

GEOPHYSICAL SURVEY REPORT

STRATASCAN™



Project name:

Dolbenmaen to Cwmystradlyn

Client:

Gwynedd Archaeological Trust

February 2014

Job ref:

J6198

Report author:

Orlando J. Prestidge BA(Hons) MA AlFA

GEOPHYSICAL SURVEY REPORT

Project name:

Dolbenmaen to Cwmystradlyn

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Job ref:

J6198

Techniques:

**Detailed magnetic survey –
Gradiometry**

Survey date:

2nd - 9th December

22nd – 23rd February

Site centred at:

SH 492 432

Post code:

LL51 9LQ

Field team:

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1 SUMMARY OF RESULTS

A detailed gradiometry survey was conducted over approximately 16.2 hectares of mixed upland pasture. No probable archaeology has been located. A number of features of possible archaeological origin have been identified predominantly towards the western end of the survey area. These include a number of linear and curvi-linear cut features and evidence of ploughed out embankments and earthworks.

Other modern and natural features have also been identified including magnetic disturbance, magnetic debris and spikes, utilities, an area of unknown disturbance and areas of natural background variation.

2 INTRODUCTION

2.1 *Background synopsis*

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by Gwynedd Archaeological Trust.

2.2 *Site location*

The site is located near Dolbenmaen, Gwynedd at OS ref. SH 492 432. The survey area sits north of the A487 road and north west of the town of Porthmadog.

2.3 *Description of site*

The survey area is 16.2 hectares of mixed upland pasture in a linear, pipeline route of 5.42km. The topography is mostly sloping, with some steeper slopes in places. The majority of the route roughly follows the line of the A487 road. Some small areas of the pipeline route were unsurveyable due to protruding rocky outcrops.

2.4 *Geology and soils*

The underlying geology is Unnamed Extrusive Rocks, Ordovician - Tuff, Felsic. Igneous Bedrock formed approximately 444 to 488 million years ago in the Ordovician Period (British Geological Survey website). The drift geology is Till - Diamicton. (British Geological Survey website).

The overlying soils are known as Wick 1 which are typical deep well drained coarse loamy and sandy soils. Some similar soils are affected by groundwater (Soil Survey of England and Wales, Sheet 2 Wales).

2.5 **Site history and archaeological potential**

No specific details were available to Stratascan.

2.6 **Survey objectives**

The objective of the survey was to locate any features of possible archaeological origin in order that they may be assessed prior to development.

2.7 **Survey methods**

This report and all fieldwork have been conducted in accordance with both the English Heritage guidelines outlined in the document: *Geophysical Survey in Archaeological Field Evaluation, 2008* and with the Institute for Archaeologists document *Standard and Guidance for Archaeological Geophysical Survey*.

Detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomalies. More information regarding this technique is included in the Methodology section below and in Appendix A.

2.8 **Processing, presentation and interpretation of results**

2.8.1 *Processing*

Processing is performed using specialist software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following schedule shows the basic processing carried out on all minimally processed gradiometer data used in this report:

- | | |
|---------------------|--|
| 1. <i>Destripe</i> | (Removes striping effects caused by zero-point discrepancies between different sensors and walking directions) |
| 2. <i>Destagger</i> | (Removes zigzag effects caused by inconsistent walking speeds on sloping, uneven or overgrown terrain) |

2.8.2 *Presentation of results and interpretation*

The presentation of the data for each site involves a print-out of the minimally processed data both as a greyscale plot and a colour plot showing extreme magnetic values, together with a greyscale plot of the processed data. Magnetic anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing for the site.

3 RESULTS

The detailed magnetic gradiometer survey conducted at Dolbenmaen has identified a number of anomalies that have been characterised as being of *possible* archaeological origin.

The difference between *probable* and *possible* archaeological origin is a confidence rating. Features identified within the dataset that form recognisable archaeological patterns or seem to be related to a deliberate historical act have been interpreted as being of a probable archaeological origin.

Features of possible archaeological origin tend to be more amorphous anomalies which may have similar magnetic attributes in terms of strength or polarity but are difficult to classify as being archaeological or natural.

The following list of numbered anomalies refers to numerical labels on the interpretation plots.

3.1 *Probable Archaeology*

No probable archaeology has been identified within the survey area.

3.2 *Possible Archaeology*

- 1 A number of positive linear and curvi-linear anomalies, possibly relating to cut features of archaeological origin. These could indicate the presence of ditches, field boundaries and enclosures.
- 2 A number of linear and curvi-linear negative anomalies, possibly relating to ploughed out bank or earthwork features of archaeological origin.
- 3 A curvi-linear area of magnetic debris, possibly of archaeological origin.
- 4 A number of positive point features, possibly indicating the presence of areas of pitting of an archaeological origin.

3.3 *Other Anomalies*

- 5 Linear anomaly probably related to pipe, cable or other modern service.
- 6 Areas of magnetic disturbance are the result of substantial nearby ferrous metal objects such as fences and underground services. These effects can mask weaker archaeological anomalies, but on this site have not affected a significant proportion of the area.
- 7 An area of strong magnetic debris, possibly disturbed or made ground.
- 8 Scattered magnetic debris
- 9 Area of amorphous magnetic variation, probably of natural (e.g. geological or

- pedological) origin.
- 10** Area of magnetic disturbance of uncertain origin.
- 11** A number of magnetic 'spikes' (strong focussed values with associated antipolar response) indicate ferrous metal objects. These are likely to be modern rubbish.

4 CONCLUSION

A detailed gradiometry survey was conducted over approximately 16.2 hectares of mixed upland pasture. No probable archaeology has been located. A number of features of possible archaeological origin have been identified predominantly towards the western end of the survey area. These include a number of linear and curvi-linear cut features and evidence of ploughed out embankments and earthworks.

Other modern and natural features have also been identified including magnetic disturbance, magnetic debris and spikes, utilities, an area of unknown disturbance and areas of natural background variation.

