vegetation) whilst the A483 lies to the east which is also elevated and bounded by mature established vefetation. The B5097 / Bronwylfa road forms the southern boundary and Cadwgan Lane, a single-track road, forms the western boundary.

1.2.2 An existing vehicular access is located at the main development site's southern boundary from the B5097.

1.2.3 The land to the west of Cadwgan Lane comprises an L-shaped agricultural field and extends to approximately 3.4ha. It is bounded by a tree belt to the north, Bersham Cricket Club to the south west, and the B5097 /Bronwylfa Road to the south. An access track for abnormal loads extending to approximately 0.2ha is proposed on the southern part of this field.

1.2.4 Agricultural land and uses form the site's predominant surroundings to the north, south and west with pockets of residential properties dispersed throughout. To the east of the site (approx. 5000m), on the opposite side of the A483, is the village of Rhostyllen. The

Legacy National Grid Station, which the proposals will connect to, is located approximately 750m west of the site.

1.2.5 Wrexham City Centre is located approximately 3km north-east.

1.2.6 The geophysical survey site extended over two additional fields and occupied an area of 7.2 hectares comprising four mixed-use, irregular, hedged agricultural fields in total (Figure 2). The B5097 Bronwylfa Road road divides the northern and southern fields of the site. The southern fields are bounded by adjacent fields to the south, and the B5098 road bounds the fields to the east. The northern fields are bounded by the Bersham Cricket Club and open fields to the west, and by the dis-used railway to the north. Their eastern boundary is the A483 (Figure 2).

1.2.7 The southern fields are bordered by a mix of hedgerows and post-and-wire fencing (plate 1). On the west side, they are bordered by a small plantation of trees (plate 2). The northern fields were bordered by a mix of post-and-wire fencing, and woodland to the north and southeast (plate 3). The topography in each field comprised areas of both flat and gently undulating ground (plate 4).

1.2.8 The underlying geology for the northern part of the site comprises Mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation - sedimentary bedrock formed between 319 and 309.5 million years ago during the Carboniferous period.

1.2.9 The bedrock is overlain by superficial deposits which, over the eastern part of the site, comprises Devensian Till - Diamicton, a sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period. However, the western part of the site is overlain by Devensian Glaciofluvial Deposits - Sand and gravel, formed between 116 and 11.8 thousand years ago during the Quaternary period. (BGS, Geology Viewer – accessed 20/2/2023).

1.3 Archaeological and Historical Background

1.3.1 Archaeology Wales recently carried out an archaeological Desk Based Assessment of the wider study area, of which the geophysical survey area comprises the northeastern portion. Cadw have also asked for a Stage 1 settings assessment of all designated archaeological assets within 3km of the site (forthcoming). The following is a summary of the results from the desk-based assessment (Davey & Muller 2023).

1.3.2 The site lies within 200m of the Bersham Conservation Area and the wider proposed development area contains four Scheduled Monuments: Offa's Dyke: Section extending 120m from Railway to Bronwylfa Road, Legacy (DE194); Offa's Dyke: Cadwgan Hall Section, extending from River Clywedog to the Railway (DE132); Moated Site near Groesfoel Farm,

Rhostyllen (DE193); and Croes-Foel Round Barrow (DE048). The Croes-Foel Round Barrow (DE048) lies in the south-eastern part of the proposed development area, approximately. This monument comprises the remains of an earthen built round barrow, which probably dates to the Bronze Age (c. 2300 - 800 BC). The barrow is circular in shape on plan and has a rounded profile. The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual practices.

1.3.3 Two scheduled sections of Offa's Dyke lie within the proposed study area (DE194 & DE132). It is currently proposed that a cable trench will pass across the line of this monument. The linear earthwork is believed to have been constructed in the 8th century AD to define the western border of the Anglo-Saxon kingdom of Mercia. The monument comprises a defensive bank and ditch consisting of a stretch of bank, with a ditch on the western side. A counterscarp (raised bank) may be visible on the west side of the ditch in places. The monument is of national importance for its potential to enhance our knowledge of early medieval defensive organisation and settlement.

1.3.4 Later medieval activity is attested by the presence of the Moated Site near Groesfoel Farm, Rhostyllen (DE193); This monument approximately 200m southwest of the site and comprises the remains of a well-preserved medieval moated homestead. The moat is complete except for part of the eastern side and is of an average depth of 1.5m. It is waterfilled in the northwest corner and elsewhere it is marshy. There is a causeway on the north side with traces of masonry and within the enclosure are masonry foundations of a building measuring 5 x 6.5m with a small rectangular addition of 3m square. The monument is of national importance for its potential to enhance our knowledge of medieval settlement.

1.3.5 Further medieval activity is known from Cadwgan Hall immediately to the north of the site and an associated mound: Cadwgan Hall Mound (DE131) thought to be the site of a motte and Bailey adjacent to Offa's Dyke.

1.3.6 Historic maps indicate the presence of Industrial activity in the area by the early 19th century. A coal pit is recorded on the Ordnance Survey surveyors' drawings of 1835 at Esclusham in the southwest part of the wider study area, approximately 800m west of the proposed new Battery Storage facility. A disused railway also runs through the site from west to east. This represents a section of the GWR Rhos Branch line built between 1899 and 1912. The associated Legacy Station appears to have been constructed on the Rhos branch adjacent to the former coal pits (OS County Series 6-inch Denbighshire Sheet XXVIII.SW Revised: 1909 to 1910, Published: 1914).

1.3.7 The site lies within the landmap historic landscape area of Talwrn (WRXHMHL021), characterised as a rural environment of agricultural irregular fieldscapes.

2. Aims and Objectives

2.1 Geophysical Survey

The geophysical survey was undertaken in order to:

- Locate and describe archaeological features that may be present within the survey area. The work attempts to elucidate the presence or absence of archaeological material that might be affected by the scheme, its character, distribution, extent and relative significance, providing sub-surface data to inform any future on-site works.
- It is the aim of this report to provide information which is sufficiently detailed to allow the archaeological resource to be better understood. The information could then be used to help inform further archaeological work undertaken in association with the proposed development.

3. Methodology

3.1 Geophysical Survey

3.1.1 The survey was carried out using a Bartington Grad601-2 dual sensor fluxgate gradiometer. This instrument has been chosen due to its proven efficient and effective method of locating sub-surface archaeological anomalies on greenfield sites. The machine consists of two high stability fluxgate sensors suspended on a single frame, accurately aligned, that can detect localised magnetic anomalies compared with the general magnetic background. When mapped in a systematic manner this allows changes in the magnetic field resulting from differing features in the soil to be plotted. Strong magnetic anomalies will be generated by iron-based objects or areas modified by heat, such as hearths and kilns. More subtle anomalies may be generated by changes, typically in the iron-oxide content, of underlying soils, compared to the natural subsoil. This enables the detection of material infilling sub-surface archaeological features such as ditches, pits and structural remains. Data from this may be mapped at closely spaced regular intervals, to produce an image that may be interpreted to locate buried archaeological features (Aspinall *et al*, 2011; Clark, 1997).

Moreover, Fluxgate gradiometry has the advantage of being able to identify the broadest range of sub-surface archaeological feature types and can detect such anomalies at a range of soil depths (typically 0.3-2m).

3.1.2 The site was located by GPS. All survey points were located with the GPS and plotted onto an O.S. base map.

3.1.3 The on-site survey was undertaken in a single phase over a two-week period. Detailed survey was carried out in grids of 30m x 30m along zigzag and parallel traverses

spaced at 1m intervals, recording data points spaced at 0.25m intervals to a maximum instrument sensitivity of 0.1nT in accordance with Historic England Guidelines. The survey mode was set to bi-directional (traverses walked alternately northwest-southeast/southeast-northwest). Incomplete survey lines resulting from irregular area boundaries or obstacles were completed using the 'dummy log' key. At regular intervals the data was downloaded in the field onto a laptop computer for storage and assessment.

3.2 Data Processing and Presentation

3.2.1 Following the completion of the detailed survey, processing and analysis took place using the TerraSurveyor Lite v.3 software package.

3.2.2 A composite of each detailed survey area has been created and processed using Terrasurveyor Lite v.3. The report includes raw and unclipped data in greyscale. Every effort has been made to reduce the instrument directional sensitivity in the field rather than reliance on post data-collection processing.

3.2.3 The final results have been presented at an appropriate scale tied to the Ordnance Survey National Grid.

3.2.4 The most typical method of visualising the data is as a greyscale image (Figures 3-6). In a greyscale plot, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A limited number of standard operations can be carried out to process the data, including clipping and graduated shade. The data was analysed using a variety of parameters and styles and the most useful of these were saved as *TIF images and displayed using Adobe Illustrator software. The results of the survey were then overlaid onto a digital map of the study area. This was then used to produce interpretation figures.

