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Front cover: The milked cow vignette on the Grindle map – *Two Legal Maps from Shropshire*).

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Capturing the castle: recent survey work at Castle Pulverbatch motte and bailey, Shropshire

By GILES CAREY[1]

This short article presents a summary of non-intrusive survey work undertaken at Castle Pulverbatch motte and bailey in 2017–18. The results of geophysical survey as well as earthwork survey derived from Structure from Motion photogrammetry – obtaining 3D information from 2D imagery – are discussed in the context of previous work at the site.

INTRODUCTION

Pulverbatch is a village situated in central Shropshire, about 13km south-west of Shrewsbury on a minor road to Bishop's Castle. The modern village is formed of two quite distinct centres: Church Pulverbatch, known locally as 'Churcheton', then Churton since at least the 13th century (Gaydon 1968, 138) – a small nucleated settlement around St Edith's church; and Castle Pulverbatch about a kilometre further to the south-west. The fine motte and bailey castle is situated on the edge of a spur extending south from Castle Pulverbatch, where its position makes good use of the natural topography. Traces of ridge and furrow ploughing of probable medieval origin have been recorded in the surrounding landscape; and the tenement pattern of what has been suggested as a settlement contemporary with the castle (Creighton 2002, 203) is preserved in modern property boundaries just to its north (Figure 1).

The castle comprises a roughly circular motte with a base diameter of 35m, standing up to 8m high. A substantial ditch 7m wide and 2.6m deep, with a counterscarp bank 4m wide and 0.8m high, separates the motte from the flat ground to the west. The inner bailey, north of the motte, is roughly rectangular measuring 28m by 30m. Around its western and northern sides, the bailey is defended by a substantial bank up to 10m wide, 4.2m high externally and 1.5m high internally. Its eastern side lacks a bank but makes strategic use of a steepened natural scarp for defence. To the west of the motte the outer bailey has much slighter defences and measures 80m north/south by 40m east/west. A defensive bank up to 6.5m wide and 1.4m high runs along its north-west side, defining a deep holloway adjacent to a field boundary. The slighter defences of the outer bailey have been suggested as indicating a two-phase construction for the site, with the outer bailey representing the enlargement of a compact and strongly defended initial structure (Stillman 1980, 3).

Strategically, the castle occupies a dominant location. From the top of the motte, views run along the valley of the Churton Brook, covering the road to the west in particular (Figure 2). It has been suggested that the castle could have provided a control point over the route from the westward hills to the Severn valley, perhaps levying a toll on traffic (Stillman 1980, 18).

HISTORICAL BACKGROUND
with Hugh Hannaford

Pulverbatch is first mentioned in the Domesday Survey of 1086 when it appears as 'Polrebec'. The name derives from Old English, a combination of *pulfre* of unknown meaning[2] and *bæce* meaning stream valley (Gelling 1990, 245–7). At Domesday, the manor of Pulverbatch, combining both modern settlements, was held by Roger Venator [The Hunter]. Roger Venator was a smaller tenant of Roger of Montgomery, Earl of Shrewsbury. Along with his brother Norman, he was a huntsman for the Earl and was consequently granted land in the Shropshire forests. As well as Pulverbatch, he held nearby Wrentnall.

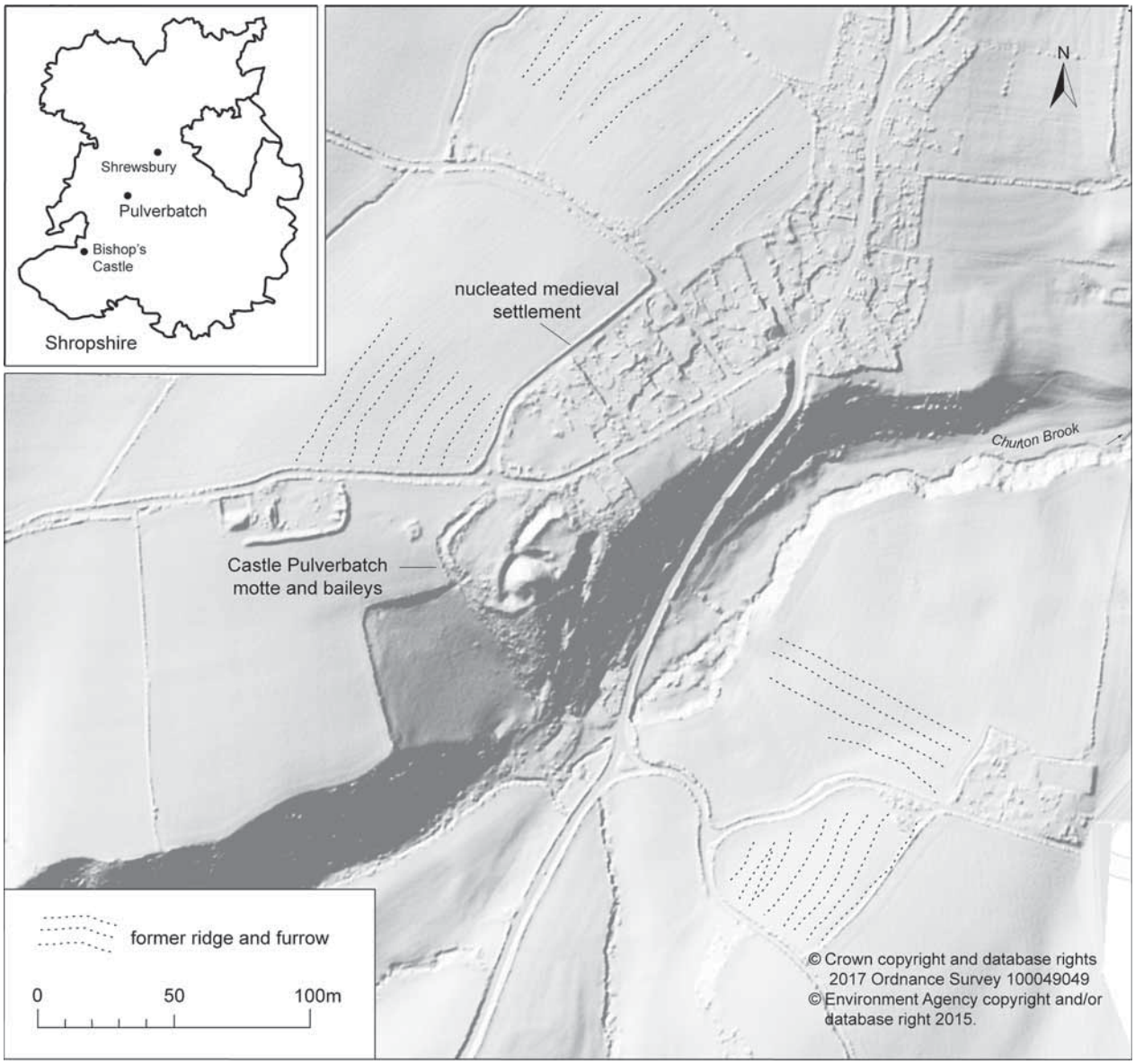


Figure 1. General location, and plan of the immediate area around Castle Pulverbatch. Modern roads are shown, but field-boundaries, which are for the most part of post-medieval date, have been excluded to enhance what are taken to be the medieval elements of the landscape. Ridge and furrow plotted after Stillman 1980 – much of it has been removed by more recent ploughing.

