Geophysical Survey Report
Langwell, Applecross
RGC1116APC

On behalf of:

Applecross Community Archaeology Project

The European Agricultural Fund for Rural Development: **Europe investing in rural areas**

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Rose Geophysical Consultants:
Specialising in Archaeological Survey and Consultancy

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Executive Summary

This report covers a geophysical survey carried out over the former township of Langwell, Applecross. There are some surviving earthworks visible on the ground, together with estate maps from *circa* 1810 showing the former township.

As part of the Applecross Community Archaeology Project, Rose Geophysical Consultants was asked to carry out the survey with community involvement as part of the wider training element of the project. The data collected by the group has been included in this report.

The geophysical surveys have identified a wealth of anomalies many of which are thought to be archaeologically significant. There is good correlation between the results from the gradiometry and resistance survey. Both data sets exhibit a marked change in the nature of the responses in the east of the survey area corresponding to the recorded location of the former township. It is likely that what is being detected are general anomalies associated with the former settlement, the structures of which have been removed resulting in the lack of coherent responses indicative of buildings etc. Two very strong linear magnetic responses in the west of the survey area are puzzling. While it is tempting to interpret these as possible former field bounders associated with the former township, a natural or modern origin is more probable.

Survey:	Langwell Applecross (RGC1115APC)
NGR:	NG 7150 4398
On behalf of:	Applecross Community Archaeology Project
Date of Survey:	3rd - 5th September 2011
Survey Personnel:	Dr S M Ovenden, A S Wilson and members of ACAP
Date of Report:	3rd November 2011
Report Author:	DR S M Ovenden

1. Introduction

1.1 This report covers a geophysical survey carried out over the former township of Langwell, Applecross. There are some surviving earthworks, together with estate maps from *circa* 1810 showing the former township.

1.2 Given the nature of the archaeology, gradiometer and resistance surveys were undertaken over areas of 1.4ha and 1ha, respectively, as indicated in Figure 1.

1.3 As part of the Applecross Community Archaeology Project, Rose Geophysical Consultants was asked to carry out the survey with community involvement as part of the wider training element of the project. The data collected by the group has been included in this report.

2. Methodology

2.1 Prior to data collection a series of 20m grids was established across the site and tied-in by Rose Geophysical Consultants. These have been passed on to the client.

2.2 Gradiometer survey was undertaken using a Bartington Grad601-2 gradiometer. The gradiometer comprises two fluxgate sensors mounted 1m apart on a vertical axis. Each sensor measures the earth's magnetic field, in nanoTesla (nT), and the instrument records the difference between the observed readings for each sensor. As a result the instrument is able to record subtle changes or anomalies in the earth's magnetic field caused by material in the top metre or so of the earth's surface. Data was collected at 0.25m intervals along traverses 1m apart within the series of 20m grids, which were later merged together.

2.3 Resistance survey was carried out using a Geoscan RM15 resistance meter and MPX15 multiplexer. For this survey a standard twin probe configuration was used with a mobile probe separation of 0.5m providing a depth resolution of approximately 0.75m. Data were collected at 1mby 1m intervals.

2.4 The data were processed with Geoscan Research Geoplot 3.00 software, using a standard range of corrections and processing algorithms.

2.5 These include, for gradiometer survey, setting the data mean to zero and destagger of the data. The edited data are displayed as XY traces and grey-scale images. Interpolated data are displayed as grey-scale images. In these images the data have been interpolated in the Y direction to create a 'square dataset' which has the overall effect of smoothing the data.

2.6 For the resistance data bad contact readings have been removed and the data have been interpolated. They have had a high pass filtered applied which removes underlying trends in the data.

3. Results of Gradiometer Survey

Anomaly numbers are shown on the Interpretation diagram (Figure 5).

3.1 The data display a relatively high level of magnetic response across the site. The strongest anomalies are two linear responses (1) along the western and southern limits of the survey area. These have been noted as potentially natural in origin on the interpretation plan. The predominantly negative response is unusual and would normally suggest a stone feature, and indeed the response shows some comparison with responses from field boundaries seen in some parts of Britain. However, given the underlying geology of sandstone and the generally weakly magnetised soils such an interpretation is contentious, unless this feature is substantial. One perhaps more likely interpretation is that of igneous intrusions along the bedding plans of the underlying sandstone. A landfill site lies to the southwest of the site and vent pipes are known to exist in the vicinity. This raises the possibility that these anomalies are modern in origin, indicating some associated utility. However, the fact that these do not respect the existing field boundaries casts doubt on such an interpretation.

3.2 General areas of increased magnetic response (2) have been highlighted on the interpretation diagram in the east of the survey area. These areas appear to coincide with the main concentration of the township as indicated on estate plans from the 1800's, and represent the type of responses one could expect from a cleared settlement. They comprise concentrations of responses from possible pit-type features, burnt and/or fired material, and ferrous debris, with the better defined anomalies within this area being highlighted on the interpretation diagram.

3.3 Although some pit type responses have also been noted in the northeast of the survey area, the majority are confined to the general areas of increased response

3.4 Numerous positive, and a few negative, trends are apparent in the data. These generally follow a NW-SE and SW-NE trend with some being rectilinear in form and are thought to be associated with the layout of the former township. Given the existing field boundaries, it is unlikely that these are agricultural in origin, although a natural origin, i.e. localised geological or pedological variations, cannot be dismissed.

4. Results of Resistance Survey

Anomaly letters are shown on the Interpretation diagram (Figure 9).