3.2.5 All works were undertaken in accordance with the standard required by The Chartered Institute for Archaeologist's *Standard and Guidance for Archaeological Geophysical Survey*(2020) and current Health and Safety legislation.

4. Geophysical Survey Results

The geophysical survey was undertaken during a period of cold, occasionally wet, and windy weather.

4.1 Limitations

4.1.1 A small area in Field 4 was avoided for safety reasons due to the presence of deep holes hidden beneath tall grass. In such limited situations, the 'dummy log' key was used,

and no data collected. The north-west edge of Field 4 was also inaccessible due to the presence of trees and other impenetrable vegetation (plate 5). A small section of the south-east edge of the same field was also unsuitable for surveying due to the presence of multiple metal fences (plate 6).

4.1.2 The south-east corner of Fields 1 and 2, and the central/south-east area in Field 3, represent the locations of the welfare cabin and therefore not surveyed (plate 7).

4.2 Results **(Figs 3 - 9)**

4.2.1 The four fields comprising the survey are designated as Fields 1 - 4. The survey identified geophysical anomalies of possible archaeological origin in all fields. These were mostly consistent with silted up sub-surface linear ditches probably representing former field boundaries. Some of these linear anomalies co-incided with former field boundaries visible on historic 19th century mapping, although others, on a different alignment, appear to pre-date the 1839 Tithe map of *the township of Eclusham Below in the parish of Wrexham and County of Denbigh*. Each anomaly is described below in the order they were surveyed (starting with Fields 1-2).

4.2.2 The anomalies are annotated red for those of a probable archaeological origin on Figures 5-6; orange for those of an uncertain archaeological origin; green where they correspond with an historic event/boundary; blue for natural or geological variations; and pink for anomalies of likely modern origin.

4.2.3 There are at least four, large circular/sub-circular areas with strong magnetic responses in Field 3. These potentially mark locations of former small scale open caste coal mining (bell) pits. They are not recorded on historic mapping but do lie within the geological region of Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation (BGS 2023).

4.2.4 The survey recorded a strong linear bipolar anomaly running approximately N-S through Field 2 and continuing in Field 4. This represents a response from a modern service pipe.

4.2.5 Single dipolar anomalies (positive points with a negative response, or vice versa) recorded throughout the survey may represent either isolated ferrous detritus, or thermoremanent magnetic materials, such as fragments of burnt stone, brick or tile, or pot.

5 Interpretation

5.1 Fields 1 and 2 **(Figures 3 - 7)**

5.1.1 Anomalies characteristic of archaeological features, including possible ditches/field boundaries and pits, were detected within Fields 1 and 2. Fields 1 and 2 also show a series of parallel approximately E-W aligned geophysical trends which are likely to represent evidence of recent ploughing (F1). There is the potential that recent ploughing such as this, may have truncated potential archaeological remains. Numerous fragments of ceramic and metal materials visible on the surface of the fields are also likely to have contributed to the magnetic 'noise' visible throughout the data. This noise is visible as numerous small discrete dipolar responses.

5.1.2 One linear anomaly (F2) recorded in Fields 1 and 2 can be attributed to a former historic field boundary, as recorded in the 1839 Tithe Map from and later historic Ordnance Survey maps. It runs approximately north-northeast/south-southwest, from the central eastern part of the southern field boundary, although it peters out towards the northern part of the field. In form it is a single, positive linear, suggestive of a former earthen or stony hedge bank. The former hedge bank boundary has been severely truncated by the plough, as evidenceD by the continuity of plough trends (F1) across its line, and entirely lost in the northern part of the field. The anomaly furthest to the east (F3) appears to be a positive linear flanked by slightly negative responses. It follows the modern line of the eastern field boundary which was only established in the late 20th century when the Wrexham By-pass was constructed. Google earth imagery suggests that this represents a former tractor path running just inside and parallel to the eastern field boundary. Curvilinear feature (F11), in the northeast corner of the field appears to be related to (F3) on available satellite imagery.

5.1.3 On either side of the hedge dividing Fields 1 and 2 are a series of positive linear anomalies forming possible enclosures (F4 and F5). F4 clearly continues into Field 3. The irregular shape of the enclosure may indicate that this is not one contemporary enclosure, but potentially comprising ditched field boundaries of more than one period. The anomalies associated with (F4) pre-date the earliest historic mapping of 1839. At the southwest corner of (F4) a short section of a distinct linear appears to transition into a more diffuse linear (F6) which may be of geological or geomorphological origin. The enclosure (F5) to the east of the extant historic hedge bank which divides Fields 1 and 2, is aligned with this historic boundary, and may be broadly contemporary with it. Nevertheless, no such enclosure is visible on any 19th century historic map, suggesting that enclosure (F5) must also predate the mid-19th century. It has two possible entrances, one each on the north and the east sides, and measures roughly 54m wide by 64m long.

5.1.4 In the vicinity of enclosures (F4) and (F5) are a few singular points with a strong magnetic response. One of these is a dipole (F7): a strongly paired positive and negative

anomaly and could simply represent ferrous detritus. Another is a strongly positive magnetic point with a slight negative response around it (F8), which could represent an infilled pit. The central one of these anomalies (F9) has a central low magnetic response surrounded by an area of higher magnetism, which is then surrounded by another area of lower magnetism. Its response is quite large and distinctive, and (F9) could represent a pit filled with low magnetic material. It is interesting to note that all three anomalies (F7) – (F9) are in proximity with the extant hedge bank that subdivides Fields 1 and 2. A final positive point immediately next to a dipole (F10) sits just to the north of (F6).

5.1.5 In the south-west section of Fields 1 and 2 are some diffuse, positive irregular curvilinears running north-west/south-east (marked in blue). These are natural geological and/or geomorphological variations in the subsoil, potentially representing the location of palaeochannels. These natural magnetic responses are bisected by a strong N-S aligned bipolar linear response (alternating black-white linear) that corresponds with a modern service.

5.2 Field 3 **(Figures 3 - 6, 8)**

5.2.1 The southwestern part of Field 3 contains positive linear anomalies that form part of enclosure (F4), continued from Fields 1 and 2.

5.2.2 There are also four or more, large circular/sub-circular areas with strong magnetic responses (F12). These potentially mark locations of former open caste coal mining (bell) pits typical of the early post-medieval period (circa 17th to early 19th century). They are not recorded on late 19th century Ordnance Survey historic maps, suggesting they are 19th century or earlier in origin. They lie within an area of recorded coal measures on the British Geological Survey (BGS 2023): Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation. The southern geological boundary of the coal measures follows the southern boundary of Field 3.

5.2.3 At the eastern end of Field 3 is a short section of positive linear (F13) aligned approximately N-S. This linear corresponds with a former field boundary and footpath shown on historic maps from 1839, the line of which still continues to the north of the Rhos Railway embankment. A modern footpath also still follows this route.

5.3 Field 4 **(Figures 3 - 6, 9)**

5.3.1 Field 4 contained a spread of magnetic debris in its south-west corner, and though there was nothing visible on the surface, the ground was hard and uneven. It is possible that the response was formed from magnetic debris having been dumped or buried here in the recent past, potentially comprising thermo-remnant materials such as brick or tiles. The

modern service is clearly visible as a strong bipolar linear response (alternating black-white linear) running parallel to the east side of the field and continuing to the south across the road and into Field 1.

5.3.2 The only potential archaeological feature identified within Field 4, was a former field boundary (F14) that is visible on the Tithe map of 1839. It comprises a linear a collection of dipoles running north-west for at least 29m, then curving to the east/north-east for a further 27m, where it becomes more distinct as a positive linear anomaly with a slight negative response on its north side, suggestive of a ploughed-out bank and ditch.

6 Conclusions

6.1.1 Overall the density of potential archaeological features recorded on site is relatively low. Modern ploughing (F1) appears to have severely reduced archaeological potential, most noticeably in Field 2.

6.1.2 Anomalies (F2), (F13) and (F14) relate to field boundaries that are visible on the Tithe Map of the township of Eclusham Below in the parish of Wrexham and County of Denbigh of 1839 and therefore must pre-date that map in origin. These features generally take the form of ploughed out hedge banks and are of low archaeological significance.