In 1086, Domesday records Pulverbatch as comprising two hides of land which paid tax, and there was land for five ploughs: two ploughs in the lordship with four slaves, while seven villagers had a further three ploughs between them. There were also two 'radmans' [riding men - the lord's servants] in the manor. There was enough woodland for the fattening of 100 pigs. Before 1066, the manor had been worth £6 in tax; that had dropped to 20s in 1066, but by the Domesday Survey, its value had risen again slightly to 30s (Eyton 1854, 189).

The evidence appears to indicate that the castle was built towards the end of the 11th century, either by Roger Venator or his son, also called Roger. Castle Pulverbatch is one of eighteen or more earthwork castles in south-west Shropshire that were built by the first Norman lords installed by Roger of Montgomery, himself one of three key lieutenants installed by William the Conqueror following rebellions in the Welsh Marches in the later 1060s. Documentary sources refer to the castle still being occupied in 1205, but there is no trace of a manor-house here in documents of 1292 (Gaydon 1968, 131).

In the immediate area, another motte and bailey lies 1.2km to the south-east, north of Wilderley Hall Farm (Figure 3, site 6), which at Domesday was held by another minor tenant of Roger of Montgomery, Hugh Fitz Turgis (Eyton 1854, 258); Probably, like Castle Pulverbatch, Wilderley was positioned strategically to command a route running northwards from the Long Mynd towards the Severn Valley (Gaydon 1968, 132). Little is known about the documentary history

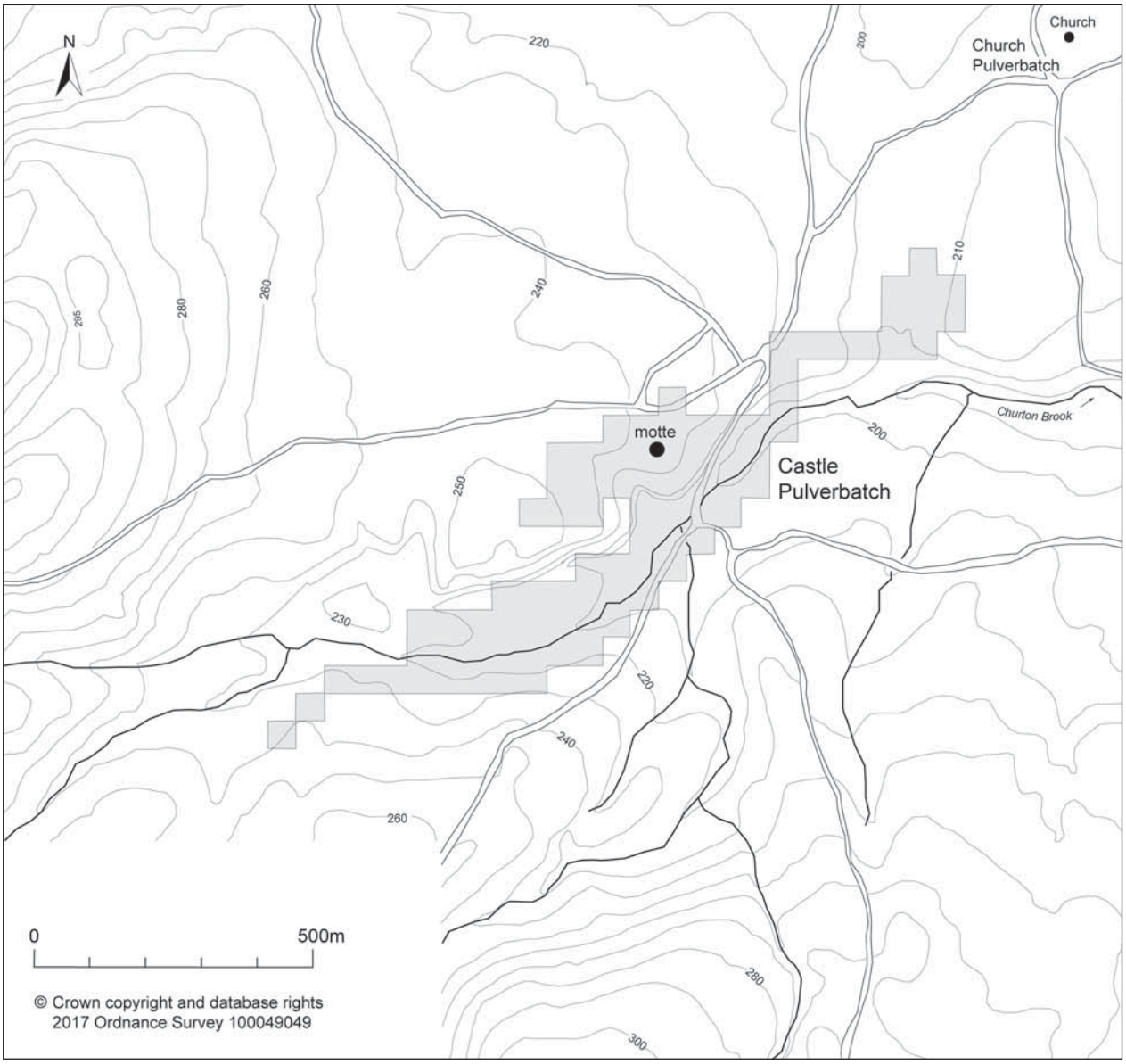


Figure 2. Viewshed analysis from Castle Pulverbatch. Based upon a viewpoint 2m above the top of the motte, with shading indicating visibility, based upon Ordnance Survey terrain data at 50m resolution.

of Wilderley so establishing any chronological link between the two castle sites remains challenging.

In 1254 Philip Marmion was granted the right to hold a weekly market at Pulverbatch on Mondays, and an annual three-day fair 'the eve, the day [16th September] and the morrow of St Edith the Virgin', to whom the church in Church Pulverbatch was dedicated (Eyton 1858, 197).

