GEOPHYSICAL SURVEY REPORT

CHERISH Ireland-Wales Project -
Fach Farm, Abersoch, Gwynedd

Client

Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Survey Report

14719

Date

May 2019

Survey Report 14719: CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

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2. SURVEY TECHNIQUE

Detailed magnetic survey (magnetometry) was chosen as the most efficient and effective method of locating the type of archaeological anomalies which might be expected at this site. A 0.5m traverse interval was chosen to provide extra detail over the enclosure itself.

Bartington Cart System	Traverse Interval 1.0m	Sample Interval 0.125m
Bartington Cart System	Traverse Interval 0.5m	Sample Interval 0.125m

3 SUMMARY OF RESULTS

3.1 A detailed magnetometry survey was conducted over approximately 6.8 ha of pasture at Fach Farm, Abersoch, as part of the CHERISH Ireland-Wales project, with the aim of clarifying the nature of the enclosure feature identified through aerial reconnaissance. The survey has identified a large multi-vallate enclosure, comprising three defensive ditches, probable annexes and internal settlement features. Additional evidence of settlement activity is present across the site, and includes a sub-rectangular enclosure, several ditches, pits and potential ring-ditches. Further linear anomalies are of undetermined origin, while evidence of modern ploughing activity has been mapped across the site.

4 INTRODUCTION

4.1 **SUMO Geophysics Ltd** were commissioned by the Royal Commission on the Ancient and Historical Monuments of Wales as part of their CHERISH – Climate Change and Coastal Heritage - project, aimed at raising awareness and understanding of the past, present and near future impacts of climate change, storminess and extreme weather events on the rich cultural heritage of the sea and coast (http://www.cherishproject.eu/). CHERISH is a five-year Ireland-Wales project, between the Royal Commission on the Ancient and Historical Monuments of Wales, the Discovery Programme, Ireland, Aberystwyth University: Department of Geography and Earth Sciences and the Geological Survey Ireland. It began in January 2017 and will run until December 2021; the project will receive €4.1 million of EU funds through the Ireland Wales Co-operation Programme 2014-2020.

4.2 Site details

NGR / Postcode	SH 312 290 / LL53 7AD
Location	The site is located to the north of Abersoch, Gwynedd, lying immediately south-west of Fach Farm Caravan Park.
HER	Gwynedd Archaeological Trust (GAT)
Unitary Authority	Gwynedd
Parish	Llanengan
Topography	Fairly level, with a general fall from northwest-southeast.
Current Land Use	Pasture
Geology (BGS 2019)	Bedrock: Bach Formation - sandstone and mudstone. Superficial: none recorded.
Soils (CU 2019)	Soilscape 6; freely draining slightly acid loamy soils.
Archaeology (RCAHMW 2019)	Royal Commission aerial reconnaissance in 2018 revealed parch-marks south of Fach Farm of an apparent bivallate square enclosure with rounded corners some 70m across, possibly representing a later prehistoric enclosure. The enclosure appears to be encircled by an outer defensive ditch and was thought to be similar to a probable Roman forlet, surveyed by GAT at Cemlyn on north Anglesey in 2014. The enclosure occupies a locally prominent knoll below the summit of a south-east facing ridge at around 45m O.D., sited against an escarpment edge on the east side, with good views of Abersoch beach beyond.
Survey Methods	Magnetometer survey (fluxgate gradiometer)
Study Area	*c.* 6.8 ha

4.3 **Aims and Objectives**

To characterise the nature of the buried remains and to clarify the morphology of the enclosure, and to locate and characterise any anomalies of possible archaeological interest beyond the cropmark.

