

**Proposed Extension to
Bennettsbridge Limestone Quarry
Kilree,
Sheastown,
Bennettsbridge,
Co. Kilkenny**

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Archaeological Geophysical Survey

Detection Licence No. 24R0429

**Survey undertaken on behalf of
Bennettsbridge Limestone**

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EAG 479

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Summary of Results

Between the 2nd and 5th September 2024, a geophysical survey commissioned by Bennettsbridge Limestone was conducted over a proposed quarry extension within the townland of Kilree, Sheastown, County Kilkenny. A magnetometer survey was undertaken at a sample resolution of 0.5m x 0.25m.

The survey was conducted upon a bedrock geology consisting of wackestone, packstone and limestone, beneath gravels. The majority of the survey area was covered in short grass with electric fences dividing the area and some cattle feeding troughs present.

The geophysical survey undertaken for this report revealed a series of relict field divisions as well as two field boundaries which relate to features shown on the historic ordnance survey mapping. The influence of agriculture was also seen in the detection of cultivation furrows and imported soils as well as interference from two cattle feeding troughs.

Three arcing possible ditch or cut features were also detected which may be archaeological in origin. While a large area of magnetic enhancement is most likely geological in origin.



Statement of Indemnity

*A geophysical survey is a scientific procedure that produces observations of results which are influenced by specific variables. The results and subsequent interpretation of the geophysical survey presented here should not be treated as an absolute representation of the underlying archaeological features, but as a hypothesis that must be proved or disproved. **Direct investigations are recommended to confirm the findings of this report.** Verification can only be provided via intrusive means, such as Test Trench excavations.*

1 Introduction

Earthsound Geophysics Ltd. was commissioned by Bennettsbridge Limestone to execute a geophysical survey over the foot print of a proposed quarry extension within the townland of Kilree, Sheastown, County Kilkenny.

The geophysical survey was requested to determine the presence/absence of unknown archaeological features associated with OF016-013---- : Designed landscape feature or any other archaeological remains which exist within the proposed development.

It was agreed to assess the site using a magnetometer surveys. The method was approved by the Archaeological Licensing Section of the National Monuments Service. A Consent to use a Detection Device under Section 2 (2) of the National Monuments (Amendment) Act, 1987, was issued by the Minister for Housing, Local Government and Heritage: Consent No. 24R0429, issued to Heather Gimson. In accordance with the licence conditions a copy of this report will be lodged with the department.

1.1 Geography, Geology, Topography & Climate

Townland	Kilree, Sheastown
County	Kilkenny
Central ITM Co-ordinates of the site	653843 / 649732
No. of Fields Surveyed	4
Ground Cover	Short Grass
Geology	wackestone, packstone and limestone
Drift / Quaternary Geology	gravels
Drainage	Dry
Topography	The majority of the survey area was flat with some sloping areas in the centre and southern fields.
Climate	The weather encountered during the survey was mostly dry with periods of rain. These conditions are unlikely to have affected the survey to a large degree.

1.2 Archaeological Background

The survey area contains no recorded monuments. Three monuments are located within the vicinity:

KK023-047001- : Castle located c.250m to the northwest of the survey area

KK023-049001- : Enclosure located c.50m to the west of the survey area

KK023-049002- : Enclosure & KK023-049003- : Enclosure are located between 80 and 150m to the west of the survey area

1.3 Aims & Objectives

The aim of the geophysical survey was to determine the nature of the archaeological resource in advance of the proposed development scheme. Specific objectives were to:

- Determine the presence or absence of archaeological features
- Assess the spatial extent of the archaeological features

A detailed magnetometer survey was carried out within the survey area. This technique has been used in commercial and research archaeological projects for many years and is considered the most appropriate techniques for a detailed investigation of the underlying archaeology (Aspinall *et al.* 2008, Clark 1996, Scollar *et al.* 1990, Gaffney & Gater 2003).

