Geophysical Survey Report

Lands At Ardrostig, Bishopstown, Cork

Detection License
18R0199

Client
John Cronin & Associates

On behalf of
HW Planning For Ardstone Homes

Date
October 2018

Project
TAG1800IE27

TARGET
archaeological geophysics

survey@targetgeophysics.com
www.targetgeophysics.com
Holsbeeksesteenweg 10, 3010 Kessel-Lo, Belgium
+32 (0) 483504280 / +353 (0) 878580112

TARGET REPORT 1800IE27

LANDS AT ARDROSTIG, BISHOPSTOWN, CORK

PROJECT BACKGROUND

Geophysical survey was undertaken at the site of a proposed residential development located at Ardrostig, in Ardarostig townland, near Bishopstown, on the south-western outskirts of Cork City. The proposed development, which comprises 1 large arable field situated on a N facing slope S of Waterfall Road, lies c.0.1m S of the N40, 0.5km W of the N71, and c.0.1km E of Waterfall Road Industrial Estate. A total 8.3 hectares of high resolution magnetic gradiometer survey was undertaken at the site examining all available lands within the proposed development boundary.

This geophysical survey was commissioned by John Cronin & Associates on behalf of HW Planning, for Ardstone Homes, and forms part of a pre-planning archaeological assessment prior to proposed development at the site. The survey objectives were to identify the location, form and character of buried archaeological remains, where present within the site boundary, and to advise further archaeological works prior to proposed development.

Coordinates 563280 568848 (ITM central coordinate)

Townland Ardarostig

County County Cork

Landuse Arable

Landscape, soils geology North facing agricultural land occupied by fine loamy drift of the Clonroche (1100a) association, with bedrock comprising of sandstone and mudstone belonging to the Gyleen, Cuskinny, and Old Head Sandstone Formations (Irish National Soils Map, 1:250,000k, V1b, 2014; Geological Survey Ireland Spatial Resources, Public Data Viewer Series).

Archaeology No recorded monuments and places (RMPs) are located within the site boundary. Enclosure CO086-134 represents the closest RMP in proximity to the proposed development, situated c.05km SE beyond the site boundary. Numerous RMPs located in the surrounding landscape demonstrate that the proposed development lies within a region rich in evidence of human settlement ranging from the early prehistoric through to the late medieval period. Details of RMPs located within a 0.6km radius of the proposed development are provided below:

SMR No.	Class	Townland	ITM Easting	ITM Northing
CO073-069----	Ringfort - rath	Ballinaspig More	562728	568903
CO073-111----	Fulacht fia	Ballinaspig More	562518	569213
CO073-112----	Fulacht fia	Ballinaspig More	562598	569193
CO073-113----	Pit-burial	Ballinaspig More	562884	569028
CO073-114----	Building	Ballinaspig More	562634	569009
CO073-115----	Structure	Ballinaspig More	562733	569033
CO073-117----	Excavation - miscellaneous	Ballinaspig More	562631	569006
CO074-128----	Burnt mound	Ballinaspig More	563277	569141
CO074-129----	Fulacht fia	Ballinaspig More	563809	569241
CO086-134----	Enclosure	Ardarostig	563535	568794

Fieldwork 21st September 2018

Report issue 2nd October 2018

Author John Nicholls MSc

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Client John Cronin & Associates on behalf of HW Planning for Ardstone Homes

Technique High resolution magnetic gradiometry

1 SURVEY METHODOLOGY

1.1 Survey coverage and data collection

1.1.1 High resolution magnetic gradiometer survey was undertaken at the site, investigating a total 8.3 hectares of available land within the proposed development boundary. The survey employed an advanced multichannel fluxgate gradiometer system combined with cm precision GPS. Magnetic gradiometer and GPS data were recorded simultaneously at rates of 75Hz and 1Hz respectively, conducting parallel instrument traverses 2.8m in width across the site, providing a spatial resolution of c.80 magnetic gradiometer measurements per m^2.