5 REFERENCES

British Geological Survey South Sheet, 1977. *Geological Survey Ten Mile Map, South Sheet First Edition (Quaternary)*. Institute of Geological Sciences.

British Geological Survey, 2001. *Geological Survey Ten Mile Map, South Sheet, Fourth Edition (Solid)*. British Geological Society.

British Geological Survey, n.d., *website*:
(<http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps>) Geology of Britain viewer.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 2 Wales*.

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<http://www.archaeologists.net/sites/default/files/nodefiles/Geophysics2010.pdf>

APPENDIX A – METHODOLOGY & SURVEY EQUIPMENT

Grid locations

The location of the survey grids has been plotted together with the referencing information. Grids were set out using a Leica 705auto Total Station and referenced to suitable topographic features around the perimeter of the site or a Leica Smart Rover RTK GPS.

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. A SmartNet RTK GPS uses Ordnance Survey's network of over 100 fixed base stations to give an accuracy of around 0.01m.

Survey equipment and gradiometer configuration

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

Sampling interval

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid.

Depth of scan and resolution

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m, though strongly magnetic objects may be visible at greater depths. The collection of data at 0.25m centres provides an optimum methodology for the task balancing cost and time with resolution.

Data capture

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.

APPENDIX B – BASIC PRINCIPLES OF MAGNETIC SURVEY

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.

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 and material such as brick and tile may be magnetised through the same process.

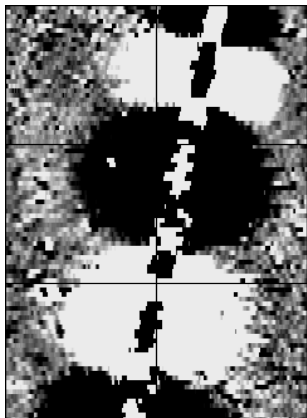
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement 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 field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried 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, disturbance from modern services etc.

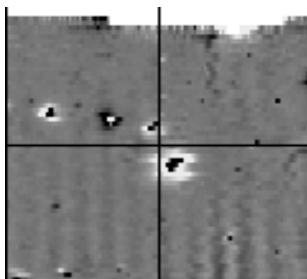
APPENDIX C – GLOSSARY OF MAGNETIC ANOMALIES

Bipolar



A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

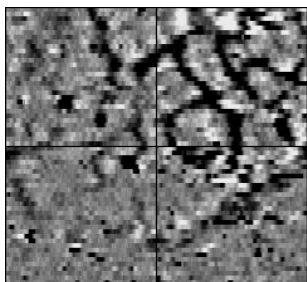


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

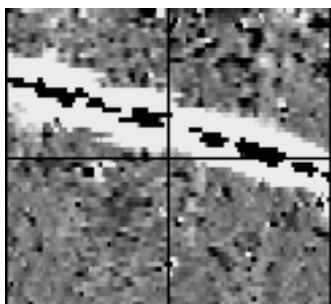
See bipolar and dipolar.

Positive linear



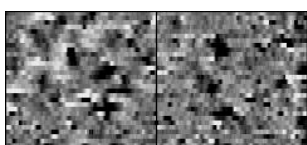
A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.

Positive linear anomaly with associated negative response



A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

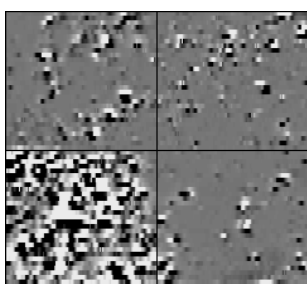
Positive point/area



depressions in the ground.

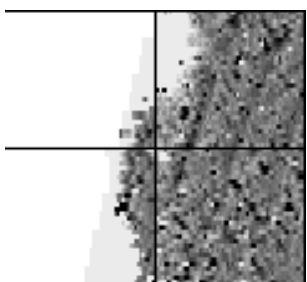
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring

Magnetic debris



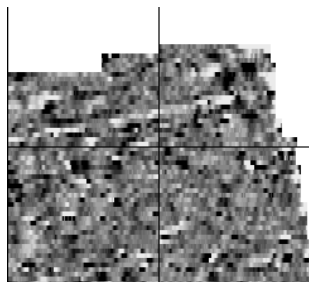
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low ($\pm 3\text{nT}$) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly ($\pm 250\text{nT}$) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremanent material such as bricks or ash.

Magnetic disturbance



Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.

Negative linear

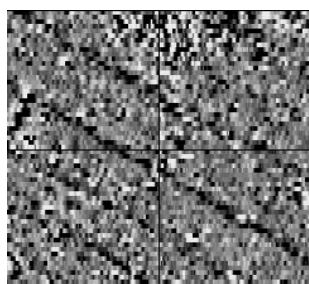


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity



Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing, clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

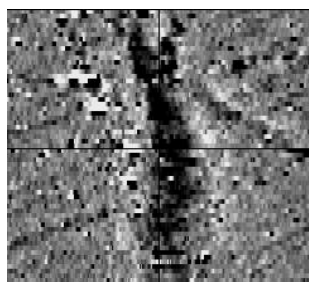
Strength of response

The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a 10m² area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Colour plots are used to show the amplitude of response.

