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Appendix 13B – Geophysical Survey Report

Ballynisky Wind Farm

Ballynisky Green Energy Ltd.

December 2025

Geophysical Survey Report

Ballynisky Wind Farm,

Co. Limerick.

RECEIVED: 19/12/2025

(Townlands: *Kilbradran, Graigoor, Ballynisky & Ballyegny More*).

Prospection Licence No. 24R0517.

Client: Laurence Dunne Archaeology Ltd.

Issue Date: November 2024.

Prepared by: Michael Greiner & Seán Shanahan; Shanarc Archaeology Ltd.



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1. Introduction

A detailed geophysical Magnetometry survey was carried out by Shanarc Archaeology Ltd. under geophysical survey licence no. 24R0517, for Laurence Dunne Archaeology Ltd., in relation to the proposed development of Ballynisky Wind Farm, across a number of individual plots in the townlands of Kilbradran, Graigoor, Ballynisky & Ballyegny More, in Co. Limerick (Figures 1–4).

The subject site comprises twenty-six individual agricultural greenfields or portions thereof, which are divided into nine land parcels (Sites A–I); with a combined area of c. 66.5-hectares of which c. 55.2-hectares were subjected to geophysical survey (Figures 1–4).

The cumulative site is located in an area with a high concentration of recorded SMR/RMP sites. Three recorded SMR/RMP sites fall within the proposed development areas, and the archaeological Zones of Notification for a further four monuments extend within the boundaries of several of the proposed development areas.

The development is currently in the pre-planning phase. As part of pre-planning mitigation, the client had requested that a geophysical survey of the site be carried out.

The general purpose of the geophysical survey was to establish the potential presence of any subsurface archaeological features or remains located within the proposed development areas of site; including but not limited to the subsurface remains of the various recorded SMR/RMP sites. The results of the geophysical survey will be used to inform an archaeological assessment of the site, which is being conducted by Laurence Dunne Archaeology Ltd.

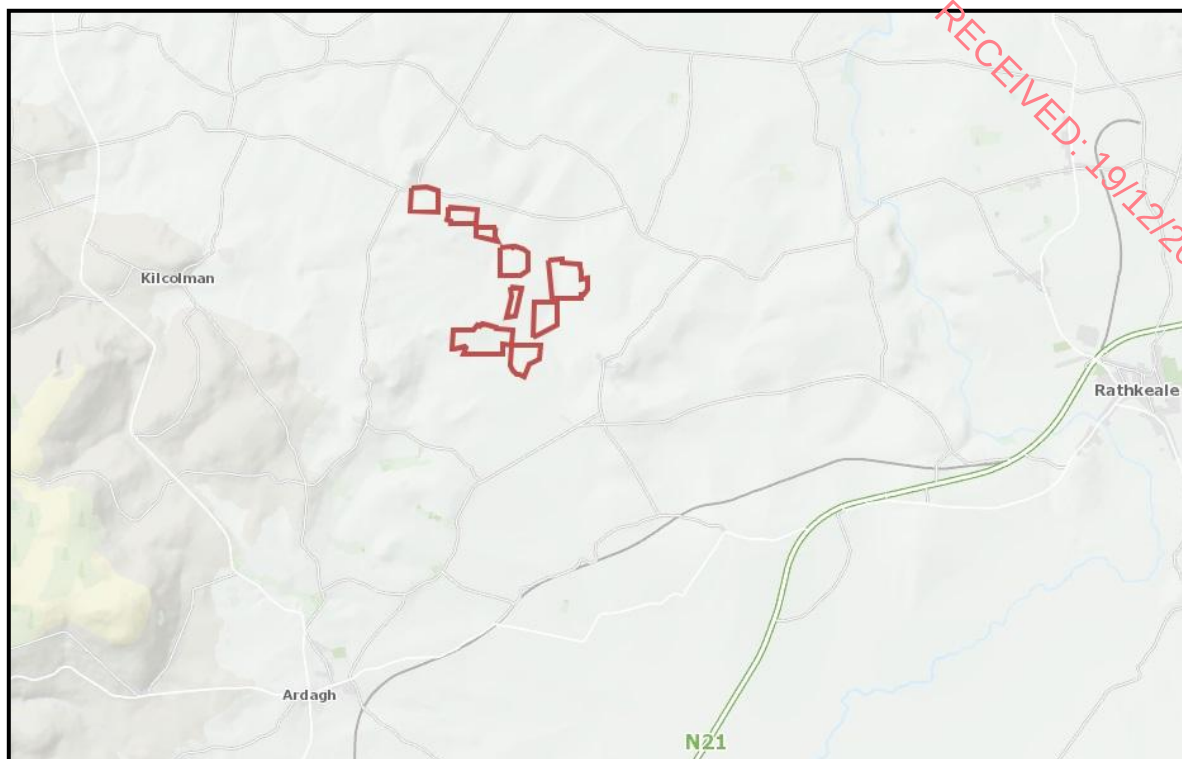


Figure 1: Overview location of sites (in red) in Co. Limerick (Tailte Eireann Licence No. CYAL50392781).

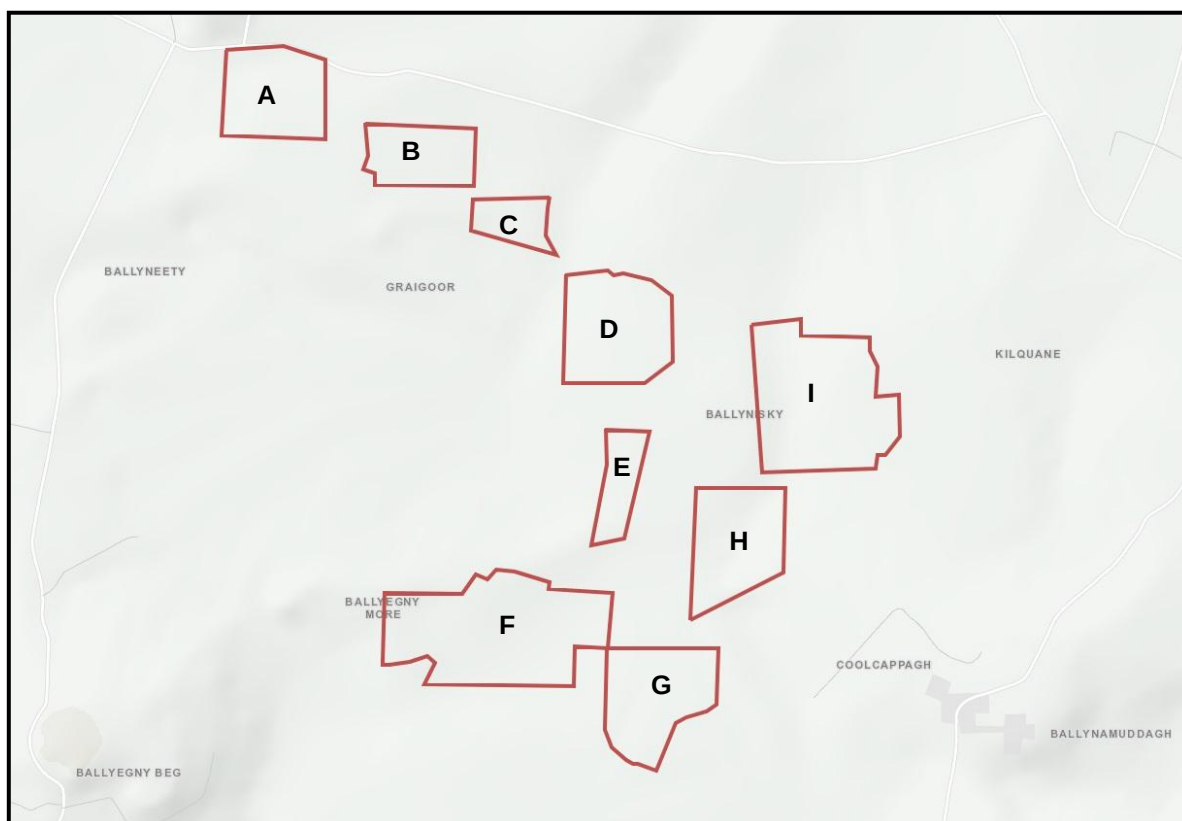


Figure 2: Location overview of sites (in red) in local context (Tailte Eireann Licence No. CYAL50392781).

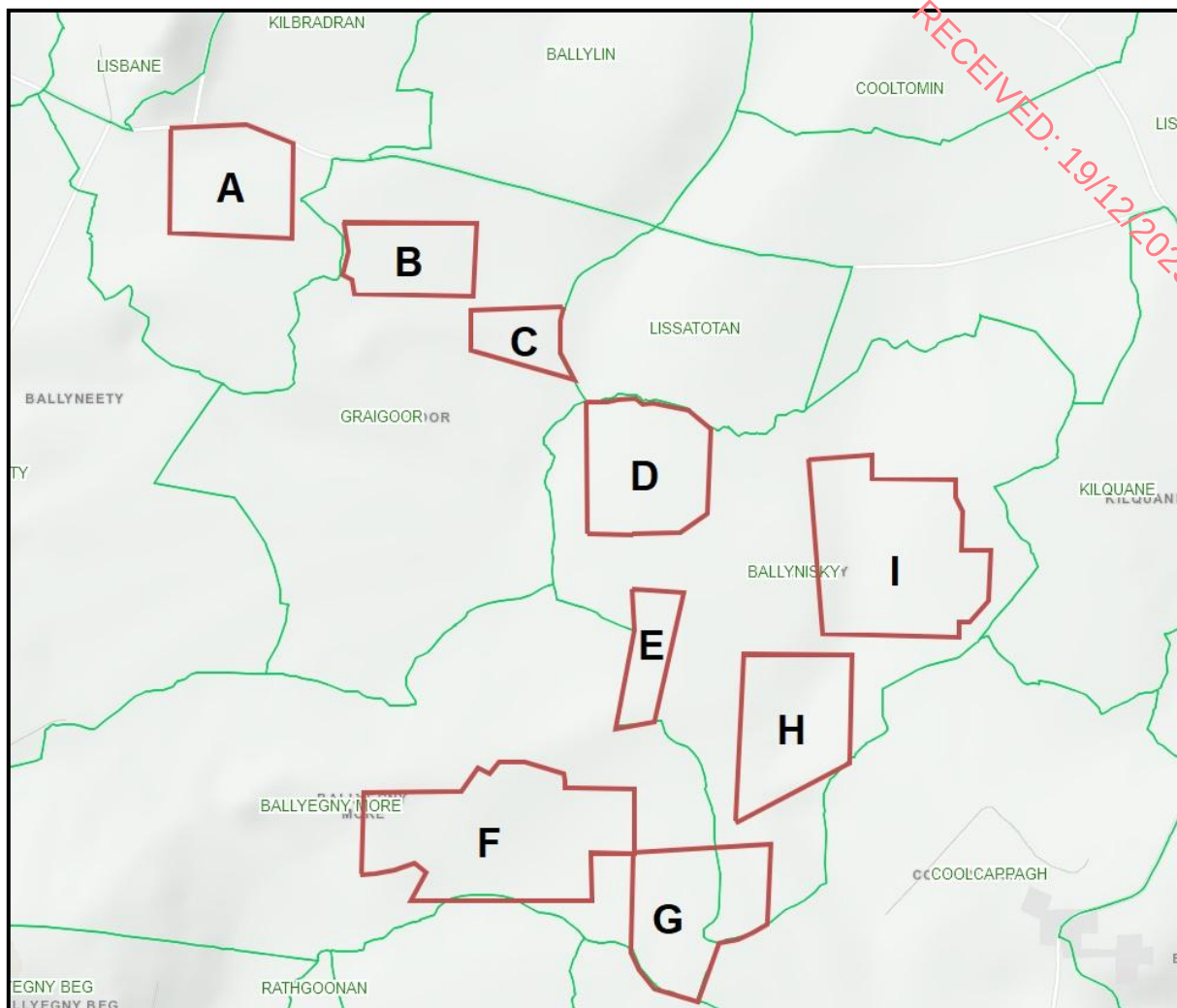


Figure 3: Location overview of sites (in red) in local townland context (Tailte Eireann Licence No. CYAL50392781).

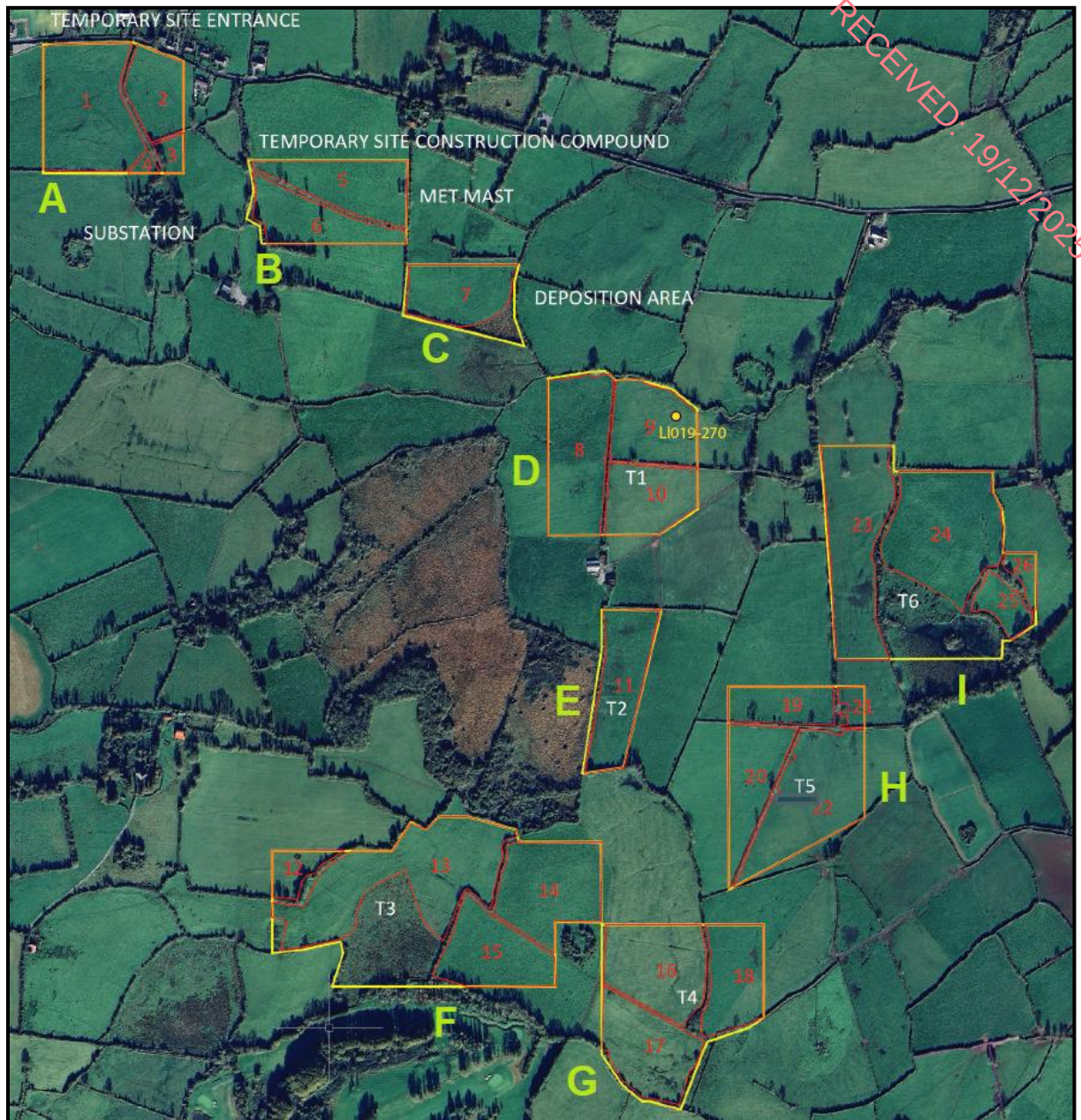


Figure 4: Aerial overview of sites (in yellow) with individual fields and field numbers (in red) and locations of proposed wind turbines (T1-T6) (Tailte Eireann Licence No. CYAL50392781) (Source: supplied by Client).

2. Site Location

The subject site comprises twenty-six individual agricultural fields or parts thereof, which are divided into nine parcels of land located within the adjoining townlands of Kilbradran, Graigoor, Ballynisky & Ballyegny More, in Co. Limerick. The cumulative site is located c. 3.5km to the northeast of the town of Ardagh and c. 5km to the west-northwest of the town of Rathkeale (Figures 1–4).

For the purpose of this report, the nine separate land parcels are referred to as Sites A–I. The individual site locations and associated fields are listed below in Table 1 and indicated in Figures 3–4.

Table 1: Size and location of the nine site areas.

Site Name	Townland	Field Numbers	ITM Coordinates	Site Area
A	Kilbradran	1, 2, 3, 4	E 528966, N 643783	c. 5.9-hectares
B	Graigoor	5, 6	E 529374, N 643598	c. 4.4-hectares
C	Graigoor	7	E 529625, N 643434	c. 2.5-hectares
D	Ballynisky	8, 9, 10	E 529911, N 643135	c. 7.7-hectares
E	Ballynisky	11	E 529916, N 642717	c. 2.5-hectares
F	Ballyegny More	12, 13, 14, 15	E 529633, N 642307	c. 14.7-hectares
G	Ballyegny More & Ballynisky	16, 17, 18	E 530038, N 642156	c. 8.0-hectares
H	Ballynisky	19, 20, 21, 22	E 530247, N 642566	c. 7.9-hectares
I	Ballynisky	23, 24, 25, 26	E 530488, N 642958	c. 12.7-hectares

3. Archaeological Context

The proposed development sites are located within the townlands of Kilbradran and Graigoor in Kilbradran Civil Parish in the Barony of Shanid, and in the townlands of Ballynisky and Ballyegny More in Clonagh Civil Parish in the Barony of Connello Lower, in Co. Limerick.

The cumulative site is located in an area with a very high concentration of recorded archaeological sites, with the SMR/RMP recording seventy sites within a 1km radius of the proposed development areas.

The existing archaeological record demonstrates human activity in the surrounding area dating to at least as early as the Bronze Age (c. 2400-500 BC). Burnt mounds, referred to as *fulachta fia* when associated with a trough, have traditionally been interpreted as cooking places (Waddell 1998, 174) and constitute one of the most common monument types of the Bronze Age. Three *fulachta fia* are recorded within 1km of the site; with the nearest example (LI019-135----) being located in Kilbradran c. 190m to the north of proposed development Site A.

The introduction of Christianity to Ireland occurred during the 5th century A.D., and secular settlement during this era is represented by the ringfort, alternatively referred to as '*rath*' '*lios*' or '*dún*' - to indicate an earthen bank and exterior ditch enclosing a central area - or '*cashel*' to indicate a stone-walled enclosure. Usually circular or sub-circular and often sited on raised ground, there are over 45,000 currently identified in Ireland, making them the most numerous and widely distributed monuments in the Irish landscape. These enclosed medieval homesteads are generally dated to between c. AD 500-1200, the bulk being erected during the period from c. AD 550-850 (Stout 2017). While Ringforts/raths are not uniform, the most common form is that of a moderate size with a single bank and ditch enclosing a space of 25m-60m. They are generally considered to be dispersed homesteads, and traces of houses have been excavated within a number of raths. (Mitchell & Ryan 2007, 254-261). Smaller, 'univallate' examples may have been the homesteads for lower ranks of society, while larger bi- or tri-vallate examples were likely used by lords or wealthy landowners.

There are fifty-six recorded ringforts within a 1km radius of the various proposed development areas. Two ringforts (LI028-038---- & LI028-039----) fall within the boundaries of proposed development Site F. Three additional ringforts are located immediately outside proposed development Site A (LI019-132----), and proposed development Sites F & G (LI028-043---- &

LI028-182----), and the Zones of Notification associated with these ringforts extend within the boundaries of the proposed development areas to various degrees. Additionally a recorded enclosure (LI019-270----) is located within proposed development Site D.

The Sites and Monuments Record (SMR) records seventy sites within c. 1km radius of the proposed development sites; of these recorded monuments, three fall within the proposed development areas, and the archaeological Zones of Notification for a further four monuments extend into the boundaries of several proposed development areas.

The recorded SMR/RMP sites within the proposed development areas, and those sites whose Zones of Notification extend into the proposed development areas, are listed in Table 2 and their locations are indicated in Figures 5 & 6.

Table 2: Recorded Monuments within a c. 1km radius of the proposed development sites.

SMR No.	Class	Townland	ITM (E, N)	Location	Annotation on Figure 5
LI019-270----	Enclosure	Ballynisky	530008, 643205	Within Site D	1
LI028-039----	Ringfort - rath	Ballyegny More	529341, 642337	Within Site F	2
LI028-038----	Ringfort - rath	Ballyegny More	529315, 642284	Within Site F	3
LI019-131001-	Church	Kilbradran	528931, 643939	Zone of Notification extends into Site A	4
LI019-131002-	Graveyard	Kilbradran	528937, 643926	Zone of Notification extends into Site A	5
LI028-182----	Ringfort - rath	Ballynisky	530234, 642283	Zone of Notification extends into Site G	6
LI028-043----	Ringfort - rath	Ballyegny More	529836, 642226	Zone of Notification extends into Sites F & G	7

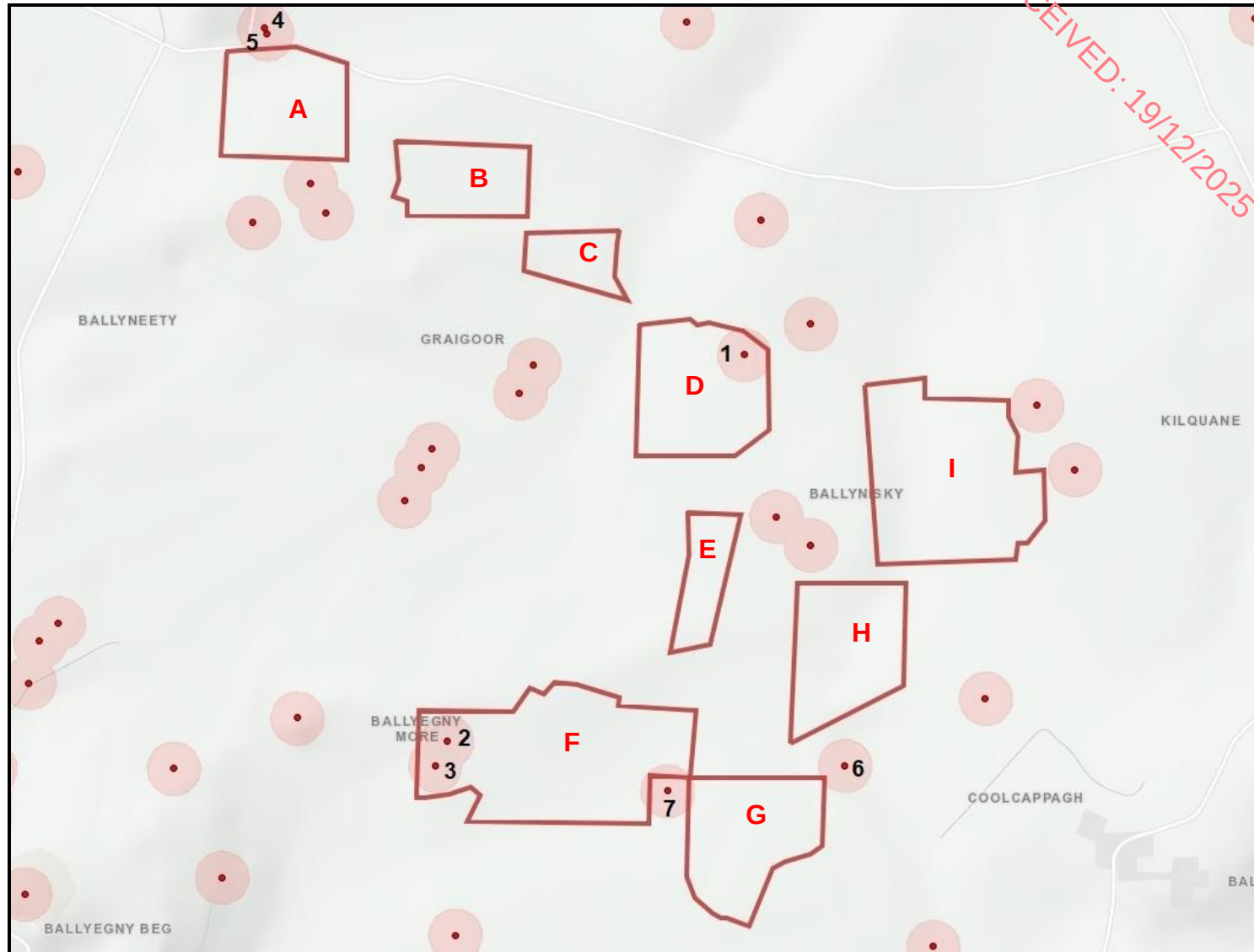


Figure 5: Location of SMR/RMP sites (red dots) and their associated Zones of Notification (shaded pink) relative to the proposed development areas (in red) (Tailte Eireann Licence No. CYAL50392781).



Figure 6: Location of SMR/RMP sites (red dots) and their associated Zones of Notification (shaded pink) relative to the proposed development areas (in red) (Tailte Eireann Licence No. CYAL50392781).

4. Previous Archaeological Investigations

The excavations bulletin (www.excavations.ie); records no previous archaeological excavations within any of the proposed development areas, or within the wider townlands of Graigoor, Ballynisky or Ballyegny More.

A single previous excavation (Licence No. 08E0214 / Excavation Bulletin No. 2008:780) is recorded for the wider townland of Kilbradran. This excavation comprised testing on the site of a proposed house to the immediate east of the recorded church (LI019-131001-) and graveyard (LI019-131002-) within their associated Zone of Notification. The excavation area was located immediately to the north of current proposed development Site A. No archaeology was found.

5. Cartographic Analysis

The Ordnance Survey (OSi) maps covering the cumulative site and proposed development areas were consulted. The first ever large-scale survey of Ireland was undertaken by the Ordnance Survey between 1829 and 1842, producing highly accurate maps at different scales.

The first-edition 6-inch OSi map for the subject sites (OSi Sheets: LK019 & LK028) was surveyed in 1840 and published in 1844 (Figure 7). It shows the majority of the geophysical survey areas as comprising portions of numerous agricultural fields. Proposed development Site D has one small house structure on its central southern boundary, and Site H has two small house structures on its central southern boundary. Site I is shown as wooded/parkland associated with Waterville House which is located just outside its western boundary. In proposed development Site F a number of small house structures are shown in its central northern portion, and the two recorded ringforts (LI028-038---- & LI028-039----) are shown at the west of the area; two narrow bands of woodland are also indicated in Site F.

In the general surroundings of the geophysical survey areas, the church (LI019-131001-) and graveyard (LI019-131002-) to the north of Site A are indicated. A large number of ringforts are also shown as circular banked enclosures in the general surroundings of the subject sites.

The OSi 25-inch map surveyed in 1989 and published in 1900 (Figure 8) shows some minor changes to the internal field boundaries within the various site areas. A pathway and/or the line of a drain/water-channel now crosses Site A from north to southeast leading from the road at the north to cluster of house structures and a pump just to the south of Site A. The house structures formerly shown in Sites D and H are no longer shown, though a number of the houses formerly shown in Site F are still present. The two ringforts and the wooded areas in Site F are also still shown. In Site I to the west of Waterville House most of the woodland appears to be gone, though a circular water features and drain are now shown at the south of this area.