5 RESULTS

The survey has been divided into six survey areas (Areas 1-6) and specific anomalies have been given numerical labels [1] [2] *which appear in the text below, as well as on the Interpretation Figure(s).*

5.1 ***Probable / Possible Archaeology***

5.1.1 A multi-vallate enclosure [1] has been detected in the location of the parch marks identified in the aerial reconnaissance survey carried out by the RCAHMW (2019). The enclosure comprises three concentric ditches, with the outer ditch measuring some 115m in diameter, and the smallest inner ditch approximately 50m across. The enclosure was originally thought to be a "bivallate square enclosure with rounded corners, comparable to that of a Roman Fortlet (GAT 37976) on Anglesey" (RCAHMW 2019); however, the results indicate that the Fach Farm enclosure is in fact circular in form and comprises three defensive ditches as opposed to two. It is arguable that the smallest, internal ditch, has a sub-rectangular form similar to that at Cemlyn; however, few other similarities can be drawn between the Cemlyn site and the enclosure at Fach Farm (Plates 1 & 2 below).

Plate 1: Fach Farm univallate enclosure (SUMO 2019)

Plate 2: Cemlyn Roman Fortlet (GAT 2015)

5.1.2 The enclosure [1] may have potential entrances in the south-west and west, though their interpretation as such is tentative given the level of disturbance around them. A partial sub-rectangular anomaly and small cluster of pit-like anomalies [2] are evident within the enclosure and are thought to reflect evidence of settlement activity. Further pits [3] can be seen running along the interior of the outer defensive ditch; it is tempting to interpret these

as a line of post pits, originally forming a timber palisade. The south-eastern arc of the innermost ditch appears to be missing, and the 1892 - 1914 25 Inch OS Map (Fig. 08) shows this area of the site as scrubland; therefore, it is possible that the ditch has been destroyed as a result of land clearance, and only deeper ditches survive in the area.

5.1.3 A small, sub-circular response, measuring approximately 5m in diameter [4], and abutting the inner enclosure ditch of [1] could be a small annexe with associated pits. Similarly, additional ditches and a potential annular response [5] could indicate further subdivisions, while the sub-circular response could potentially be indicative of a ring-ditch.

5.1.4 A series of ditch-type anomalies [6] in the west of Area 2 appear to form a sub-rectangular enclosure, measuring approximately 50m x 60m. It is possible that this is associated with the multi-vallate enclosure [1] to its east, however its exact relationship is unclear, and it remains undecided as to whether the two enclosures are contemporary or reflect differing phases of activity. Within the sub-rectangular enclosure [6], a number of incomplete circular responses and small discrete anomalies [7] can be seen. These anomalies may be a result of a series of adjoining ring-ditches, with the small discrete responses indicative of pits. However, the responses lack clarity and appear to have been truncated as a result of modern ploughing activity; hence their interpretation as ‘possible’ archaeology.

5.1.5 A linear ditch-type anomaly [8] can be seen running approximately northeast-southwest from the western edge of the enclosure [1], and although intermittent in nature, a continuation of the ditch appears to be visible in Area 4 [9]. A small group of discrete anomalies [8a] may form the middle section of the ditch [8-9], they may be pits or remnants of the ditch truncated by ploughing.

5.1.6 A further ditch-like response [10] is visible running from Area 2 into Area 5. This anomaly, along with those of [8-9] are likely to form part of a wider field system associated with the enclosure site [1].

5.1.7 The parallel linear responses [11] are ditch-like in appearance and of possible archaeological origin; they may be associated with a trackway, however the disturbance from the nearby underground service makes further interpretation difficult.

5.2 ***Uncertain***

5.2.1 A number of linear and isolated discrete responses plus clusters of anomalies are visible across the site, all of which could have an archaeological, natural or modern explanation. Some of the clusters of discrete anomalies may be of archaeological interest; for example, a small group of weak, possible sub-circular responses and a small, trapezoidal response in Areas 2 and 4 may be of archaeological interest, though they could equally be natural or a result of agricultural activity. Other positive linear trends could be a result of ditches, though their exact origin remains unclear. A negative linear response running approximately east-west across Area 2 could feasibly be associated with an old field boundary, though no evidence of such a feature is visible on historic maps. Parallel linear anomalies in Area 5 could be archaeological. i.e. a trackway, though their alignment corresponds with modern plough lines and they may simply be agricultural in origin.