1.2 Survey instrumentation

1.2.1 Details of the instrumentation employed for this geophysical survey are provided below:

Technique	Sensor spacing	Sample rate	Instrumentation	Instrument sensitivity/precision	No. of measurements recorded
Magnetic (fluxgate) gradiometry	0.35m	75Hz	9 x Foerster Ferex CON650 Archaeology probes & 10-channel data logger	<75pT/√Hz at 1Hz (650mm baseline)	731,707
GPS	3.15m	1Hz	Trimble R10 GPS operating in VRS mode	<0.1m (vertical & horizontal)	10,534

1.3 Data processing

1.3.1 Survey data were processed using in-house, open-source and commercial software. Following GPS and magnetic gradiometer measurements on site survey data were processed as follows:

Process	Description
1	Zero median correction to balance data from entire sensor array
2	Gridding of corrected data via nearest neighbour interpolation or kriging
3	Greyscale generation at optimum range & export to tiff-format (.tiff & .wld)

1.3.2 To assure integrity of the processed data, and maintain close correlation with the original raw on-site measurements, no additional smoothing, low or high pass filters were applied proceeding steps 1-3.

2 GENERAL CONSIDERATIONS & COMPLICATING FACTORS

2.1 Access & ground conditions

2.1.1 Ground conditions at the site were generally suitable to geophysical survey the investigation area being under short stubble at the time of fieldwork, with few obstructions present to impede the progress of fieldwork. One area of poor ground in the eastern portion of the site remained unavailable to survey due to an excessively poor ground surface. Survey also avoided a series of pylons, which extend NE-SW across the site.

2.2 Modern interference

2.2.1 The pylons traversing the site support high voltage overhead power cables which traverse the centre of investigation NE-SW. The magnetic variation caused by the high voltage supply through these cables has caused interference to the survey instrumentation. This interference is visible in the survey results as a band of magnetic disturbance c.14-20m in width and extending NE-SW across the investigation area. The

potential that this magnetic disturbance may have masked responses of possible archaeological significance should not be dismissed.

2.2.2 Numerous small-scale ferrous responses are also evident throughout the survey results. Ferrous responses are a common occurrence in magnetic survey data, and in most cases represent modern metal debris contained within the topsoil. Several broad ferrous responses evident in the data, mostly at the edges of survey, represent modern surfaces and debris at the site perimeter.

3 MAGNETIC GRADIOMETRY RESULTS

3.1 No definitive patterns of archaeological character are evident in the survey results. The data highlight a low level of background magnetic variation across the investigation area, and this is punctuated, as is the case for most magnetic survey data, by a scatter of small-scale modern ferrous debris.

3.2 Responses from existing, and former, cultivation are evident in the results to the N, NE, W and SW of survey centre, and these are visible as closely spaced parallel linear anomalies on NE-SW/NW-SE alignments. Remnants of a former land division are also indicated N of survey centre. Historic mapping from 1837-1842 & 1888-1913 highlights the location of a further land division traversing the site centre NE-SW, which most likely underlies the magnetic disturbance caused by the high voltage overhead power cables traversing the site.

3.3 Part of an early field system, which predates the historic mapping, is indicated to the SW by a rectangular pattern or linear anomalies. This early field system appears to extend beyond the site boundary to the SW.

3.4 Responses of questionable archaeological potential are indicated by the results, and include a large and weakly magnetic anomaly (A), which is irregular in form and located in proximity to the early field system to the SW; and small-scale positives to the W (B-C), N (D), NE (E), and SE (F) of survey centre. Archaeological interpretation for these responses is tentative. These anomalies demonstrate no clear patterning or significant concentration of response to warrant a definite archaeological interpretation. A natural soil morphological/geological, modern ferrous or recent landuse origin is expected for the majority.

3.5 The results also highlight weakly positive/negative linear responses aligned generally NW-SE, and evident mostly to the S/SW. An abundance of weak linear trends are also apparent, mainly to the N-NE. These anomalies are at the limits of instrument detection and expected to represent natural variations in the underlying soil and geology.