6.1.3 The alignment of anomaly group (F4) is completely unrelated to that of the field boundaries visible on historic mapping which suggests a period of abandonment following the end of their useful life and prior to the establishment of the current field alignments, potentially during the medieval period. It could be argued that the current prevailing NNW-SSE co-axial field alignments in the region follow those of the early medieval Offas Dyke. This might suggest that the (F4) group of anomalies date from the Romano-British period or earlier. Sample excavation of these anomalies would be required to confirm their form, function and date.

6.1.4 A second anomaly group (F5) appears to form an enclosure which may utilise the current boundary between Fields 1 and 2 as its western boundary. This extant boundary takes the form of a degraded hedge bank and is visible on the 1839 Tithe map. Enclosure (F5) is not visible on the Tithe map but is potentially broadly contemporary. Again, sample excavation would be necessary to confirm this interpretation.

6.1.5 At least four large circular or elliptical magnetic responses have also been highlighted within Field 3 (F12). These potentially mark the locations of former open caste coal mining (bell) pits typical of the early post medieval period (circa 17th to early 19th century). They are limited to the northern part of the survey area, within a region of recorded coal measures on the British Geological Survey (BGS 2023). The southern geological boundary of the coal measures follows the road between Field 3 and Fields 1-2. It is notable that Fields 1

and 2 are free of these features. This interpretation could be tested by machine excavated trenches which may also serve to inform future engineering decisions.

6.1.6 Other irregular curvilnear geophysical anomalies visible in the southern part of the site relate to natural geological and/or geomorphological variations in the subsoil and do not represent archaeological features.

6.1.7 The interpretation and suggested date of any of the potential sub-surface archaeological remains identified during this survey is unproven and dependent on further archaeological investigation.

7 Bibliography and References

Aspinall, A. Gaffney, C. & Schmidt, A. 2011. *Magnetometry for Archaeologists.* Altamira, London.

British Geological Society, 2023. Online map resource (https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/)

Chartered Institute for Archaeologists. 2020. *Standards and Guidance for Geophysical Surveys.*

Conyers, L. 2018. *Ground-penetrating Radar and Magnetometry for Buried Landscape Analysis*. Springer, Cham.

Davey, J. 2023. *Written Scheme of Investigation For a Geophysical Survey: Land at Rhostyllen, Wrexham*. [Unpublished] Project No: 3056

Davey, J. & Muller, J. 2023. *Archaeological Desk Based Assessment: On Land at Rhostyllen, Wrexham*. February 2023. [Unpublished] Report No. 2162.

Gaffney, C & Gater, J. 2003. *Revealing the Buried Past: Geophysics for Archaeologist*. The History Press, Stroud.

Schmidt A. 2011. *Geophysical Data in Archaeology: A Guide to Good Practice*. Archaeology Data Service and Digital Antiquity.

Schmidt A. et al. 2016. *EAC Guidelines for the Use of Geophysics in Archaeology, Questions to ask and points to consider.* EAC Guidelines 2.

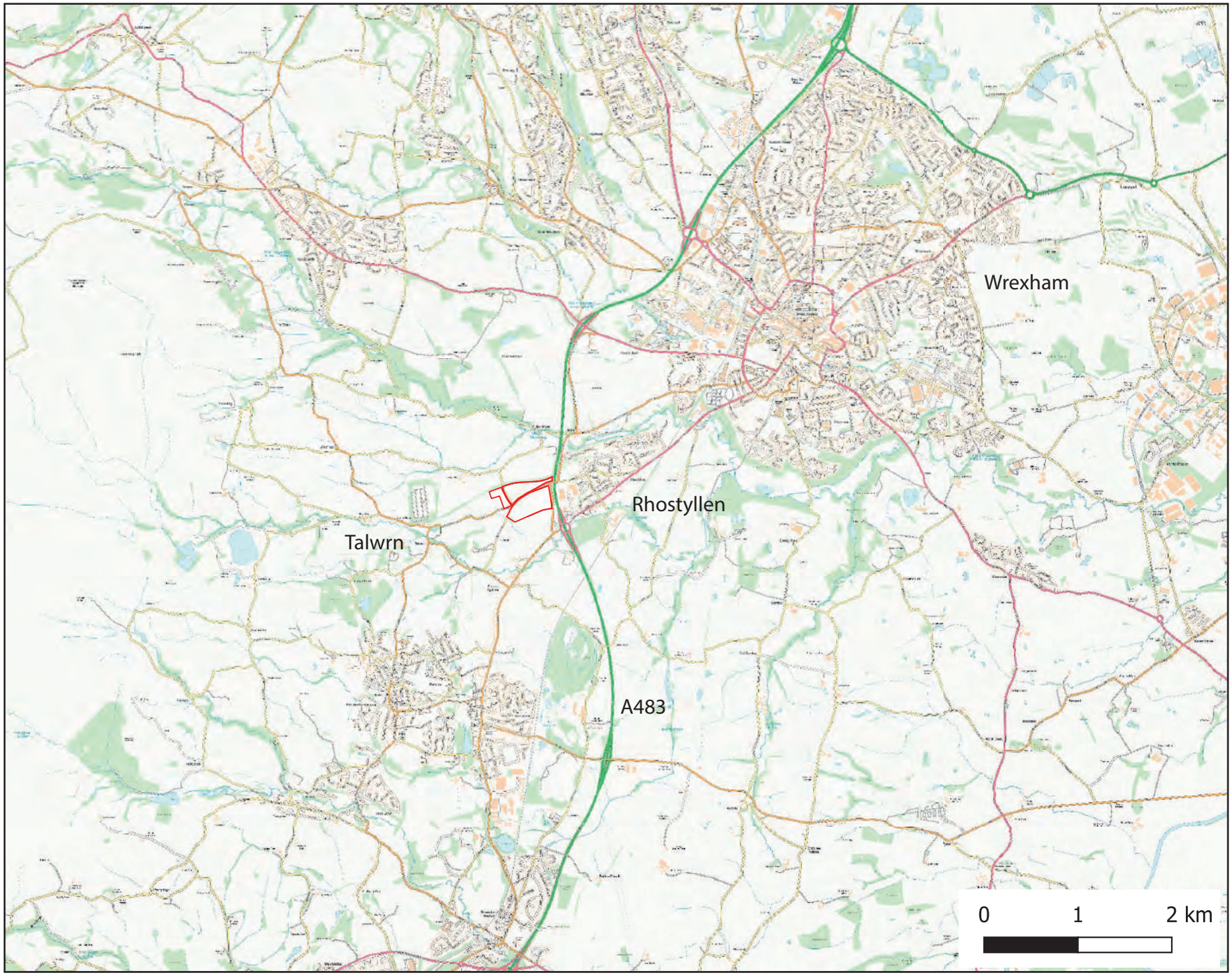
Maps Consulted

Map of the township of Eclusham Below in the parish of Wrexham and County of Denbigh (Tithe Map), 1839, scale 1:3,168