5.3 *Agricultural – Ploughing*

5.3.1 Straight, closely spaced, magnetically weak parallel linear anomalies are visible across the site on varying orientations. These are likely to be a result of modern agricultural practice, i.e. ploughing. The effect of the ploughing on the buried archaeological remains is evident in some locations, whereby the agriculture appears to cut through or truncate likely archaeological ditches.

5.4 *Natural / Geological / Pedological*

5.4.1 Amorphous magnetic anomalies are visible throughout the data, and these are likely to have natural origins, i.e. relate to localised variations in the underlying geology.

5.5 *Ferrous / Magnetic Disturbance*

5.5.1 A strong bipolar linear anomaly runs across the site and is a result of an underground service such as a pipe or cable. The response appears to bisect the western-most edge of the muilt-vallate enclosure [1] and the magnetic disturbance associated with the service may have the potential to mask archaeological responses.

5.5.2 Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

6 DATA APPRAISAL & CONFIDENCE ASSESSMENT

6.1 Historic England guidelines (EH 2008) Table 4 states that the typical magnetic response on the local soils / geology is generally good but it can be variable. The results from this survey indicate the presence of probable later prehistoric multi-vallate enclosure, along with a rectilinear enclosure, pits and a potential field system. It can therefore be determined that the technique has been effective.

7 CONCLUSION

7.1 The survey at Fach Farm, Abersoch, has identified a multi-vallate defended settlement, in contrast to an earlier assessment of the site from aerial reconnaissance (RCAHMW) when it was thought to be associated with a Roman fortlet. Comparisons had been drawn between Fach Farm and another Roman fortlet at Cemlyn (GAT 2015), but this now seems unlikely. This geophysical survey has revealed three concentric defensive ditches, some 115m across at its widest point, and as such it is probable that the site has origins earlier than the Roman period, though the exact date of the settlement is difficult to ascertain.

7.2 Within the area surrounding the enclosure, a number of additional linear and discrete anomalies have been identified, including a sub-rectangular enclosure, potential ring-ditches and trackways. The exact origin of these responses remains less clear, and it is feasible that the ditches relate to a peripheral field system.

7.3 The remaining linear anomalies identified in the survey could have archaeological, natural or agricultural origins. Evidence for modern ploughing is visible across the site, along with a couple of areas of natural magnetic variation and an underground service.

