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SURVEY REPORT

Aerial and Earth Resistance Survey
Site of Church of Renles
Killard Upper, County Down (DOW 039.004)

Killard Point to the left and Gunnes Island to right

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1.1 Location

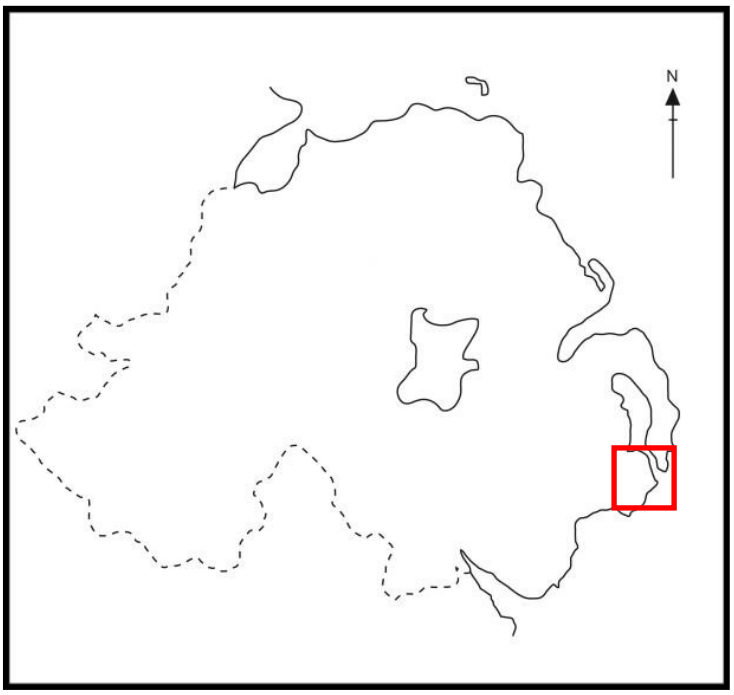


Figure 1: Location map

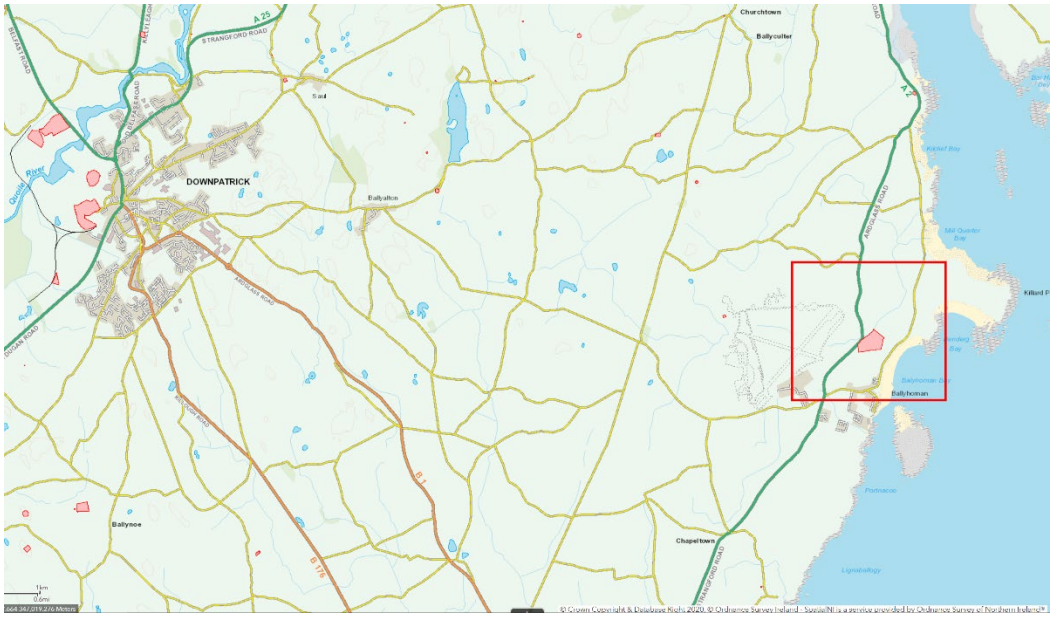


Figure 2: Relational location (source: HERoNI Map viewer)

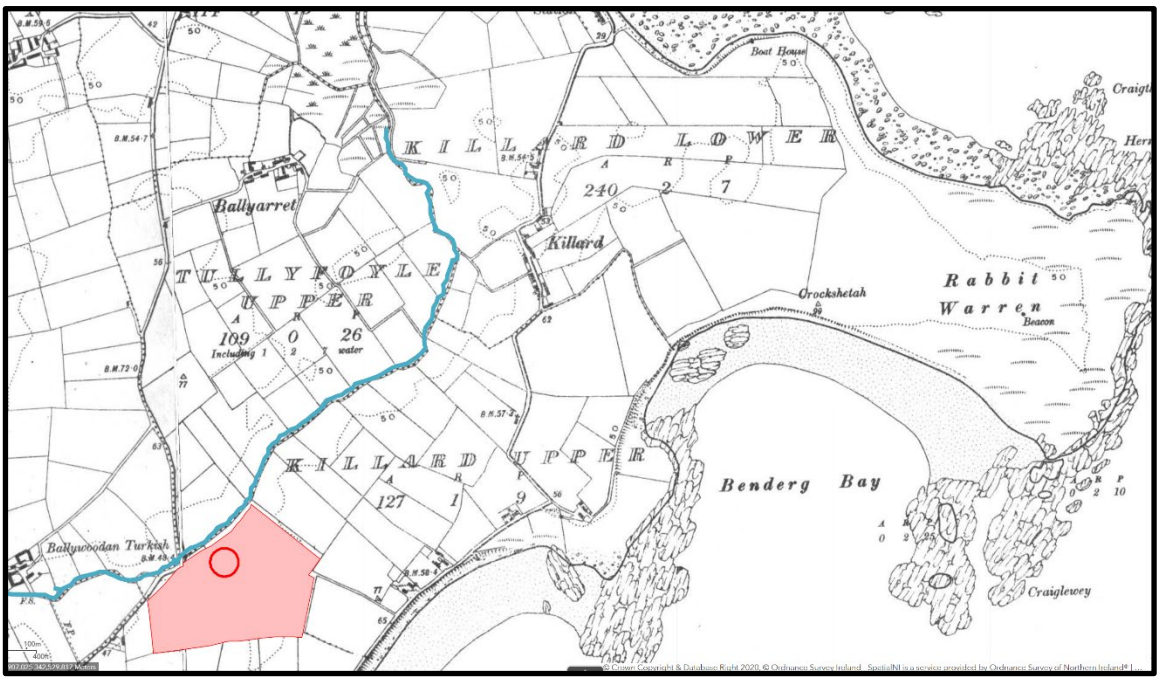


Figure 3: Local Relational Location (Source: 6 inch 3rd Edition 1900 HERoNI Map Viewer)

1.2 Aims and Site Background

HeritageNI undertook an Earth Resistance geophysical survey of an area of archaeological interest locally identified by a local resident and subsequently mapped by drone and an Earth Resistance survey in the townland of Killard Upper in the Lecale area of County Down. The aim was to identify more clearly any archaeological features that could complement the aerial drone survey by carrying out an Earth Resistance survey. Metal detectorists have frequented the field over many years and produced dozens of finds. Sadly only a few of them are accessible, however photographs exist for some of them. At least 2 of the finds have been dated to the 6th/7th century.

In the Historic Environment Map Viewer a site was marked as unlocated in the neighbouring field. After consultation with the Historic Environment Division it was concluded that the map pin should be moved to the newly identified location as being the most likely location of the medieval Church of Renles (DOW 039.004) Other names associated with the site/church are Kenlys, Killerneede, Kells and Cargy.

(Diocese of Down.)

The chapel of Burcestona[c] —— 17*s.* 4*d.* — Tenth, 21*d.*
The chapel of Balibodan[d] and
Abbot-grange[e] ———— 16*s.* —— Tenth, 19¼*d.*
The church of Kirkeleth[f] —— 12 marks – Tenth, 16*s.*
The church of Renles[g] ——— 4 marks — Tenth, 5*s.* 4*d.*
The church of Rathcolpe[h] —— 4 marks — Tenth, 5*s.* 4*d.*
The church of Cnokengarre[i]— 3½ marks – Tenth, 4*s.* 8*d.*

The

the hurdles', probably in reference to its original construction: "more Scotorum, non de lapide, sed de *robore secto*, atque harundine tecta". (Bede, H. E., iii. 25). The parish church was styled 'Ecclesia Sti. Kelani de Kylcleth'.—Reg. Prene, p. 398. Reg. Mey, lib. ii. p. 214. See *Appendix.*

[g] *Renlis.*—Now Killard, a double townland, lying at the extreme east of Lecale, and belonging to Ballyculter parish, though detached from it. — Ord. Survey, s. 39. "Capella de Killernard in Lekaile, near the sea, it is St. John's".—*Terrier.* In the Inq. 3 Ed. VI. it was found, under the name *Kenlys*, to be a chapel of Ballyculter, and appropriate to the abbey of Saul. The Ul. Visit. Book in one place (p. 246) calls it *Killerneede;* and in another (p. 262) *Kells.* The site of the church is called *Cargy:* it is in a field of Upper Killard, about a gunshot distant from the shore, and 50 yards from the rivulet which bounds the townland. It is a little plot about 18 yards long, and 6 broad, lying east and west; and it remains uncultivated in the very centre of a highly productive field.