The OSi Cassini 6-inch map of 1942 (Figure 9) shows no notable changes within or immediately adjacent to any of the proposed development areas since the earlier 25-inch map.

Aside from the two ringforts in Site F, the historic OSi maps give no indication for the presence of any possible archaeological features within the proposed development sites.

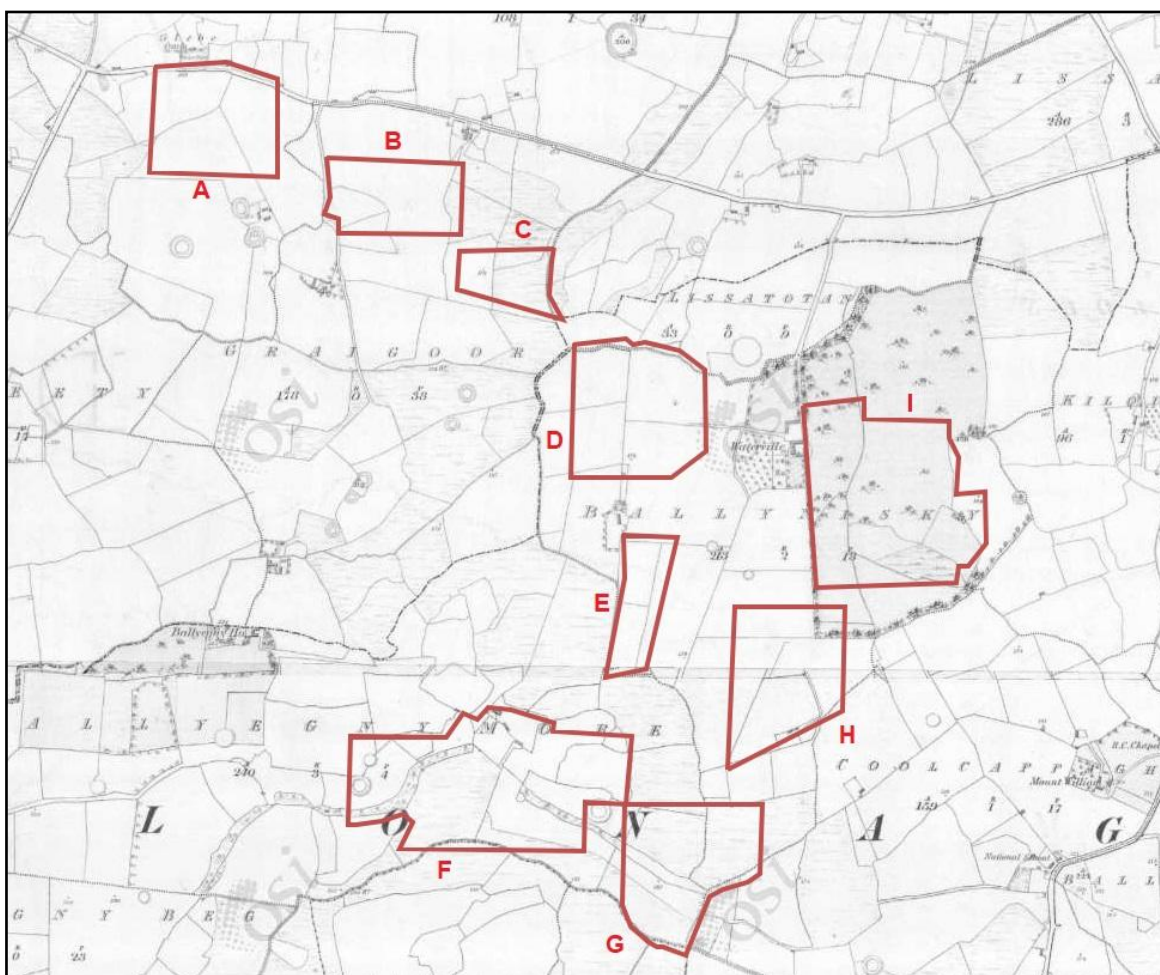


Figure 7: Location of sites (in red) on first-edition OSi map (Sheets LK019 & LK028) 1840-1844 (Tailte Eireann Licence No. CYAL50392781).

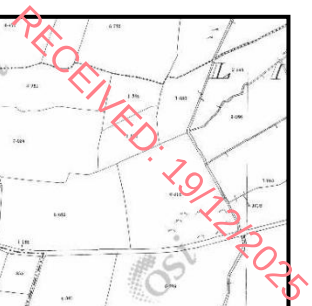


Figure 8: Location of sites (in red) on historic 25-inch OSi map, 1898-1900 (Tailte Eireann Licence No. CYAL50392781).

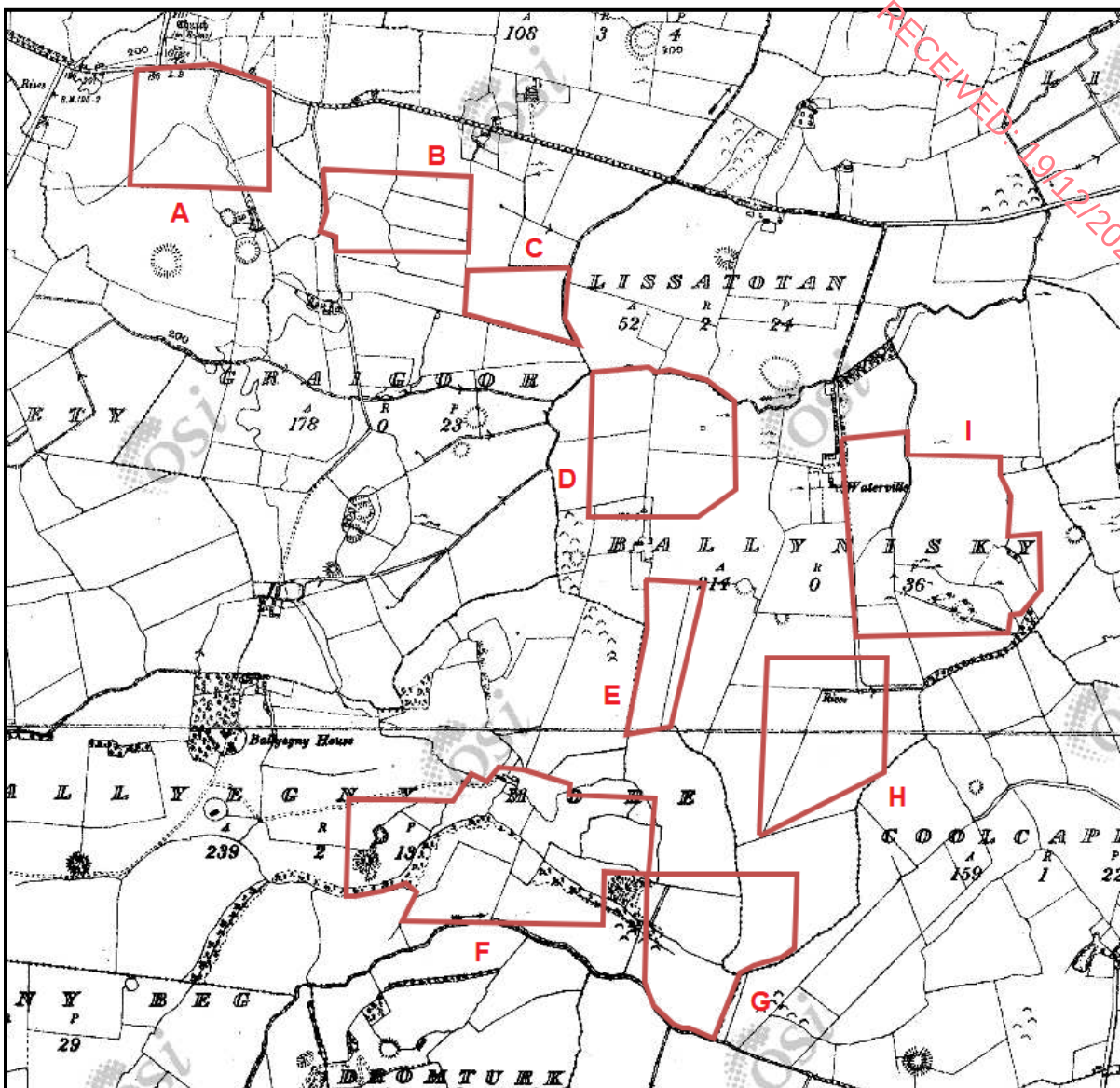


Figure 9: Location of site (in red) on Cassini 6-inch OSi map, 1942
(Tailte Eireann Licence No. CYAL50392781).

6. Aerial Photographs

In addition to the OSi maps the available aerial photographs were also examined. The following aerial photographs, available on the Tailte Eireann website Geohive (<http://map.geohive.ie>), were consulted: 1995, 1996–2000, 2001–2005, 2006–2012, Digital Globe 2011–2013, and Aerial Premium 2013–2018 (Figures 10–15).

The successful detection of archaeological sites through aerial photography varies, and depends on several factors including the position of the sun, the type of crop growing and the amount of rainfall in a growing season. In some years, such as during the drought of 2018, sites were clearly visible, while in others the same site could be undetectable from the air.

All of the consulted aerial photographs show all the site areas as comprising agricultural fields. The two ringforts (LI028-038---- & LI028-039----) in Site F, and the enclosure (LI019-270----) in Site D are visible as cropmarks and/or surface anomalies in the majority of the consulted aerial photographs. Frequent additional surface anomalies throughout all nine sites appear to relate to various former field boundaries; some, though not all of these match the locations of boundaries shown in the historic OSi maps.

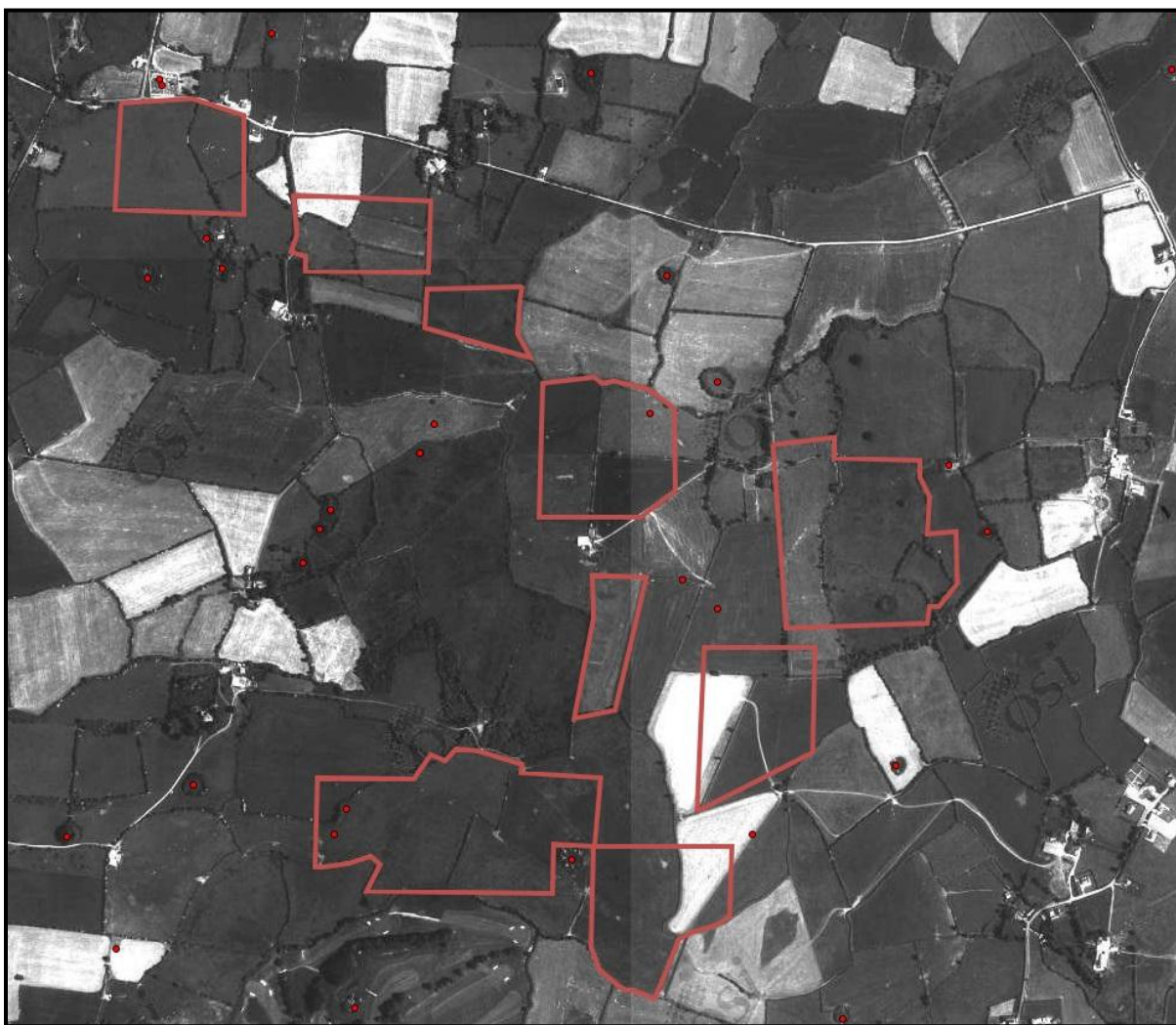


Figure 10: Location of site areas (in red) and recorded SMR/RMP site (red dots) on OSi aerial photograph, 1995 (Tailte Eireann Licence No. CYAL50392781).

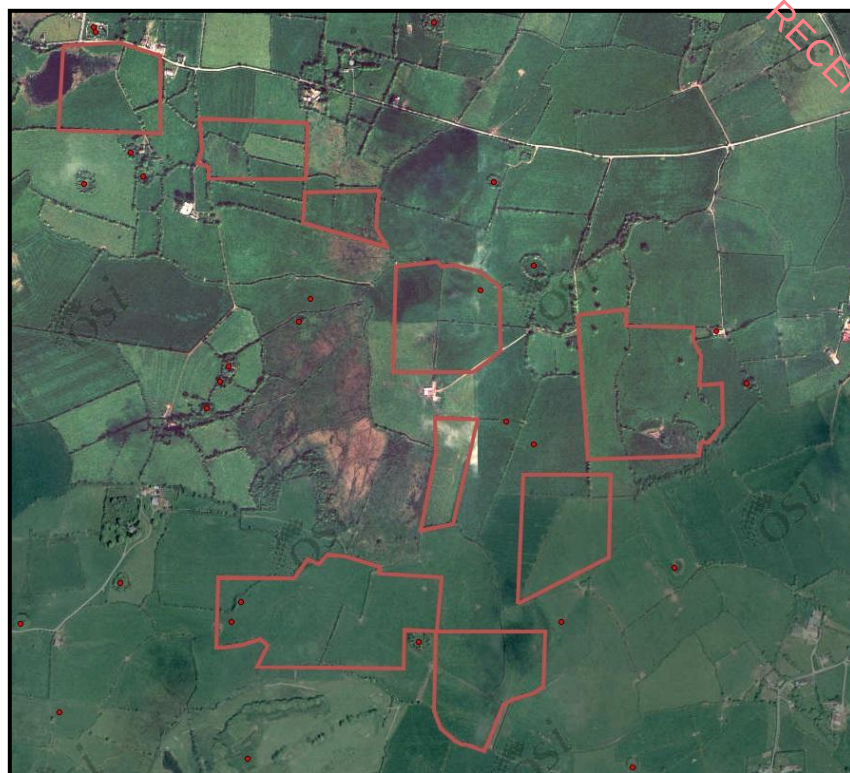


Figure 11: Location of site areas (*in red*) and recorded SMR/RMP site (*red dots*) on OSi aerial photograph, 1996–2000 (Tailte Eireann Licence No. CYAL50392781).



Figure 12: Location of site areas (*in red*) and recorded SMR/RMP site (*red dots*) on OSi aerial photograph, 2001–2005 (Tailte Eireann Licence No. CYAL50392781).



Figure 13: Location of site areas (*in red*) and recorded SMR/RMP site (*red dots*) on OSi aerial photograph, 2006–2012 (Tailte Eireann Licence No. CYAL50392781).

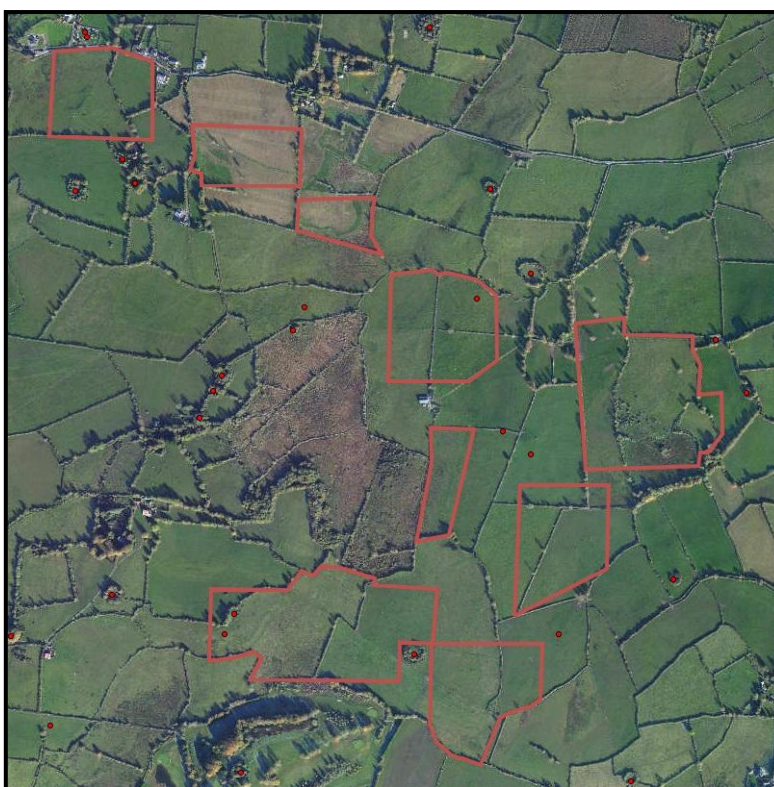


Figure 14: Location of site areas (*in red*) and recorded SMR/RMP site (*red dots*) on OSi aerial photograph, Digital Globe 2011–2013 (Tailte Eireann Licence No. CYAL50392781).



Figure 15: Location of site areas (*in red*) and recorded SMR/RMP site (*red dots*) on OSi aerial photograph, Aerial Premium 2013–2018 (Tailte Eireann Licence No. CYAL50392781).

7. Site Description and Survey Conditions

The subject site comprises twenty-six individual agricultural fields or parts thereof, which are divided into nine separate parcels of land located within the adjoining townlands of Kilbradran, Graigoor, Ballynisky & Ballyegny More, in Co. Limerick. The cumulative site is located c. 3.5km to the northeast of the town of Ardagh and c. 5km to the west northwest of the town of Rathkeale (Figures 1–4).

A site inspection was conducted by Seán Shanahan of Shanarc Archaeology Ltd. on 24th September 2024. All nine land parcels comprised agricultural greenfield, and were under short pasture at the time of the site inspection (Plates 1–8). Within the nine wider land parcels, the areas proposed for the locations of Turbine 3 and Turbine 6 (Figures 4; Plates 7 & 8) comprised overgrown water logged areas not suited to geophysical survey; for this reason these two areas were not given field numbers and are not included in the proposed geophysical survey (Figures 4; Plates 7 & 8).

Aside from the overgrown waterlogged areas around proposed Turbines 3 & 6, there were no visible major constraints on the proposed geophysical survey methodology.

The geophysical survey under licence no. 24R0517 was carried out between 21st October and 1st November 2024. At the time of the geophysical survey, the nine individual sites were under short grass. Weather conditions during the geophysical survey were primarily overcast with occasional periods of light rain, though ground conditions remained moderately firm in most of the surveyed fields.

Minor constraints encountered during the geophysical survey comprised occasional areas of vegetation/scrub, occasional deep machine ruts in wetter areas of the site, and the occasional remains of internal field boundaries/fences; however given the mobile nature of the survey device, these obstacles were easily circumvented.

Site Inspection Plates



Plate 1: Drone overview of Site A, fields 1–4; looking north (Source: Shanarc Archaeology Ltd. - 24.09.24).



Plate 2: Drone overview of Site B, fields 5–6; looking north (Source: Shanarc Archaeology Ltd. - 24.09.24).

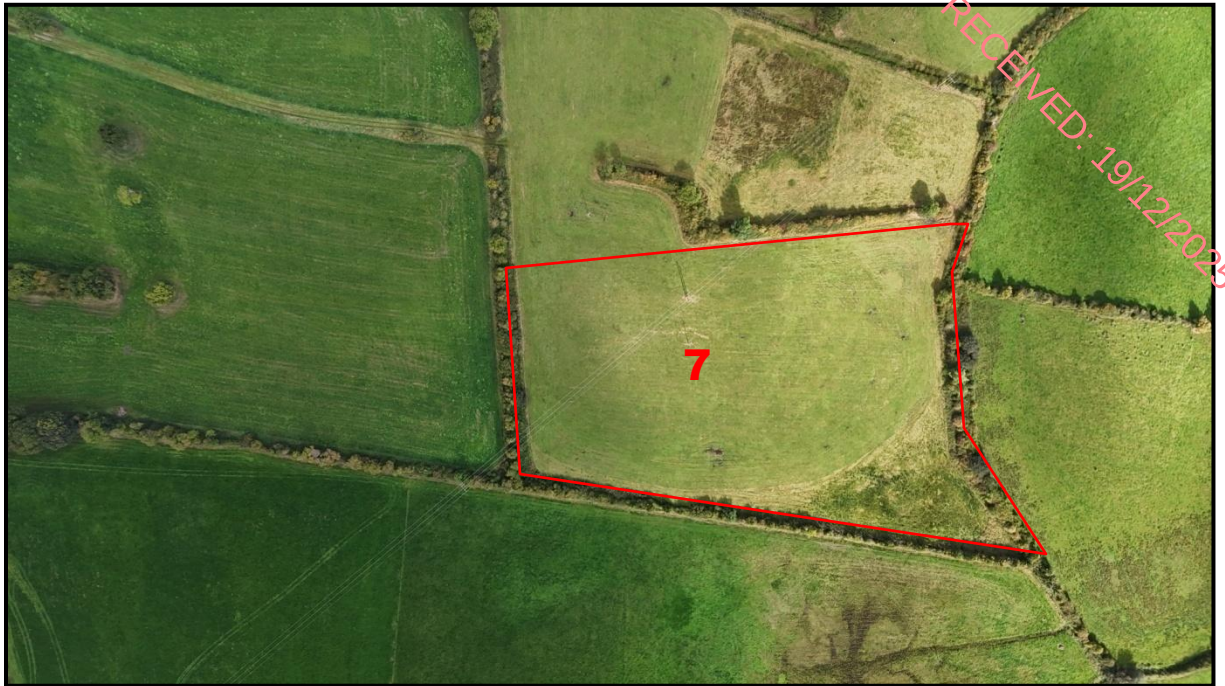


Plate 3: Drone overview of Site C, field 7; looking north (Source: Shanarc Archaeology Ltd. - 24.09.24).



Plate 4: Drone overview of Site D, fields 8–10 (in red), with proposed Turbine 1 location (in blue); looking north (Source: Shanarc Archaeology Ltd. - 24.09.24).

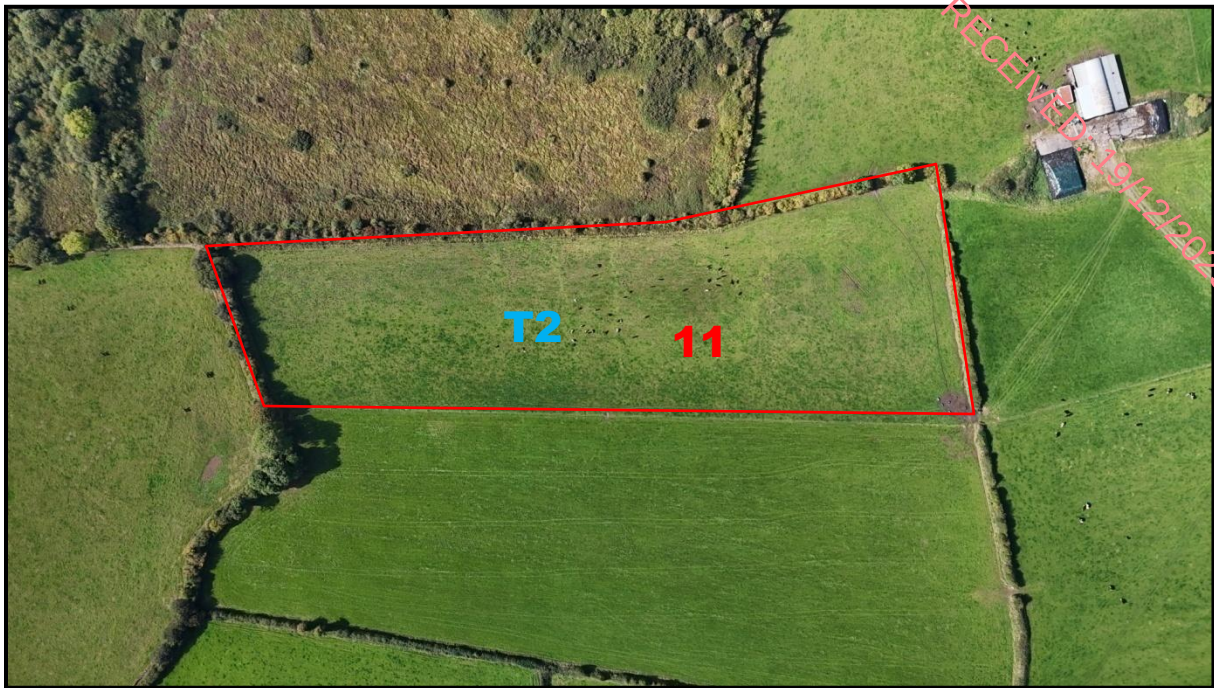


Plate 5: Drone overview of Site E, field 11 (in red), with proposed Turbine 2 location (in blue); looking west
(Source: Shanarc Archaeology Ltd. - 24.09.24).