4.1 As with the gradiometry data there is a marked change in the level of response (A) in the east of the survey area in the recorded area of the former township. There is very good correlation between the resistance data and the gradiometer data, as can be seen in Figure 10. Although it is possible that this increase in resistance (A) is simply due to naturally rising bedrock, the correlation between the two data sets and the relatively well defined edge suggest this is not the case.

4.2 Within this general area of high resistance are numerous more discrete high resistance anomalies, which may be archaeologically significant. These are particularly apparent in the high pass filtered data, which removes the background trend in the data. They have a general NW-SE and SW-NE trend. Within this zone there are also numerous linear high, and a few low, resistance trends. These are comparable to those seen in the gradiometer data and are also thought to be associated with the layout of the former township.

4.3 Towards the centre of the survey area similar responses (B) have also been noted. It would be of interest to overlie this data on topographic data to ascertain correlation with the surviving earthworks.

4.4 Toward the centre of the survey area, and apparently associated with (B), are several curvilinear trends (C). It is thought that these may indicate field/property boundaries.

4.5 In the west of the survey area several anomalies are apparent which have been interpreted as modern in origin. These coincide with a metalled track way, wall tumble and piles of clearance rubble.

5. Conclusions

5.1 The geophysical surveys have identified a wealth of anomalies many of which are thought to be archaeologically significant. There is good correlation between the results from the two techniques.

5.2 Both data sets exhibit a marked change in the nature of the responses in the east of the survey area in the recorded location of the former township. It is likely that what is being detected are general anomalies associated with the former settlement, the structures of which have been removed resulting in the lack of coherent responses indicative of buildings etc.

5.3 Two very strong linear magnetic responses in the west of the survey area are puzzling. While it is tempting to interpret these as possible former field bounders associated with the former township, a natural or modern origin is more probable.

List of Figures

Mains of
Applecross

LANGWELL, APPLECROSS

GEOPHYSICAL SURVEY

Sketch Location Diagram

Gradiometer Survey

Resistance Survey

N

0m 100m

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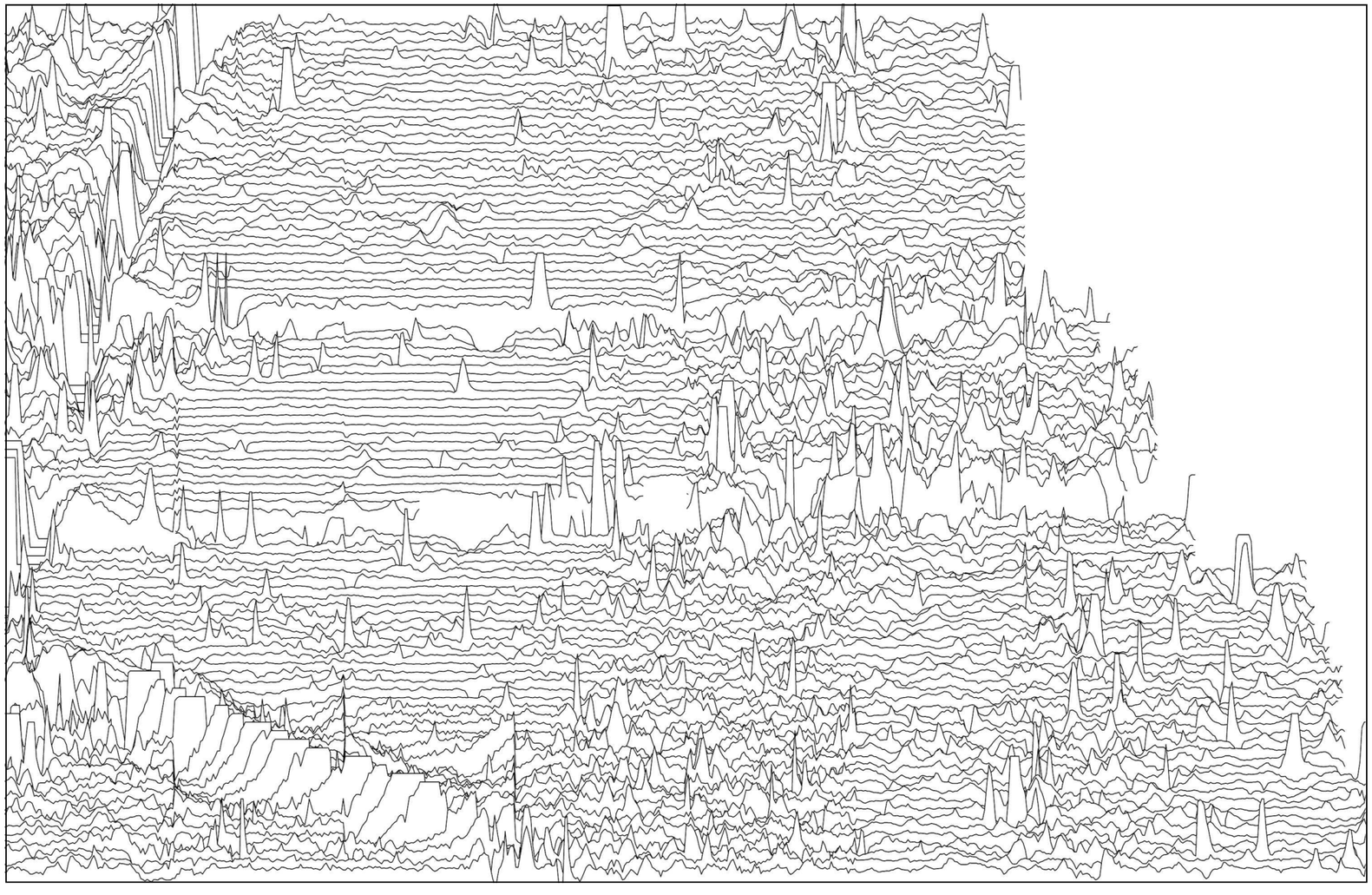
Figure 1

