

**THE INNER BAILEY
PENSTOWE CASTLE
KILKHAMPTON
CORNWALL**

Results of a Geophysical Survey



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THE INNER BAILEY, PENSTOWE CASTLE,
KILKHAMPTON, CORNWALL
RESULTS OF A GEOPHYSICAL SURVEY

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On behalf of the National Trust (NT)

SUMMARY

This report presents the results of a geophysical survey carried out by South West Archaeology Ltd. (SWARCH) on land at Penstowe Castle, Kilkhampton, Cornwall. The site is located on an elongated knoll west of the village of Kilkhampton. The castle (MCO39452; DCO1339) is a rare example in Cornwall with a motte and two baileys that was probably built between 1066 and the end of the 12th century, probably during The Anarchy, 1135-1153. Excavations revealing 12th century pottery and structural elements on the motte and in the inner bailey took place in 1925 and the 1950s. Subsequent archaeological assessments and topographic surveys and plans of the castle were made between 1977 and 1999 (see Preston-Jones 1988; Reynolds 1999).

The geophysical survey identified 20 groups of anomalies from both magnetometry and resistivity surveys. The majority of these could be amalgamated and corresponded to previously identified topographic features within the castles motte and baileys. These anomalies represent a possible pit and stony bank material that may represent foundations to a structure on the motte; bank material around the edges of the inner and outer baileys; a possible wall and made- or disturbed ground at the west end of the outer bailey; possible former building platforms beneath shallow soil, and made-ground across the south half of the inner bailey; a possible wall-line associated with a sub-rectangular structure in the north half of the inner bailey; and a scattering of possible discrete pit-like or natural features in the two baileys.

Any potential buried archaeological resource should have survived relatively well, given the visible earthworks on the site. However, that is not to say that any previously built structures or activity will have left deep- or any archaeological evidence. Although reasonable and good plans of the site were drawn after the 20th century excavations of the site, details of these works are lacking and excavation on the site in the 1920's and 1950's may have truncated some of any buried archaeological resource and associated investigation and back-filling may have obfuscated the geophysical record.



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1.0 INTRODUCTION

LOCATION:	PENSTOWE CASTLE (A.K.A. KILKHAMPTON CASTLE)
PARISH:	KILKHAMPTON
COUNTY:	CORNWALL
NGR:	SS 24302 11577
SWARCH REF.	KCG21

1.1 PROJECT BACKGROUND

South West Archaeology Ltd. (SWARCH) was commissioned by Cornwall Archaeology Unit (CAU), on behalf of the National Trust, to undertake a geophysical survey on Penstowe Castle, Kilkhampton, Cornwall. This work was undertaken in accordance with best practice and ClfA guidance.

1.2 TOPOGRAPHICAL AND GEOLOGICAL BACKGROUND

Penstowe Castle (the site) is located west of the village of Kilkhampton, c.990m west of the A39 along West Street and immediately south of the street. The castle occupies an elongated oval knoll at a height of c.127m AOD, surrounded by very steep slopes, particularly to the north, south and west. This castle was set within an agricultural landscape of steep valleys and hills, with views along the Coombe Valley to the west (Figure 1).

The soils on the site are the well drained fine loamy or fine silty soils over rock of the Manod Association (SSEW 1983), which the sedimentary sandstone of the Bude Formation (BGS 2021).

1.3 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Kilkhampton (*Kelk*) is first documented in c.839AD in a Charter gifting land to the bishopric of Sherbourne from King Egbert of Wessex (Charter Ref: S 1296; Sawyer 1968; Preston-Jones 1988). Kilkhampton is recorded in the Domesday Book as *Chilchetone* (Morris 1992), which is derived from the Cornish *Kylgh* meaning 'circle' and Old English *tūn* meaning 'estate/farmstead' (Watts 2004). In 1086 Kilkhampton was a large estate of 69 households. It was held by the king, although is likely to have been granted to the Grenville family during the 11th century, prior to- or during King William Rufus' reign (1087-1100) (Lysons 1814). The Grenville's were kinsmen of the Earls of Gloucester, who may have been the original branch of the family to hold the estate from the king (Preston-Jones 1988 – from Henderson 1925), Robert, Earl of Gloucester was the half-brother, and supporter during The Anarchy, of the Empress Matilda. The Grenville family were responsible for developing Kilkhampton as a prosperous market town. In the 18th century the estate passed through marriage to the Carteret family, then via a nephew to the Thynne family, who was then created Lord Carteret (Lysons 1814). The 1840 tithe apportionment shows that Lord Carteret owned the site (plot 338; *Castle Hill*) and that it was occupied at the time by a Richard Jewel and under pasture.

Kilkhampton has a rich archaeological background with Bronze Age barrows are recorded on the south edge of the settlement (MCO2253; MCO2254) and Iron Age/Romano-British settlement activity and findspots both in- and near to the settlement (MCO826; MCO8921), including along the ridges/slopes of the valleys between Coombe to the west and the River Tamar to the east (MCO7556; MCO8526).

Cornwall's Historic Landscape Characterisation describes the site as 'Plantations and scrub' (HCO10); however, it is a surrounding landscape of 'Medieval Farmland' (HCO4), which is attested for by large amounts of surviving strip-fields between the site and Kilkhampton (MCO21117) and

cropmarks of field systems and ridge and furrow in the surrounding area (e.g. MCO40209). The earliest mapping of the site, naming it *Castle Hill* was the Stowe Atlas, 1694 (accessible in the Cornwall Record Office; Preston-Jones 1988). It was also named *Castle Hill* on the 1813 Ordnance Survey (OS) mapping and 1840 Tithe map. The OS first and second edition mapping, published 1885 and 1906, show a more detailed topographic depiction of the castle. The motte, baileys, some internal slopes/features and footpaths are shown on these maps. Supporting cartographic sources and LiDAR imagery of the site can be seen in Appendix 2.

Penstowe Castle (MCO39452; DCO1339) has been subject to two previous archaeological assessments (Preston-Jones 1988; Reynolds 1999) as well as within an assessment regarding Kilkhampton (Sheppard 1980). These previous reports include archaeological and historical summaries of the site and its area, putting it in context. Of note are a survey of earthworks immediately east of the castle and a watching brief of a water pipe trench that ran across these earthworks/outer ramparts in c.1999; and castle surveys and excavations conducted in c.1925, the early 1950s; and subsequent site/measured surveys in 1977, 1982 and 1988.

The 1925 works were conducted by Charles Henderson, who identified building foundations and produced a sketch plan and cross section of the castle. His excavation established that c.0.304m of 'topsoil' overlaid the natural bedrock in the Inner bailey and that walls of structures in the inner bailey were comprised of- or survived as loose stone: no worked pieces were present. The early 1950s investigations were conducted by John Bradford who identified 'D'-shaped foundations on the motte along with 12th century sherds of pottery. In 1977 the site was surveyed by Ordnance Survey who corroborated the presence of a 'D'-shaped feature on the motte, but did not identify building remains in the baileys; it may have been largely overgrown at the time. When the National Trust surveyed the site in 1982 the castle was relatively overgrown with scrub and no internal features were identified within the baileys apart from a single stone foundation noted in the inner bailey. Post scrub clearance in 1988 the Cornwall Archaeological Unit and the British Trust for Conservation Volunteers identified and surveyed further topographic features of/on the castle (see Appendix 1, Figure 11). Two circular pits cut into the west end of the inner bailey have been interpreted as possible quarries and show that the surface of the bailey is at natural ground level and not built up. The 1990's watching brief of work across ramparts and earthworks east of the castle indicated a clayey construction and recovered 14th/15th century pottery from the topsoil.

No documentary evidence for the establishment/building of the castle exists; however, it was probably built between 1066 and the end of the 12th century. It may have been built by William I or the Grenville family; although probably it was built as an 'adulterine' castle during The Anarchy (1135-1153), possibly by the Earl of Gloucester. The castle is one of only two known examples in Cornwall with a motte and two baileys, the other being East Leigh Berries. A physical description of the castle as given in the HER can be seen below:

'The oval motte is situated at the western end of the castle. It is 18m in length east to west, and 8m from north to south. A V-shaped ditch below the motte separates it from the inner bailey. The inner bailey is rectangular and measures 30m east to west, and 25m north to south. The outer bailey, separated from the inner by a V-shaped ditch, is of a trapezoidal form: 24m east to west; 20m north to south; 14m north to south-east.'

The Castle is a scheduled monument (1003079), and the scheduling text reads:

'The monument includes a motte and bailey, situated on an elongated natural knoll above steep valley of an unnamed river, leading to the Coombe Valley to the west of Kilkhampton. The motte survives as a steep-sided oval mound measuring up to 6m high and surrounded by a ditch of up to 8m wide and 3.6m deep. There is a rampart bank at the summit of the motte, and immediately to the east a rectangular inner bailey, separated from a D-shaped outer bailey by a V-shaped ditch up to 8m wide and 1.5m deep, with both baileys being defined by ramparts with surrounding outer ditches. The whole castle is enclosed by later field boundary banks beyond the ditches. The inner bailey contains various earthworks including a probable wall with opposed

entrances and building platforms. The outer bailey also has an uneven interior and there is a possible causeway at the eastern end across the outer ditch. Known locally as 'Kilkhampton or Penstowe Castle' there is no known surviving medieval documentation leaving writers, such as Henderson in the 1920's, to suggest it was an 'adulterine' castle built during the Civil War between Stephen and Matilda in the mid-12th century. The earliest known reference is the Stowe Atlas of 1694. Partial excavations were carried out by Henderson in 1925 and Bradford in the early 1950's. The latter discovered the foundations of a D-shaped building on the summit of the motte and some 12th century pottery.'

1.4 METHODOLOGY

This work was undertaken in accordance with current best practice and CIfA guidance. Any desk-based assessment aspect of this report follows the guidance as outlined in: *Standard and Guidance for Archaeological Desk-Based Assessment* (CIfA 2014a) and *Understanding Place: historic area assessments in a planning and development context* (English Heritage 2012). The geophysical (gradiometer) survey follows the general guidance as outlined in: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016) and *Standard and Guidance for Archaeological Geophysical Survey* (CIfA 2014b).



FIGURE 1: SITE LOCATION (THE SITE IS INDICATED).

2.0 GEOPHYSICAL SURVEY

2.1 INTRODUCTION

An area of c.0.13ha was the subject of both a magnetometry (gradiometer) survey and a resistivity survey. The purpose of this survey was to identify and record magnetic anomalies and anomalies of relative resistance within the proposed site. While identified anomalies may relate to archaeological deposits and structures the dimensions of recorded anomalies may not correspond directly with any associated features. The following discussion attempts to clarify and characterise the identified anomalies. The survey was undertaken on the 9th of March 2021 by J. Bampton and M. Edwards; the survey data was processed by J. Bampton.