At an inquest on the death of Philip Marmion, held at Shrewsbury on January 14 1292, his estate at Pulverbatch is recorded as including a '*capital* messuage [house, yard, outbuildings and land], a carucate of arable land, and two acres of meadow. A Mill realised 30s...' (Eyton 1858, 199). The latter was presumably on the site indicated by slight earthworks in a field identified on the tithe map as Upper Mill Meadow (Figure 3, site 3).

PREVIOUS RESEARCH

Despite the good survival of the earthworks at Castle Pulverbatch, the site has been subject to only limited previous research.

A rough plan of the castle was produced in 1906 by Edward Andrews Downman, an Anglican clergyman and antiquary, who was responsible for a wide range of topographic drawings across England and Wales. The plan and brief notes, held in Shropshire Archives (SA 6001/297) record the earthworks at a scale of 25 inches to 1 mile (although the actual plan is a little outline in form) and includes, at a small scale, four profiles across the earthworks. This plan appears not to show either the scoop now evident on the southern side of the motte, or the disturbance evident mid-way along the south side of the inner bailey.

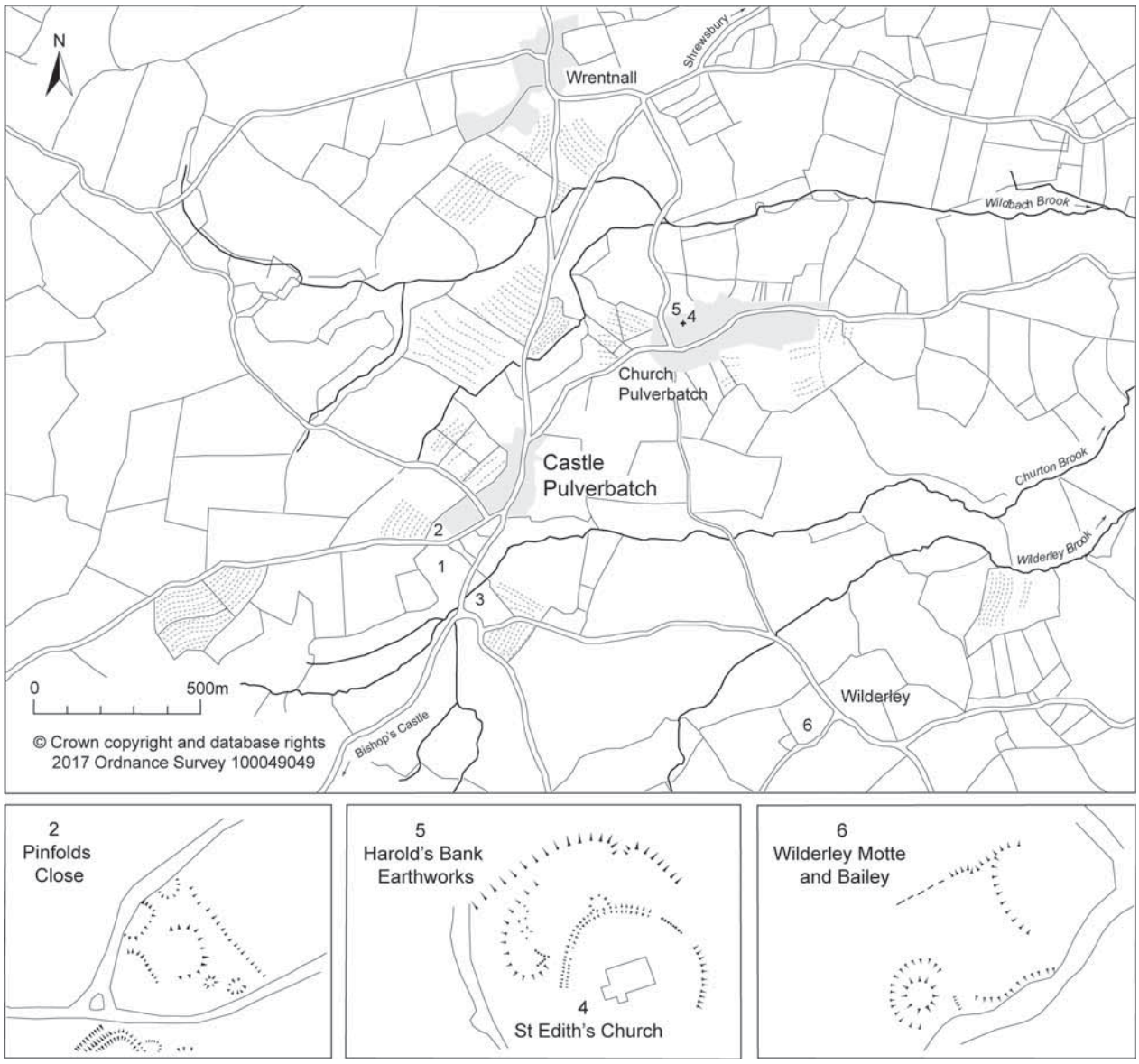


Figure 3. Key sites mentioned in the text. 1. Castle Pulverbatch (HER PRN 01056); 2. Possible tenement plot, Pinfold's close and medieval settlement (PRN 03703); 3. Mill site (PRN 03704); 4. Church of St. Edith, within circular churchyard (PRN 33037); 5. Possible circular earthwork surrounding church (PRN 03702); 6. Motte and bailey at Wilderley Hall (PRN 01052). Derived from sketch survey by Nigel Stillman (1980), with additional detail added from LiDAR imagery.

The first prolonged programme of research on the site was undertaken by Nigel Stillman (Stillman 1980). This study, as well as providing a useful programme of desk-based research into the castle and manor of Pulverbatch, includes a contour survey of both baileys. This contour survey identified a number of features of interest. In the inner bailey, the survey identified a series of hollows, which appeared to be related to modern activity, representing a number of gate posts forming stock pens visible on the 1973 Ordnance Survey map. In the outer bailey, a rectangular feature was recorded in the northern extent of the rampart; it was suggested that this represented a large building, partially obscured by the rampart's slumping following abandonment (Stillman 1980, 7).

In 2015, a programme of desk-based research, limited survey and a condition survey were undertaken of Castle Pulverbatch (Hannaford and Silvester 2015), as part of the 'Helping Hillforts and Earthwork Castles' project undertaken by the Stiperstones and Corndon Hill Country Landscape Partnership Scheme. This outlined the historical development of the castle and the surrounding demesne. An overview composite hachure plan was prepared from LiDAR data and the work of Stillman (1980).

THE PRESENT SURVEY PROJECT

Methodology

The 2017–18 survey at Castle Pulverbatch employed large scale topographic survey, more-focused conventional analytical earthwork survey, and detailed geophysical survey. This methodology was developed from work undertaken at Caus Castle, Westbury (Fradley forthcoming; Fradley and Carey 2016; Carey 2015; Carey 2016). The key aim was to provide, through non-intrusive survey, a series of datasets that could be compared and contrasted to maximise data recovery from the site. As at Caus, the survey techniques employed a combination of above- and below-ground analysis, with analytical earthwork survey combined with geophysical survey at both sites.