[h] *Rathcolpe.* — Now Raholp, a townland in the west angle of Ballyculter parish.—Ord. Survey, s. 31. In a sub-denomination called 'Banaghen' or 'Benagh', about 100 yards to the right of the road leading from Downpatrick to Ballyculter, stand the ruins of the church, called *Churchmoyley.* They are 33 feet 4 inches long, and 21 feet 4 inches wide. The south-wall is overturned; the east and west walls are about 12 feet high. The east window is 4 feet 6 inches high, and 10 inches wide, splayed inside to the width of 3 feet 2 inches; and ends, not in an arch, but in a large flag. In building the walls, yellow clay has been used instead of mortar. The plot of ground which the ruins and cemetery occupy, is about half a rood in extent; and seems, from its elevation above the surrounding field, to have been at one time a 'rath'. The voice of antiquity ascribes the foundation of the church of Raċ-colpa to St. Patrick; and at the hand of St. Tassach, its bishop, according to the hymn of St. Fiech, he received the communion shortly before he died.—See *Appendix.*

[i] *Cnokengarre.* — Cnocan ȝeapp ('the

Figure 4: Reeves, W. 1847, 39 mentions the church as being of 'St Johns'

In a field belonging to Miss Breen, in the townland of Killard,* there is a place called Cargy, which is the site of a church valued in the Taxation of Pope Nicholas, under the name of "the church of Renles" (intended for Kenles), at four marks. In the inquisition of the third of Edward VI. it was found, under the name *Kenlys*, to be a chapel of Ballyculter and appropriate to the Abbey of Saul. It is called Killernard in the "Terrier." That document, though compiled in the year 1615, preserves to us an account of the various sums paid in ancient times by the respective churches to the bishop. The following extracts regard the different churches in the parish of Dunsford and Ardglass :—

"Capella de Killernard, in Lekale, near the sea. In proxies, 1s; in refections, 1s; synodals, 2s. It is St. John's."

"Capella de Lismullan. The bishop's mensal. The curate pays in proxies, 1s; refections, 1s; synodals, 2s."

Figure 5: O'Laverty, J. 1878, Vol l, p181

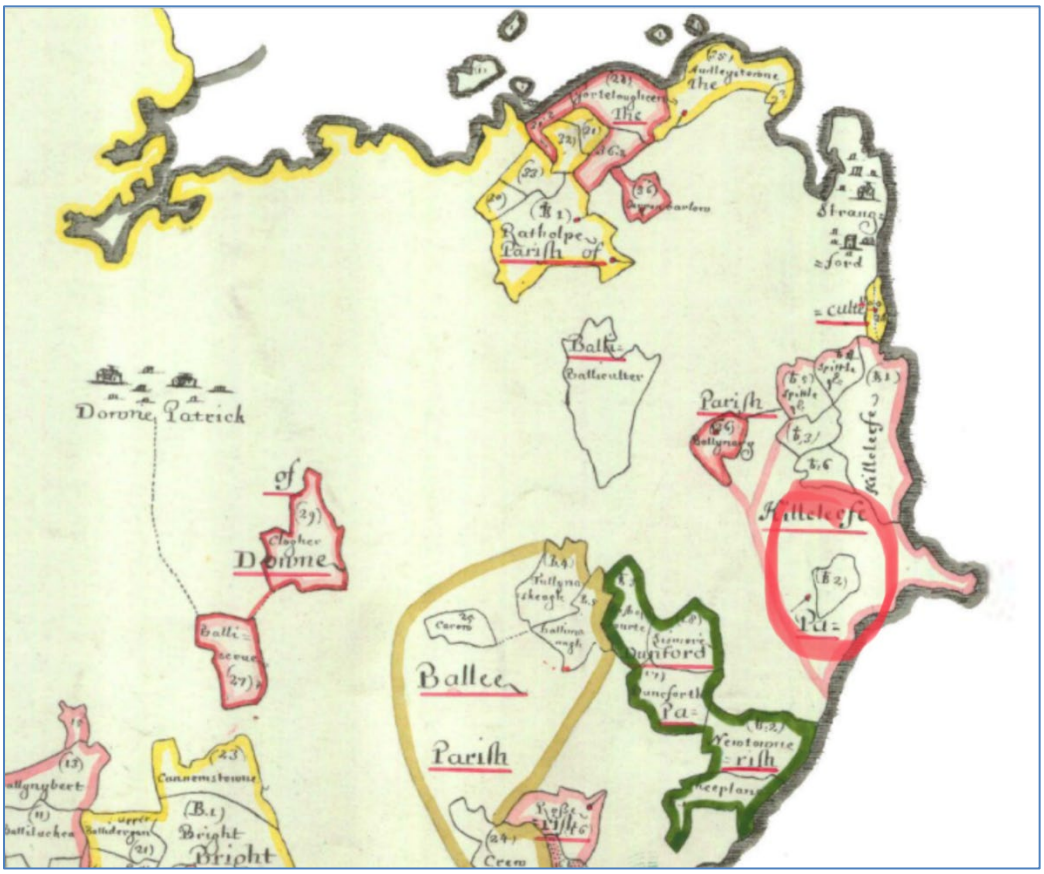


Figure 6: Section of Down Survey (1655-56) of Lecale (courtesy of the Library of Trinity College, Dublin)

2. Survey Methods

The aerial survey was carried out by David Craig of HeritageNI using a 20 megapixel Hasselblad camera on a DJI Mavic 2 Pro drone. The flight path was created in Map Pilot Pro and flown as a completely autonomous mission. The flight was flown at 400 feet with each photograph having a 70% overlap. Images were processed in Adobe Photoshop and the Photogrammetry software, Agisoft Metashape Pro. The analysis was facilitated in Quantum GIS.

Earth Resistivity was the method employed for this project. More information regarding this technique is included in the Methodology section below.

3. Description of site

The survey area consists of approximately 50 ha of gently sloping prime agricultural land with a crop of barley.

No previous archaeological survey has been carried out on the site.

3.1 Archiving

Copies of this report have been deposited with HED and the Ulster Archaeological Society. All site records have been archived by HeritageNI

4. Credits and Acknowledgements

The survey was led by David Craig and included Ian Gilespie, Anne McDerrmott, Randal Scott and John Convery.

I am particularly grateful to the landowners, The Fitzsimons family and the tenant farmer for allowing access to the survey site.

HeritageNI are also grateful to the Ulster Archaeological society for the loan of the Resistivity Meter and associated equipment.

I would like to acknowledge the input of Barrie Hartwell in assisting with the interpretation of the results and Cormac Bourke for his initial assessment of some of the finds and finds photographs.

Much appreciation is given to the metal detecting fraternity for their willing to share images of their finds which greatly enhances our understanding of the site.

5. Aerial survey

The site was first identified on in the July 2018 dataset of Google Earth and aerial mapped by drone by HeritageNI twice, once in July 2020 and again in July 2021. The 2021 flight is what was used in this report.

Figure 7: 2018 dataset from Google Earth (© 2021 CNES/Airbus)

The field was mapped by HeritageNI on 10th July 2020 using the 20 megapixel Hasselblad camera on a DJI Mavic 2 Pro drone with the autonomous mission being programmed in the flight control app Map Pilot Pro. The results did not add anything new to the knowledge base of the site.

In July 2021 the field was observed in a prime semi-ripened state and the field was mapped again by drone which produced crop marks (Figure 9) more clearly defined and a large circular enclosure near the entrance to the field not seen on any previous imagery. Modern removed field boundaries and field drains can also be seen.

The aerial survey imagery was created from a mosaic of 208 photographs with a Ground Sample Distance of 3cm/pixel flown at 400 feet. The resulting dataset was georeferenced for use in GIS. The main ortho mosaic is 23094 x 20156 pixels.