2.2 SITE INSPECTION

The site was located across the internal areas of Penstowe's motte and baileys. These constituted a very small sub-circular area at the west end of the castle (the motte), and two small approximately rectangular areas; one in the middle- (the inner bailey) and one at the east- (the outer bailey) end of the castle. All of these areas were under short and relatively well worn grass. The monument was in good condition with well-defined and surviving banks and ditches. It was possible to survey the approximately level tops and internal areas of the motte and baileys. On the motte this area was defined by a 'D'-shaped bank around its east and south sides, with a flattish top presumably worn level by footfall. This bank may have been eroded through or had an access in its east side that allowed the current access to the motte. This bank helped define a slight hollow/level interior. This interior was a little less even with a dip in its north side and evidence of a small camp fire near its middle. The inner bailey, although quite even and level had a large number of topographic features within well-defined approximately square area. The north bank of this area had signs of erosion and a worn path was visible running along the north side of the inner bailey. Some uneven mounds were visible near the foot of the slope of the high east bank to the inner bailey. A possible ridge ran approximately east-west along the middle of this area. On the south side of this the area had a slight depression that could define a sunken platform. The north-east quarter of the inner bailey had a slightly raised and uneven sub-rectangular 'platform'. At the north-west edge of the inner bailey, in the west side of the bailey an area of the bank was uneven and a section of pitched stone wall was visible. This may equate to a retaining wall and be part of an original feature or later repair or feature. The outer bailey had slightly inconsistent banks at its east end and relatively low banks along its south side. There were no obvious topographic features visible within the outer bailey during the survey apart from a gully in the north-east side of the area running onto the ditch between the baileys. Worn 'foot'-paths were visible from the east entrance to the site running to the north-west corner of the outer bailey. This path forked to go into the gully and to the northwest corner of the area. Another foot-worn path was evident up the south-west corner of the outer bailey. Supporting photographs for the site inspection can be seen in Appendix 3.

2.3 METHODOLOGY

The geophysical surveys followed the general guidance as outlined in: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016) and *Standard and Guidance for Archaeological Geophysical Survey* (ClfA 2014b).

The magnetometry (gradiometer) survey was carried out using a twin-sensor fluxgate gradiometer (Bartington Grad601). These machines are sensitive to depths of up to 1.50m. The survey parameters were: sample intervals of 0.125m, traverse intervals of 1m, a zigzag traverse pattern,

traverse orientation was circumstantial, grid squares of 30×30m. The gradiometer was adjusted ('zeroed') every 0.5-1ha.

The resistivity survey was carried out using an RM15-D Resistivity Meter with an MPX15 Multiplexer module allowing for four terminal sensing using a PA20 multiprobe (dualprobe) array system. These machines are sensitive to depths of up to c.1m. The survey parameters were: sample intervals of 1m, traverse intervals of 1m, a zigzag traverse pattern, traverse orientation was circumstantial, grid squares of 30×30m.

The survey grid was tied into the Ordnance Survey National Grid- and set out using a Leica CS15 GNSS Rover GPS. The data was downloaded onto *Grad601 Version 3.16* and processed using *TerraSurveyor Version 3.0.36.0*. The primary data plots and analytical tools used in this analysis were *Shade* and *Metadata*. The details of the data processing are as follows:

Magnetometry Processes:

DeStripe all traverses, median; used to equalise underlying differences between grids (potentially caused by instrument drift or orientation, directional effects inherent in magnetic instrument, or differences in instrument set up during survey e.g. using two gradiometers).

DeStagger grids a4, a5, a7-a11, all traverses out- and inbound by 0.25m; reduces staggering effects within data derived from zig-zag collection method.

Clip +/- 1SD; removes extreme data point values.

Magnetometry Details:

0.12363ha surveyed

Stats prior to data clipping; Max. 94.56nT, Min. -91.18nT; Standard Deviation 6.72nT, mean 0.45nT, median -0.04nT.

Resistivity Processes:

DeSpike threshold 1 window size 3×3, once; removes extreme data point signals.

Clip from 62.00 to 455.00 Ohm; removes extreme data point values.

Resistivity Details:

0.1464ha surveyed

Stats prior to any processing; Max. 1170.00 Ohm, Min. -2047.50 Ohm; Standard Deviation 756.26nT, mean -11.57 Ohm, median 245.50 Ohm.

2.4 RESULTS

Tables 1 and 2 with the accompanying Figures 2-6 show the analyses and interpretation of the geophysical survey data. Additional graphic images of the survey data and numbered grid locations can be found in Appendix 1.

* note on 'Class' in Table 2 (in relation to resistivity survey data):

- Negative responses refer to readings of lesser relative resistance and represent in-filled cut features or relatively soft deposits.
- Positive responses refer to readings of higher relative resistance and represent built/compact stony features or relatively hard deposits.
- In this instance readings of below c.260Ohms are considered negative responses; and above c.260Ohms, positive responses.

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Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
1	Moderate mixed, possible	Sub-rectangular spread	Disturbed or made-ground	Indicative of an area of disturbed ground or spread material. Spread within a topographic feature associated with a possible platform/'hall'. Response of between c.+21nT and -12nT.
2	Moderate mixed, possible	Linear	Disturbed or made-ground	Indicative of disturbed ground along the top edge of a bank. Possibly made-ground associated with the bank. Associated with resistivity Groups F and G. Response of between c.+20nT and -17nT.
3	Weak-moderate positive, probable	Intermittent linear	Bank material	Indicative of material associated with banks that surround the castles motte and baileys. Responses of between c.+10nT to +20nT. One particular example in the south-west former of the inner bailey (<+36nT) may be an example of a pit or looser in-fill/repair to the bank at the edge of the bailey. Associated with resistivity Group B.
4	Weak negative, probable	Intermittent linear	Bank material	Indicative of compact or stony material associated with banks that surround the castles motte and baileys. Associated with resistivity Group A. Responses of between <c.-11nT.
5	Weak-moderate negative, possible	Ovoid	Pit or geological	Indicative of a deposit of stony or compact material, possibly within a pit. Possibly associated with modern ground disturbance/activity considering 20 th century excavations. Possibly geological material. Examples in the south-west corner of the inner bailey may be associated with disturbed ground. Associated with resistivity Group J. Response of <c.-17nT.
6	Weak positive, possible	Amorphous linear/ spread	Pit or geological	Indicative of cut and in-filled discrete features such as pits or tree-throws. The majority of these are in areas of possible disturbed ground, in the west of the outer bailey, south-west of the inner bailey, and at a possible platform/structure in the north-east corner of the inner bailey. Associated with resistivity Group J. Response of c.+15nT to c.+36nT.
7	Strong dipolar, possible	Ovoid	Campfire or mixed deposit	Indicative of a possible thermoremnant event, such as a small fire or a possible ferrous object or debris. Possibly within a pit-like feature or within the topsoil. The remains of a camp fire on the motte during the time of the survey was not well definable within the survey data. Response of <+/-52nT.
8	Positive and negative, possible	Linear	Topographic feature / extant gully	This anomaly equates to a visible topographic feature in the outer bailey. A small gully/depression runs along the approximate line of this anomaly. The positive and negative responses may equate to relative shallow and deeper areas of soil. It could be associated with the Group 2 anomaly; possibly remnants of a robbed-out sub-rectangular structure. Associated with resistivity Group E. Responses of +20nT to -8nT.
Other anomalies				
-	Strong dipolar, probable	Point/ ovoid	Ferrous objects/debris	Black crosses in Figure 3. The site has a small number of very weak, probable geological dipolar responses. The marked stronger examples are indicative of ferrous objects that are typically presumed to be modern, such as farm machinery fragments. Similar and weaker responses can be indicative of geological features/anomalies. These are highly probable to be non-archaeological in nature.

TABLE 1: INTERPRETATION OF GRADIOMETER SURVEY DATA.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
A	Positive, probable	Spreads (roughly linear and curving)	Bank material	Associated with possibly stony bank material. Examples on motte correspond to an interrupted 'D'-shaped bank with a relatively flat top. Possibly associated with 20 th century identified 'D'-shaped structure. Associated with Groups B, 3 and 4 Responses (Ohm) of c.369 to 416.
B	Negative, probable	Linear and ovoid spreads	Bank material	Associated with relatively softer bank material, possibly less stony redeposited subsoil and topsoil. Associated with Groups A, 3 and 4. Responses (Ohm) of c.167 to 240.
C	Positive, probable	Linear / rectilinear	Wall/foundation line	Indicative of a compact or stony line of material such as a wall or foundation. Corresponds to a topographic ridge line recorded in the 20 th century and associated with a possible hall/building platform in the inner bailey. Associated with Group 1. Response (Ohm) of c.349.
D	Positive, possible	Amorphous spread	Stony deposit	Indicative of a compact or stony deposit associated with the east edge of a possible structure and the foot of a bank; either of which may account for a stony deposit in this location. Response (Ohm) of c.416.
E	Positive, probable	Linear	Topographic feature/ gully	Indicative of a line of compact or stony material. Associated with a topographic feature extant during the survey; a gully. This response probably indicates a shallow soil overlaying natural bedrock that has been eroded or cut in to, forming the extant gully. Possibly associated with worn foot paths and/or Groups F and G. Possible a robbed out structure (?). Associated with Group 8. Response (Ohm) of c.400.
F	Positive, probable	Linear	Retaining wall / wall line	Indicative of a stony or compact deposit; possibly a wall. Possibly a retaining function associated with the bank it is in. Possible comparable example exposed in the west side of the inner bailey. Associated with Groups E and G that could represent retained material and a possible robbed out return or associated 'gully'. Response (Ohm) of c.400.
G	Positive (& Negative), probable	Sub-rectangular	Made-ground or disturbed ground	Mostly negative response indicative of a possible loose stony deposit associated with an adjacent potential structure; therefore, possibly retained material, or made- or disturbed ground. Response (Ohm) of c.136 to 455.
H	Positive, possible	Amorphous spread	Shallow ground disturbance	Associated with a slightly lower set platform defined by a slight topographic ridge along its north edge in the inner bailey. Possibly associated with underlying bedrock in an area of shallow/reduced topsoil. This could be related to a former building platform. Response (Ohm) of c.340.
I	Positive, possible	Ovoid	Pits or tree-throws	Indicative of relatively softer in-filled discrete features such as pits, postholes or tree-throws. These may be associated with possible platform, ridge or disturbed ground area in the inner bailey. Response (Ohm) of c.65.
J	Negative, probable	Amorphous spread	Made-ground or disturbed ground	Indicative of relatively softer in-filled feature, with less relative stone content. Corresponds to a topographic feature and footpath route as depicted on OS mapping between c.1885 and 1906. This area is relatively level with the rest of the inner bailey and may have been made-up at some point in the 20 th century, possibly to consolidate the castle or have been investigated and in-filled during excavations in the 20 th century. Response (Ohm) of c.156 to 200.
K	Negative, probable	Semi-circular spread	Pit or made-ground	Indicative of an area in-filled with relatively soft material such as a pit or tree-throw. Although the height and relative size of the castle may not facilitate or necessitate a well, it could represent a well or built chamber within a modified motte/hill construction. Within the limits of a previously investigated and identified 'D'-shaped structure/bank. Possibly associated with back-filled 20 th century excavations. Response (Ohm) of c.156.
L	Positive, Possible	Ovoid	Compact ground areas, stony deposits or geological variation	Indicative of small areas of high resistance indicative of large stones/boulders or small discrete features in-filled with stone/compacted material. The examples in the outer bailey may correspond to geological variation/features or anomalies associated with differential compaction along a former/extant footpath/route way. Response (Ohm) of <c.330.

