TIGERGEO

Craswall Priory, Herefordshire

Geophysical Survey Report
(Electrical Resistance – Archaeology)
Version 1.0

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TIGERGEO

Craswall Priory, Herefordshire

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Non-Technical Summary

A survey was commissioned by Craswall Grandmontine Society to prospect for buried features of potential archaeological interest at the Grandmontine Priory of St Mary, at Craswall, Herefordshire. The ruins of the priory are designated as a Grade II listed building (Ref. 355313) and the ruins, ponds and holloways are designated as a scheduled monument (Ref. SM 1014536).

This report describes the work undertaken for an electrical resistance (ER) survey using a Geoscan Research RM15 twin-probe electrical resistance meter and presents the results of the survey with an interpretation informed by the best available information at the time of writing.

Fragmentary traces of the cloister have been mapped, e.g. the southern inner wall, but the western one is missing and the eastern and northern buried beneath rubble. There is no electrical resistance evidence for a structure extending west from the southern chapel, and hence no direct evidence for an earlier church, however, such a structure would be buried not only beneath the later cloister but the rubble blanketing this area. It is possible that the survey has detected the remains of a structure of a different date to the cloister, parallel to the chapter house. If there was an earlier church then maybe this is the site of a former west range of the cloister, the whole being of less extent than the extant form. It may be relevant in this context that the eastern side of this possible building would roughly coincide with where the west gable of an earlier church could be expected.

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1 Introduction

A magnetic survey has been commissioned by the Craswall Grandmontine Society to prospect for buried features of potential archaeological interest at the Grandmontine Priory of St Mary, at Craswall, Herefordshire. The ruins of the priory are designated as a Grade II listed building (Ref. 355313) and the ruins, ponds and holloways are designated as a scheduled monument (Ref. SM 1014536).

The specification for the survey was set out in a Written Scheme of Investigation (WSI) (TigerGeo, 2023) that was submitted in application for a Section 42 licence.

This report describes the work undertaken for an electrical resistance (ER) survey using a Geoscan Research RM15 twin-probe electrical resistance meter and presents the results of the survey with an interpretation informed by the best available information at the time of writing.

2 Context

2.1 Location

Craswall Priory is located in the valley bottom (Cwm y Canddo) adjacent to Abbey Farm, which lies northwest of the dispersed settlement of Craswall.

The survey area is located in the cloister, one of the few areas within the ruins relatively free of surface debris.

Country	England
County	Herefordshire
Nearest Settlement	Craswall
Central Co-ordinates	327255, 237685
Survey Area (ha)	c. 0.03

2.2 Environment

The below information is taken from the British Geological Survey (BGS), modern and historic mapping and aerial imagery and provides a basic summary of the survey area.

Soilscapes Classification	Slowly permeable seasonally wet acid loamy and clayey soils [24]
Superficial 1:50,000 BGS	None recorded in northern part Head - Clay, silt, sand and gravel [HEAD] in southern part
Bedrock 1:50,000 BGS	St Maughans Formation - Argillaceous rocks and sandstone, interbedded [SMG]
Topography	Generally flat, slightly slopes down NW-SE
Current Land Use	Ruins, rough pasture
Historic Land Use	Religious complex
Vegetation Cover	Grass

2.3 Archaeology

The ruins of Craswall Priory are designated as a Grade II listed building (Ref. 355313) and the ruins, ponds and holloways are designated as a scheduled monument (Ref. SM 1014536).

The plan of Craswall Priory does not conform to the standard for the Grandmontine order in that it has chapels to the north and south of the church. While the northern one is thought to be a later addition, the southern has been suggested as the remains of the choir and chancel of an earlier church. This is based upon the observation that the Passage of the Dead, a corridor dictated by liturgical practice to normally pass between the choir and the chapter house, is here between the southern chapel and the chapter house. This could imply the present church to have been constructed alongside (i.e. to the north) of an earlier one.

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If this is the case, then the present cloister and garth must also represent and enlargement of an earlier example because it bounds the south side of the present nave, not the south chapel.

Part of the objective of this survey is to examine whether there are indeed the remains of an earlier complex buried below what is now the cloister.

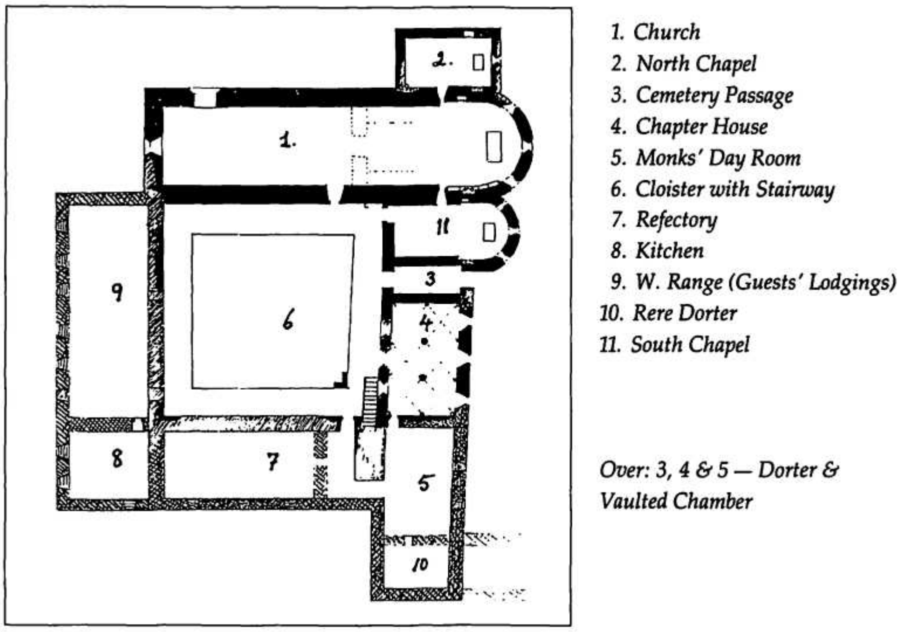

Figure 1: Craswall Priory ground plan (reproduced from Hutchison, 1989)

Historic Ordnance Survey maps provide little detail of the ruins, depicting the church, east range and cloister as a series of walls and earthworks. Recent work by SUMO, resulting in a virtual model of the ruins, has proved useful for understanding the context of the geophysical work.