8 REFERENCES

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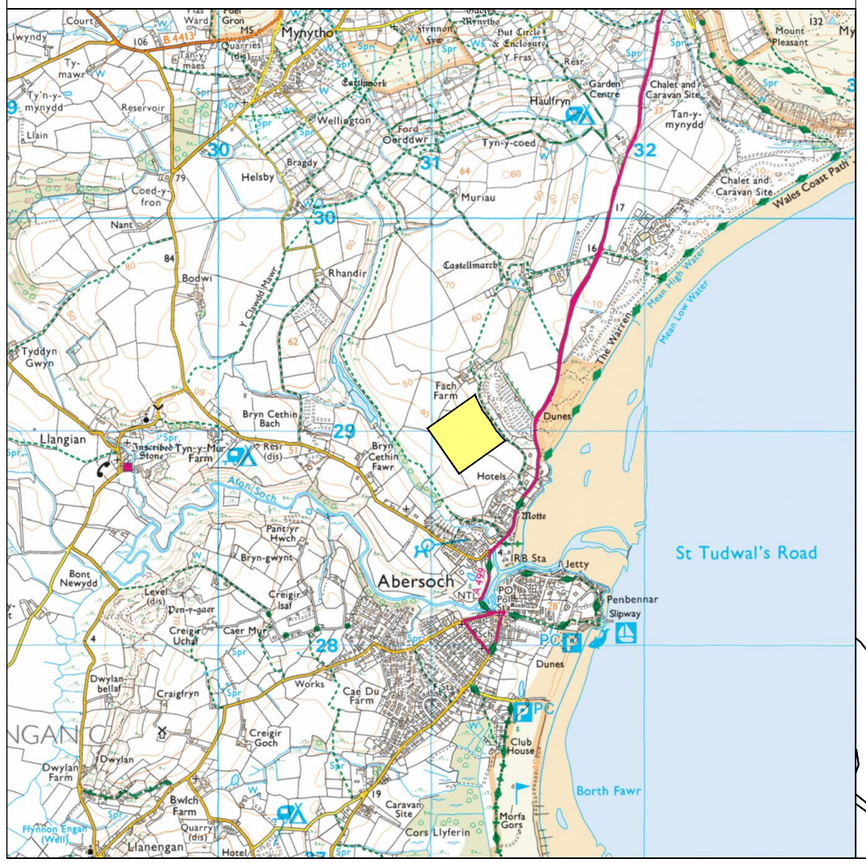
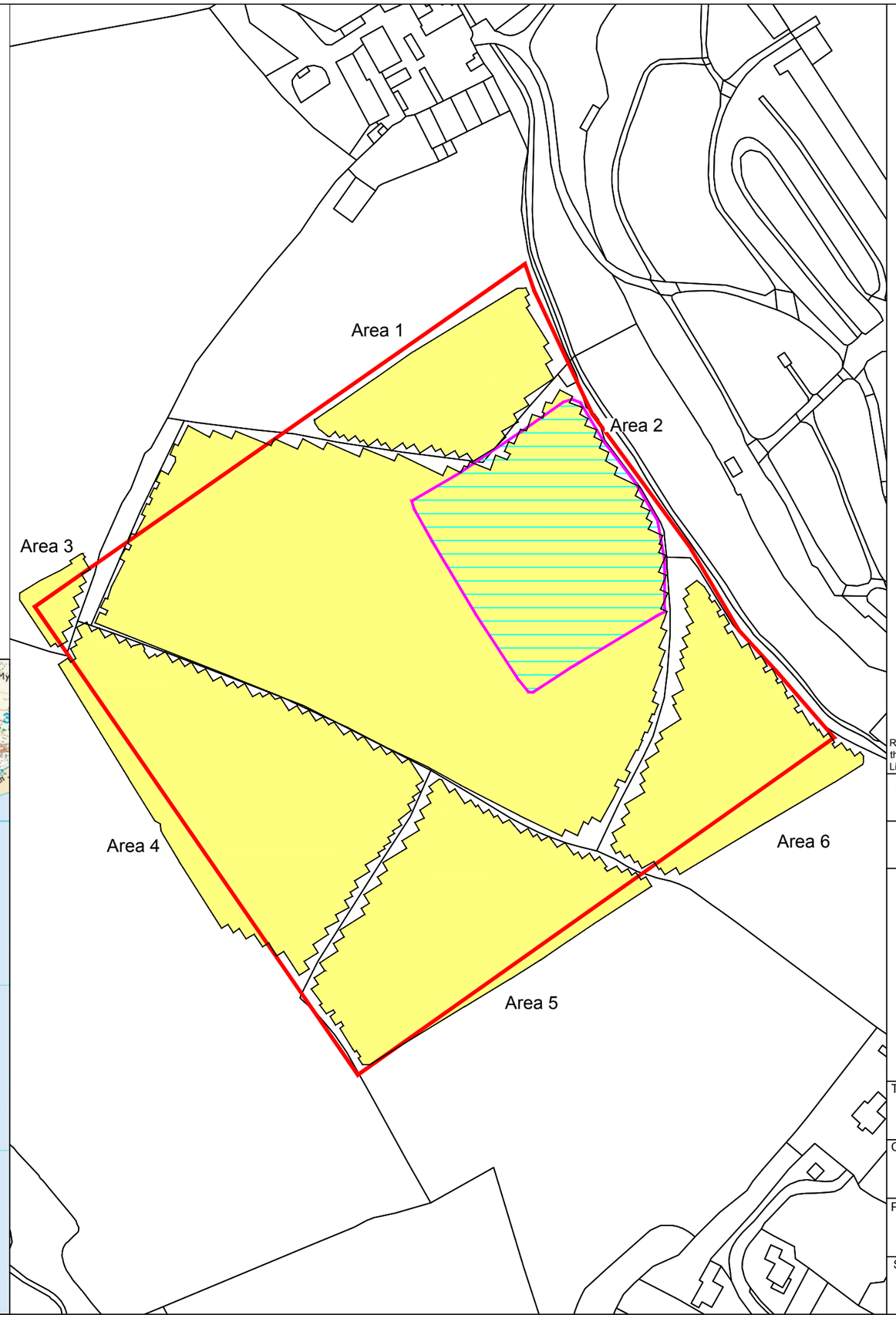