TABLE 2: INTERPRETATION OF RESISTIVITY SURVEY DATA.

2.5 DISCUSSION

The geophysical survey identified 20 groups of anomalies from both magnetometry and resistivity surveys. Between them these represent a possible pit and foundations to a structure on the motte; bank material around the edges of the inner and outer baileys; a possible wall and made-/disturbed ground at the west end of the outer bailey; possible former building platforms and made-ground across the south half of the inner bailey; a possible wall-line associated with a sub-rectangular structure in the north half of the inner bailey; and a scattering of possible discrete pit-like or natural features in the two baileys (see Figure 6). The majority of these anomalies can be equated to identified earthworks that have previously been recorded at the castle.

The magnetometry survey identified eight groups of anomalies (see Table 1; Figures 2 and 3). These included: a possible building platform represented by a mixed response indicative of disturbed ground (Group 1); possible made-ground along a bank/ridge to the outer bailey (Group 2); bank material associated with less stony deposits on the ridges that define the motte and baileys (Group 3); stony bank material and possible compacted ground associated with the same ridges that define the motte and baileys as Group 3 (Group 4); occasional compacted or stony deposits associated with natural or in-filled features, including material on the motte, and a possible former wall line to a structure and an area of disturbed/made-ground in the inner bailey (Group 5). Discrete in-filled features such as pits or tree-throws or areas of differential back-filling to disturbed ground (Group 6); a possible modern campfire or some other thermoremnant response or magnetic debris (Group 7). Positive and negative responses associated with an eroded gully visible on the ground during the survey and indicated on OS mapping (Group 8).

The resistivity survey identified twelve groups of anomalies (A-L) (see Table 2; Figures 4 and 5). These included: probable stony aspects of bank material defining the edges of the motte and baileys, the example on the motte probably indicates a possible previously identified structure (Group A); probable softer aspects of bank material associated with Group A and the banks that define the edges of the motte and bailey (Group B); possible wall lines associated with a previously identified structure in the inner bailey (Group C); compact or stony deposits associated with bank erosion or stony debris (Group D); a worn or cut gully in the outer bailey (E); a possible wall line (Group F) that may be retaining made-ground (Group G); a compacted or stony deposit or area of shallower topsoil over bedrock associated with possible platforms in the inner bailey (Group H); possible discrete in-filled features such as pits or tree-throws (Group I); an area of relatively softer, possible made-ground (Group J); a possible pit or made-ground on the motte within a probable 'D'-shaped structure/bank (Group K); sporadic responses indicative of geological anomalies or stony/compacted deposits that could be within features or associated with shallow ground disturbance (Group L).

When compared, some of the anomalies from the two surveys can be amalgamated and better understood. This interpretation can be further improved when overlain with existing topographic surveys of the site.

Groups 1 and parts of Group 5 and possibly 6 can be associated with Group C and possibly some of the Group L anomalies. These anomalies equate to a well-defined topographic feature that includes ridges and a probable building platform in the north-east quarter of the inner bailey. The topographic survey conducted in 1882 and modified in 1888 (Preston-Jones 1988) described this structure as 12m by 8m across with a stony face visible on one side and otherwise defined by stony ridges that had possible entrances on its north and south sides. A stone foundation had been recorded in previous works along its northern edge.

Group 2 in the outer bailey equates to Group G and both indicate some possible mixed linear deposit, which may be being retained by a possible wall represented by Group F. A potentially

comparable piece of exposed wall/structure is in the bank/ridge at the west end of the inner bailey. These walls may indicate buildings in these areas, a vertical face to the west ends of the bailey platforms, reinforced 'bridging' points across their respective ditches, or multiple of these three interpretations.

Group 8 equates to Group E, and although they represent a visible 'gully'/extant earthwork they could be associated with Groups, 2, F and G and indicate some form of right-angled structural activity. The 'gully', although ostensibly worn into place may indicate a robbed-out wall-line or possible drain-type feature. Late 19th century OS mapping does depict some kind of slope in this part of the site suggesting that these features, that are still visible earthworks, existed prior to any 20th century excavations of the site. The previous topographic survey suggests that a sub-rectangular structure was situated on the west side of the outer bailey and that it was cut by a shallow hollow (the 'gully'). The anomalies in this area may all be associated with a potential structure.

Groups 3 and 4 equate to Groups B and A, respectively. These basically represent the banks/ridges that define the edges of the inner and outer baileys and the motte. These topographic features have been surveyed in the past and were extant during the survey. In the magnetometry survey the negative (probable compact/stony deposits) mostly define the base of these banks with positive responses indicating the built-up material of these banks. In the resistivity survey the banks themselves are generally identifiable with some of the banks more clearly defined by negative (probable softer clayey/more silty soils); while others are defined by positive (more compact or stony deposits). On the motte, this bank material may be stony due to an internal structure or foundation, as identified in excavations on the 1950's. If so, it may be possible that a structural element survives in the banks at the east end of the outer bailey, near the castle entrance. However, given the shallow natural knoll utilized by the castle, it is possible that some aspects of its construction are either modified bedrock or contain large amounts of redeposited stony bedrock material.

The majority of Group 5 and group 6 anomalies can be associated with areas of probable made-ground or ground disturbance. In the outer bailey this constitutes an area of uneven ground as recorded on previous topographic surveys and is located near to an area of a possible worn gully and other probable made-ground deposits. These may represent areas of surviving internal features at this end of the outer bailey. In the inner bailey the examples of Groups 5 and 6 are in an area of relatively level ground that could be level due to being a platform or due to having been raised and levelled at a later point. This corner of the inner bailey was depicted on OS mapping as being the route/footpath leading into the inner bailey from the ditch between the motte and inner bailey. It is possible that erosion or plantation along this line and near the corner of the earthwork resulted in the need for later repair and consolidation.

Group 7 is a dipolar response that if stronger could have been disregarded as metallic debris, which is typically modern; or if it were weak enough could have been indicative of a natural/geological feature. Its response could still be indicative of these interpretations, although slightly extreme or obscured. However, it seems likely that this response is indicative of a possible *in-situ* thermoremnant event, such as a burnt pit. The presence of campfires that were visible during the survey on the motte and inner bailey may account for responses of this type.

Group H is an anomalous spread that corresponds to the slope and area of a slightly sunken 'platform' as depicted on previous topographic surveys and a possible spread of disturbed material or natural overlain by a relatively shallow topsoil. It does overlay topographic features, whose nature may in part account for this anomaly. Two flat-bottomed hollows are depicted on the previous topographic surveys in this part of the inner bailey with a probable wall connecting them to the structure on the north side of the bailey. Two responses (Group I) that are comparable to

Group 6 are on the north side of the Group H spread. These could be indicative of pits or tree-throws, or be associated with debris or aspects of the adjacent features.

Group D could be associated with Group A and merely be indicative of compact or stony bank material. However, it corresponds to a rough and raised patch on the ground that was noticeable during the survey at the east end of a perceived platform and base of a bank. This anomaly could be indicative of weathered bank material or stony material associated with the adjacent platform and possible relict structure.

In summary: the geophysical surveys have ostensibly succeeded in identifying areas where the soil may be more shallow across areas that have been disturbed or reduced for platforms; possibly stony banks, which may include foundations of structures and a possible retaining wall; and areas of disturbed or made-ground associated with previously identified areas of potential and in the south-west quarter of the inner bailey. No clear evidence of numerous structures in the castle was present, although arguments and re-interpretations of the data could be made. It seems possible, given the relatively small nature of each part of the motte and baileys that each zone could have had a single, relatively large structure with open or covered yard space accounting for the rest of the area. The inner bailey ostensibly had the most space for multiple structures. The possible structure within the outer bailey may have been set back at its west end. Vague areas of high resistance in the outer bailey appear to illustrate the edge of the bailey at the foot of its defining banks; however it is possibly illustrative of longer lines of foundation or sub-structure. It is also possible that the west ends of each bailey originally had a vertical face or a stone reinforced structure to accommodate a bridges over their respective ditches.

Any potential buried archaeological resource should have survived relatively well, given the visible earthworks on the site. However, that is not to say that any previously built structures or activity will have left deep- or any archaeological evidence. Although reasonable and good plans of the site were drawn after the 20th century excavations of the site, details of these works are lacking and excavation on the site in the 1920's and 1950's may have truncated some of any buried archaeological resource and associated investigation and back-filling may have obfuscated the geophysical record.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