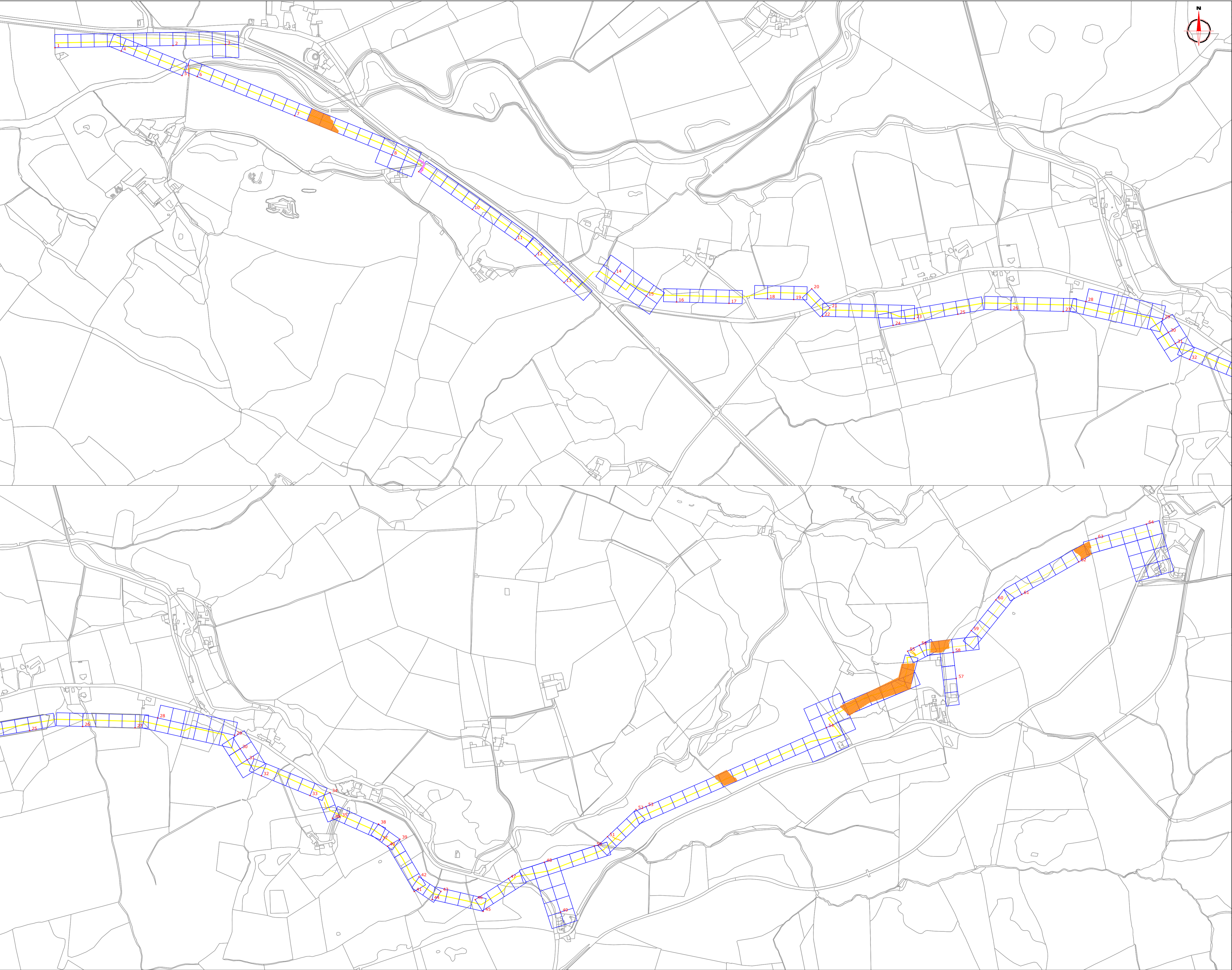
Thermoremanent response

A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately ± 100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred in situ (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations



Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Survey area

Site centred on NGR SH 492 432

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Upper Hook Road
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WR8 0SA

OS 100km square = SH

KEY

- Unsurveyable area
- Survey grid
- GPS referencing point

OS REFERENCING INFORMATION

ID	Easting	Northing	ID	Easting	Northing
1	250065.97	343091.14	33	252770.64	342333.40
2	250335.92	343096.20	34	252816.34	342339.78
3	250455.00	343098.45	35	252830.04	342284.30
4	250217.47	343083.45	36	252821.66	342281.46
5	250356.65	343027.51	37	252931.06	342232.13
6	250391.29	343025.09	38	252927.10	342268.24
7	250613.98	342935.58	39	252975.98	342233.44
8	250836.66	342846.07	40	252947.89	342217.60
9	250897.48	342807.82	41	253008.76	342114.19
10	251020.03	342721.33	42	253019.82	342147.55
11	251118.07	342652.14	43	253069.74	342114.26
12	251163.52	342615.15	44	253049.50	342095.71
13	251229.65	342554.11	45	253166.42	342068.69
14	251344.01	342575.42	46	253148.14	342095.51
15	251417.66	342523.69	47	253224.13	342143.74
16	251486.82	342509.89	48	253306.26	342181.07
17	251606.78	342506.87	49	253343.07	342066.85
18	251694.57	342517.04	50	253420.48	342217.88
19	251754.55	342515.53	51	253450.48	342239.36
20	251795.79	342540.10	52	253515.67	342301.41
21	251837.14	342496.62	53	253538.46	342308.12
22	251820.42	342477.05	54	253950.68	342488.60
23	252030.35	342471.76	55	254136.44	342663.32
24	251981.85	342456.42	56	254163.18	342676.93
25	252129.85	342481.97	57	254247.54	342600.99
26	252250.69	342491.31	58	254240.52	342660.58
27	252370.66	342488.29	59	254281.95	342710.41
28	252422.45	342510.85	60	254338.07	342780.77
29	252598.06	342471.30	61	254397.23	342793.14
30	252610.89	342440.44	62	254527.48	342867.54
31	252626.88	342415.06	63	254566.75	342920.97
32	252659.45	342378.52	64	254682.17	342953.82

Job No.	6198	Survey Date	DEC 2013
Client			
GWYNEDD ARCHAEOLOGICAL TRUST			
Project Title			
GEOPHYSICAL SURVEY - DOLBEMAEN TO CWMYSTRADLYN			
Subject			
SITE LOCATION AND SURVEY AREA & REFERENCING			

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ASSOCIATION

SUMO
GROUP
MEMBER

ISO 9001
certified

ISO 14001
certified

ISO 45001
certified

Scale 1:4000

0m 40 80 120 160 200 240m

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
FEB 2013	OJP	01



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)

Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

COLOUR PLOT OF MINIMALLY
PROCESSED GRADIOMETER
DATA SHOWING EXTREME
VALUES - AREAS 1 & 2

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ims

ISO 18001
certified

Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

Checked by

DGE

Issue No.

