

## National Roads Authority Archaeological Geophysical Survey Database 2001-2010: Archive Report

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Survey Event No. **114**  
Survey Name **N9 / N10 Holdenstown, County Kilkenny**

### **This Geophysical Report should be Referenced or Acknowledged as:**

Leigh, J.M., 2007. N9/N10 Holdenstown, County Kilkenny: Archaeological Geophysical Survey. J.M. Leigh Surveys. Unpublished Report. May 2007.

Detection Licence No. Unknown  
Ministerial Directions No. Not Applicable  
NRA Route No. N9  
NRA Scheme Name Carlow to Knocktopher  
NRA Scheme ID Unspecified

Survey carried out for Kilkenny County Council

Survey funded by the National Roads Authority

#### **Known problems with this report**

There are no known archive issues with this report

Depositor James Bonsall, NRA Fellowship Programme  
Primary Archive held by Tramore House NRDO  
Secondary Archive held by J.M. Leigh Surveys

This archive was last updated on 25/10/2011

GEOPHYSICAL SURVEY REPORT

N9 / N10 HOLDENSTOWN

COUNTY KILKENNY

24/05/2007

FOR IRISH ARCHAEOLOGICAL CONSULTANCY LTD.



## **Geophysical Survey Summary**

### **N9 / N10 Holdenstown, Co. Kilkenny**

#### ***Introduction***

A geophysical survey was conducted by J. M. Leigh Surveys at a site located along the proposed N9 / N10 road Scheme. The area under investigation is located in the townland of Holdenstown, Co. Kilkenny. The geophysical survey forms part of a wider archaeological assessment undertaken by Irish Archaeological Consultancy Ltd.

#### ***Location, topography and geology***

Holdenstown is located to the south east of Kilkenny, and north of Bennettsbridge. An area of approximately 2.7ha was subject to geophysical survey. The topography is gently undulating and the soils of the locality consist of gleys with associated grey brown podzols. The soils comprise varying depths of morainic drift over limestone with shale, sandstone and dolomite.

#### ***Archaeological Background***

During the first phase of investigation for the N9 / N10 road scheme, a chapel and graveyard site (KK024:020) was investigated with geophysical survey (Shiel, 2003). An enclosure site was identified as a curving ditch type response. The current proposed road is located to the immediate east of this site. Test trenching here revealed a cluster of possible grave cuts of up to 30 graves (Coughlan, 2007). No enclosing feature of the site was identified during testing, however it was concluded that the possible grave cuts form part of a large archaeological complex, possibly an early Christian settlement.

#### ***Aims & Objectives***

Geophysical survey has been requested to provide further understanding of the features identified during test trenching and a previous geophysical survey (Shiel, 2003). It is the main aim of this survey to provide further information pertaining to the nature and extent of the archaeological site identified as a series of possible grave cuts and areas of burning.

#### ***\*Summary of Results***

The detailed survey has identified responses suggestive of large pits and burning activity. The majority of responses appear to the immediate north of the possible grave cuts identified during testing. The responses appear to span the survey area and are also identified in the GSB (Shiel, 2003) survey. A spread of pit type features may be represented here, and is suggestive of occupational activity.

No geophysical signal representing the possible grave cuts was identified and no boundary or enclosure ditch can be interpreted from the data, however a clear area of increased magnetic response is evident, and may reflect the extent of the site.

*\* This Summary must be read in conjunction with the full geophysics report.*

## **Geophysical Survey Report**

### **N9 / N10 Holdenstown, Co. Kilkenny**

#### **1 Survey Area & Background**

- 1.1 The area targeted for detailed geophysical survey lies along the proposed N9 / N10 road scheme. An area approximately 2.7ha in size was highlighted for geophysical survey to the south east of Kilkenny and north of Bennettsbridge, in the townland of Holdenstown.
- 1.2 In 2003 a geophysical survey was conducted by GSB in the area of recorded monument (KK024:020), and part of an enclosure site was detected (Shiel, 2003). The Environmental Impact Statement for the road scheme (*EIS*, Vol. 3 – Appendices, pp.A191-2) suggest this may be the location of a chapel and graveyard and the geophysical survey results were consistent with an early Christian settlement.
- 1.3 Test trenching of the road centreline and corridor, to the east of the enclosure site, was conducted by T. Coughlan (direction number A032/051, and Licence E3361) in March 2007. A spread of possible grave cut features and areas of burning were detected between chainage points 42+190 and 42+280. No enclosure ditch delimiting the site was identified during the test trenching.
- 1.4 This geophysical survey was requested to investigate the extent of the archaeological site revealed during the test trenching (Coughlan, 2007), and investigate any possible association of the detected features with the enclosure site to the west of the current survey area.
- 1.5 Detailed gradiometer survey was conducted with 20m x 20m survey grids with a sample interval of 0.25m and a traverse interval of 1m. Survey was undertaken with a Bartington GRAD 601 dual sensor instrument.
- 1.6 Figure 1 presents the site and survey location and recorded monuments in the vicinity at a scale of 1:10,000. The location of the previous geophysical survey (Shiel, 2003) is also presented. The current survey area has been subdivided into Areas 1A, 1B and Area 2 for ease of display, and is presented in Figures 2, 3 and 4.
- 1.7 Survey grids were set out by the staff of J. M. Leigh Surveys. Survey blocks were tied in to field boundaries and local features with a total station instrument. Detailed tie-in information is available upon request.

## **2 Data Display**

- 2.1 A summary greyscale image and interpretation diagram of the detailed gradiometer results is presented in Figures 2 and 3 at a scale of 1:1000. Figure 4 presents the survey interpretation and the preliminary test trenching results at a scale of 1:750.
- 2.2 Raw data is displayed in archive format in Appendix A1.1 to A1.8. The data is displayed as a raw xy-trace plots and greyscale images, and accompanying interpretation diagrams, all at a scale of 1:500.
- 2.3 The display formats referred to above, and the interpretation categories are discussed in the Summary Technical Information section at the end of this report.
- 2.4 All data collection, processing and display conform to the guidelines recommended by English Heritage (David, 1995).

### **3 Further Information & Ground Conditions**

- 3.1 Survey ground conditions in Areas 1A and 1B were difficult due to waist high crop. The instruments sensors had to be raised to avoid poor data collection. Raising the sensors will have affected the detected magnetic strength of the responses, however, potential archaeology can still be interpreted within the survey results, and the overall impact on the interpretation is thought to be negligible.
- 3.2 Survey Area 2 consisted of much younger crop and detailed gradiometer survey was conducted without problem.
- 3.3 No resistance survey could be conducted. The high crop in Areas 1A and 1B made survey with the resistance equipment impractical. Survey would have resulted in damage to the crop and the resistance equipment. In Area 2, the tilled soil would result in contact resistance anomalies and it was anticipated that resistance survey would have been ineffective and misleading.

#### **4 Results of Detailed Gradiometer Survey. (Figures 2, 3 and 4)**

##### *Area 1A & 1B*

- 4.1 Survey Areas 1A and 1B are dominated by a clear area of increased background magnetic response. Within this are several responses which demonstrate clear archaeological potential.
- 4.2 Isolated responses (A) (Figure 3) are evident in the north of Area 1A and suggest archaeological pits or spreads of burnt material are present. Similar responses have been identified in the GSB survey (Shiel, 2003) to the immediate west, and may represent a continuation of possible archaeological pit-type features. The spread of pit-type responses is indicated (B) in Figures 3 and 4.
- 4.3 The responses (A) are consistent with the results from test trenching (Figure 4), demonstrating areas of possible burning and disturbance, suggestive of occupational activity.
- 4.4 The concentration and strength of the isolated responses appears to lessen in the south of Area 1A. Within the locality of the possible grave cuts, few responses of archaeological strength were identified, and the individual grave cut features cannot be distinguished in the geophysical survey results. However, pit-type responses are still present and responses (B) are of particular interest. The shape and form of the responses is suggestive of archaeology and a burnt feature or large pit containing burnt material may be represented here.
- 4.5 In Area 1B less prominent responses may be of interest, however, the responses may reflect a broader increase in background magnetic response, and archaeological interpretation is tentative.
- 4.6 A series of linear trends in the data are most likely the result of ploughing activity. The archaeological implications of the plough trends are unknown. It is possible that some of the trends represent a former field system, although this is speculative.
- 4.7 A broad ferrous response is evident in the west of Areas 1A and 1B. This is indicative of rubble or debris, and may represent the remains of a farm building. No archaeological interpretation of this response can be made, and a modern origin is considered more likely.