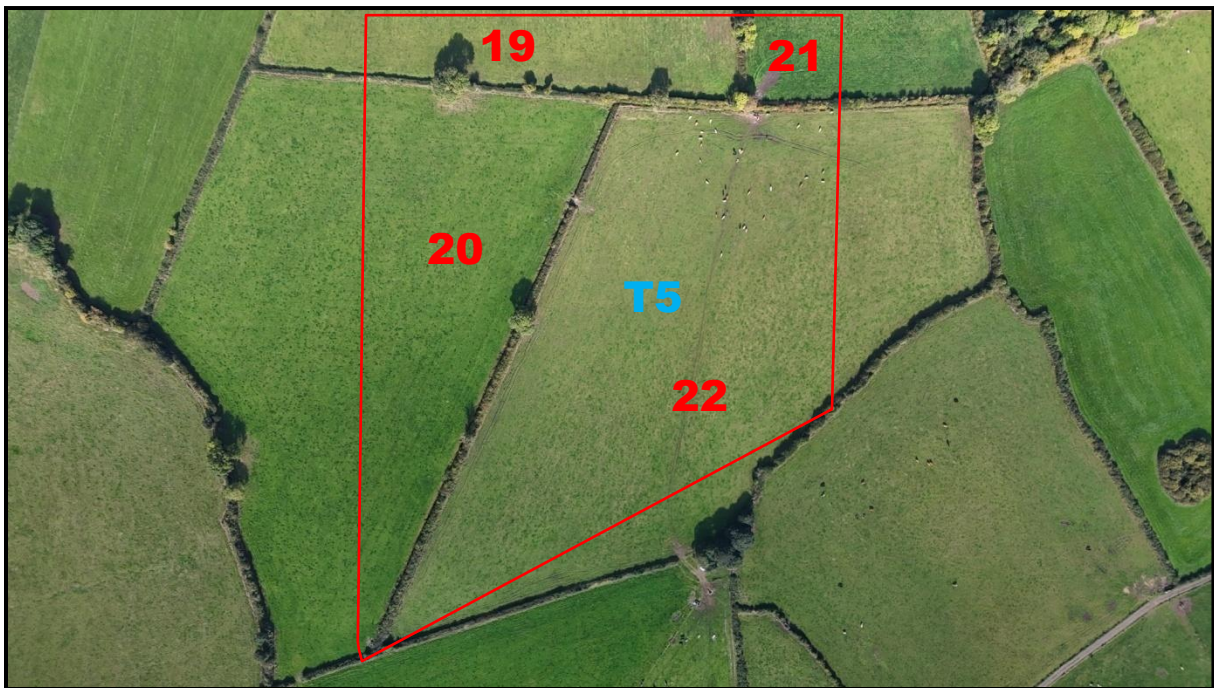


Plate 6: Drone overview of Site H, fields 19–22 (in red), with proposed Turbine 5 location (in blue); looking north
(Source: Shanarc Archaeology Ltd. - 24.09.24).



Plate 7: Drone overview of Site I, fields 23–25 (*in red*), with proposed Turbine 6 location (*in blue*); looking east
(Source: Shanarc Archaeology Ltd. - 24.09.24).

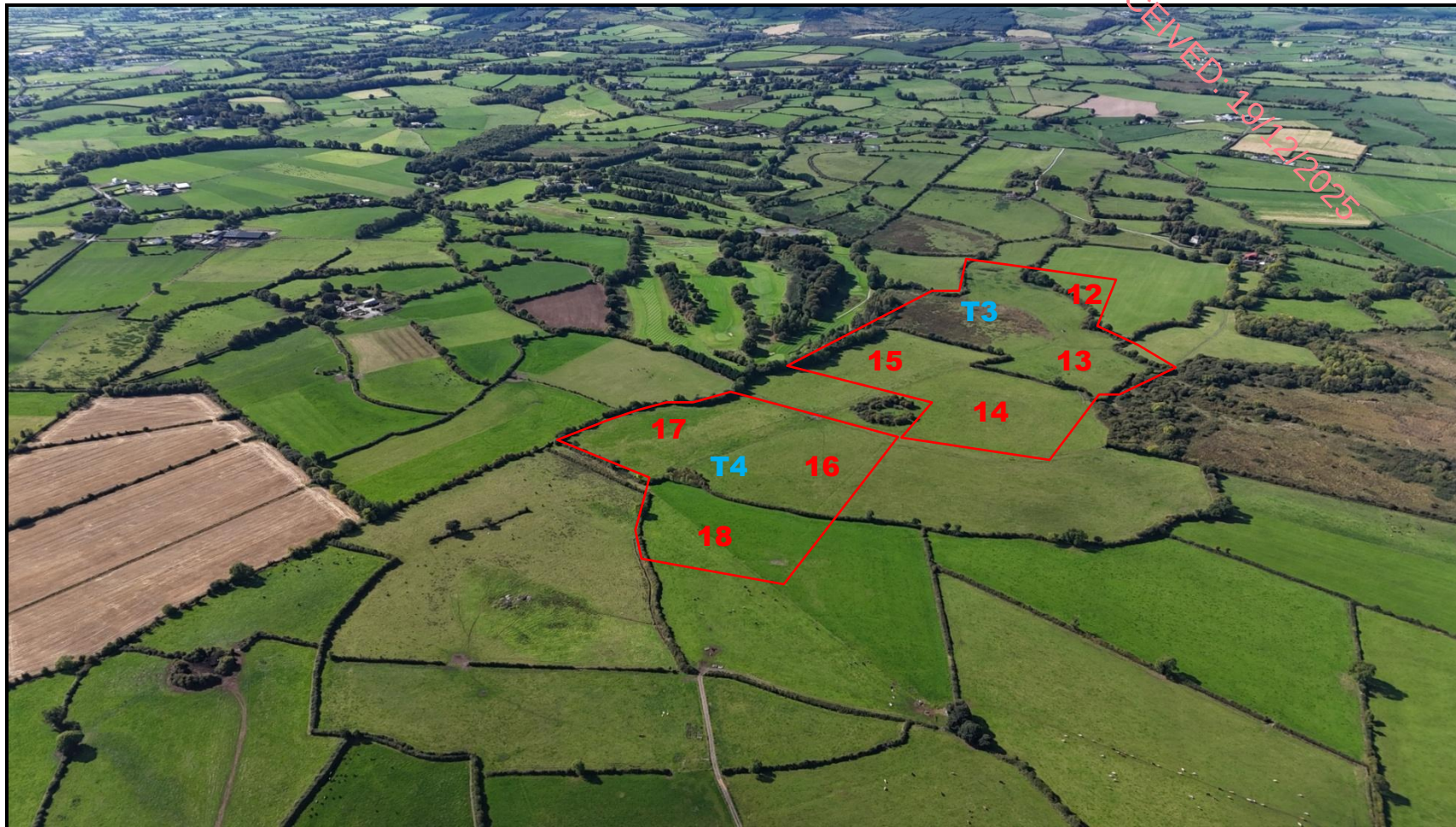


Plate 8: Drone overview of Site F, fields 12–15 and Site G, fields 16–18 (*in red*), with proposed Turbine 3 & 4 locations (*in blue*); looking southwest
(Source: Shanarc Archaeology Ltd. - 24.09.24).

8. Site Geology

The cumulative sites are situated on relatively level to slightly undulating terrain, with an average elevation of between c. 47m–60m OD; highest to the west in Sites A and F, and lowest in the central region around sites D, E & H.

The geophysical survey area is impacted by two sedimentary bedrock formations. Sites A, B, C, D & I, and the northern portions of Sites E & H, are recorded as part of the Rathkeale Formation which comprises “dark muddy limestone & shaly mudstone” (www.gsi.ie). Sites F & G, and the southern portions of Sites E & H are recorded as undifferentiated Visian Limestones (www.gsi.ie).

Geologically, the Quaternary refers to the present era, having begun 2.6 million years ago; much of this time period relates to the Ice Age. Quaternary sediments (glacial sediments) refer to the soft material that has been deposited during this time; in the Irish context much of this relates to the movement of glaciers or ice-sheets. The principle types of associated sediments comprise tills (boulder clays), gravels, sands and peat. Over most parts of Ireland, these sediments cover the bedrock (solid rock at or below the land surface) (www.geohive.ie).

The quaternary in the proposed development sites is recorded as ‘till derived from limestones’ with occasional smaller areas of alluvium bordering and partially extending into Sites D, F, G & I (www.geohive.ie).

Bonsall (2014) outlines the idealised performance of geophysical techniques upon principle Irish geologies, based on a five-scale performance rating (poor, moderate to poor, moderate, moderate to good, & good). This scale is applied to Magnetometer, Resistance and Electromagnetic techniques (Bonsall et al., 2014).

In general, limestone based bedrock types rate as ‘moderate’, while shale rates as ‘good’ and mudstone rates as ‘moderate to good’ in the geophysical survey suitability/performance range for Magnetometry.

Tills can give a generally poor response to a Magnetometry survey; though the use of narrower 0.5m traverse separations can increase the chances of successfully identifying archaeological features for detailed magnetometer surveys (Bonsall et al., 2014). The tills in

the geophysical survey areas are derived from limestone; with limestone typically rating as 'moderate' for Magnetometry.

Alluvium can create a low magnetic background for Magnetometry surveys; however this can be deceptive as alluvial soils strongly affect the ability to detect archaeological features due to an increased distance between the target and the sensor. Alluvial cover may mask responses, or misrepresent the extent of archaeological features and create anomalies or trends that may be misinterpreted as archaeological (Weston, 2001). EMI surveys can face similar problems to Magnetometry surveys, depending on the thickness of the alluvium (Bonsall, 2014); though in general low frequency EMI devices appear to be relatively effective at detecting archaeological features beneath alluvium (Simpson et al., 2009).

9. Geophysical Survey

The geophysical survey under licence no. 24R0517 was carried out between 21st October and 1st November 2024. At the time of the geophysical survey, the nine individual sites were under short grass. Weather conditions during the geophysical survey were primarily overcast with occasional periods of light rain, though ground conditions remained moderately firm in most of the surveyed fields.

Minor constraints encountered during the geophysical survey comprised occasional areas of vegetation/scrub, occasional deep machine ruts in wetter areas of the site, and the occasional remains of internal field boundaries/fences; however given the mobile nature of the survey device, these obstacles were easily circumvented.

9.1 Introduction to Geophysical Survey

Geophysical survey is a systematic measurement of a physical property related to the earth. There are numerous sources of disturbance of this property, some owing to cultural heritage features, some owing to the measuring method, and others that relate to the environment in which the measurement is made. No disturbance, or 'anomaly', is capable of providing an unambiguous and comprehensive description of a feature, in particular in archaeological contexts where there are a myriad of factors involved.

The measured anomaly is generated by the presence or absence of certain materials within a feature, not by the feature itself. Not all archaeological features produce disturbances that

can be detected by a particular instrument or methodology. For this reason, the absence of an anomaly must never be taken to mean the absence of an archaeological feature. The best surveys are those that use a variety of techniques over the same ground at resolutions adequate for the detection of a range of different features.

In general, topsoil is more magnetic than subsoil, which can be slightly more magnetic than parent geology, whether sands, gravels or clays; however, there are exceptions to this. The reasons for this are natural, and are due to biological processes in the topsoil that change iron between various oxidation states, each differently magnetic. Where there is an accumulation of topsoil, or where topsoil has been incorporated into other features, a greater magnetic susceptibility will result.

Within landscapes, soil tends to accumulate in negative features like pits and ditches, and will include soil particles with thermoremanent magnetization (TRM) through exposure to heat if there is settlement or industry nearby. In addition, particles slowly settling out of stationary water will attempt to align with the ambient magnetic field at the time, creating a deposit with depositional remanent magnetization (DRM).

As a consequence, magnetic survey is nearly always more a case of mapping accumulated magnetic soils than structures, which would not be detected unless they were magnetic in their own right e.g. built of brick or tile. As a prospecting tool, the magnetic survey is thus indirect. Fortunately, the mechanisms outlined above are commonplace and favoured by human activity, and it is nearly always the case that cut features will alter in some way the local magnetic field.

9.2 Survey Methodology

The site at Ballynisky Wind Farm, Co. Limerick was subjected to a detailed Magnetometry survey; data was collected using a SENSYS MAGNETO® MX V3 magnetometer survey system.

The SENSYS MAGNETO® MX V3 is a cart based large area magnetometer survey system which can host up to 16 fluxgate gradiometers. The modular trailer can be set up in various configurations to be carried, pushed or pulled. The survey width can be adjusted from 1m to 4m. This system is perfectly suited for rapid non-invasive geophysical survey on land. The system used at Ballynisky Wind Farm was configured as a 4m wide, vehicle towed cart system equipped with 16 sensors of type FGM650/3 with a spacing of 0.25m. The FGM650/3 is a vertical Fluxgate gradiometer with a measurement range of $\pm 3,000$ nanoTesla (nT), making it

ideal for surveying in a diverse range of archaeological, geological and soil morphological conditions.

The SENSYS MAGNETO® MX V3 utilises GPS continuous measurement, whereby data is measured and saved continuously during a chosen measuring period, and the data position is determined by a GPS receiver. Measurements are conducted in straight lines avoiding overlapping tracks and maintaining a steady walking speed, or a vehicle towed cart speed of no more than 15km/h.

Survey related GPS data was recorded using a Trimble R12i GPS unit with real-time VRS Now technology. Accurate GPS information is an essential part of gathering quality survey data that can be easily identified again in the field. The Trimble R12i GPS has an accuracy tolerance of 0.01m. This potential inaccuracy is augmented by the type of survey employed. Generally, gradiometry data can have a displacement of up to 25cm, due in part to the strength of the readings and/or the depth of the recorded response.

A number of GPS coordinates are shown on the included figures, and more detailed survey tie-in information can be made available upon request.

9.3 Data Display

Summary grayscale images of the Magnetometry data were produced. The grayscale Magnetometry data is presented in Figures 16, 19, 22, 25, 28, 31 & 34, while general interpretative images of the Magnetometry data are presented in Figures 17, 20, 23, 26, 29, 32 & 35. Additional interpretative images with overlaid OSi map data are presented in Figures 18, 21, 24, 27, 30, 33 & 36.

Georeferenced geotiff images were created for the Magnetometry data. A 50Hz filter was applied to the Magnetometry data prior to clipping, and the Magnetometry grayscale images were produced with a standard dynamic range of between -10nT (white) to 10nT (black). Interpretative data images were based on the combined results of -3nT to 3nT and -10nT to 10nT survey data ranges.

To provide a location context, survey data images are overlaid on Tailte Éireann; formerly Ordnance Survey of Ireland (OSi) map data of the site (Sources: www.geohive.ie and www.archaeology.ie), and in-set overview maps were overlaid on recent 2022–2024 Google Earth images of the site (Source: <https://earth.google.com>). ITM coordinate reference points

are provided in the figures. Additional coordinates and survey tie-in information are available upon request.

Detailed data images of the geophysical survey area were produced at a scale of 1:2000 (Figures 16–36), while in-set site overviews in relevant figures are presented at a scale of 1:20000 (Figures 16–36). Appropriate scale bars, grayscale palettes and keys are presented on all relevant figures.

9.4 General Survey Results

The geophysical survey under licence no. 24R0517 was carried out between 21st October and 1st November 2024. At the time of the geophysical survey, the nine individual sites were under short grass. Weather conditions during the geophysical survey were primarily overcast with occasional periods of light rain, though ground conditions remained moderately firm in most of the surveyed fields.

Minor constraints encountered during the geophysical survey comprised occasional areas of vegetation/scrub, occasional deep machine ruts in wetter areas of the site, and the occasional remains of internal field boundaries/fences; however given the mobile nature of the survey device, these obstacles were easily circumvented. The areas of constraint are indicated in dark brown on the relevant interpretative data Figures.

The data collected during the geophysical survey revealed a large number of anomalies across the site. The majority of the identified anomalies comprised small ferrous anomalies likely representing modern agricultural disturbance. The geophysical survey data also produced evidence of a large number of clear linear anomalies, the majority of which appear to relate to historic field systems; though only a small number if these can be matched to field boundaries depicted on the historic OSi maps.

The geophysical survey data identified a number of definite archaeological features in the form of various enclosures and/or ringforts; some though not all of these relate to previously recorded SMR/RMP sites. In addition to these archaeological features a moderate number of anomalies were interpreted as potential archaeology; primarily representing possible small to medium sized pit type features with a smaller number of anomalies representing potential additional enclosures.

The grayscale Magnetometry data is presented in Figures 16, 19, 22, 25, 28, 31 & 34, while interpretative images of the Magnetometry data are presented in Figures 17, 20, 23, 26, 29, 32 & 35. Additionally Figures 18, 21, 24, 27, 30, 33 & 36, show the interpretative geophysical survey data relative to the historic map data from the OSi first-edition and 25-inch maps.

The various types of anomaly identified in the Magnetometry data, along with their interpretations and their potential archaeological significance are discussed below.

9.4.1 Detailed Results of Magnetometry Survey

The geophysical survey identified multiple anomalies across the various survey areas. These identified anomalies are generally interpreted in seven categories; modern magnetic interference, ferrous, areas of concentrated magnetic response, furrows, linears, archaeology, and potential archaeology.

Modern Magnetic Interference:

The geophysical survey data showed a number of small areas of magnetic interference along the edges of the geophysical survey areas. This interference is modern in nature, being caused primarily by the modern disturbance and/or modern boundary fences. The areas of modern magnetic interference are indicated in black hatch on the relevant interpretative data Figures.

Ferrous:

The Magnetometry data identified frequent small anomalies, which were interpreted as modern ferrous disturbance. These are indicated in yellow-brown on the relevant interpretative data Figures. These anomalies are found in all areas of the surveyed sites. These anomalies primarily comprise small to medium sized dipolar anomalies, the magnetic strength of which suggests they are ferrous in nature. While most of the ferrous anomalies across the sites likely represent modern ferrous disturbance, primarily associated with agricultural activity and modern ground disturbance, it must be noted that strong ferrous anomalies may on occasion mask smaller archaeological finds or features.

Areas of Concentrated Magnetic Response:

As well as numerous small isolated magnetic responses across the geophysical survey sites, there were also a number of larger areas of concentrated magnetic response; these are represented as orange hatched areas on the relevant interpretative Figures. In these areas, the detected magnetic anomalies are so tightly grouped, and often of such amplitude, that

it is impossible to define where the individual anomalies begin or end. In so far as these anomalies can be individually analysed, they appear to be generally strongly dipolar in nature, which could derive from numerous different causes, ranging from burning, to the presence of subsurface structural remains or construction debris, modern ferrous disturbance, or underlying geology.

While many of the areas of concentrated magnetic response across the various survey areas are likely linked to modern activity, it must be noted that such large areas of disturbance may also mask smaller anomalies associated with potential archaeological finds or features.

Furrows:

The geophysical survey data produced evidence agricultural activity in the form of agricultural furrows in the majority of the surveyed fields; these are indicated in light brown in the relevant interpretative data Figures. The majority of the agricultural furrows represent plough furrows of indeterminate date; many of these are also visible in various aerial photographs of the sites. A smaller number of wider spaced furrows clearly relate to modern machine/harvester ruts/tracks which are also clearly visible in recent aerial photographs of the relevant fields.

Linears:

The geophysical survey data produced evidence of an extensive network of interconnecting linear anomalies across the majority of the survey areas; these are indicated in purple in the relevant interpretative data Figures.

The majority of the identified linear anomalies appear to represent historic field systems; though only a moderate number appear to correlate with the recorded boundaries on the historic OSI maps.

While the majority of the linears are likely historic in nature, it is probable that a moderate number may also relate to modern activity, either representing modern drains, modern field boundaries and/or larger machine tracks/ruts. A small number of the linears may also represent larger enclosure type features rather than simple agricultural fields.

Archaeology:

The geophysical survey data identified a number of definite archaeological features in the form of enclosures and/or ringforts. In total four such features were identified, with two relating to the previously recorded enclosure (LI019-027----) in Site D and the previously

recorded ringfort (LI028-038----) in Site F; notably the second recorded ringfort (LI028-039----) in Site F was not identified in the survey data. The additional two definite archaeological features comprise a circular and a rectangular enclosure in the northern part of Site F.

The features identified as definite archaeology are indicated in light blue and numbered in red in the relevant interpretative data Figures.

Potential Archaeology:

In addition to the anomalies identified as definite archaeology, a moderate number of anomalies across the site were interpreted as potential archaeology. These anomalies are indicated in dark blue; with notable features being numbered in red, in the relevant interpretative data Figures.

Anomalies interpreted as potential archaeology were found all in all areas of the surveyed sites, occurring both in isolation and occasional small clusters.

The anomalies identified as potential archaeology are primarily small to medium sized dipolar anomalies with a strongly positive polarity, and lesser, at times almost imperceptible negative response; such anomalies tend to be indicative of pit type features. A smaller number of the possible pit type features with a strong associated negative magnetic response may represent burning in the form of possible hearth or kiln type features. While the geophysical data suggests the majority of these potential archaeological anomalies may be pit type features, excavation would be required to confirm whether or not they are archaeological in nature.

A small number of larger and/or curvilinear anomalies were interpreted as potential archaeology in the form of possible additional enclosure type features; generally less defined than those interpreted as definite archaeology and potentially with alternative non-archaeological explanations.

9.4.2 Detailed Results of Magnetometry Survey by Site

The detailed survey results of the individual Sites are discussed below. Where notable features were identified, these were named as Features 1–11. The notable Features are numbered in red on Figures 16–36, and are summarised in Table 3.

9.4.2.1 Site A

The geophysical survey results for Site A, comprising Fields 1–4, are presented in Figures 16–18.

In addition to numerous modern ferrous anomalies and agricultural furrows, the geophysical survey data for Site A also revealed an extensive network of linear anomalies and multiple potential archaeological anomalies (Figures 17–18).

The linears in the southern portion of Field 1 clearly indicate a historic field system. The linears in Field 2 likely reflect a mixture of historic field boundaries and modern agricultural tracks. None of the linears in Site A match any field boundaries shown on the historic OSi maps.

A cluster of short linears at the north of Field 1 likely represents modern machine activity given the proximity of the field entrance. While the historic first-edition OSi map places a number of house structures in this general vicinity, when adjusted to match the actual road alignment, these features would fall on the opposite side of the road outside the subject site. The possibility that the short linears at the north of the site represent additional boundaries or structures should however not be entirely discounted.

A moderate number of anomalies were identified as potential archaeology in the form of possible pits and/or occasional hearth type features. Two larger features (Features 1 & 2) were identified as possible archaeology; potentially representing enclosure type features.

Feature 1 presents as a sub-circular to oval area of disturbance c. 19m x c. 14m, which is enclosed by a faint positive and negative trend, which could imply a surrounding ditch and bank (Figures 16–18). The anomaly is not clearly enough defined to definitively identify the feature as an archaeological enclosure, and modern agricultural activity/disturbance should be not be ruled out as a cause.

Feature 2 presents as a distinct positive curved linear. The form of the anomaly if continued, could suggest a possible circular enclosure with a c. 14m diameter; however the anomaly is impacted by an area of magnetic interference to the south and by a linear boundary to the north-northwest which make it unclear if the anomaly continues in these directions. Given the nature and shape of the anomaly it should be considered as a possible enclosure; however modern agricultural activity should not be entirely discounted.

9.4.2.2 Site B

The geophysical survey results for Site B, comprising Fields 5–6, are presented in Figures 19–21.

In addition to numerous modern ferrous anomalies and agricultural furrows, the geophysical survey data for Site B also revealed an extensive network of linear anomalies, a number of large areas of concentrated magnetic response, and multiple potential archaeological anomalies (Figures 19–21).

The majority of the linear anomalies in Site B appear to represent historic field boundaries, with several corresponding to former boundaries shown in the historic OSi maps and aerial photographs. One feature of note in the network of linear anomalies is a possible c 12m x c. 6m house structure (Feature 3), located in the north-western portion of Field 5. While most of the linears appear to represent former field boundaries it is possible that some may also be the result of modern agricultural machine activity.

There are a number of larger areas of concentrated magnetic response which appear to represent areas of disturbance; particularly those in Field 5 may be associated with field boundary removal in these areas. Excavation would be required to determine the exact nature of these anomalies, and therefore the possibility that they could represent areas of burning and/or other archaeological activity cannot be ruled out.

A moderate number of anomalies were identified as potential archaeology in the form of possible pits type features. Most of these potential archaeological anomalies occur in isolation in the eastern half of the site.

9.4.2.3 Site C

The geophysical survey results for Site C, comprising Field 7, are presented in Figures 19–21.

In addition to numerous modern ferrous anomalies and agricultural furrows, the geophysical survey data for Site C also revealed a small number of linear anomalies, two areas of concentrated magnetic response, and a small number of potential archaeological anomalies (Figures 19–21).

The linears in Site C appear to represent historic field boundaries with the two largest examples being visible as former boundaries on both the historic OSi maps and previous aerial photographs of the site.

The two areas of concentrated magnetic response are non-archaeological, and relate to the locations of electricity posts.

A small number of anomalies were identified as potential archaeology in the form of possible pits type features; these occur in isolation across the site, without any visible trends or associations.

9.4.2.4 Site D

The geophysical survey results for Site D, comprising Fields 8–10, are presented in Figures 22–24.

In addition to numerous modern ferrous anomalies and a high concentration of agricultural furrows, the geophysical survey data for Site D also revealed an extensive network of linear anomalies, numerous potential archaeological anomalies, and clear evidence of the recorded enclosure (LI019-270----)(Figures 22–24).

The majority of the linear anomalies in Site D appear to represent historic field boundaries, though only a very small number can be matched to boundaries indicated on the historic OSi maps. It is possible that a number of the linears could also relate to modern agricultural disturbance i.e. machine tracks.

The survey data for Site D provided clear evidence of the enclosure (LI019-270----) previously recorded in this location. The associated geophysical anomaly (Feature 4) indicates a ditched enclosure with a diameter of c. 37m–39m, with a probable entrance located at the east.

A relatively high number of anomalies were identified as potential archaeology in the form of possible pits type features; these occur in isolation as well as in occasional clusters across all areas of the site, but are most concentrated in the eastern part of the site. One notable feature (Feature 5) comprises the potential subsurface remains of a lime kiln recorded in this general area on the historic OSi maps (Figures 7–9 & 24).

9.4.2.5 Site E

The geophysical survey results for Site E, comprising Field 11, are presented in Figures 25–27.

Site E produced a relatively small amount of geophysical data. A single short linear was identified in the southern portion of the site; though it is unclear if this represents a former field boundary or modern agricultural disturbance. A small number of anomalies were identified as

potential archaeology in the form of possible pits type features; these occur in isolation across the site, without any visible trends or associations.

9.4.2.6 Site F

The geophysical survey results for Site F, comprising Fields 12–15, are presented in Figures 28–30.

In addition to numerous modern ferrous anomalies and a high concentration of agricultural furrows, the geophysical survey data for Site F also revealed an extensive network of linear anomalies, several large areas of concentrated magnetic response, numerous potential archaeological anomalies, and clear evidence of several enclosure type features, including the recorded ringfort (LI028-038----)(Figures 28–30).

The majority of the identified linears appear to represent historic field systems, a notable number can be matched to boundaries indicated in the historic OSi maps.

A number of areas of concentrated magnetic response are located across the site. A large area of concentrated magnetic response at the north-northeast of Field 13 likely relates to possible sub-surface remains of a number of house structures shown in this area on the historic OSi maps. A number of linear orientated areas of concentrated magnetic response in Field 15 are visible as a roughly linear anomaly/area of disturbance in the aerial photographs of the site, and may represent a former field boundary, track, or a natural feature such as a watercourse or natural drainage. The remaining areas of concentrated magnetic response likely represent areas of ground disturbance; though whether this is related to archaeological activity or modern agricultural activity cannot be determined without excavation.

Three definite archaeological features were identified in Field 13 (Features 6, 7 & 8). The previously recorded ringfort (LI028-038----) was identified at the southeast of the site (Feature 6), with the associated anomaly suggesting a circular bank and two ditches with an external diameter of c. 40m. The adjacent recorded ringfort (LI028-039----) was not identified in the geophysical survey data; with any remains likely falling in the unsurveyed boundary area between Fields 12 & 13.