01

Date

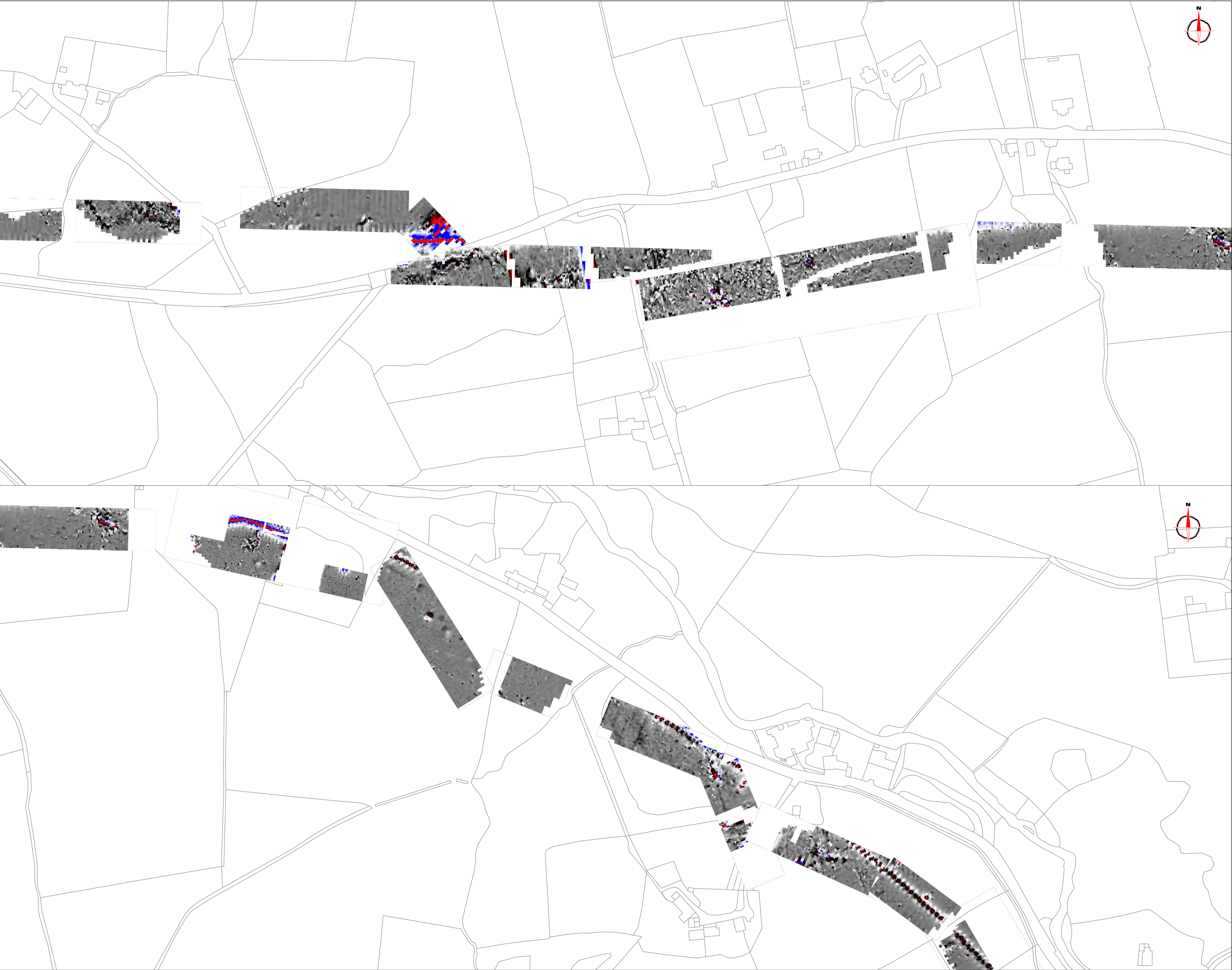
FEB 2013

Drawn by

OJP

Figure No.

03



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)

Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

COLOUR PLOT OF MINIMALLY
PROCESSED GRADIOMETER
DATA SHOWING EXTREME
VALUES - AREAS 3 & 4

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ISO 9001
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ISO 9001
certified

Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

Checked by

DGE

Issue No.