OS County Series Denbighshire Sheet XXVIII 1879, six inches to the mile

OS County Series Denbighshire Sheet XXVIII.SE 1900, six inches to the mile

OS County Series Denbighshire Sheet XXVIII.SE 1946, six inches to the mile



Site location

Figure 1: Location Plan

ARCHAEOLOGY WALES
Revealing the past, informing the future

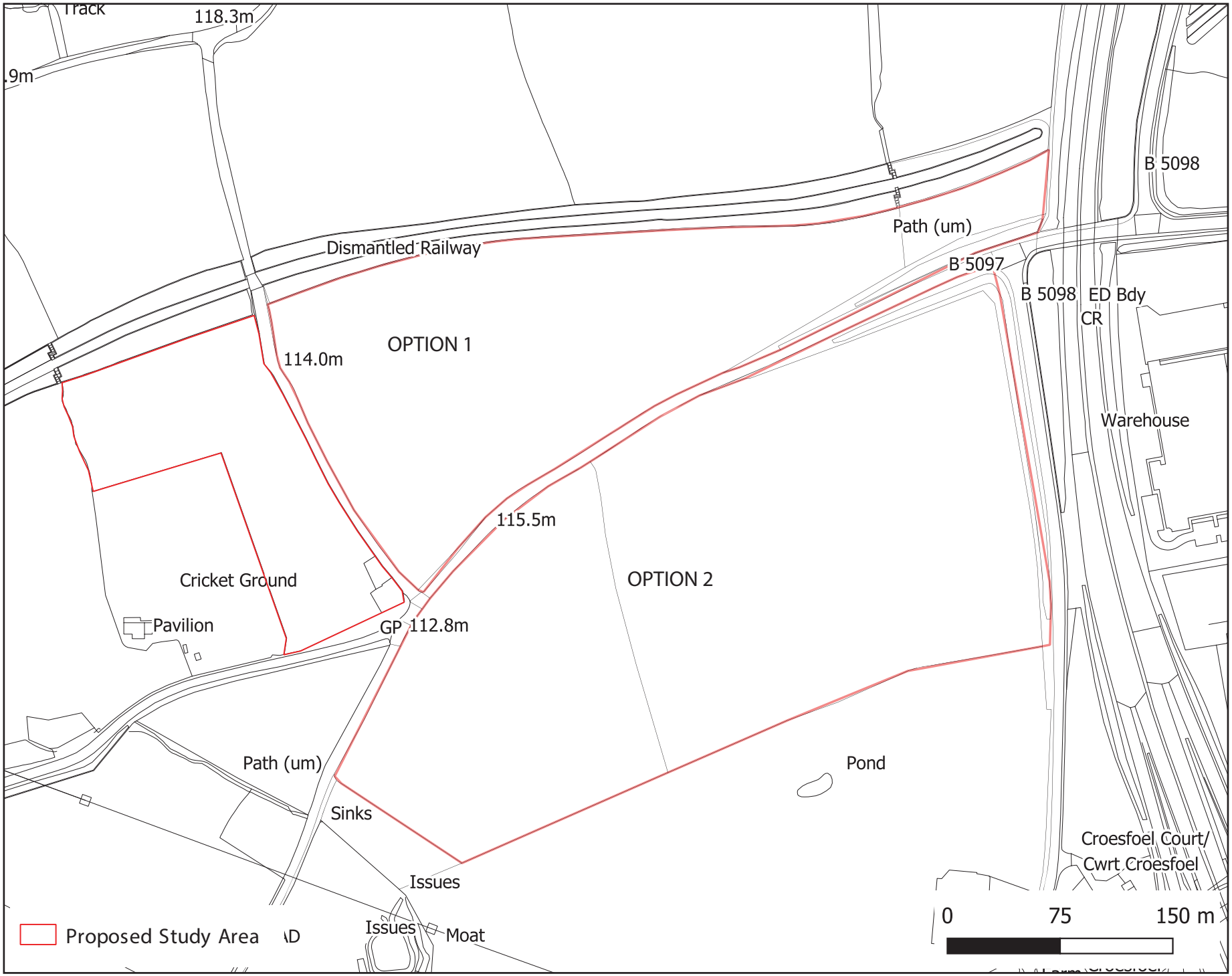


Figure 2: Detailed Location Plan