3.6 No evidence of outlying features associated with enclosure site CO086-134 are suggested by the results from survey within the proposed development boundary.

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4 CONCLUSION

4.1 No responses of archaeological character have been recorded from geophysical survey within the site boundary. The results highlight remains of present, and past cultivation, a former boundary and an earlier field system, as well as an abundance of weak linear responses indicative of regional soil/geological variations.

4.2 No significant responses associated with enclosure CO086-134 situated beyond the proposed development to the SE have been recorded from survey within the site boundary.

4.3 Weakly magnetic and poorly defined positive anomalies have been detected. However, these display no significant patterning or concentration of response to suggest they are of archaeological origin. The majority of anomalies indicated by the results from survey are expected to derive from effects from natural soil/geological variation, former landuse, and modern ferrous debris.

4.4 A band of magnetic disturbance extends across the investigation area NE-SW, and this masks the location of a former boundary depicted on historic mapping.

*** This conclusion must be read in conjunction with the detailed discussion of the results included in the main section of this report.**

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LIST OF FIGURES

APPENDIX

MAGNETOMETRY

Introduction
Magnetometry represents one of a suite of geophysical techniques employed in archaeological prospection to inform invasive investigations such as trial trenching and excavation.

Frequently used to determine the often non-visible boundaries of archaeological remains, magnetometer surveys enable archaeologists to identify the location, form and extent of a diverse array of archaeological features no longer visible at the surface.

1. Advanced multi-channel magnetometer survey mapping the buried foundation of a 14th century castle (towed configuration with ATV).

Buried archaeological remains successfully identified using magnetometry include sites such as enclosure systems and deserted villages, hillforts and military encampments, henges and tumuli, villa/castle foundations, and ecclesiastical settlements.

Background to application
The basis for use of magnetometry in archaeological prospection derives from the abundance of natural iron oxides in most soils, and our ability to measure subtle variations in the magnetic properties of these iron oxides caused by human activity. Discrete variations in soil magnetism associated with buried archaeological remains derive typically from in situ burning and organic enrichment of the soil, through activities such as cooking and heating; pottery manufacture and metal working; as well as use of fired building materials such as ceramic tiles and brick. These burnt, fired and organic rich deposits create subtle magnetic contrasts visible as discrete magnetic anomalies superimposed on the earth's geomagnetic field.

2. Results from magnetometer survey presented in greyscale format highlighting pit remains bordering an enclosure site and Roman villa.

3. Burnt & fired debris revealed following excavation of pit remains bordering an enclosure site and Roman villa.

Magnetometer surveys conducted in both commercial and research archaeological investigations enable determination of the location, form and extent of buried archaeological remains. Data acquired from these surveys can be quickly generated into georeferenced images and interpretation layers to inform subsequent trial trenching and excavation.

Technology

TARGET provides precise mapping and characterization of buried archaeological remains by employing an array of highly stable and sensitive fluxgate gradiometers, combined with an advanced data logging system and cm precision GPS. This state-of-the-art geophysical instrumentation, which is capable of collecting extremely dense data sets, permits detailed high resolution survey of archaeological sites from as small as 1ha in size, to larger scale investigation of sites up to 150ha or more.