2 Methodology

Fieldwork Dates	02 – 05/09/2024
Method / Area	Magnetometer: 16.3 Ha
Field staff	D. Gillespie, E. Murray & F. Ahmed

2.1 Magnetometer Survey

Instrument	Eastern Atlas LEA MAX ¹⁵⁰⁵ System
Components	LEA D2, 10-channel digitiser
Data Acquisition Resolution	0.5m x 0.1m
Sensors	8 x Förster FEREX [®] 4.032 CON650 fluxgate gradiometers
Platform	LEA MAX ¹⁵⁰⁵ System cart
Data Acquisition Method	Gridless, using a Trimble RTK GPS VRS Now system to an accuracy of 5cm
Sensitivity	<0.2 nT
Data Logger	Panasonic Toughbook CF-H2 Field computer
Calibration	According to manufacturers guidelines (Pilz & Goossens 2015)
Data Processing	Ealdec: Profile decoding Ealmat.m: Normalisation, drift correction Process-it: Surfer 8: Data Gridding (0.5m x 0.25m), using the Kriging Gridding Method
Graphical Display / Dynamic Range	Greyscale -3nT (black) to 3nT (white)

2.2 Reporting, Mapping & Archiving

The geophysical survey and report follow the recommendations outlined by relevant best practice guidance documents as a minimum standard (David *et al.* 2008; Gaffney *et al.* 2002, Schmidt *et al.* 2015).

Ordnance Survey of Ireland mapping was supplied by ASM Ireland.

Geophysical data, the figures presented here and the text have been archived following the recommendations of the Archaeology Data Service (Schmidt & Ernenwein 2011).

3 Results & Discussion

The interpretation figures should not be looked at in isolation but in conjunction with the information below and classification terms contained in the Appendices.

3.1 Magnetometer Survey

In magnetic data, a dipolar anomaly or 'iron spike' is a response to buried ferrous objects, often in the topsoil. Iron spikes generally are not removed in geophysical data, although often modern in origin, they can be indicative of archaeological material. A large amount of dipolar anomalies were detected throughout the northern and central fields. These are likely to be associated with modern farming practices.

Two metallic cattle feeding troughs were present within the two northern fields. These have created two highly magnetic large anomalies within the data. An area of highly magnetic material was also detected on the northeastern edge of the survey area. This c. 37m wide area runs along the side of the quarry and is likely to be associated with modern soil and debris deposition. It is of no archaeological significance but its presence may obscure underlying archaeological remains. Throughout the survey area a number of linear or curvilinear magnetic trends were detected. These are suggestive of ditches or cut features and the majority of them tend to run in a NE direction suggesting that they are associated with relict field divisions or cultivation processes. An overprint of cultivation furrows can be seen across the northern and central fields. This runs parallel to the existing field boundaries and is likely to be relatively modern in origin.

Anomaly 1 is a linear ditch 183m in length which matches a relict field boundary shown on the historic ordnance survey maps.

Anomalies 2, 3 & 4 consists of arcing possible ditch or cut features, measuring 46m, 111m & 38m in length which may be archaeological in origin. Anomaly 3 forms an oval ditch 41m in diameter which has been overcut by a relict field division.

Anomaly 5 is an arcing possible ditch or cut feature, measuring 45m in length. This anomaly could be archaeological, agricultural or geological in origin. Anomaly 6 is a linear ditch 27m in length which matches a relict field boundary shown on the historic ordnance survey maps.

Anomaly 7 represents an area of magnetic enhancement which measures 65m in width and stretches across the width of the survey area. Although the anomaly is located close to a number of recorded enclosures it is unlikely to be archaeological in origin given its scale. Situated within a sloping field this anomaly is likely to be geological in origin.

4 Conclusion

4.1 Summary of Results

The geophysical survey undertaken for this report revealed a series of relict field divisions as well as two field boundaries which relate to features shown on the historic ordnance survey mapping. The influence of agriculture was also seen in the detection of cultivation furrows and imported soils as well as interference from two cattle feeding troughs.

Three arcing possible ditch or cut features were also detected which may be archaeological in origin. While a large area of magnetic enhancement is most likely geological in origin.

4.2 Dissemination

The results of this survey were submitted to Bennettsbridge Limestone. Additional copies will be distributed in accordance with the Consent to use a Detection Device.

5 Bibliography

Clark, A. J. 1996. *Seeing Beneath the Soil*. Revised Edition, London, Routledge.

David, A. Linford, N. & Linford, P. 2008. *Geophysical Survey in Archaeological Field Evaluation*. Second Edition, English Heritage.

Gaffney, C. F., Gater, J. A., Linford, P., Gaffney, V. L. & White, R. 2000. 'Large-scale systematic fluxgate gradiometry at the Roman city of Wroxeter', *Archaeological Prospection* 7: 81–99.

Gaffney, C. & Gater, J. 2003. *Revealing the Buried Past: Geophysics for Archaeologists*. Stroud: Tempus Publishing.

Gaffney, C., Gater, J. & Ovenden, S. 2002. *The use of Geophysical Techniques in Archaeological Evaluations*, IFA Paper No. 6, Institute of Field Archaeologists.

