GALETECH
ENERGY SERVICES

Cush Wind Farm
Phase II

Environmental Impact Assessment Report

Annex 11.2: Geophysical Survey Report

Cush Wind Limited

Geophysical Survey Report

Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly

Client
Cush Wind Ltd.

Detection License
26R0335

TAG Project
202625

Date
July 2026

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PROJECT DETAILS

Project	Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly
License no.	26R0335
Townlands	Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia, Shanacloon
Town	Birr
County	Co. Offaly
ITM	NW 608435 710198 – SE 612344 708835
Client	Cush Wind Ltd.
Planning	Pre-planning
Geophysicist & report author	John Nicholls MSc.
Geophysical technique	Magnetometry (fluxgate gradiometry)
Report date	26th July 2026
TARGET project	202625

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EXECUTIVE SUMMARY

Target Archaeological Geophysics Ltd. was appointed by Cush Wind Ltd. to conduct a geophysical survey along the route of the proposed Cush Wind Farm underground electricity line (UGL) in the townlands of Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia and Shanacloon to the NE of Birr, in County Offaly.

The geophysical survey was undertaken as part of a pre-planning archaeological assessment prior to proposed development.

The route of the proposed underground electricity line (UGL) traverses the constraint areas associated with RMPs OF030-015 (tower house), OF030-015001 (bawn), OF030-016 (church) and OF030-016001 (graveyard), in Eglish townland, to the W of the N52. Further RMPs are also present within the surrounding landscape.

Geophysical survey was conducted along the route of the underground electricity line (UGL) following license approval from the National Monuments Service, Department of Housing, Local Government & Heritage, examining all suitable lands within the investigation corridor (detection license 26R0335). In total, 29 areas of geophysical survey (GS1-29) were completed.

No remains of definite archaeological character were recorded by the geophysical survey, and no responses of significant archaeological potential were identified. Where buried archaeological remains associated with RMPs OF030-015, OF030-015001, OF030-016 and OF030-016001 may be present in GS15 they will not have been recorded due to widespread magnetic disturbance throughout this section of the investigation corridor.

Increased magnetic response, poorly defined positives and trends were recorded by the geophysical survey. The majority of these, however, are expected to relate to patterns of recent landuse, modern ferrous and natural soil/geological variation.

Full details relating to the geophysical methodology, data processing, analysis, display and results from this geophysical survey are provided in the following pages of this report.

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1 INTRODUCTION

Geophysical survey was undertaken along the route of the proposed Cush Wind Farm underground electricity line (UGL), in the townlands of Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia and Shanacloon, to the NE of Birr in Co. Offaly. Approximately 4.9km in length the proposed underground electricity line (UGL) route extends NW-SE from ITM 608435 710198 c.0.85km E of the N62, as far as ITM 612344 708835 c.0.9km S of Grennan's Mill and the L7006, crossing the N52 at ITM 609922 709716.

The geophysical survey formed part of a pre-planning archaeological assessment commissioned by Cush Wind Ltd, and was carried out under license from the National Monuments Service, Department of Housing, Local Government & Heritage (license 26R0335) with the following aims:

- to identify any geophysical anomalies of possible archaeological origin within the specified areas
- accurately locate these anomalies & present the findings in graphical format
- describe these anomalies & discuss their likely provenance in a written report

The route of the proposed underground electricity line (UGL) traverses part of a neighbouring proposed development situated in Clonbeale Beg Glebe, Rathnure North and Parkmore townlands for which a previous geophysical survey was undertaken in 2023 (Nicholls J, license 23R0107). An extract of the results from that geophysical survey are included in this report to highlight the findings along that section of the route of the proposed underground electricity line (UGL).

1.1 Landscape, soils & geology

The route of the proposed underground electricity line (UGL) traverses poor to good quality undulating pasture land and tillage overlying cut over raised peat, fine loamy drift (Elton 1000a and Mylerstown 650a associations), and river alluvium, with limestone gravels and till present in the subsoil. Bedrock is characterised by Waulsortian massive unbedded lime-mudstone, Visean undifferentiated limestone, and Lucan formation dark limestone and shale (Irish National Soils Map, 1:250,000k, V1b; Geological Survey of Ireland Spatial resources, Public Data Viewer Series).

1.2 Archaeological background

The zones of notification associated with RMPs OF030-015 (tower house), OF030-015001 (bawn), OF030-016 (church) and OF030-016001 (graveyard) are traversed by the route of the proposed underground electricity line (UGL) in Eglish townland, immediately W of the N52. Further RMPs are present in the wider landscape, mostly at distance of 320m or greater. The following extract from the National Monuments Service SMR database provides summary details relating to OF030-015, OF030-015001, OF030-016 and OF030-016001, and further RMPs situated within a 1km radius.