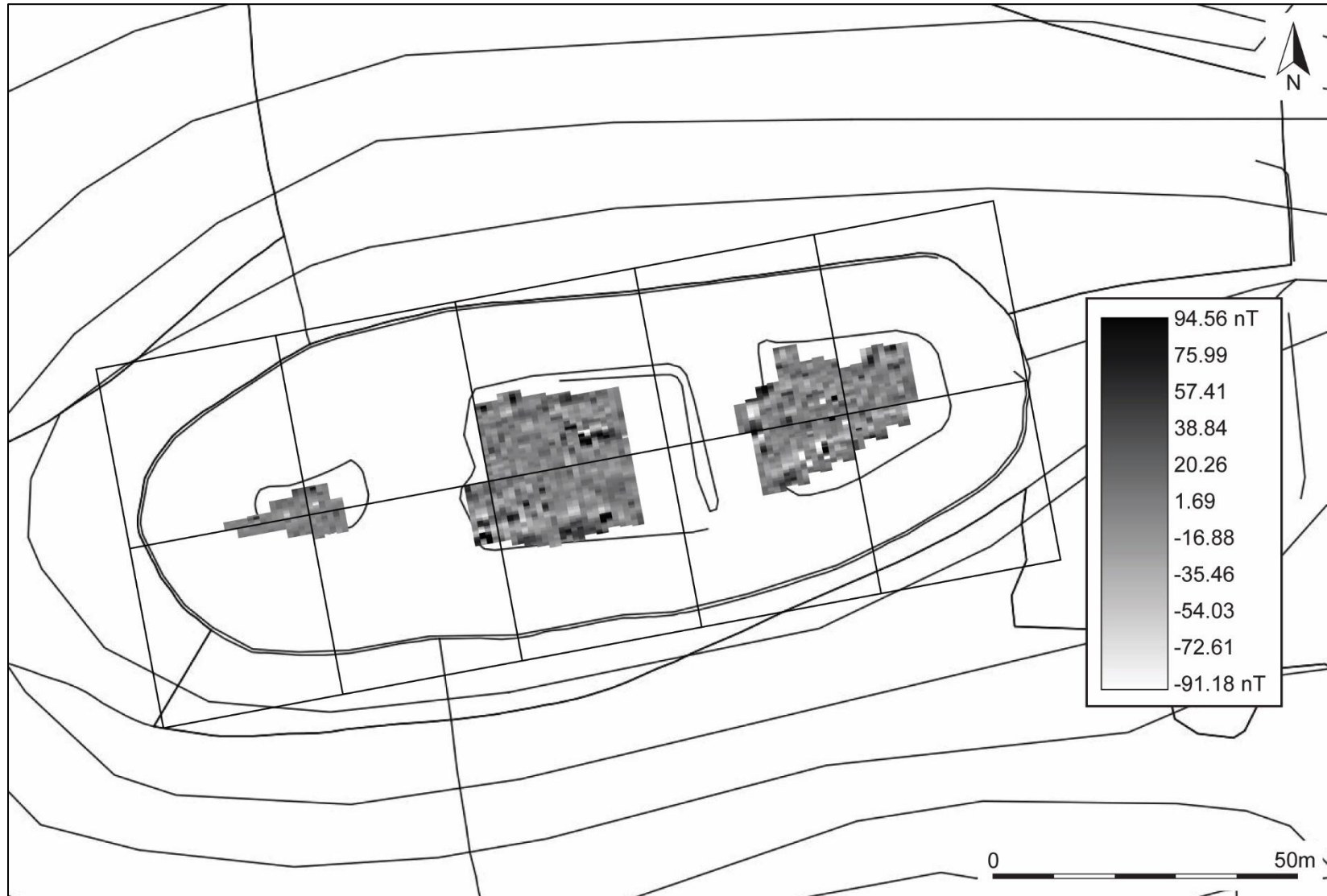


FIGURE 2: SHADE PLOT OF MAGNETOMETRY SURVEY DATA; MINIMAL PROCESSING.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

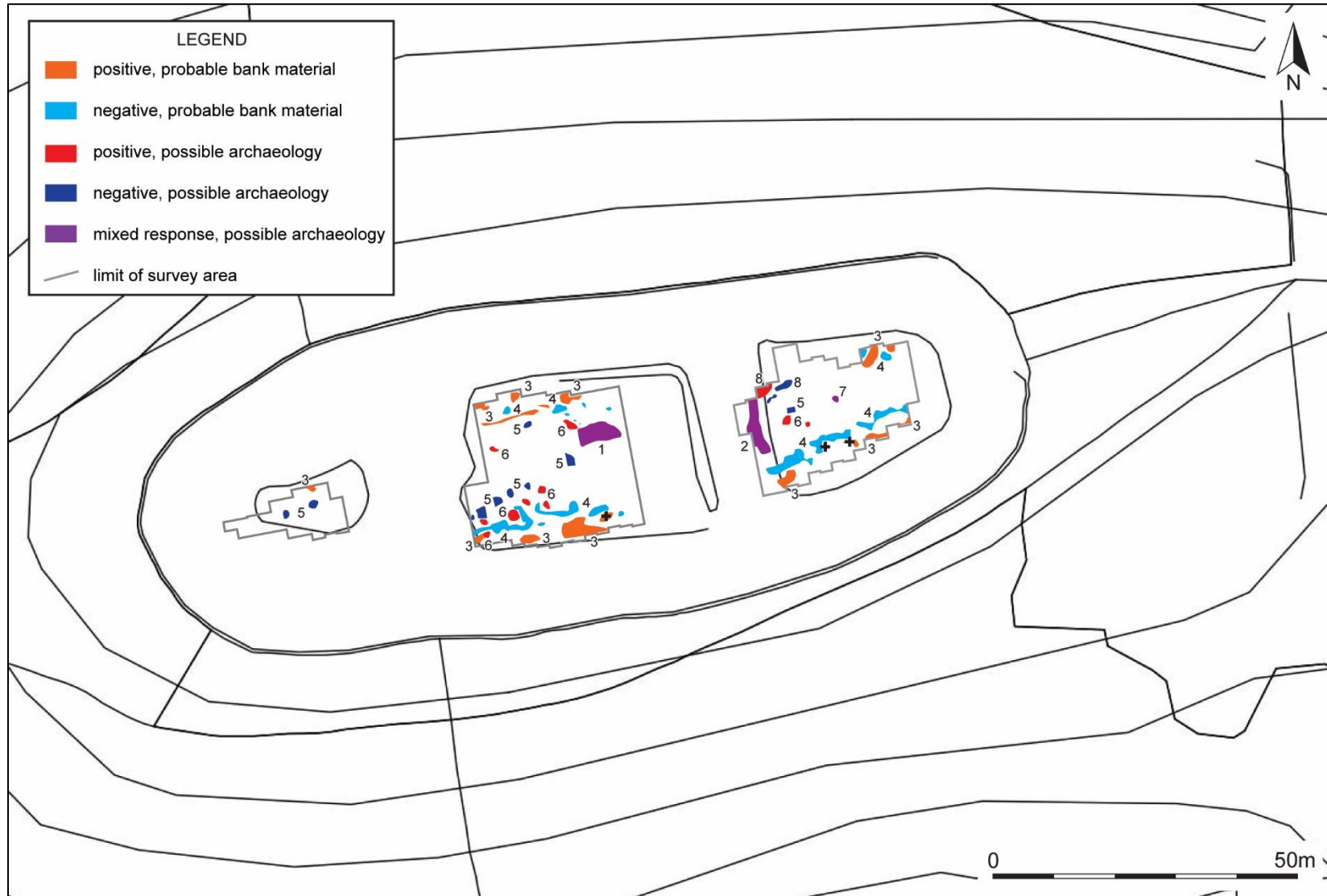


FIGURE 3: INTERPRETATION OF MAGNETOMETRY SURVEY DATA.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

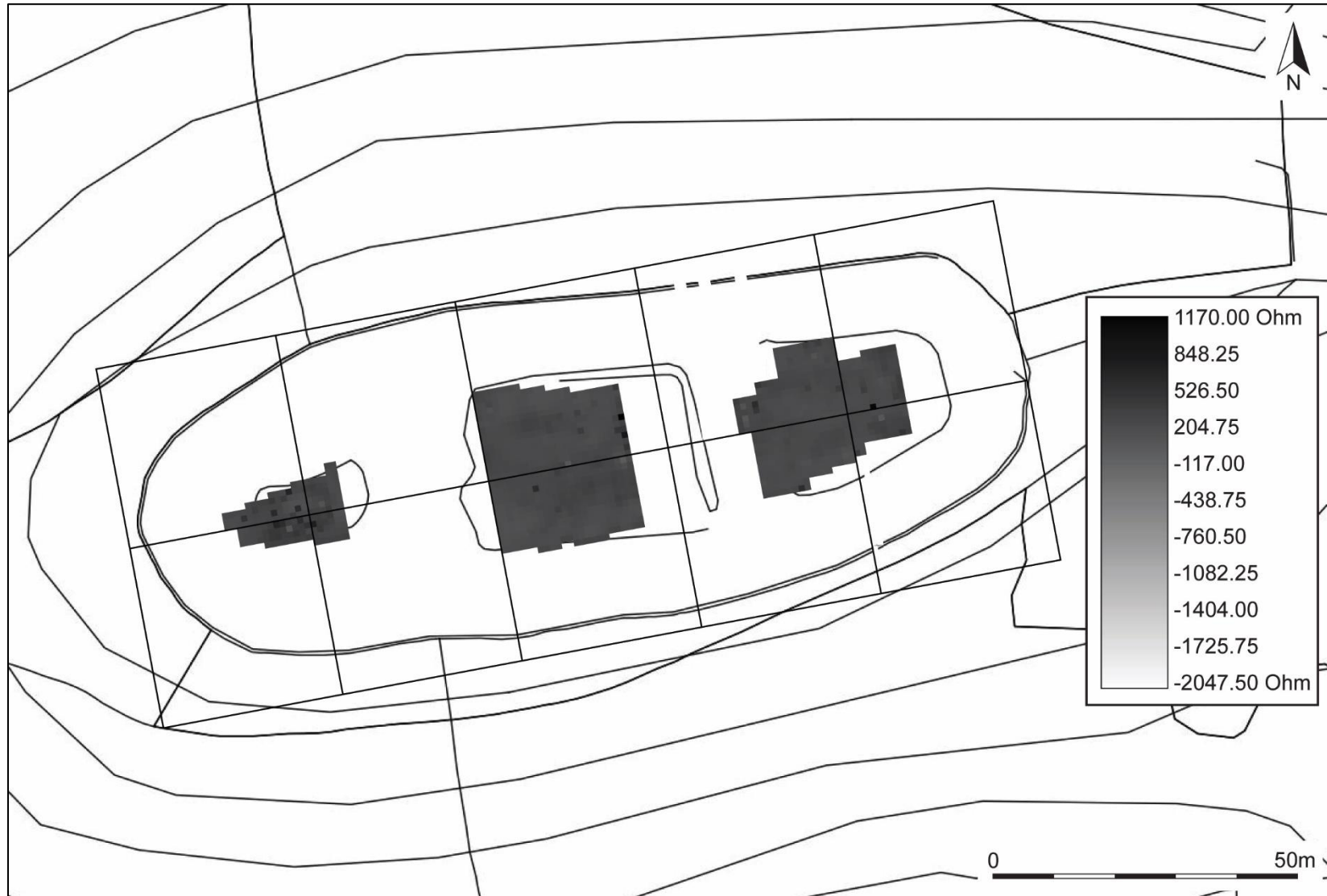


FIGURE 4: SHADE PLOT OF RESISTIVITY SURVEY DATA; MINIMAL PROCESSING.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