Survey Areas (1.0m x 0.125m)	N
Survey Area (0.5m x 0.125m)	

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Site Location

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
NOT TO SCALE

Fig No:
01

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 75
1:1500 @ A3

Fig No:
02

Area 1

Area 2

Area 3

Area 4

Area 5

Area 6

N

+4nT

-2nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 75
1:1500 @ A3

Fig No:
03

a 3

Area 2

Area 2

0.5m centred data

1.0m centred data

N

Area of 0.5m centred data

+2nT

-1nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 50
1:1000 @ A3

Fig No:
04

a 3

Area 2

Area 2

0.5m centred data

1.0m centred data

N

+4nT

-2nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 50
1:1000 @ A3

Fig No:
05

Area 1

Area 2

Area 3

Area 4

Area 5

Area 6

1

2

3

4

5

6

7

8

8a

9

10

10

11

N

KEY

	Probable archaeology (discrete anomaly / trend)
	Possible archaeology (discrete anomaly / trend / area of increased response)
	Uncertain Origin (discrete anomaly / trend / area of increased response)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Interpretation - Overview

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 75
1:1500 @ A3

Fig No:
06

Area 2

1
2
3
4
5
10

N

+4nT
-2nT

KEY

- Probable archaeology (discrete anomaly / trend)
- Possible archaeology (discrete anomaly / trend / area of increased response)
- Uncertain Origin (discrete anomaly / trend / area of increased response)
- Agriculture (plough)
- Natural (e.g. geological / pedological)
- Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

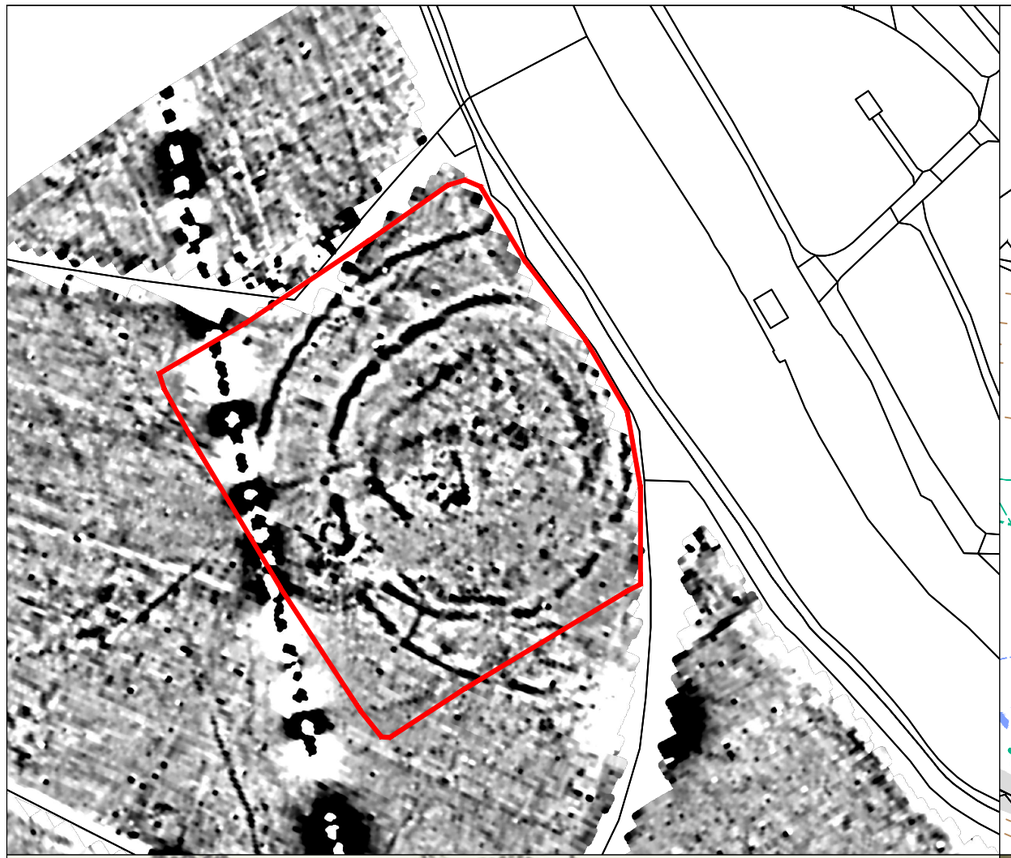
Title:
Magnetometer Survey -
Focused Greyscale Plot and Interpretation