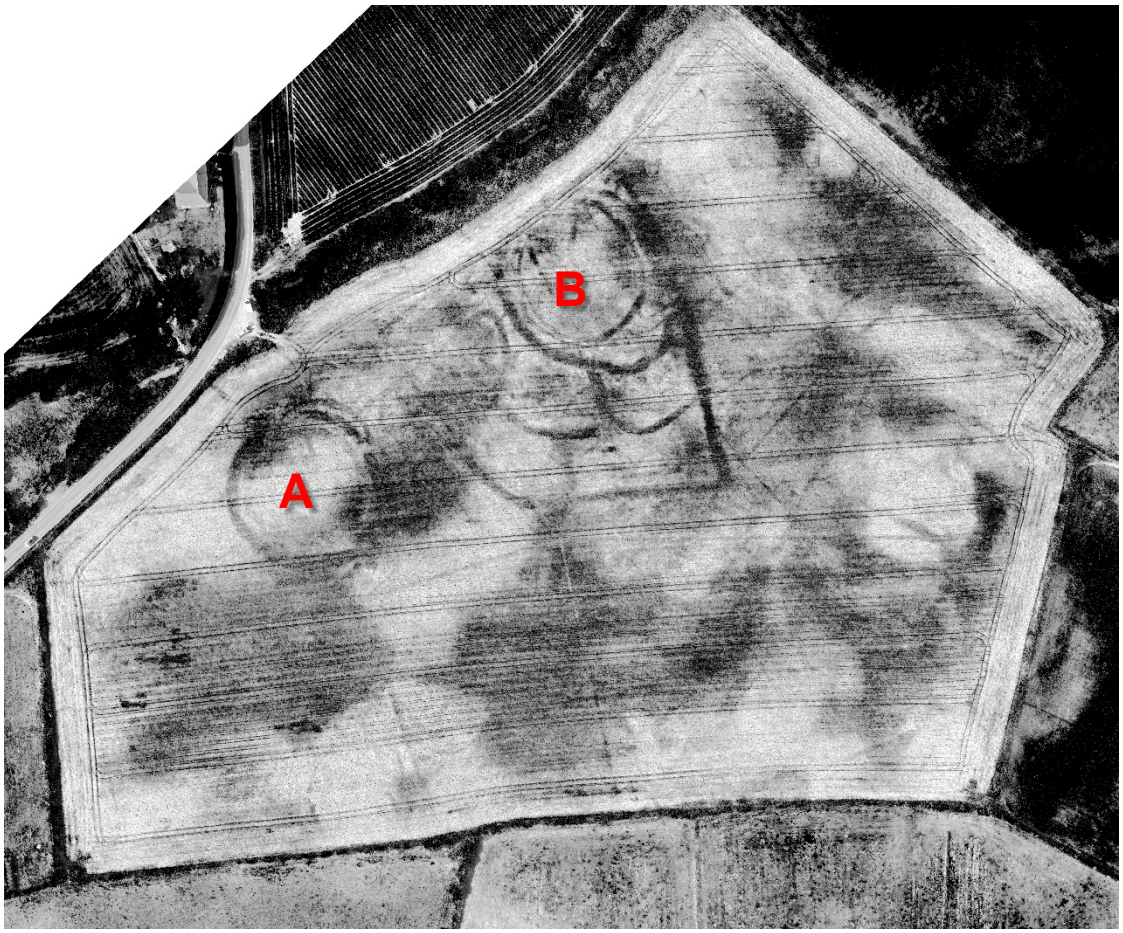


Figure 8: July 2021 Drone dataset spectrally enhanced and converted to greyscale

2 circular enclosures can be identified and referred to as A and B throughout this report. The enclosure B is situated on a slight ridge running SW to NE ending just before it meets the river river Cargy which runs along the NW edge of the field as can be seen on the multi-directional hillshade (Figure 10) created from a Digital elevation Model (DEM) built from the drone acquired imagery, (Figure 9)

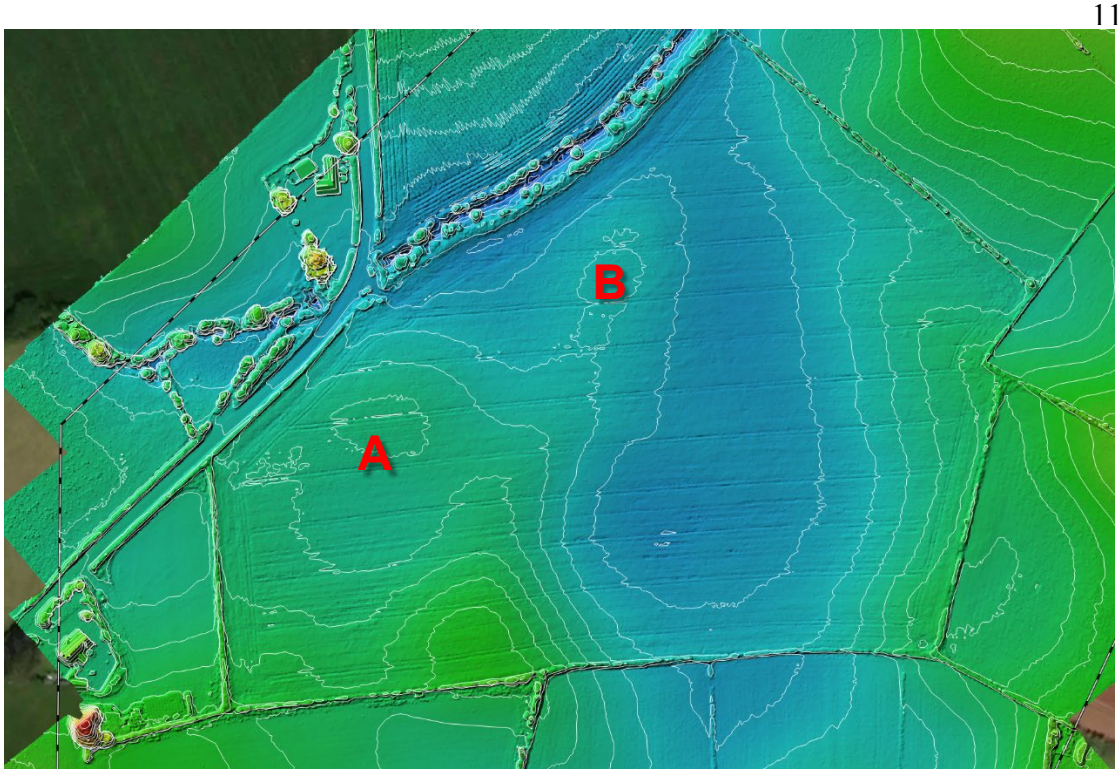


Figure 9: 1m contours; Green is high round Blue is low ground (Source: drone data)

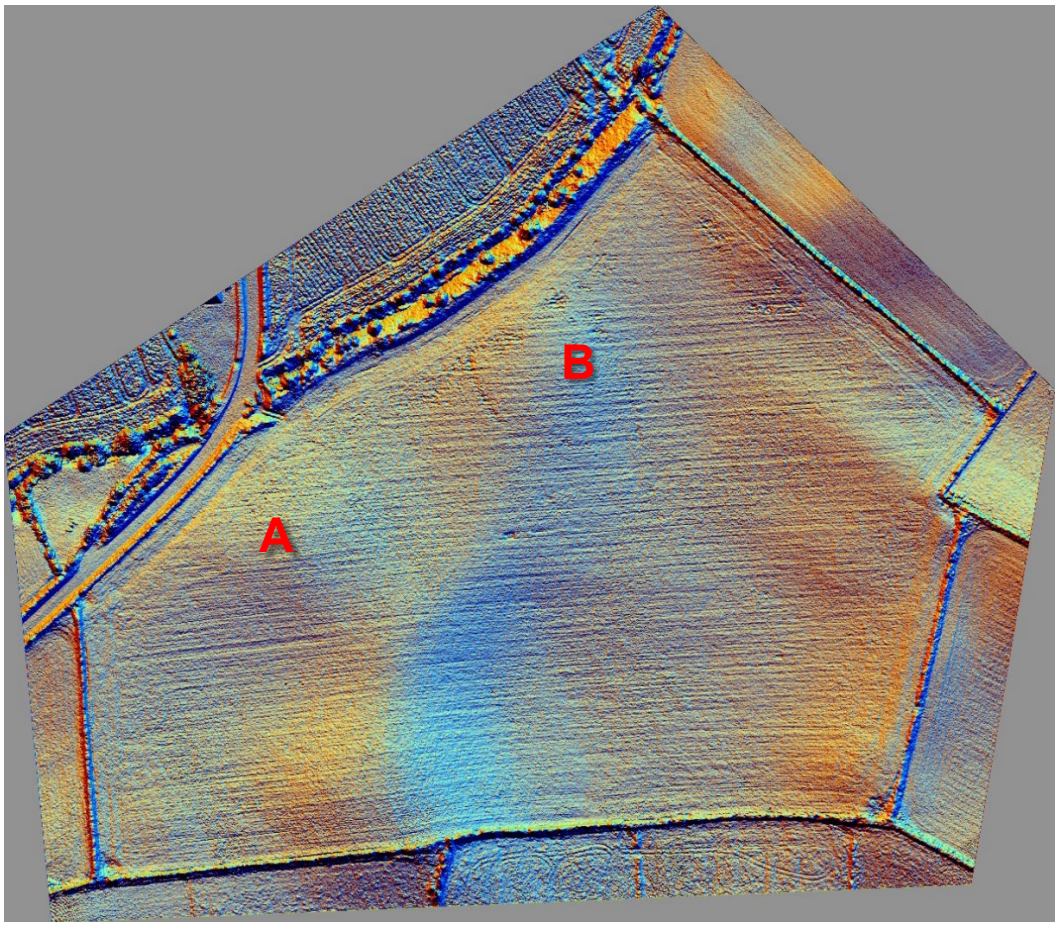


Figure 10: Multi-directional hillshade from 2021 aerial Digital Elevation Model (Source Drone Data via RVT

The slightly higher ground to the south of the field entrance (A in Figure 9, Figure 10,

Figure 11 and Figure 12) is enclosed by a triple circular crop marks approximately 53m in diameter. At least one entrance can be identified at its NE side.

The inner church enclosure is most likely is at top right (B in Figure 9, Figure 10, Figure 11 and Figure 12).