Most of what is known is derived from excavations in the early 1900s and the 1960s, and small scale works linked with conservation measures since then. The church (for example) has been completely excavated, as has the north chapel, but part of the south chapel has been investigated. The southern and western ranges are known only by their outline, small amounts of masonry and accumulated rubble. It is not known whether the cloister, the subject of the geophysical survey, has been excavated, in whole or in part, although topographic variation would suggest that some has occurred in the western part, while an extensive spread of rubble might suggest much to be untouched.

Unlike many ecclesiastical sites in England, the remoteness of the location and sparse occupation of the landscape post-Dissolution has meant relatively little robbing of masonry has occurred and only occasional excavations. The choir and chancel of the church have been completely excavated, as has the chapter house, but much of the rest of the structure remains blanketed in rubble, including much of the cloister. There are signs perhaps of undocumented excavations, including within the cloister, and much of the layout of the site remains conjectural.

3 Discussion

3.1 Data character

The data is moderately variable, more so in the eastern half of the cloister than the other. The area is too small to assess the contribution of natural soil processes and hydrological factors, plus there is reason to expect the whole of the area to be essentially artificial ground. Variation in the eastern half is within about 15 Ohm away from visible features, rising by 50 – 60 % over the ruins of the stairs in the southeast corner.

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Similar variation is seem elsewhere around the edges of the cloister where there is buried rubble. In the western half, away from such rubble deposits, variation is within 4 – 5 Ohm.

There are no defects in the data and processing has been limited to a manual spike reduction where individual items of rubble have significantly elevated individual measurements.

3.2 Geology, soils and hydrology

The valley bottom site is a flood plain, so the buildings can here be assumed to founded on a depth of alluvium. Waterlogging of the surrounding land seems commonplace, at least during wetter seasons, although the actual site is presumed to be moderately better drained. Whether the cloister is known to flood on occasion is uncertain, and hence whether means of artificial drainage should be expected is likewise unknown. The surface soils are all considered modified, through accumulation of rubble from buildings, and maybe spoil from excavations. Below this older soils can be expected to be preserved, although to what extent the priory was founded on made ground is not known and hence whether these buried soils are similar to natural deposits nearby.

3.3 Archaeology

The resistance data suggests two clear zones with the cloister, an eastern, and a western one. The reason for this seems to be due to the presence of rubble deposits across the eastern half, visible on the surface and felt below the turf. Whether these are in situ or debris from past excavations is uncertain. There is a linear bank and ditch crossing the cloister, west of which the texture changes to smoother one, with less rubble evident at the surface. This transition suggests a recent land use difference, with maybe the western part being excavated (although nothing is known about this) or the eastern part dumped upon perhaps during excavations. That this rubble must be of some age is evident from a probable land drain cut into it, apparently linking points halfway along the eastern and southern walls of the cloister. A second drain appears to be the origin of the shallow ditch almost north to south across the cloister.

There are small raised resistance anomalies that seem to piecemeal represent the north wall bounding the southern walk of the cloister garth, aligned with the extant southeast corner. It is no thicker than 0.5 m, potentially less. A similar western wall is not evident in the data (the linear anomaly that does exist being at the wrong angle and too far into the cloister) and an eastern wall would be beneath the rubble and not necessarily detectable. The northern wall would be beneath the bank of rubble that bounds the northern edge of the survey, so unfortunately two of the four expected walls are not currently detectable. Why the western wall is not apparent in the data is unknown, but at the moment there is no physical or electrical evidence for it.

The slightly lower western half of the cloister is bounded on the east by a shallow ditch below a bank. The ditch seems to be the line of the drain mentioned above but within the bank there is a high resistance linear body that varies from about 0.5 - 0.9 m thickness. It is tempting to identify this structure as masonry, rather than a central path within the cloister, as the latter would likely be undetectable beneath the rubble evident eastwards, but it cannot be entirely discounted. It may be significant that the structure is parallel to the west wall of the chapter house, itself at a slight angle to the church. If the apparently standard four to one ratio of Grandmontine nave length to width applies, then the position of this feature would be roughly coincident with the expected west gable of an earlier nave extrapolated from the south chapel.

About 5.5 m to the west there is a second, near parallel, high resistance feature no more than about 0.5 m wide. This seems also to define the western edge of the slightly sunken area. As already noted this area is devoid of rubble and maybe excavated but if so what was found is unknown. In plan, it resembles a building but in this location it would have to predate the present cloister.

Within the possible excavated area there are a number of weak rectilinear variations of resistance, none sufficiently well defined or with enough context to permit attempts at structural interpretations. These can be created by backfilled excavations or changes in buried materials.

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3.4 Conclusions

There is no sign of a westwards continuation of southern chapel, so nothing in the data to support there having been an earlier nave. However, this area has a covering of rubble above the remains of the cloister garth and the remains of a nave would have been buried still deeper, below the garth, so potentially below the depth of investigation in these conditions.

The cloister garth seems to have been bounded by masonry so was presumably a covered structure, at least around the southern and eastern sides. There is no sign of the equivalent western wall although the survey crossed it’s likely position.

The western half of the cloister has been treated differently in the past, lacking the surface rubble that is typical of the eastern half. It is possible that it has been excavated at some unknown time and it may be that the two probable drains were inserted at a similar time.