Table 1.2.1 Recorded Monuments & Places (RMPs)

SMR No.	Townland	Class	ITM East	ITM North
OF030-010	Ballycollin (Eglish By.), Eglish	Enclosure	609988	710512
OF030-011	Coologe	Enclosure	610196	710810
OF030-013	Cloncarban	Enclosure	609699	708932
OF030-015	Eglish	Castle - tower house	609834	709843
OF030-015001	Eglish	Bawn	609824	709843
OF030-016	Eglish	Church	609895	709823
OF030-016001	Eglish	Graveyard	609891	709826
OF030-017	Eglish	Ritual site - holy well	608539	709385

OF030-018	Ballynaguilsha	Enclosure	609579	708912
OF030-019	Cloncarban	Enclosure	609884	709119
OF030-020	Cloncarban	Enclosure	610783	709148
OF030-021001	Tinnacross	Church	612322	709671
OF030-021002	Tinnacross	Graveyard	612329	709660
OF030-023	Ballycollin (Eglish By.)	Mass-rock	608544	709425
OF030-080	Coologe	Road - class 3 togher	609308	711213
OF030-081	Galros East	Structure - peatland	608065	711085
OF030-082	Whigsborough	Structure - peatland	609095	711627
OF030-083	Ballycollin (Eglish By.)	Structure - peatland	608676	711194
OF031-069	Raheenglass	Architectural feature	612860	709815
OF031-072	Rathmount	Cross - high cross (present location)	612848	709745
OF035-003	Ballindown	Ringfort - rath	607595	708095
OF035-004	Bogderries	Enclosure	608914	708017
OF035-005	Clonbeale More	Enclosure	610858	708266

2 SURVEY METHODOLOGY

2.1 Survey locations & extent

29 areas of geophysical survey (GS1-29), amounting to 24.5ha, were completed along the route of the proposed underground electricity line (UGL), examining all lands available at the time of fieldwork.

2.2 Instrumentation

The geophysical survey was undertaken by means of a magnetometry, employing fluxgate gradiometer arrays combined with cm precision GPS, recording magnetometer and GPS data simultaneously at bandwidths of 50Hz and 1Hz. Data was acquired along parallel instrument traverses 3.42m (10-channel array) and 2.66m (8-channel array) in width, both systems operating in 'tow configuration' using ATVs.

Table 2.2.1 Instrumentation & survey spatial resolution

Technique	Sensor spacing	Bandwidth	Instrumentation	Sensitivity	No. of data
Magnetometry (fluxgate gradiometry)	0.38m	50Hz	Foerster fluxgate gradiometer arrays	< 75pT/√ @ 1Hz (650mm baseline)	11,310,000
GPS	3.42m & 2.66m	1Hz	Trimble R10 & TSC5	<0.1m	30,100

The spatial resolution of the geophysical survey completed in GS1-29 equates to c.60 magnetometer measurements per m^2. This resolution meets with ease the 'Level 3 – Characterisation' EAC Guidelines for geophysical survey in archaeology (Schmidt et al 2016).

2.3 Statement on survey speed & data quality

Capture of reliable and accurate geophysical data for archaeological purposes relies heavily on good survey design and appropriate equipment usage. Excess speed during magnetometer survey in particular, significantly degrades both instrument performance and data quality, causing:

- increased vibration, oscillation & mechanical noise affecting sensor probes, cables, loggers & GPS
- decline in the structural integrity of the survey cart/sensor platform
- reduced ability to filter out 50Hz/60Hz electricity power line interference

Consequently, the following issues affecting data quality occur:

- reduced repeatability & accuracy of measurement
- increased 'noise' levels, measurement errors & unwanted magnetic fluctuations
- reduced positional accuracy resulting in distortion of anomalies
- inferior feature detection, analysis & interpretation

All magnetometer data acquired during the geophysical fieldwork were recorded at appropriate speeds, within safe operational limits for the geophysical equipment, following manufacturer's guidelines. Graph 2.3.1 below presents the mean survey speed in km/h for all data files acquired during this geophysical survey. The statistics files from which these values derive are available on request.

2.3.1 Speed of data acquisition



2.4 Data processing

Post fieldwork the geophysical survey data were processed as follows:

Table 2.4.1 Geophysical data processing

Process	Description
a)	Positioning of geophysical data based on real-time GPS measurements (WGS84 Geodetic CRS)
b)	Zero median transect processing for multi-sensor magnetometer data collected along parallel transects
c)	Transformation from WGS84 geodetic CRS to ITM (IRENET95) projected CRS
d)	Gridding/interpolation (ordinary kriging), of vector points (processed geophysical measurements) to raster imagery (cells)
e)	Raster export in greyscale format georeferenced in ITM (IRENET95)

To maintain the integrity of the processed geophysical results, and correlation with the original on-site measurements, no further processing or filtering of the data was undertaken.

2.5 Data analysis prior to presentation of survey results

Table 2.5.1 below presents the mean, minimum, maximum and standard deviation of the processed geophysical data, highlighting the central tendency, distribution, and variability of measurements, i.e. soil magnetic contrast, recorded along the investigation corridor in GS1-29.