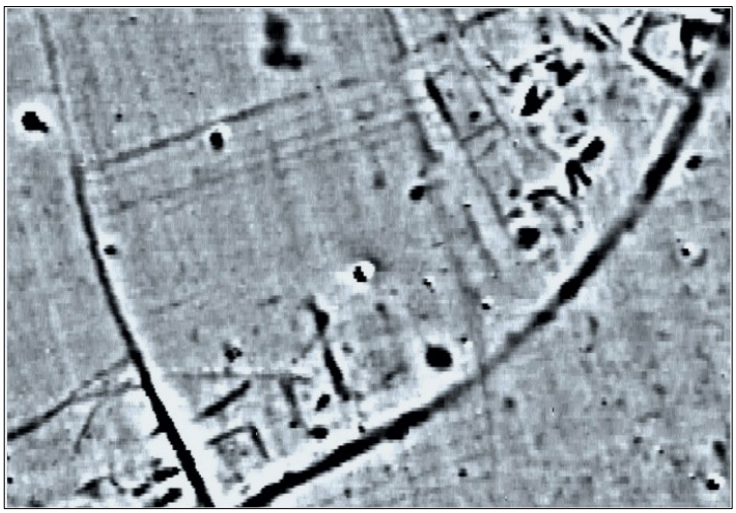
4. Advanced multi-channel gradiometer system for magnetometer survey (manual configuration).

5. GPS tracks (red) highlighting lines of data collection & results from magnetometer fieldwork at a suspected burial ground.

TARGET undertakes high resolution magnetometer surveys as standard, recording data at c.5cm intervals with probe separations of 0.28m or 0.5m, for precise measurement and characterization of buried archaeological remains.

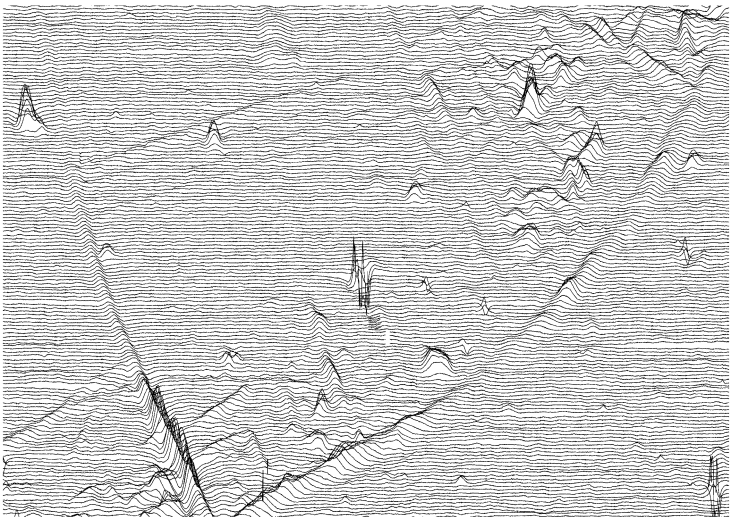
Data Display

Greyscale plots are the most common format for displaying magnetometer data. This display 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 a given data set. This display method also enables the identification of discrete responses barely visible above natural 'background' magnetic variation on site.



6. Greyscale from survey at the site of a deserted medieval village.

XY trace plots provide a near-perspective representation of measurements along individual lines of data recorded from each of the magnetometer sensors. The XY trace format is used as a conventional method for identifying responses which derive from modern ferrous debris. The XY trace display is particularly when identifying magnetically strong anomalies indicative of buried hearths, kilns and furnaces.



7. XY trace from survey at the site of a deserted medieval village.

Drawing	Site location	**Project**	Lands at Ardrostig, Bishopstown, Cork	**Client**	John Cronin & Associates on behalf of HW Planning for Ardstone Homes	**Fig.**	1	**Scale**	1:5000 @ A3	**TAG.** 1800IE27