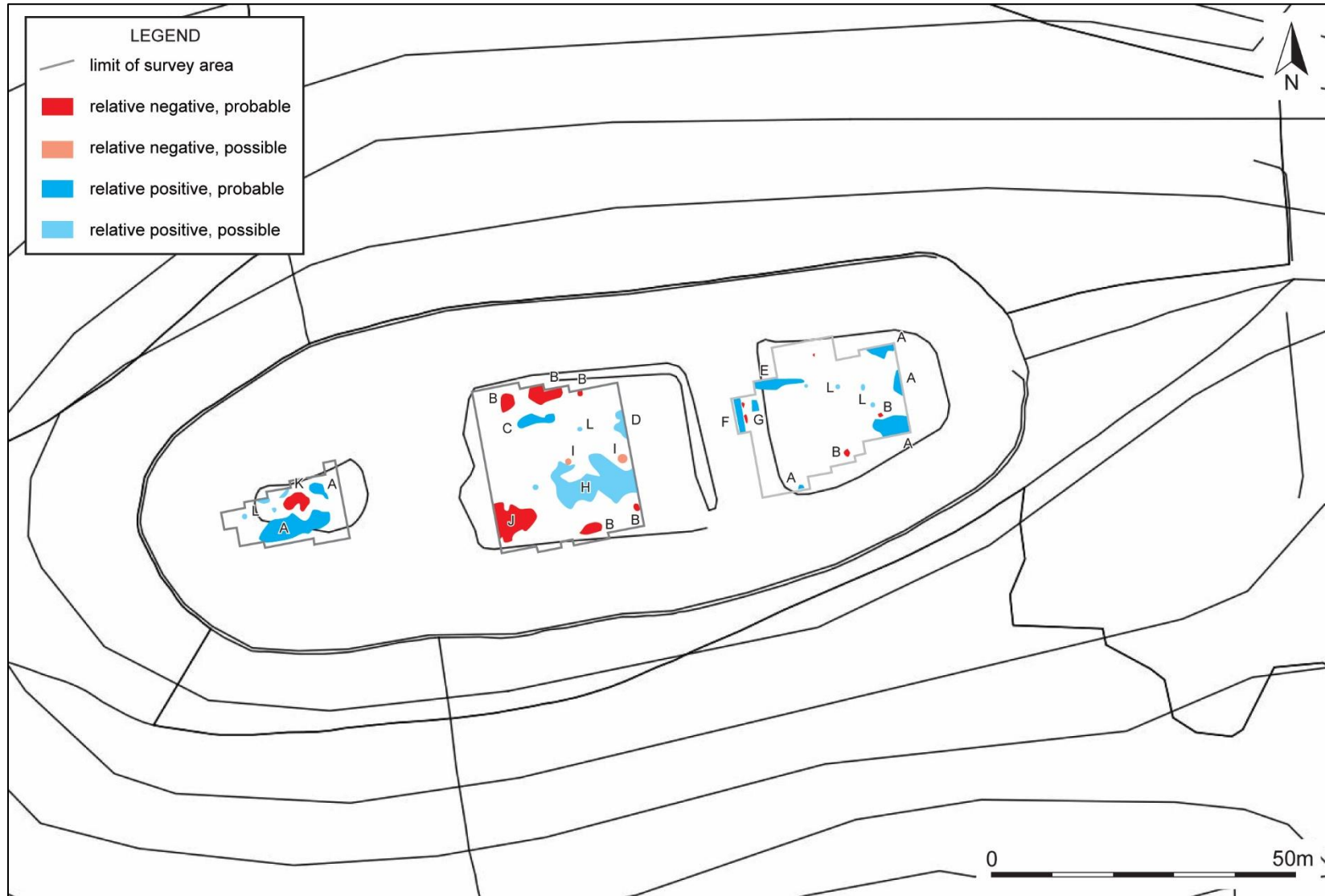


FIGURE 5: INTERPRETATION OF RESISTIVITY SURVEY DATA.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

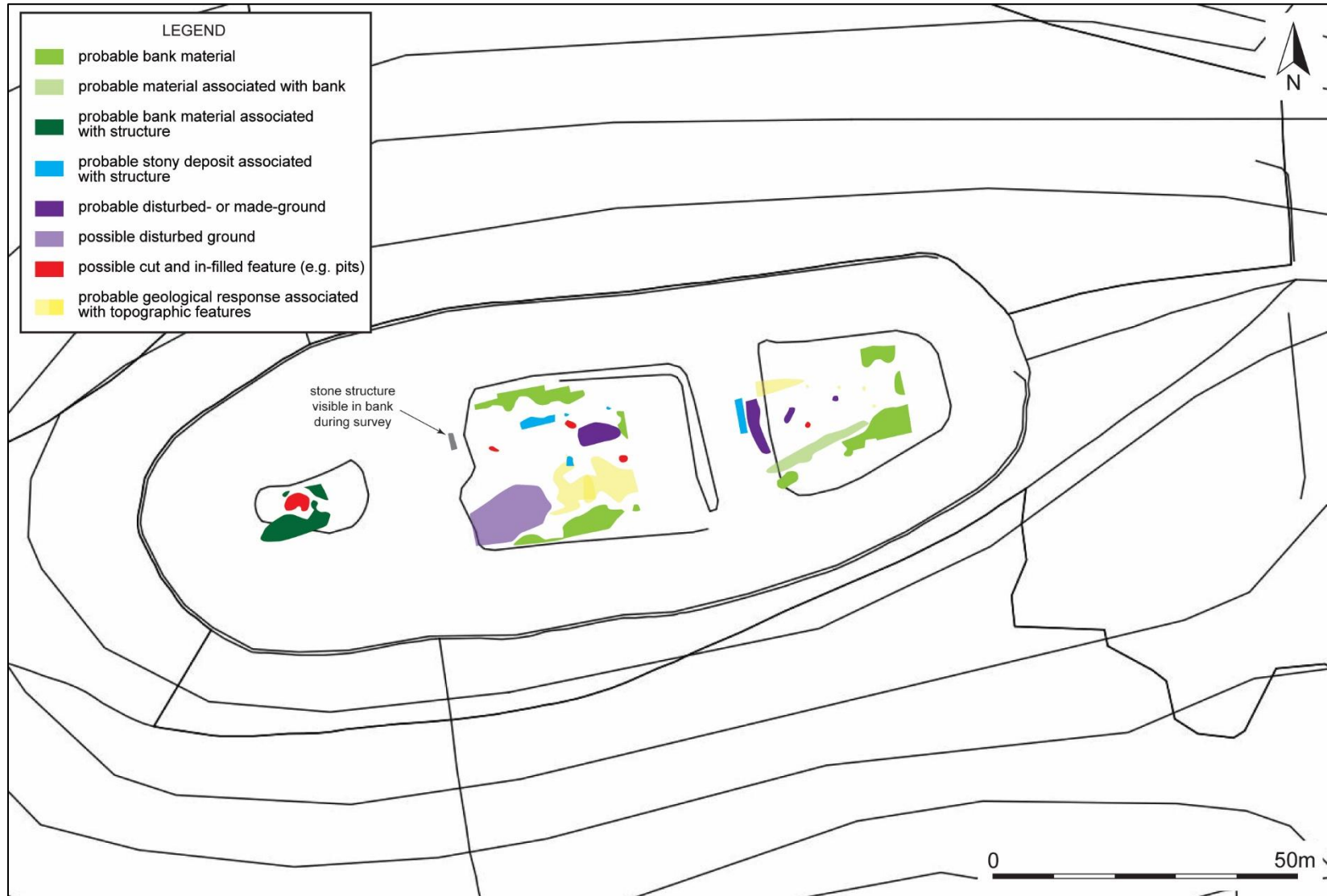


FIGURE 6: COMBINED INTERPRETATION OF MAGNETOMETRY AND RESISTIVITY SURVEY DATA.

3.0 CONCLUSION

Penstowe Castle (the site) is located west of the village of Kilkhampston on an elongated oval knoll with views along the Coombe Valley to the west, in a medieval field-scape. The castle (MCO39452; DCO1339) is a rare example in Cornwall with a motte and two baileys that was probably built between 1066 and the end of the 12th century. The construction of Penstowe Castle is generally interpreted as being associated with the civil war between Stephen and Matilda (The Anarchy, 1135-1153). An excavation in the 1920's revealed a loose stone foundation to a structure in the inner bailey. An excavation of the motte in the 1950s revealed a 'D'-shaped structure and 12th century pottery. Subsequent surveys have produced detailed topographic maps of internal earthworks of the castle indicative of possible building platforms and structures.

The geophysical survey identified 20 groups of anomalies from both magnetometry and resistivity surveys. The majority of these could be amalgamated and corresponded to previously identified topographic features within the castles motte and baileys. These anomalies represent a possible pit and stony bank material that may represent foundations to a structure on the motte; bank material around the edges of the inner and outer baileys; a possible wall and made- or disturbed ground at the west end of the outer bailey; possible former building platforms beneath shallow soil, and made-ground across the south half of the inner bailey; a possible wall-line associated with a sub-rectangular structure in the north half of the inner bailey; and a scattering of possible discrete pit-like or natural features in the two baileys. There was no conclusive evidence for the presence or absence of yet unknown structures on the site. It seems possible, given the relatively small nature of each part of the motte and baileys that each zone could have had a single main structure with open or covered yard space accounting for the rest of the area. The inner bailey ostensibly had the most space and visible potential platforms for multiple structures. A possible structure within the outer bailey appears to have probably been set back at its west end; although this may have been associated with some other aspect of the castles construction, such as a bridge across an inner ditch or original vertical face to the bailey platform.

Any potential buried archaeological resource should have survived relatively well, given the visible earthworks on the site. However, that is not to say that any previously built structures or activity will have left deep- or any archaeological evidence. Although reasonable and good plans of the site were drawn after the 20th century excavations of the site, details of these works are lacking and excavation on the site in the 1920's and 1950's may have truncated some of any buried archaeological resource and associated investigation and back-filling may have obfuscated the geophysical record.

4.0 BIBLIOGRAPHY & REFERENCES

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- Environment Agency** 2021: *LiDAR, Digital Surface Model and Digital Terrain Model data* <https://environment.data.gov.uk/DefraDataDownload/?Mode=survey>

Cornwall Record Office (CRO)

- Surveyors draft map for the Holsworthy area, surveyed c.1803
- Kilkhampston Tithe Apportionment, 1840
- Kilkhampston Tithe Map, 1840
- Ordnance Survey 1st edition, 25 inch map, Sheet: Cornwall III.4, surveyed 1884, published 1885
- Ordnance Survey 2nd edition, 25 inch map, Sheet: Cornwall III.4, revised 1905, published 1906