A key component of earthwork survey on the site was the creation of a digital elevation model (Plate 2), derived from Structure from Motion photogrammetry. This model was used as the primary source for representing the earthworks of the site by conventional means (Figure 7).[3] The model created through this process has been used extensively to explore the site and has allowed for a more detailed understanding of the topography, both within the site and its immediate environs, accompanied with detailed ground observation (see Bedford 2015, 24). It has also been used alongside airborne light detection and ranging (LiDAR) data for the wider area to provide a detailed picture of the topography of the local landscape.

The photogrammetry for the site was undertaken by Adam Stanford of Aerial Cam (Stanford 2017). The site was flown systematically, capturing 242 images at vertical or near-vertical orientation and covering an area of almost 7ha (Figure 4 and Plate 1). These photographs were processed into a unified digital elevation model for further analysis and visualisation.

The first phase of geophysical survey at the site was carried out in April 2017 (Donaldson and Sabin 2017). The relatively small size of the site meant that all accessible areas could be surveyed. It was considered essential that a number of different techniques were undertaken on the site to provide cross-comparable results.[4] Earth resistance survey was carried out across the entire inner bailey and the vast majority of the outer bailey, save for the small car park (Figure 5). A sample and traverse interval of 0.5m provided the high resolution considered essential to provide detailed analysis of the buried stonework that could reasonably be assumed to form a major component of the site.[5] Magnetometer survey was carried out an all accessible areas, across both the inner and outer baileys, as well as a small-scale survey of the top of the motte (Figure 6). The survey used a cart-based system, which allowed for collection on a sample interval equivalent to *c*.0.15m, and a traverse interval of 0.5m, again providing a high-resolution survey dataset.[6]

Given the encouraging results of the initial programme of geophysical survey, a grant was secured from the Shropshire Archaeological and Historical Society's Pagett Fund to carry out ground penetrating radar (GPR) survey at the site. This was undertaken on the site in January 2018 and was targeted on the inner bailey, but it was also possible to cover most of the outer bailey.[7]

The results of geophysical survey and the digital elevation model derived from photogrammetry, were integrated within a geographic information system to allow for direct cross-comparison of the datasets. The photogrammetric survey was used alongside previous

Figure 4. Adam Stanford of Aerial Cam at work. The drone that captured the 242 images for photogrammetry is just visible below the clouds to the right of the motte. *Photograph: author.*

Figure 5. Earth resistance survey underway. Here David Sabin of Archaeological Surveys is working on a bank on the outer lip of the motte ditch. *Photograph: author*.

Figure 6. Ground penetrating radar (GPR) in progress on the top of the motte. The roof of St Edith's church tower, Church Pulverbatch can just be seen centrally on the further horizon. *Photograph: author.*

outline survey work to provide an interpretation of the earthworks of the motte, inner and outer baileys, and the wider environs of the site.

Results

The inner bailey

The earthwork model (Plate 2) shows clearly the large conical motte dominating the inner bailey, with a large quarry scoop removed from its south flank. Cathcart King and Spurgeon drew attention to a 'perfectly homogenous' group of small earthwork castles in the Vale of Montgomery: twelve motte and baileys spread between Montgomery in the south-west and Caus in the north-east (Cathcart King and Spurgeon 1965). These are characterised by mottes with a very restricted top, which would have been capable of carrying only a 'blockhouse or pill-box, though no doubt of more than one storey' (Cathcart King and Spurgeon 1965, 81). Although Pulverbatch lies further east than this group, and in a slightly different topographic setting, the restricted space available on the top of its motte would suggest that, rather than a keep, a smaller structure such as a watch-tower might have stood here; this would certainly offer a key strategic point for protecting routeways at the northern approaches to the Long Mynd and the western flank of the entrance to the Stretton valley. There are local traditions of stonework surviving on top of the motte; a very small area of magnetometer survey failed to produce any conclusive structural evidence for this, although a general area of magnetic enhancement was noted.

The inner bailey is defined by a bank around its western and northern sides but on the eastern side the natural hillslope has been cut back, enhancing the steep scarp slope above an approach route to the castle. A clear pit (Figure 7, feature **a**), measuring *c*.6m in diameter and 1.2m deep was recorded on the southern side, below the motte. This earthwork has previously been interpreted as an original feature, and drawn comparison[8] with the large covered latrine pit, dating to the late 12th or early 13th century from Hen Domen (Phase Y: feature VII; Barker 1989, 145; Fig. 14), which was also situated adjacent to the motte ditch, and which was of comparable dimensions. However, local