Table 2.5.1 Univariate statistics

Mean	Minimum	Maximum	Standard deviation
+0.062	-725.91	+4925.65	15.18

The mean value of +0.062nT within the data set demonstrates that background variation across the site lies mostly well within a range of +/-1.5nT. Greyscale presentations of the survey results are, therefore, presented slightly above background variation, using a dynamic range of +2/-1.5nT, for optimum display.

2.6 Figures

Figure 1 presents a location diagram highlighting the route of the proposed underground electricity line (UGL) through Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia and Shanacloon townlands, either side of the N52, to the NE of Birr (scales 1:500,000 and 1:15,000).

Figure 2 presents the soil and geological context along the route of the proposed underground electricity line (UGL) and the surrounding landscape (scale 1:30,000).

Figure 3 highlights the locations of OF030-015, OF030-015001, OF030-016 and OF030-016001 W of the N52, with further RMPs situated in a 1km radius indicated (scale 1: 15,000).

Figure 4 presents the locations of geophysical survey areas GS1-29 completed along the investigation corridor.

Figures 5-14 present summary greyscales and interpretations diagrams of the results from geophysical survey in GS1-29 at a scale of 1: 2500, with notable anomalies indicated on the interpretations.

Figures 15-32 present greyscales plots of the data and interpretations from GS1-29 at a scale of 1:1500 to assist review of the survey results.

3 GENERAL CONSIDERATIONS

3.1 Ground conditions & access

Ground conditions along the route of the proposed underground electricity line (UGL) varied considerably, the investigation corridor traversing a mixture of poor to good quality pasture and tillage. Survey was precluded at several locations due to an esker between GS5-6, woodland to the S/SE of GS15 and dense scrub between GS26-27. The south-eastern extent of the proposed underground electricity line (UGL) was not surveyed due to access complications.

3.2 Modern interference

The results from magnetometer survey in GS1-29 display a multitude of small-scale ferrous responses throughout. These are a common occurrence in magnetometer data and relate mostly to modern metallic debris contained in the topsoil. Broad ferrous responses and zones of magnetic disturbance are also apparent in the data, the majority at the perimeter of survey in proximity to existing field boundaries and modern surfaces. It should be noted that where subtle magnetic contrasts associated with OF030-015, OF030-015001, OF030-016 and OF030-016001 may be present in GS15, these are unlikely to be detected due to the range of magnetic disturbance encountered along this section of the proposed underground electricity line (UGL).

Magnetic disturbance was also recorded to the SE in GS24 due to interference from overhead power cables.

Responses associated with modern ferrous and magnetic disturbance are not referred to in the results section of this report unless deemed relevant.

3.3 Recent landuse

Responses from former cultivation are indicated by the results from survey in GS3, GS21 and GS28-29, visible as closely spaced parallel linear anomalies aligned NW-SE, NE-SW and E-W. Remnants of former field boundaries depicted on the historic mapping are also visible in the results from GS5, GS13, GS28 and GS29, with suspected former boundaries also suggested in GS13 and GS28-29. The possibility that the former field boundary remains depicted on historic mapping in GS13 may in part relate to a former trackway or road should not be ignored.

Numerous land drains/suspected land drains have also been recorded by the geophysical survey in GS1-5, GS17, GS20, GS22, GS24-26.

Responses associated with past cultivation, former/suspected former field boundaries and land drains are not referred to in the results section of this report unless deemed relevant.

3.4 Natural soil/geological variation

Responses from natural soil/geological variation are also indicated in the results from geophysical survey in GS1-8, GS12-14, GS16-18, GS20-29.

Natural soil/geological variations are not referred to in the results section of this report unless deemed relevant.

4 MAGNETOMETER SURVEY RESULTS

4.1 General overview

The results from geophysical survey in GS1-29 display a mostly quiet magnetic background along the investigation corridor within a range of +/-1.5nT. Abundant responses indicative of modern ferrous/magnetic disturbance have been recorded, with remnants of former cultivation, former/suspected former field boundaries, land drains and natural soil/geological variation also evident.

4.2 Archaeology

No definitive archaeological type responses are indicated by the results from geophysical survey in GS1-29. No clear representation of settlement activity in the form of enclosure remains, ditch type anomalies, clusters of significant archaeological type response have been recorded.

4.3 ? Archaeology

No responses demonstrating significant archaeological potential are indicated by the results from GS1-GS29.

4.4 Responses of uncertain origin

The results do, however, highlight an abundance of small-scale positives, trends and zones of increased magnetic response uncertain in origin. The majority of these demonstrate no clear character or patterning to warrant an archaeological interpretation. Unless referred to in the table of results in section 4.5 of this report these anomalies are expected to relate to effects from recent landuse, natural variation and/or modern ferrous.