LANGWELL, APPLECROSS

GRADIOMETER SURVEY

Raw Data: XY Trace



30 nT

N

0m 20m

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Figure 2

LANGWELL, APPLECROSS

GRADIOMETER SURVEY

Raw Data: Greyscale Image

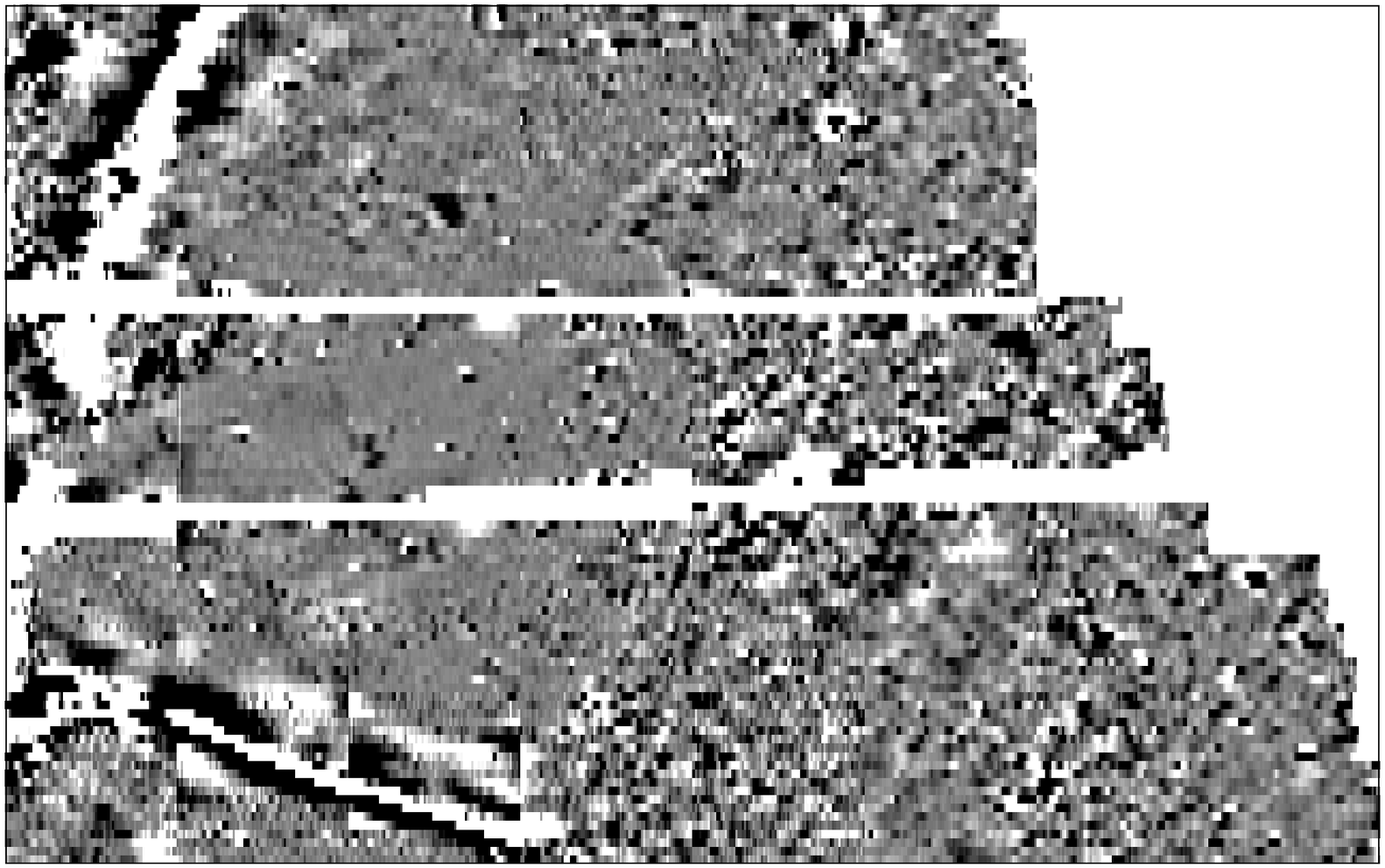