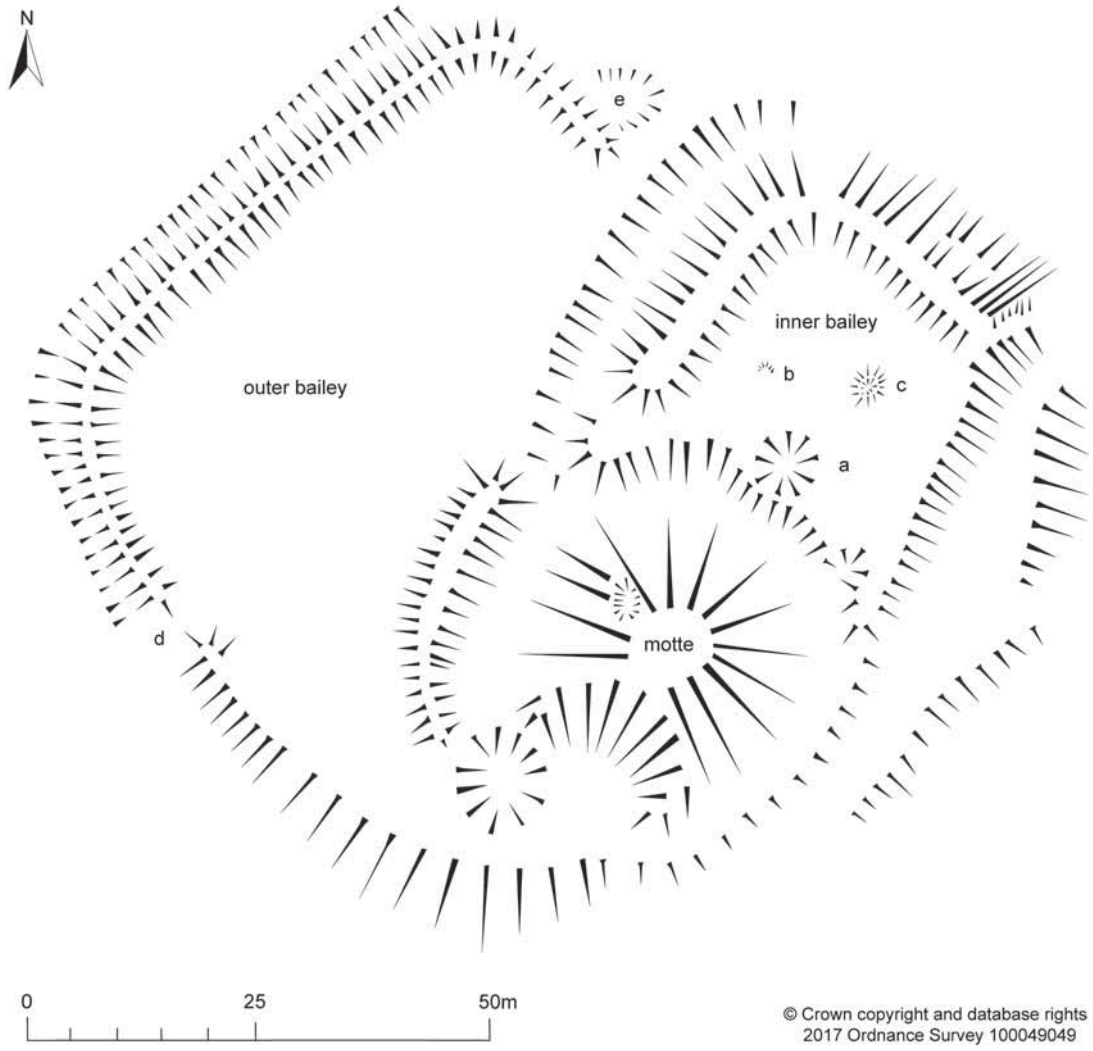


Figure 7. Composite hachure plan for the site, derived primarily from digital elevation model, Plate 2. *Drawn by the author*.

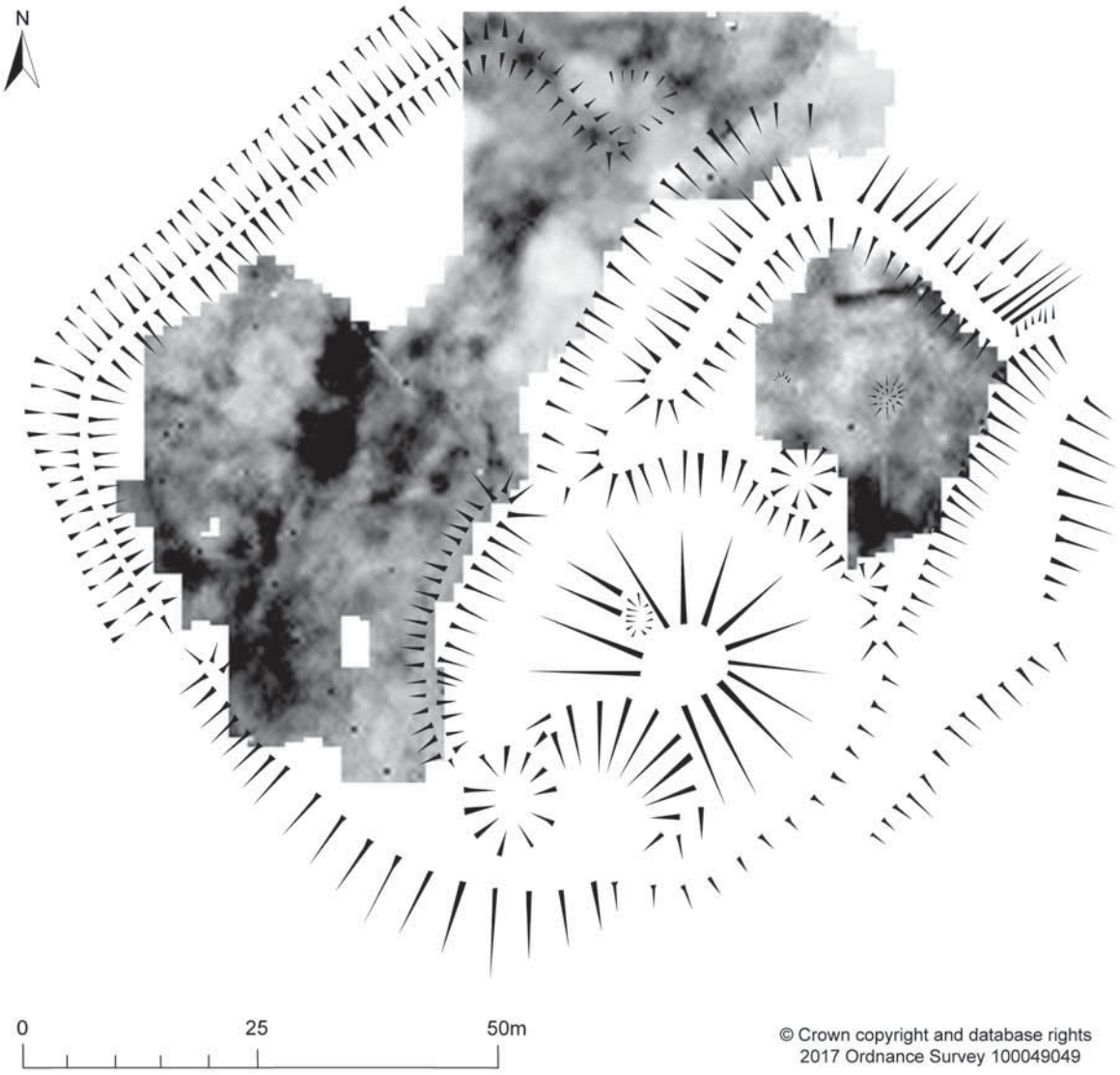


Figure 8. A sample from the geophysical survey results: here of minimally processed earth resistance survey data. Plots of the results of magnetometer survey and the originals of the interpretative plots combined in Figure 9 are to be found in Donaldson and Sabin 2017. *Copyright: Archaeological Surveys Ltd 2017 and author*.

knowledge has suggested this feature may relate to a 'foxhole' of Second World War date; it certainly does not appear on either the 1st edition Ordnance Survey 1:2500 map or Downman's plan of 1906 (SA 6001/297).