APPENDIX 1: ADDITIONAL GRAPHICAL IMAGES OF THE GRADIOMETER SURVEY

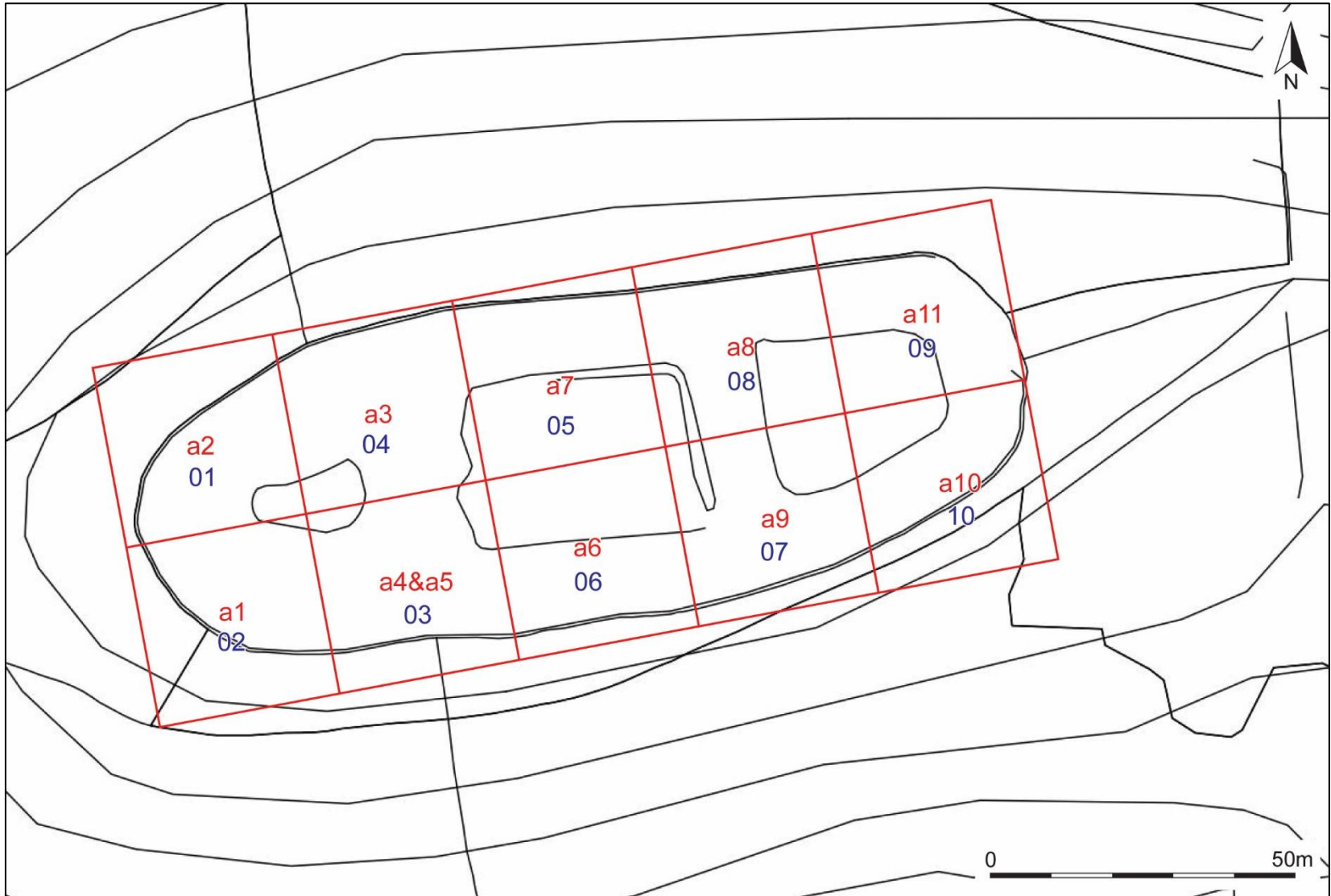


FIGURE 7: GEOPHYSICAL SURVEY GRID LOCATION AND NUMBERING (MAGNETOMETRY GRID NUMBERS IN RED; RESISTIVITY GRID NUMBERS IN BLUE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



FIGURE 8: RED-GREY-BLUE SHADE PLOT OF MAGNETOMETRY SURVEY DATA; GRADIATED SHADING; CLIPPED BY 1SD (STANDARD DEVIATION).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

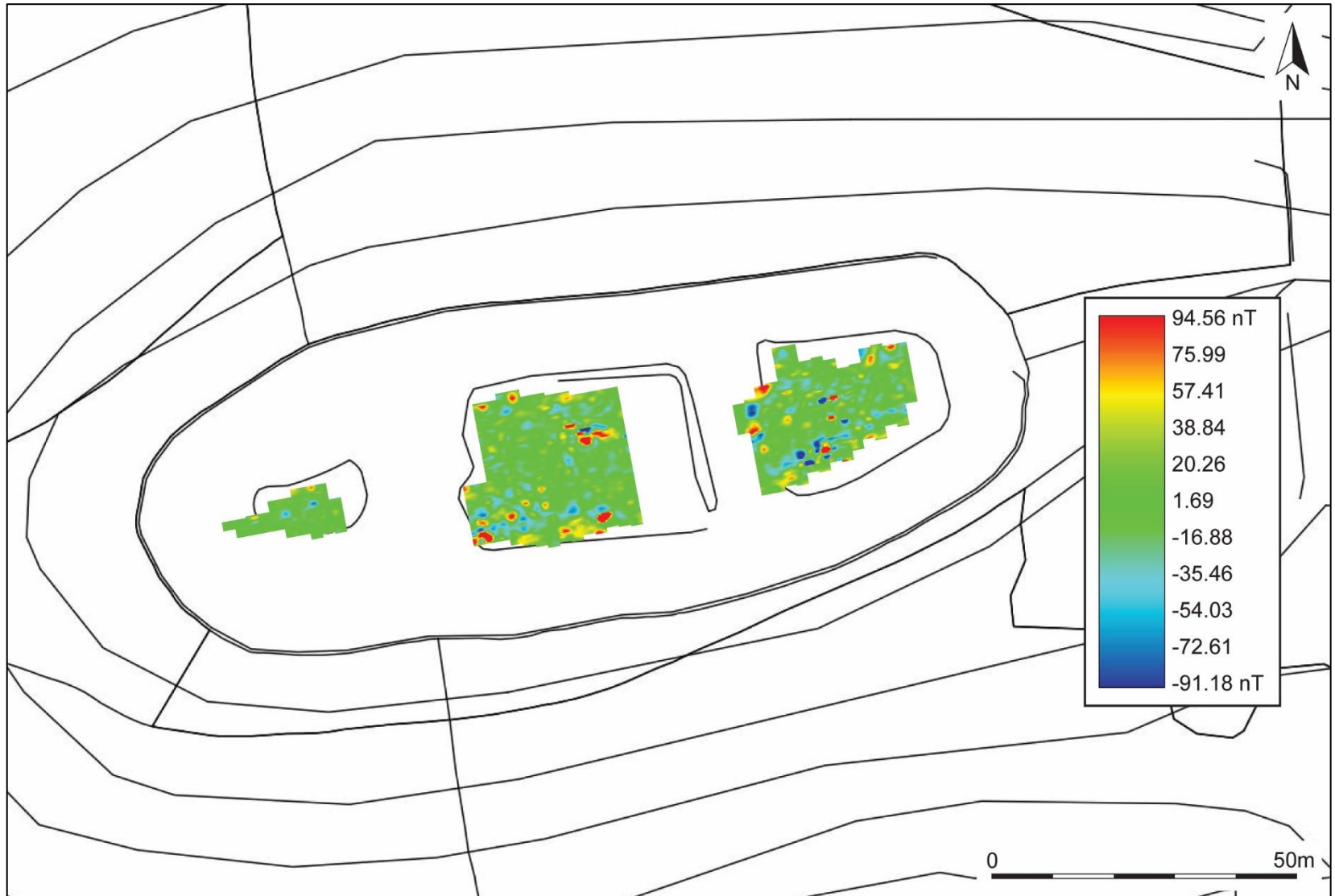


FIGURE 9: RED-GREEN-BLUE SHADE PLOT OF MAGNETOMETRY SURVEY DATA; GRADIATED SHADING.

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL

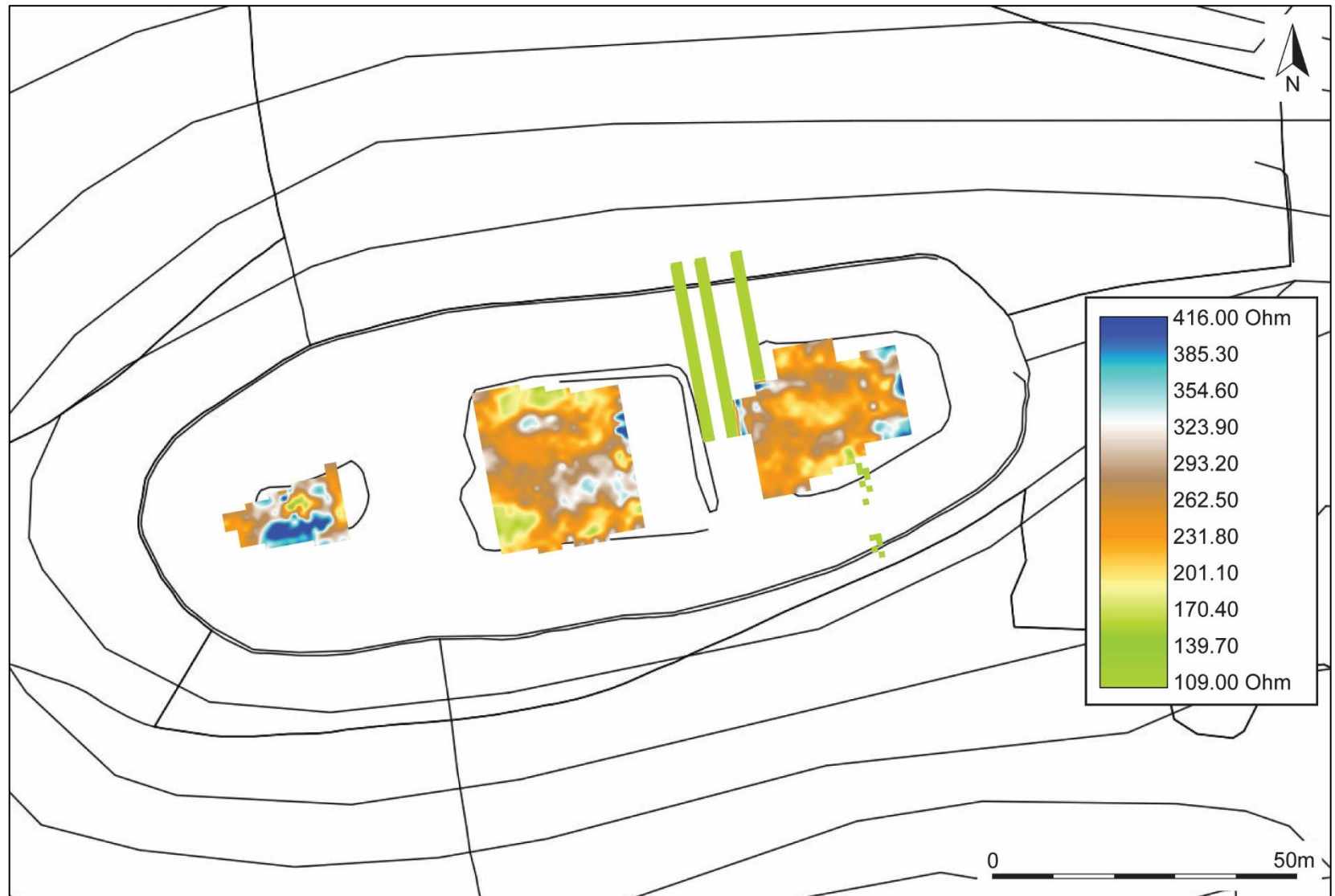


FIGURE 10: TERRAIN SHADE PLOT OF RESISTIVITY SURVEY DATA; GRADIATED SHADING; DESPIKED ONCE; DATA CLIPPED TO 109 AND 416 OHM.