Below this western half a number of linear raised resistance anomalies could suggest the remains of a building, with a different orientation to the present cloister, although parallel to the chapter house. It is probable that this possible building, and possibly also the footings of the chapter house, both belong to an earlier phase, in which case this may be new evidence for the priory having been enlarged and the church rebuilt.

3.5 Caveats

Geophysical survey is reliant upon the detection of anomalous values and patterns in physical properties of the ground, e.g. magnetic, electromagnetic, electrical, elastic, density and others. It does not directly detect underground features and structures and therefore the presence or absence of these within a geophysical interpretation is not a direct indicator of presence or absence in the ground. Specific points to consider are:

- some physical properties are time variant or mutually interdependent with others;
- for a buried feature to be detectable it must produce anomalous values of the physical property being measured;
- any anomaly is only as good as its contrast against background textures and noise within the data.

TigerGeo will always attempt to verify the accuracy and integrity of data it uses within a project but at all times its liability is by necessity limited to its own work and does not extend to third party data and information. Where work is undertaken to another party's specification any perceived failure of that specification to attain its objective remains the responsibility of the originator, TigerGeo meanwhile ensuring any possible shortcomings are addressed within the normal constraints upon resources.

4 Methodology

4.1 Set out

Work generally follows the recommendations of these documents:

- Chartered Institute for Archaeologists (2014, updated 2020) “Standard and Guidance for Archaeological Geophysical Survey”;
- English Heritage (2008) “Geophysical Survey in Archaeological Field Evaluation”;
- European Archaeological Council (2015) “Guidelines for the Use of Geophysics in Archaeology”;

and is undertaken in accordance with the high professional standards and technical competence expected by the Geological Society of London.

Due to the nature of the proposed survey area, Network RTK GNSS will be used to establish an accurate grid and to survey in other features to help locate the data and inform interpretation. From these accurately located points, grid set out will be by tape measures to allow the areas to flow around obstacles such as fences etc.

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4.2 Principles

4.2.1 Physical concepts

This section is specifically about planar electrical resistance, i.e. pole-pole or 'twin-probe' survey, not electrical resistivity sounding or tomography.

Electrical resistance is the measured consequence of electrical resistivity, the degree to which a material restricts the flow of electric current. Within soil this is generally due to a combination of factors, including the chemistry due to the mineral and humic components, these to some extent working in opposition, plus the size of pore spaces, their degree of interconnection, to what extent they are water filled and whether the surface of the pore spaces are electro-chemically active. The latter reason is why clay tends to be less resistive than silt while pore dynamics govern the soil's response to hydraulic cycling. For any given soil, the hydraulic context directly impacts upon the 3D distribution of electrical resistivity variation. Given the temporal character of the former, the latter also varies in time. Electrical resistance data collected in dry conditions after rainfall will be different from that collected in wet conditions after a period of dry weather. Data collected after a short period of rain will be different from that collected after prolonged rain. However, there is one constant: after a period of no rainfall electrical resistivity contrast within soil will always be at a minimum and therefore survey is unlikely to useful. The hydraulic output from a soil is as important as input from rainfall; drainage from a surface soil is influenced by deeper deposits, the degree of saturation of the ground, slope and whether it can physically trap water within its pore spaces, e.g. clays.

Considerable temporal and spatial variation across a variety of scales is therefore normal and the detection and mapping of structures of archaeological interest is dependent upon these. However, certain principles can be applied:

- an open-textured soil will always hydrate and drain faster than a heavier one;
- clay soils will retain moisture longer than sands and silts;
- soils will normally be less resistive than mortared masonry structures, however an un-mortared
- structure can behave more like an open-textured soil;
- unconsolidated fills tend to be more open-textured than undisturbed ground;
- wet soils are less resistive than dry ones.

With these in mind and given appropriate conditions it is evident that electrical resistance survey can detect things like buried pit and ditch fills, walls and similar structures. Floors may be indirectly detected if they modify drainage of the soil. However, their chances of detection are entirely dependent upon the local soil hydrology and hence the weather conditions prior to and during survey, the soil type and surface treatments (e.g. ploughed, not ploughed, grass or bare soil, etc.). Variation of any of these within a survey will likely change the relationship between measured electrical resistance and the archaeological interpretation.

No physical variation exists in isolation and the patterns of electrical resistance observed at the surface relate not to individual structural variations but to the combination of all variations within the 3D electrical current path. Those variations with the greatest influence upon the current vector will be most manifest within the resistance measurement. As a consequence, closely spaced structures may not be separately resolved, their depth of burial will affect the result and likewise their penetration into the ground. Given adjacent pairs of structures or fills with opposing resistivity characteristics, only one may be resolved. As an extension of this, paradoxes may be evident, e.g. the effect upon drainage (potentially low resistance) of a masonry structure may be more evident than the structure (high resistance) itself. A high resistivity structure close to the surface may force the majority of current to flow over it, producing a low resistance anomaly.

4.2.2 Instrumentation (pole-pole / twin probe resistance)

The pole-pole, or as commonly called in archaeological applications, the twin-probe array, is one of many that can be used, each with its own benefits and drawbacks across the spectra of resolution, sensitivity, signal to noise ratio and anomaly form. The pole-pole is especially sensitive to lateral variation beneath the array but relatively insensitive to laminar structure. This sensitivity is marked at shallow depths, thus for a

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0.5m AM (mobile current and potential) probe separation a depth of investigation of approximately 0.75mbgl applies, though with some variation.

Because the exact geometry of the array is rarely known (due to the constant variation of relative orientation and separation of the two sets of probes) the measurement is expressed as electrical resistance, in Ohm, not the volume specific quantity of resistivity. Measurements are thus not directly comparable across sites and nor is their size indicative of particular materials etc., unlike the resistivity measure available from electrical resistivity tomography or from variations of the Wenner array, both of which shares the same fundamental principles.