A small rectangular enclosure c. 13m x c. 11m, was identified at the north-northeast of Field 13 (Feature 7). There is a possibility that this feature could also represent a large house. A circular enclosure c. 17m x c. 16m (Feature 8), comprising a ditch with an opening to the south east, was identified c. 20m to the southwest of Feature 7.

A moderate number of anomalies were identified as potential archaeology in the form of possible pits and/or occasional hearth type features. Two larger features (Features 9 & 10) were identified as potential archaeology; possibly representing enclosure type features.

A small circular anomaly (Feature 9) with a c. 6m diameter in the north-eastern part of Field 13 was identified as possible archaeology, potentially representing a small enclosure or ring-ditch. In previous geophysical surveys identical anomalies have occasionally been produced by modern agricultural activity i.e. previous cattle feeder ring locations (Shanahan & Greiner, 2023). While there is no surface evidence of a cattle feeder in this location, the anomaly should be considered as potentially agricultural in origin; though excavation would be required to determine the exact nature of the anomaly.

A large c. 32m x c. 26m diameter, sub-circular anomaly (Feature 10) in Field 15, was identified as potential archaeology in the form of a possible enclosure or ringfort. This anomaly is less distinct than the other identified enclosures, and corresponds relatively closely to the location of a sub-circular enclosed section of field boundary shown adjacent to an area of woodland in the first-edition OSi map (Figures 7 & 30). Whether this section of field-boundary was itself the remains of a circular enclosure is unclear. While the identified geophysical anomaly could well represent an archaeological enclosure or ringfort, it is also possible that it is simply associated with a former field boundary and/or disturbance related to the removal of said boundary. Excavation would be required to determine the exact nature and archaeological significance of this Feature.

9.4.2.7 Site G

The geophysical survey results for Site G, comprising Fields 16–18, are presented in Figures 31–33.

In addition a moderate number of modern ferrous anomalies and numerous agricultural furrows, the geophysical survey data for Site G also revealed a small amount of linear anomalies and multiple potential archaeological anomalies (Figures 31–33).

The majority of the linear anomalies can be matched to former field boundaries indicated in the historic OSi maps and/or visible in various aerial photographs of the site.

A moderate number of anomalies were identified as potential archaeology in the form of possible pits. These anomalies are found in all areas of the site; though they are most concentrated in an area of general disturbance at the northwest of Field 17.

9.4.2.8 Site H

The geophysical survey results for Site H, comprising Fields 19–22, are presented in Figures 25–27.

In addition to numerous modern ferrous anomalies and a high concentration of agricultural furrows, the geophysical survey data for Site H also revealed an extensive network of linear anomalies, several large areas of concentrated magnetic response and a moderate number of potential archaeological anomalies.

The majority of the identified linears appear to represent historical field systems; though only a very small number can be matched to the boundaries indicated on the historic OSi maps. It is likely that a number of the linears also relate to modern agricultural activity in the form of ruts, drains and/or removed modern field boundaries.

A large area of concentrated magnetic response at the north of Field 20 likely represents an area of underlying geological disturbance; though the possibility that it masks agricultural or archaeological activity cannot be discounted. Another area of concentrated magnetic response at the south of Field 21 represents an area of modern surface disturbance.

A moderate number of anomalies were identified as potential archaeology in the form of possible pit type features.

9.4.2.9 Site I

The geophysical survey results for Site I, comprising Fields 23–26, are presented in Figures 34–36.

In addition to numerous modern ferrous anomalies and a high concentration of agricultural furrows, the geophysical survey data for Site I also revealed an extensive network of complex linear anomalies, and a moderate number of potential archaeological anomalies.

The survey data for Site I is dominated by a dense network of linears in Field 24 and the north of Field 23. While some of these linears undoubtedly relate to modern agricultural activity, the majority appear to represent historic field systems; though only a very small number can be matched to any boundaries indicated in the historic OSi maps.

A large enclosed area (Feature 11) c. 97m x c. 55m, in the centre of Field 24 may simply represent an individual field; however there is a notable possibility that it could represent

some kind of enclosed complex. The concentrated short linears in the western part of this enclosed area could potentially represent structural remains.

The linears at the north of Field 23, while less distinct than those associated with Feature 11 could be interpreted in a similar manner; however many of the individual anomalies in this area are more indicative of modern disturbance and likely predominantly represent modern machine tracks. The possibility that some represent historic boundaries and/or archaeological features should however not be entirely discounted.

A moderate number of anomalies across the site were identified as potential archaeology in the form of possible pit type features.

Table 3: Archaeological features and notable potential archaeological features.

Feature number	Interpretation	Site	Field	Dimensions	ITM (E/N)	Figures
1	Possible enclosure	A	1	c. 19m x c. 14m	E 528983, N 643796	16–18
2	Possible enclosure	A	2	c. 14m diameter	E 529055, N 643726	16–18
3	House	B	5	c. 12m x c. 6m	E 529341, N 643658	19–21
4	Enclosure (LI019-270----	D	9	c. 37m x c. 39m	E 530104, N 643195	22–24
5	Structure / Lime Kiln	D	9	c. 7m x c. 5m	E 529999, N 643164	22–24
6	Ringfort (LI028-038----	F	13	c. 39m x c. 40m	E 529309, N 642285	28–30
7	Enclosure/House	F	13	c. 13m x c. 11m	E 529651, N 642443	28–30
8	Enclosure	F	13	c. 17m x c. 16m	E 529617, N 642433	28–30
9	Possible ring-ditch	F	13	c. 6m diameter	E 529599, N 642399	28–30
10	Possible Ringfort/Enclosure	F	15	c. 32m x c. 26m	E 529666, N 642259	28–30
11	Possible large enclosure	I	24	c. 97m x c. 55m	E 530540, N 642989	34–36

10. Conclusions

The Magnetometry survey data produced a large number of anomalies across the nine subject sites. When combined with the historical data and SMR/RMP records, all the data indicates that the cumulative proposed development site lies in an area of concentrated archaeological activity.

The majority of the geophysical survey data comprised extensive networks of linears, representing historical field systems. Additionally a large number of anomalies were identified as potential archaeology in the form of possible pits and/or hearth type features.

Eleven features of particular note were identified within Sites A, B, D, F & I (Features 1–11; Table 3); primarily in the form enclosure type features, but also including ringforts, a possible ring-ditch, a lime kiln and possible houses.

Of the three previously recorded SMR/RMP sites located within the proposed development sites, two were clearly identified in the geophysical survey data; namely the enclosure (LI019-270----) in Site D, and one of the ringforts (LI028-038----) in Site F. The second previously recorded ringfort (LI028-039----) in Site F was not identified in the geophysical survey data; with any remains likely falling in an unsurveyed area within an internal site boundary.

The geophysical survey data clearly shows the presence of both definite and potential archaeological features across the proposed development site.

While geophysical survey is a useful tool in identifying the location of sub-surface features or anomalies, the interpretation of geophysical survey data is not an exact science; and although the interpretation of detected anomalies is based on known scientific principles relating to the employed survey techniques combined with detailed historical research, the exact nature and/or archaeological significance of individual detected anomalies can only be definitively confirmed through excavation.

Given the location of the cumulative proposed development site and the findings of the geophysical survey, it would be recommended that the pending development layout be designed in such a way as to avoid any definite archaeology and/or notable potential archaeological features identified in the geophysical survey data. It would be further recommend that any areas of the site in which future development related groundworks are to take place be subjected to a programme of archaeological testing and/or monitoring.

11. Interpretive classes

Introduction

Key to interpretation is separation of each anomaly into broad classes, namely whether caused by agricultural processes (e.g. ploughing, composting, drainage etc.), geological factors or whether a structure or feature of archaeological interest is likely. Within these, anomalies are in turn classified by whether they most likely represent a fill or a drain, or a region of differing data texture etc. More detailed descriptions are included below.

The actual means of classification is based upon geophysical understanding of anomaly formation, the behaviour of soils, landscape context and structural form. For example, to consider just one form of anomaly: weakly dipolar discrete magnetic anomalies of small size are likely to have shallow non-ferrous sources and are therefore likely to be pits. Larger ones of the same class could also be pits or locally-deeper topsoil, but if strongly magnetic could also be hearths. Strongly dipolar discrete anomalies are in all cases likely to be ferrous or similarly magnetic debris, although small repeatedly heated and *in situ* hearths can produce similar anomalies.

Agriculture – field boundaries

Coherent linear dipolar enhancement of magnetic field strength marking ditch fills, narrow bands of more variable magnetic field or changes in apparent magnetic susceptibility are all included within this category if they correlate with boundaries depicted on the Ordnance Survey maps. If there is no correlation, then these anomaly types are not categorised as field boundaries.

Agriculture – cultivation

Banded variations in apparent magnetic susceptibility caused by a variable thickness of topsoil, depositional remanent magnetisation of sediments in furrows or susceptibility enhancement through heating (a by-product of burning organic matter like seaweed) tend to indicate past cultivation, whether ridge-based techniques, medieval ridge and furrow or post medieval 'lazy beds'. Modern cultivation, e.g. recent ploughing, is not included.

Agriculture – drains

In some cases it is possible to identify drainage networks either as ditch-fill type anomalies, noisy or repeating dipolar anomalies from terracotta pipes or reduced magnetic field strength anomalies from culverts, plastic or non-reinforced concrete pipes. In all cases, identification of a herringbone pattern to these is sufficient for inclusion within this category.

Archaeology – fills

Any linear or discrete enhancement of magnetic field strength, usually with a dipolar character of variable strength that cannot be categorised as a field boundary, cultivation or as having a geological origin, is classified as a fill of potential archaeological interest. Fills are normally earthen, and include an often invisible proportion of heated soil or topsoil that augments local magnetic field strength. Inverted anomalies are possible over non-earthen fills, e.g. those that comprise peat, sand or gravel within soil. This category is subject to the 'habitation effect' where, in the absence of other sources of magnetic material, anomaly strength will decrease away from sources of heated soil and sometimes to the extent of non-detectability.

Former enclosure ditches that contained standing water can promote enhanced volumetric magnetic susceptibility through depositional remanence and remain detectable regardless of the presence of other sources of magnetic material.

Archaeology – other discrete

This category is secondary to fills and includes anomalies that by virtue of their character are likely to be of archaeological interest but cannot be adequately described as fills. Examples include strongly magnetic bodies lacking ferrous character that might indicate hearths or kilns. In some cases, anomalies of ferrous character may be included.

Archaeology – structures

On some sites the combination of plan form and anomaly character, e.g. rectilinear reduced magnetic field strength anomalies, might indicate the likely presence of masonry, robber trenches or rubble foundations. Other types of structure are only included if the evidence is unequivocal, e.g. small ring ditches with doorways and hearths. In some circumstances, a less definite category may be assigned to the individual anomalies instead.

Archaeology – zones

On some sites it is possible to define different areas of activity on the basis of magnetic character, e.g. texture and anomaly strength. These might indicate the presence of middens or foci within larger complexes. This category does not indicate a presence or absence of anomalies of possible archaeological interest.

Geology – discrete

On some sites, there will be anomalies, e.g. some gravels and alluvial contexts, which can obscure those potentially of archaeological interest. They may have a strength equal to or greater than that associated with more relevant sources, e.g. ditch fills, but can normally be differentiated on the basis of anomaly form coupled with geological understanding. Where there is ambiguity, or relevance to the study, these anomalies will be included in this category.

Geology – zones

Not all changes in geology can be detected at the surface, directly or indirectly, but sometimes there will be a difference evident in the geological data that can be attributed to a change, e.g. from alluvium to tidal flat deposits, or bedrock to alluvium. In some cases the geophysical difference will not exactly coincide with the geological contact and this is especially the case across transitions in soil type.

Services

All overhead (OH) and underground (UG) services are depicted where these are detectable in the data or where they may influence aspects of the interpretation.

Texture

Geophysical data varies in character across areas owing to a range of factors, including soil chemistry, near surface geology, hydrology and land use past and present. Where these variations are of interest or relevance to the study they are included in this category.

12. Interpretation of Magnetometry data

Anomaly classification used to interpret Magnetometry data

After Smalley (2013).

Polarity:

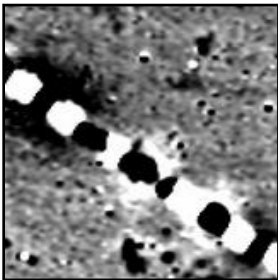
Polarity is the general term used to describe the measurement of a magnetic response. An anomaly may have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

Strength of response:

The amplitude of a magnetic response is important when assigning an interpretation to a specific anomaly. For example, a positive anomaly with extremely high nT values may often be caused by modern magnetic interference, while a similarly sized and shaped anomaly with significantly lower nT values may have a natural origin.

Thermoremanent response:

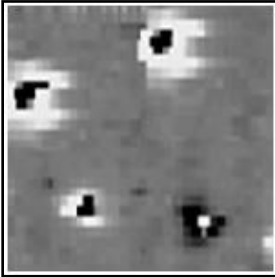
When an object or feature has been subjected to prolonged or intense heat it may acquire a magnetic field. This can be anything up to approximately +/-100 nT in value. Typically, such features include kilns, clay fired drain pipes, tiles and bricks, hearths or bonfires. If heating has occurred *in situ*, as with a kiln, the response is likely to be bipolar, whereas if the heated objects have been disturbed or moved relative to each other they may take an irregular form and display a more debris style response (e.g. ash).



Bipolar:

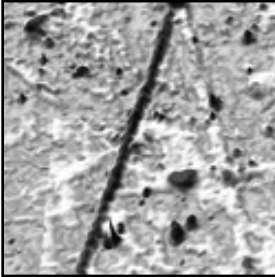
Bipolar anomalies are composed of both positive and negative responses. A bipolar anomaly can be made up of any number of positive responses and negative responses. A pipeline consisting of alternating positive and negative anomalies is a typical example of a bipolar anomaly. In contrast, a dipolar anomaly has only one area of each polarity. Interpretation of a bipolar anomaly may depend on the strength of the magnetic field. A weak response may be caused by a clay field drain while a strong response may be caused by a metallic service.

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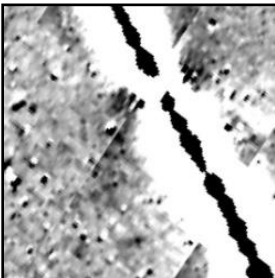
Dipolar:

A dipolar anomaly comprises a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses are created by a single feature. The interpretation of a dipolar anomaly will depend on the strength of the magnetic measurements. Very strong anomalies are likely to be caused by ferrous objects.



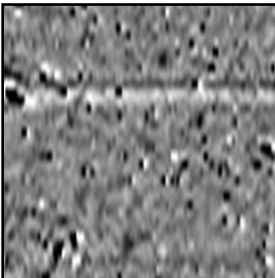
Positive linear:

A positive linear is a linear response which is entirely positive in polarity. These are typically related to in-filled cut features where the fill material is magnetically enhanced when compared to the surrounding matrix. Positive linear anomalies may be caused by ditches of an archaeological nature, former field boundaries or agricultural activities related to ploughing; some may even have a natural origin.



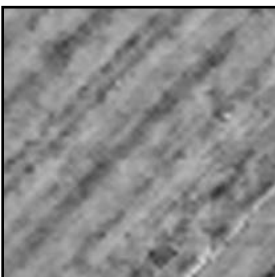
Positive linear with associated negative response:

A positive linear anomaly that has an associated adjacent negative anomaly is generally caused by a single feature. In the example shown, this is likely to be a single length of wire or cable probably relating to a modern service. Magnetically weaker responses may indicate field boundaries or earthwork style features.



Negative linear:

A negative linear is a linear response that is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative to the background topsoil is built up. Negative linears may be caused by earthen banks of an archaeological nature, former field boundaries or plough activity.



Ploughing activity:

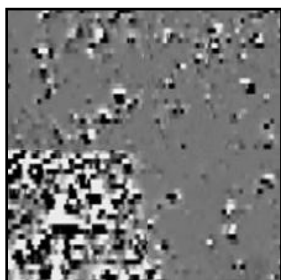
Ploughing activity can often be indicated by a series of parallel linear anomalies. These linear anomalies may be of either positive polarity or negative polarity depending on site specifics. It can sometimes be difficult to distinguish between ancient or more modern plough furrows; indicators such as the separation of each linear, their straightness, strength of response and cross cutting relationships can be used to aid interpretation, although none of these can necessarily differentiate between various phases of activity.

**Positive point/area:**

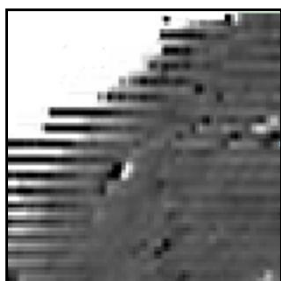
This generally refers to spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity, and similar to positive linear anomalies, they are usually caused by in-filled cut features. They may indicate pits of an archaeological origin, as well as tree bowls or other naturally occurring depressions in the ground.

**Negative point/area:**

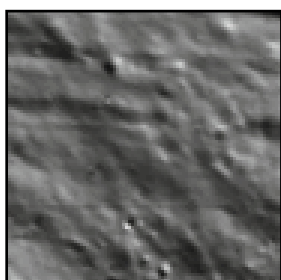
These are the opposite of positive point anomalies. Negative point responses may be caused by raised areas or earthen banks, which may be either archaeological or natural in origin.

**Magnetic debris:**

Magnetic debris comprises numerous dipolar responses spread over an area. If the amplitude of response is low, the origin may represent general ground disturbance, something as simple as an area of mixed or dug earth. Moderately strong anomalies may indicate a spread of thermoremanent materials such as bricks or ash, while stronger anomalies are generally indicative of a spread of ferrous debris.

**Magnetic disturbance:**

Magnetic disturbance is a high amplitude response and may comprise either a bipolar anomaly or a single polarity response. It is generally associated with magnetic interference from modern ferrous materials or structures such as fencing, buildings or vehicles, and is most commonly found around the perimeter of a site in proximity to boundary fences.

**Weak background variations:**

Weakly magnetic wide scale variations within survey data may occasionally be seen across a site. These usually have no specific structure and can often appear curvy or sinuous in form. These are most likely caused by natural events or features, such as soil creep or dried up/seasonal streams, though they may also represent changes in the underlying geology or soil type that may contain unpredictable distributions of magnetic minerals. Such variations may be apparent in several locations across a site.

13. Technical Information

13.1 Instrumentation

Gradiometer Survey

A detailed gradiometer survey may be conducted to define any responses detected during scanning; alternatively it may be applied as a stand-alone methodology. Detailed survey is typically applied with a sample interval of 0.25m and a traverse interval of 1m, to allow for accurate detection of potential archaeological responses. Survey data is generally collected in grids of 40m x 40m, though occasionally grids of 20m x 20m or 10m x 10m and a transverse interval of 0.5m may be used if higher resolution data is found to be necessary.

In recording data using geophysical instruments, two traverse techniques can be applied, zig-zag or parallel. Parallel traverses offer more security from possible errors. Zig-zag traverses are quicker, giving rapid ground coverage. However, this traverse type has a tendency for disparity of responses in alternate traverses, which is generated by the mistiming of a surveyors walking speed. This can be treated during the processing stage; however, it can never be fully removed. Zig-zag traverses can also produce a stripping effect on the data. This is identified as alternating dark and light bands, but is only seen in gradiometer and GPR data. It is caused by the misalignment of the two magnetometers in gradiometry data, and is an effect of tilting and lifting of the antennae over differentiating ground cover within GPR results (Ermenwein and Kvamme 2008, 143). These however, can be removed during data processing. The similarities between this type of error, and that of the geophysical representation of cultivation marks, means such responses can be inadvertently processed out. Linear earthworks positioned parallel to traverses can also be mistaken as stripping.

Survey data at Ballynisky Wind Farm, Co. Limerick was collected using a SENSYS MAGNETO® MX V3 Modular Large Area Magnetometer Survey System. As this system is GPS tracked, it was not necessary to set out a geo-referenced survey grid prior to data collection, as is required with most traditional geophysical survey techniques. Measurements were conducted in straight lines avoiding overlapping tracks and maintaining a speed of less than 15km/h. The survey techniques employed when using the GPS tracked SENSYS MAGNETO® MX V3 is comparable with the parallel traverse techniques of traditional gradiometer survey.

SENSYS MAGNETO® MX V3 Modular Large Area Magnetometer Survey System

The Magnetometry survey data at Ballynisky Wind Farm, Co. Limerick was collected using a SENSYS MAGNETO® MX V3 Modular Large Area Magnetometer Survey System. The system comprises a modular, versatile, lightweight carrier system, a data acquisition unit; it can host up to 16 fluxgate gradiometers on a trailer having a width of 3.85m. The modular trailer can be set up in various configurations to be carried, pushed or pulled by person or by vehicle. The survey width can be adjusted from 1m to 4m. The system used at Ballynisky Wind Farm, was configured as a 4m wide, vehicle towed cart system equipped with 16 sensors of type FGM650/3 with a spacing of 0.25m. The FGM650/3 is a vertical Fluxgate gradiometer with a measurement range of $\pm 3,000$ nT. A compact data acquisition unit offers high sampling rates, 24Bit digitizing of all measurement data and an Ethernet interface to output the data. At maximum survey speed the system captures data every 20mm.

In order to reach a positioning accuracy of ± 1 cm for every measurement point, the MX V3 is equipped with a RTK DGPS. The GPS rover station is mounted to the cart while the GPS base station (reference point) is set next to the measurement area. As the MX V3 survey system is GPS tracked, it does not require the setting out of a survey grid prior to commencement of the survey. Measurements are conducted in straight lines avoiding overlapping tracks and maintaining a steady speed of no more than 15km/ph. For accurate results the measurement is started when the sensors are exactly at the start line and stopped when they are exactly at the end line before the vehicle is turned. High resolution magnetic gradiometry survey data (survey frequency 200Hz) is downloaded on-site to a laptop computer for initial processing and storage, and are later transferred to a desktop computer for further minimal processing, interpretation and archiving. The resulting data are processed using MAGNETO® MonMx geophysical software.

Trimble R12i GNSS System

A Trimble R12i with a TSC7 logger is a handheld GPS device which utilizes VRS Now real-time corrections to provide Real-time kinematic positioning (RTK) data, with a Network RTK accuracy of 8 mm + 0.5 ppm RMS (Horizontal) and 15 mm + 0.5 ppm RMS (Vertical).

This highly accurate device was used as part of the SENSYS MAGNETO® MX V3's GPS tracking system to precisely track and record geographical location data during the survey.

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SENSYS MAGNETO® MX V3 Modular Large Area Magnetometer Survey System, technical specifications information and user manuals (accessed November 2024); <https://sensysmagnetometer.com/>

Trimble R12i GNSS System and TSC7 logger (accessed November 2024)
<https://geospatial.trimble.com/products-and-solutions/trimble-r12#product-downloads>

www.excavations.ie	Summary accounts of archaeological investigations
https://heritagemaps.ie/	OSi maps and heritage data
https://data.gov.ie/	Government website containing LiDAR data

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15. Figures

Figure 16: Site A; Grayscale Magnetometry data.

Figure 17: Site A; Interpretative Magnetometry data.

Figure 18: Site A; Interpretative Magnetometry data overlaid with historic OSi map data.

Figure 19: Sites B & C; Grayscale Magnetometry data.

Figure 20: Sites B & C; Interpretative Magnetometry data.

Figure 21: Sites B & C; Interpretative Magnetometry data overlaid with historic OSi map data.

Figure 22: Site D; Grayscale Magnetometry data.

Figure 23: Site D; Interpretative Magnetometry data.

Figure 24: Site D; Interpretative Magnetometry data overlaid with historic OSi map data.

Figure 25: Sites E & H; Interpretative Magnetometry data.

Figure 26: Sites E & H; Interpretative Magnetometry data.

Figure 27: Sites E & H; Interpretative Magnetometry data overlaid with historic OSi map data.

Figure 28: Site F; Grayscale Magnetometry data.

Figure 29: Site F; Interpretative Magnetometry data.

Figure 30: Site F; Interpretative Magnetometry data overlaid with historic OSi map data.

Figure 31: Site G; Grayscale Magnetometry data.

Figure 32: Site G; Interpretative Magnetometry data.

Figure 33: Site G; Interpretative Magnetometry data overlaid with historic OSi map data.

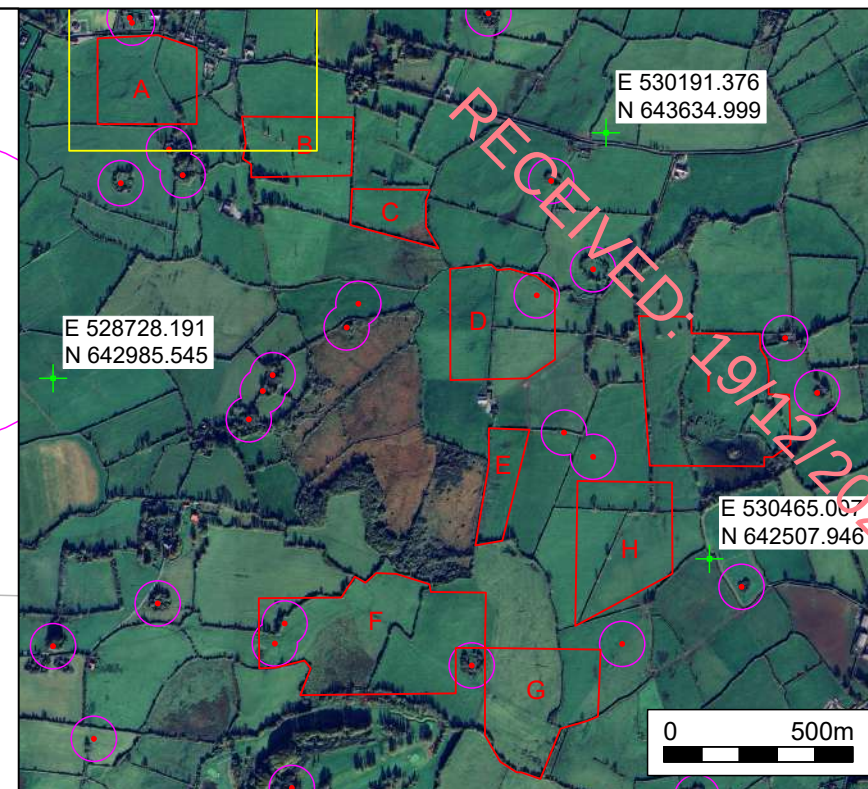
Figure 34: Site I; Grayscale Magnetometry data.

Figure 35: Site I; Interpretative Magnetometry data.

Figure 36: Site I; Interpretative Magnetometry data overlaid with historic OSi map data.



E 528982.612
N 644053.609



NOTES:

- For associated Interpretative survey data see Figures 17 & 18.

Notable Features (See Report Table 3):

- 1 = Possible Enclosure.
- 2 = Possible Enclosure.
- 3 = House.

SMR Site Data:

- 1 = LI019-131001- (Church).
- 2 = LI019-131001- (Graveyard).
- 3 = LI019-132--- (Ringfort/Rath).
- 4 = LI019-135--- (Fulacht Fia).