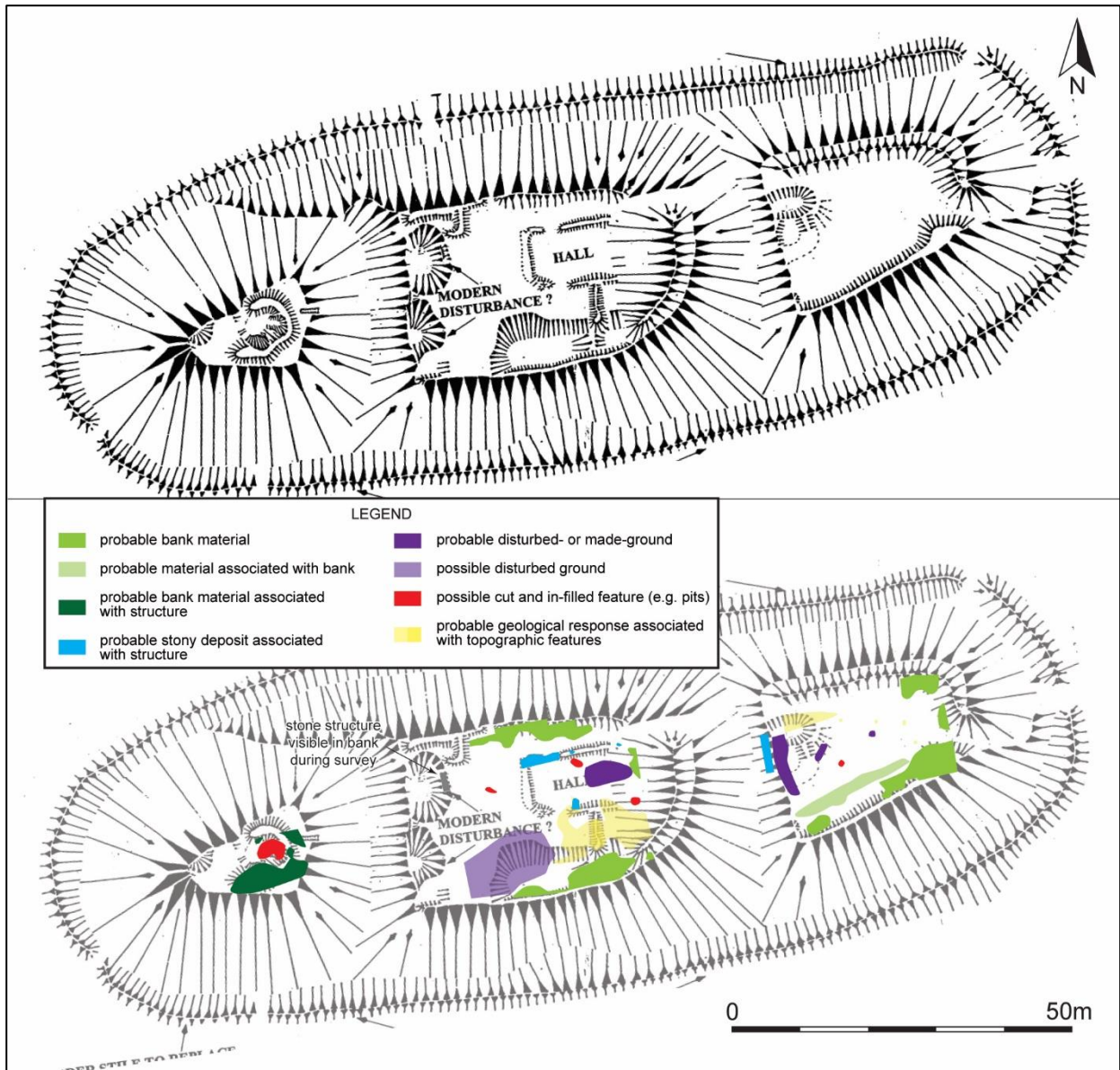


FIGURE 11: (ABOVE) TOPOGRAPHIC SURVEY OF THE CASTLE (SOURCE: PRESTON-JONES 1988); (BELOW) COMBINED INTERPRETATION OF GEOPHYSICAL SURVEYS OVER EXISTING TOPOGRAPHIC SURVEY.

APPENDIX 2: SUPPORTING SOURCES



FIGURE 12: EXTRACT FROM THE SURVEYOR'S DRAFT MAP, C.1803; THE APPROXIMATE LOCATION OF THE SITE IS INDICATED (CRO).

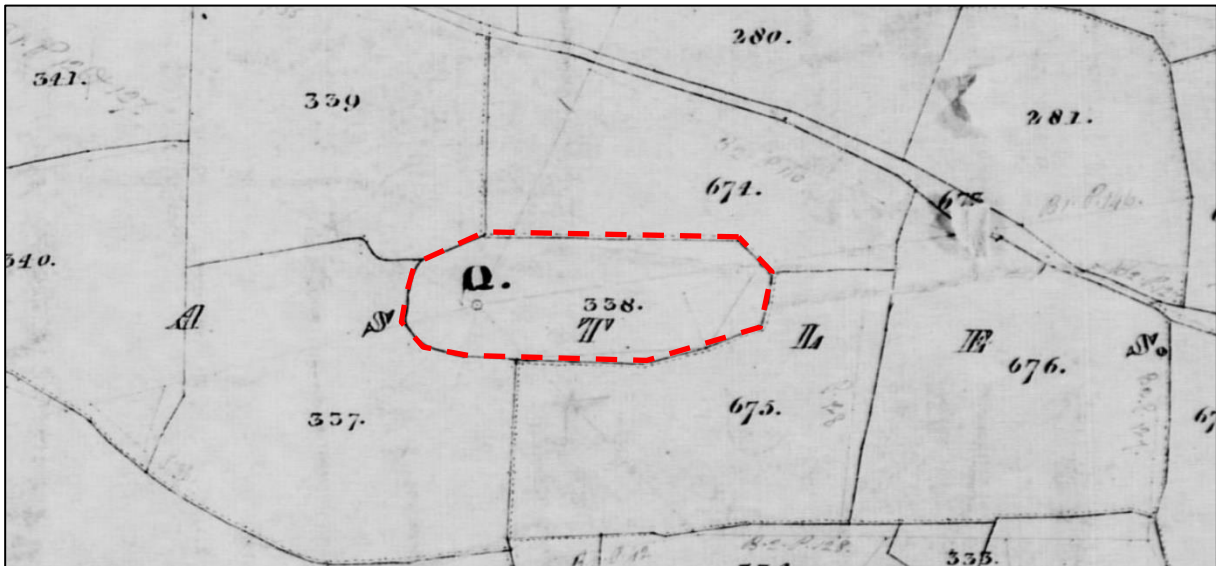


FIGURE 13: EXTRACT FROM THE KILKHAMPTON TITHE MAP, 1840; THE SITE IS OUTLINED IN RED (CRO).

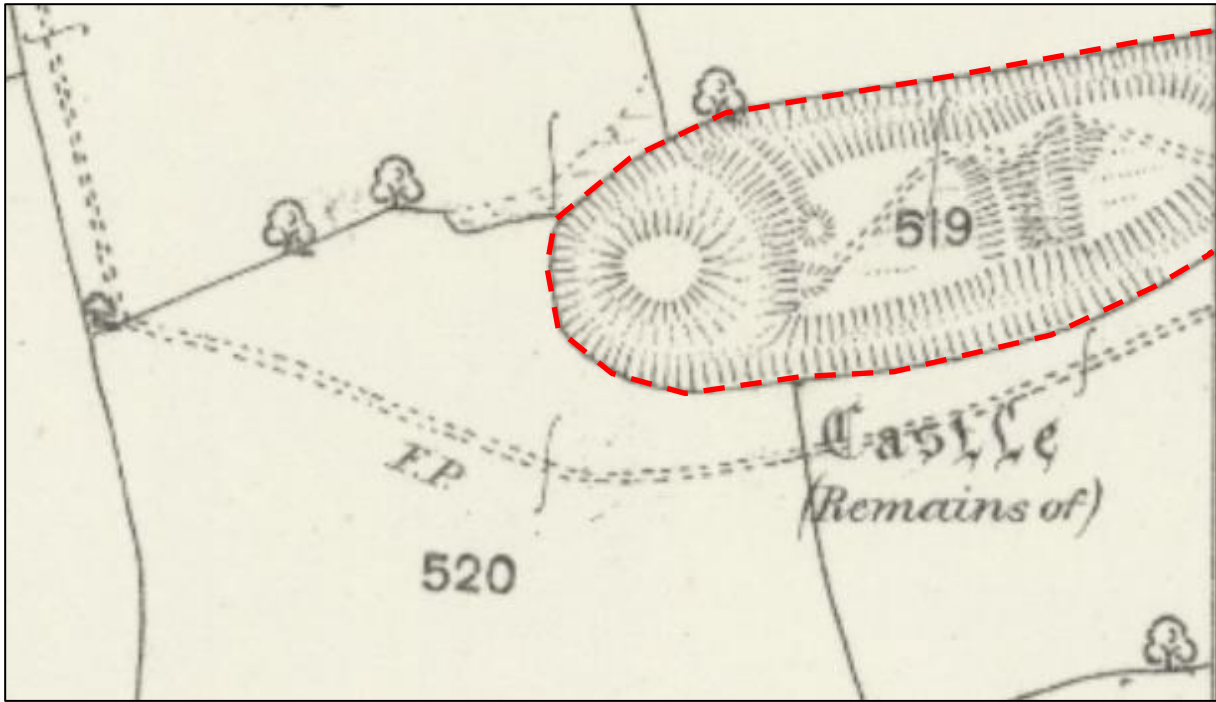


FIGURE 14: EXTRACT FROM THE ORDNANCE SURVEY 1ST EDITION, 25 INCH SERIES, PUBLISHED 1885; THE SITE IS OUTLINED IN RED (CRO).