The results of geophysical survey were promising in the inner bailey. A series of high resistance linear anomalies was recorded in the resistivity results, parallel to the defensive bailey banks (Figure 9, feature **A**). These were considered to represent structural remains, together with a roughly circular high resistance response (Figure 9, feature **B**). The centre of this latter feature corresponded with a positive magnetic anomaly, and was suggested as possibly representing a well, measuring *c*.3m across (Sabin and Donaldson 2017, 12). An alternative interpretation is that this feature might represent a possible corner tower, and that, taken together, these linear features might represent fragmentary stone foundations of a substantial building, with a timber superstructure, measuring *c*.22m by 18m.

Subsequent Ground Penetrating Radar (GPR) failed, however, to fully elucidate the nature of the possible structure. A number of high amplitude responses were visible in the data, particularly between timeslices at an apparent depth of *c*.0.40m to *c*.0.70m, although these anomalies were amorphous in definition. This is possibly reflective of disturbance to buried deposits or may partially be an artefact of the parent geology, interbedded siltstone and limestone of the Precambrian Bridges Group.

Magnetometer survey additionally recorded a possible broad linear ditch-type anomaly alongside the eastern edge of the bailey (Figure 9, feature **C**). This feature leaves little earthwork trace, and, if of archaeological origin, its function is unclear.

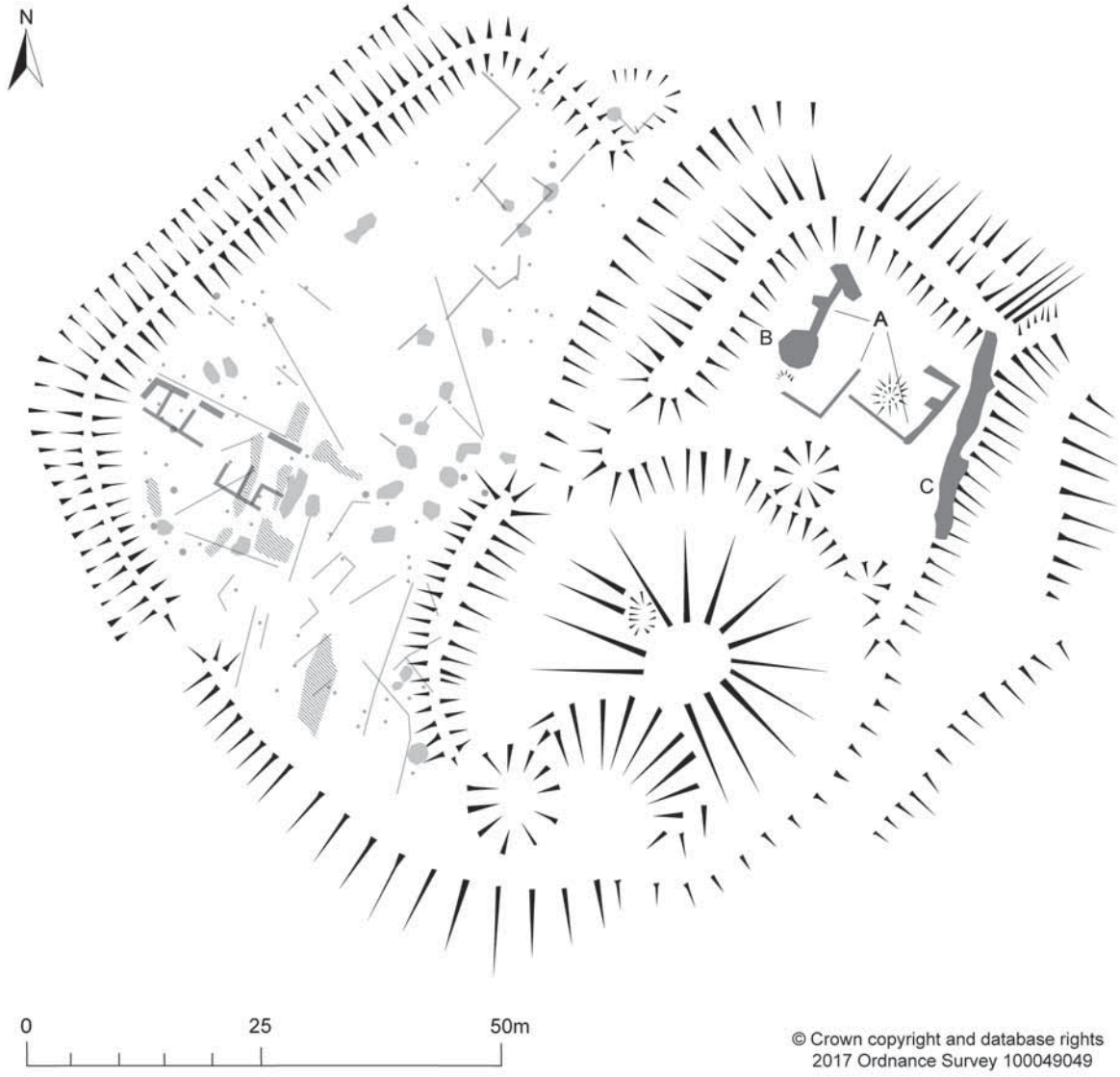


Figure 9. Selected interpretative plots of geophysical surveys. Interpretation of resistance and magnetic anomalies are combined as a single drawing. Anomalies identified with a letter are referred to in the text. Refer to Donaldson and Sabin 2017 for further discussion of other anomalies in the outer bailey. *Drawn by author from Donaldson and Sabin 2017*.

Few features from the earthwork survey could be directly associated with interpretations of sub surface deposits from geophysical survey. A number of very slight features are visible in the digital elevation model (Plate 2), although they are of amorphous form. Stillman noted a series of small discrete hollows running across the internal area of the inner bailey, which were equated with fences shown on the 1973 OS 1:2500 map (Stillman 1980, 5). It is highly probable that the majority of earthworks visible in the inner bailey belong to this later activity. Only two features appear to be earlier to this later activity. Only two features appear to be of earlier origin and are plotted on the composite hachure plan, possibly representing the edge of a small building platform (Figure 7, feature **b**) to the east of features identified in the geophysical survey, and a possible pit along the eastern side of the possible structural material (Figure 7, feature **c**), although these are offered as tentative interpretations only.

The outer bailey

Earthwork survey in the outer bailey largely confirmed the layout of earthwork features as recorded in previous survey work. As recorded consistently since 1980, the banks survive well on the southern and western sides, but the northern rampart, adjacent to the road, has been significantly denuded, probably by wheeled traffic, prior to the formalisation of the car park in 2016 in the northwestern quadrant of the bailey.

The bailey's outer banks are enhanced on the western side by the tree-lined holloway that has formed in the ditch, measuring approximately 4m wide, by 0.75m deep. A field boundary runs along the top of a small counterscarp bank, and has done so since at least the

1880s, as depicted on the 1st edition Ordnance Survey map.