ARCHAEOLOGY WALES
Revealing the past, informing the future

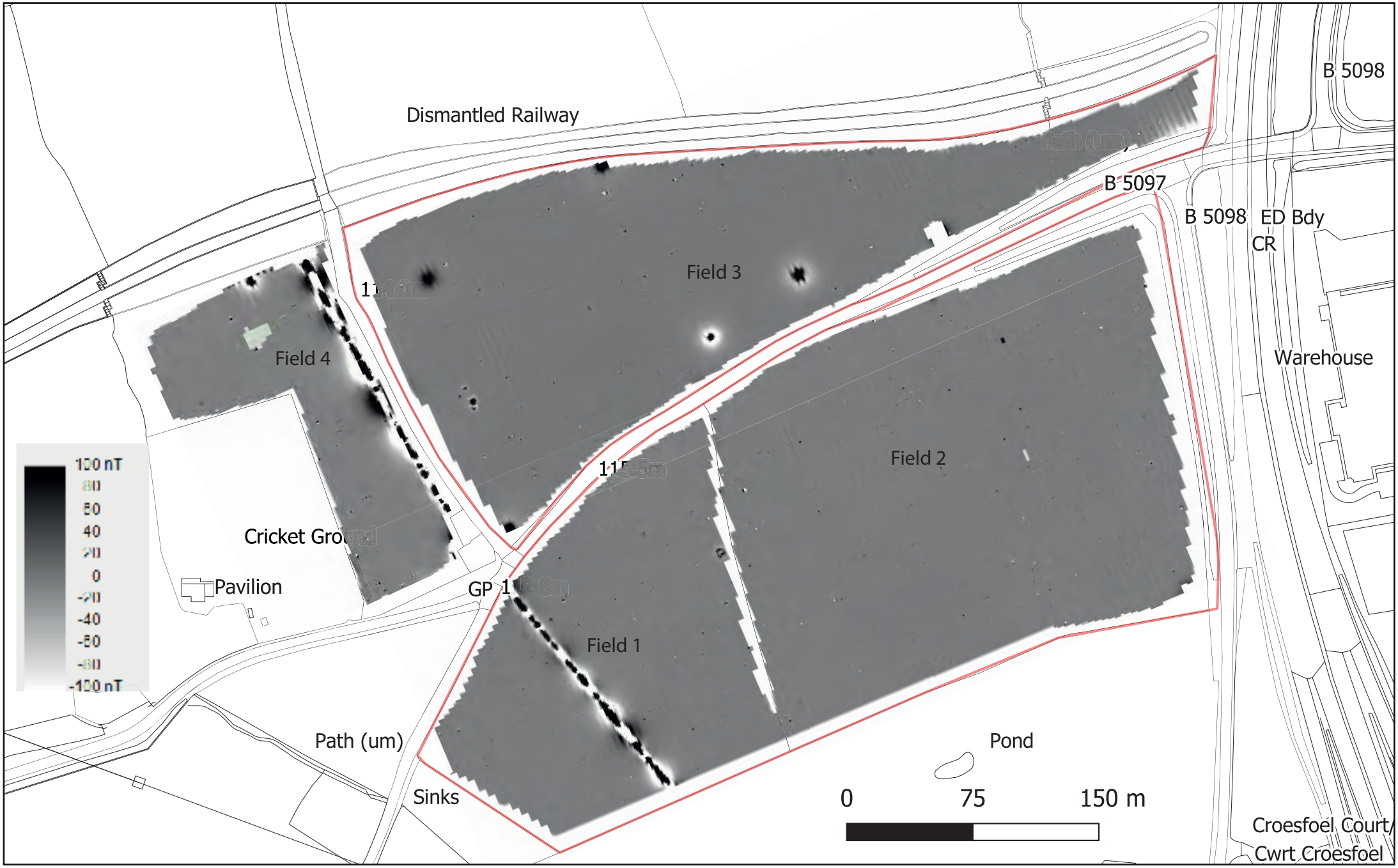


Figure 3. Fields 1 - 4: Raw data

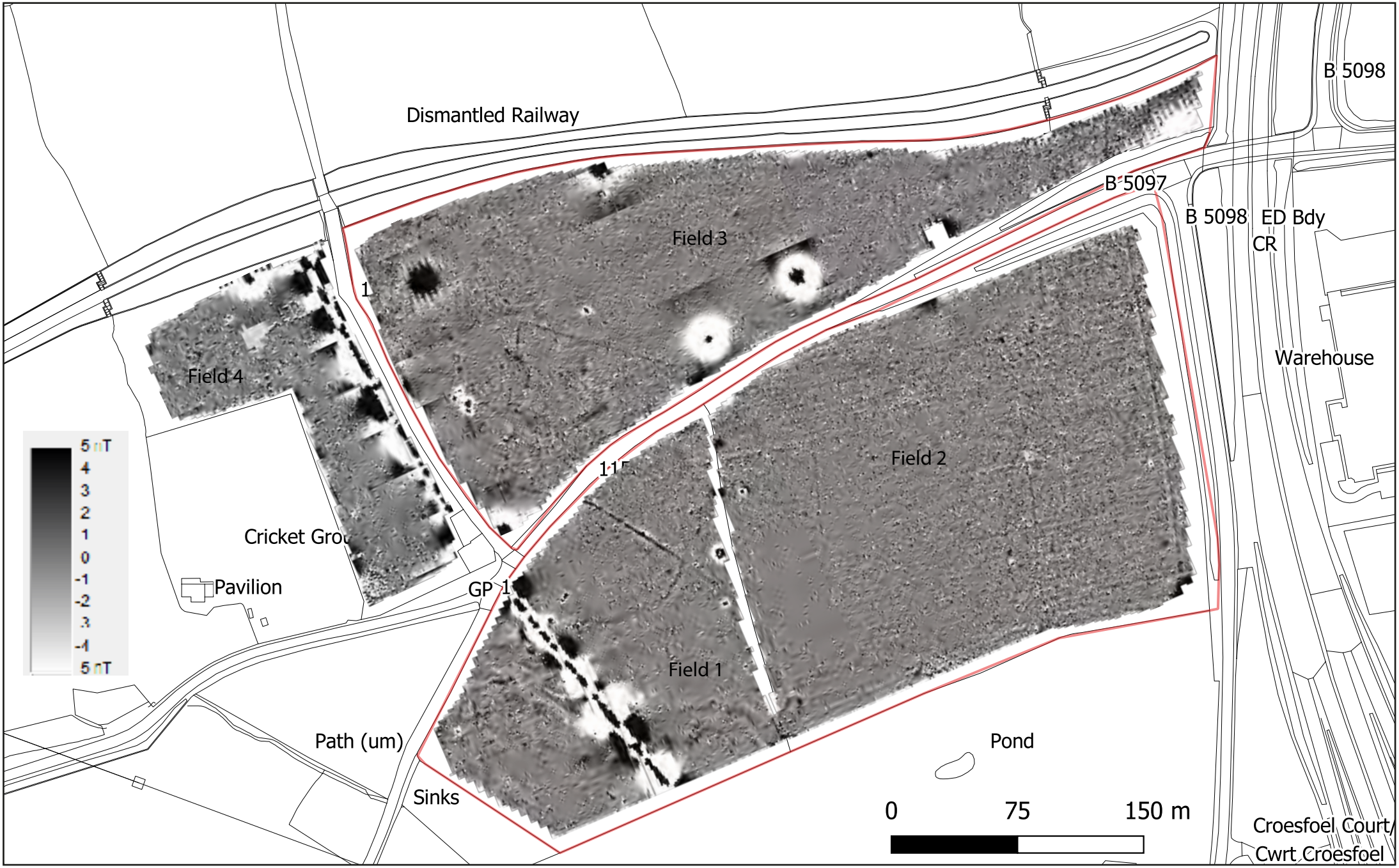


Figure 4. Fields 1-4: Greyscale plot of processed data clipped to +/-5 and destriped

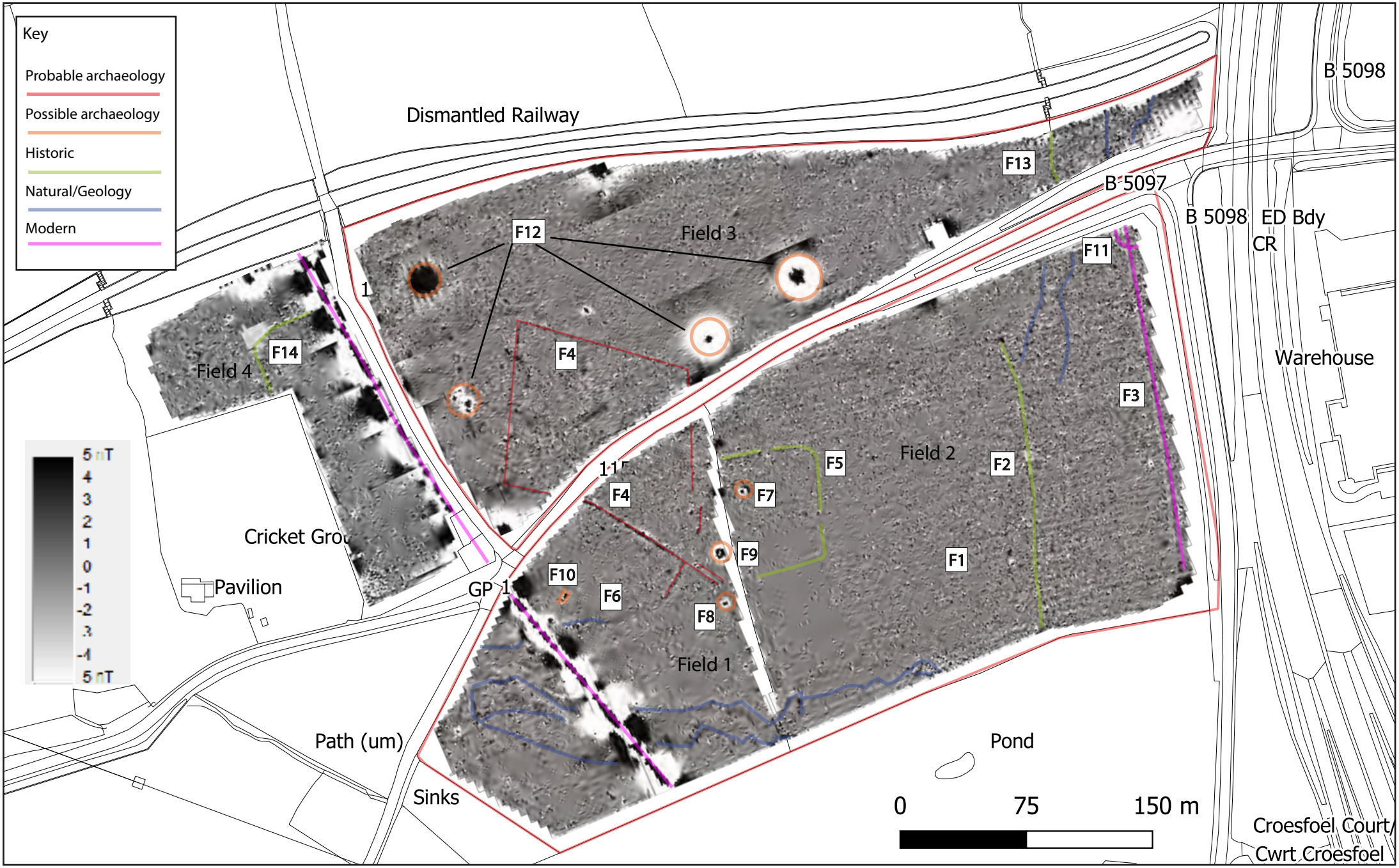


Figure 5. Fields 1-4: Greyscale plot of processed data clipped to +/-5 and destriped, with interpretation