Key:

- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Grid Peg



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CLIENT:
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PROJECT:
Ballynisky Wind Farm,
Ballynisky,
Co. Limerick

TITLE:
Site A:
Grayscale Magnetometry Data

DATE:
26/11/2024

SCALE:
1:2000 & 1:20000

DRAWING NO.:
Figure 16

LICENCE NO.:
24R0517

PRODUCED BY:
MG

Field 1

E 528791.980
N 643719.661

Site A

Field 2

Field 3

Field 4

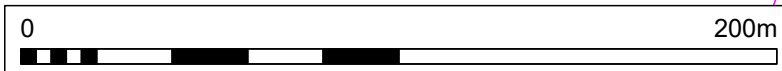
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N 643615.569

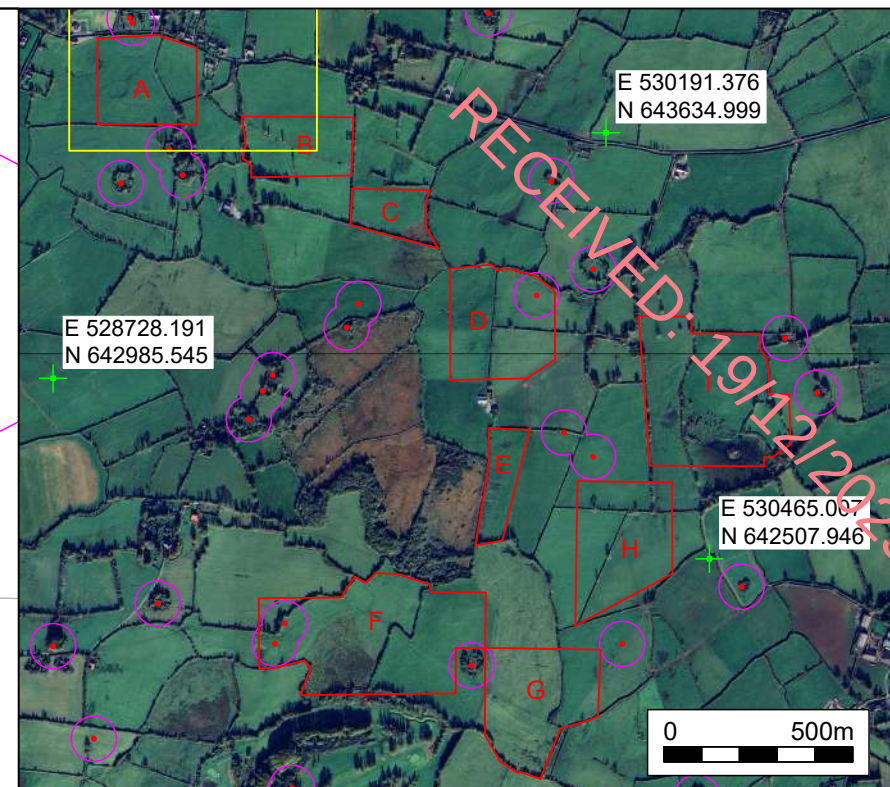
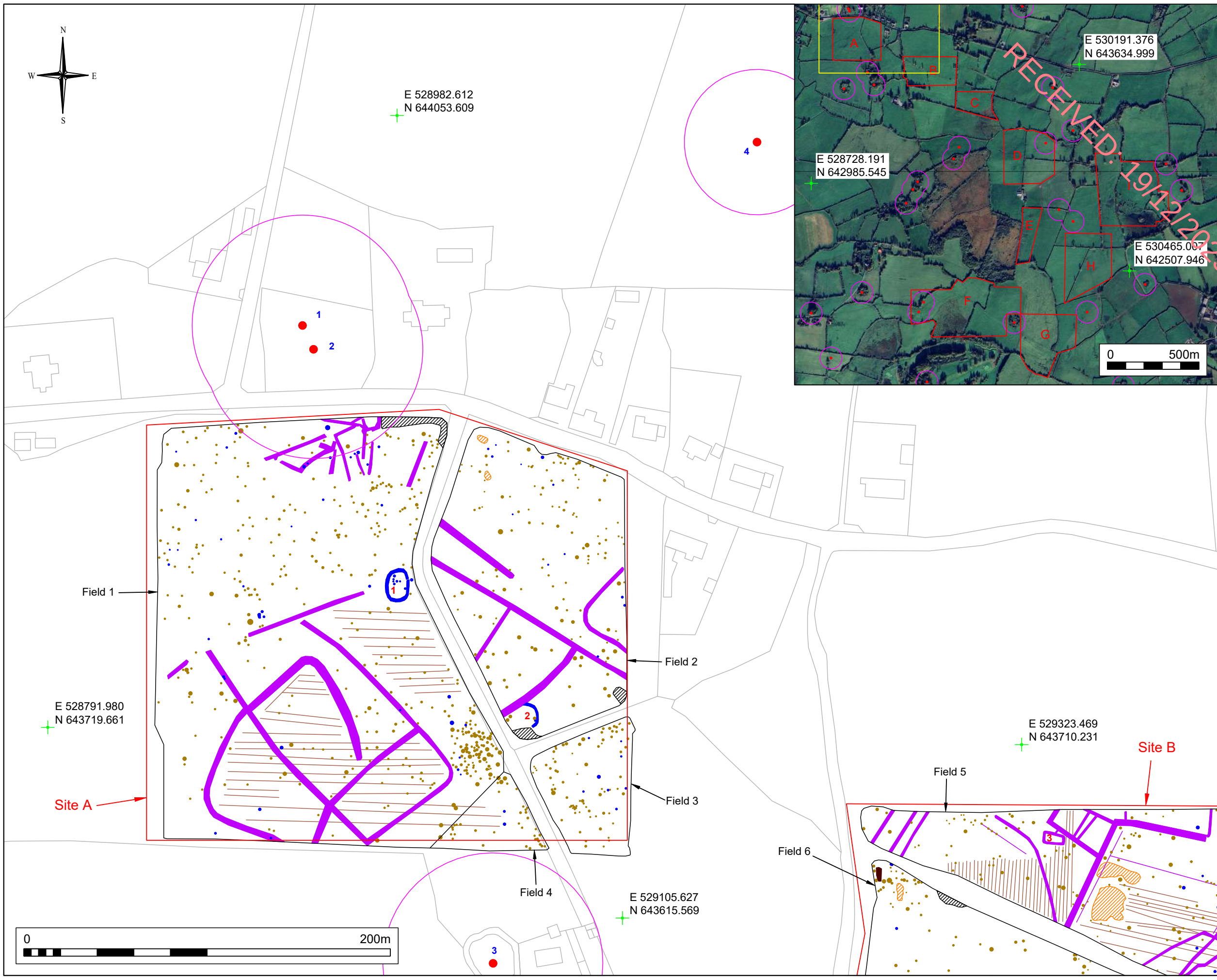
Field 6

Field 5

E 529323.469
N 643710.231

Site B





NOTES:

- For associated Grayscale Magnetometry data see Figure 16.
- For additional Interpretative survey data see Figure 18.

Notable Features (See Report Table 3):

- 1 = Possible Enclosure.
- 2 = Possible Enclosure.
- 3 = House.

SMR Site Data:

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- 2 = LI019-131001- (Graveyard).
- 3 = LI019-132--- (Ringfort/Rath).
- 4 = LI019-135--- (Fulacht Fia).

Key:

- Ferrous
- Archaeology
- Potential Archaeology
- Linear / Trend
- Furrow
- Area of Concentrated Magnetic Response
- Magnetic Interference / Modern
- Error / Constraints
- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Figure Location
- Grid Peg

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TITLE: Site A: Interpretative Magnetometry Data

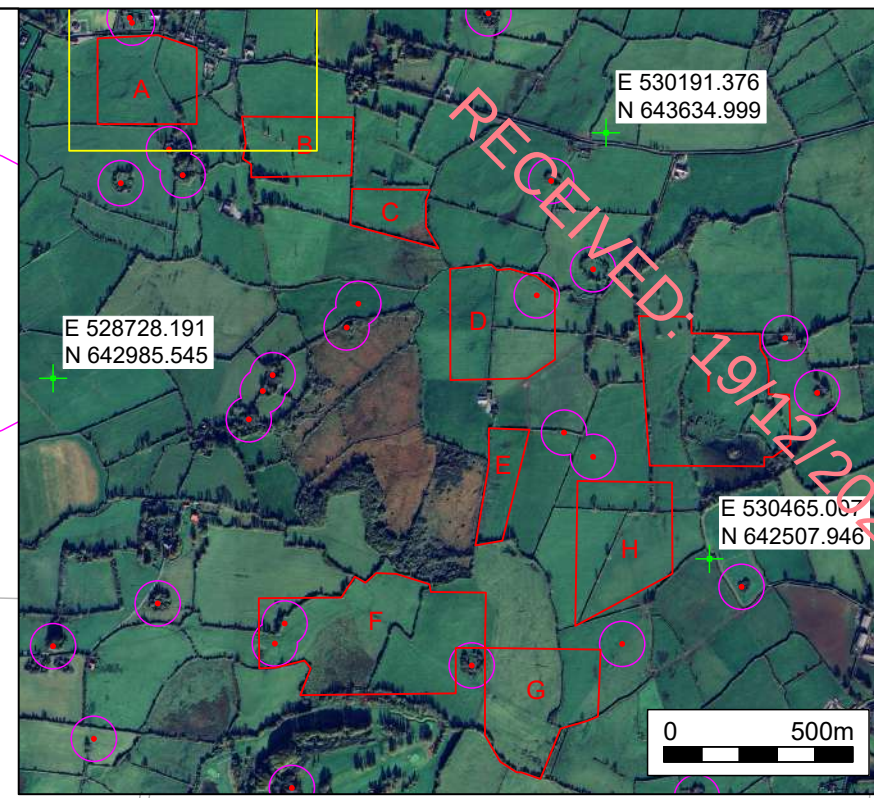
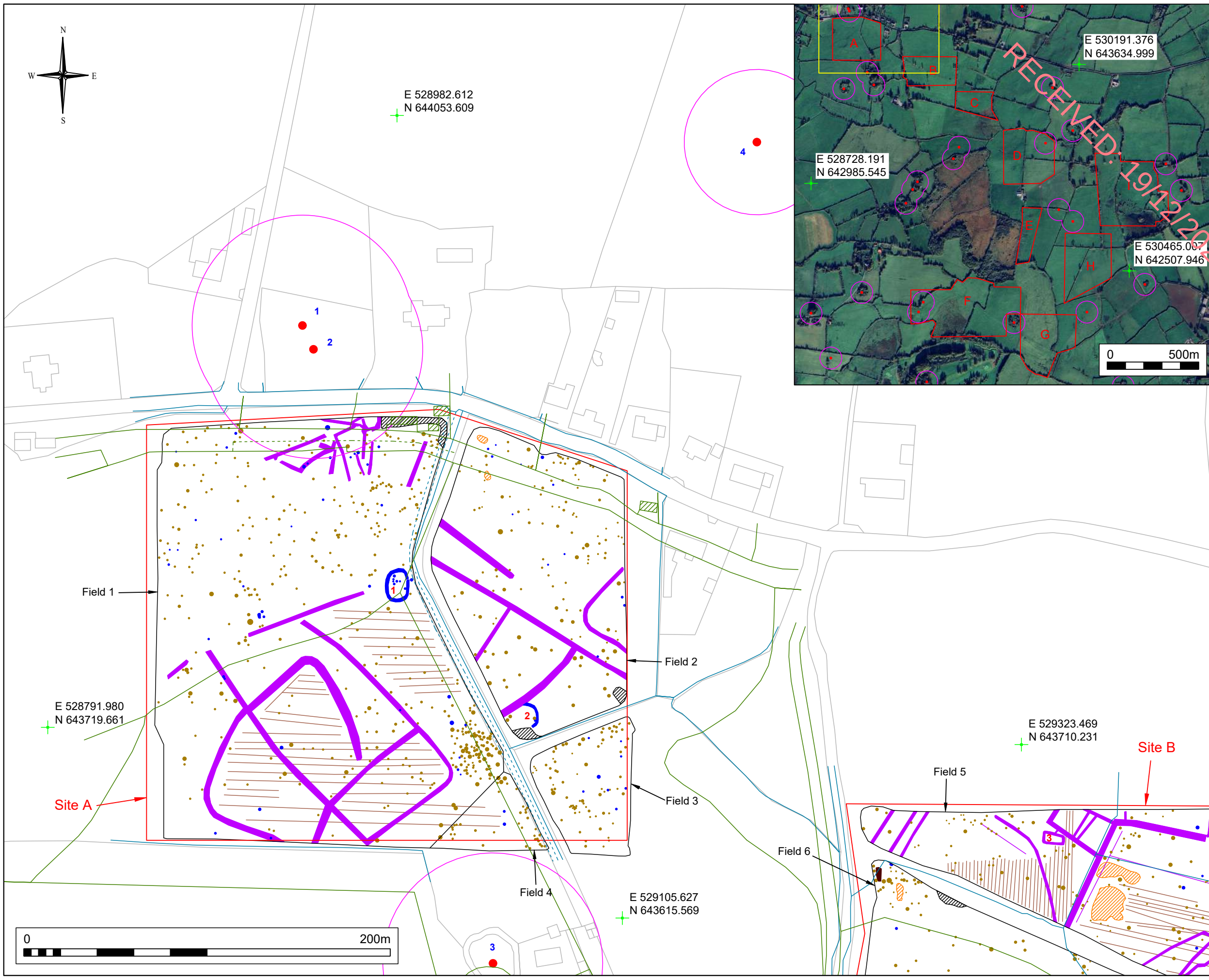
DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 17

LICENCE NO.: 24R0517

PRODUCED BY: MG



- NOTES:
- For associated Grayscale Magnetometry data see Figure 16.
 - For associated Interpretative survey data see Figure 17.
- Notable Features (See Report Table 3):
- 1 = Possible Enclosure.
 - 2 = Possible Enclosure.
 - 3 = House.
- SMR Site Data:
- 1 = LI019-131001- (Church).
 - 2 = LI019-131001- (Graveyard).
 - 3 = LI019-132--- (Ringfort/Rath).
 - 4 = LI019-135--- (Fulacht Fia).
- Key:
- Ferrous
 - Archaeology
 - Potential Archaeology
 - Linear / Trend
 - Furrow
 - Area of Concentrated Magnetic Response
 - Magnetic Interference / Modern
 - Error / Constraints
 - Site Boundary
 - Survey Boundary
 - Historic Field Boundary 1st Edition OSi
 - Historic Field Boundary 25-inch OSi
 - SMR Site
 - Zone of Notification
 - Figure Location
 - Grid Peg

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TITLE: Site A: Interpretative Magnetometry Data, Overlaid with Historic OSi Map Data

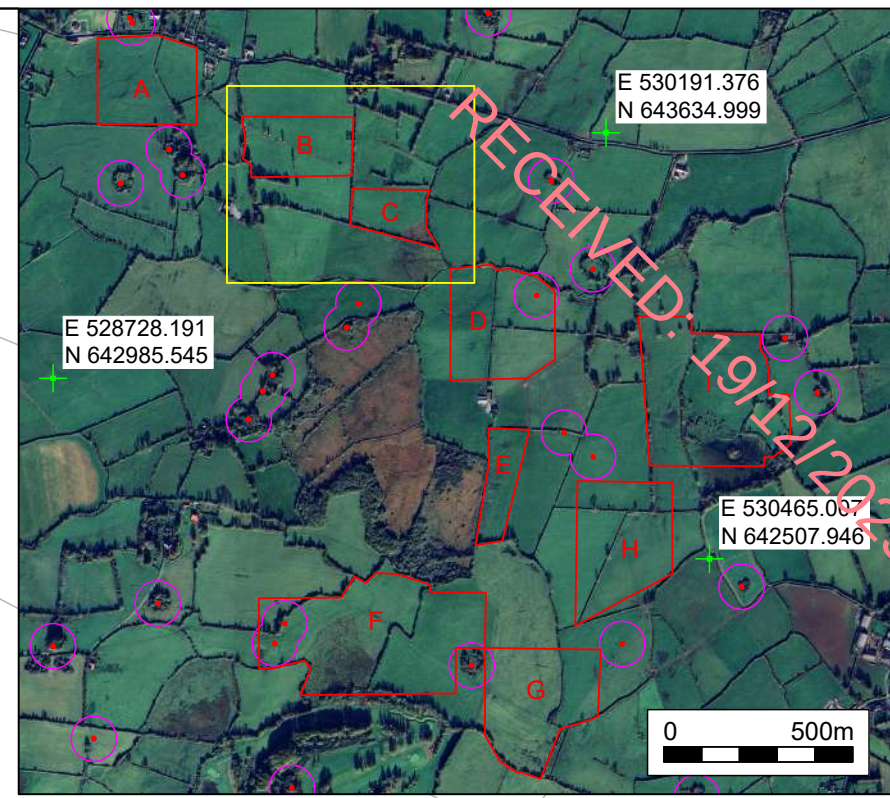
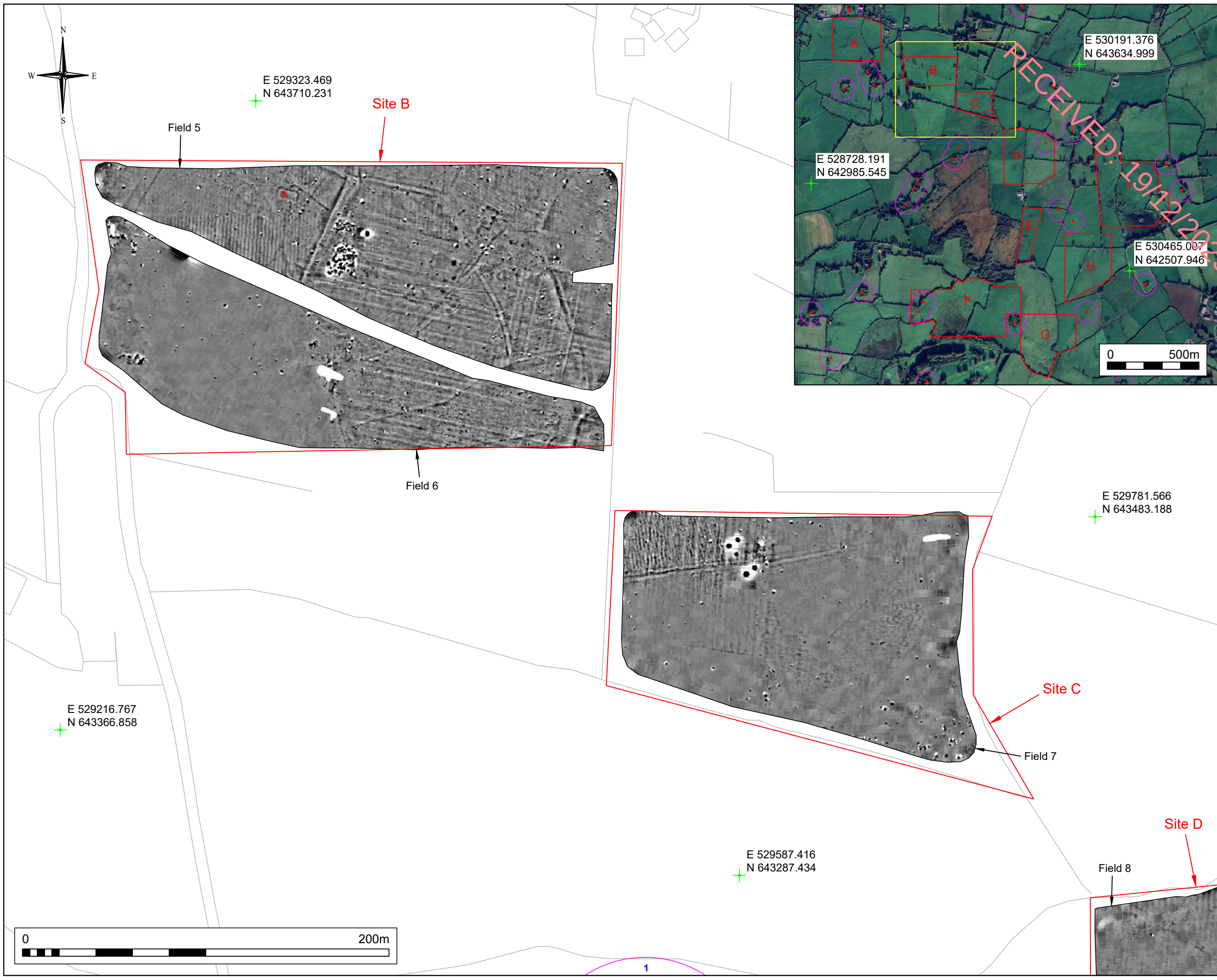
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SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 18

LICENCE NO.: 24R0517

PRODUCED BY: MG



NOTES:

- For associated Interpretative survey data see Figures 20 & 21.

Notable Features (See Report Table 3):

3 = House.

SMR Site Data:

1 = LI019-202- (Ringfort/Rath).

-10 nT 10

Key:

- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Grid Peg

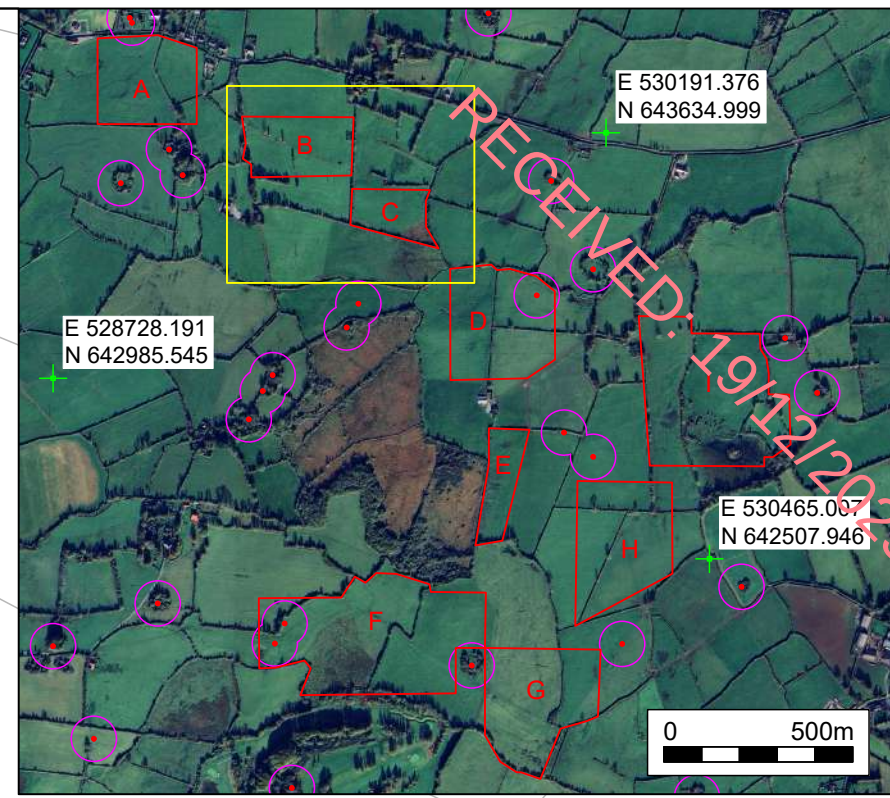
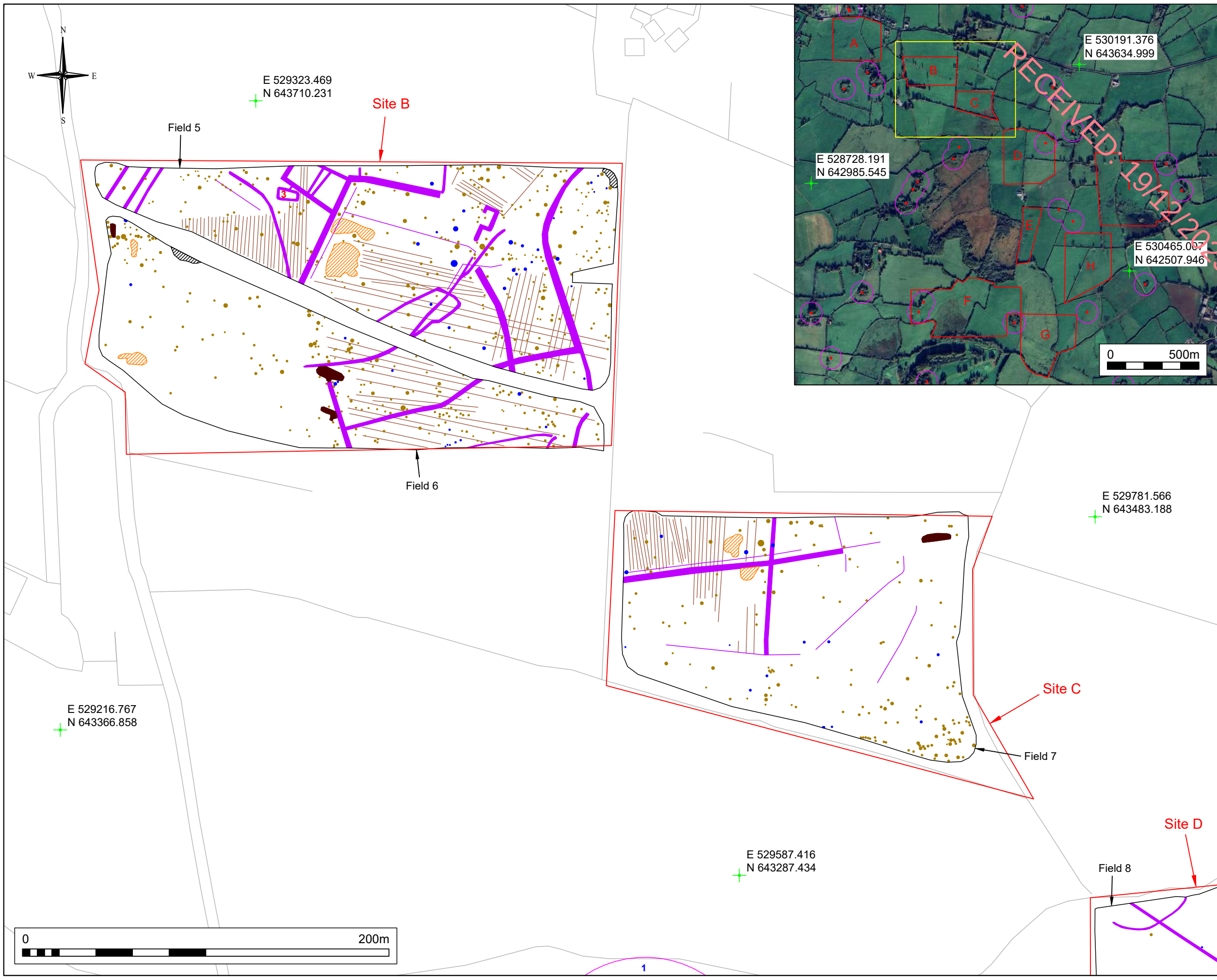
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TITLE: Sites B & C: Grayscale Magnetometry Data	DRAWING NO.: Figure 19
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 19.
- For additional Interpretative survey data see Figure 21.

Notable Features (See Report Table 3):

3 = House.

SMR Site Data:

1 = LI019-202---- (Ringfort/Rath).