Within the pole-pole array configuration, the primary variable is the AM probe spacing. Increasing this from 0.5m increases the sensitivity of the array to deeper variations, however, measurements remain significantly affected by shallower variations due to current paths. Conversely, decreasing the spacing sensitises the measurement to regions closer to the surface.

For discrete buried structural entities (e.g., walls and pit or ditch fills) the volume of ground affected by the resistivity contrast is larger than the physical extent of the structure and thus variations smaller than the survey resolution can be detected not mapped, a behaviour critical to interpretation of the data. As for all planar survey methods the higher the spatial resolution of the survey the better the result will be, although with diminishing returns beyond some resolution dependent upon local resistivity contrast and structure size (and hence weather conditions prior to survey).

4.3 Survey

4.3.1 Technical equipment

Measured variable	Electrical resistance, probe array geometry dependent
Instrument	Geoscan Research RM15
Configuration	Pole-pole 0.5 m AM probe separation, so penetration to ~0.7 mbgl
QA Procedure	Continuous observation
Spatial resolution	0.5 m (along line) x 0.5 m (across line)

4.3.2 Monitoring & quality assessment

There is no dedicated quality management data available from the instrumentation used but continuous observation throughout survey, examination of the sensitivity of the measurement to frame movement and monitoring of background resistance values between survey grids and days allows some measure of quality assurance.

4.4 Data Processing

All data processing is minimised and limited to what is essential for the class of data being collected, e.g. reduction of orientation effects, suppression of single point defects (drop-outs or spikes) etc. The processing stream for this data is as follows:

Process	**Software**	**Parameters**
Spike reduction	Proprietary	Manual spike reduction of outliers
Grid levelling	Proprietary	Not used
Smoothing	Proprietary	Not used
Interpolation	Proprietary	Bilinear to 0.25 m x 0.25 m (and to 0.125 upon positioning in GIS)
Trend reduction	Proprietary	Not used

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4.5 Interpretation

4.5.1 Introduction

Numerous sources are used in the interpretive process, which takes into account shallow geological conditions, past and present land use, drainage, weather before and during survey, topography and any previous knowledge about the site and the surrounding area. Old Ordnance Survey mapping is consulted and also older sources if available. Geological information (for the UK) is sourced only from British Geological Survey resources and aerial imagery from online sources. LiDAR data is usually sourced from the Environment Agency or other national equivalents, SAR from NASA and other topographic data from original survey.

Information from nearby surveys is consulted to inform upon local data character, variations across soils and near-surface geological contexts. Published data from other surveys may also be used if accompanied by adequate metadata.

4.5.2 Details

The interpretation of electrical resistance anomalies is site and time-specific (hence the designation as 'apparent resistance' and not 'resistivity') and they are not diagnostic of materials. The form of an anomaly is dependent upon the contrast between a body and the surrounding material and thus the same sort of feature can generate different anomalies across a site.

It is fairly common to suppress background trends to improve local anomaly contrast, however, if there are resistance trends across a site, perhaps due to differences of drainage on a slope, then anomaly form will still vary and needs to be taken into account.

Conversion to apparent resistivity is theoretically possible but rarely done as the exact probe geometry at each measurement point is not usually known. In theory this would render the data more diagnostic of materials but in practice this is hindered by the uncertainties of 3D current flow within the depth of investigation. The technique is planar, i.e. 2D, and therefore the result is a projection into 2D of electric current flow within a 3D volume limited in depth by the probe geometry. For the pole – pole array this is the spacing of the mobile potential (M) and current injection (A) probes and the depth of investigation is a maximum of about 0.75m.

The data cannot be interpreted without contextual information, including local hydrological variations and soil types. Even then, it is interpreted from the viewpoint of expecting a particular target, e.g. a buried wall or culvert and therefore an expectation of likely anomaly form.

In general terms, adjacent materials with different porosities and therefore different bulk electrical properties can be distinguished and provided the hydrological context is known, correctly identified. Therefore a wall or culvert buried within a clean soil can normally be detected under a range of conditions but the situation becomes more complex where the target is the fill of a buried pit for example. In this case the survey has to rely upon differences in water retention in the different materials and whether these are laterally distinguishable within the depth of investigation. Such a fill can exhibit either a higher or lower apparent resistance than the surrounding ground and hence variations across a site can result in different anomaly strengths and forms for the same fill.

4.6 Glossary

Acronym / term	Type	Definition
A	Physical quantity	SI unit Amp of electric current
BGS	Organisation	British Geological Survey
CIfA	Organisation	Chartered Institute for Archaeologists
dB	Physical quantity	Decibel, unit of amplification / attenuation
DRM	Process	Depositional Remanent Magnetisation