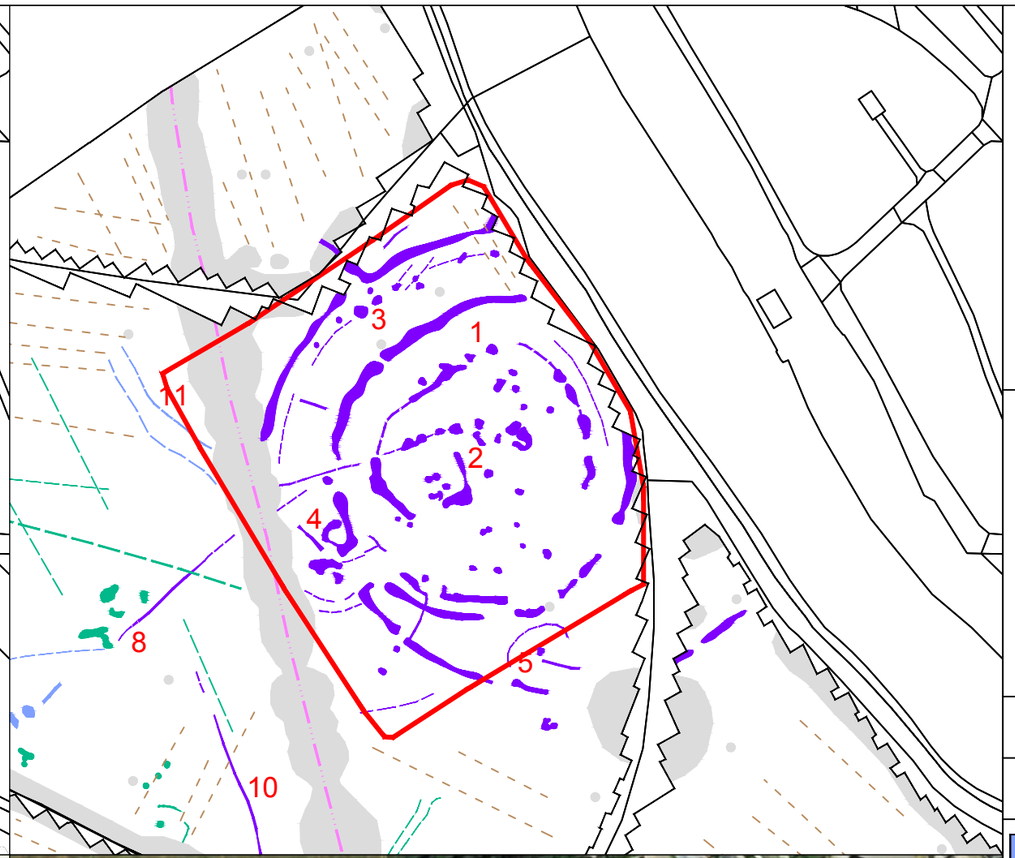
Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