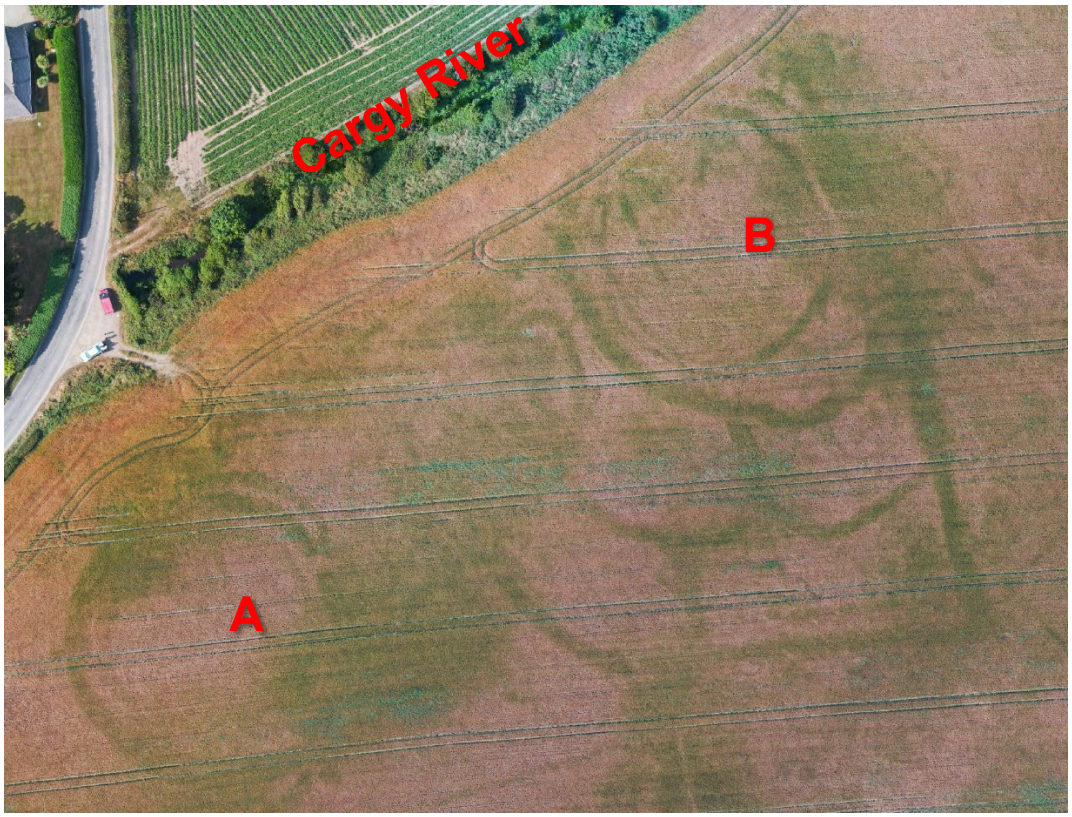


Figure 11: The two main groups of crop marks (Source: Drone data)

6. Earth Resistance Survey Methodology

6.1 Date of Fieldwork

The fieldwork was carried out over 3 days from 5th-7th November 2020 when the weather had been dry thoughout and the day before.

6.2 Grid Locations

The location of the survey grids has been plotted in. Grids were set out using 100m and 50m measuring tapes and corners reference locations recorded using a Trimble Catalyst GNSS to an accuracy of 10cm. The grid positions were chosen in 2020 based on known imagery at the time. The background imagery in Figure 13 in fact from 2021.

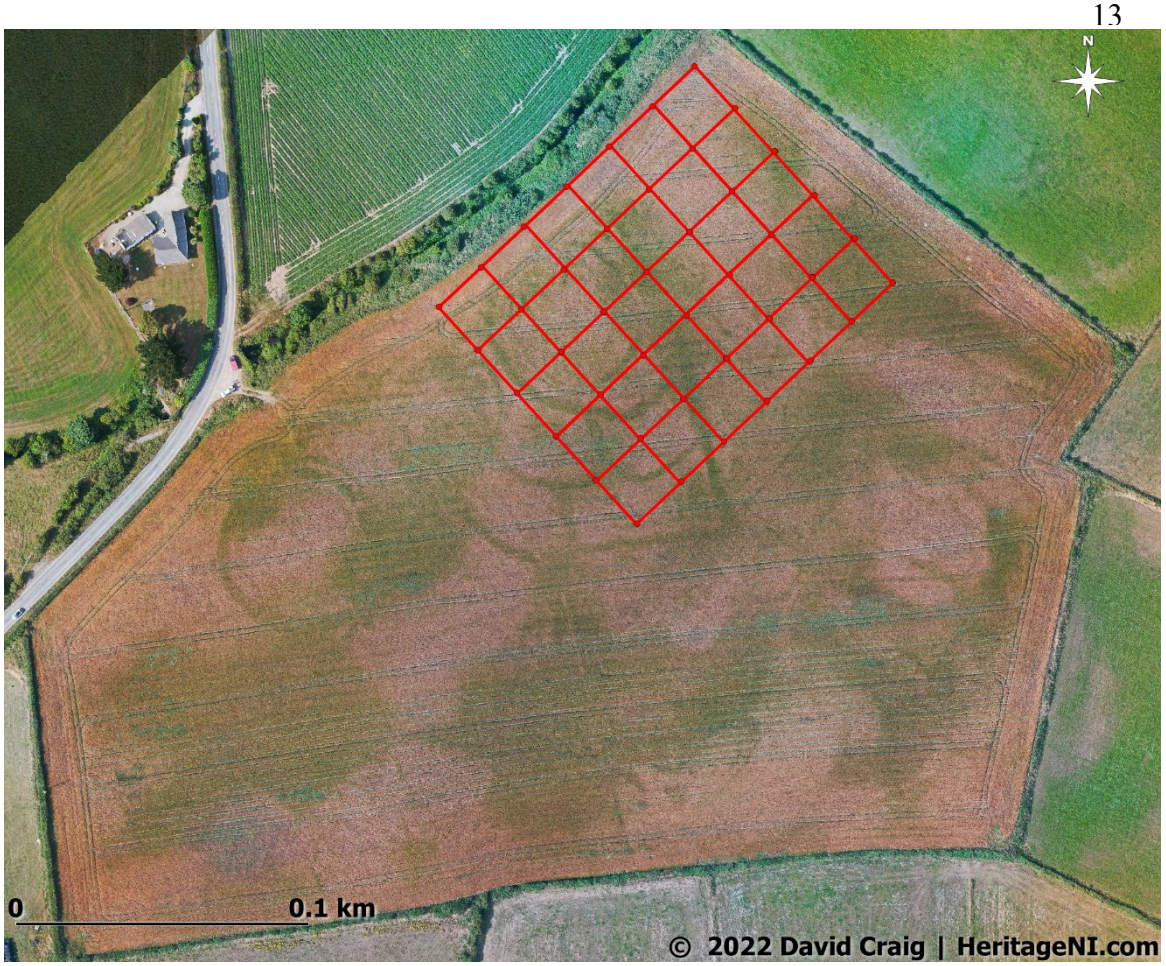


Figure 12: Grid Positions

6.3 Description of Techniques and Equipment Configurations

This method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response (light coloured in the Resistivity plot), while features such as a ditch which retains moisture give a relatively low response (dark coloured in the resistivity plot.)

The resistance meter used was an TAR-3 manufactured by RM Frobisher incorporating a Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. The instrument uses an automatic data logger which permits the data to be recorded as the survey progresses for later downloading to a computer for processing and presentation.

Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out.

6.4 Sampling Interval

Readings were taken at 1.0m centres along traverses 1.0m apart. This equates to 400 sampling points in a full 20m x 20 grid. All traverses were surveyed in a “zigzag” mode.

6.5 Depth of Scan and Resolution

The 0.5m probe spacing of a twin probe array has a typical depth of penetration of 0.5m to 1.0m. The collection of data at 1m centres with 0.5m probe spacing provides an

optimum resolution for the task.

6.6 Data Capture

The readings are logged consecutively into the TAR-3 on an SD card. The data is transferred to the office for processing and presentation.

6.7 Processing

The processing was carried out using specialist software known as Snuffler and involved the 'despiking' of high contact resistance readings and the passing of the data though a ‘Remove Geology’ filter. This has the effect of removing the larger variations in the data often associated with geological features. Data was further enhanced by interpolating the data points and the application of a sharpening filter. The nett effect is aimed at enhancing the archaeological or man-made anomalies contained in the data.

6.8 Presentation of Results and Interpretation

The presentation of the data for the site involves a print-out of the raw data as a grey scale plot (Figure 3), together with Figures for various filters and routines applied. Anomalies have been identified and plotted onto the ‘Abstraction and Interpretation of Anomalies’ drawing (Figure 8).

Plan drawings and elevations were completed, using data obtained from the drone and field surveys. The site was also subject to a wider drone survey, data from which was stored in digital format and used to generate some of the images in this report.