The most notable of anomalies of uncertain origin recorded in GS1-29 along the route of the proposed underground electricity line (UGL) include:

- a cluster of strongly magnetic positives to the S in GS2
- increased magnetic response, small-scale positives and trends to the W, NW and SW in GS3
- small-scale positives and trends to the E in GS4

- increased magnetic response and small-scale positives NW of centre in GS6
- increased magnetic response and trends to the NE in GS11
- increased magnetic response N of centre in GS12
- small-scale positives S of centre in GS13
- small-scale positives NE of centre in GS19
- small-scale positives at survey centre in GS21
- a linear trend extending NW-SE across GS24
- increased magnetic response, small-scale positives and trends to the NW and S of centre in GS28
- curving trends NE of centre in GS29

No further responses of note were recorded by the geophysical survey conducted in GS1-29 along the route of the proposed underground electricity line (UGL).

4.5 Table of survey results (figures 5-32)

The following table of survey results provides further descriptions of the notable responses recorded by the geophysical survey in GS1-GS29 and also suggests their likely provenance:

Table of survey results

GS	Response	Interpretation legend						Description & likely provenance
		Arch.	*? Arch.*	*? Bf.*	*Imr*	*Unc.*	*Tr.*	
2	1					✓		Cluster of strongly magnetic positives uncertain in origin. A recent landuse and/or modern ferrous origin is expected.
3	2					✓		Cluster of small-scale positives uncertain in origin, likely relating to recent landuse and/or natural soil/geological variation.
3	3				✓	✓		Increased magnetic response and small-scale positives uncertain in origin. A recent landuse and/or natural soil/geological origin is suggested.
3	4				✓			Increased magnetic response uncertain in origin. A recent landuse and/or natural soil/geological origin is suggested.
3	5					✓	✓	Sub-rectangular concentration of small-scale positives and trends uncertain in origin. A recent landuse and/or natural soil/geological origin is deemed most likely.
4	6					✓	✓	Cluster of discrete positives and trends uncertain in origin. A recent landuse and/or natural soil/geological origin is expected. Responses 6 are located beyond the limits of the proposed development.
6	7				✓	✓		Increased magnetic response and small-scale positives of potential note. Anomalies 7 are located at the base of an esker. A recent landuse and/or natural soil/geological explanation should not be ignored.
11	8				✓		✓	Increased magnetic response and trends potentially associated with a flour mill, corn mill and kiln depicted on the historic mapping in the vicinity of GS11.
12	9				✓			Increased magnetic response of uncertain origin. A recent landuse and/or natural soil/geological origin should not be dismissed.
13	10					✓		Small-scale positives uncertain in origin, likely deriving from variations in soil morphology/near surface geology.
19	11					✓		Cluster of small-scale positives uncertain in origin. A recent landuse and or natural soil/geological origin is expected.

GS	Response	Interpretation legend						Description & likely provenance
		Arch.	*? Arch.*	*? Bf.*	*Imr*	*Unc.*	*Tr.*	
21	12					✓		Small-scale positives uncertain in origin likely relating to recent landuse and or natural soil/geological variation.
24	13						✓	Linear trend uncertain in origin, potentially relating to a former drain or past land division.
28	14				✓	✓		Cluster of strongly magnetic positives and increased magnetic response uncertain in origin. The possibility that 14 represents burnt/fired material of interest should not be ignored. A recent landuse and/or modern ferrous origin should also be considered.
28	15					✓	✓	Small-scale positive and curving trends of potential note. A recent landuse, natural soil/geological and/or modern ferrous origin is deemed most likely.
29	16						✓	Curving trends of potential interest. A recent landuse origin should not be dismissed.

5 CONCLUSION

No responses of definite archaeological character or significant archaeological potential have been recorded by the geophysical survey in GS1-29 along the route of the proposed underground electricity line (UGL). No clear representation of enclosure remains, concentrations of ditch type response, potential pit groupings or burnt/fired deposits are indicated by the results. Where archaeological remains associated with RMPs OF030-015, OF030-015001, OF030-016 and OF030-016001 may be present in GS15 they will not have been detected due to large-scale magnetic disturbance recorded by the geophysical survey.

An abundance of responses associated with recent landuse have been detected, including remnants of former/suspected former field boundaries, past cultivation, land drains and modern ferrous/magnetic disturbance.

Small-scale positive responses, trends and zones of increased response of potential note have been identified by the geophysical survey. The precise nature of these anomalies remains uncertain. While an archaeological explanation should not be entirely dismissed, it is suggested that the majority of these responses relate to effects from recent landuse, modern ferrous/magnetic disturbance and/or natural soil/geological variation.

6 BIBLIOGRAPHY

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Schmidt A, Linford P, Linford N, David A, Gaffney C, Sarris A & Fassbinder J (2016), EAC Guidelines for the use of geophysics in Archaeology, published by Europae Archaeologia Consilium (EAC), Association Internationale sans But Lucratif (AISBL).

Schmidt A. Dabas M & Sarris A (2020), Dreaming of perfect data: characterizing noise in archaeological-geophysical measurements, Geosciences 2020, 10, 382.