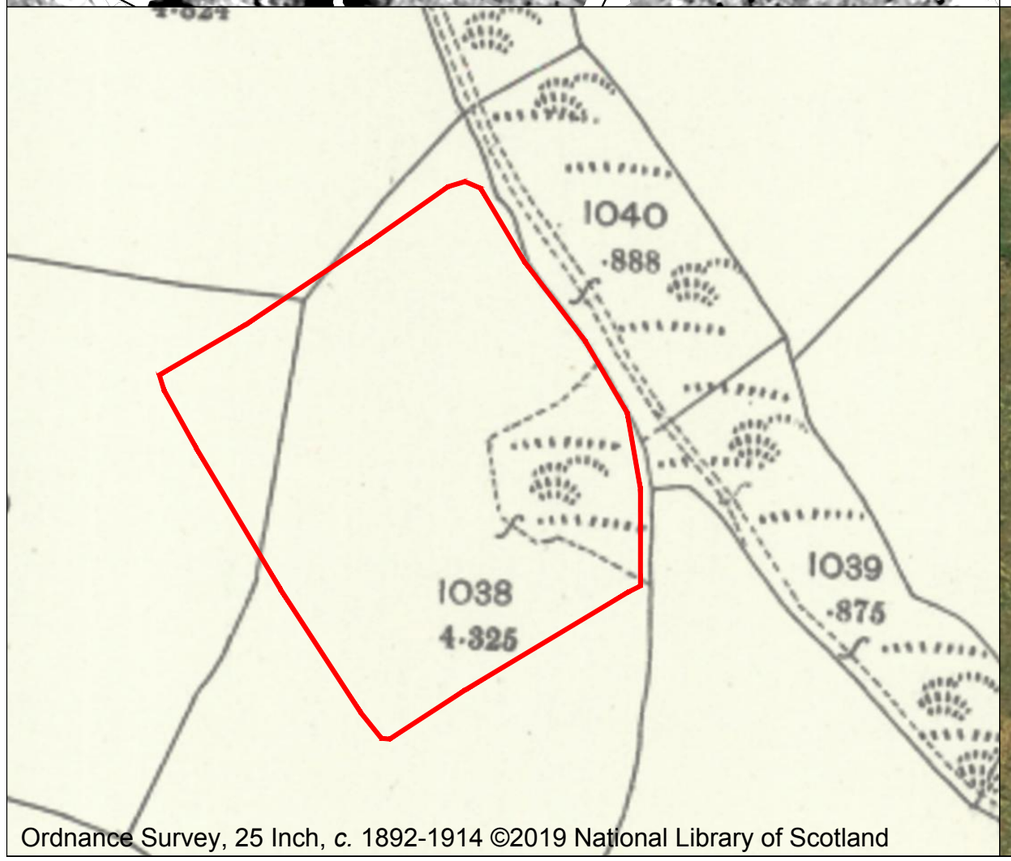
Project:
14719 - CHERISH Ireland-Wales Project -
Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 50
1:1000 @ A3