## *Area 2*

- 4.8 The data collected in Area 2 is noticeably quiet in comparison with Areas 1A and 1B. Few responses of potential archaeological interest have been identified.
- 4.9 In the north of Area 2, an isolated anomaly is of archaeological strength ( $\pm 5\text{nT}$ ). However, the response is located close to a field boundary and there are no additional responses which may suggest the presence of archaeology. The response may represent more deeply buried modern ferrous debris, and archaeological interpretation is cautious.
- 4.10 Several trends are evident in Area 2. The linear trends are suggestive of agricultural activity, and may be modern in origin.
- 4.11 A semi-circular trend (D) is barely visible but may be of interest. It is possible that an ephemeral archaeological feature with a weak magnetic signature is represented here, although interpretation is cautious. It must be noted that the trend is at the limits of the instruments detection, and natural variations may be represented here.



## 5 Conclusion & Discussion

- 5.1 The significance of the area of increased response in Areas 1A and 1B is unclear. It is possible that natural variations in the sub-soil are represented, however, an archaeological interpretation must be considered. The distinct area of increased response may reflect the extent of the archaeological site.
- 5.2 In the north of Area 1A, several responses (A) suggest a spread of possible pits or burnt features. The data, viewed with the GSB survey results (Shiel, 2003), suggest a spread of possible archaeological pits extending from the current eastern field boundary to the south of the enclosure ditch identified by the GSB survey. This is highlighted in the interpretation diagrams (Figures 3 and 4) as a shaded area (C). The testing results (Coughlan, 2007) have identified areas of burning and disturbance, and the pit-type responses identified are typical of occupational activity.
- 5.3 The possible grave cuts (Coughlan 2007) do not appear to have a geophysical signal. This is often the case with grave cuts as the fill of the grave consists of similar soil (magnetically) to the surrounding soil. The graves cannot be magnetically differentiated from the surrounding soil and this is most likely the case here.
- 5.4 No outer enclosure ditch has been identified with the geophysical survey. Often burial sites are enclosed by a ditch feature which on most occasions can be located through geophysical survey. The absence of an enclosure ditch is supported by the testing results. It is possible that the enclosing ditch feature has suffered plough damage and cannot be detected.
- 5.5 The geophysical survey results have provided further information regarding the enclosure site identified in 2003 (Shiel, 2003), and suggests the site extends easterly, into the current survey area. Although the geophysics has not detected the individual grave cuts, a spread of isolated responses is indicative of pit-type features and areas of burnt material is evident. The geophysics results show a good correlation with the preliminary testing results and suggest occupation activity extends from the enclosure site into the current survey area. Although the site limits cannot be clearly defined, the results suggest the site does not extend beyond the preliminary testing results.

## Technical Information Section

### Instrumentation & Methodology

#### *Fluxgate Gradiometer Survey*

Gradiometer survey is the most frequently applied survey instrument as it can be used in 'Scanning' or detailed survey mode.

##### *Scanning*

This is a fast and effective reconnaissance technique. The instrument is set in scanning mode and regular traverses of the investigation area are made, usually at 10m intervals. This allows a fast and effective scan of the application area, looking for any responses which may be of archaeological potential. As the traverses are made, the operator observes the instrument readout, and any responses of interest are marked for further investigation.

##### *Detailed Gradiometer Survey*

This is conducted to clearly define any responses detected during scanning, or can be applied as a stand alone methodology. Detailed survey is often applied with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids 20m x 20m, and data is displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. A survey with a grid size of 10m x 10m and a traverse interval of 0.5m will provide a data set with high resolution.



#### *Bartington GRAD 601-2*

The Bartington *Grad* 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

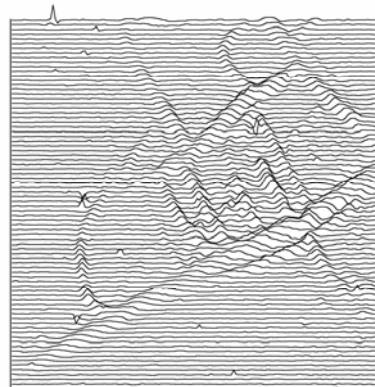
Frequent realignment of the instruments and zero drift correction; ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.



## Data Display & Presentation

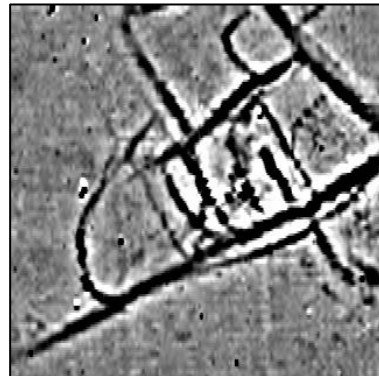
### **XY Trace**

The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.



### **Greyscale**

As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.



\*XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation.

## **Glossary of Interpretation Terms**

### ***Archaeology***

This category refers to responses which are interpreted as of clear archaeological potential, and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, storage pits and associated features.

### ***?Archaeology***

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

### ***?Industrial***

Such anomalies generally possess a strong magnetic response and may equate with archaeological features such as kilns, furnaces, concentrations of fired debris and associated industrial material.

### ***Area of Increased Magnetic Response***

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

### ***Trend***

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

### ***Ploughing/Ridge & Furrow***

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation trends.

### ***?Natural***

Resulting from localised natural variations in the magnetic background of the subsoil, these responses are often recorded in areas of low-lying land prone to flooding.

### ***Ferrous Response***

These anomalies exhibit a typically strong magnetic response, often referred to as 'iron spikes,' and are the result of modern metal debris located within the topsoil.

### ***Area of Magnetic Disturbance***

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

## References

Arup Consulting Engineers & Roughan-O'Donovan-Faber Maunsell Alliance Consulting Engineers. 2005. *N9/N10 Kilcullen to Waterford Scheme: Waterford to Powerstown Environmental Impact Statement*, Vol. 3 – Appendices, pp.A191-2.

David, A (1995) *Geophysical Survey in Archaeological Field Evaluation* Research and Professional Services Guideline No. 1

Coughlan. T (2007 *report pending*) *N9 / N10 Archaeological testing results*. Unpublished report.

Shiel, D (2003) *N9/N10 Kilcullen to Waterford - South Powerstown to Waterford* Unpublished Geophysical survey report reference GSB 2003 / 39

National Soil Survey of Ireland (1980) General soil map second edition (1:575,000). *An Foras Taluntais*.