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Figure 3

LANGWELL, APPLECROSS

GRADIOMETER SURVEY

Interpolated Data: Greyscale Image

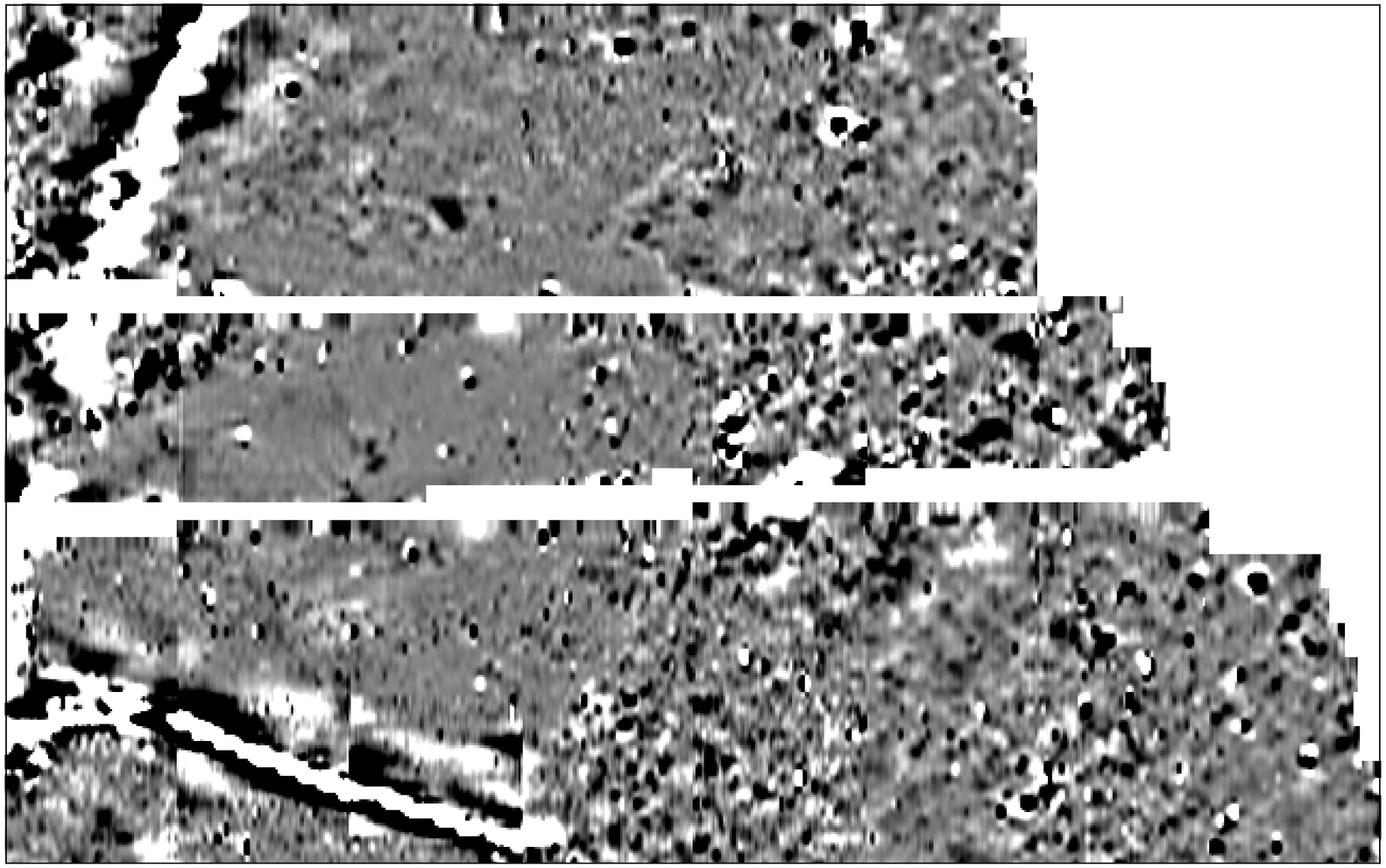

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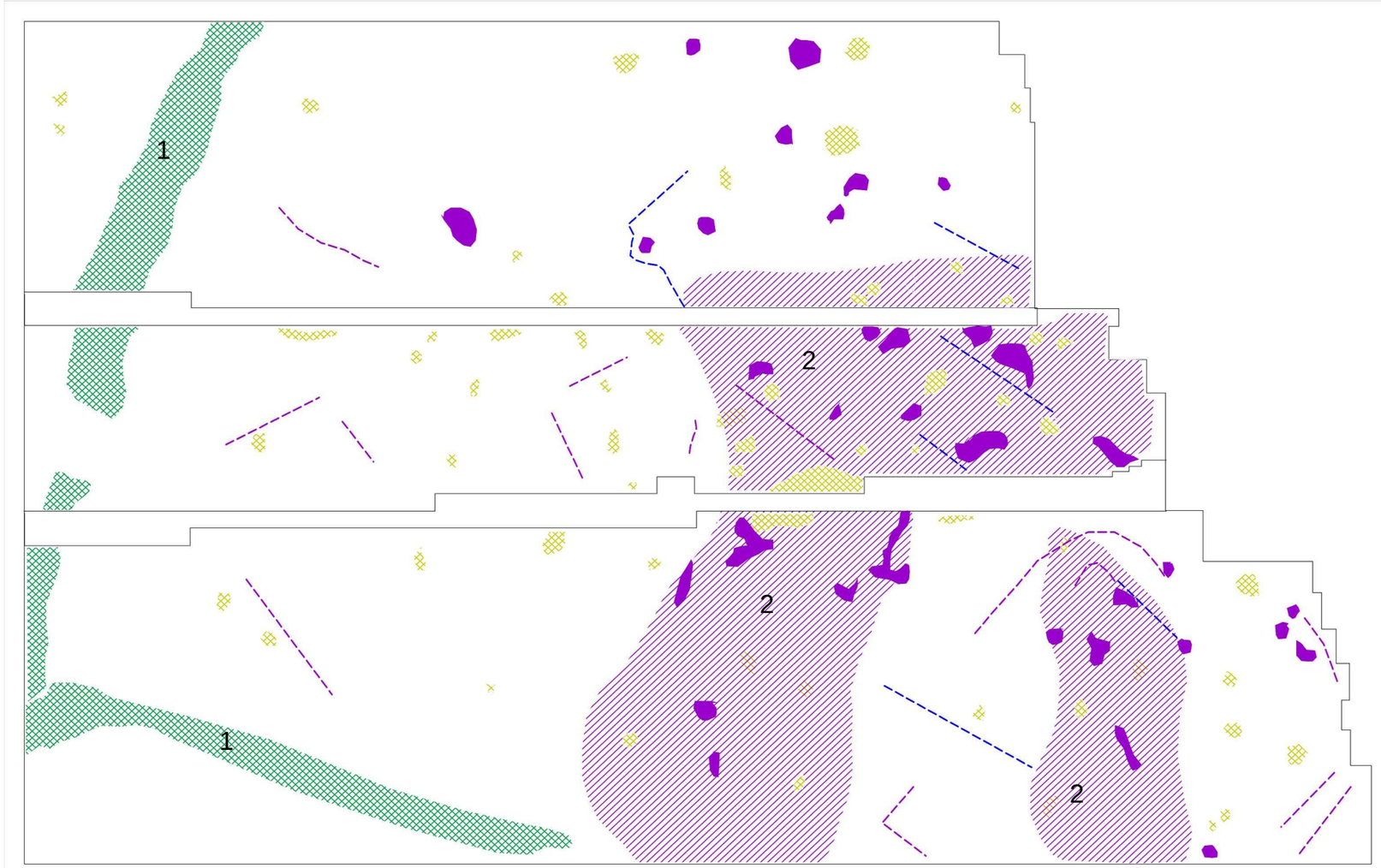
Figure 4