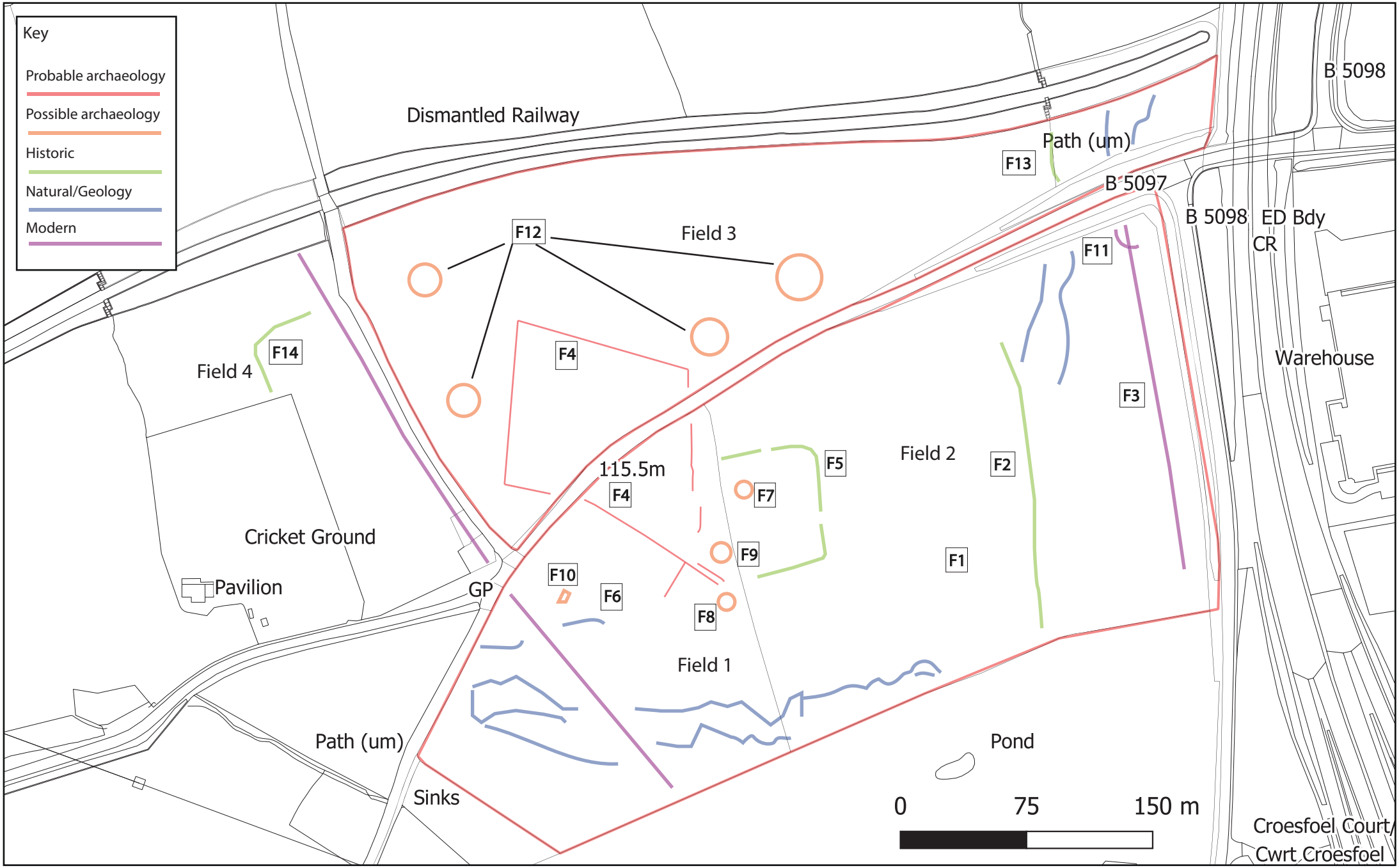


Figure 6. Fields 1-4: interpretation Only

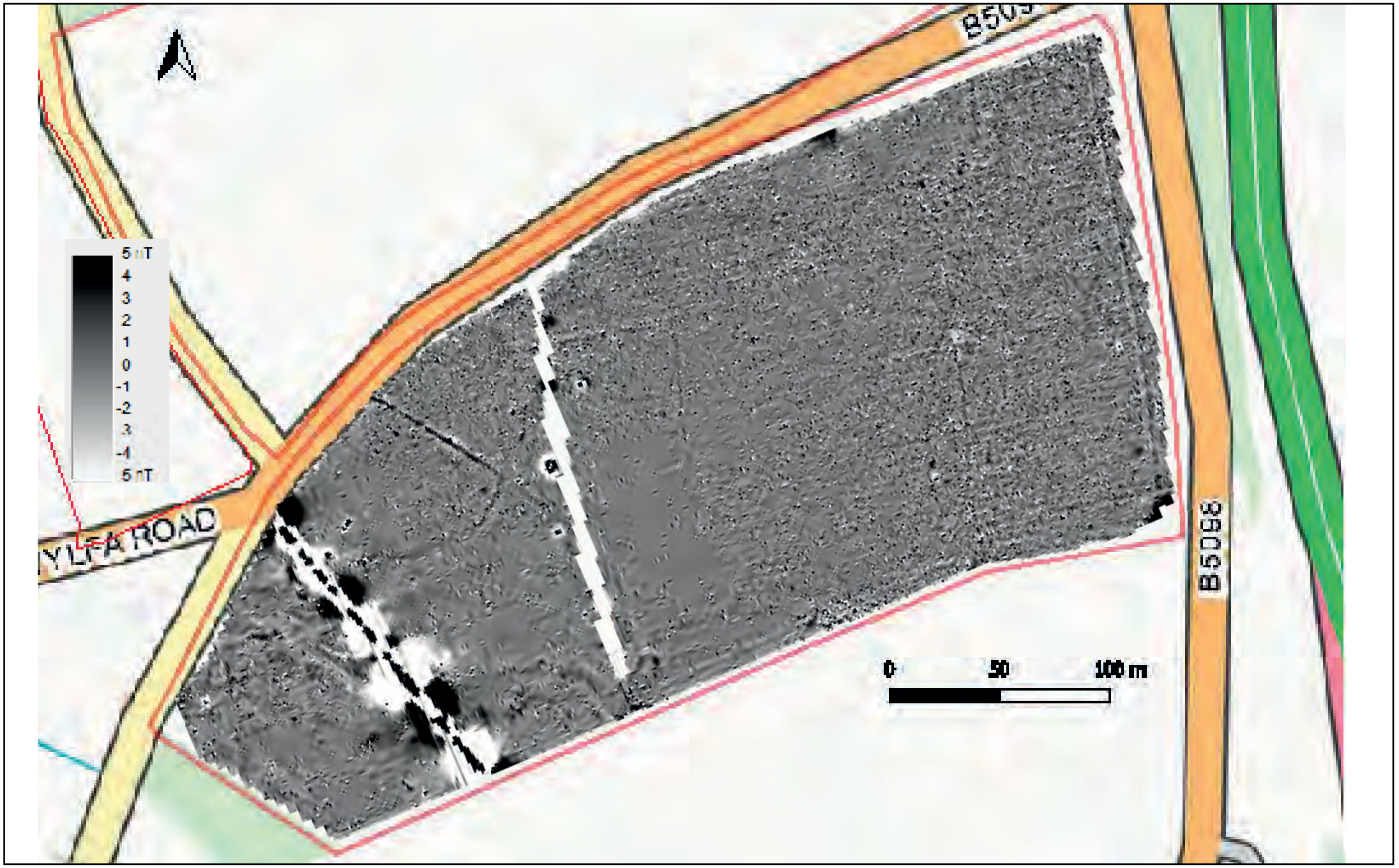


Figure 7. Fields 1-2, Greyscale plot of processed data clipped to +/-5 and destriped

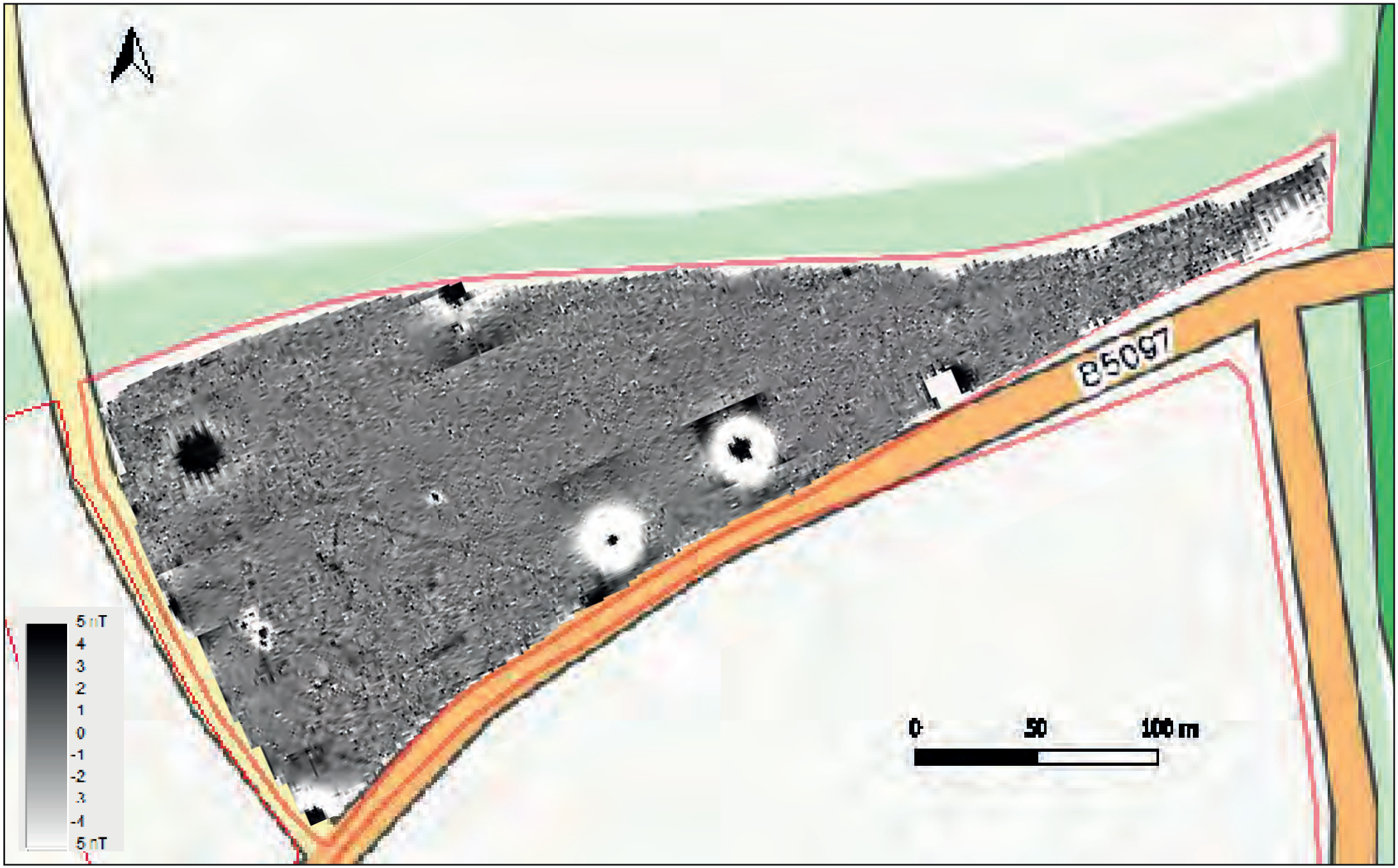


Figure 8. Field 3, Greyscale plot of processed data clipped to +/-5 and destriped

Figure 9. Field 4, Greyscale plot of processed data clipped to +/-5 and destriped

Plate 1: Field 2, view to the southwest.