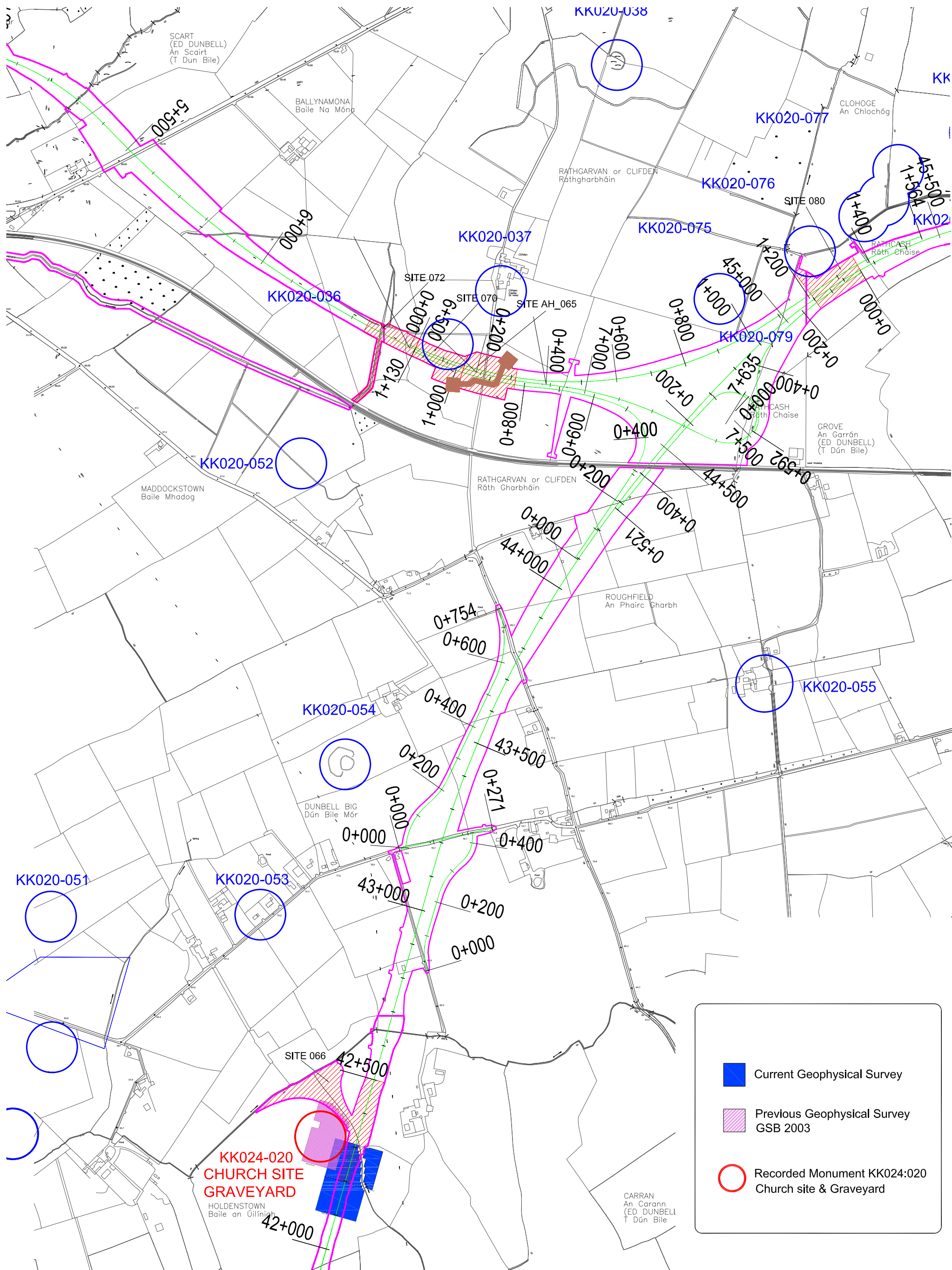
## List of Figures

### *Summary Diagrams*

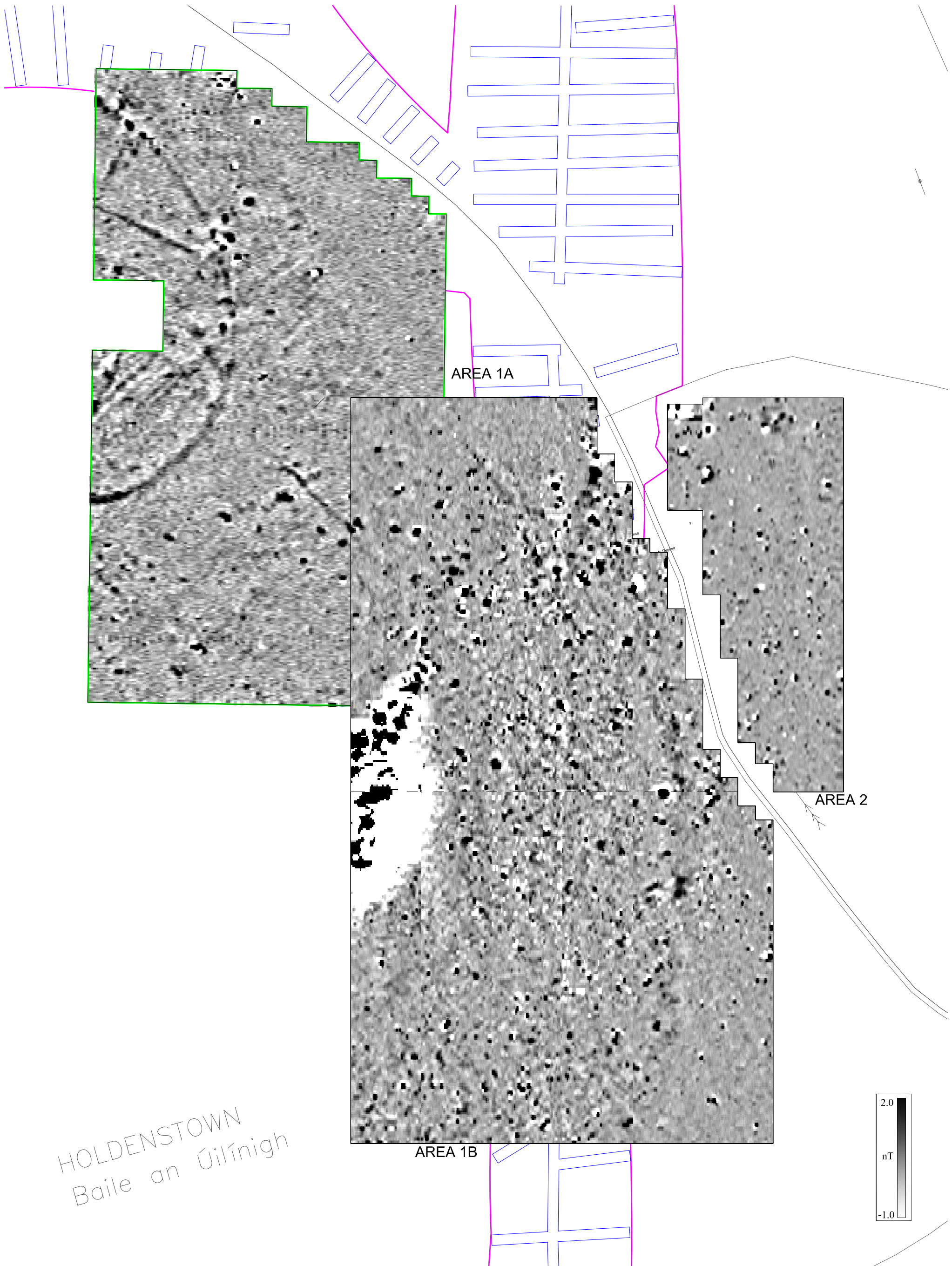
Figure 1	Site & Survey location diagram & RMP distribution.	1:10,000
Figure 2	Summary Greyscale Image	1:1,000
Figure 3	Summary Interpretation Diagram	1:1,000
Figure 4	Interpretation & Testing Results	1:750