Pilz, D. & Goossens, L. 2015. *LEA MAX SYSTEM User Manual*. Version 0.1505. Eastern Atlas GmbH & Co. KG, August 2015.

Schmidt, A. & Ernenwein, E. 2011. *Guide to Good Practice: Geophysical Data in Archaeology*. 2nd Edition. Archaeology Data Service.

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. & Fassbinder, J. 2015. *EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*. EAC Guidelines 2. Europae Archaeologiae Consilium, Belgium.

Scollar, I., Tabbagh, A., Hesse, A. & Herzog, I. 1990. *Archaeological Prospecting and Remote Sensing*, Cambridge, Cambridge University Press. Topics in Remote Sensing Vol. 2.

Websites consulted:

Geological Survey of Ireland Datasets Public Viewer on <http://www.gsi.ie/mapping>

Archaeological Survey of Ireland on <http://www.archaeology.ie>

Database of Irish Excavation Reports on <http://www.excavations.ie/Pages/HomePage.php>

6 Figures

Figure 1: Location map

Figure 2: Detailed location map

Figure 3: Magnetometer data

Figure 4: Magnetometer interpretation

Technical Appendix

Appendix 1: Anomaly Classifications

Magnetometer

Magnetometer surveys are undertaken using magnetic gradiometers which measure the magnetic content of the underlying soils. Measurements are gained using sensors which calculate the difference between the geological / pedological background and anthropogenic remains associated with archaeological activity. This activity can produce negative magnetic anomalies such as changes in backfilling material, excessive prolonged waterlogging and occasionally some stone foundations. Positive magnetic anomalies: Burnt features, particularly kilns, but also hearths, furnaces and burnt (specifically 'burnt', not 'heated') mounds of stone will create a strongly magnetic anomaly due to thermoremanence. Cut features, such as pits, ditches or wooden postholes will create anomalies that will vary in shape and magnetic intensity depending on which material they were backfilled by. The magnetic anomaly shape and intensity will also be determined by concentrations of pottery, ash or burned material, solid rocks or other material. And dipolar anomalies which is a response to buried ferrous objects, often in the topsoil. Iron spikes generally are not removed in geophysical data; although often modern in origin (iron agricultural implements, rubbish), they can be indicative of archaeological material.

Anomaly classification used to interpret data

After Gaffney & Gater (2003) and Gaffney *et al.* (2000).

A known archaeological feature type e.g. Ditch / Wall / Structure etc: An anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil, where the presence of a type of archaeological feature is known from supporting evidence.

Archaeology: A linear, curvilinear or isolated anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil, without any supporting evidence from another source.

- **Ditch / Wall:** A linear, curvilinear, annular or penannular anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil. A positive polarity suggests a ditch; a negative polarity suggests a stone-filled ditch or wall.
- **Burnt Mound / Spread:** A positive magnetic gradient that contrasts strongly with the surrounding sub-soil. An associated trough may be observed as a positive/negative anomaly, a hearth may also be expected nearby. Isolated responses in the vicinity could represent spreads of (or ploughed out) heat shattered stones.
- **Hearth:** A small isolated area (<2m diameter) of higher magnetic gradient than the surrounding sub-soil.
- **Pit:** A small isolated area (>1-2m diameter) of moderate to high magnetic gradient, judged to be caused by a pit-type feature with a fill more magnetic than the surrounding soil.

Industrial: An isolated anomaly with a strong positive gradient (>30nT), judged not to be surface iron. This type of anomaly is typically caused by the remains of kilns or furnaces.

Magnetic Enhancement: A broad area of moderate positive magnetic gradient that contrasts with the surrounding sub-soil. May represent cultural noise associated with occupation or soil disturbance, judged to be of archaeological origin.

Ferrous: Dipolar anomalies indicating ferrous responses, judged to be in the near-surface.

Cultivation: Parallel linear responses of positive or negative polarity. Strong responses may indicate added magnetic material (e.g. burnt deposits) as fertiliser. Lower magnetic gradient anomalies 'beneath' the furrow overprint may be obscured. Higher magnetic gradient anomalies may be visualised *in situ* or ploughed out 'beneath' the furrow overprint.