7 ONLINE RESOURCES

Archaeological Survey of Ireland SMR Database : http://webgis.archaeology.ie/historicenvironment/

Bing Maps: https://www.bing.com/maps

Geological Survey of Ireland Spatial Resources, Public Data Viewer Series: https://dcenr.maps.arcgis.com

Irish National Soils Map, 1:250,000k, V1b (2014), Teagasc, Cranfield University, EPA Strive Research Programme 2007-2013 & Teagasc: http://gis.teagasc.ie/soils/map.php

Google Maps: https://www.google.com/maps

MAGNETOMETRY

Introduction

Magnetometry represents one of a suite of geophysical techniques employed in archaeological prospection to inform invasive work 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.

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, ecclesiastical settlements and formal gardens.

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.



1. Magnetometer survey data in greyscale format highlighting pit remains SE of an enclosure and Roman villa.



2. Burnt-fired debris uncovered during excavation of the highlighted area SE of the same enclosure 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.

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High resolution magnetometer surveys are undertaken as standard, recording data at c.5cm intervals with probe separations of 0.3m for precise measurement and characterization of buried archaeological remains. This spatial resolution meets with ease the 'Level 3 – Characterisation' EAC Guidelines recommendation for geophysical survey in archaeology (Schmidt et al, 2016).

Instrumentation is used in combination with cm precision GPS and data collected along parallel traverses with the system installed in 'tow configuration' for use with an ATV or in push mode.

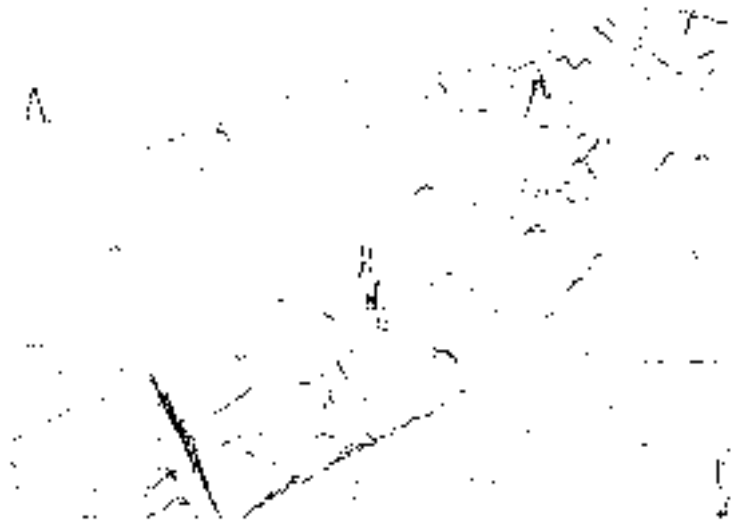
Data Display

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 magnetometer sensor. The XY trace format is used as a conventional method for identifying responses of modern ferrous debris, and also as an aid in identifying locations of potential industrial features, such kilns and metal working.



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

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Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Site location diagram	**Fig.** 1	**Scale** 1:500,000 & 1:15,000	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.

Soil Associations (Irish National Soils Map, 1:250,000k V1b, 2014; Imagery © Google / 2024 Airbus, CNES / Airbus, Maxar Technologies)

05RIV
650a
05RIV
1000a
Urban
650a
01_RsMi
650a
650a
650a
01_Bk

Bedrock Geology 100k (Geological Survey of Ireland Spatial Resources, Public Data Viewer Series; Imagery © Google / 2024 Airbus, CNES / Airbus, Maxar Technologies)

Proposed development

Underground electricity line (UGL) for geophysical survey

imestones
Visean Limes
Lucan Formation
ted)
Lucan Formatio

Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Site soil & geological context	**Fig.** 2	**Scale:** 1/30,000 @ A3 0 600m	**TAG Proj.** 202625

TARGET Archaeological Geophysics Ltd.

Proposed development
Underground electricity line (UGL) for geophysical survey
Townland boundary
SMR Zone
Architectural feature
Enclosure
Structure (peatland)
Road (Class 3 Togher)
Castle -tower house
Graveyard
Holy well
Mass rock
Church
Bawn

Aerial imagery © Google & Maxar Technologies 2026 / National Monuments Service (NMS) dataset, Department of Housing, Local Government & Heritage, © Government of Ireland 2024

OF030-082----
OF030-080----
OF030-083----
OF030-081----
OF030-011----
OF030-010----
OF030-015/15001
OF030-016/16001
OF030-023----
OF030-019----
OF030-013----
OF030-018----
OF030-020----
OF035-005----
OF035-003----
OF035-004----
OF031-072----
OF030-021002-
Galros East
Coologe
Doorosheath
Parkmore
Lowerheath
Ballycollin
Mountheny
Raheeng
Eglish
Cush
Shanacloon
Springfield
Tinnacross
Rathmount
Ballynaguilsha
Cloncarban
Mullanafawnia
Clonbeale Beg Glebe
Boolinarig Little

Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly

Client Cush Wind Ltd.