### *Raw Data Archive Plots, Appendix A1*

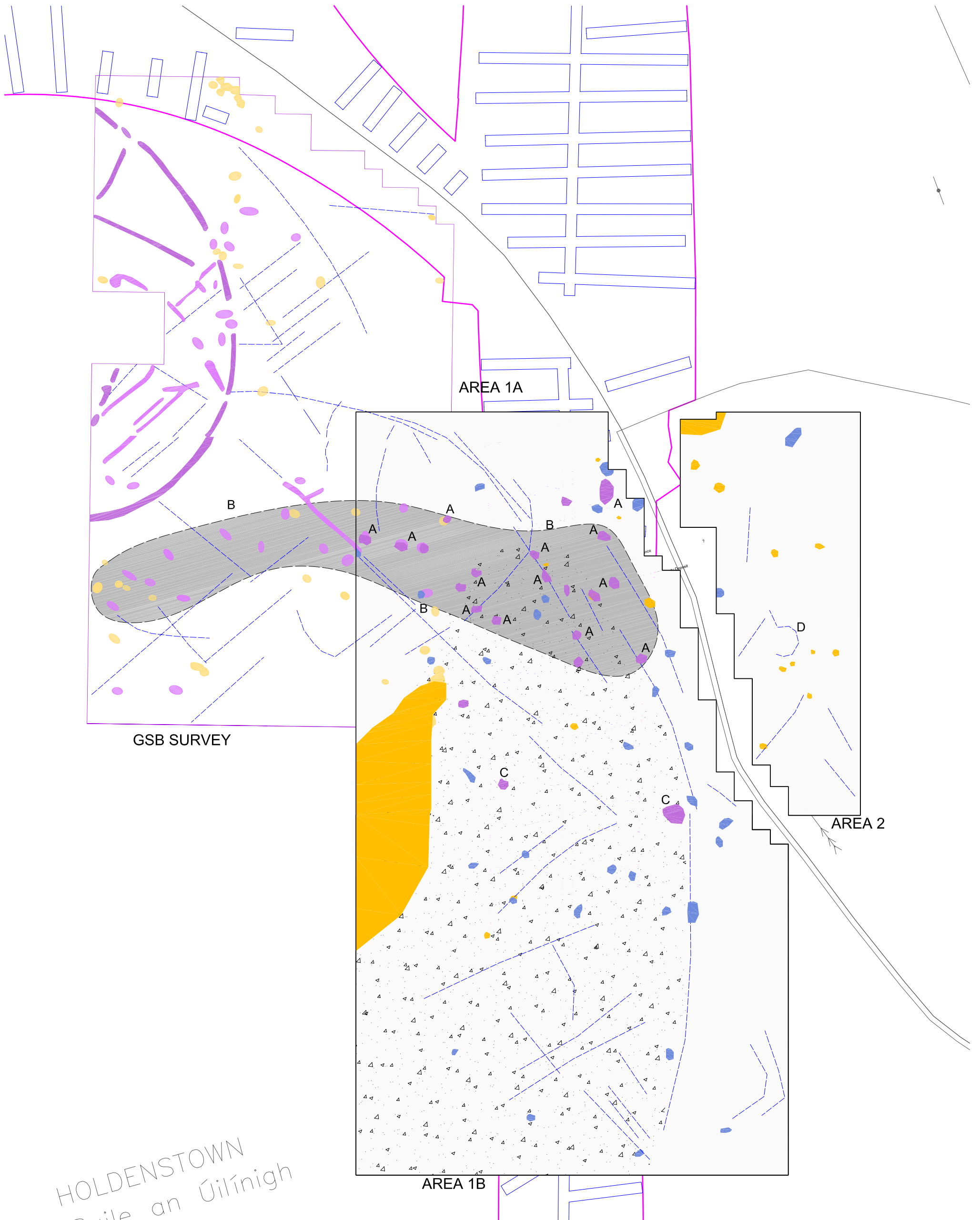
A1.1	Area 1A: XY Trace Plot	1:500
A1.2	Area 1A: Raw Greyscale Image	1:500
A1.3	Area 1A: Interpretation	1:500
A1.4	Area 1B: XY Trace Plot	1:500
A1.5	Area 1B: Raw Greyscale Image	1:500
A1.6	Area 1B: Interpretation	1:500
A1.7	Area 2: XY Trace Plot & Raw Greyscale Image	1:500
A1.8	Area 2: Interpretation	1:500











? Archaeology



Spread of ?Archaeology  
Possible Pits



Trend



Area of Increased  
Response



Ferrous Response



0 40  
metres

Client:

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Project:

GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN

Title:

SUMMARY  
INTERPRETATION  
DIAGRAM

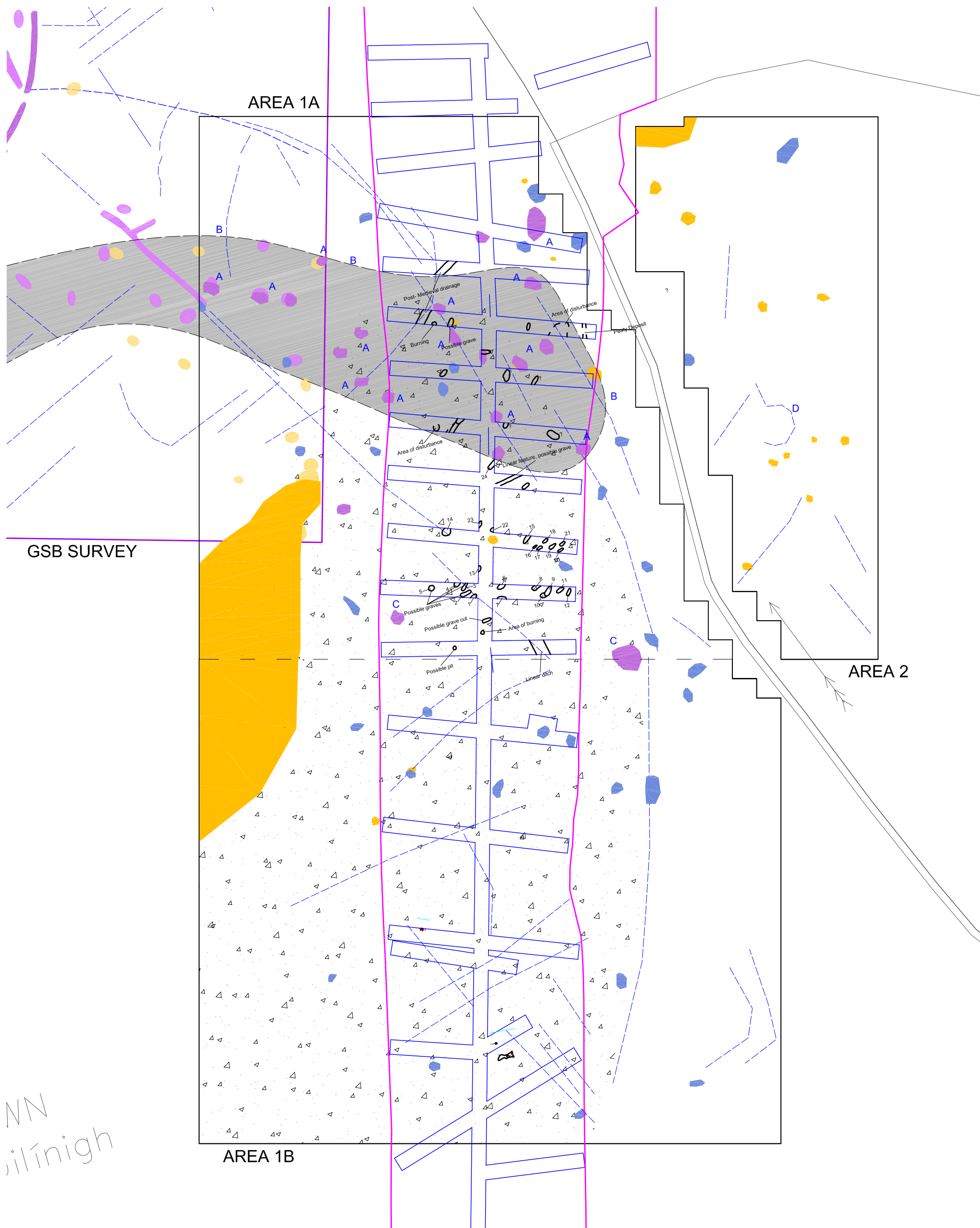
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? Archaeology