LANGWELL, APPLECROSS

GRADIOMETER SURVEY

Interpretation



?Archaeology
Positive response

Area of Increased
Magnetic Response

Positive Trend

Negative Trend

Natural

Ferrous

N

0m 20m

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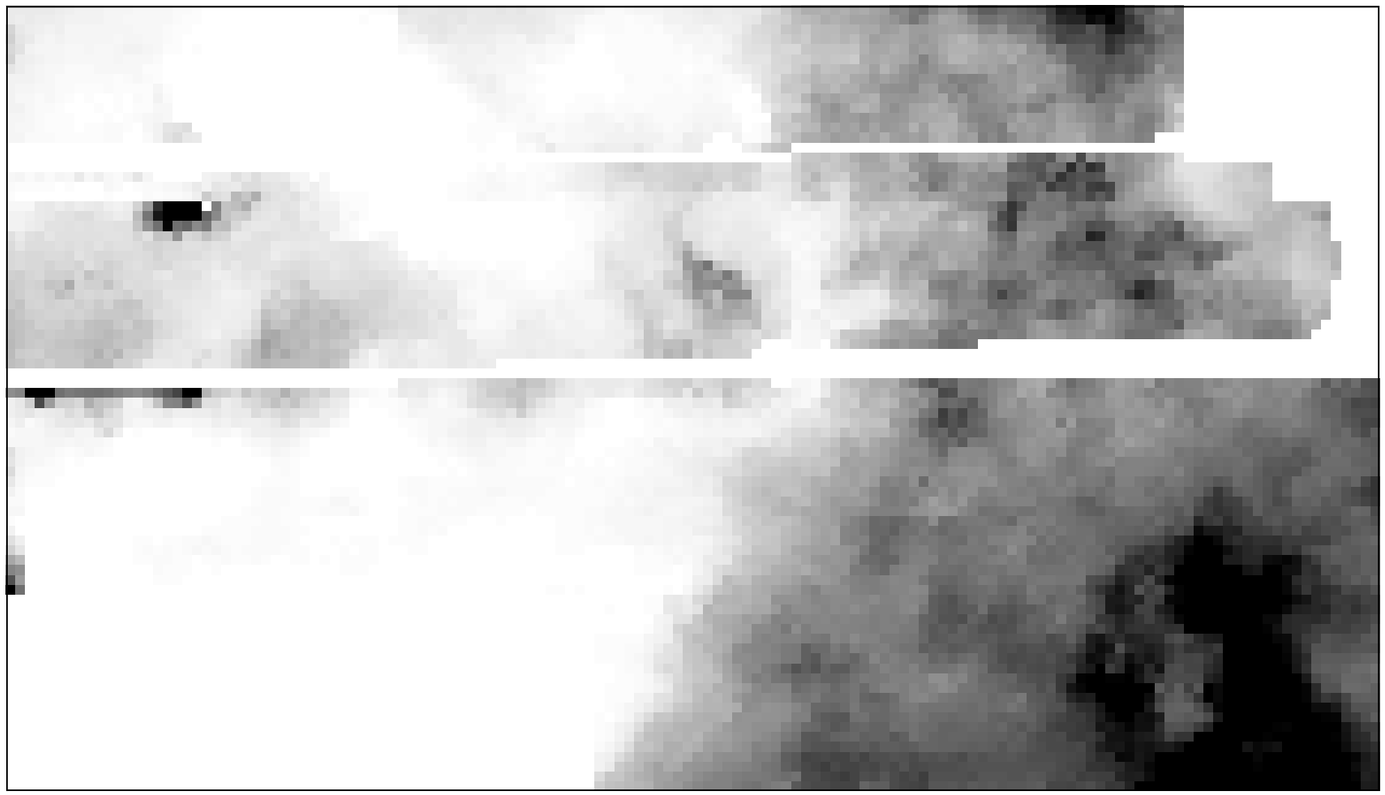
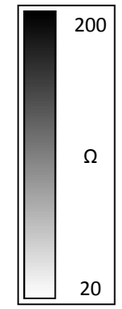
Figure 5