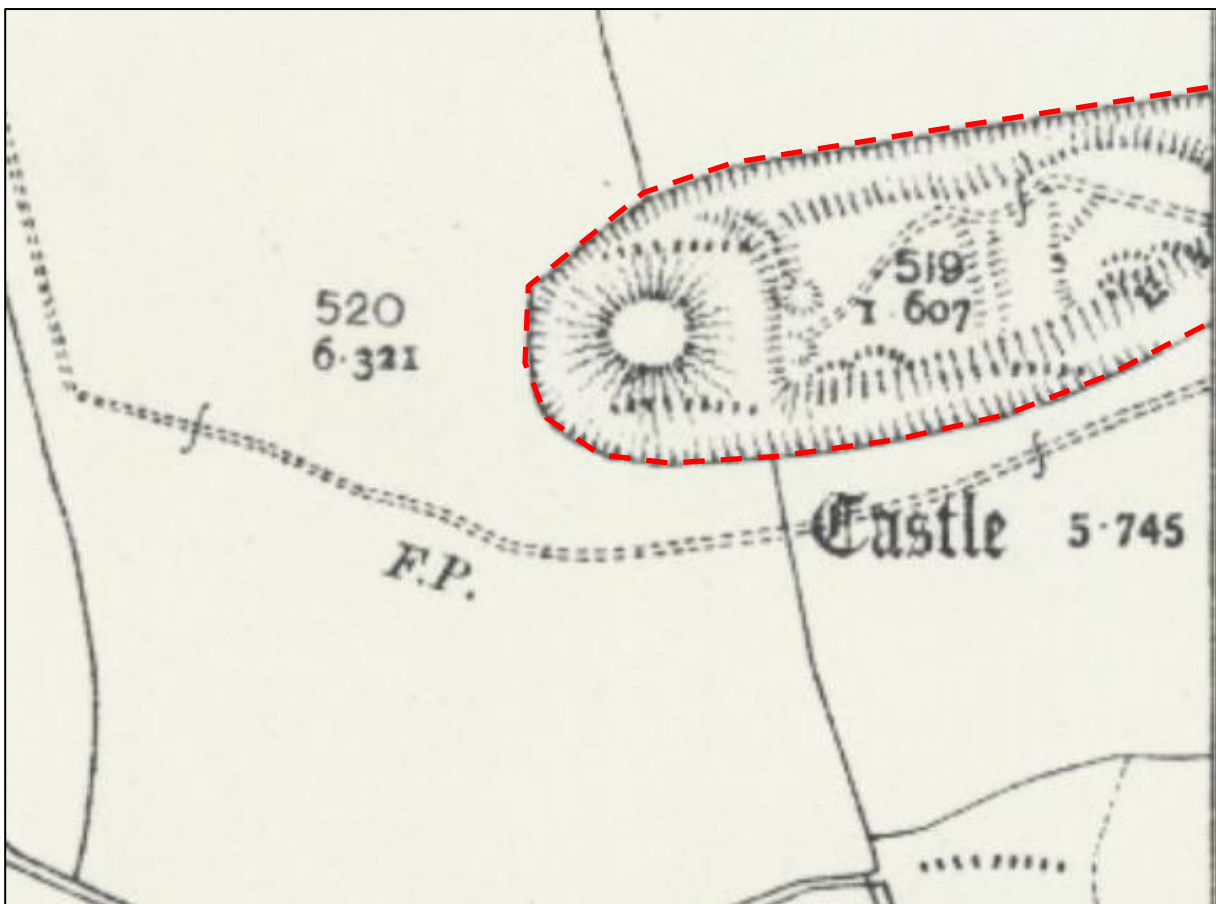


FIGURE 15: EXTRACT FROM THE ORDNANCE SURVEY 2ND EDITION, 25 INCH SERIES, PUBLISHED 1906; THE SITE IS OUTLINED IN RED (CRO).

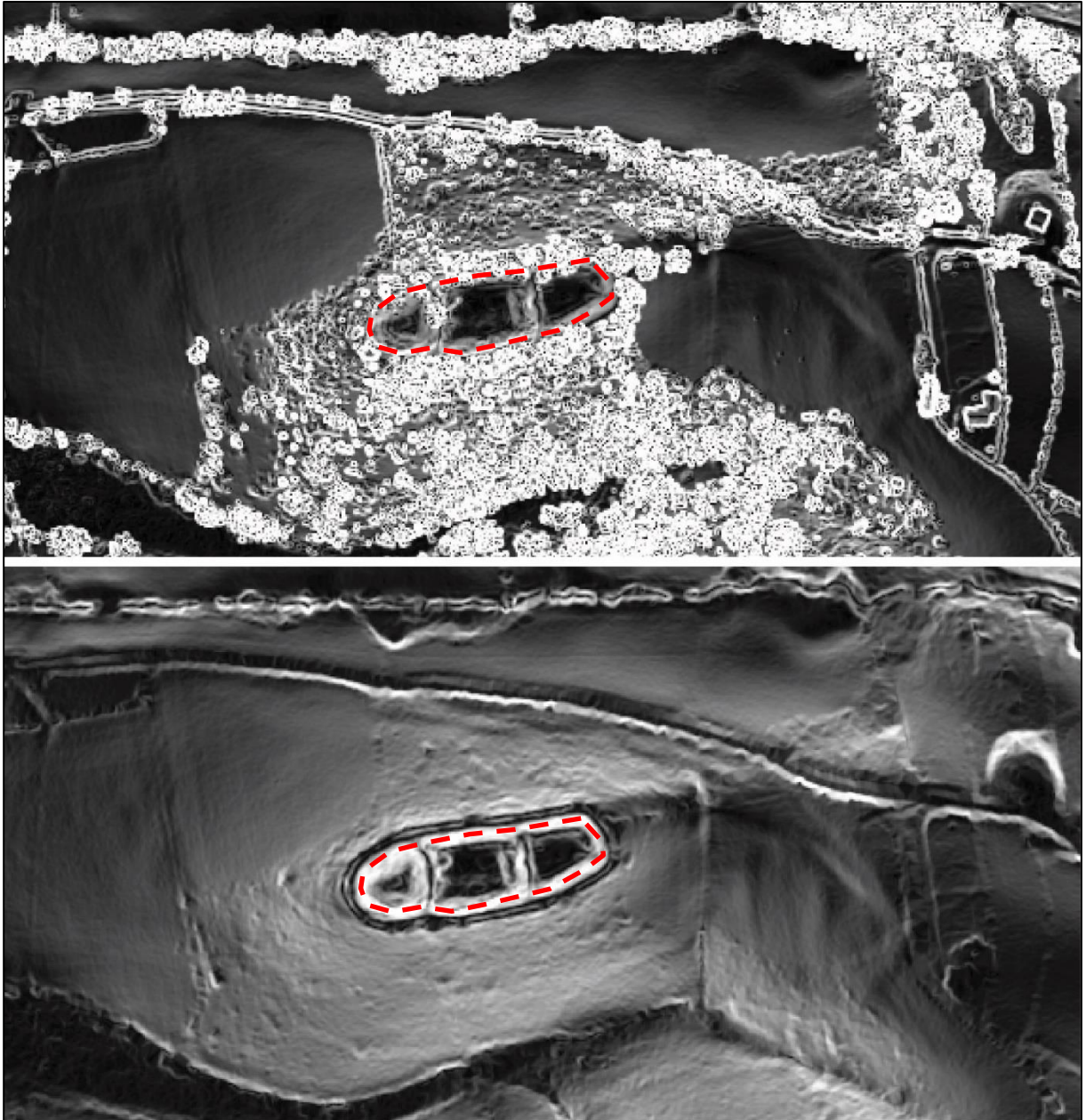


FIGURE 16: IMAGE DERIVED FROM LIDAR DATA; (ABOVE) DSM; (BELOW) DTM; THE SITE IS OUTLINED IN RED (PROCESSED USING QGIS VER2.18.4, TERRAIN ANALYSIS/SLOPE, VERTICAL EXAGGERATION 3.0). DATA: CONTAINS FREELY AVAILABLE DATA SUPPLIED BY NATURAL ENVIRONMENT RESEARCH COUNCIL (CENTRE FOR ECOLOGY & HYDROLOGY; BRITISH ANTARCTIC SURVEY; BRITISH GEOLOGICAL SURVEY); ©NERC.

APPENDIX 3: SUPPORTING PHOTOGRAPHS



1. PENSTOWE CASTLE MOTTE; VIEWED FROM THE EAST (NO SCALE).



2. VIEW LOOKING WEST FROM THE MOTTE; VIEWED FROM THE EAST (NO SCALE).



3. THE MOTTE; VIEWED FROM THE WEST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



4. VIEW OF THE MIDDLE OF THE MOTTE; VIEWED FROM THE EAST (NO SCALE).



5. THE SLOPE ON THE EAST SIDE OF THE MOTTE; VIEWED FROM THE SOUTH (NO SCALE).



6. THE DITCH BETWEEN THE MOTTE AND INNER BAILEY; VIEWED FROM THE NORTH (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



7. PITCHED STONES IN PIT/HOLLOW IN WEST EDGE OF INNER BAILEY; VIEWED FROM THE WEST (NO SCALE).



8. CLOSE-UP OF PITCHED STONE IN WEST EDGE OF THE INNER BAILEY; VIEWED FROM THE WEST (NO SCALE).



9. THE INNER BAILEY; VIEWED FROM THE WEST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



10. VIEW OF THE MOTTE FROM THE INNER BAILEY; VIEWED FROM THE EAST (NO SCALE).



11. THE INNER BAILEY; VIEWED FROM THE EAST (NO SCALE).



12. VIEW ALONG THE SOUTH SIDE OF THE INNER BAILEY; VIEWED FROM THE EAST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



13. THE INNER BAILEY; VIEWED FROM THE SOUTH-EAST (NO SCALE).



14. VIEW ALONG THE BANK/RIDGE AT THE EAST END OF THE INNER BAILEY; VIEWED FROM THE SOUTH (NO SCALE).



15. PIT/HOLLOW AT WEST SIDE OF THE INNER BAILEY; VIEWED FROM THE EAST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



16. THE OUTER BAILEY; VIEWED FROM THE SOUTH-WEST (NO SCALE).



17. VIEW OF THE PATH BETWEEN THE INNER AND OUTER BAILEYS; VIEWED FROM THE SOUTH (NO SCALE).



18. THE OUTER BAILEY; VIEWED FROM THE WEST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



19. THE DITCH BETWEEN THE INNER AND OUTER BAILEYS; VIEWED FROM THE NORTH (NO SCALE).



20. VIEW ALONG THE NORTH SIDE OF THE OUTER BAILEY; VIEWED FROM THE WEST (NO SCALE).



21. VIEW FROM THE ENTRANCE TO THE OUTER BAILEY TOWARDS KILKHAMPTON; VIEWED FROM THE WEST (NO SCALE).

THE INNER BAILEY, PENSTOWE CASTLE, KILKHAMPTON, CORNWALL



22. THE OUTER BAILEY; VIEWED FROM THE SOUTH-WEST (NO SCALE).



23. VIEW OF THE ENTRANCE TO THE CASTLE FROM THE BANK/RIDGE AT THE EAST END OF THE OUTER BAILEY;
VIEWED FROM THE WEST (NO SCALE).



24. EROSION/COLLAPSE IN THE EAST BANK TO THE INNER BAILEY; VIEWED FROM THE EAST (NO SCALE).



25. THE OUTER BAILEY; VIEWED FROM THE WEST (NO SCALE).



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