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Acronym / term	Type	Definition
EAGE	Organisation	European Association of Geoscientists and Engineers
EGNOS	Technology	European Geostationary Navigation Overlay Service
ERT	Technology	Electrical resistivity tomography
ETRS89	Technology	European Terrestrial Reference System (defined 1989)
ETSI	Organisation	European Telecommunications Standards Institute
EuroGPR	Organisation	European Ground Penetrating Radar Association, the trade body for GPR professionals
G-BASE	Data	British Geological Survey Geochemical Atlas
GeolSoc	Organisation	Geological Society of London, the chartered body for the geological profession
GNSS	Technology	Global Navigation Satellite System
GPR	Technology	Ground penetrating radar
GPS	Technology	Global Positioning System (US)
inversion	process	A combination of forward and backward modelling intended to construct a 2D or 3D model of the physical distribution of a variable from data measured on a 1D or 2D surface. It is fundamental to ERT survey
IP	Physical quantity	Induced polarisation (or chargeability) units mV/V or ms
m	Physical quantity	SI unit metres of distance
mbgl	Physical quantity	Metres below ground level
MHz	Physical quantity	SI unit mega-Hertz of frequency
MS	Physical quantity	Magnetic susceptibility, unitless
mS	Physical quantity	SI unit milli-Siemens of electrical conductivity
nT	Physical quantity	SI unit nano-Tesla of magnetic flux density
OFCOM	Organisation	The Office of Communications, the UK radio spectrum regulator
Ohm	Physical quantity	SI unit Ohm of electrical resistance
OS	Organisation	Ordnance Survey of Great Britain
OSGB36	Data	The OS national grid (Great Britain)
OSTN15	Technology	Current coordinate transformation from ETRS89 to OSGB36 co-ordinates
RDP	Physical quantity	Relative Dielectric Permittivity, unitless
RTK	Technology	Real Time Kinematic (correction of GNSS position from a base station)
s	Physical quantity	SI unit seconds of time
TMI	Physical quantity	Total magnetic intensity (measured flux density minus regional flux density)
TRM	Process	Thermo-Remanent Magnetisation
V	Physical quantity	SI unit Volt of electric potential
WGS84	Data	World Geodetic System (defined 1984)

4.7 Bibliography

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Craswall Priory (https://Craswall Priory - A Grandmontine monastery on the Welsh marchland borders)

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

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5 Supporting Information

5.1 Archiving

TigerGeo maintains an archive for all its projects, access to which is permitted for research purposes. Copyright and intellectual property rights are retained by TigerGeo on all material it has produced, the client having full licence to use such material as benefits their project. This archive contains all survey and project data, communications, field notes, reports and other related material including copies of third party data (e.g. CAD mapping, etc.) in digital form unless required to delete these, e.g. certain classes of OS digital data upon licence expiry.

5.2 Dissemination

It is assumed that the Craswall Grandmontine Society will determine the distribution path for reporting, including to any end client, other contractors, local authority etc., and will determine the timetable for upload of the project report to the OASIS Grey Literature library or supply of report or data to other archiving services including the Historic Environment Record, taking into account confidentiality etc., where this is not already fulfilled by TigerGeo discharging Section 42 licence conditions.

TigerGeo reserves the right to display data rendered anonymous on its website and in other marketing or research publications.

5.3 Standards and quality

TigerGeo is developing an Integrated Management System (IMS) towards ISO certification for ISO9001, ISO14001 and OHSAS18001/ISO45001. For work within the archaeological sector TigerGeo has been awarded CIfA (Chartered Institute for Archaeologists) Registered Organisation status.

A high standard of client-centred professionalism is maintained in accordance with the requirements of relevant professional bodies including the Geological Society of London (GeolSoc) and the Chartered Institute for Archaeologists (CIfA). Senior members of TigerGeo are professional members of the GeolSoc (FGS), CIfA (MCIfA & ACIfA grades) and other appropriate bodies, including the European Association of Geoscientists and Engineers (EAGE) Near Surface Division (MEAGE) and the Institute of Professional Soil Scientists (MISoilSci).

In addition TigerGeo is a member of EuroGPR and all ground penetrating and other radar work is in accordance with ETSI EG 202 730.

The management team at TigerGeo have almost 50 years of combined experience of near surface geophysical project design, survey, interpretation and reporting, based across a wide range of shallow geological contexts.

Data processing and interpretation adheres to the scientific principles of objectiveness and logical consistency. A standard set of approved external sources of information, e.g. from the British Geological Survey, the Ordnance Survey and similar sources of data, in addition to previous TigerGeo projects, guide the interpretive process. Due attention is paid to the technical constraints of method, resolution, contrast and other geophysical factors.

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There is a strong culture of internal peer-review within TigerGeo, for example, all reports pass through a process of authorship, technical review and finally proof-reading before release to the client. Technical queries resulting from TigerGeo's work are reviewed by the Senior Geophysicist to ensure uniformity of response prior to implementing any edits, etc.

All work is undertaken in accordance with the high professional standards and technical competence expected by the Geological Society of London and the European Association of Geoscientists and Engineers.

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5.4 Key personnel

Martin Roseveare, MSc BSc(Hons) MEAGE FGS MCIfA	**Senior Geophysicist, Director**
Martin specialised (MSc) in geophysical prospection for shallow applications and since 1997 has worked in commercial geophysics. Elected a GeolSoc Fellow in 2009 he is now working towards achieving CSci. A member of the European Association of Geoscientists & Engineers, he has served on the EuroGPR and CIfA GeoSIG committees and on the scientific committees of the 10th and 11th Archaeological Prospection conferences. He has reviewed papers for the EAGE Near Surface conference, was a technical reviewer of the Irish NRA geophysical guidance and is a founding member of the ISSGAP soils group. Professional interests include the application of geophysics to agriculture and the environment, e.g. groundwater and geohazards. He is also a software writer and equipment integrator with significant experience of embedded systems.	
Anne Roseveare, BEng(Hons) DIS MISoilSci	**Operations Manager, Environmental Geophysicist, Data Analyst**
On looking beyond engineering, Anne turned her attention to environmental monitoring and geophysics. She is a Member of the British Society of Soil Science / Institute of Professional Soil Scientists (BSSS/IPSS) and has specific areas of interest in soil physics & hydrology, agricultural applications and industrial sites. Working in shallow geophysics since 1998, Anne is a founding member of the ISSGAP soils group, also was the founding Editor of the International Society for Archaeological Prospection (ISAP). Specifications, logistics, health and safety, data handling & analysis are integral parts of her work, though she is happily distracted by the possibilities of discovering lost cities, hillwalking, dance and good food.	
Daniel Lewis, MA BA(Hons) MCIfA	**Consultant Archaeologist**
Daniel studied archaeology at the University of Nottingham and worked in field archaeology for many years, managing urban and rural fieldwork projects in and around Herefordshire. When the desk became more appealing he jumped into the world of consulting, working on small and large multi-discipline projects throughout England and Wales. At the same time, he returned to University, gaining an MA in Historic Environment Conservation. With experience in the heritage sector since 1998, Daniel has a diverse portfolio of skills. Here he ensures that geophysical work within the heritage sector is well grounded in archaeology. His spare time includes much running up mountains.	
Alexandra Gerea, MSc BSc PhD Candidate MEAGE FGS	**Environmental Geophysicist, Geophysical Processor & Analyst**
Alexandra has a BSc in Geophysics and an MSc in Applied Geo-biology and is in the final stages of a PhD in the UK after living in Portugal for six months working on her master's degree. Since 2008 she has used most mainstream processing applications across electrical, magnetic and radar methods. She combines a love of nature and science and is currently studying plant roots in agricultural environments using geophysical methods. When not doing that she enjoys travelling, hiking, nature, yoga, books, foreign languages and cats. A few years ago she found a passion for electronics and started building different devices including intelligent gardening systems and coding in Python.	