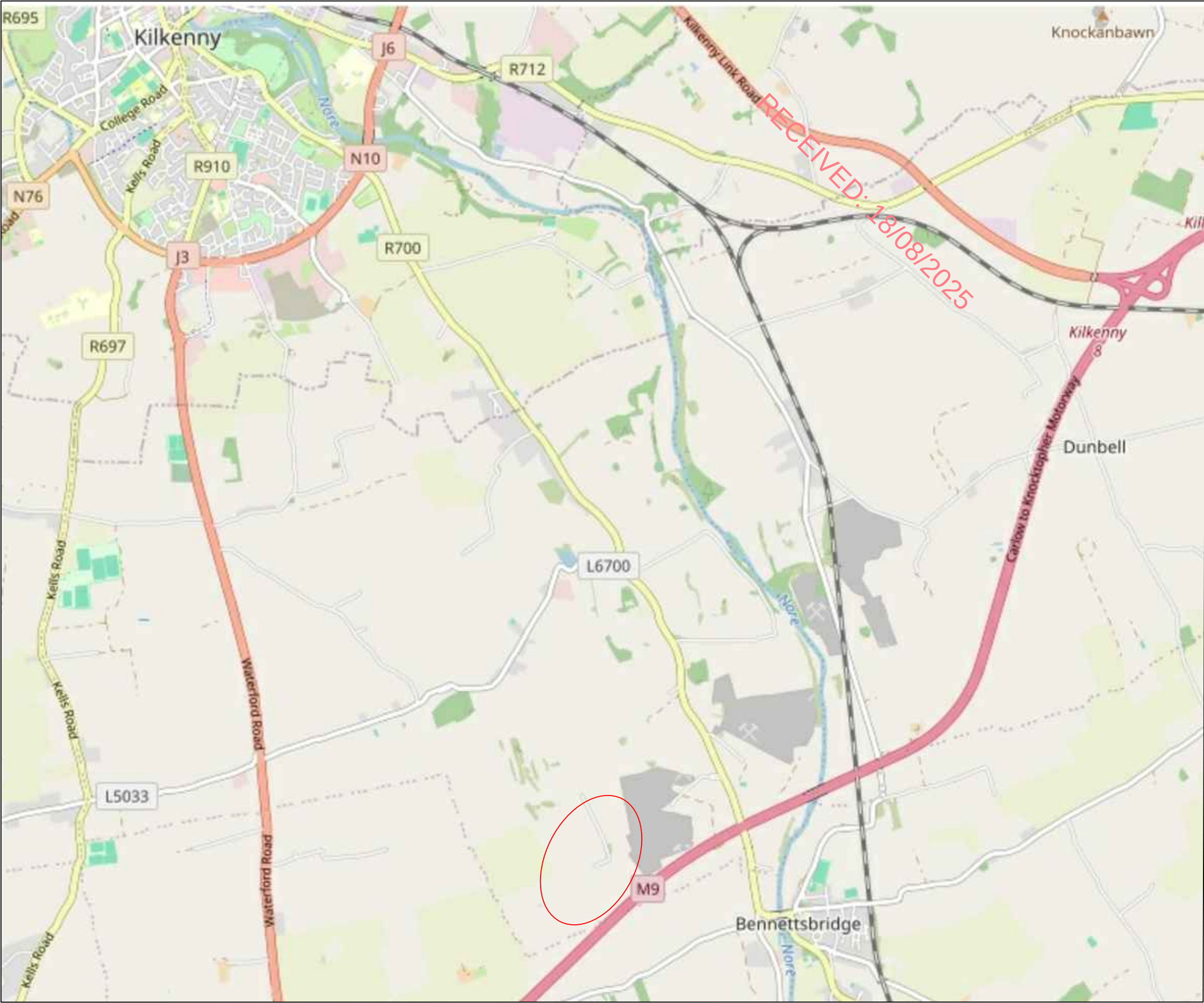
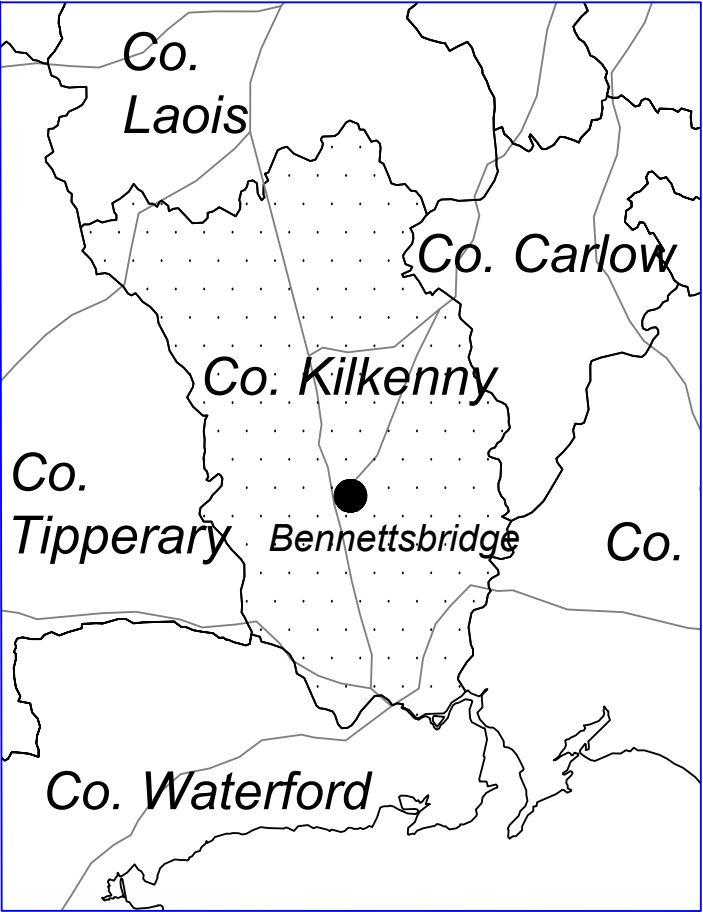
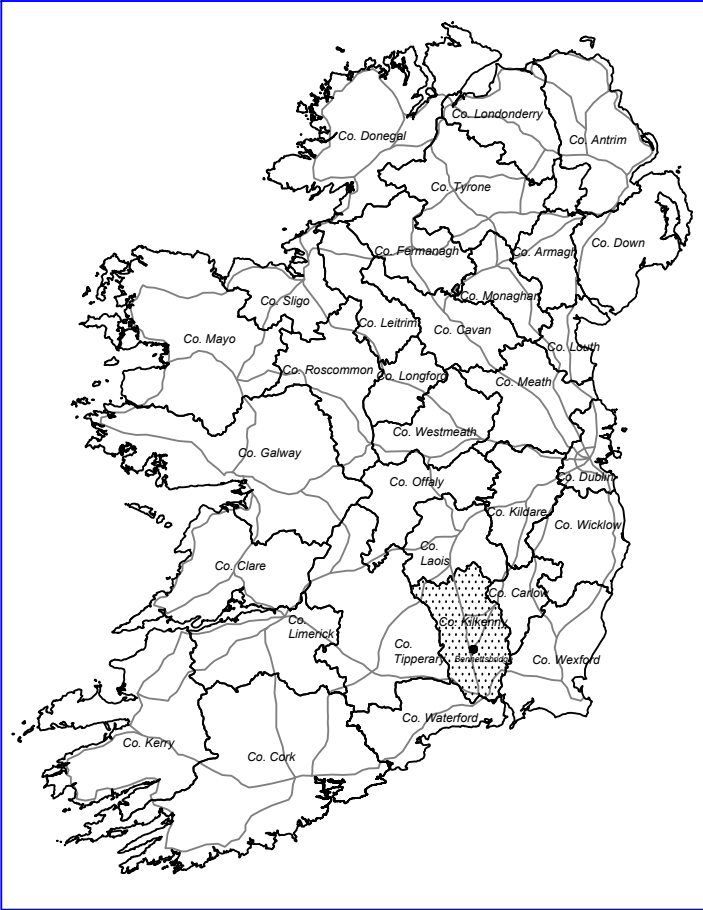
Possible Archaeology: A linear, curvilinear or isolated anomaly with a magnetic gradient that contrasts weakly with the surrounding sub-soil, without any supporting evidence from another source. Such categories may represent possible archaeological or geological sources.