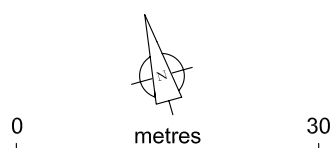


Spread of ?Archaeology  
Possible Pits

Trend

Area of Increased  
Response

Ferrous Response



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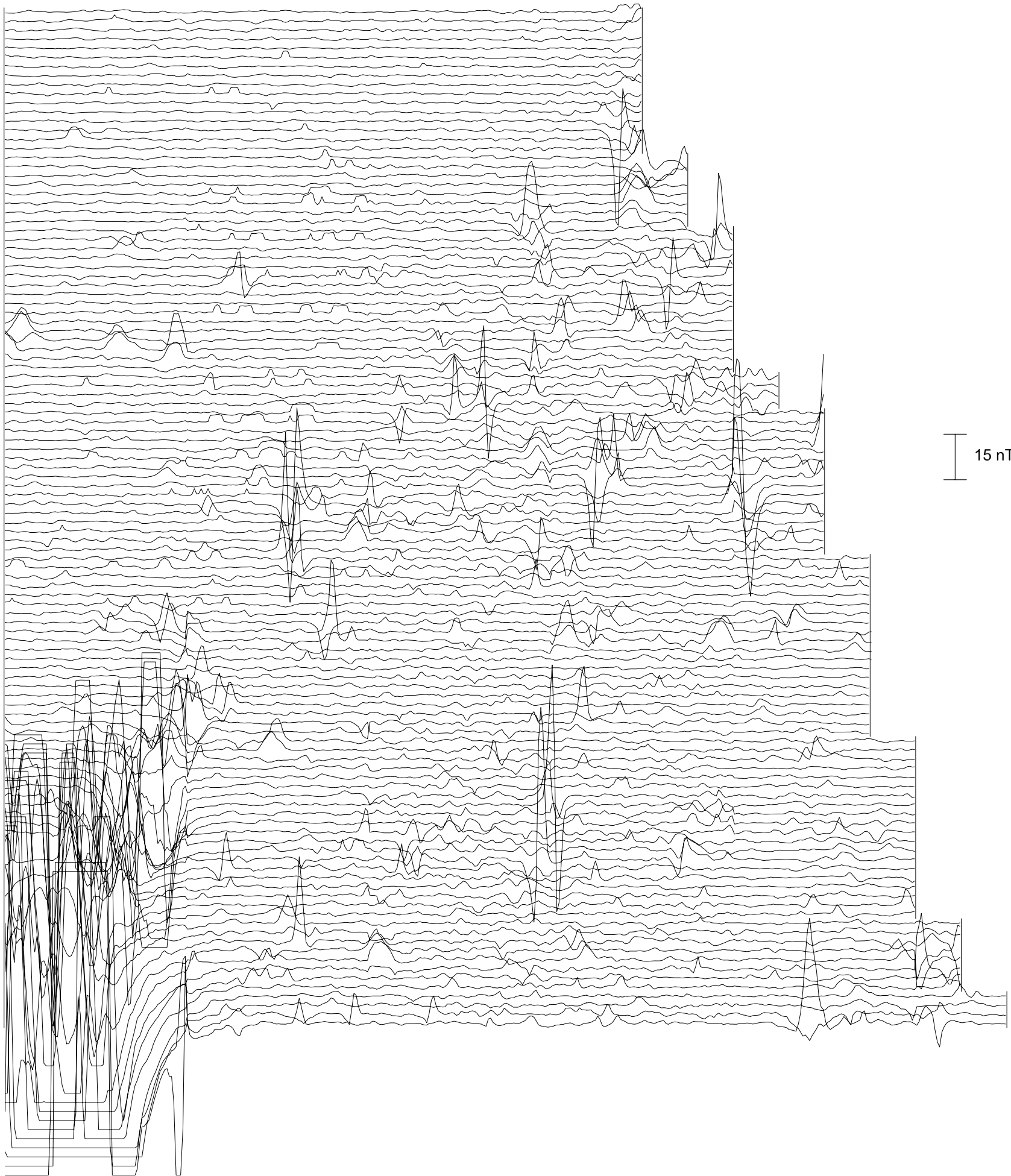
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GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN  
SITE B7

Title:  
SUMMARY  
INTERPRETATION  
DIAGRAM & TESTING  
RESULTS

Scale @ A3 1:750  
Figure: 4  
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ARCHIVE PLOT  
AREA 1A: XY TRACE PLOT



0 metres 20

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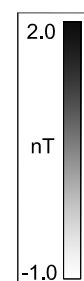
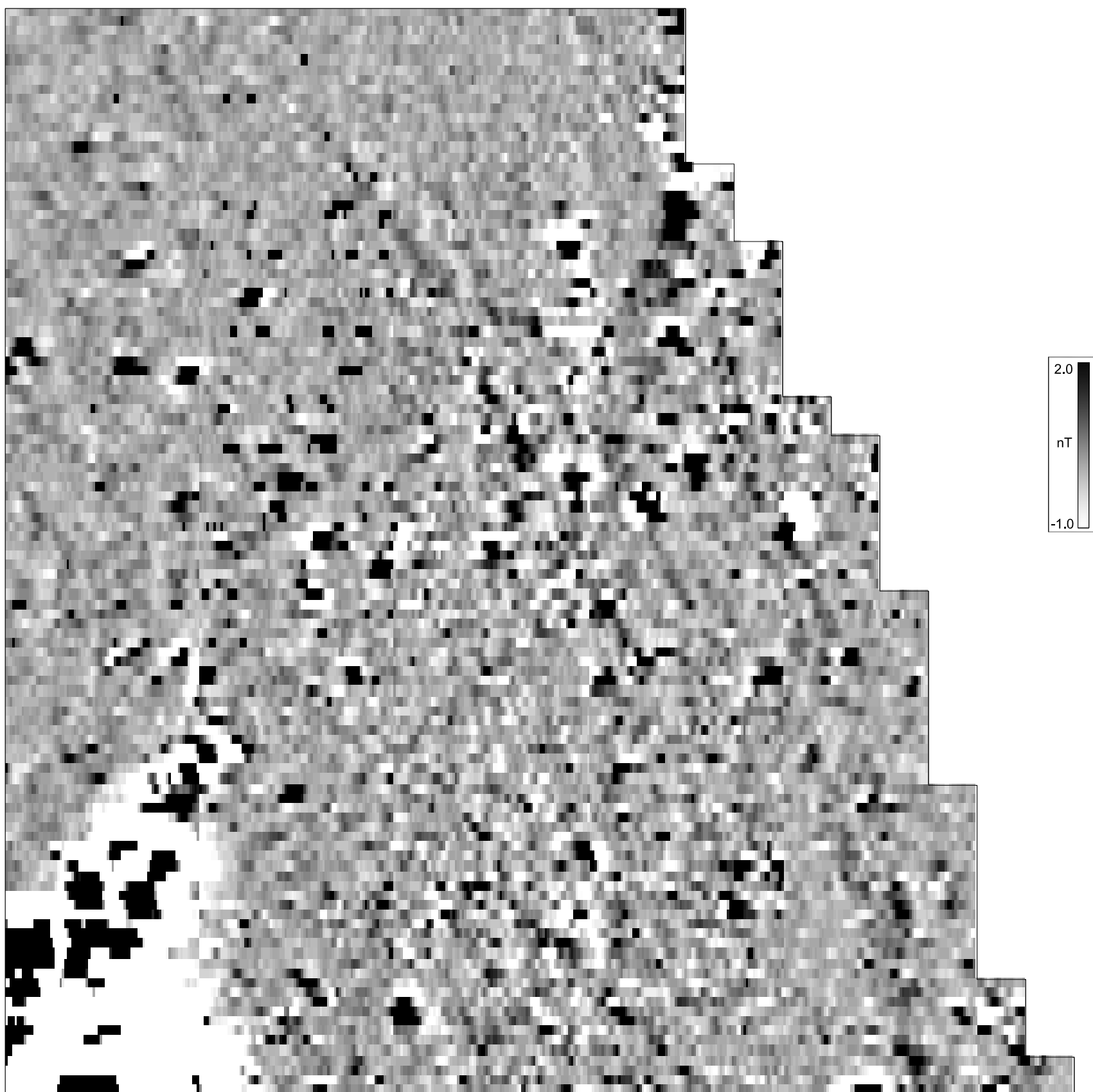
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N9 / N10 HOLDENSTOWN

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Figure: A1.1  
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ARCHIVE PLOT  
AREA 1A: RAW GREYSCALE IMAGE



0 metres 20

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N9 / N10 HOLDENTOWN

Title:

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AREA A: RAW GREYSCALE  
IMAGE