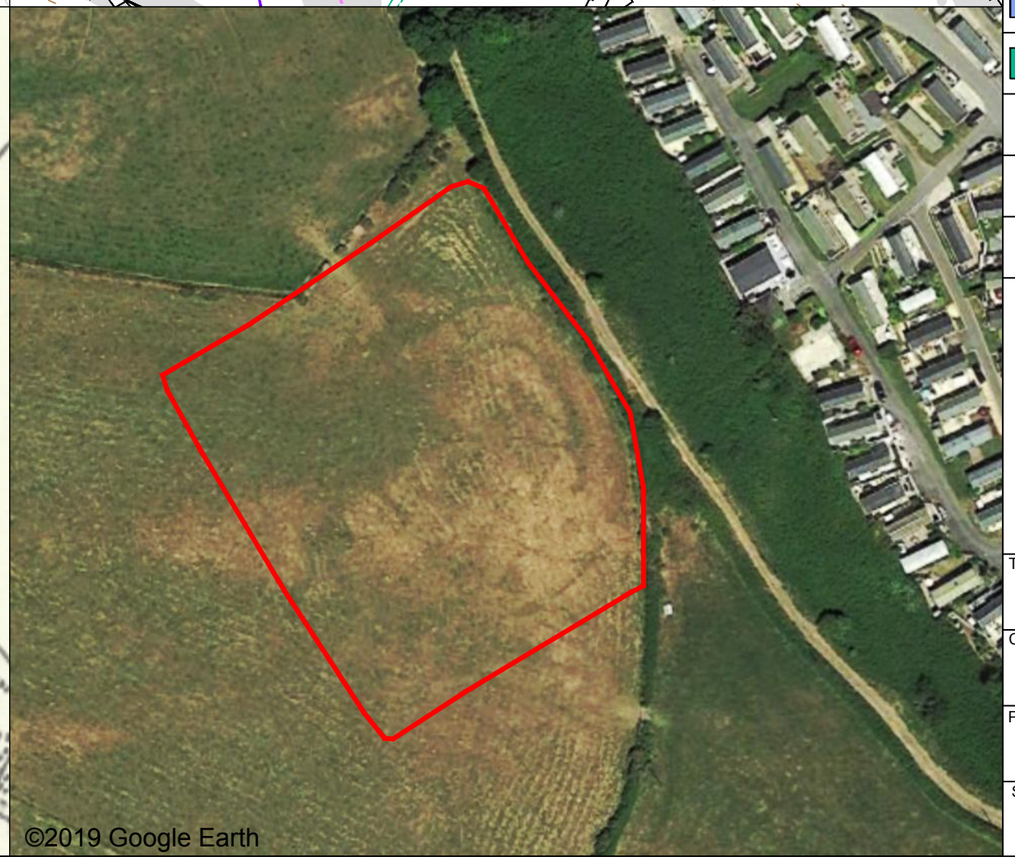
Fig No:
07







Ordnance Survey, 25 Inch, *c.* 1892-1914 ©2019 National Library of Scotland



©2019 Google Earth

N

+4nT

-2nT

KEY

- Probable archaeology (discrete anomaly / trend)
- Possible archaeology (discrete anomaly / trend / area of increased response)
- Uncertain Origin (discrete anomaly / trend / area of increased response)
- Agriculture (plough)
- Natural (e.g. geological / pedological)
- Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Focused Greyscale Plot, Interpretation, *c.* 1892-1914 OS 25 Inch Map and 2018 Google Earth Image

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 75
1:1500 @ A3

Fig No:
08

Area 1

Area 2

Area 3

Area 4

Area 5

Area 6

N

+5nT

-5nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Minimally Processed Data - Greyscale Plots

Client:
Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)

Project:
14719 - CHERISH Ireland-Wales Project - Fach Farm, Abersoch, Gwynedd

Scale:
0 metres 75
1:1500 @ A3

Fig No:
09

Appendix A - Technical Information: Magnetometer Survey Method, Processing and Presentation

Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: Bartington *Grad* 601-2

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

Presentation of results and interpretation

The presentation of the results includes a ‘minimally processed data’ and a ‘processed data’ greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the ‘Interpretation’ drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: Probable, or Possible Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification Possible.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* / *Natural* or (in the case of linear responses) *Possible Archaeology* / *Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

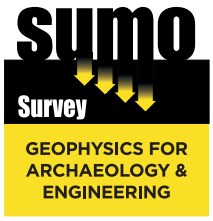
Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

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