Plate 2: Field 1, view to the west.

Plate 3: Field 3, NE corner, view to the northeast.

Plate 4: Field 2, view to the south.

Plate 5: Field 4, Lynchet forming western boundary, view to the southwest.

Plate 6: Field 4, SE Corner, view to the southeast.

Plate 6: Field 3, view to the west northwest.

Archaeology Wales

APPENDIX I: Written Scheme of Investigation

ARCHAEOLOGY WALES
Revealing the past, informing the future

Archaeology Wales Ltd
The Reading Room, Town Hall, Llanidloes SY18 6BN
T: 01686 440371
E: info@arch-wales.co.uk
www.arch-wales.co.uk

Written Scheme of Investigation

For a Geophysical Survey:

Land at Rhostyllen, Wrexham

Prepared for:
Novus Renewable Services Ltd

Project No: 3056

March 2023

Archaeology Wales Limited
The Reading Room, Town Hall,
Great Oak St., Llanidloes, Powys, SY18 6BN
Tel: +44 (0) 1686 440319
Email: admin@arch-wales.co.uk

Contents

Non Technical Summary

This Written Scheme of Investigation (WSI) details the methodology for geophysical survey on Land at Rhostyllen, Wrexham, associated with a proposed new battery storage facility and substation on land at Rhostyllen, to the west of Wrexham centred on SJ 29470 48398. It has been prepared by Archaeology Wales Ltd for Novus Renewable Services Ltd, in support of a forthcoming planning application. The local planning authority is Wrexham County Borough Council.

The purpose of the proposed Desk Based Assessment and Site Visit is to highlight and assess the impact of the proposed development on the archaeological resource.

All work will be undertaken in accordance with the standards and guidelines of the Chartered Institute for Archaeologists (2020).

1 Introduction

This Written Scheme of Investigation (WSI) details the methodology for a programme of archaeological mitigation (geophysical survey) to be undertaken at the site. The proposed development comprises plans for the construction of a new battery storage facility and substation and a buried 400kV cable on land at Rhostyllen, to the west of Wrexham centred on SJ 29470 48398 (Figure 1 and 2). The site is currently in the pre-planning application stage, the local planning authority is Wrexham County Borough Council (WCBC).

Whilst the current development proposal is in the pre-planning Application stages, Consultation with Clwyd-Powys Archaeological Trust Archaeological Planning Management (CPAT-APM) dated 13/12/2022 confirmed the requirement for an archaeological Geophysical survey to be submitted in support of the application at the pre-determination stage in the battery storage facility areas to test for unrecorded sub-surface archaeology of prehistoric and medieval date due to the proximity of the proposals to scheduled monuments. If significant geophysical anomalies are found, they will also need to be investigated by targeted trenching at the pre-determination stage. Separate WSIs to cover these required mitigation stages will be produced and submitted to CPAT for approval in advance of commencement of each stage.

This WSI has been prepared by John Davey, Archaeology Wales Ltd (Henceforth - AW) at the request of Novus Renewable Services Ltd. It provides information on the methodology that will be employed by AW during a geophysical survey of the site. This WSI is to be approved by CPAT-APM, on behalf of WCBC, prior to the survey being undertaken. The purpose of the archaeological mitigation (geophysical survey) is to provide WCBC with sufficient information regarding the nature of archaeological remains on the site of the development, the requirements for which are set out in Planning Policy (revised edition 11, 2018), Section 6.1 and Technical Advice Note (TAN) 24: The Historic Environment (2017).

All work will conform to the Standard and Guidance for Geophysical Survey (CIfA December 2020) and be undertaken by suitably qualified staff to the highest professional standards.

2 Site Description

The proposed development is still in the pre-planning application stage. However, it is understood that it will comprise a battery storage project near Bersham on land at Rhostyllen, to the west of Wrexham centred on SJ 29470 48398 (Figure 1 and 2). The proposal will include a battery storage facility and substation that is likely to be contained to the fields marked Option 1 or Option 2 (Figure 2).

The proposed Battery Storage development area currently comprises and mixed-use, irregular, hedged agricultural fields. The area of the two proposed battery storage sites is limited to approximately 7.2 ha centred on NGR SJ 3053948599 (Option 1) and 9.9ha centred on NGR SJ 3061948448 (Option 2), and it is proposed that only one of these options will eventually be developed (Figure 2).

The proposed development area is gently undulating and bounded by embankment of the former Rhos Railway Branch to the north, the A483 Wrexham Bypass to the east opposite the Croesfoel Industrial Estate; and the valley of the Glanyrafon Brook to the south. In general, the ground slopes from approximately 117m above Ordnance Datum to the northwest down to 103m aOD to the southeast. The two proposed locations for the battery storage facility lie on either side of the B5097 Pentre Bychan Road.

The underlying geology for the northern part of the site (Option 1) comprises Mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation - Sedimentary bedrock formed between 319 and 309.5 million years ago during the Carboniferous period. The underlying geology for the southern part of the site (option 2) comprises Mudstone of the Etruria Formation -. Sedimentary bedrock formed between 319 and 308 million years ago during the Carboniferous period.

The bedrock is overlain by superficial deposits which, over the eastern part of the site (options 1 and 2), comprises Devensian Till - Diamicton. A sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period. However, the western part of the site (options 1 and 2) is overlain by Devensian Glaciofluvial Deposits - Sand and gravel, formed between 116 and 11.8 thousand years ago during the Quaternary period. (BGS, Geology Viewer – accessed 20/2/2023).

3 Historical and Archaeological background

The site lies within 200m of the Bersham Conservation Area and the wider proposed development area contains four Scheduled Monuments: Offa's Dyke: Section extending 120m from Railway to Bronwylfa Road, Legacy (DE194); Offa's Dyke: Cadwgan Hall Section, extending from River Clywedog to the Railway (DE132); Moated Site near Groesfoel Farm, Rhostyllen (DE193); and Croes-Foel Round Barrow (DE048). The Croes-Foel Round Barrow (DE048) lies in the south-eastern part of the proposed development area, approximately 200m south of the proposed Option 2 battery storage site. This monument comprises the remains of an earthen built round barrow, which probably dates to the Bronze Age (c. 2300 - 800 BC). The barrow is circular in shape on plan and has a rounded profile. The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual practices.

Two scheduled sections of Offa's Dyke lie within the proposed study area (DE194 & DE132). It is currently proposed that the cable trench will pass across the line of this monument. The linear earthwork is believed to have been constructed in the 8th century AD to define the western border of the Anglo-Saxon kingdom of Mercia. The monument comprises a defensive bank and ditch consisting of a stretch of bank, with a ditch on the western side. A counterscarp (raised bank) may be visible on the west side of the ditch in places. The monument is of national importance for its potential to enhance our knowledge of early medieval defensive organisation and settlement.

Later medieval activity within the site is attested by the presence of the Moated Site near Groesfoel Farm, Rhostyllen (DE193); This monument lies less than 40m southwest of the proposed Option 2 Battery Storage facility, in a separate field. It comprises the remains of a well-preserved medieval moated homestead, lying on fairly low land. The moat is complete except for part of the eastern side and is of an average depth of 1.5m. It is waterfilled in the northwest corner and elsewhere it is marshy. There is a causeway on the north side with traces of masonry and within the enclosure are masonry foundations of a building measuring 5 x 6.5m with a small rectangular addition of 3m square. The monument is of national importance for its potential to enhance our knowledge of medieval settlement.

Further medieval activity is known from Cadwgan Hall immediately to the north of the site and an associated mound: Cadwgan Hall Mound (DE131) thought to be the site of a motte and Bailey adjacent to Offa's Dyke.

Historic maps indicate the presence of Industrial activity in the area by the early 19th century. A coal pit is recorded on the Ordnance Survey surveyors' drawings of 1835 at Esclusham in the southwest part of the wider study area, approximately 800m west of the proposed new Battery Storage facility. A disused railway also runs through the site from west to east. This represents a section of the GWR Rhos Branch line built between 1899 and 1912. The associated Legacy Station appears to have been constructed on the Rhos branch adjacent to the former coal pits (OS County Series 6 inch Denbighshire Sheet XXVIII.SW Revised: 1909 to 1910, Published: 1914).