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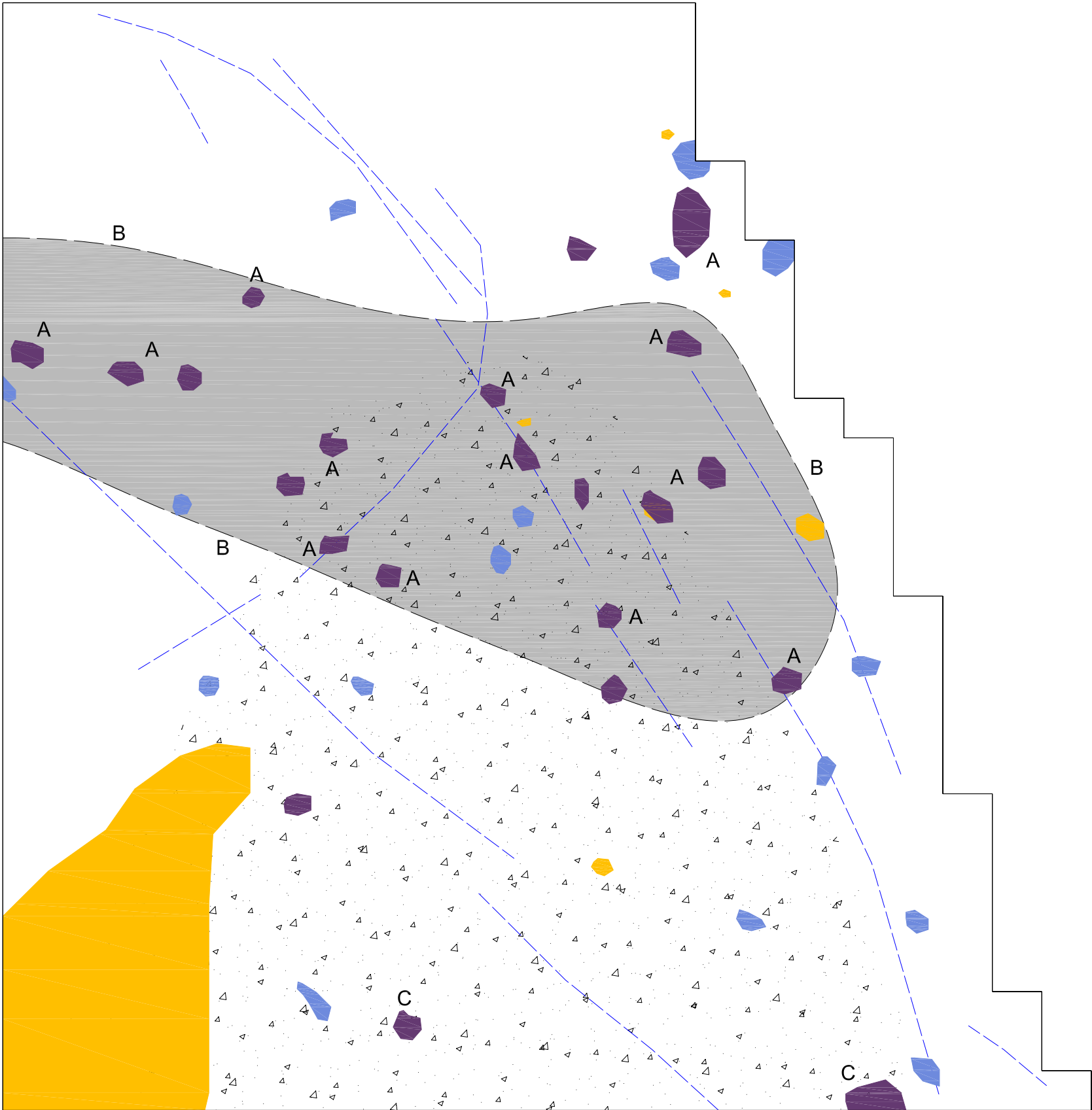
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ARCHIVE PLOT  
AREA 1A: INTERPRETATION




 ? Archaeology

 Spread of ?Archaeology Possible Pits

 Trend

 Area of Increased Response

 Ferrous Response



0 metres 20

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Project:  
GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN

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ARCHIVE PLOT  
AREA 1A: INTERPRETATION

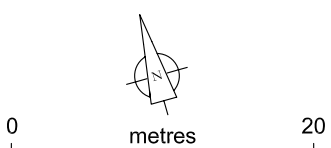
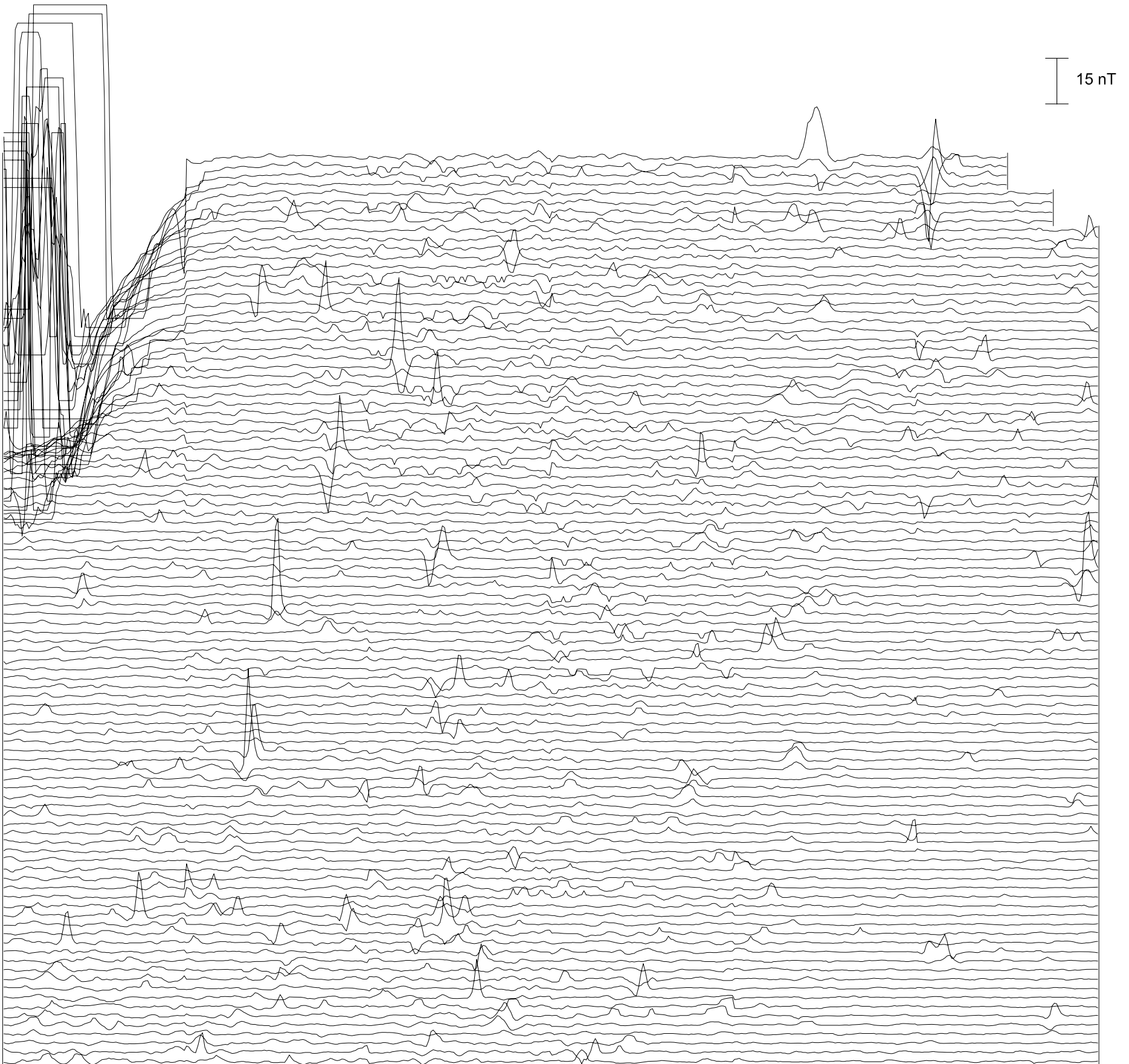
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ARCHIVE PLOT  
AREA 1B: XY TRACE PLOT