Modern Disturbance: Area where the ground has been disturbed in the recent past. Characterised by a high level of noise and very large magnetic gradients, this disturbance is often accompanied by concentrations of dipolar, near-surface ferrous responses. This category also represents anomalies whose source may lie beyond the survey area, such as fencelines, vehicles or modern buildings.

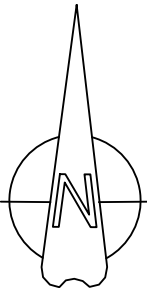
Modern Pipe: Straight, linear anomaly with very large magnetic gradients alternating regularly between positive and negative polarity.

Previous Excavation: Area of uniform magnetic signal contained within a well-defined boundary in regions otherwise densely covered with archaeological anomalies.

Geology: Anomalies of possible geomorphological origin.



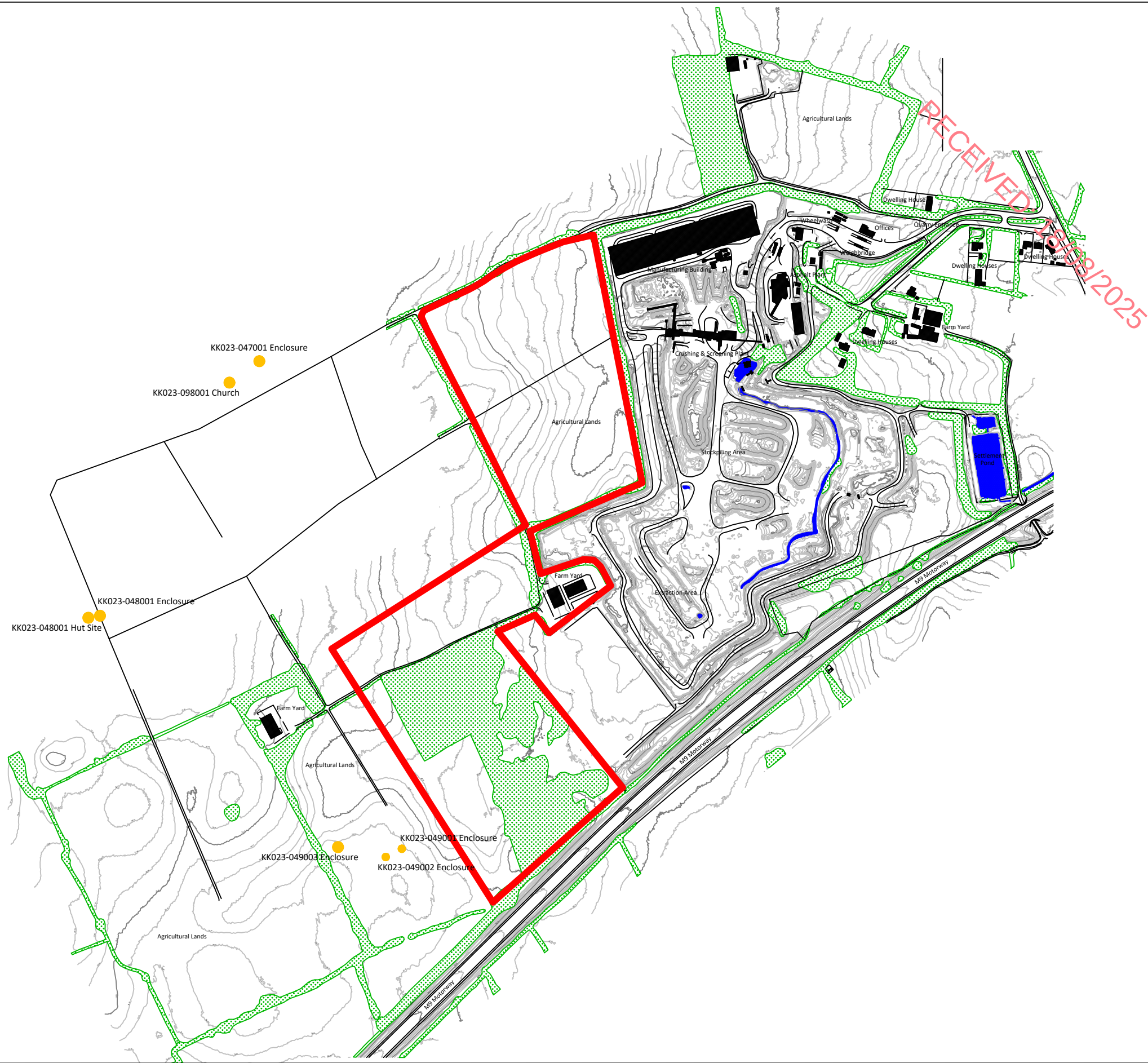
Legend
— Approximate location of Geophysical Survey Area



Project: Proposed Extension to Bennettsbridge Limestone Quarry,
Kilree, Sheastown, Bennettsbridge, Co. Kilkenny
Client: Bennettsbridge Limestone
Mapping Supplied by: Openmaps

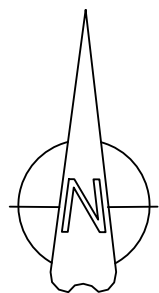
Figure No. 1: Location Map





Legend

- Basemap
- Contours
- Water
- Vegetation
- Recorded Monument
- Geophysical Survey Area



Project: Proposed Extension to Bennettsbridge Limestone Quarry, Kilree, Sheastown, Bennettsbridge, Co. Kilkenny