There is a noticeable break, 7.5m across, in the southern rampart, leading to a modern field entrance (Figure 7, feature **d**). Stillman speculated that this entrance-way might be original (Stillman 1980, 7). Elements of a trackway, appearing to run right across the outer bailey, were visible as a series of broad, parallel, dipolar features in the magnetometer survey, some of which corresponded to high resistance features, seeming to confirm at least an element of modern metalling.

Stillman noted a rectangular earthwork in the northern half of the outer bailey. Few details of this feature are provided but he records it as being overlain by the collapse and slump of the northern rampart, with 'an accumulation of debris marking the site of a large rectangular building in the bailey' (Stillman 1980, 7). It is possible that this conjecture may be supported in the rather amorphous earthworks just outside the north-eastern corner of the outer bailey. A number of possible linear features are visible in this area, possibly centred on a hollow (Figure 7, feature **e**). This coincides with a zone of low resistance within a shallow depression on a slightly raised area noted in the geophysical surveys, (Donaldson and Sabin, 2017, 10). It is possible that this may represent an area of structural remains. This area has been extensively disturbed, however, and it remains unclear to what extent the outer bailey ramparts have been altered here.

A number of linear anomalies were noted within the outer bailey; although they lacked a coherent morphology in places, the similarity of their alignment to features in the inner bailey might suggest that they represent fragmentary structural remains. It is perhaps worth making the point here that we might expect such structural remains to represent assorted timber buildings. As Barker's extensive excavations at Hen Domen indicated: 'Timber castles were not, as they are so often made out to be, temporary, second-rate erections, easily overcome and replaced in stone as soon as possible' (Barker 1989, 147); such structures may have been of timber construction for the lifetime of the castle. Certainly, GPR survey suggested that no substantial stone buildings were present within the outer bailey, although this survey technique did identify extensive disturbance associated with the trackway running roughly north/south across the outer bailey.

CASTLE, SETTLEMENT AND CHURCH

In the wider environs, it is clear that a more detailed understanding of the inter-relationship between the castle, its associated settlement, and St Edith's church is required to understand the motte and bailey in context (Figures 1 and 10). Its juxtaposition with nearby features of status, its setting in relation to ecclesiastical and secular settlements and its wider seigneurial framework (see Creighton and Higham 2004, 6) are all relevant to the interpretation of the castle site itself.

A number of authors have speculated about the medieval settlement sited immediately north and west of the castle. Little earthwork evidence survives of this settlement, although a slight bank was recorded in the 1980s by Stillman on a triangle of land known as Pinfold's Close, directly to the north of the castle's outer bailey. This triangle was suggested as a possible plot division (see Figure 3, site 2) and subsequently recorded as a property/field boundary by Wendy Horton on a site visit in 1991 (HER PRN 03703). Sadly, this area has been extensively disturbed since then, and little trace of any earthworks was found during the present survey project.

Higham and Barker see the village 'growing up around a castle founded in previously open countryside' (Higham and Barker 1992, 200) while Rowley suggests that its regularity indicates a deliberately planned settlement unit laid out by the lord of the manor in the 12th or 13th century (Rowley 1972, 86). Creighton goes further in identifying the development at Castle Pulverbatch as representing a nucleation point, "a regular settlement" growing up adjacent to the "new seigneurial centre" (Creighton 2002, 203). This would accord well with the manor of Pulverbatch becoming the *caput baroniae,* or principal manor of the baronry of Pulverbatch by the end of the 12th century (Gaydon 1968, 131). Stillman suggests that the settlement around the castle may have been a fairly speculative endeavour from the lord of the manor, a venture that was ultimately unsuccessful, with settlement shifting downhill to the modern settlement around St Edith's at Church Pulverbatch (Stillman 1980, 18). Certainly, there appears to be no evidence of the settlement at Castle Pulverbatch ever expanding into 'anything more than a small farming community' (Gaydon 1968, 132).

At present, there is no clear dating evidence concerning settlement at Pulverbatch. The chronological picture is further complicated by the suggested early date for a church at Church Pulverbatch (Figure 3, site 4). The present building is medieval in origin, although it was largely rebuilt in 1853 (Newman and Pevsner 2006, 203–4). The church lies within a circular, embanked churchyard, which has been suggested as indicating an early, possibly pre-conquest origin, drawing upon other examples from the Marches (Rowley 1972, 81), although this hypothesis is untested in the county (see Ludlow 2009, 71–76 for discussion of examples from south-west Wales). A number of other circular churchyards are known in Shropshire (Cardeston, Stanton upon Hine Heath, Llanymynech, Loppington and Leighton, *inter alia*), but the importance of that at Pulverbatch is heightened by the presence of additional earthworks to the north of the churchyard, occupying a high point within the wider landscape (Figure 3, site 5).

Figure 10. Castle Pulverbatch in context. 1. Motte and bailey; 2. Possible medieval settlement; 3. Church of St. Edith. *Copyright 2017 Aerial Cam*.

CONCLUSIONS

The survey described in this article formed the first detailed analysis of the earthworks of a motte and bailey castle described as 'one of the finest examples of its class in the county' (Historic England, 2018). A key aim was, through non-intrusive survey, to provide a cross-comparable dataset for analysis of the above- and below-ground features of the site. The results presented above indicate the success of this approach,[9] although the later disturbance of features, particularly in the outer bailey, precluded firm conclusions being drawn on phasing. The most significant conclusion of the geophysical survey was that substantial building remains may remain in the inner bailey. The lack of clarity of form of these features, makes further interpretation challenging, but the geophysical response would certainly seem to indicate the stone footings of a large building, extensively robbed, perhaps measuring some 22m by 18m. This interpretation is tentative, and we must recognise the limitations of the present survey programme in this regard.