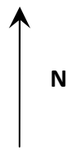
LANGWELL, APPLECROSS

RESISTANCE SURVEY

Raw Data: Greyscale Image







LANGWELL, APPLECROSS

RESISTANCE SURVEY

Interpolated Data: Greyscale Image

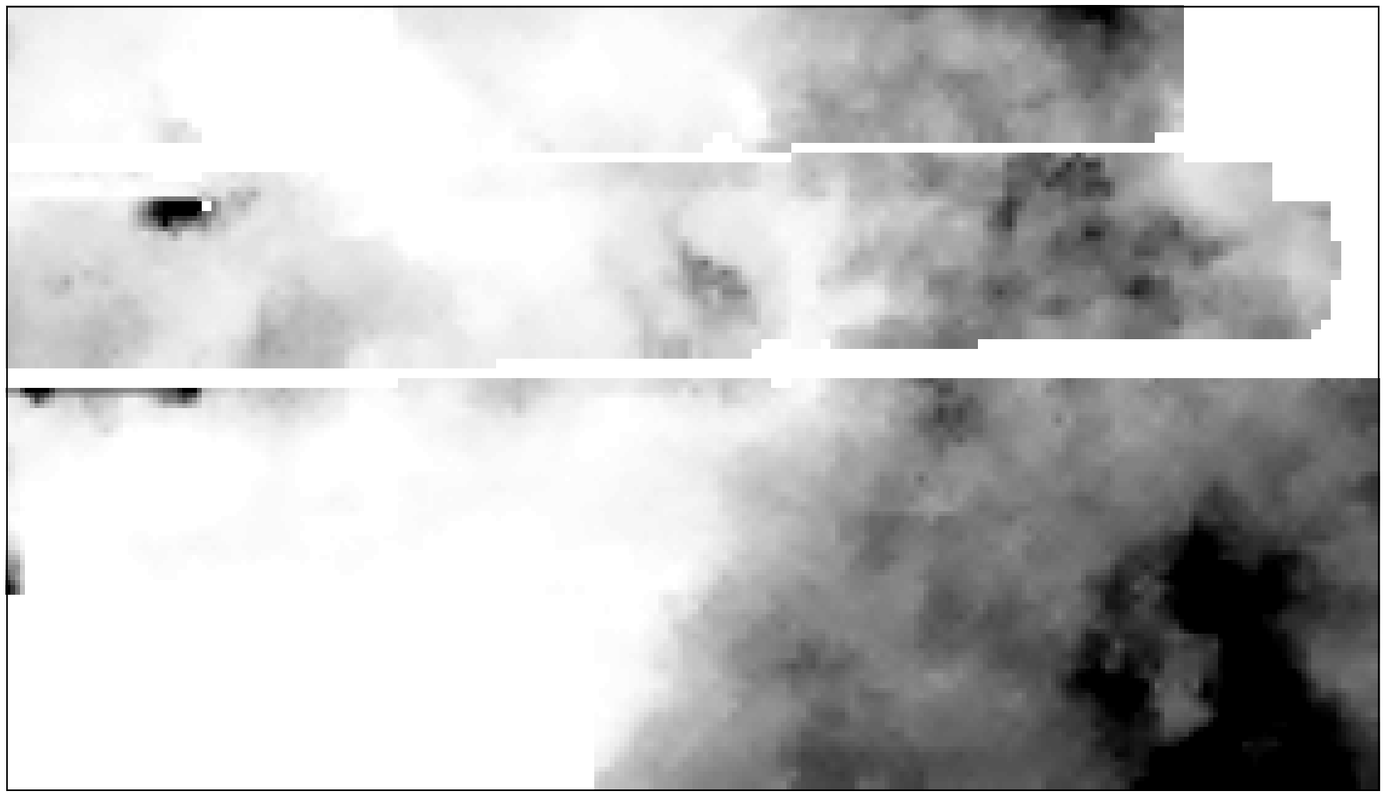


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Figure 7

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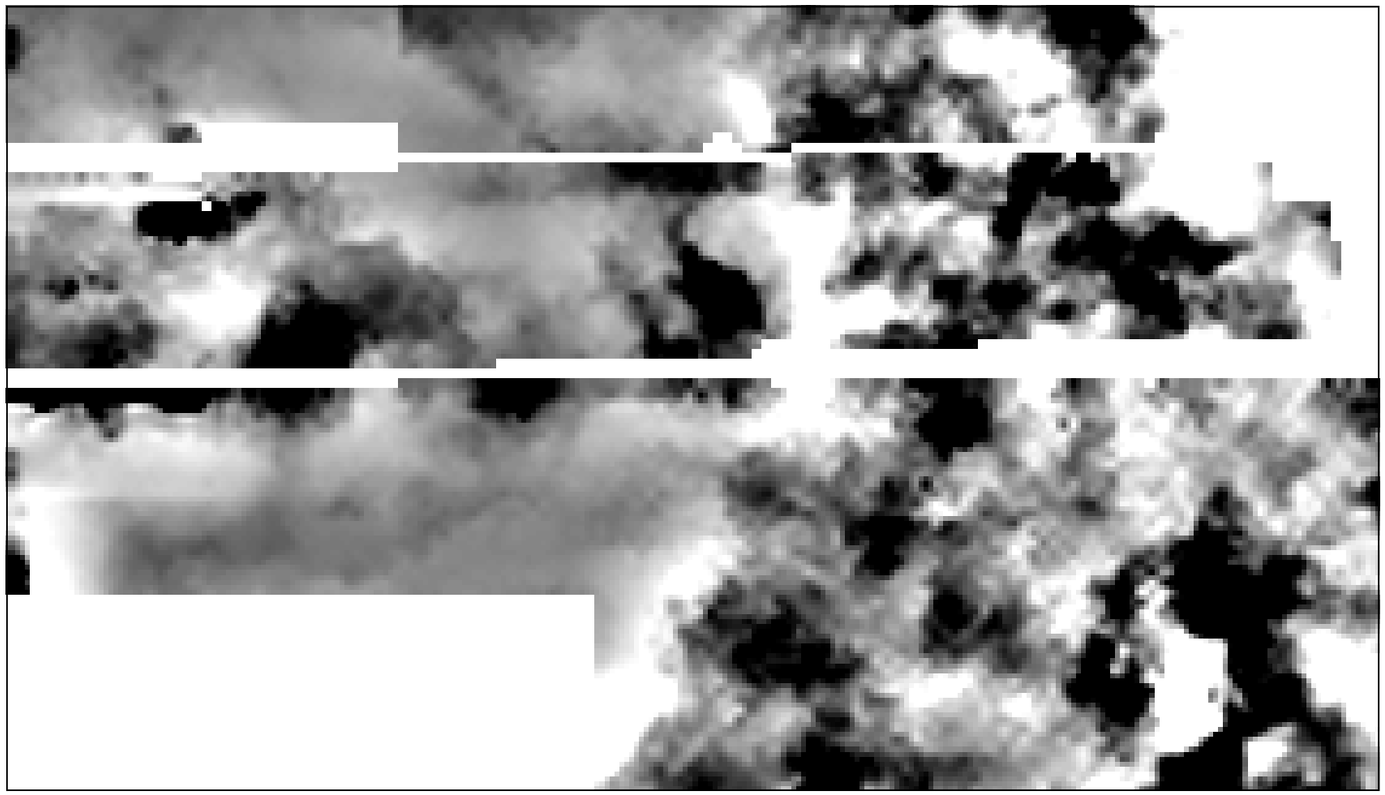
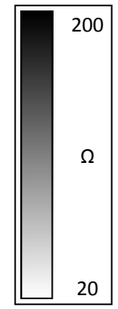
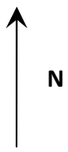
RESISTANCE SURVEY