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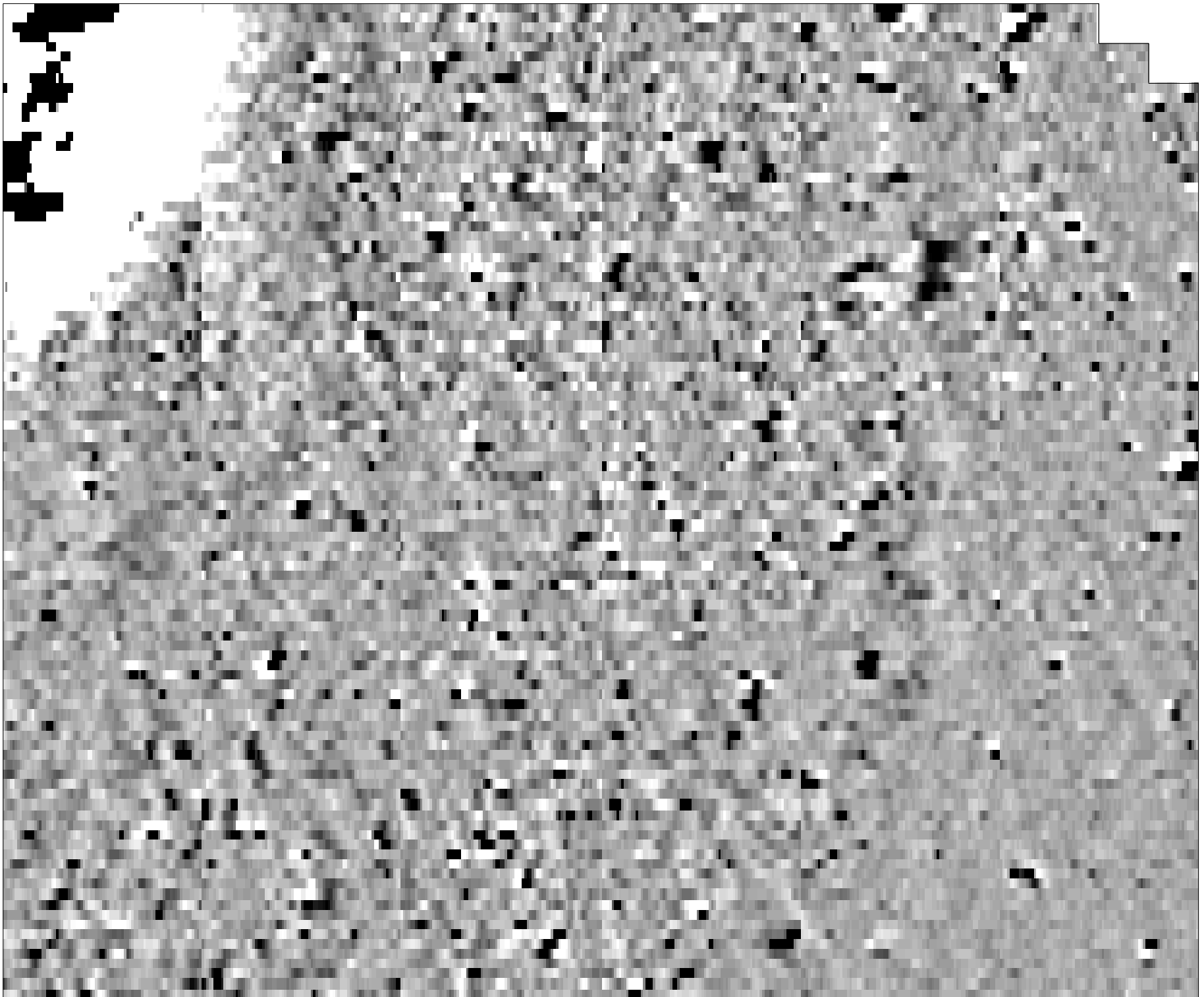
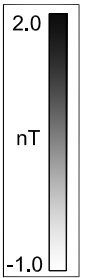
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N9 / N10 HOLDENSTOWN

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ARCHIVE PLOT  
AREA 1B: RAW GREYSCALE IMAGE



0 metres 20

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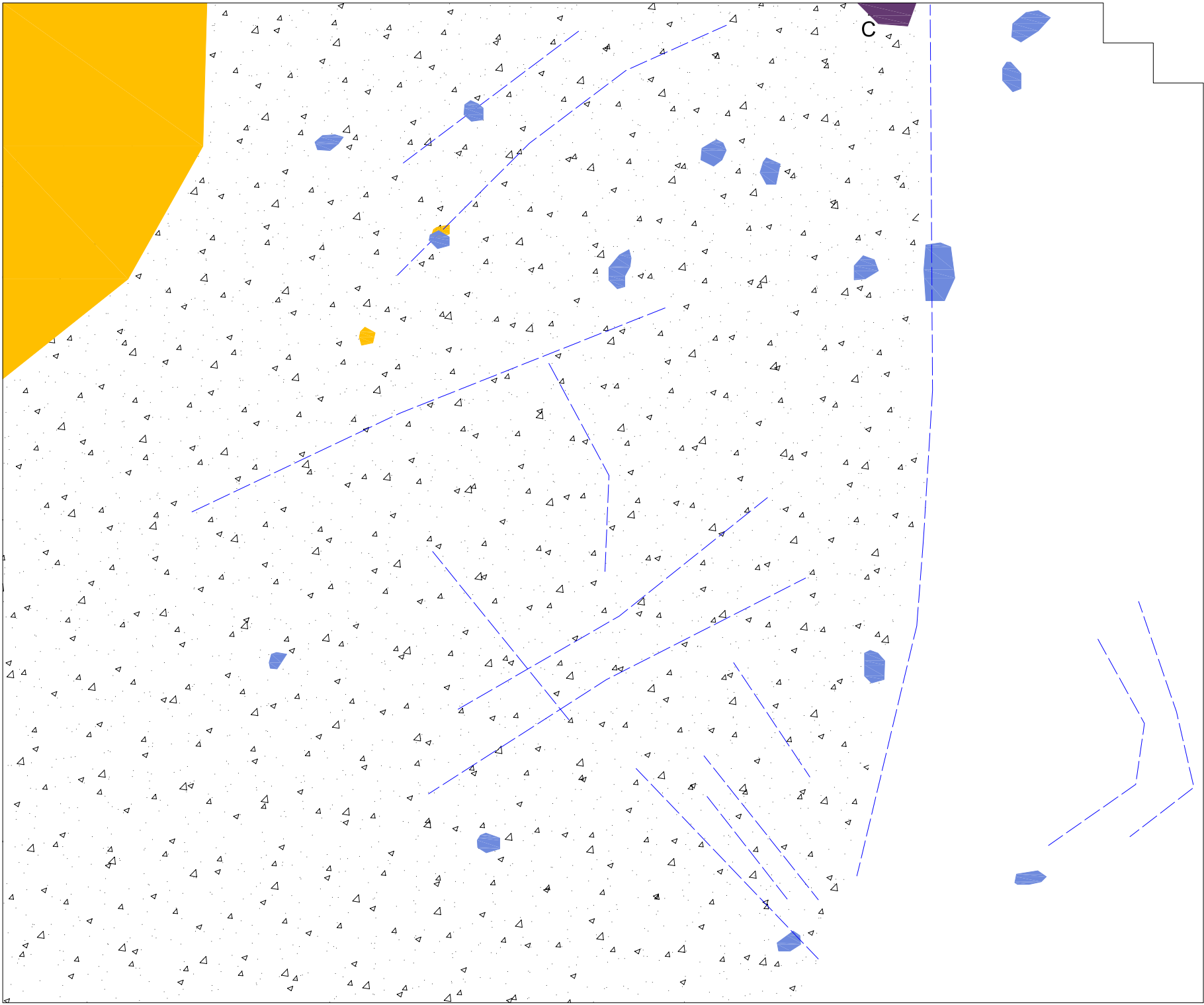
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GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN






Title:  
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AREA 1B: RAW  
GREYSCALE PLOT

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ARCHIVE PLOT  
AREA 1B: INTERPRETATION



 ? Archaeology Possible Pits  ? Archaeology  Trend  Area of Increased Response  Ferrous Response



0 metres 20

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GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN