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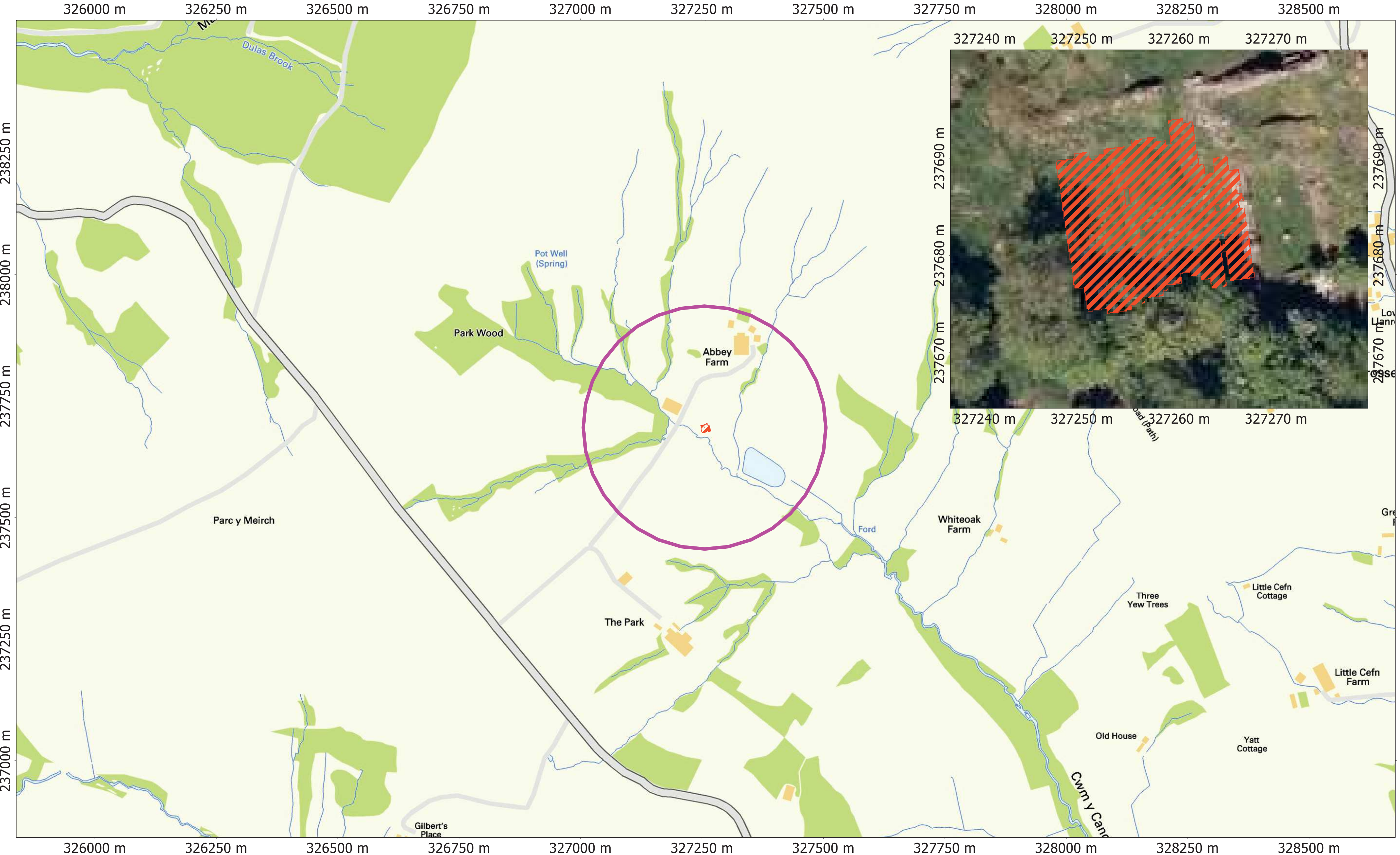