01

Date

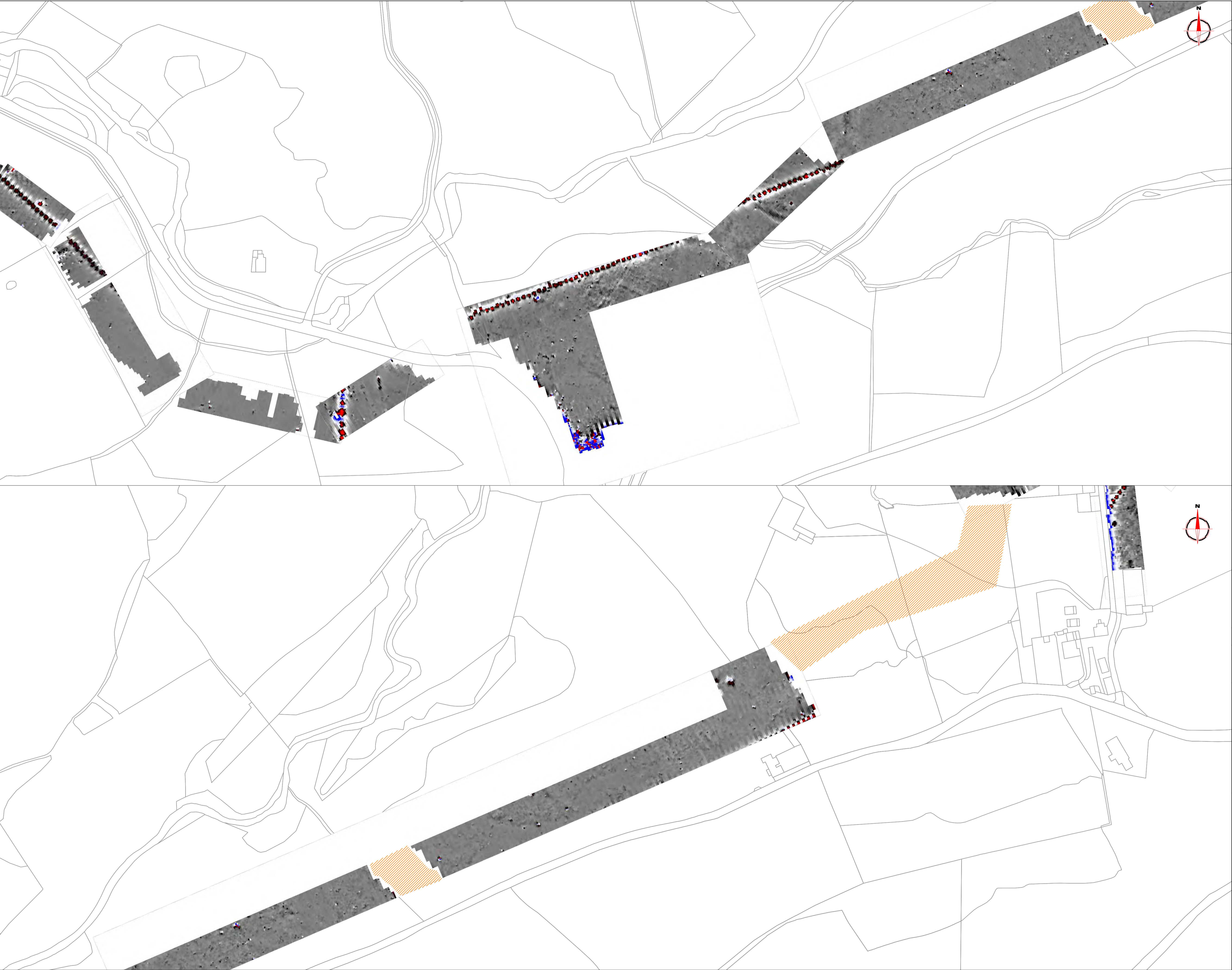
FEB 2013

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OJP

Figure No.

04



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)

Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

COLOUR PLOT OF MINIMALLY
PROCESSED GRADIOMETER
DATA SHOWING EXTREME
VALUES - AREAS 5 & 6

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

Checked by

DGE

Issue No.