Dwg: Recorded monuments & places (RMPs) within 1km of investigation area

Fig. 3

Scale: 1/15,000 @ A3 — 0 — 300m

TAG Proj. 202625

TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg:** Survey locations GS1-GS29	**Fig.** 4	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:11,000 @ A3 0 220m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary greyscale 1	**Fig.** 5	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary interpretation 1	**Fig.** 6	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary greyscale 2	**Fig.** 7	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.

Uncertain origin (Unc.)
Increased response (Imr.)
Trend (Tr.)
Former boundary (hist. mapping)
? Former boundary/field system
Cultivation
Land drain
Natural (soil/geological variation)
Magnetic disturbance
Ferrous

8
10
12
9
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13
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15
POOR TERRAIN
CROP
CROP

Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary interpretation 2	**Fig.** 8	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary greyscale 3	**Fig.** 9	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary interpretation 3	**Fig.** 10	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625

TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary greyscale 4	**Fig.** 11	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary interpretation 4	**Fig.** 12	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625

TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary greyscale 5	**Fig.** 13	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Summary interpretation 5	**Fig.** 14	**Scale:** 1:2500 @ A3 0 50m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 1	**Fig.** 15	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 1	**Fig.** 16	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 2	**Fig.** 17	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly

Client Cush Wind Ltd.