Key:

Ferrous	
Archaeology	
Potential Archaeology	
Linear / Trend	
Furrow	
Area of Concentrated Magnetic Response	
Magnetic Interference / Modern	
Error / Constraints	
Site Boundary	
Survey Boundary	
SMR Site	
Zone of Notification	
Figure Location	
Grid Peg	

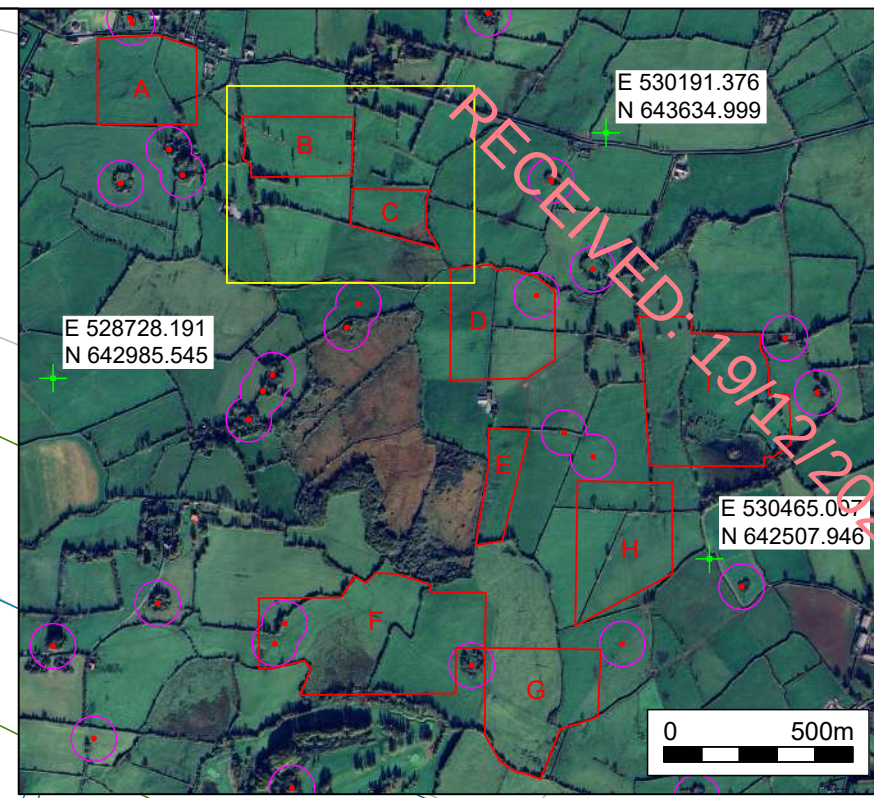
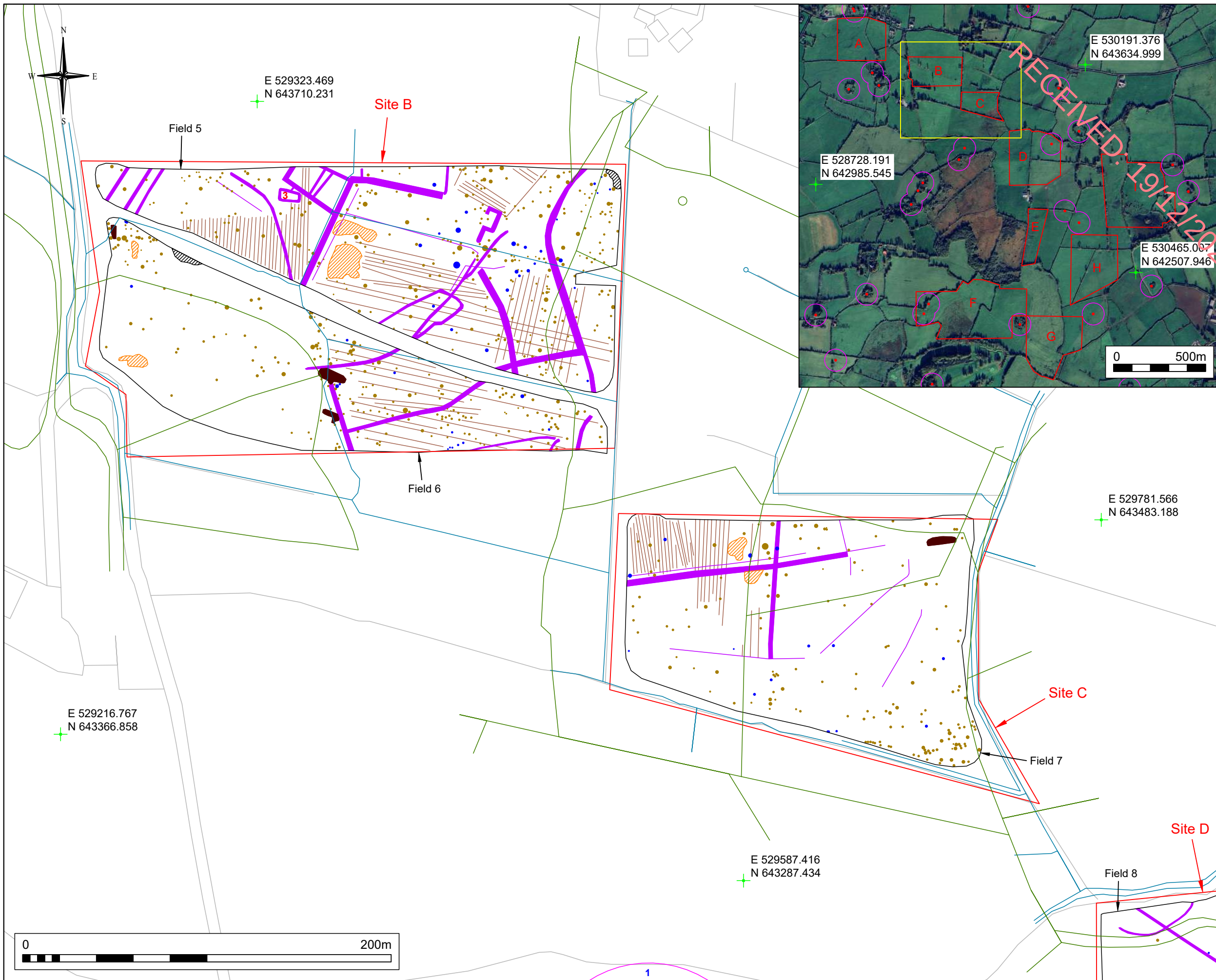
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TITLE: Sites B & C: Interpretative Magnetometry Data	DRAWING NO.: Figure 20
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



- NOTES:
- For associated Grayscale Magnetometry data see Figure 19.
 - For associated Interpretative survey data see Figure 20.
- Notable Features (See Report Table 3):
- 3 = House.
- SMR Site Data:
- 1 = LI019-202--- (Ringfort/Rath).
- Key:
- Ferrous
 - Archaeology
 - Potential Archaeology
 - Linear / Trend
 - Furrow
 - Area of Concentrated Magnetic Response
 - Magnetic Interference / Modern
 - Error / Constraints
 - Site Boundary
 - Survey Boundary
 - Historic Field Boundary 1st Edition OSi
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CLIENT: Laurence Dunne Archaeology Ltd.

PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

TITLE: Sites B & C: Interpretative Magnetometry Data, Overlaid with Historic OSi Map Data

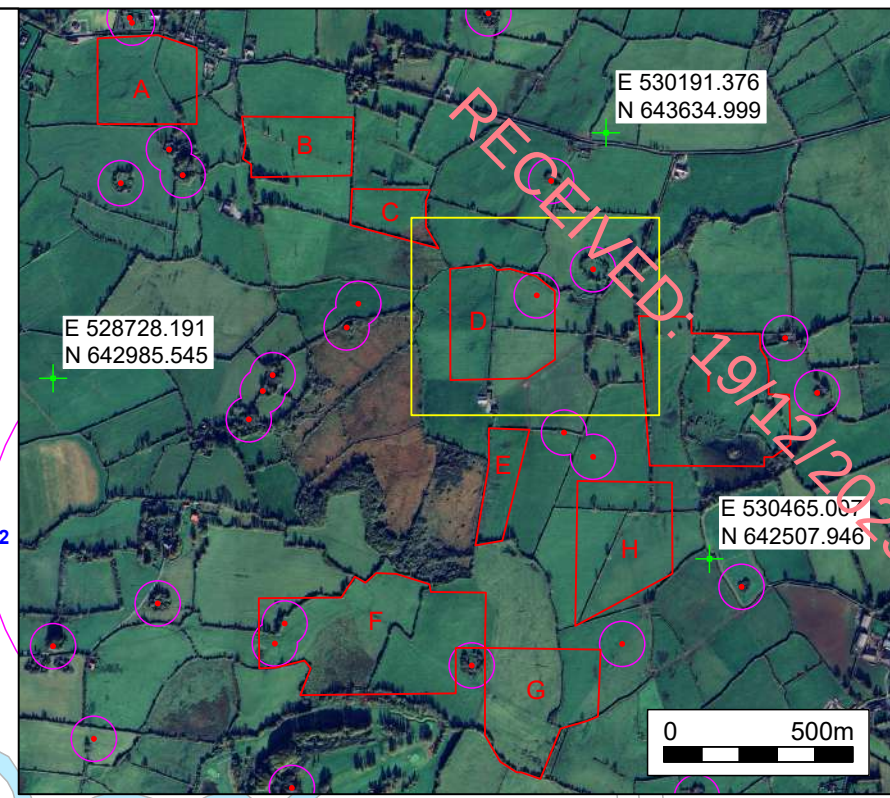
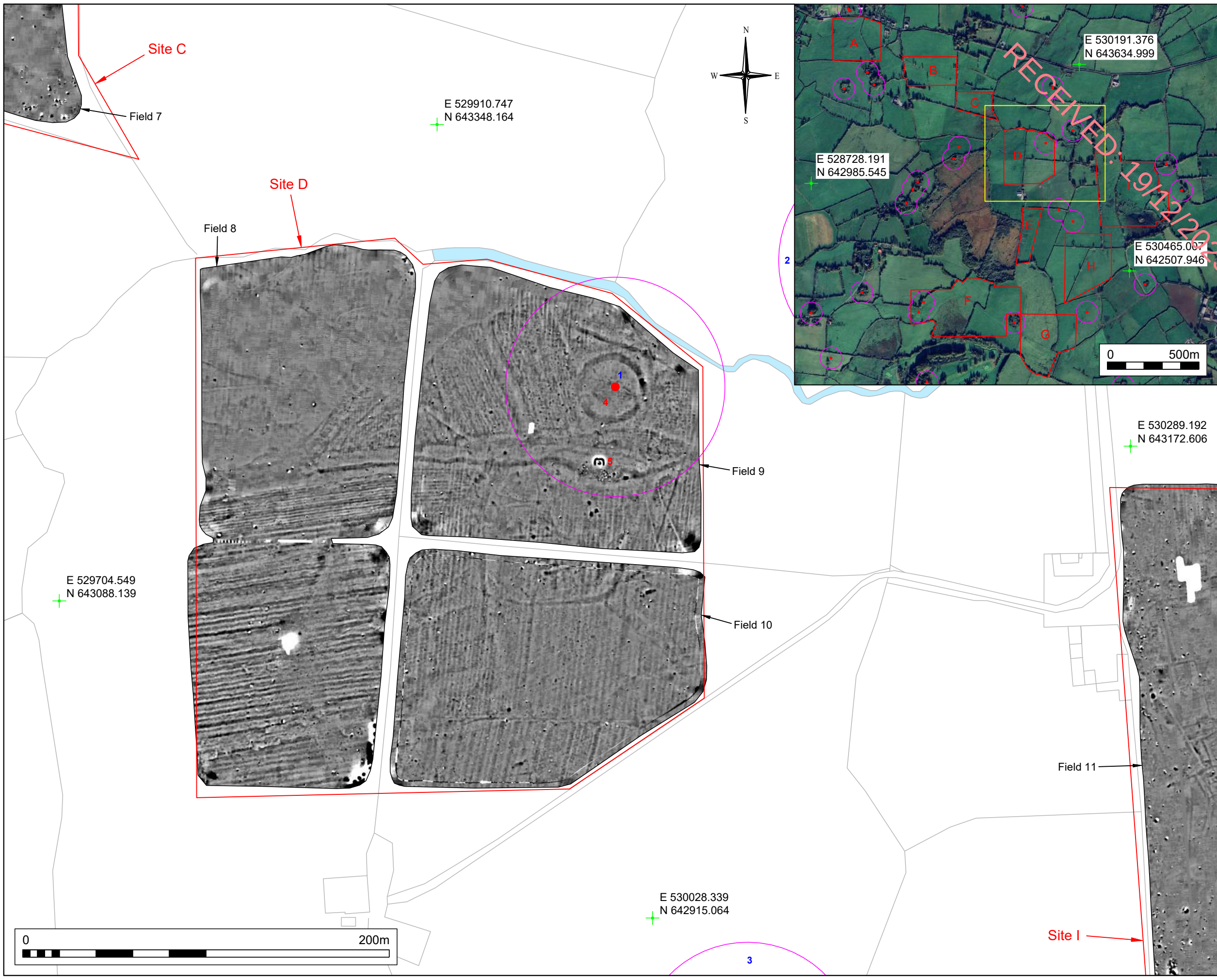
DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 21

LICENCE NO.: 24R0517

PRODUCED BY: MG



NOTES:

- For associated Interpretative survey data see Figures 23 & 24.

Notable Features (See Report Table 3):

- 4 = Enclosure (LI019-270---).
- 5 = Structure / Lime Kiln.

SMR Site Data:

- 1 = LI019-270--- (Enclosure).
- 2 = LI019-205--- (Enclosure).
- 3 = LI019-206--- (Ringfort/Rath).

nT

-10 10

Key:

- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Grid Peg

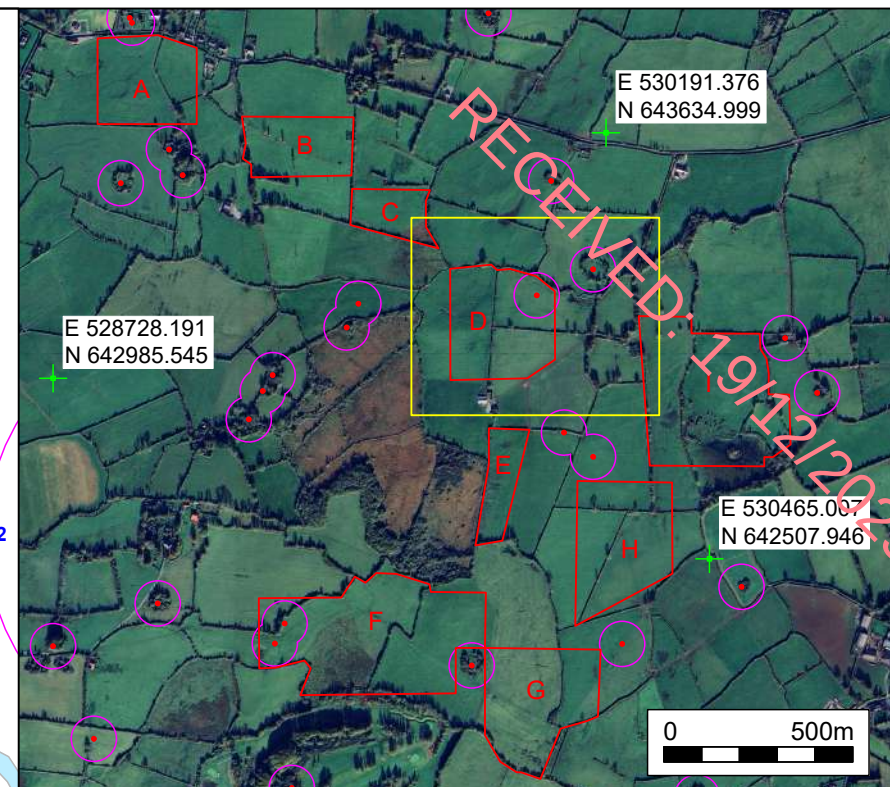
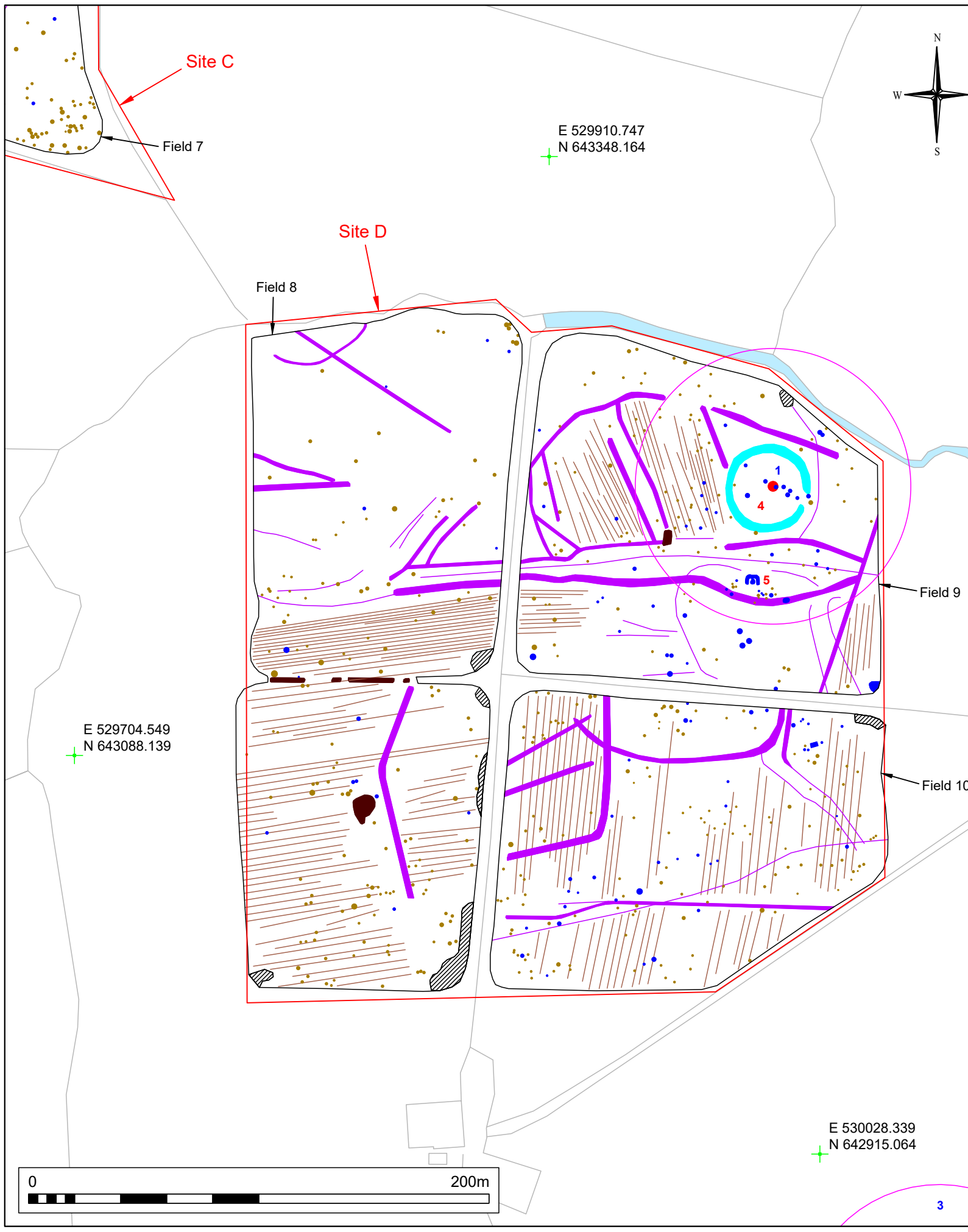
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CLIENT: Laurence Dunne Archaeology Ltd.

PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

TITLE: Site D: Grayscale Magnetometry Data	DRAWING NO.: Figure 22
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 22.
- For additional Interpretative survey data see Figure 24.

Notable Features (See Report Table 3):

- 4 = Enclosure (LI019-270---).
- 5 = Structure / Lime Kiln.

SMR Site Data:

- 1 = LI019-270--- (Enclosure).
- 2 = LI019-205--- (Enclosure).
- 3 = LI019-206--- (Ringfort/Rath).

Key:

- Ferrous
- Archaeology
- Potential Archaeology
- Linear / Trend
- Furrow
- Area of Concentrated Magnetic Response
- Magnetic Interference / Modern
- Error / Constraints
- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Figure Location
- Grid Peg

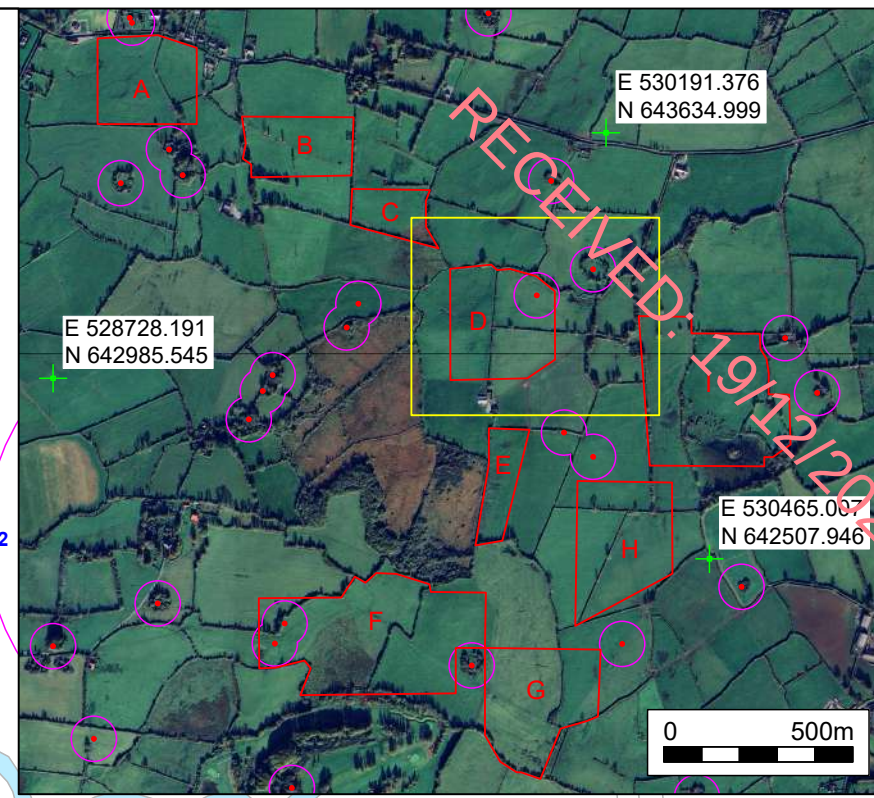
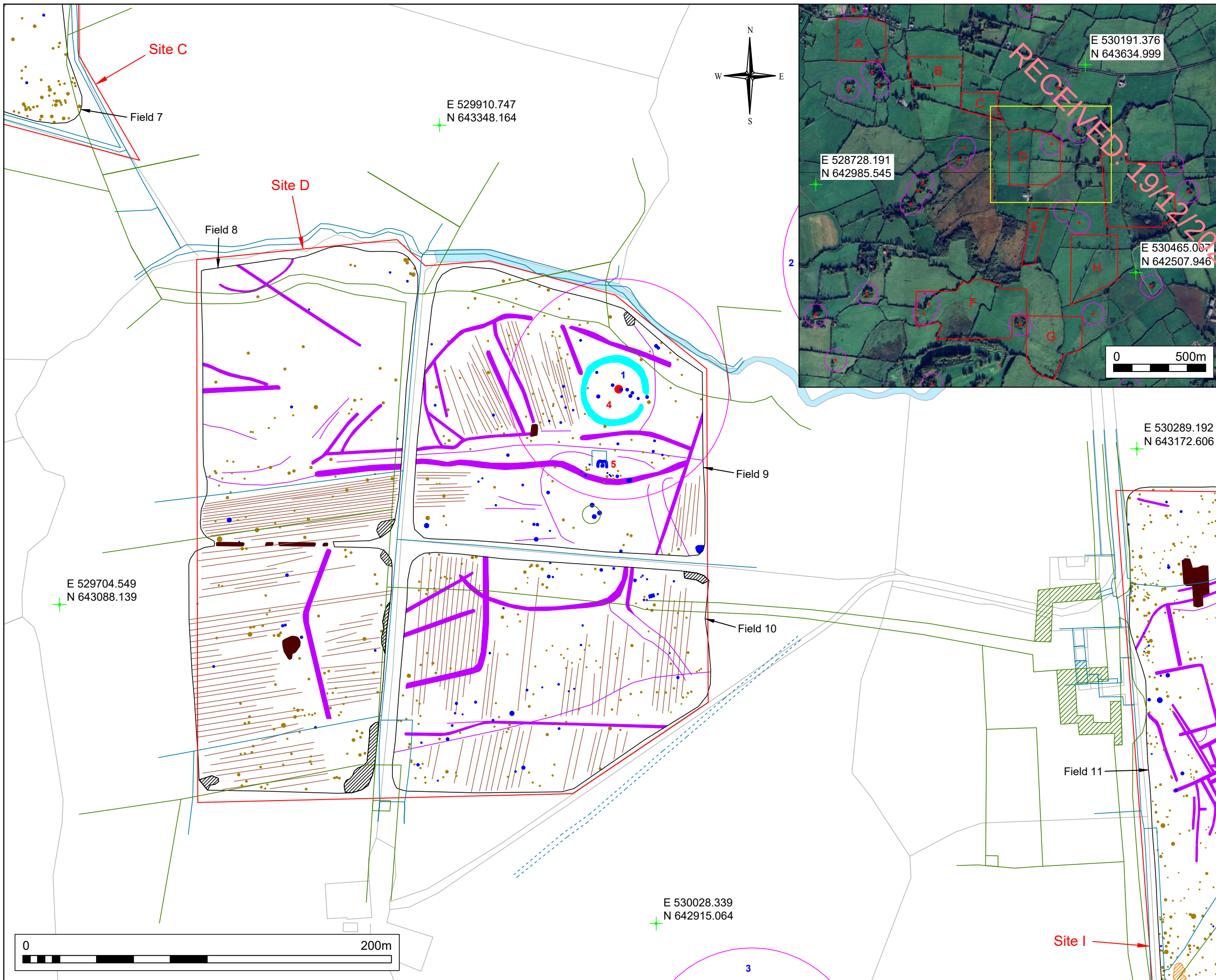
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PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

TITLE: Site D: Interpretative Magnetometry Data	DRAWING NO.: Figure 23
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 22.
- For associated Interpretative survey data see Figure 23.

Notable Features (See Report Table 3):

- 4 = Enclosure (LI019-270-),
- 5 = Structure / Lime Kiln.

SMR Site Data:

- 1 = LI019-270- (Enclosure).
- 2 = LI019-205- (Enclosure).
- 3 = LI019-206- (Ringfort/Rath).