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Mapping Supplied by: Openmaps

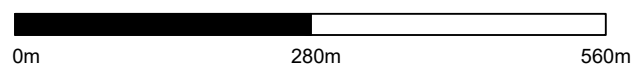
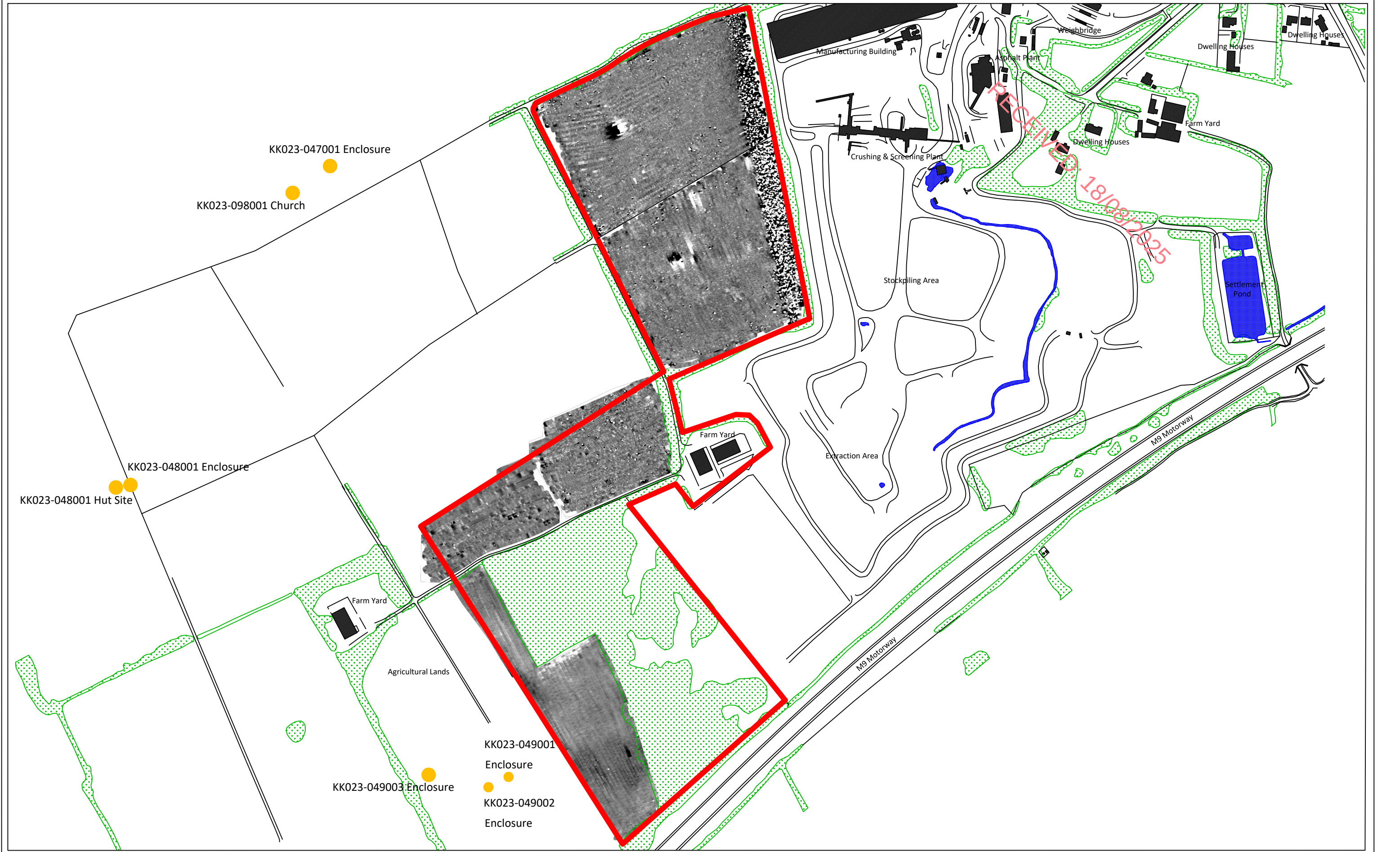
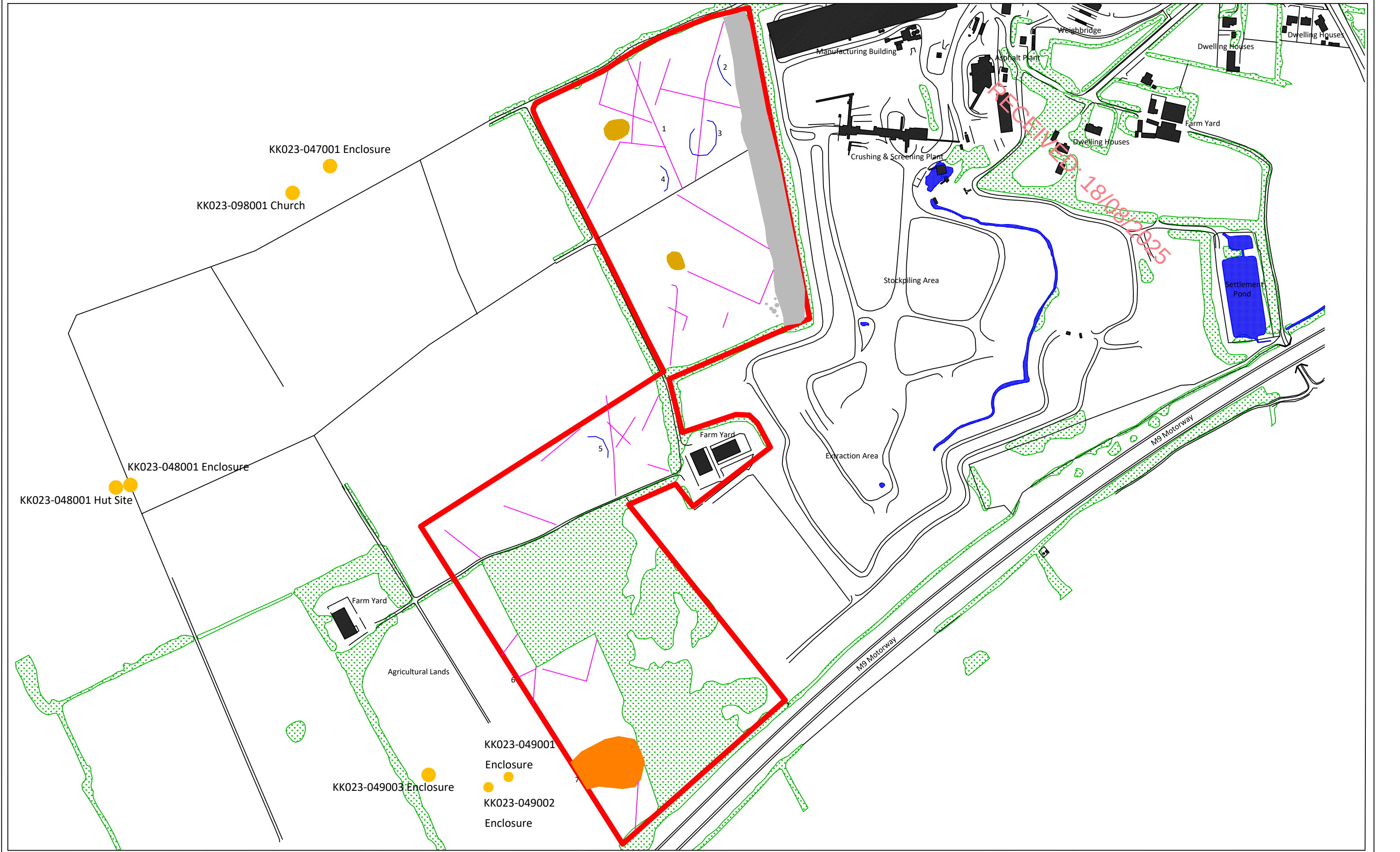


Figure No. 2: Detaied location Map





Legend - Basemap - Water - Vegetation - Recorded Monument - Geophysical Survey Area nT -3 0 3		Project: Proposed Extension to Bennettsbridge Limestone Quarry, Kilree, Sheastown, Bennettsbridge, Co. Kilkenny Client: Bennettsbridge Limestone Mapping Supplied by: ASM Ireland 0m 180m 260m	Figure No. 3: Magnetometer Data
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Legend - Basemap - Water - Vegetation - Recorded Monument - Geophysical Survey Area - Possible Archaeology - Area of Magnetic Enhancement - Magnetic Trend - Probable Agricultural Boundary - Cattle Feeding Trough - Area of Highly Magnetic Material		Project: Proposed Extension to Bennettsbridge Limestone Quarry, Kilree, Sheastown, Bennettsbridge, Co. Kilkenny Client: Bennettsbridge Limestone Mapping Supplied by: ASM Ireland 0m 180m 260m	Figure No. 4: Magnetometer Interpretation
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