The site lies within the landmap historic landscape area of Talwrn (WRXHMHL021) characterised as a rural environment of agricultural irregular fieldscapes.

Archaeology Wales have recently caried out an archaeological Desk Based Assessment of the site (Davey & Muller 2023). Cadw have also asked for a Stage 1 settings assessment of all designated archaeological assets within 3km of the site.

4 Objectives

This WSI sets out the methodology to ensure that the geophysical survey will meet the standard required by The Chartered Institute for Archaeologist's *Standard and Guidance for archaeological geophysical survey (2020)*.

The primary objective of the work will be locate and describe, by means of geophysical survey, archaeological features that may be present within the development area. The proposed archaeological work will attempt to elucidate the presence of absence of archaeological material that might be affected by the scheme, in particular its character,

distribution, extent and relative significance.

A report will be produced that will provide information which is sufficiently detailed to allow informed planning decisions to be made that can safeguard the archaeological resource. The information could then be used to determine further archaeological investigation or appropriate mitigation strategies for any archaeological remains within the area to be implemented prior to or during the proposed development.

5 Methodology for geophysical survey

The area to be surveyed will include all of the accessible development area (see the attached plan, Figure 2). On-site adjustments may be required to avoid areas of magnetic interference or inaccessibility, for example wire fencing, ponds or areas of dense undergrowth and steeper slopes which may prove unsuitable for survey.

The site will located by GPS. All survey points will be located with a total station or similar survey equipment and plotted onto an O.S. base map.

The on-site survey will be undertaken in a single phase lasting approximately two weeks. This will be followed by report production.

The survey will be carried out using a Bartington Grad601 Magnetometer. This is chosen as an efficient and effective method of locating archaeological anomalies on this type of site. The machine consists of two high stability fluxgates gradiometers suspended on a single frame, accurately aligned, that can detect localised magnetic anomalies compared with the general magnetic background. When mapped in a systematic manner this allows changes in the magnetic field resulting from differing features in the soil to be plotted. Strong magnetic anomalies will be generated by iron-based objects or areas of heat-activity, such as hearths and kilns. More subtle anomalies may be generated by changes, typically in the iron-oxide content, of underlying soils, compared to the natural subsoil. This helps to detect infilling material of features such as ditches and pits, as well as overlying material such as wall lines.

Relatively level fields of low pasture provide good locations for this type of survey. The surface of the field appears relatively uniform allowing rapid traverses and readings to be taken at consistent heights above the ground surface, and the upper ploughsoil is generally both neither deep enough to mask features cutting into the underlying subsoil, and unlikely to contain a significance amount of material that could interfere with the magnetic readings. The underlying geology appears unlikely to provide a strong magnetic response that could distort the readings. Areas of significant slopes would preclude safe surveying, as would areas of dense vegetation, but previous site visits suggests the vast majority of the area should be open to survey.

Each survey area will be divided into 20m or 30m square grids along a common alignment. Within each grid, parallel traverses 1m apart will be walked at rapid pace along the same orientation. Instrument readings will be logged at 0.25m intervals, with an average cycle of 4 using an ST1 internal sample trigger. Incomplete survey lines resulting from irregular area boundaries or obstacles will be completed using the “dummy log” key.

Further survey information will be completed on the relevant pro-forma sheet. All

data will be downloaded in the field into a laptop computer.

5.1 Data processing and presentation

Following completion of the detailed survey, a composite of the survey area will be created and processed using the software package *Terrasurveyor v.3*. After downloading, the results will be plotted in 2D.

The most typical method of visualizing the date is as a greyscale image. In a greyscale, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A variety of processing tools (including destriping and possibly despiking) will be used to enhance any potential archaeology. The mean level of each traverse of data will be reduced to zero and all grids matched so that there will be no differences between background levels. The data will be analysed using a variety of parameters and styles and the most useful of these will be saved a JPEG/TIFF images and displayed using Adobe Illustrator software.

The final results will be presented at an appropriate scale tied to the Ordnance Survey National Grid. A level of interpretation of these results will also be displayed.

6 Monitoring

CPAT-APM will be contacted approximately one week prior to the commencement of site works, and subsequently once the work is underway.

Any changes to this WSI that AW may wish to make after approval will be communicated to CPAT-APM for approval on behalf of the Planning Authority.

CPAT-APM will be given access to the site so that they can monitor the progress of the work, they will be kept regularly informed about developments, both during the site works and subsequently during the post-fieldwork programme.

7 Post-fieldwork programme

Final reporting

The client report will contain, as a minimum, the following elements:

- Concise non-technical summary of the results
- Description of, and reasoning behind, geophysical survey technique
- Detailed plans of the site and survey results
- Site illustrations, related to Ordnance Datum
- Written description
- Written interpretation of results along with illustrated interpreted site plan
- Statement of local and regional context
- Conclusions as appropriate
- Bibliography
- A copy of the AW Specification

Copies of the report will be sent to the Client, and a copy of the report will be sent to CPAT-APM for approval. Following approval, a copy will also be sent to WCBC and the regional Historic Environment Record. Digital copies will be provided in pdf format if

required.

The report and all relevant information will be submitted to the Historic Environment Record following the guidelines and procedures laid out in the *Guidance for the Submission of Data to the Welsh Historic Environment Records* (WAT 2018).

A summary report of the work will be submitted for publication to a national journal no later than one year after the completion of the work.

7.1 Site archive

The final archive (site and research) will, whenever appropriate, be deposited with the National Monuments Record, RCAHMW. An ordered and integrated project archive will be prepared and deposited in accordance with the National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales (National Panel for Archaeological Archives in Wales, 2019) and the Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs) (Welsh Archaeological Trusts, October 2022).

Copies of all reports, the digital archive and an archive index will be deposited with the National Monuments Record, RCAHMW, Aberystwyth. A high-resolution pdf copy of the report will be deposited with CPAT HER via https://cpat.org.uk/heddos.html.

8 Resources and timetable

Standards
AW works to the standards and guidance provided by the *Chartered Institute for Archaeologists*. AW fully recognise and endorse the Chartered Institute for Archaeologists' *Code of Conduct*, *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* and the *Standard and Guidance for archaeological geophysical survey* currently in force. All employees of AW, whether corporate members of the Chartered Institute for Archaeologists or not, are expected to adhere to these Codes and Standards during their employment.

Staff
The project will be undertaken by suitably qualified AW staff. Overall management of the project will be undertaken by John Davey MCIfA, AW Senior Project Manager.

Equipment
The project will use a Bartington Grad601 set to standard specifications.

Timetable of archaeological works
The work will be undertaken soon after approval of this WSI. Currently the start date is scheduled for 20th March 2023. The fieldwork is expected to last 2 weeks.

Insurance
AW is fully insured for this type of work, and holds Insurance with Aviva Insurance Ltd and Hiscox Insurance Company Limited through Towergate Insurance. Full details of these and other relevant policies can be supplied on request.

Arbitration

Disputes or differences arising in relation to this work shall be referred for a decision in accordance with the Rules of the Chartered Institute of Arbitrators' *Arbitration Scheme for the Institute for Archaeologists* applying at the date of the agreement.

9 Health and safety

Prior to the commencement of work AW will carry out and produce a formal Health and Safety Risk Assessment in accordance with *The Management of Health and Safety Regulations* 1999. A copy of the risk assessment is attached, and a copy will be kept on site and be available for inspection on request. A copy will be sent to the client (or their agent as necessary) for their information. All members of AW staff will adhere to the content of this document.

AW will adhere to best practice with regard to Health and Safety in Archaeology as set out in the FAME (Federation of Archaeological Managers and Employers) health and safety manual *Health and Safety in Field Archaeology (2002)*.

10 References

Chartered Institute for Archaeologists. 2020*. Standard and guidance for the collection, documentation, conservation and research of archaeological materials.*

Chartered Institute for Archaeologists. 2020. *Standard and guidance for archaeological geophysical survey.*

Davey, J. & Muller, J. 2023. *Archaeological Desk Based Assessment On Land at Rhostyllen, Wrexham; February 2023.* Archaeology Wales Report No. 2162.

The Welsh Archaeological Trusts (WAT). October 2022. *Guidance for the Submission of Data to the Welsh Historic Environment Records.*

Websites Consulted

British Geological Survey: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/

Accessed 20/02/2023

National Library of Scotland Maps: https://maps.nls.uk/ Accessed 20/02/2023

ARCHAEOLOGY WALES

Archaeology Wales Limited
Main Office, Unit D11.6 Treforest Industrial Estate
Pontypridd - CF37 5UR
Tel: +44 (0) 1686 440371
Email: admin@arch-wales.co.uk
Web: arch-wales.co.uk