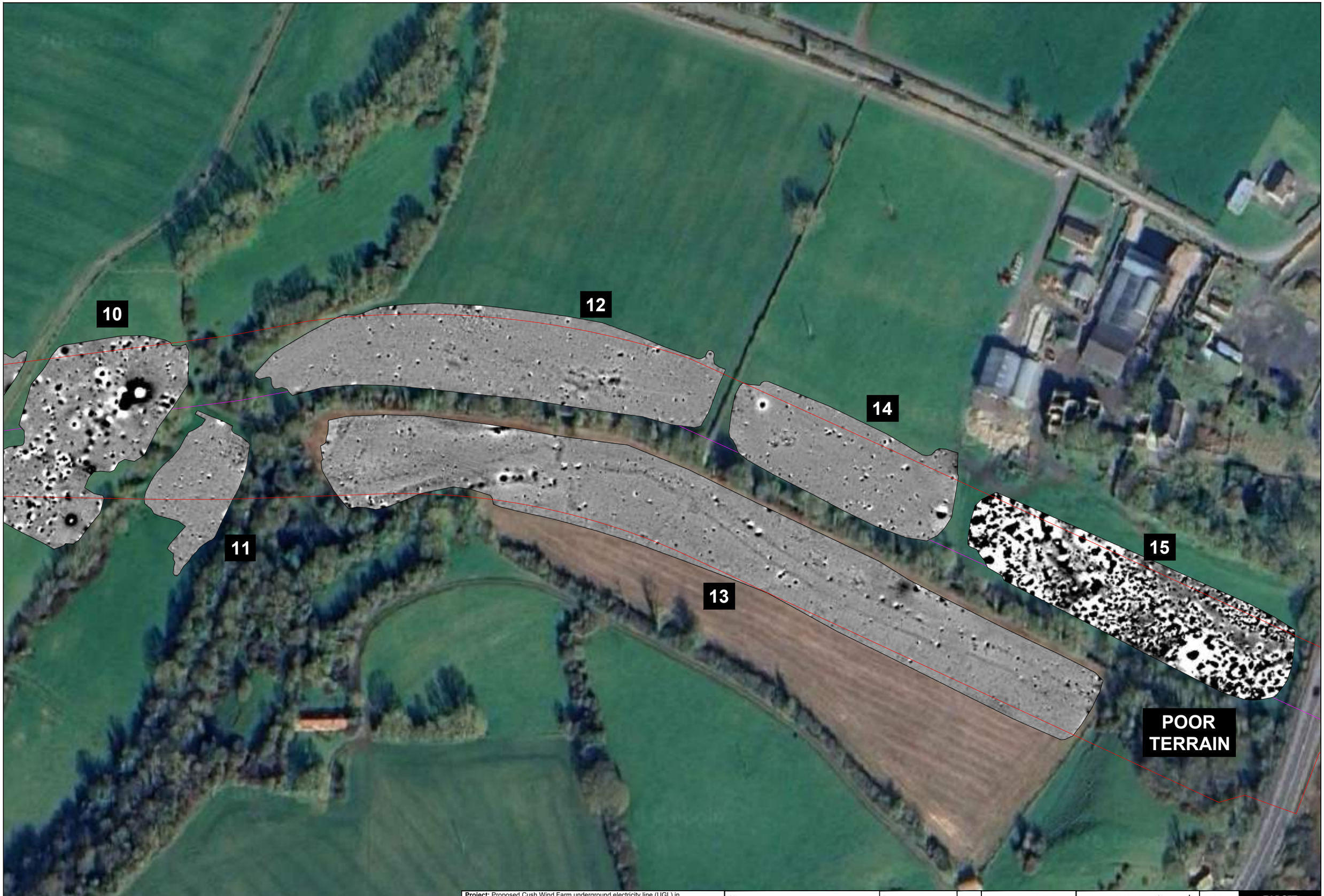
Dwg. Interpretation 2

Fig. 18

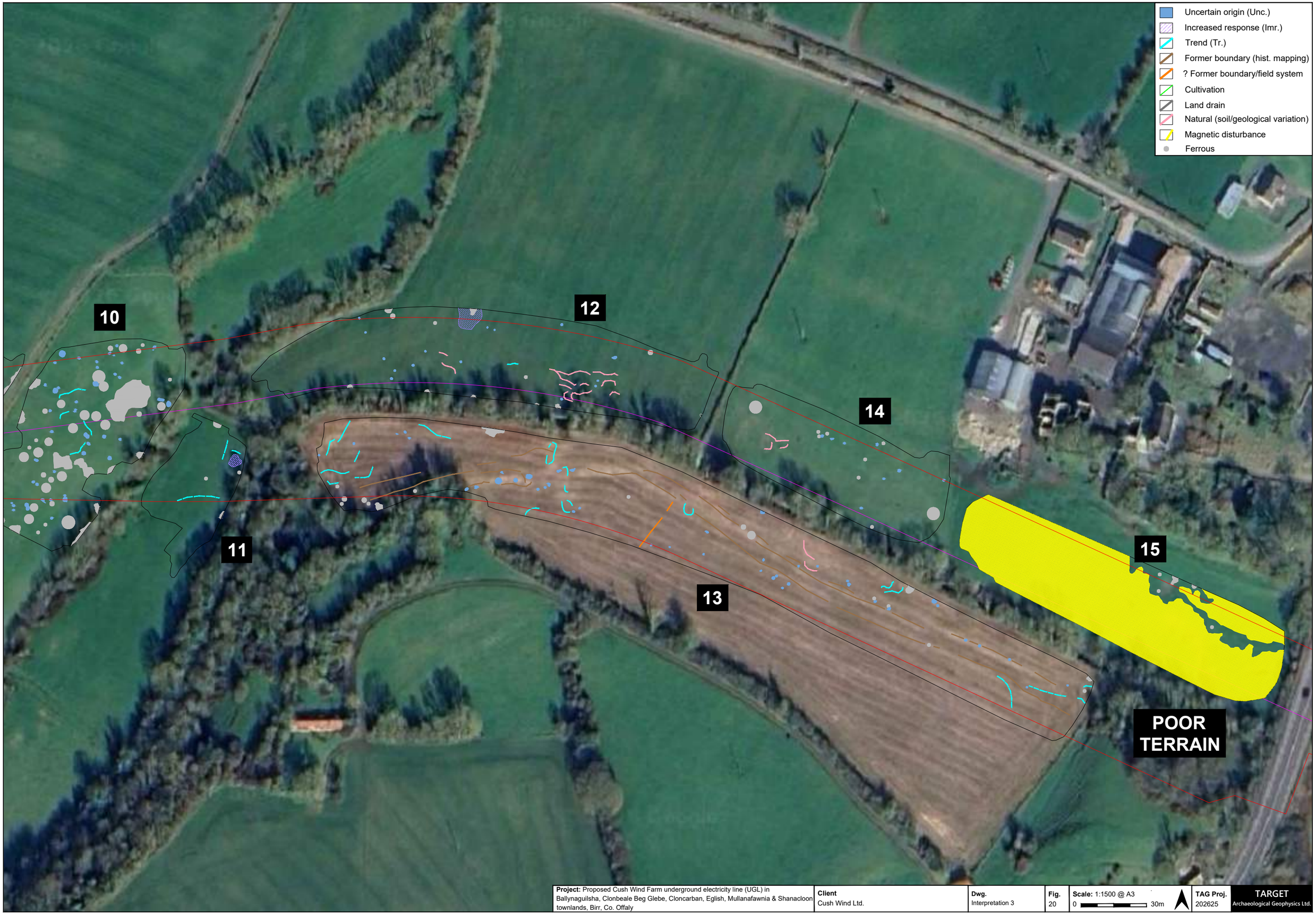
Scale: 1:1500 @ A3
0 30m

TAG Proj. 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 3	**Fig.** 19	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 3	**Fig.** 20	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 4	**Fig.** 21	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.

CROP

CROP

16

17

18

- Uncertain origin (Unc.)
- Increased response (Imr.)
- Trend (Tr.)
- Former boundary (hist. mapping)
- ? Former boundary/field system
- Cultivation
- Land drain
- Natural (soil/geological variation)
- Magnetic disturbance
- Ferrous

Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 4	**Fig.** 22	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 5	**Fig.** 23	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 5	**Fig.** 24	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 6	**Fig.** 25	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 6	**Fig.** 26	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET Archaeological Geophysics Ltd.