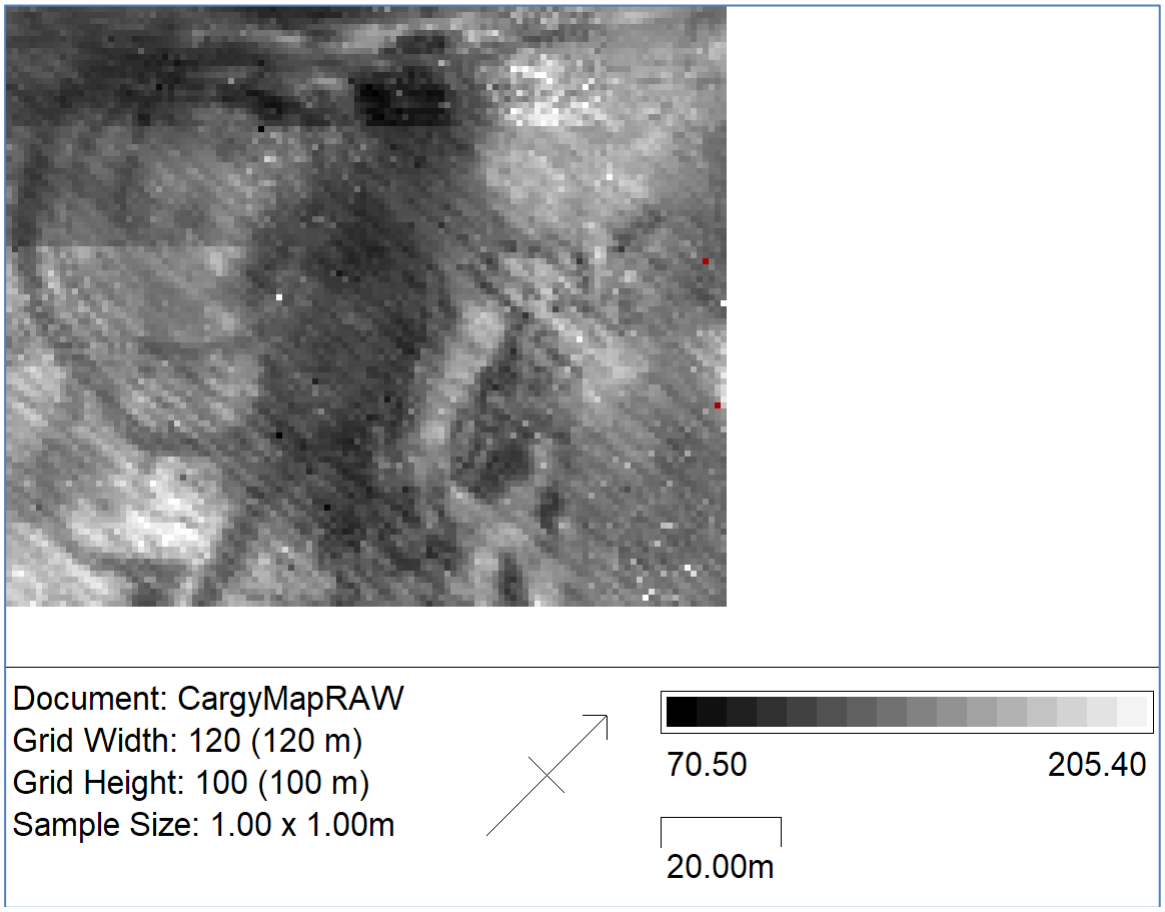


Figure 13: Unfiltered results (Source: Snuffler)

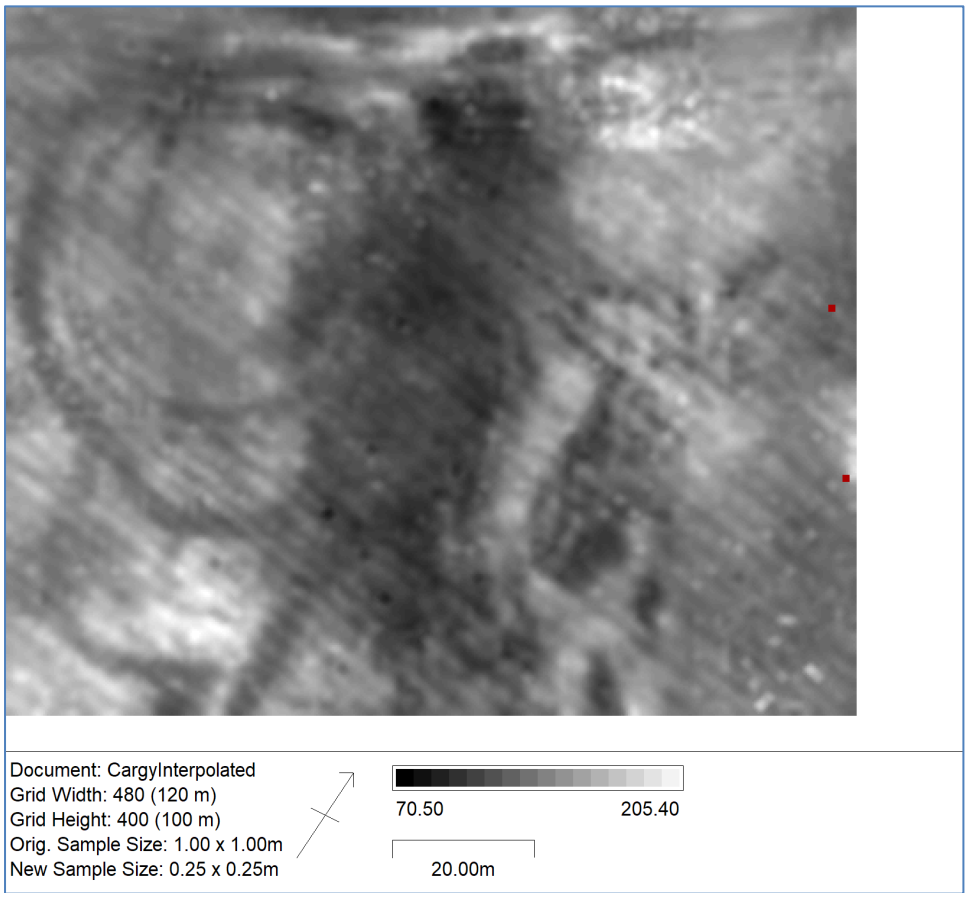


Figure 14: Interpolated Results (Source: Snuffler)

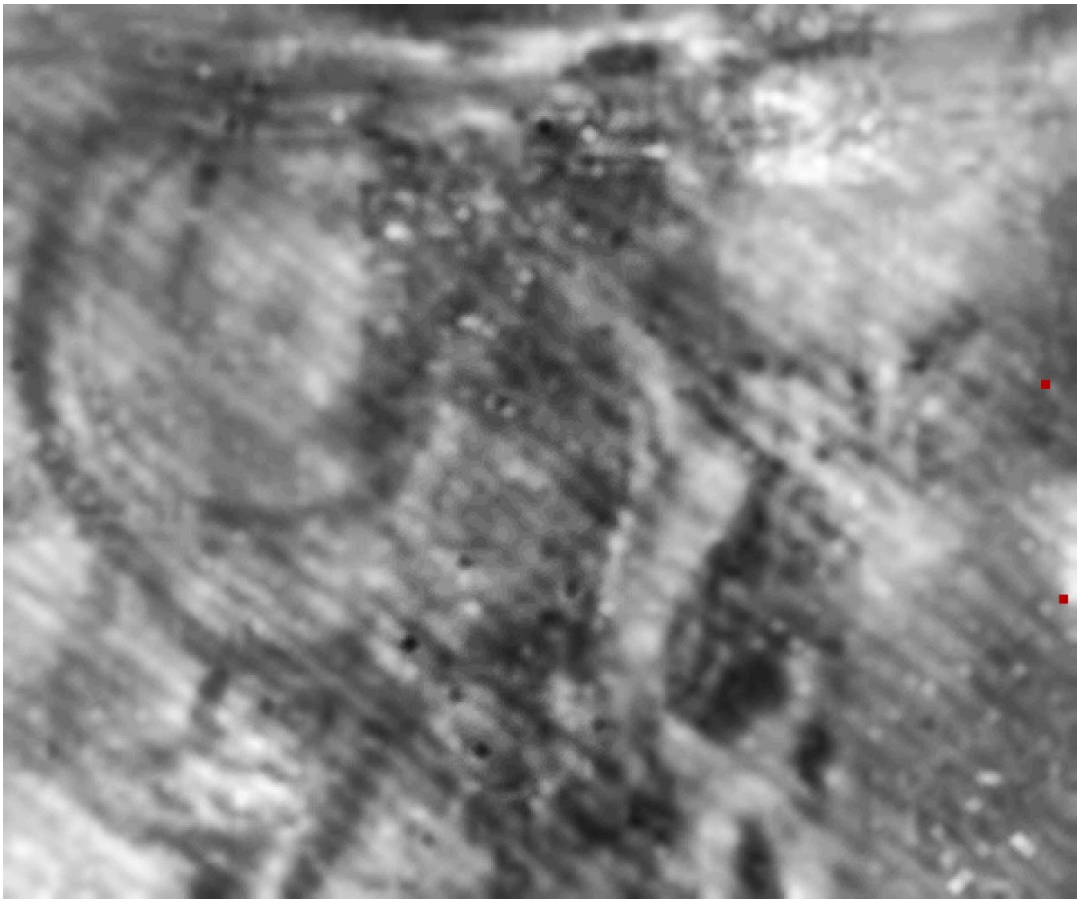


Figure 15: Interpolated with manual smoothing (Source: Snuffler)

7. Discussion

It is clear from the combined Earth Resistance survey (Figure 16) and the wider aerial survey that this site is complex and probably in use across a wide time period as indicated by the finds of a 5th/6th Century Pin and bracelet terminal through to a mention in the Taxation of Pope Nicholas of 1306 as Renlys and an Inquisition of 1547 where it goes by the name of Kenlys. The apron ditches south of feature B have gaps in their ditches which would suggest facilitation of transfer of livestock from field to field.