High Pass Filtered Data: Greyscale Image



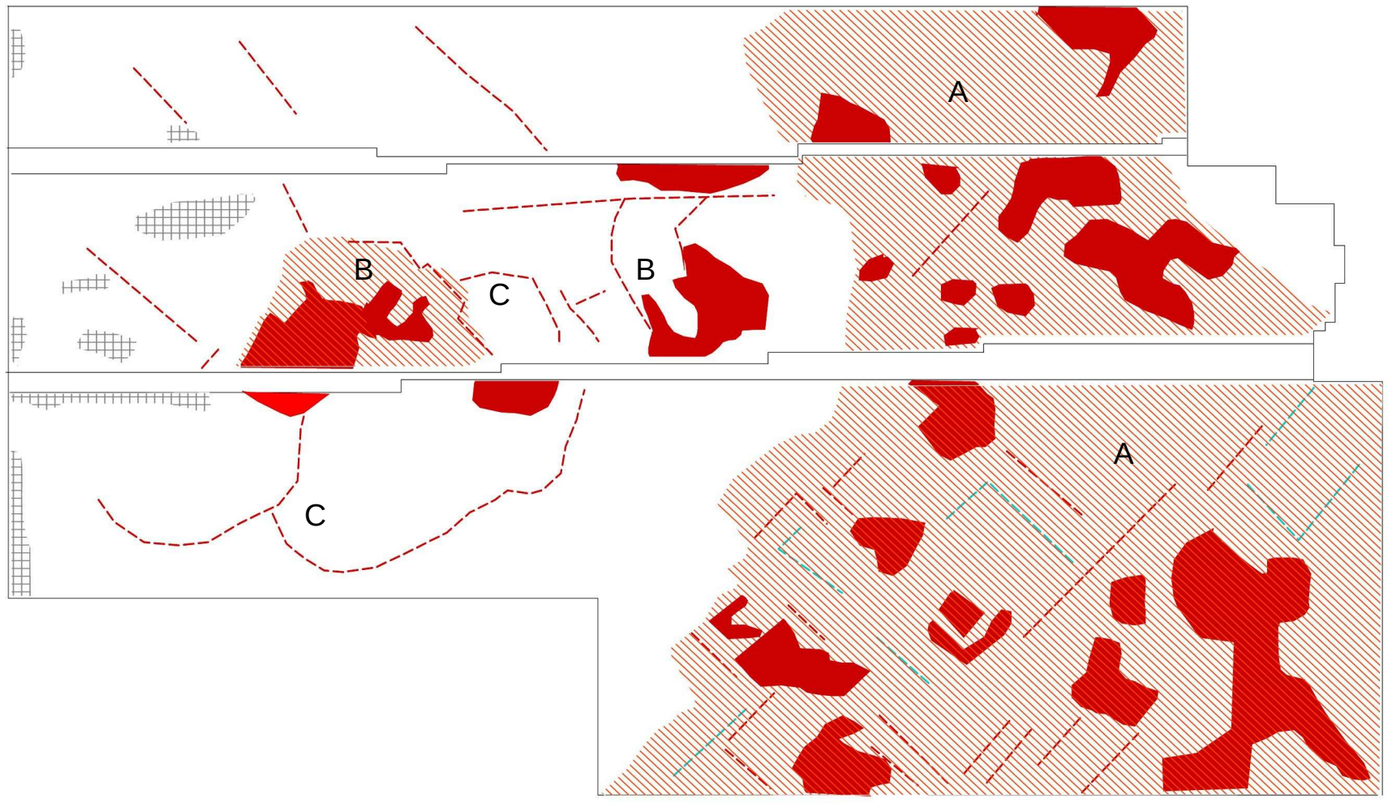




LANGWELL, APPLECROSS

RESISTANCE SURVEY

Interpretation



?Archaeology
High Resistance

High Resistance

High Resistance Trend

Low Resistance Trend

?Modern

N

0m 20m

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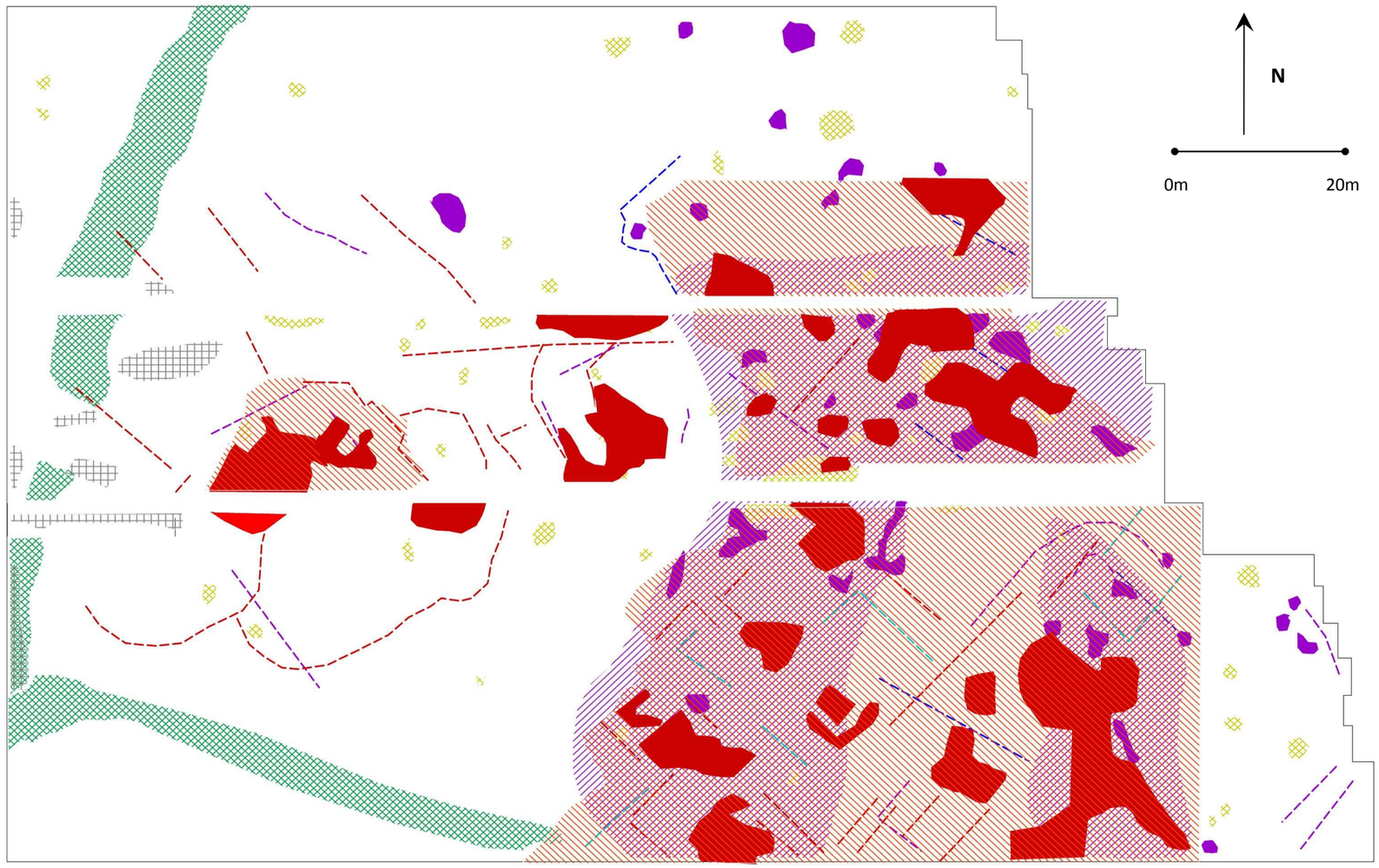
Figure 9

LANGWELL, APPLECROSS

Summary Interpretation



?Archaeology
Positive response

Area of Increased
Magnetic Response

Positive Trend

Negative Trend

Natural

Ferrous

?Archaeology
High Resistance

High Resistance

High Resistance Trend

Low Resistance Trend

?Modern

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Figure 10