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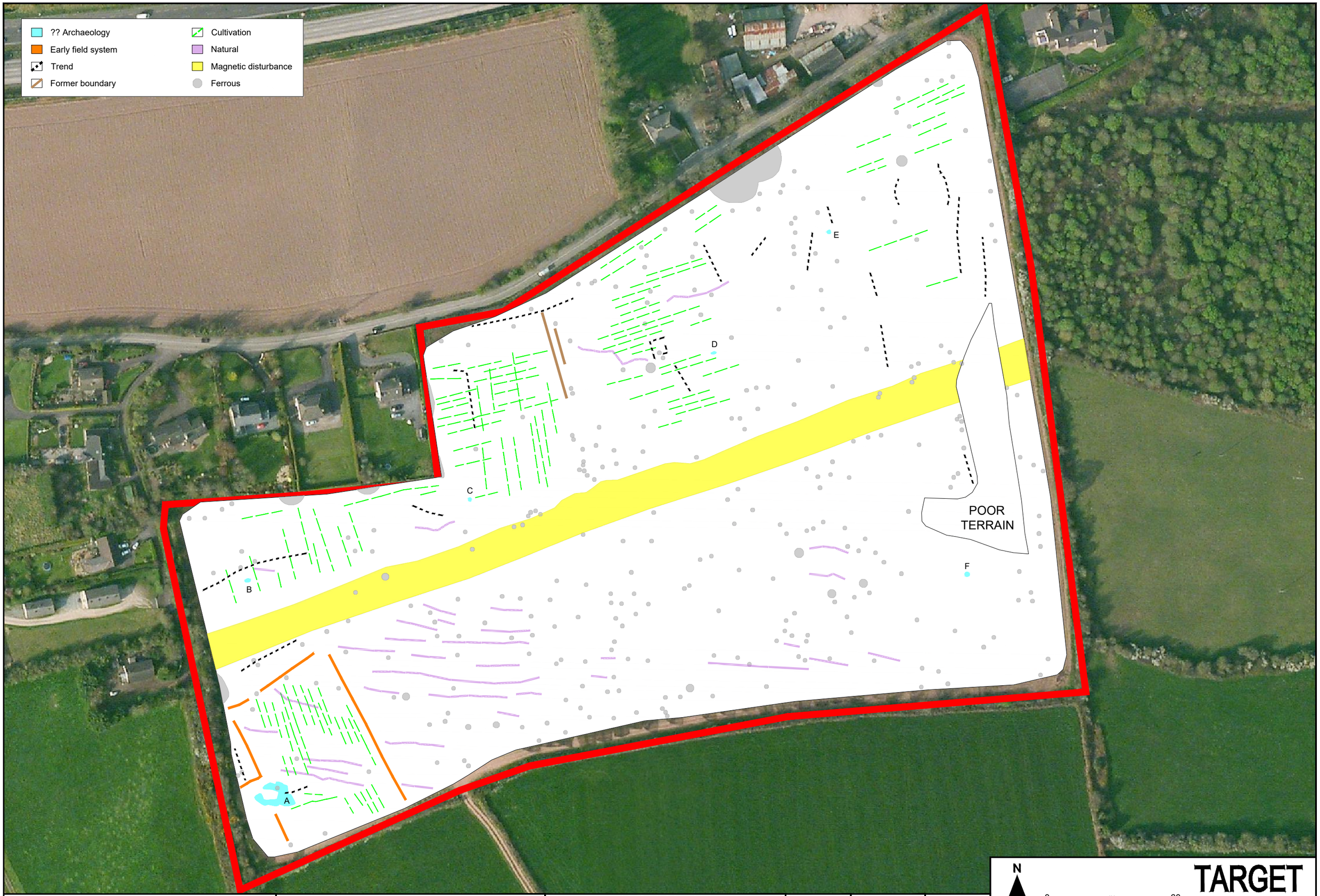
Drawing	Greyscale	**Project**	Lands at Ardrostig, Bishopstown, Cork	**Client**	John Cronin & Associates on behalf of HW Planning for Ardstone Homes	**Fig.**	2	**Scale**	1:1500 @ A3	**TAG.** 1800IE27



Drawing	Interpretation	**Project**	Lands at Ardrostig, Bishopstown, Cork	**Client**	John Cronin & Associates on behalf of HW Planning for Ardstone Homes	**Fig.**	3	**Scale**	1:1500 @ A3	**TAG.**	1800IE27

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survey@targetgeophysics.com
www.targetgeophysics.com

Holsbeeksesteenweg 10, 3010 Kessel-Lo, Belgium

+32 (0) 483504280 / +353 (0) 878580112

Registered Business in Belgium (0845.688.362) & Ireland (No. 257414)