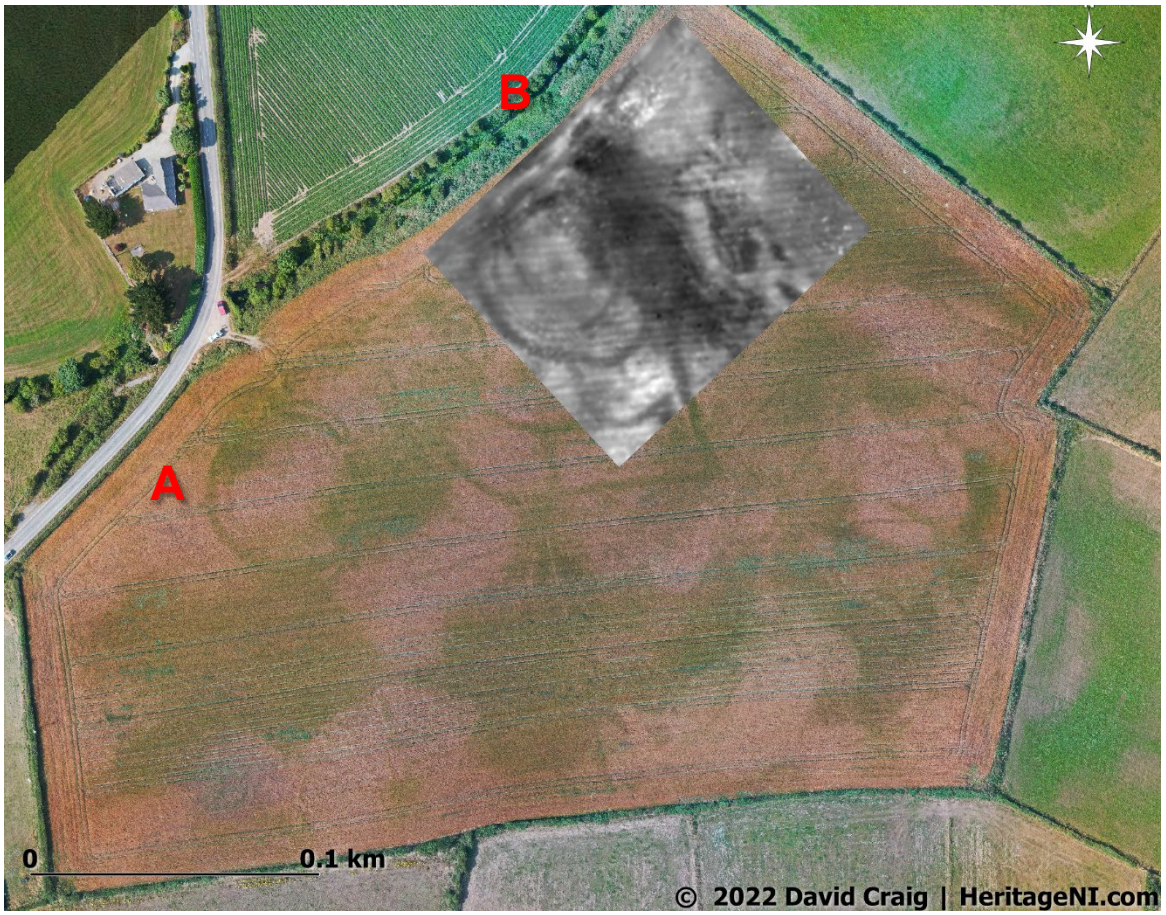


Figure 16: Combined aerial and earth resistance survey

Feature Group A

There is a fainter inner ditch which may represent an earlier filled in ditch. A sharply defined entrance can be seen at the NE side in the outer enclosure. The faint inner darker areas at the northern part of the enclosure may indicate settlement.

D in Figure 19 shows a circular ring ditch like feature which can be viewed with some clarity in the enlarged portion of multi-directional hillshade derived from the DEM (Figure 20). This feature is cut across by the southern part of the ditch of feature A. See the Abstracted Figure 20.

E in Figure 19 could possibly be another entrance

Figure 17: details from the drone data of Feature A (Source: Drone data)

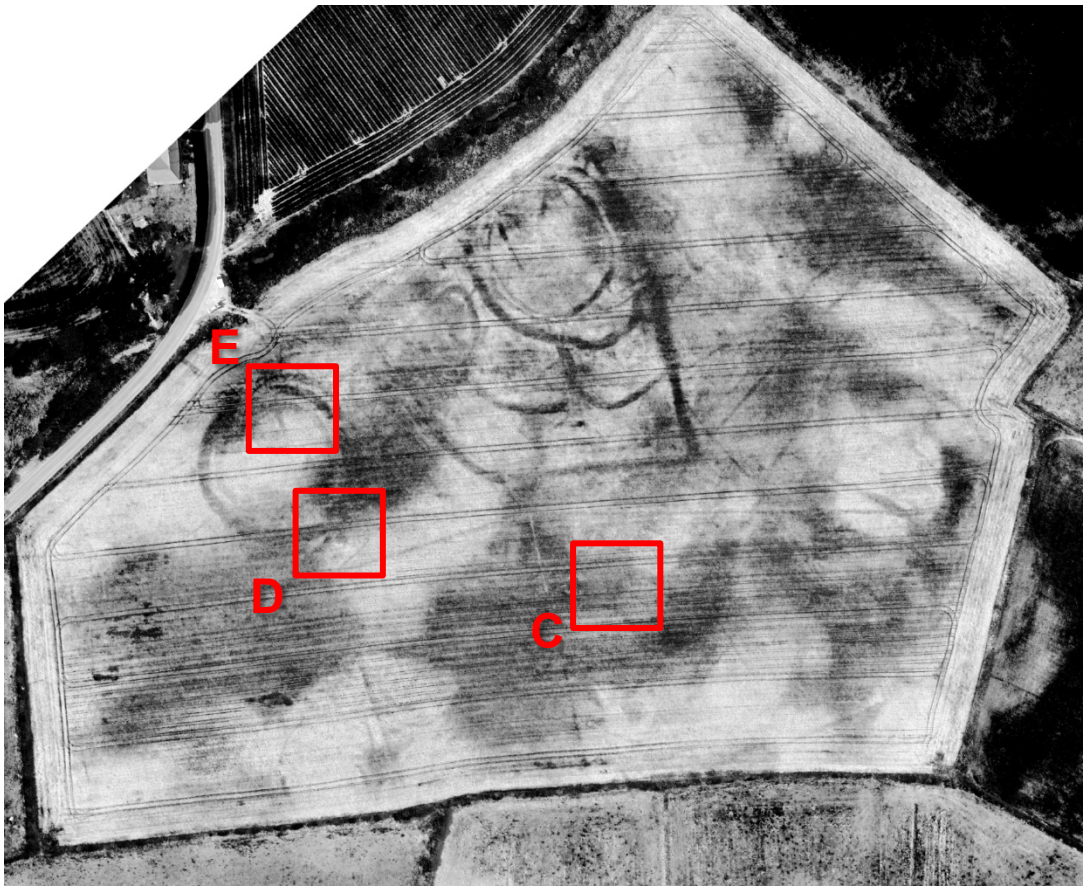


Figure 18: Enhanced Image extracted from the drone RGB Orthomosaic

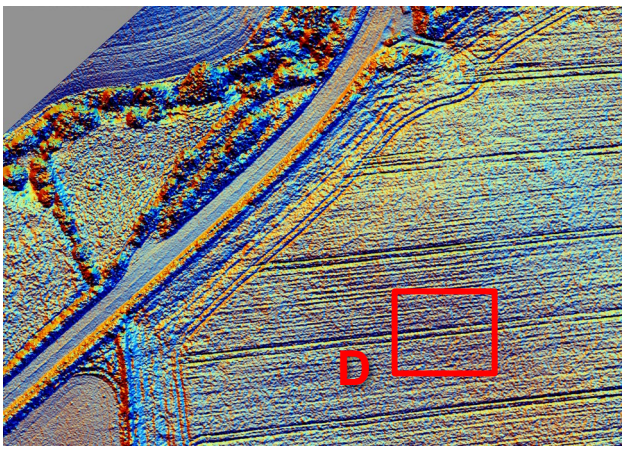


Figure 19: Enlarged detail from the multi-directional hillshade showing ring ditch type feature (D in Figure 19) (Source: Drone Data via RVT)

Feature D

This feature appears in the multi-directional hillshade created from the DEM with a x5 vertical exaggeration applied to the output. A circular ditch with an inner bank and a further inner ditch can be identified. This feature seems to be cut by the large Feature A.