Title:  
ARCHIVE PLOT  
AREA 1B: INTERPRETATION

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Issue Date: 24.05.2007

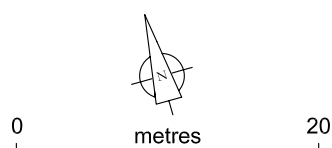
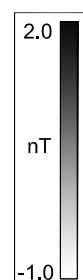
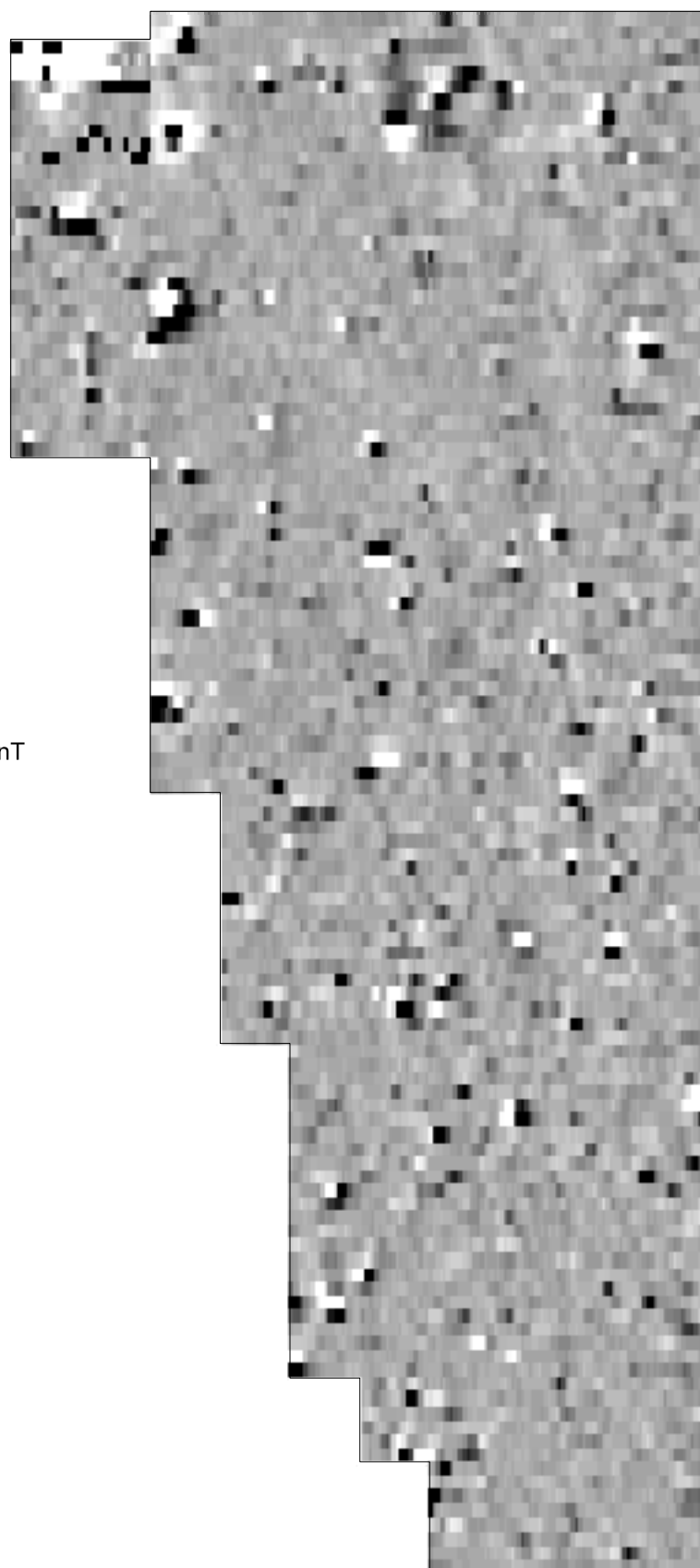
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ARCHIVE PLOT  
AREA 2: XY TRACE PLOT & RAW  
GREYSCALE IMAGE



15 nT



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CONSULTANCY LTD.

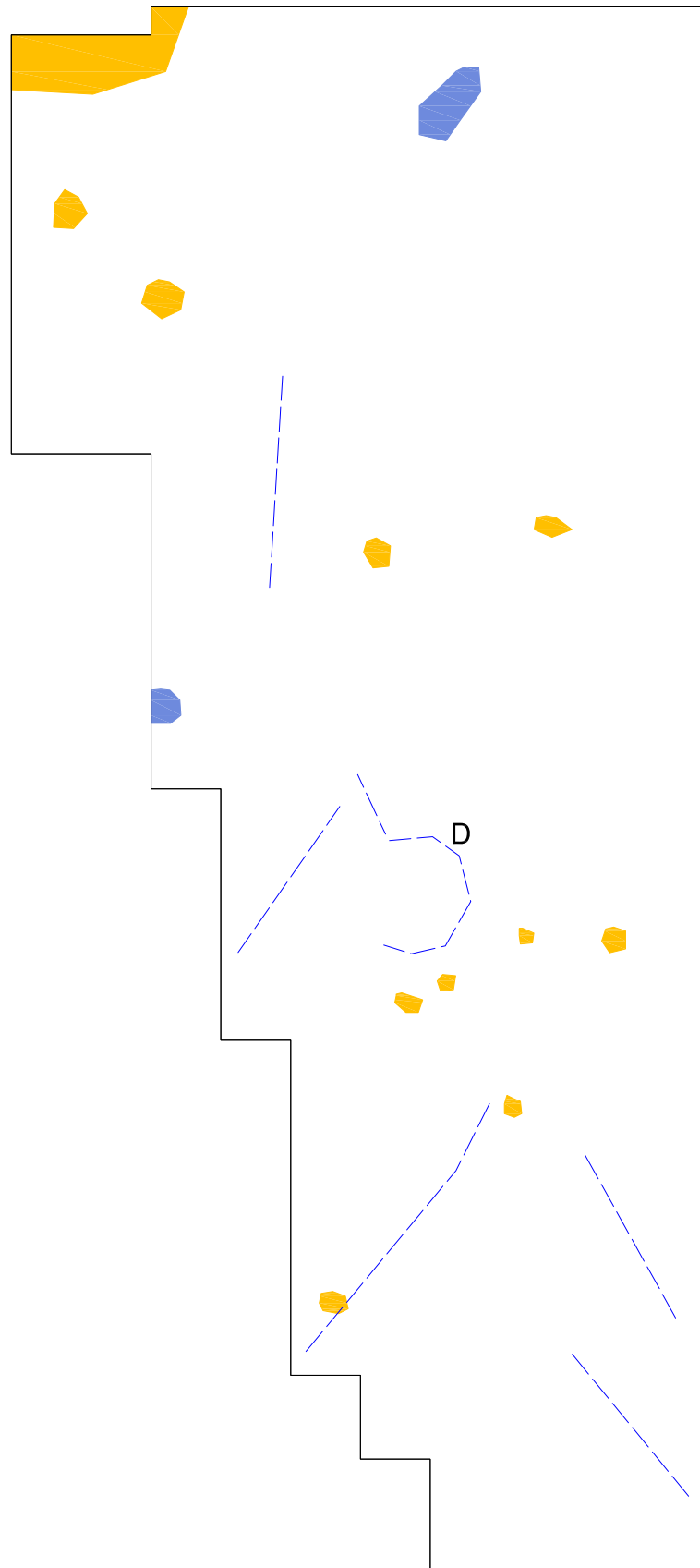
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N9 / N10 HOLDENSTOWN

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AREA 2: XY TRACE PLOT &  
RAW GREYSCALE IMAGE

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Figure:	A1.7
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ARCHIVE PLOT  
AREA 2: INTERPRETATION



 ? Archaeology     Trend     Ferrous Response



0      20  
metres

Client:  
IRISH ARCHAEOLOGICAL  
CONSULTANCY LTD.

Project:  
GEOPHYSICAL SURVEY:  
N9 / N10 HOLDENSTOWN

Title:  
ARCHIVE PLOT  
AREA 2: INTERPRETATION

Scale @ A3	1:500
Figure:	A1.8
Issue Date:	24.05.2007

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