ACKNOWLEDGEMENTS

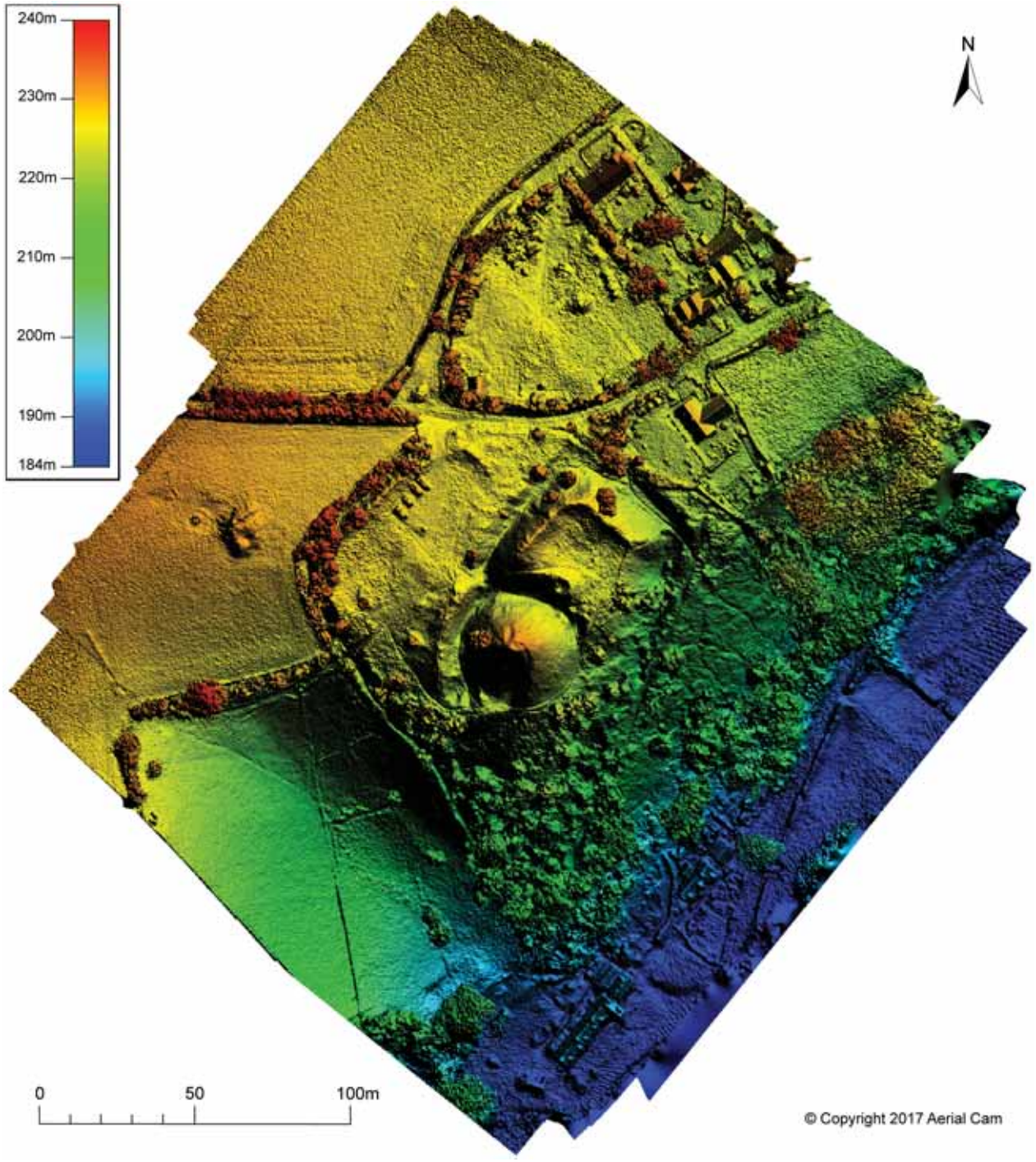
The surveys described in this article were funded by two grant schemes. The author's thanks go to the Castle Studies Trust (CST), who funded the main programme of work, with secondary survey supported by the Pagett fund of the Shropshire Archaeological and Historical Society. Access to the site was greatly facilitated by ongoing management work being undertaken by the Friends of Castle Pulverbatch, grant-aided by Stiperstones and Corndon Landscape Partnership Scheme, who also facilitated the CST grant and provided much of the LiDAR data used in this study. Thanks, in this regard, are due in particular to Joe Penfold and Joy Howells. Historic England granted Section 42 Consent for both geophysical surveys, and Alison MacDonald is thanked for her prompt assistance with this. Particular thanks go to my colleagues in the Historic Environment Team, Shropshire Council, for their support, particularly Hugh Hannaford who has assisted with background research for this site. All errors, interpretations and omissions, of course, remain the author's responsibility.

Plate 1. Orthophoto of Pulverbatch motte, its inner and outer baileys, and surrounding landscape, including, towards the top of the image, Pinfold Close on the western end of the Norman settlement. *Copyright 2017 Aerial Cam*.

NOTES

1. Email giles.carey@shropshire.gov.uk; Historic Environment Team, Shropshire Council, Shirehall, Shrewsbury, SY2 6ND.
2. It has also been suggested that it derives from the Scandinavian *puldra* meaning to gush, presumably in reference to Churton brook (Stillman 1980), although this interpretation does not have particular credence (Gelling 1990, 126). Also see Eyton 1854, 189.
3. This technique involves the use of an unmanned aerial vehicle or drone (UAV), taking sequences of overlapping photographs of the site. Specialist software (in this instance Agisoft PhotoScan) is then used to perform automatic positional calibration of each image, and the results can be tied into known coordinates to create a metrically accurate, highly detailed topographic model of the site (see Historic England 2017, 8). This can then be

Plate 2. Composite digital elevation model, derived from Structure from Motion photogrammetry, visualized using a colour ramp. *Copyright 2017 Aerial Cam*.



visualized and explored in a number of ways. A textured 3D Digital Elevation Model produced from this Structure from Motion Photogrammetry has been made available through the Sketchfab website, which can be rotated, tilted and analysed: see http://tiny.cc/CastlePulverbatch.

4. The underlying geology is interbedded siltstone and limestone overlain across the survey area by a well-drained, loamy soil. Magnetometer survey on similar soils can produce variable results as it can be difficult to distinguish natural features from man-made ones. Resistivity may also respond to natural variations in the depth of soil and make-up of the natural geology. The underlying geology was however considered acceptable for both sorts of survey.
5. The earth resistance survey was carried out by Archaeological Surveys Ltd, using a Geoscan Research

Ltd RM85 resistance meter using a mobile parallel twin probe array with a 0.5m electrode separation. Data were recorded at 0.5m intervals along traverses separated by 0.5m within 10m grids with a zig-zag progression. The instrument was set to filter stray earth currents which can cause errors within the resistance measurements.

6. The detailed magnetic survey was carried out by Archaeological Surveys Ltd, using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording data between 0.1nT and 10,000nT. It is linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.
7. The ground penetrating radar survey was undertaken by David Ashby of the University of Winchester (Ashby 2018). The survey was carried out using a pulse EKKO PRO 250MHz transducer connected to a Digital Video Logger (DVL) to control and record the data from the unit. The traverse interval was 1.0m, with readings being taken to a depth of 3m. The readings were automatically logged at 0.025m intervals, giving a resolution of 400 readings per 10m linear traverse.
8. OS comments on SMR Card. 'A large pit in the inner bailey at SJ 4226 0220 compares in size and position with that at … Hen Domen, Powys'. – OS FI 27/5/1971
9. For more detailed discussion, the reader is referred to the archive reports held in Shropshire HER.

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