Key:

Ferrous	
Archaeology	
Potential Archaeology	
Linear / Trend	
Furrow	
Area of Concentrated Magnetic Response	
Magnetic Interference / Modern	
Error / Constraints	
Site Boundary	
Survey Boundary	
Historic Field Boundary 1st Edition OSI	
Historic Field Boundary 25-inch OSI	
SMR Site	
Zone of Notification	
Figure Location	
Grid Peg	

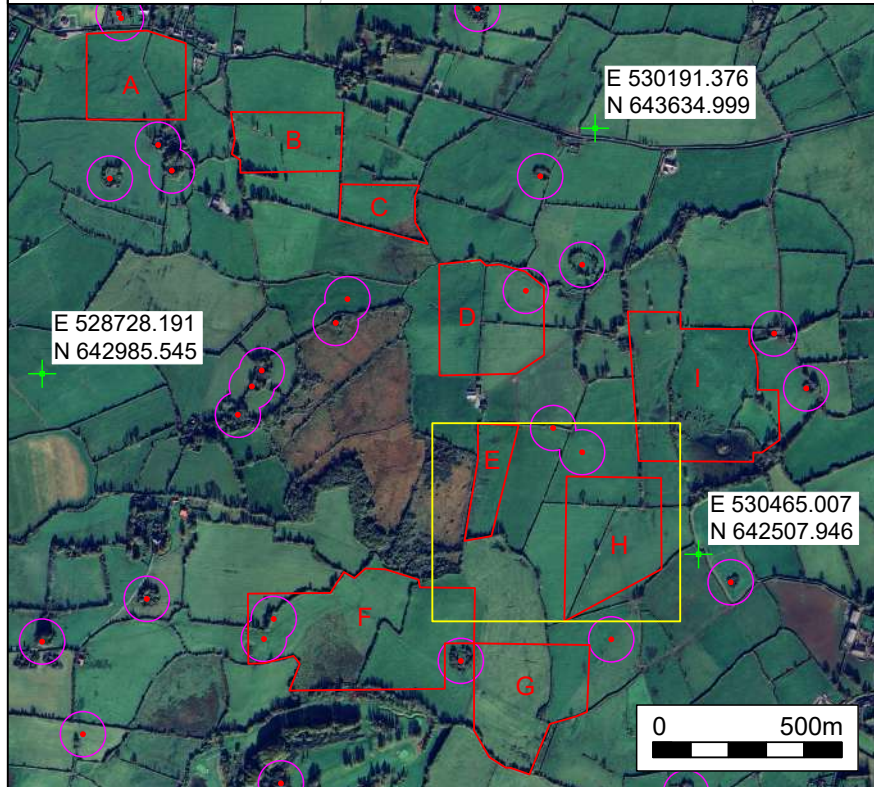
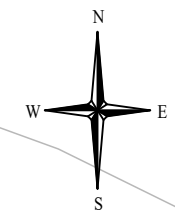
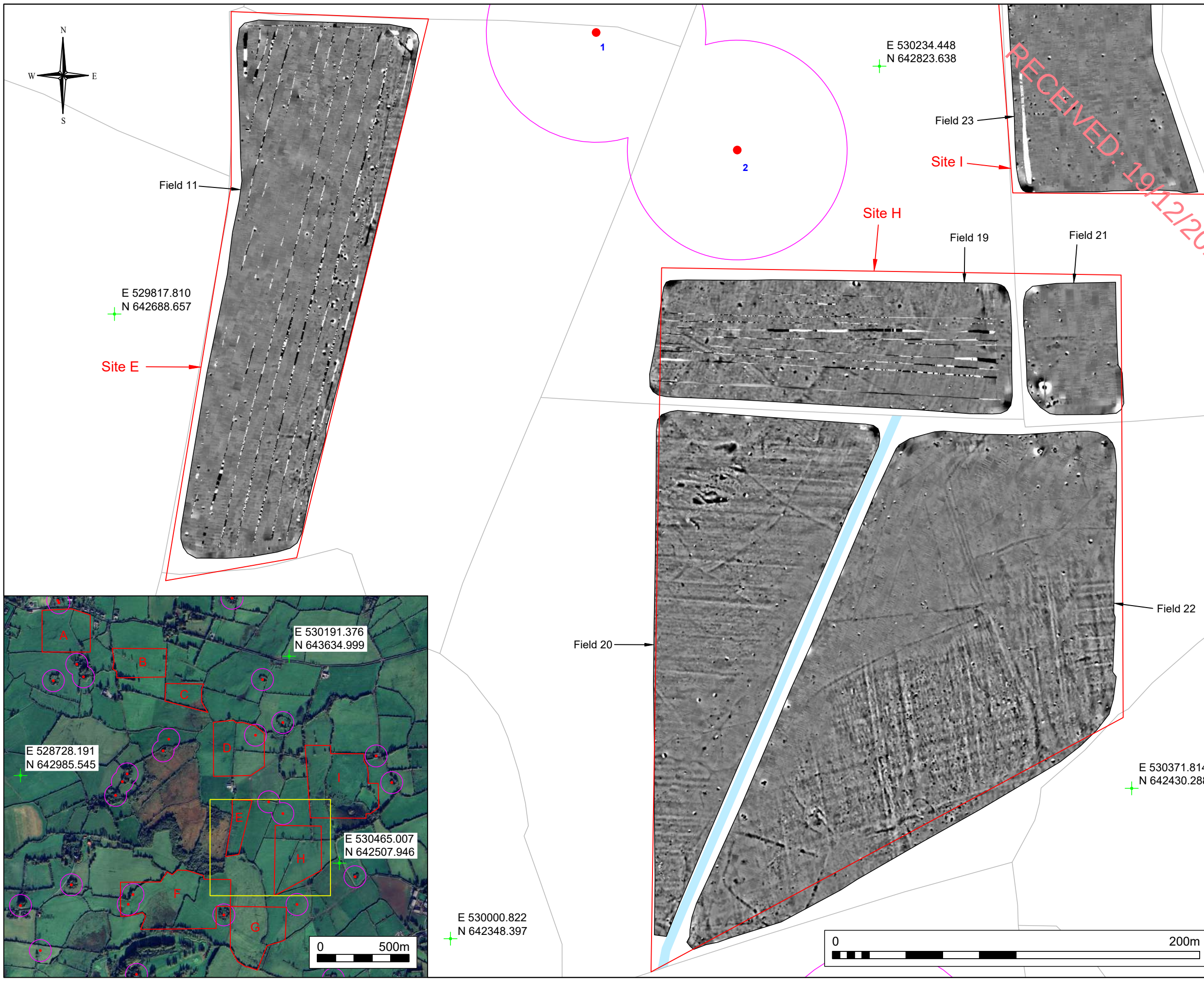
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PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

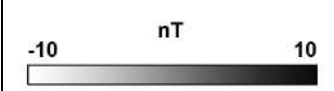
TITLE: Site D: Interpretative Magnetometry Data, Overlaid with Historic OSI Map Data	DRAWING NO.: Figure 24
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Interpretative survey data see Figures 26 & 27.

SMR Site Data:
1 = LI019-206--- (Ringfort/Rath).
2 = LI019-207--- (Ringfort/Rath).



- Key:
- Site Boundary
 - Survey Boundary
 - SMR Site
 - Zone of Notification
 - Grid Peg



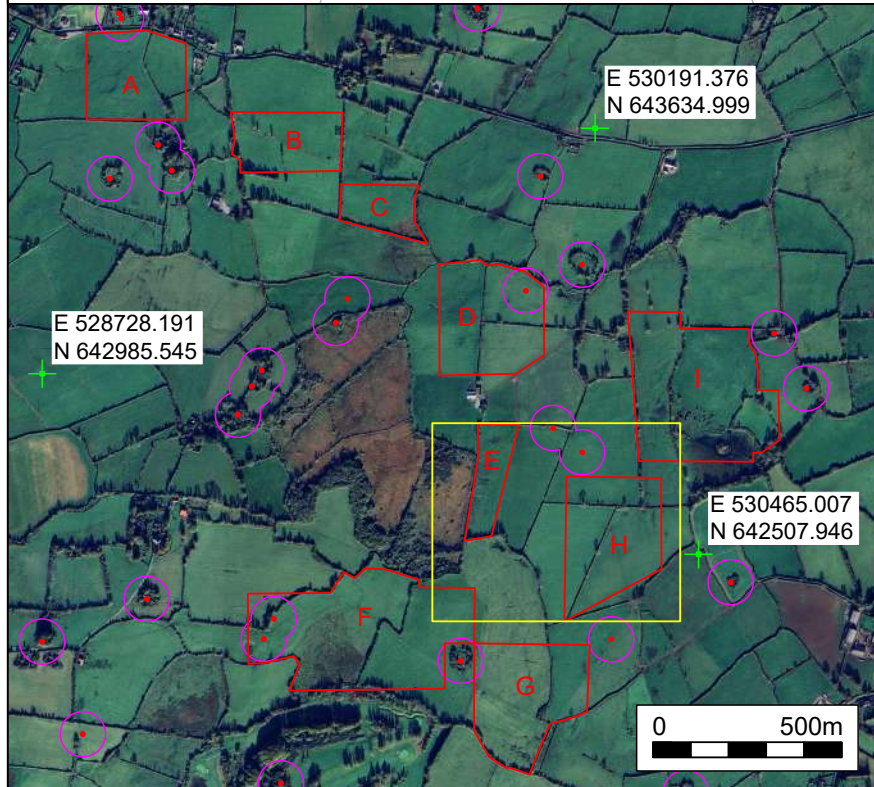
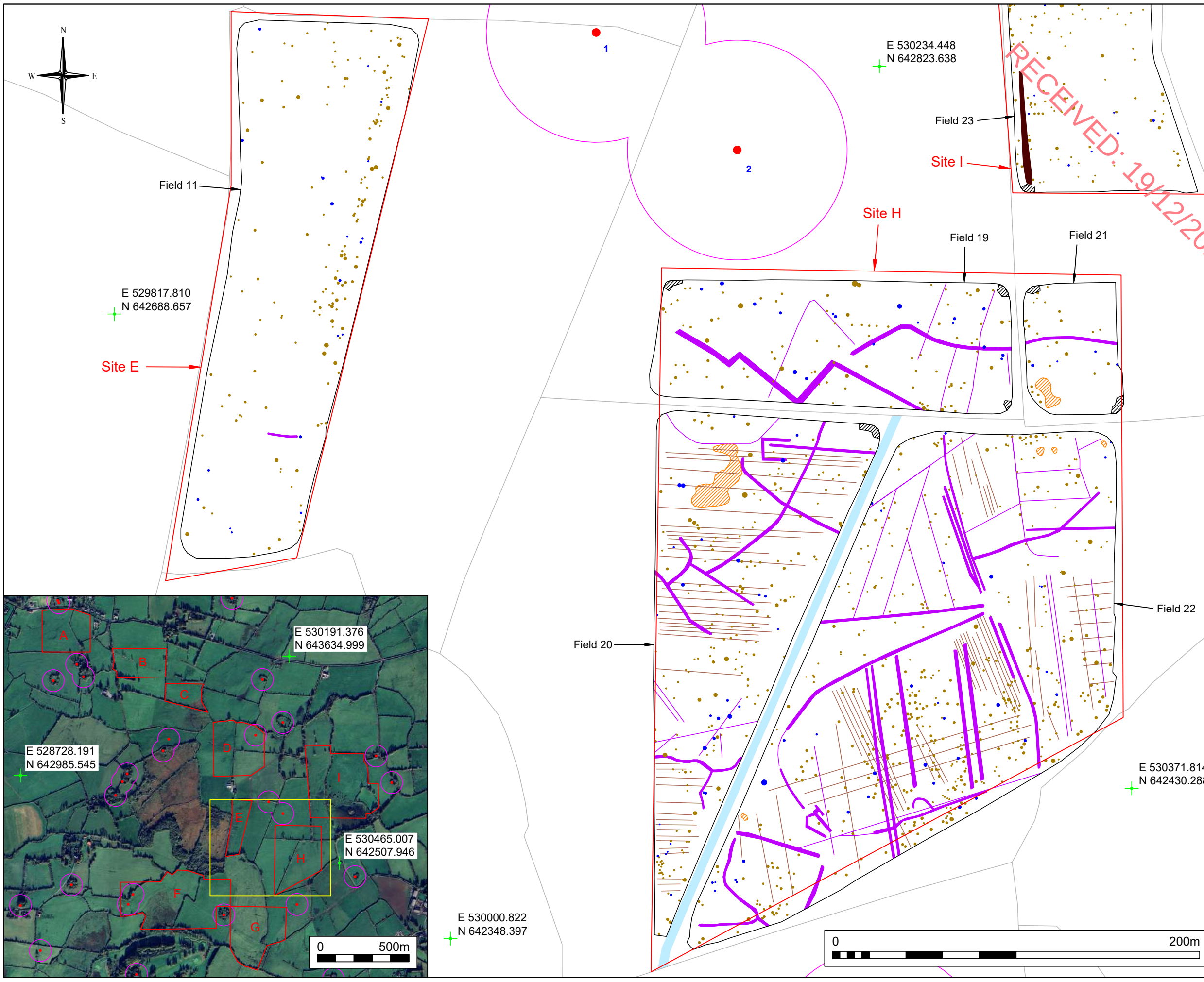
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TITLE: Sites E & H: Grayscale Magnetometry Data	DRAWING NO.: Figure 25
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 25.
- For additional Interpretative survey data see Figure 27.

SMR Site Data:

1 = LI019-206---- (Ringfort/Rath).

2 = LI019-207---- (Ringfort/Rath).

Key:

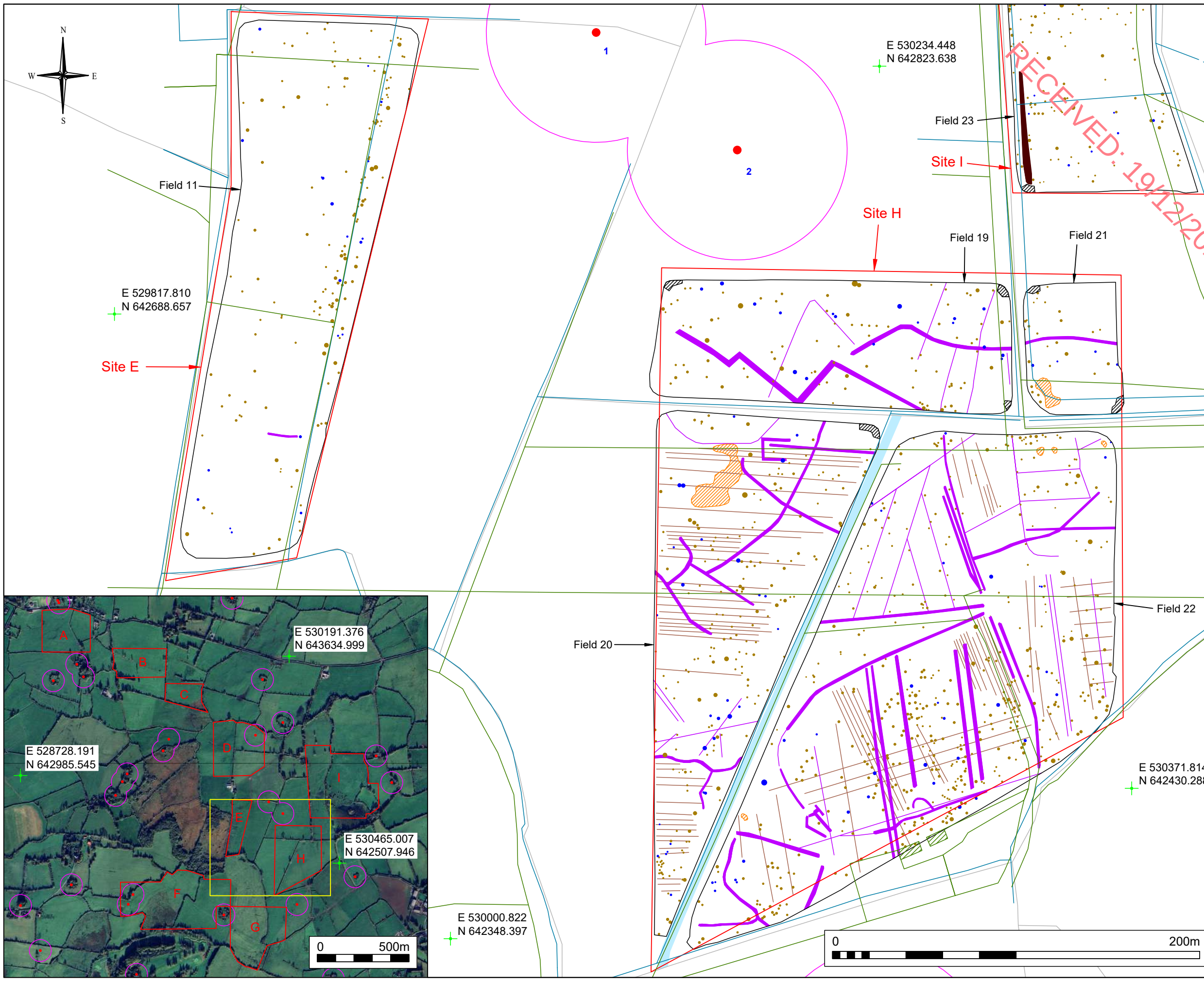
Ferrous	
Archaeology	
Potential Archaeology	
Linear / Trend	
Furrow	
Area of Concentrated Magnetic Response	
Magnetic Interference / Modern	
Error / Constraints	
Site Boundary	
Survey Boundary	
SMR Site	
Zone of Notification	
Figure Location	
Grid Peg	

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TITLE: Sites E & H: Interpretative Magnetometry Data	DRAWING NO.: Figure 26
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 25.
- For associated Interpretative survey data see Figure 26.

SMR Site Data:

1 = LI019-206---- (Ringfort/Rath).

2 = LI019-207---- (Ringfort/Rath).

Key:

Ferrous	
Archaeology	
Potential Archaeology	
Linear / Trend	
Furrow	
Area of Concentrated Magnetic Response	
Magnetic Interference / Modern	
Error / Constraints	
Site Boundary	
Survey Boundary	
Historic Field Boundary 1st Edition OSI	
Historic Field Boundary 25-inch OSI	
SMR Site	
Zone of Notification	
Figure Location	
Grid Peg	

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TITLE: Sites E & H: Interpretative Magnetometry Data, Overlaid with Historic OSI Map Data

DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 27

LICENCE NO.: 24R0517

PRODUCED BY: MG

RECEIVED: 19/12/2025



NOTES:

- For associated Interpretative survey data see Figures 29 & 30.

Notable Features (See Report Table 3):

- 6 = Ringfort (LI028-038---).
- 7 = Enclosure.
- 8 = Enclosure.
- 9 = Possible Ring-ditch.
- 10 = Possible Ringfort/Enclosure.

SMR Site Data:

- 1 = LI028-043--- (Ringfort/Rath).
- 2 = LI028-039--- (Ringfort/Rath).
- 3 = LI028-038--- (Ringfort/Rath).

nT

-10 10

Key:

- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Grid Peg

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PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

TITLE: Site F: Grayscale Magnetometry Data

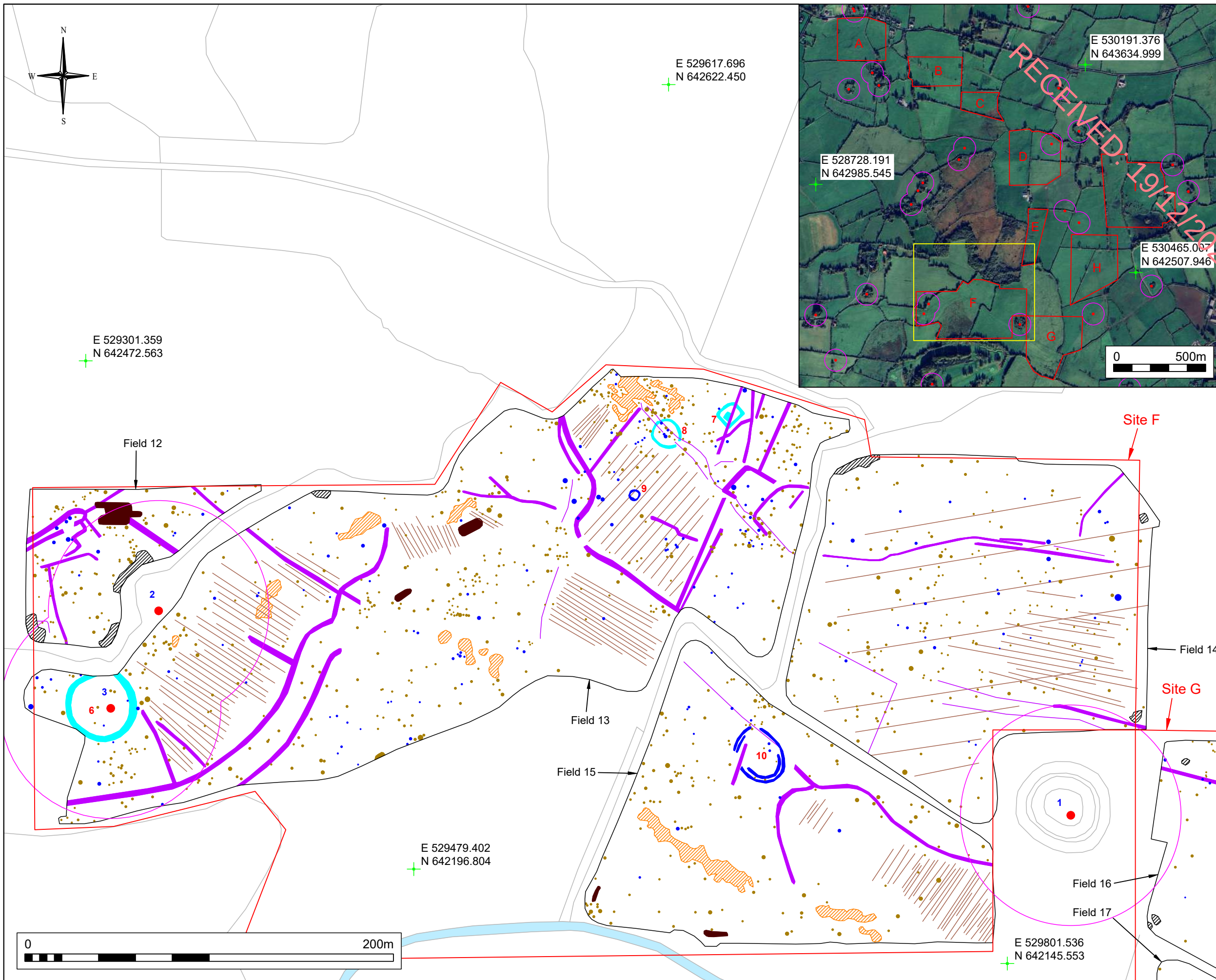
DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 28

LICENCE NO.: 24R0517

PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 28.
- For additional Interpretative survey data see Figure 30.

Notable Features (See Report Table 3):

- 6 = Ringfort (LI028-038----).
- 7 = Enclosure.
- 8 = Enclosure.
- 9 = Possible Ring-ditch.
- 10 = Possible Ringfort/Enclosure.

SMR Site Data:

- 1 = LI028-043---- (Ringfort/Rath).
- 2 = LI028-039---- (Ringfort/Rath).
- 3 = LI028-038---- (Ringfort/Rath).

Key:

- Ferrous
- Archaeology
- Potential Archaeology
- Linear / Trend
- Furrow
- Area of Concentrated Magnetic Response
- Magnetic Interference / Modern
- Error / Constraints
- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Figure Location
- Grid Peg

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TITLE: Site F: Interpretative Magnetometry Data

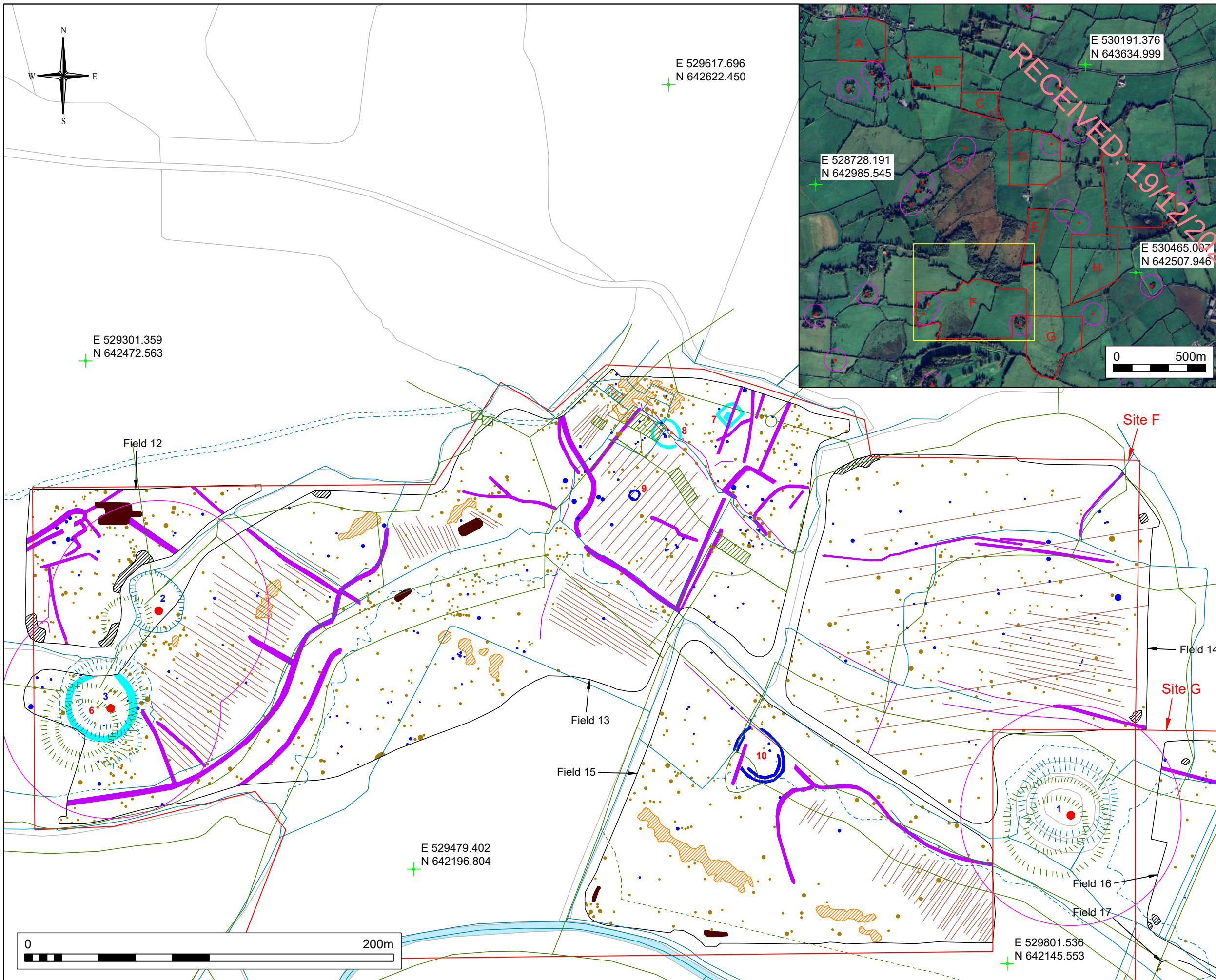
DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 29

LICENCE NO.: 24R0517

PRODUCED BY: MG



- NOTES:
- For associated Grayscale Magnetometry data see Figure 28.
 - For associated Interpretative survey data see Figure 29.
- Notable Features (See Report Table 3):
- 6 = Ringfort (LI028-038----).
 - 7 = Enclosure.
 - 8 = Enclosure.
 - 9 = Possible Ring-ditch.
 - 10 = Possible Ringfort/Enclosure.
- SMR Site Data:
- 1 = LI028-043---- (Ringfort/Rath).
 - 2 = LI028-039---- (Ringfort/Rath).
 - 3 = LI028-038---- (Ringfort/Rath).
- Key:
- Ferrous
 - Archaeology
 - Potential Archaeology
 - Linear / Trend
 - Furrow
 - Area of Concentrated Magnetic Response
 - Magnetic Interference / Modern
 - Error / Constraints
 - Site Boundary
 - Survey Boundary
 - Historic Field Boundary 1st Edition OSI
 - Historic Field Boundary 25-inch OSI
 - SMR Site
 - Zone of Notification
 - Figure Location
 - Grid Peg

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TITLE: Site F: Interpretative Magnetometry Data, Overlaid with Historic OSI Map Data

DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

DRAWING NO.: Figure 30

LICENCE NO.: 24R0517

PRODUCED BY: MG



NOTES:

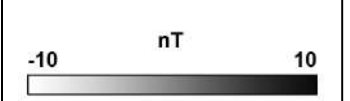
- For associated Interpretative survey data see Figures 32 & 33.