01

Date

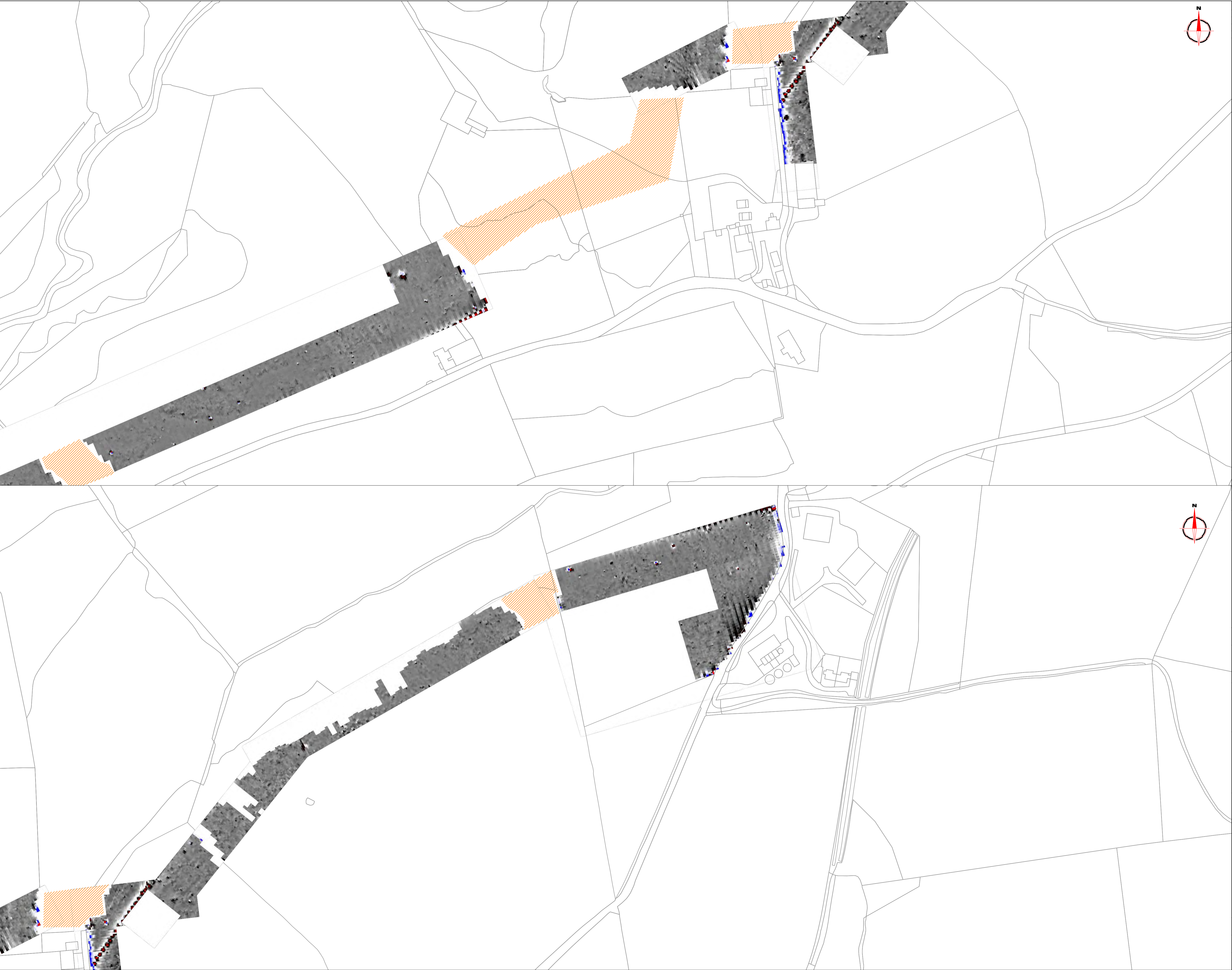
FEB 2013

Drawn by

OJP

Figure No.

05



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

COLOUR PLOT OF MINIMALLY
PROCESSED GRADIOMETER
DATA SHOWING EXTREME
VALUES - AREAS 7 & 8

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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Date

FEB 2013

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Figure No.

06



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

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Job No.	6198	Survey Date	DEC 2013
Client			
GWYNEDD ARCHAEOLOGICAL TRUST			
Project Title			
GEOPHYSICAL SURVEY - DOLBEMAEN TO CWMYSTRADLYN			
Subject			
PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - AREAS 1 & 2			

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

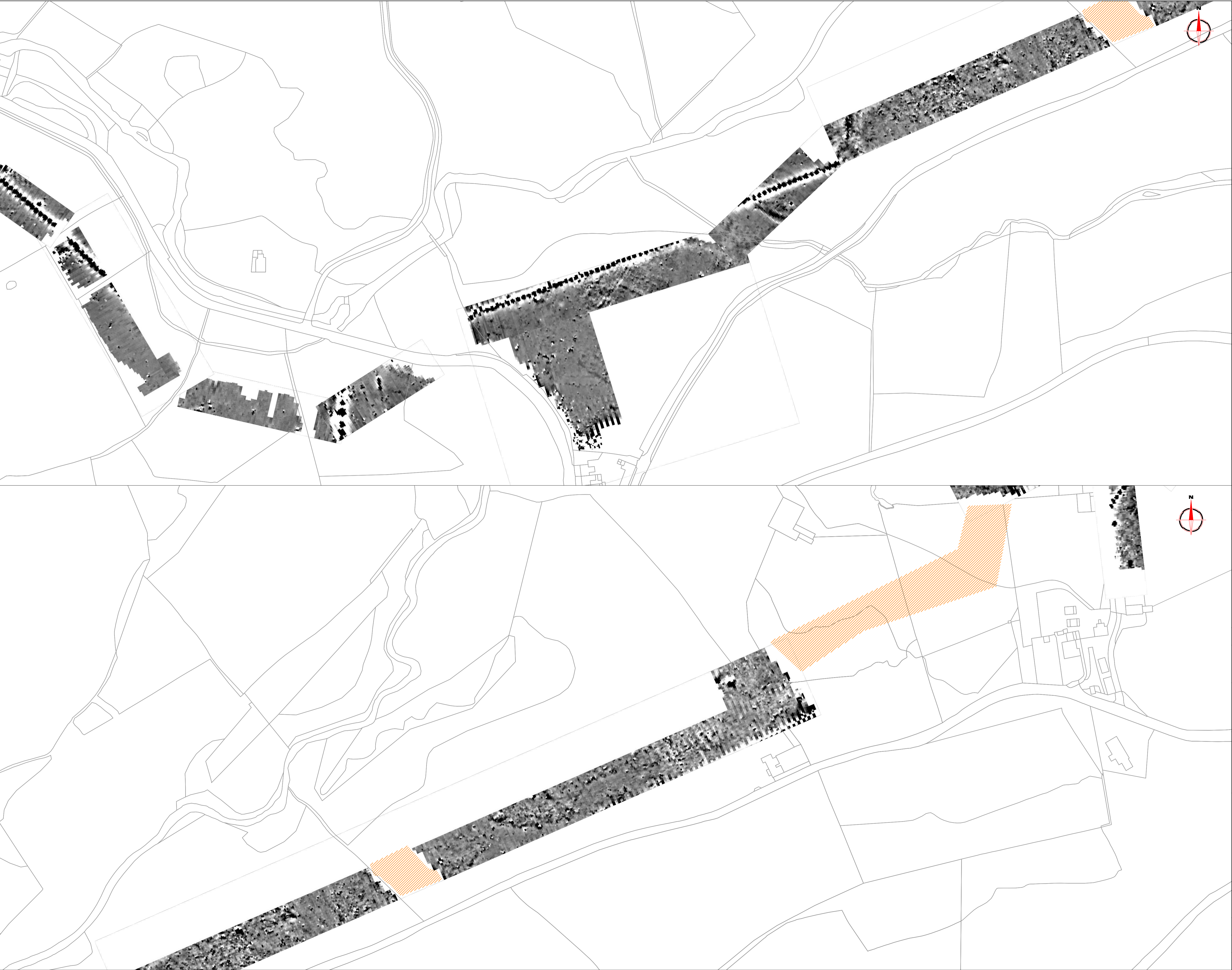
Plot	A1	Checked by	DGE	Issue No.	01
Date	FEB 2013	Drawn by	OJP	Figure No.	07



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

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Job No.	6198		Survey Date	DEC 2013	
Client	GWYNEDD ARCHAEOLOGICAL TRUST				
Project Title	GEOPHYSICAL SURVEY - DOLBEMAEN TO CWMYSTRADLYN				
Subject	PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - AREAS 3 & 4				
<div><div>STRATASCANTM GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div><div><div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div><div></div></div></div>					
Scale	0m 10 20 30 40 50 60 70 80m				
1:1250					
Plot	A1	Checked by	DGE	Issue No.	01
Date	FEB 2013	Drawn by	OJP	Figure No.	08



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Zero

Mean

-2nT

+2nT

+2nT

-2nT

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

PLOT OF MINIMALLY
PROCESSED GRADIOMETER
DATA - AREAS 5 & 6

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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Date

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Figure No.