CPH231 Craswall Priory, Herefordshire
DWG 01 Location Map

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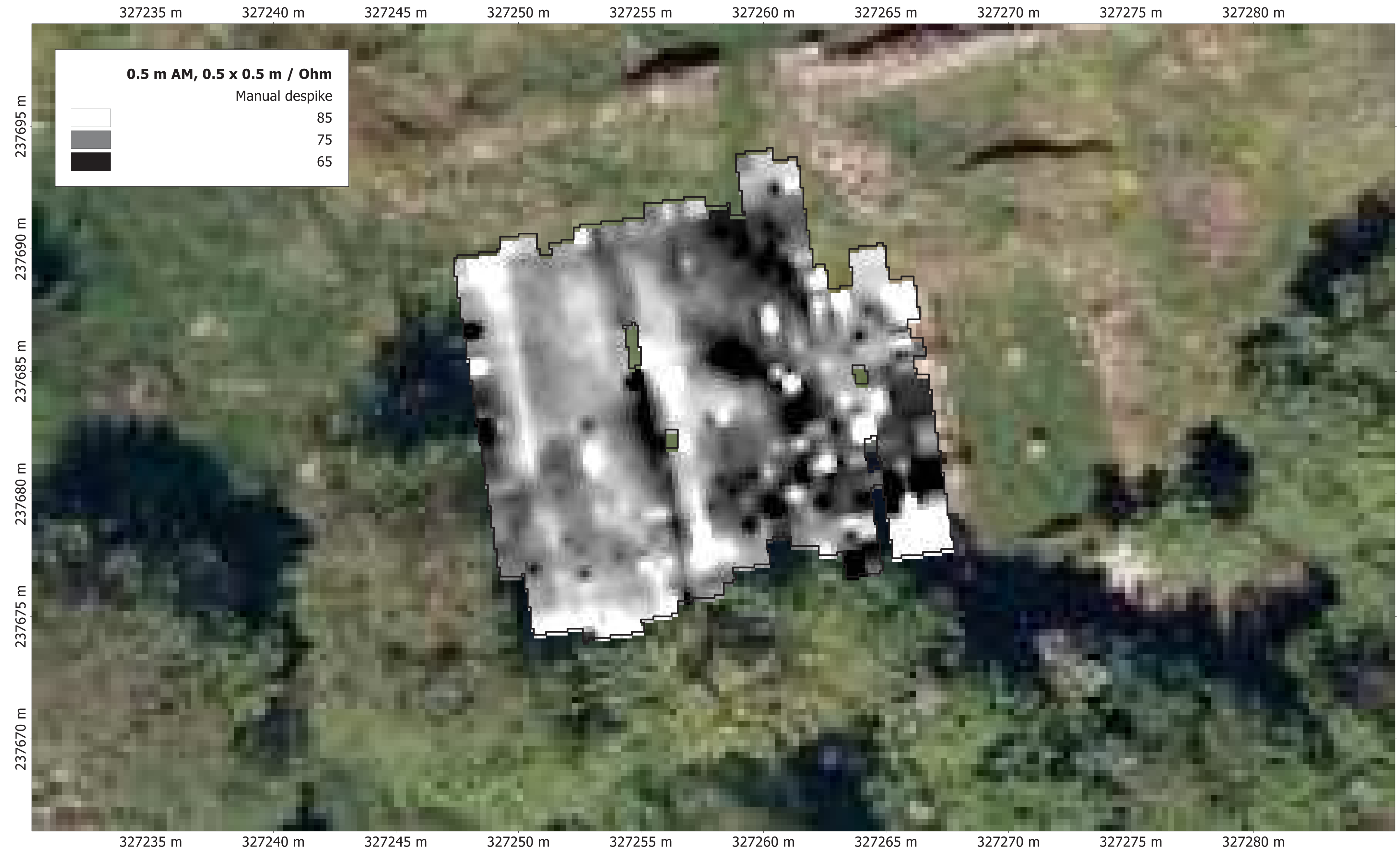

CPH231 Craswall Priory, Herefordshire
DWG 02a Electrical Resistance (0.5 m) Twin - Greyscale

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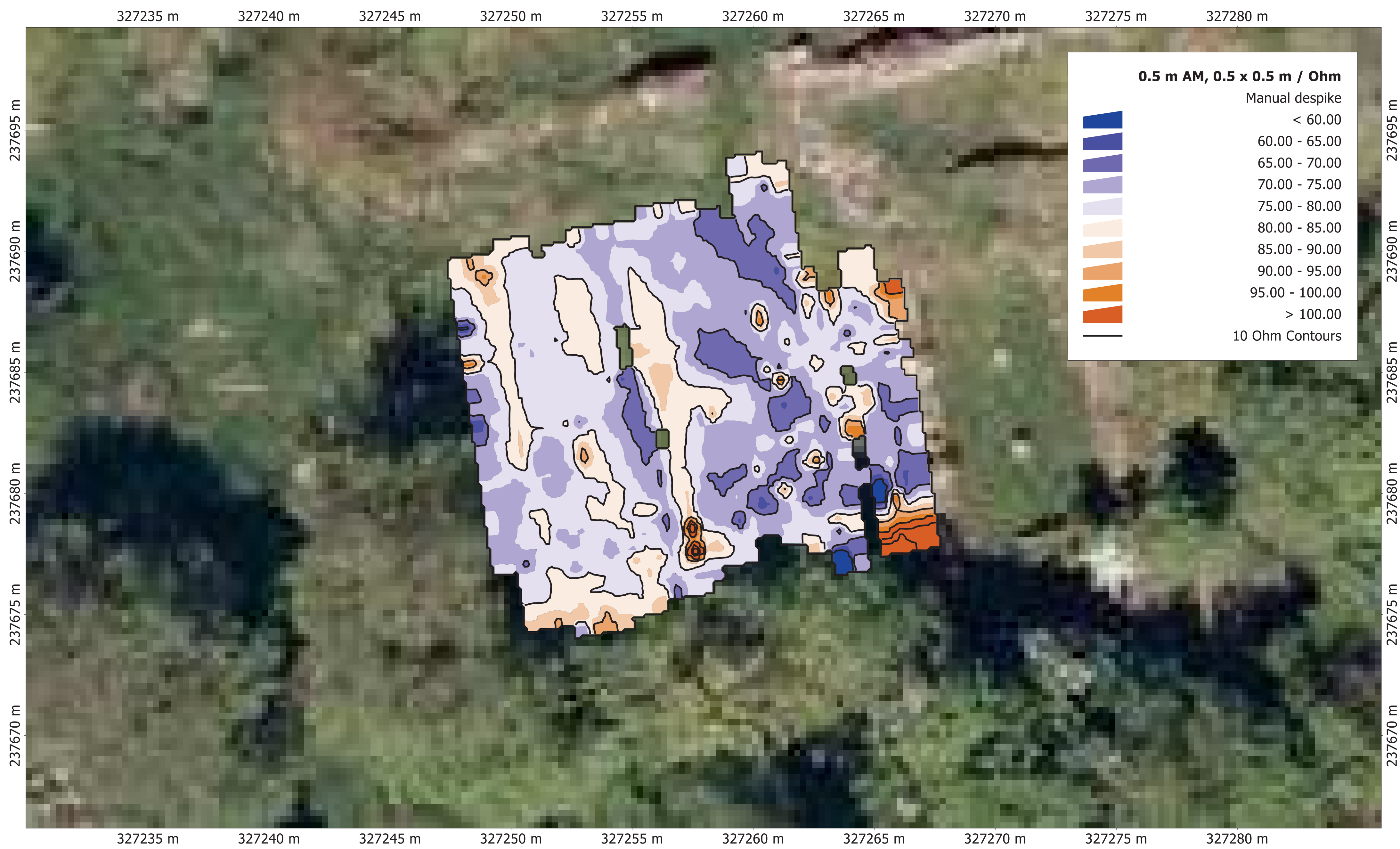