Notable Features (See Report Table 3):

- 7 = Enclosure.
- 8 = Enclosure.
- 9 = Possible Ring-ditch.
- 10 = Possible Ringfort/Enclosure.

SMR Site Data:

- 1 = LI028-043---- (Ringfort/Rath).
- 2 = LI028-182---- (Ringfort/Rath).



- Key:
- Site Boundary
 - Survey Boundary
 - SMR Site
 - Zone of Notification
 - Grid Peg

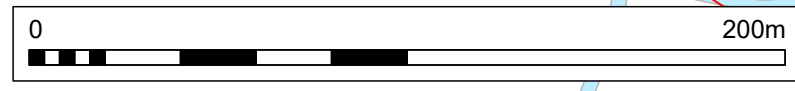
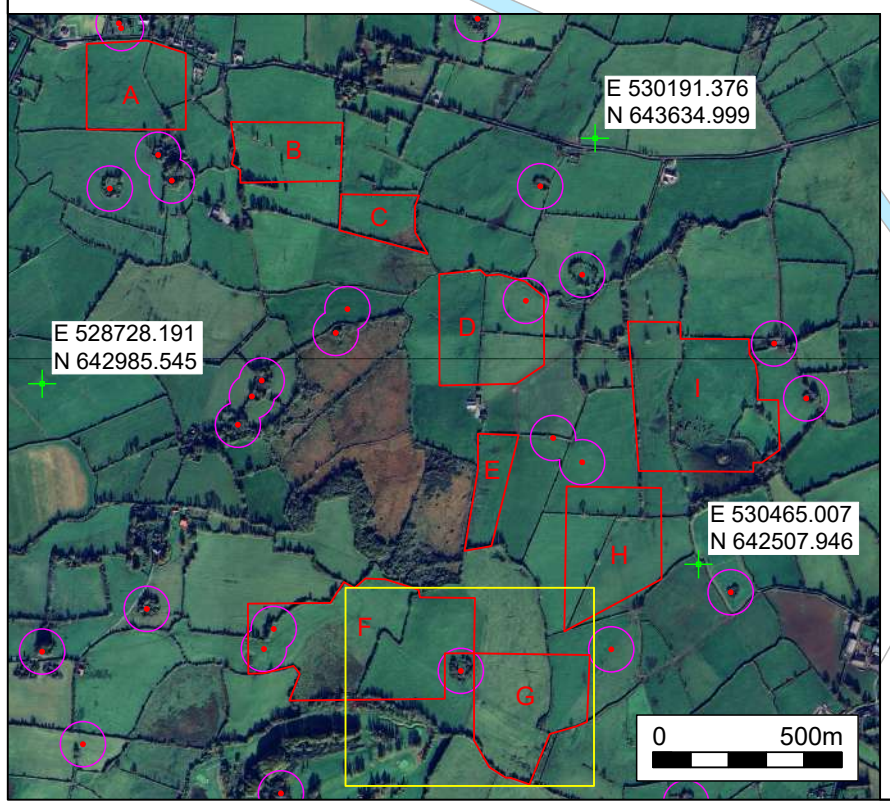
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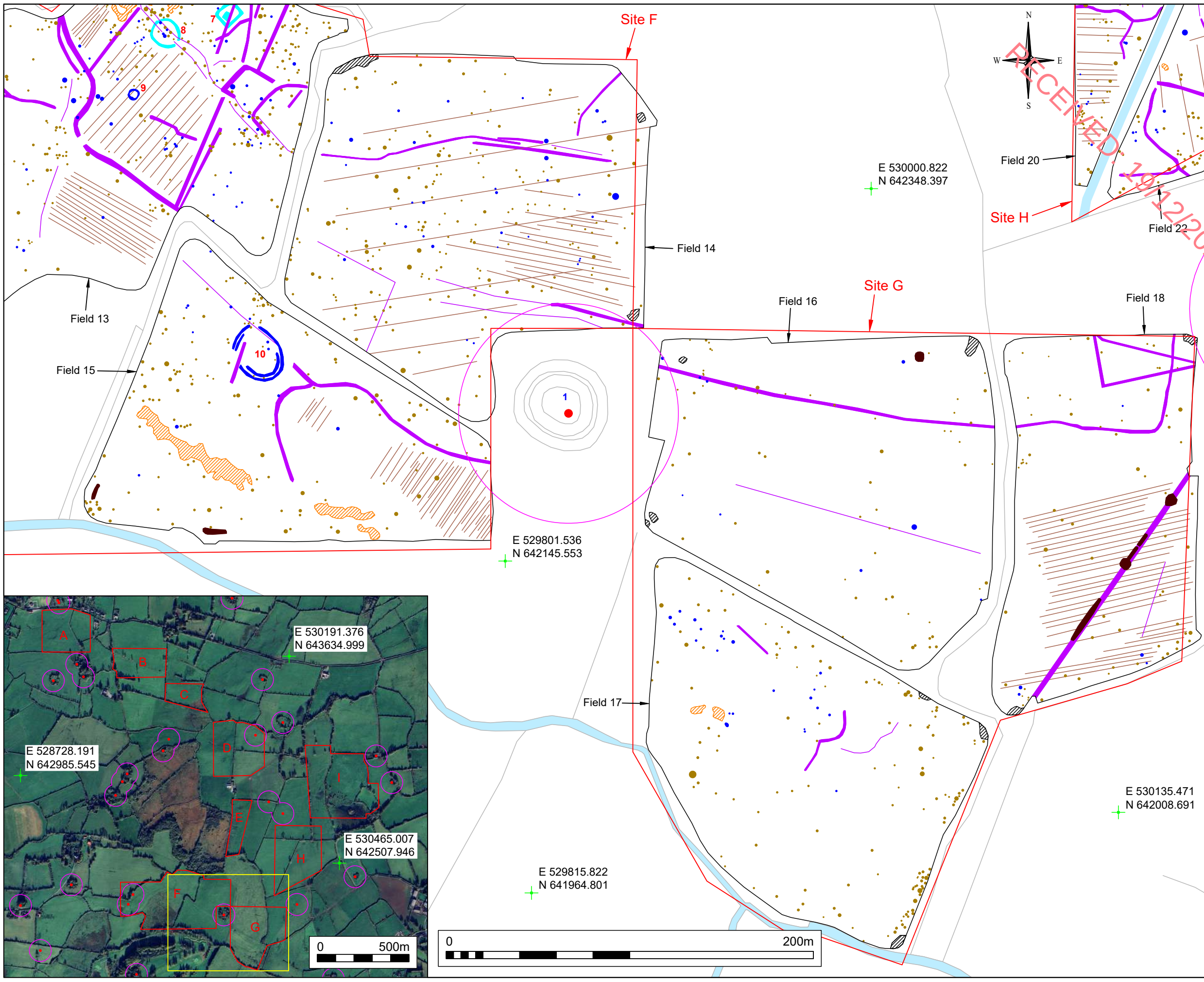
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TITLE: Site G: Grayscale Magnetometry Data	DRAWING NO.: Figure 31
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG





NOTES:

- For associated Grayscale Magnetometry data see Figure 31.
- For additional Interpretative survey data see Figure 33.

Notable Features (See Report Table 3):

- 7 = Enclosure.
- 8 = Enclosure.
- 9 = Possible Ring-ditch.
- 10 = Possible Ringfort/Enclosure.

SMR Site Data:

- 1 = LI028-043--- (Ringfort/Rath).
- 2 = LI028-182--- (Ringfort/Rath).

- Key:
- Ferrous
 - Archaeology
 - Potential Archaeology
 - Linear / Trend
 - Furrow
 - Area of Concentrated Magnetic Response
 - Magnetic Interference / Modern
 - Error / Constraints
 - Site Boundary
 - Survey Boundary
 - SMR Site
 - Zone of Notification
 - Figure Location
 - Grid Peg



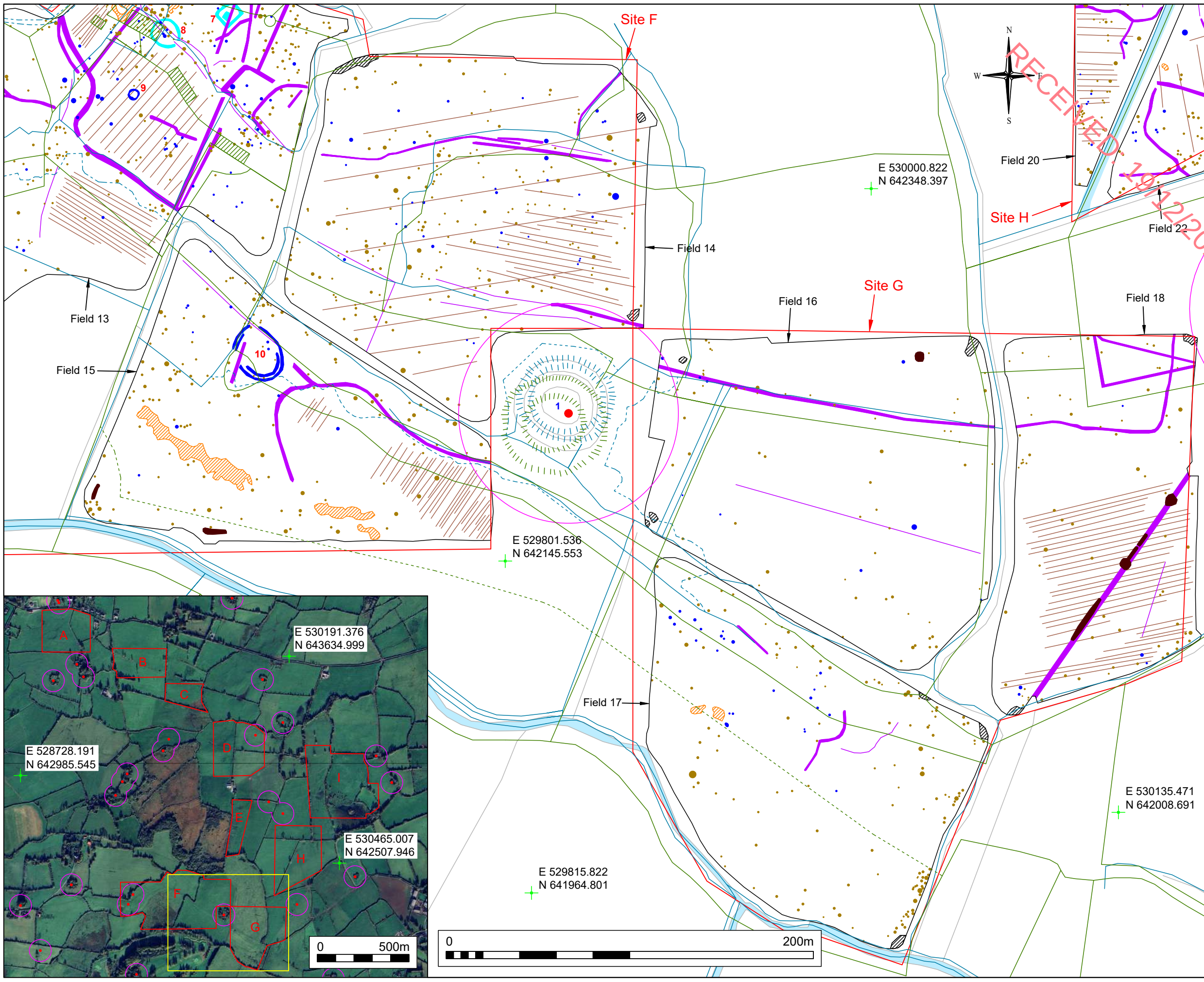
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TITLE: Site G: Interpretative Magnetometry Data	DRAWING NO.: Figure 32
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 31.
- For associated Interpretative survey data see Figure 32.

Notable Features (See Report Table 3):

- 7 = Enclosure.
- 8 = Enclosure.
- 9 = Possible Ring-ditch.
- 10 = Possible Ringfort/Enclosure.

SMR Site Data:

- 1 = LI028-043--- (Ringfort/Rath).
- 2 = LI028-182--- (Ringfort/Rath).

Key:

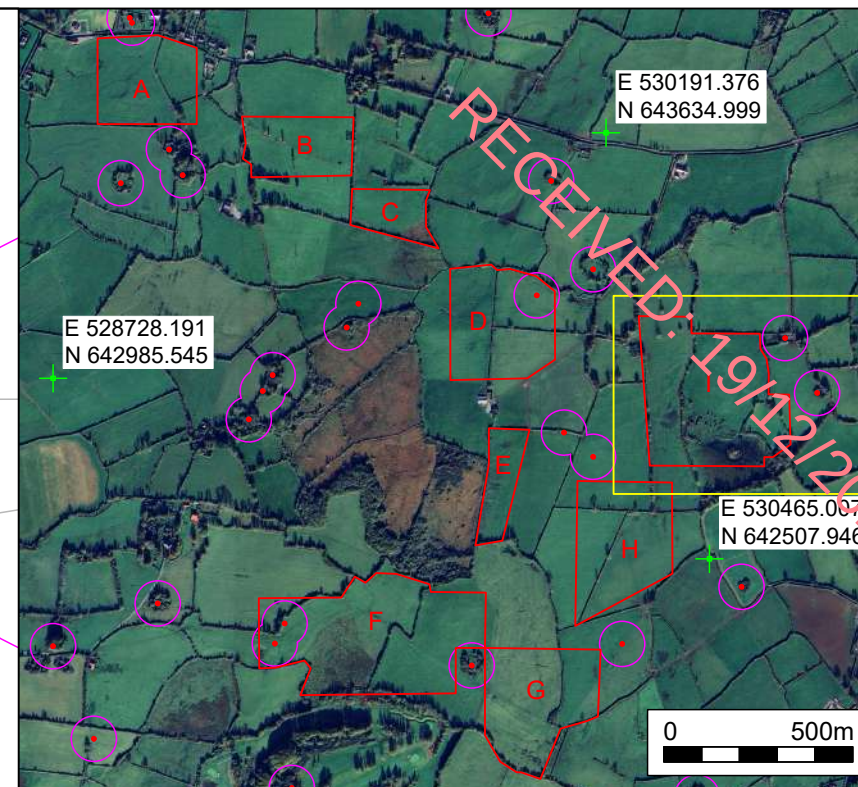
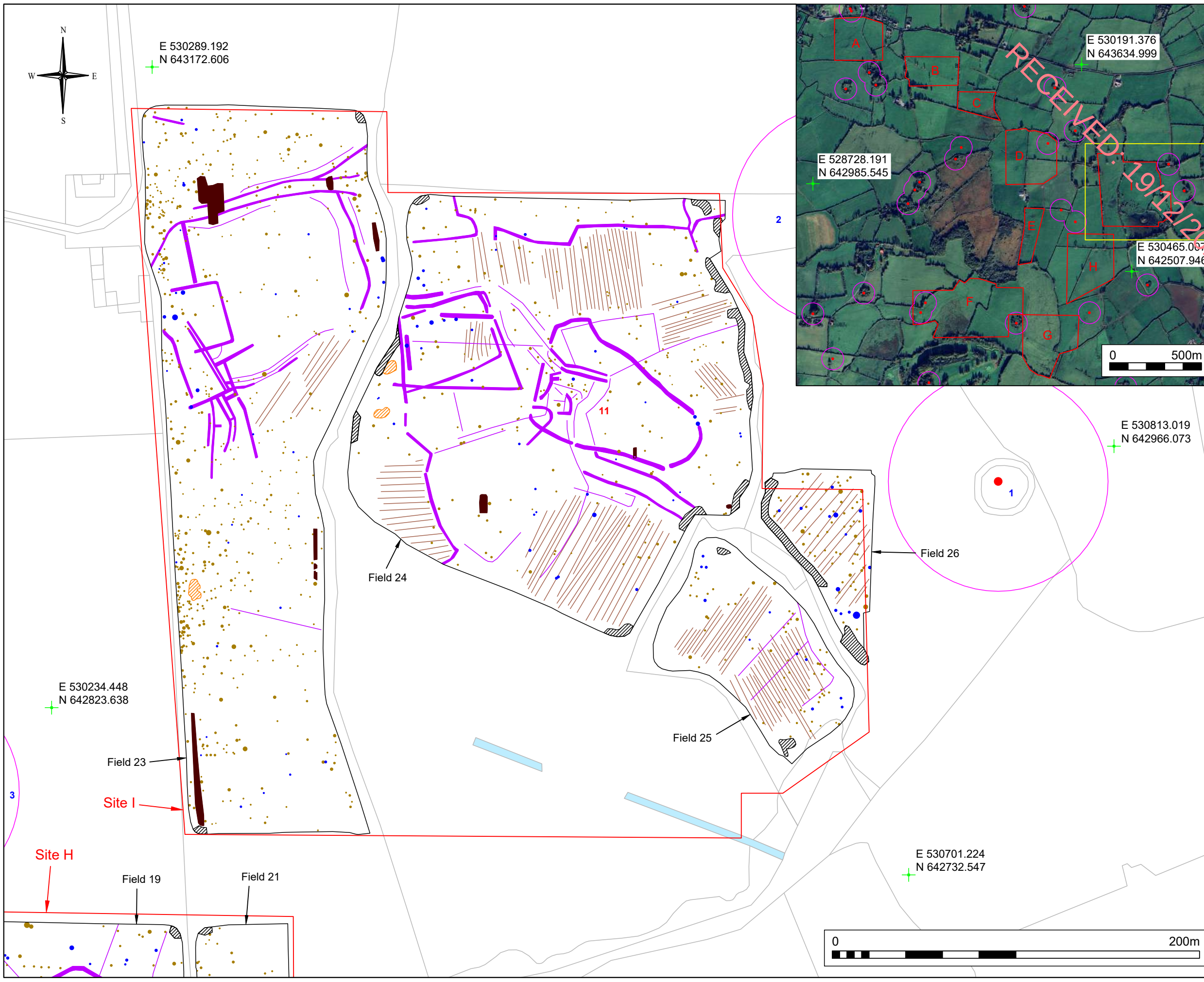
2	Ferrous	
	Archaeology	
	Potential Archaeology	
	Linear / Trend	
	Furrow	
	Area of Concentrated Magnetic Response	
	Magnetic Interference / Modern	
	Error / Constraints	
	Site Boundary	
	Survey Boundary	
	Historic Field Boundary 1st Edition OSI	
	Historic Field Boundary 25-inch OSI	
	SMR Site	
	Zone of Notification	
	Figure Location	
	Grid Peg	

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PROJECT: Ballynisky Wind Farm, Ballynisky, Co. Limerick

TITLE: Site G: Interpretative Magnetometry Data, Overlaid with Historic OSI Map Data	DRAWING NO.: Figure 33
DATE: 26/11/2024	LICENCE NO.: 24R0517
SCALE: 1:2000 & 1:20000	PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 34.
- For additional Interpretative survey data see Figure 36.

Notable Features (See Report Table 3):

- 1 = Possible Large Enclosure.

SMR Site Data:

- 1 = LI019-209---- (Ringfort/Rath).
- 2 = LI019-208---- (Enclosure).
- 3 = LI019-207---- (Ringfort/Rath).

Key:

- Ferrous
- Archaeology
- Potential Archaeology
- Linear / Trend
- Furrow
- Area of Concentrated Magnetic Response
- Magnetic Interference / Modern
- Error / Constraints
- Site Boundary
- Survey Boundary
- SMR Site
- Zone of Notification
- Figure Location
- Grid Peg

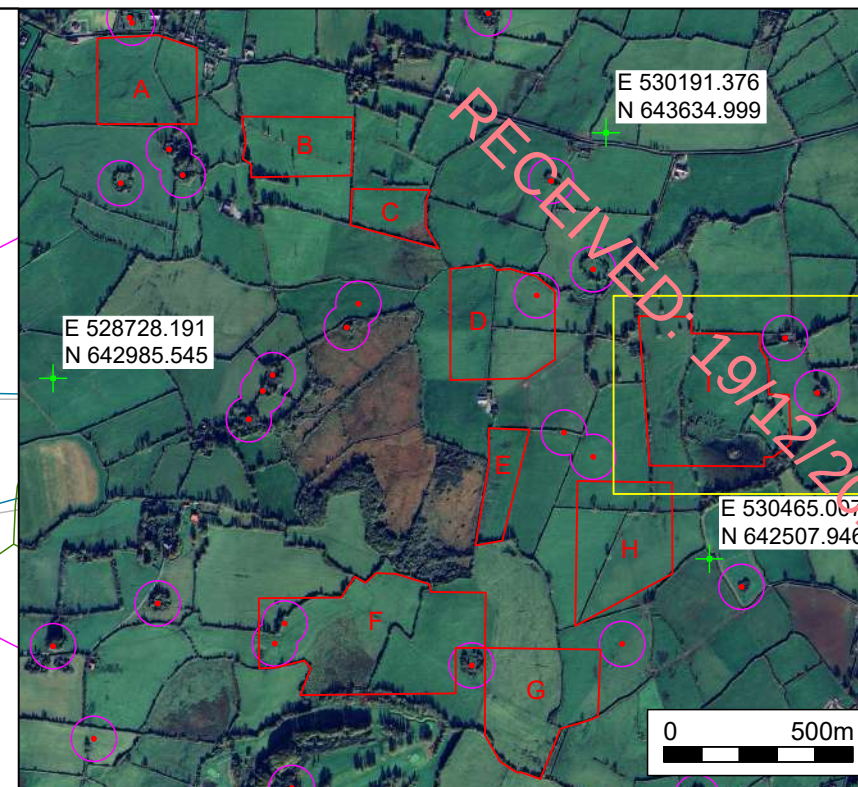
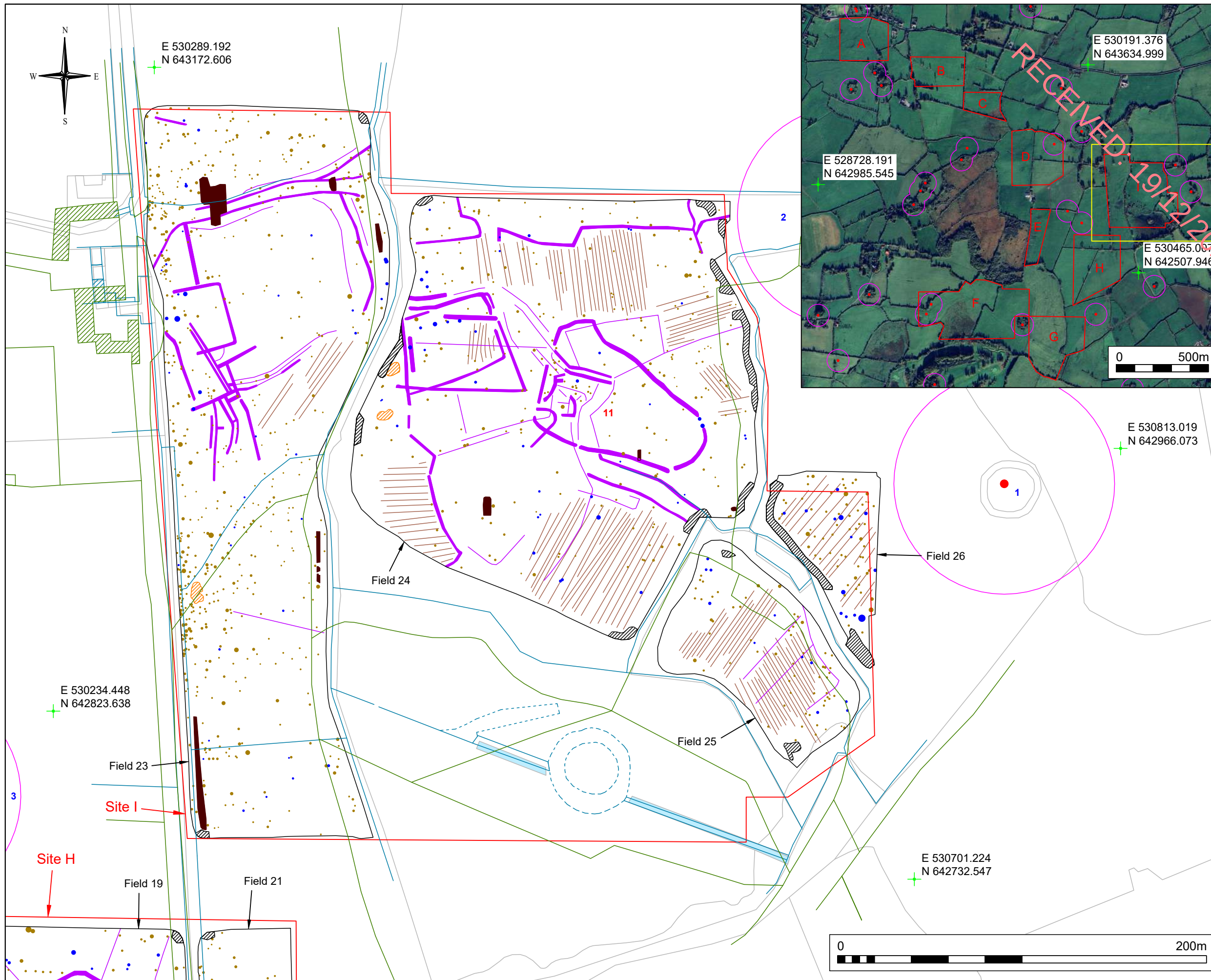
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TITLE: Site I: Interpretative Magnetometry Data
DRAWING NO.: Figure 35
LICENCE NO.: 24R0517
DATE: 26/11/2024
SCALE: 1:2000 & 1:20000
PRODUCED BY: MG



NOTES:

- For associated Grayscale Magnetometry data see Figure 34.
- For associated Interpretative survey data see Figure 35.

Notable Features (See Report Table 3):

11 = Possible Large Enclosure.

SMR Site Data:

- 1 = LI019-209---- (Ringfort/Rath).
- 2 = LI019-208---- (Enclosure).
- 3 = LI019-207---- (Ringfort/Rath).

Key:

- Ferrous
- Archaeology
- Potential Archaeology
- Linear / Trend
- Furrow
- Area of Concentrated Magnetic Response
- Magnetic Interference / Modern
- Error / Constraints
- Site Boundary
- Survey Boundary
- Historic Field Boundary 1st Edition OSI
- Historic Field Boundary 25-inch OSI
- SMR Site
- Zone of Notification
- Figure Location
- Grid Peg



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PROJECT:
Ballynisky Wind Farm,
Ballynisky,
Co. Limerick

TITLE: Site I: Interpretative
Magnetometry Data, Overlaid with
Historic OSI Map Data

DATE: 26/11/2024

SCALE: 1:2000 & 1:20000

PRODUCED BY: MG

DRAWING NO.:
Figure 36

LICENCE NO.:
24R0517

PRODUCED BY: MG