09



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Zero

Mean

+2nT

-2nT

Job No.

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Survey Date

DEC 2013

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GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY - DOLBEMAEN TO CWMYSTRADLYN

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - AREAS 7 & 8

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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Date

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Figure No.

10



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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KEY

PROBABLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin

Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin

Moderate strength discrete anomaly - probable thermoremanent feature

Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin

Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

Possible archaeological debris

Magnetic spike - probable ferrous object

OTHER ANOMALIES

Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing

Linear anomaly - probably related to pipe, cable or other modern service

Linear anomaly - possibly related to land drain

Magnetic disturbance associated with nearby metal object such as service or field boundary

Strong magnetic debris - possible disturbed or made ground

Scattered magnetic debris

Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin

Unsurveyable area

Magnetic disturbance of uncertain origin

Job No.

6198

Survey Date

DEC 2013

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
DOLBEMAEN TO
CWMYSTRADLYN

Subject

INTERPRETATION -
AREAS 1 & 2

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Scale

1:1250

0m 10 20 30 40 50 60 70 80m

Plot

A1

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DGE

Issue No.

01

Date

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Figure No.

11



Amendments

Issue No.	Date	Description
-	-	-
-	-	-
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KEY

PROBABLE ARCHAEOLOGY

	Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
	Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
	Moderate strength discrete anomaly - probable thermoremanent feature
	Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

	Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
	Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin
	Possible archaeological debris
	Magnetic spike - probable ferrous object

OTHER ANOMALIES

	Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
	Linear anomaly - probably related to pipe, cable or other modern service
	Linear anomaly - possibly related to land drain
	Magnetic disturbance associated with nearby metal object such as service or field boundary
	Strong magnetic debris - possible disturbed or made ground
	Scattered magnetic debris
	Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
	Unsurveyable area
	Magnetic disturbance of uncertain origin

Job No. 6198 Survey Date DEC 2013

Client GWYNEDD ARCHAEOLOGICAL TRUST

Project Title GEOPHYSICAL SURVEY - DOLBEMAEN TO CWMYSTRADLYN

Subject INTERPRETATION - AREAS 3 & 4

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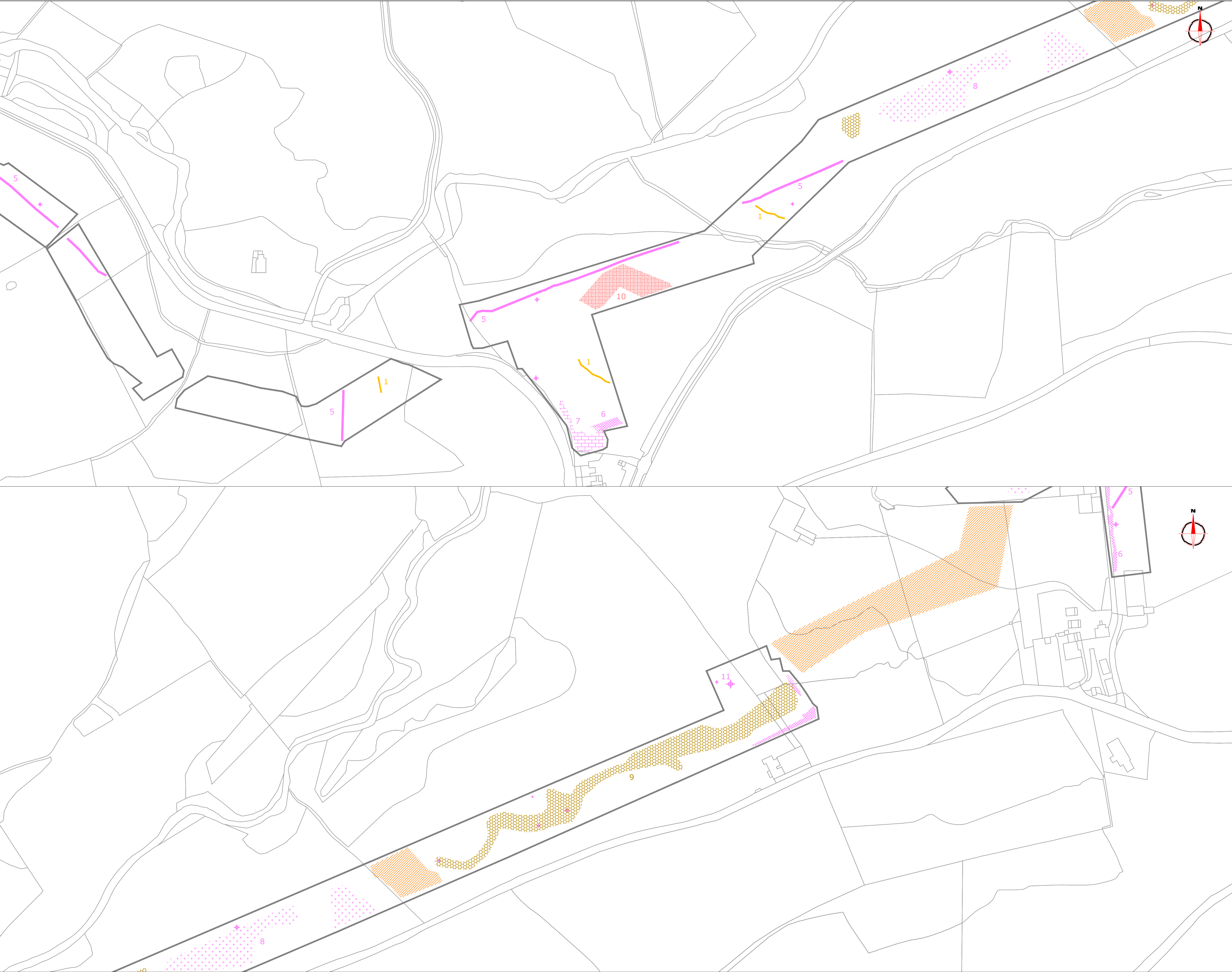
ISO 9001 certified