Feature Group B

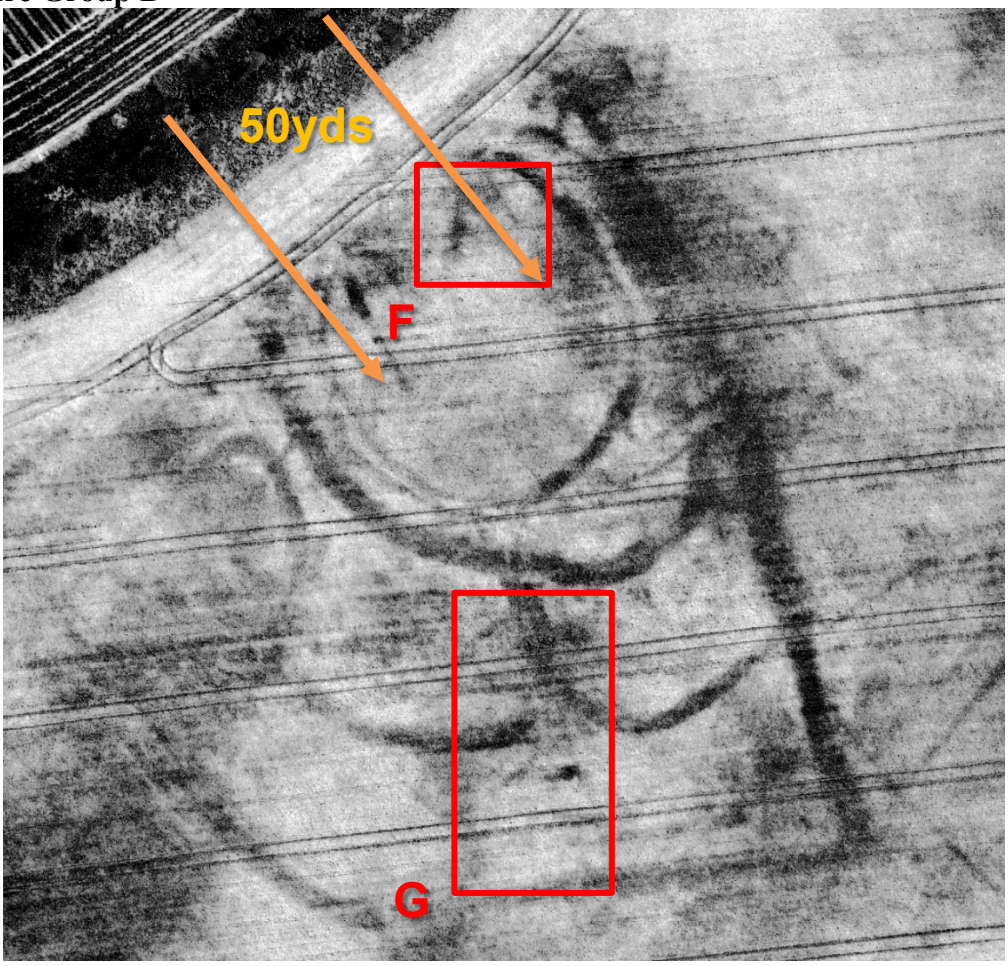


Figure 20: Enlarged view Feature area B from the drone enhanced RGB ortho-mosaic and the probable site of the church 50yds from the river (Source; drone data)

The aerial survey in Figure 21 needs to be viewed in conjunction with the Earth Resistance survey in Figure 16. There is no definitive shape that could be attributed to the church in the aerial imagery however the low resistance area to the east (F) within the inner enclosure could represent structures. Reeves describes the church as being 18yds by 6yds and 50yds from the river.

The area marked as G seems to be an entrance at least to the apron enclosures. The prominent dark spot on this area may indicate a well or spring. Its position would suggest it was central for livestock watering if not for the human inhabitants as well.

Figure 21: G, Possible Entrance way (Source: Drone data)

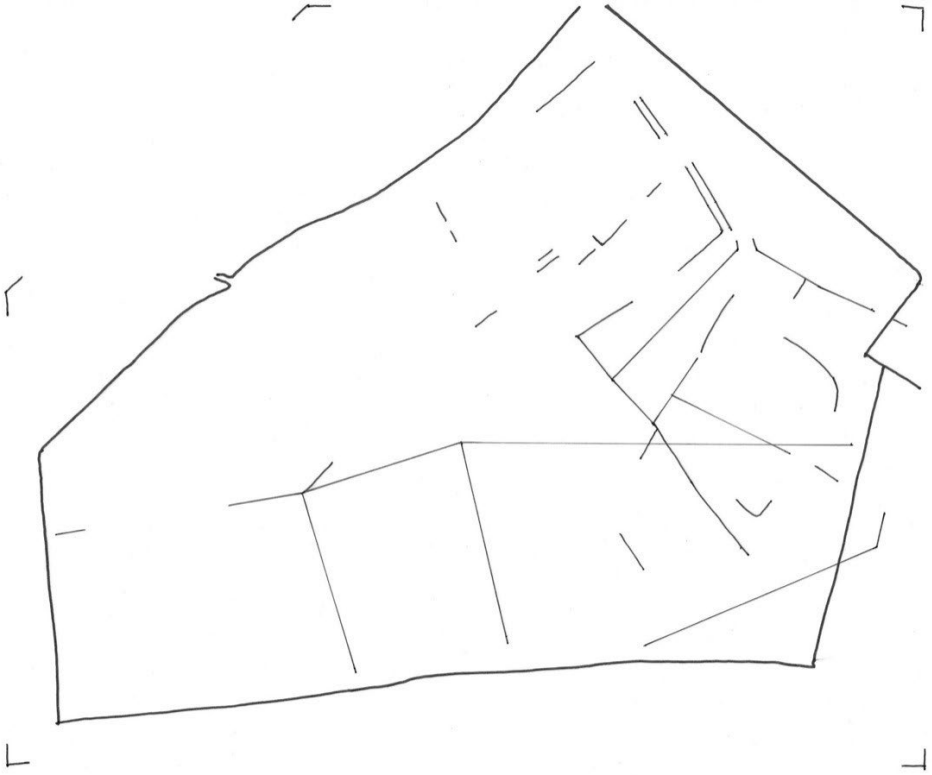


Figure 22: Pre-modern field boundaries (Barrie Hartwell)

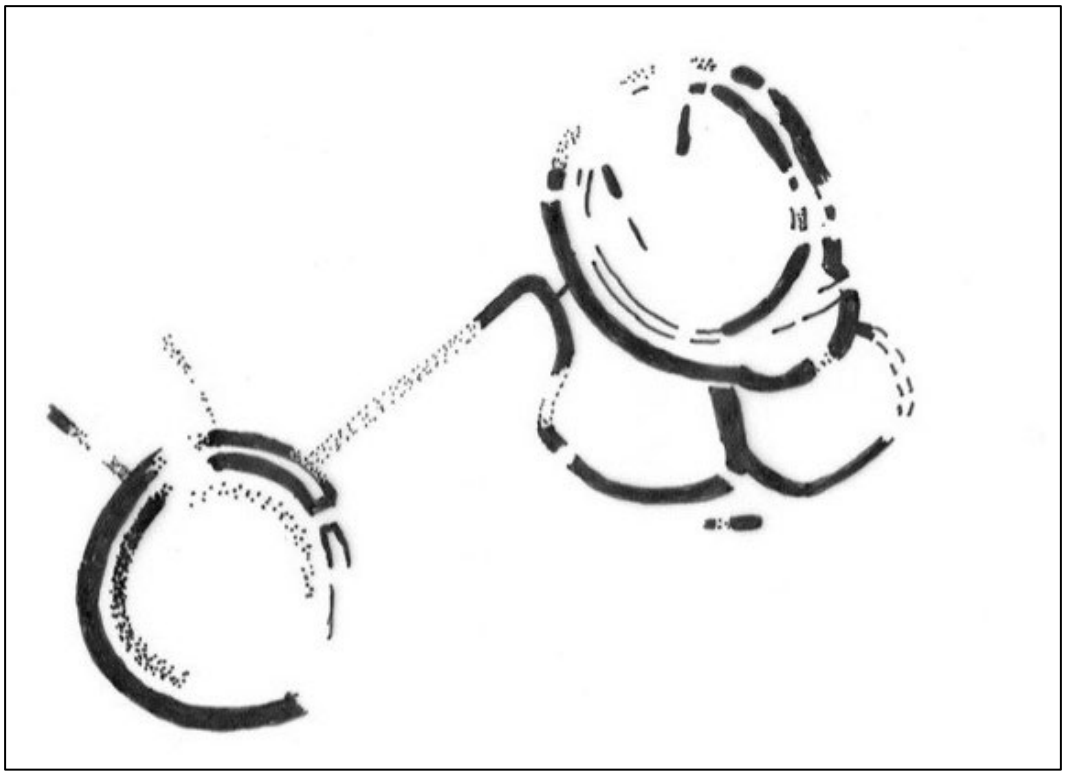


Figure 23: Overall drawing of the site (Barrie Hartwell)

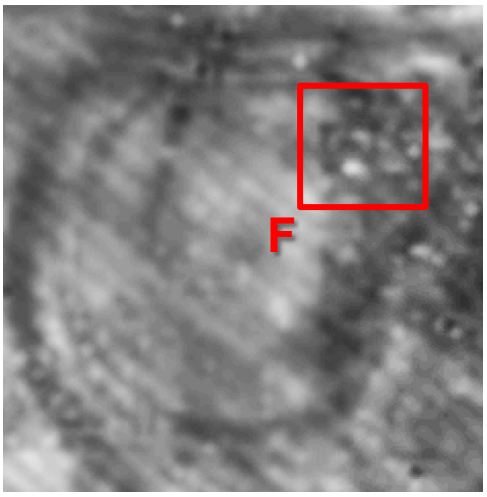


Figure 24: Possible location of church buildings in Resistivity results

Feature C
C in Figure 19 shows what could be a Fulacht fiadh or Burnt Mound when its location and shape are viewed relative to the palaeo-channel running west to east which is only subtly identifiable in the RGB ortho-mosaic. The feature is 6.7m from north to south

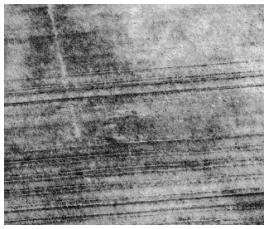


Figure 25: Possible Fulacht fiadh (C) in Figure 19 (Source: Drone Data)

8. The Finds

All these metallic finds have been traced to having come from the ploughsoil of this field. The whereabouts of most of them are not now known.