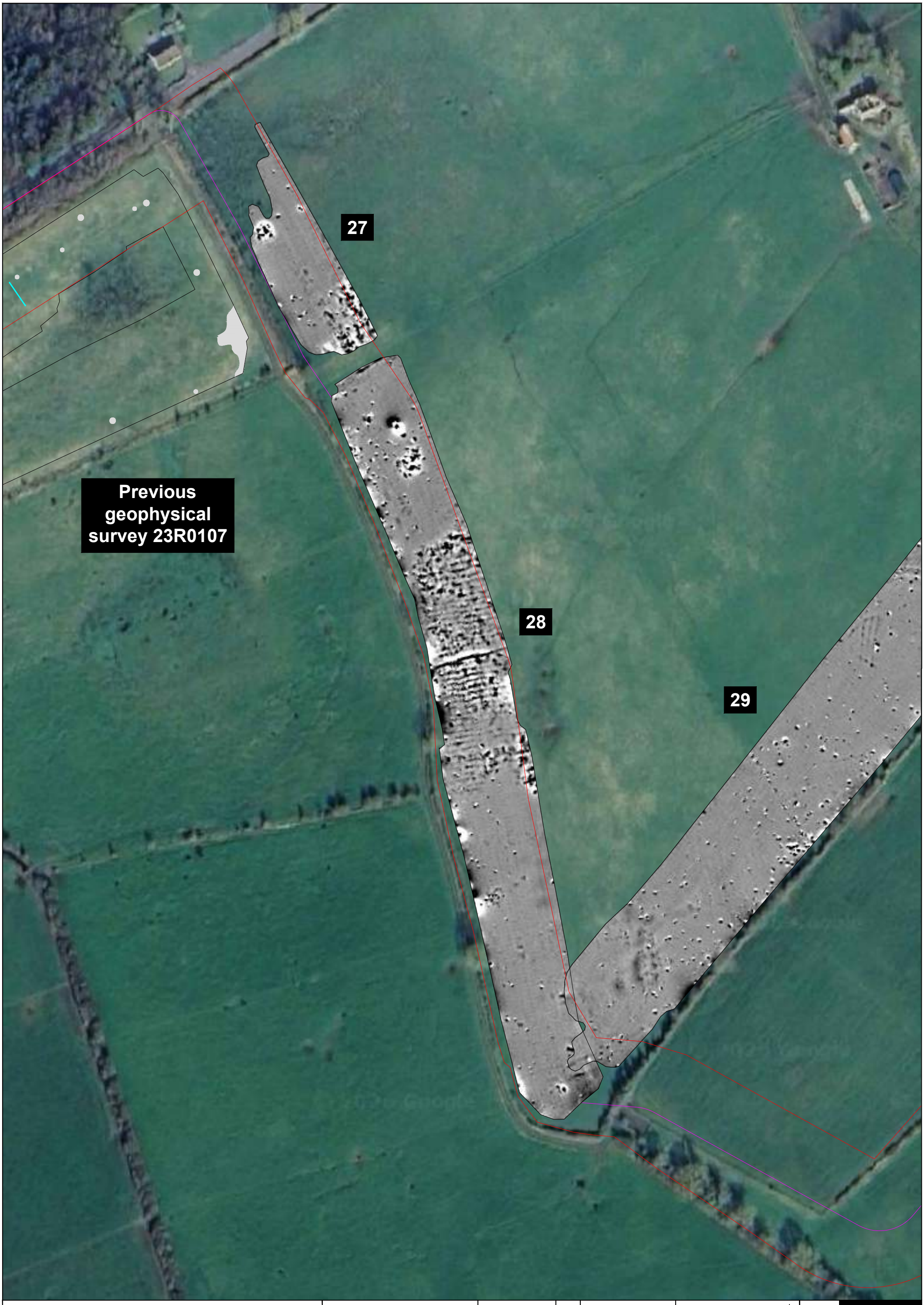


Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 7	**Fig.** 27	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 7	**Fig.** 28	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 8	**Fig.** 29	**Dynamic range (nT)** -1.5 +2	**Scale:** 1/1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Interpretation 8	**Fig.** 30	**Dynamic range (nT)** -1.5 +2	**Scale:** 1/1500 @ A3 0 30m	**TAG Proj.** 202625

TARGET
Archaeological Geophysics Ltd.

28

29

NO ACCESS

Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly	**Client** Cush Wind Ltd.	**Dwg.** Greyscale 9	**Fig.** 31	**Dynamic range (nT)** -1.5 +2	**Scale:** 1:1500 @ A3 0 30m	**TAG Proj.** 202625	TARGET Archaeological Geophysics Ltd.



Project: Proposed Cush Wind Farm underground electricity line (UGL) in Ballynaguilsha, Clonbeale Beg Glebe, Cloncarban, Eglish, Mullanafawnia & Shanacloon townlands, Birr, Co. Offaly

Client Cush Wind Ltd.

Dwg. Interpretation 9

Fig. 32

Scale: 1:1500 @ A3

0 30m

TAG Proj. 202625

TARGET Archaeological Geophysics Ltd.

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