ISO 14001 certified

ISO 18001 certified

Scale 1:1250 0m 10 20 30 40 50 60 70 80m

Plot A1	Checked by DGE	Issue No. 01
Date FEB 2013	Drawn by OJP	Figure No. 12



Amendments

Issue No.	Date	Description
-	-	-
-	-	-
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KEY

PROBABLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin

Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin

Moderate strength discrete anomaly - probable thermoremanent feature

Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin

Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

Possible archaeological debris

Magnetic spike - probable ferrous object

OTHER ANOMALIES

Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing

Linear anomaly - probably related to pipe, cable or other modern service

Linear anomaly - possibly related to land drain

Magnetic disturbance associated with nearby metal object such as service or field boundary

Strong magnetic debris - possible disturbed or made ground

Scattered magnetic debris

Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin

Unsurveyable area

Magnetic disturbance of uncertain origin

Job No.

6198

Survey Date

DEC 2013

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GWYNEDD ARCHAEOLOGICAL TRUST

Project Title

GEOPHYSICAL SURVEY -
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Subject

INTERPRETATION -
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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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DGE

Issue No.

01

Date

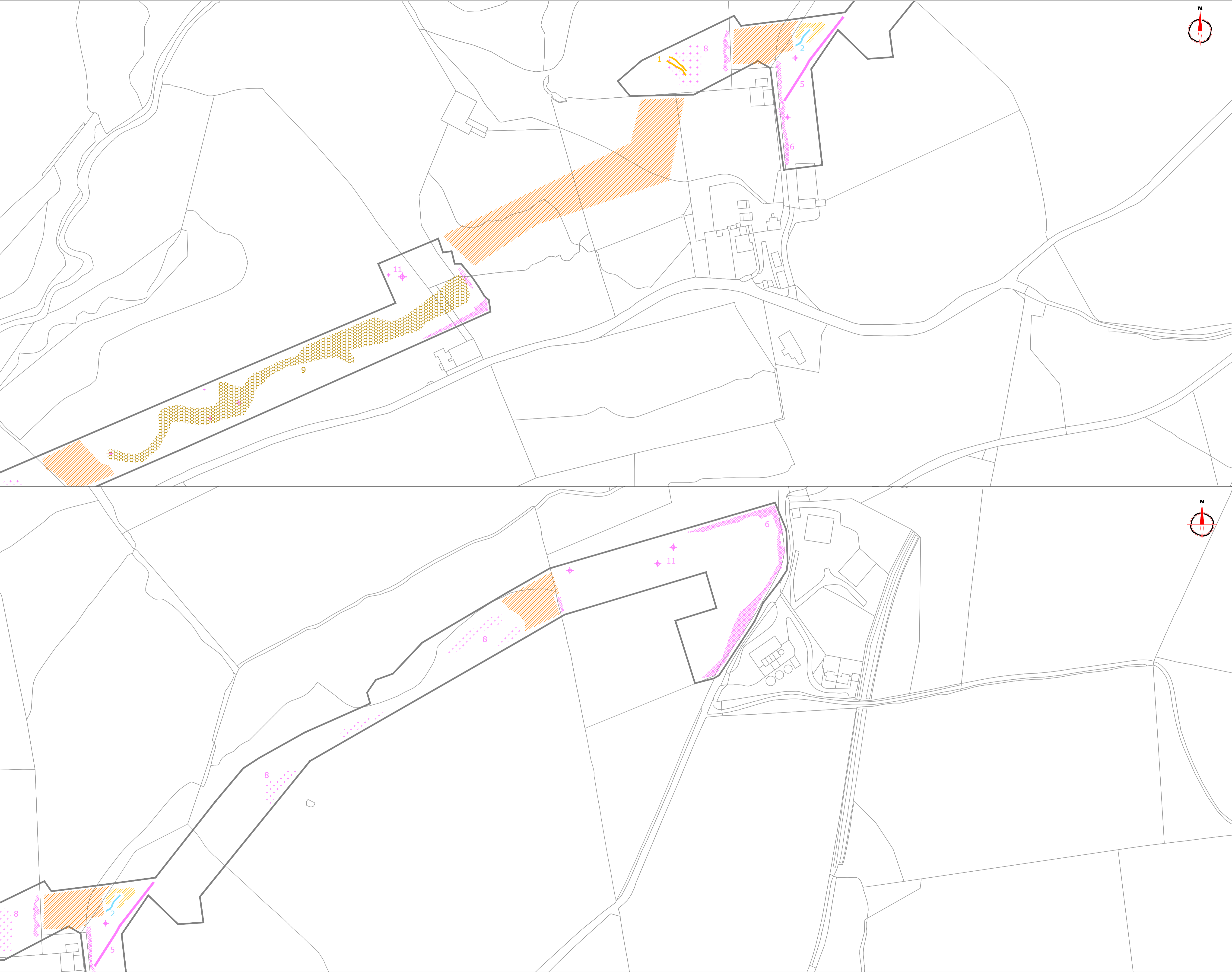
FEB 2013

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Figure No.

13



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-
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KEY

PROBABLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
- Moderate strength discrete anomaly - probable thermoremanent feature
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin
- Possible archaeological debris
- Magnetic spike - probable ferrous object

OTHER ANOMALIES

- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Strong magnetic debris - possible disturbed or made ground
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Unsurveyable area
- Magnetic disturbance of uncertain origin

Job No.

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Project Title

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Subject

INTERPRETATION -
AREAS 7 & 8

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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

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Figure No.

14

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