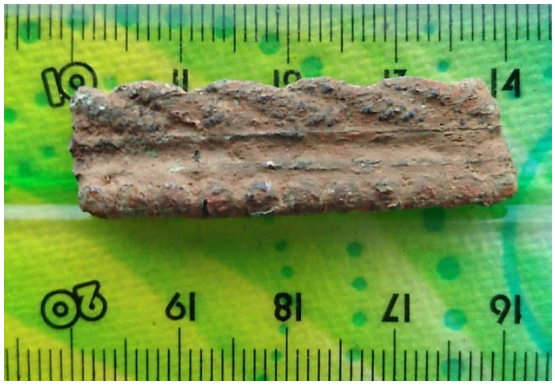
7th Century (C. Bourke) Bracelet terminal

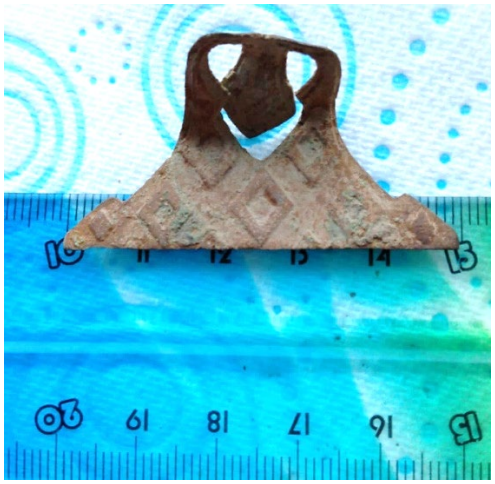
6th/7th (C. Bourke) Century Pin

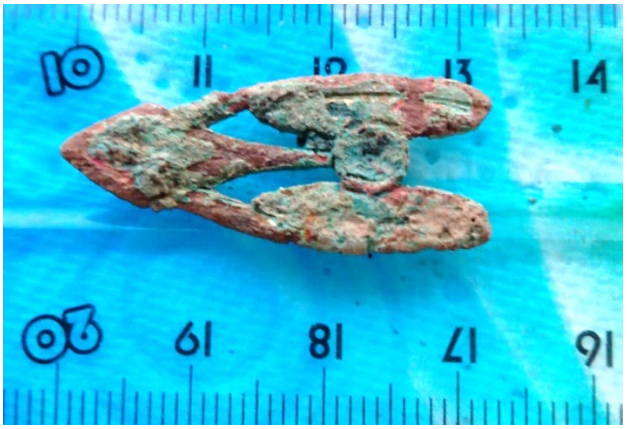
Copy of a copy originally
taken by Down Museum

Copy of a copy originally
taken by Down Museum

Copy of a copy originally
taken by Down Museum
White lead handles, iron tool







9. Recommendations for further work

The suggested site of a Fulacht fiadh (C) could easily be proved by a competent metal detectorist who could identify the presence of magnetism in heat cracked stones in the subsurface.

The bank up against the south side of the Cargy River could be cleared of the dense briars and investigated for the surface presence of worked stone and grave maker remnants. Locals can recall seeing inscribed grave fragments. This would be the natural place where large stones would have been cleared to. A few can be seen in winter when there is less foliage. Any finds could be photographed, their location recorded and left in situ.

While the above suggestions would still need Scheduled Monument Consent, they would be non-invasive and supervised by a qualified Archaeologist.

It is suggested that funding be sought for a staged Archaeological investigation by test trenching intially to identify the period of use and construction of various features in both Feature Groups A and B. As, according to the metal detected finds and the cropmark morphology, the site would seem to have been occupied across a wide period of time.

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11.APPENDIX A: Black and White Crop Mark Enhancement Methodology

The method was first developed using imagery flown over the Temple Field at Mount Stewart in an attempt to unravel the various feature found in that field. The technique was further enhanced as part of the process of identifying features in the surround wheat fields around the Giants Ring at Ballynahatty in 2018 in association with Barrie Hartwell. The technique works well on wheat and barley crops. It is crucial that the time of the drone image acquisition is chosen when the crop is midway between ripening as it turns from green to ripe yellow. It is the manipulation of these 2 colours that achieves the enhanced result.

The source imagery is the high resolution RGB geoTIFF created using the photogrammetry software Agisoft Metashape Pro version 1.8. The multiple source images were acquired by drone. This main technique utilises several functions within Adobe PhotoShop v23.2.2

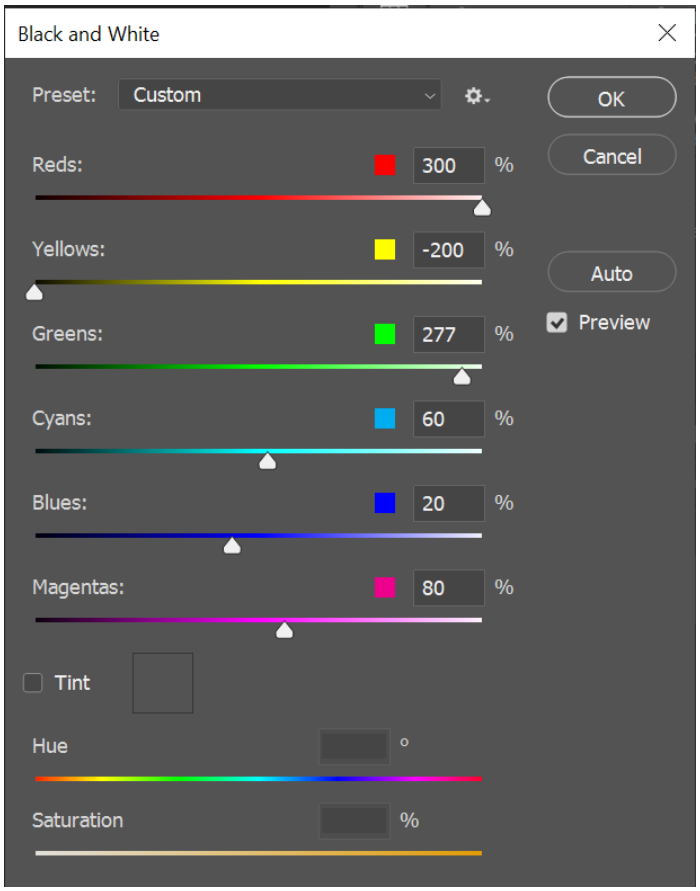
In order to manipulate the imagery a fast CPU, at least 32Gb of memory and multiple

graphics cards was used. 208 photographs were acquired with a 70% side and forward overlap. The resulting image was 23094 x 20156 pixels and approximately 1Gb in size.

Prior to creating the GeoTIFF file the 208 images were processed through the artificial intelligence software Topaz Sharpen AI.

The Camera Raw plugin within Photoshop was used to stretch the tones to the full visible range. Highlights, midtones and shadows were also adjusted to create the optimum result.

The Black and White function was then used to manipulate the GeoTIFF to achieve the best contrast with the yellow and green colour bands. The Red band was also adjusted. Cyan, Blues and Magenta adjustments made no discernible difference.



The output from this function was again loaded into the Camera Raw plugin for final adjustments.

12.APPENDIX B: Drone Data Acquisition Methodology

The seasonal time of acquisition had to be chosen precisely when the crop was slightly prior to full ripening where there was still areas of unripened crop in the localised areas with elevated moisture retention. The drone used was a DJI Mavic Pro 2 with a 20mp Hasselblad camera. Multiple overlapping images were acquired using the automated capture software MapPilot and flown autonomously. 208 photographs were taken nadir to create a single georeferenced photogrammetry dataset that is 19,860 x 24,814 pixels. The ground sample distance (GSD) is 3.08 pixels/cm at an AGL of 120m. The images were processed through the photogrammetry and 3D modelling software, Agisoft Metashape Pro. v1.8 The resulting geoTIFF image was further processed through the Camera Raw plugin in Adobe Photoshop and the colours adjusted using a custom filter to create the

enhanced black and white image. A Digital Elevation Model (DEM) file was also created and processed through the DEM enhancing software Relief Visualization Toolkit[1]. Quantum Graphical Information System (QGIS) was used to correlate the various acquired datasets.

[1] Kokalj, Ž., Somrak, M. 2019. Why Not a Single Image? Combining Visualizations to Facilitate Fieldwork and On-Screen Mapping. *Remote Sensing 11*(7): 747.