CPH231 Craswall Priory, Herefordshire

DWG 02b Electrical Resistance (0.5 m) Twin - Contours

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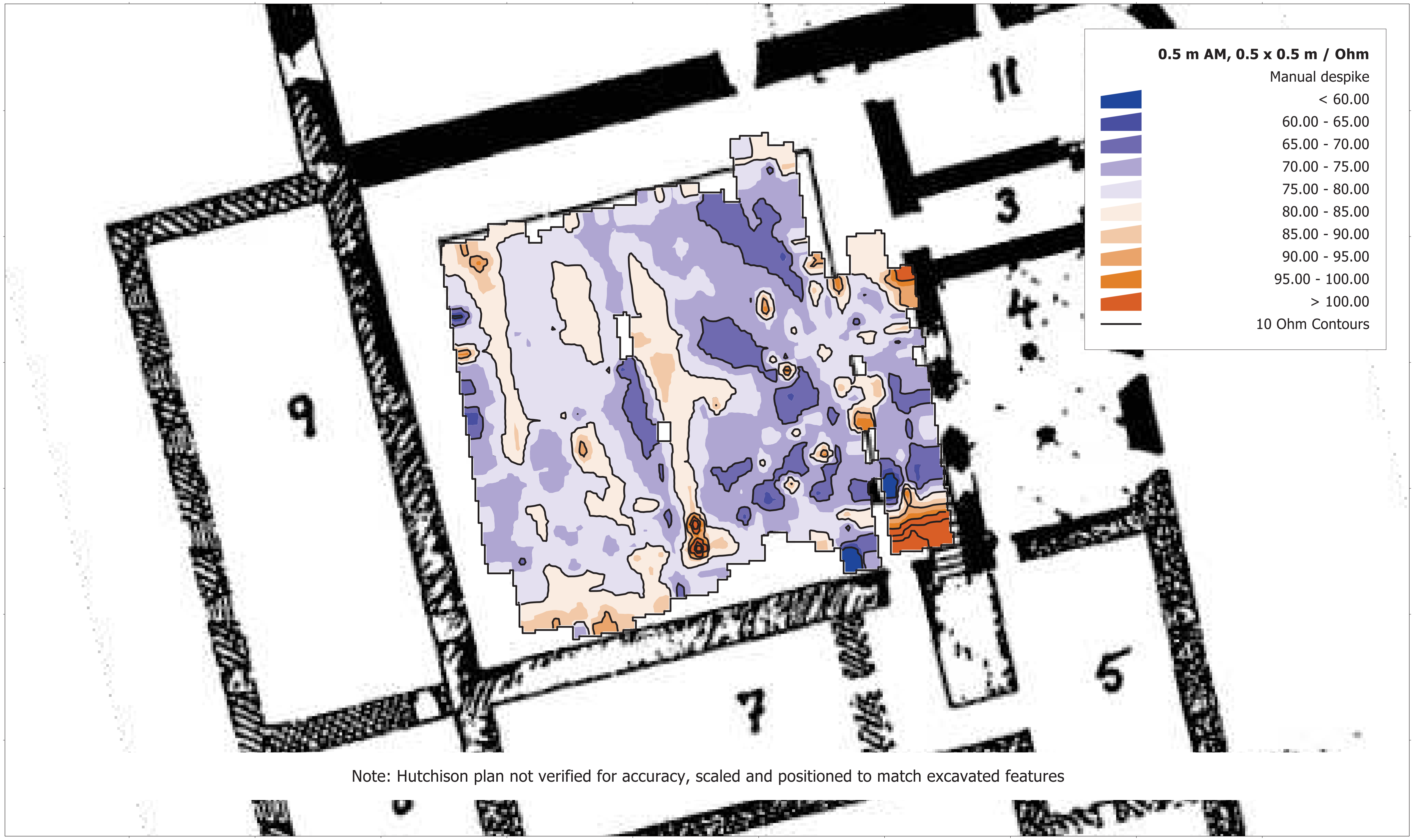

CPH231 Craswall Priory, Herefordshire

DWG 02c Electrical Resistance (0.5 m) Twin - On Hutchison Plan

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DWG 03a Interpretation

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DWG 03b Interpretation - On Hutchison Plan

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